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Stormwater Management Report and Servicing Brief

Palladium Resort Development Limited Partnership
2775 & 2785 Palladium Drive & Block 244
Ottawa, ON

Prepared for:

Palladium Resort Development Limited Partnership
2962 Carp Road
Ottawa, ON
K0A 1L0

Attention: Tim Eisner

LRL File No.: 240720

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1 INTRODUCTION AND SITE DESCRIPTION

LRL Associates Ltd. was retained by Palladium Resort Development Limited Partnership to complete a Stormwater Management Analysis and Servicing Brief for the development at 2775 & 2785 Palladium Drive located in Ottawa, ON.

The subject property is legally described as Concession 1 Lot 2, Blocks 243 and 251 Registered Plan 4M-1687, and Block 244, registered Plan 4M-25, geographic township of Huntley in the City of Ottawa. The subject lots are zoned IM (Mixed Industrial under bylaw 2026-50). The three properties are being developed and are included in this report. Blocks 243 & 251 represent 2775 and 2785 Palladium drive. These properties are **1.6 ha** each and are being combined into one **3.2 ha** property located on the east side of Culdaff St. Block 244 is located to the west of Culdaff Road and is approximately **1.99 ha.** In addition, we would like to note that the subject property is located with the 195 Huntmar Drive development area and part of the Kanata West Concept Plan.

It should be noted that *the DSEL – Design Brief for 2325483 Ontario LTD. 195 Huntmar Drive, City of Ottawa, Project No.: 12-624, July 2020 2nd submission*, refers to property 2785 Palladium Drive, as Block 251 and Block 256. The existing storm sewer design sheets, drainage areas, and existing stormwater management facility references Block 256. The existing sanitary sewer design sheets and existing sanitary drainage areas reference Block 251.



Figure 1: Aerial View of Proposed Development

The proposed development at Block 243/251consists of a 7-storey Hotel, a 2-storey Family Entertainment Centre, an indoor waterpark with slide tower and a 1 storey support building for the

waterpark complete with parking area. The development of the parcel west of Culdaff Road, Block 244, consist of an outdoor event and parking area.

The first floor of the hotel and family entertainment centre includes hospitality rooms, hotel lobby reception and check-in, fitness centre, gift shop and kitchen & concession area, approximately 4,545 m². The hotel area second floor includes rooms and the second floor of the family entertainment centre includes kitchen, restaurant, and administration area, approximately 2,780 m². The third floor and additional floors are hotel rooms are an area of approximately 2,043 m² per floor. The water park floor area and support building are approximately 10,112 m². For further details, refer to the Site Plan included in ***Appendix B.***

This design will demonstrate conformance with the design criteria of the City of Ottawa, the DSEL 195 Huntmar design brief (July 2020), DSEL Functional Servicing Report (FSR) (May 2019), and the Kanata West Master Servicing Study (KWMSS) (June 2016), background studies. It should also be noted that the 195 Huntmar Drive design was completed with stormwater management provided by J.F. Sabourin and Associates Inc, watermain analysis completed by GeoAdvice Engeinering Inc, and geotechnical analysis completed by Paterson Group Inc.

This report has also been prepared in consideration of the terms and conditions noted above and with the civil drawings prepared for the new development. Should there be any changes in the design features, which may relate to the stormwater and servicing considerations, LRL Associates Ltd. should be advised to review the report recommendations.

2 BACKGROUND STUDIES AND GUIDELINES

The following guidelines were utilized in the preparation of this report:

- **Ottawa Sewer Design Guidelines**
  City of Ottawa, SDG002, October 2012
    - Technical Bulleting ISDTB-2014-01
      City of Ottawa, February 5, 2014
    - Technical Bulleting PIEDTB-2016-01
      City of Ottawa, September 6, 2016
    - Technical Bulleting ISTB-2018-01
      City of Ottawa, March 21, 2018
    - Technical Bulleting ISTB-2018-04
      City of Ottawa, June 27, 2018
    - Technical Bulleting ISTB-2019-02
      City of Ottawa, July 8, 2019
- **City of Ottawa Design Guidelines – Water Distribution**
  City of Ottawa, WDG001, July 2010

  - Technical Bulleting ISD-2010-2
    City of Ottawa, December 15, 2010
  - Technical Bulleting ISDTB-2014-02
    City of Ottawa, May 27, 2014
  - Technical Bulleting ISDTB-2018-02
    City of Ottawa, March 21, 2018
  - Technical Bulleting ISDTB-2021-03
    City of Ottawa, August 18, 2021
  - Technical Bulleting IWSTB-2024-05
    City of Ottawa, November 18, 2024

- DESL – Functional Servicing Report 2325483 Ontario LTD. 195 Huntmar Drive, City of Ottawa, Project No.: 12-624, May 2019 Rev 3.
- DSEL – Design Brief for 2325483 Ontario LTD. 195 Huntmar Drive, City of Ottawa, Project No.: 12-624, July 2020 2nd submission.
- GeoAdvice Engineering Inc., Hydraulic Capacity and Modeling Analysis, 195 Huntmar Drive Subdivision Development, Final Report, December 20, 2019 R3.
- Kanata West Master Servicing Study (KWMSS) volume 1 of 2, Stantec Consulting Ltd, Cumming Cockburn Limited, IBI June 16, 2006.
- Kanata West Master Servicing Study (KWMSS) volume 2 of 2, Stantec Consulting Ltd, Cumming Cockburn Limited, IBI June 16, 2006.
- Paterson Group, Permeameter Test Investigation, Proposed Mixed-Use Development, 195 Huntmar Drive – Ottawa, June 18, 2020.
- DSEL – Memorandum, 195 Huntmar Development (D07-16-16-0011) Summary of Low Impact Development Measures, July 9, 2020.
- DSEL – Design Brief for Stormwater Management Pond 7 for the 195 Huntmar Drive Subdivision, City of Ottawa, Project No. 12-624, Revised July 2020.

3 EXISTING INFRASTRUCTURE AND DRAINAGE DESCRIPTION

The subject property is located within the 195 Huntmar Drive property boundary, located within the Kanata West Concept Plan (KWCP) area and subject to the Kanata West Master Servicing Study (KWMSS).

The existing infrastructure listed below were designed as part of the 195 Huntmar Drive servicing, FSR, and KWMSS and included the development of the three parcels detailed within this servicing report, Block 244, 243 and 251.

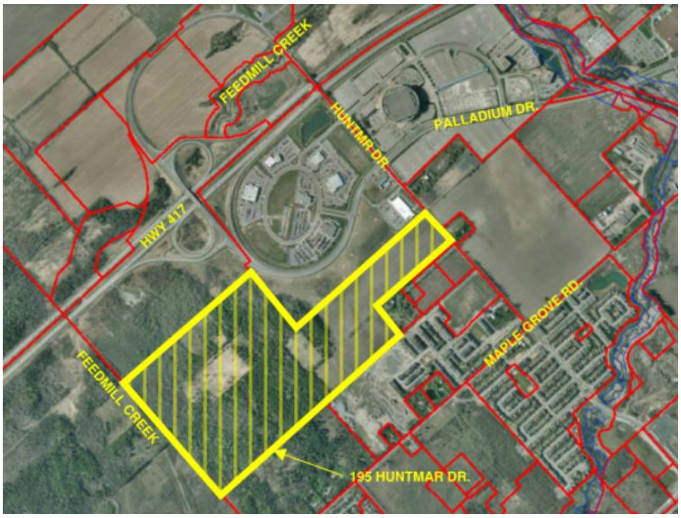


Figure 2: 195 Huntmar Drive property boundary

Culdaff Road

- 300mm diameter PVC watermain. (*Currently a dead-end extension from Derreen Ave*).
- 2 – 200mm diameter PVC water stubs extend from the Culdaff Rd watermain to the subject property, site 243 and 251.
- 1 – 200mm diameter PVC water stubs extend from the Culdaff Rd watermain to the subject property, site 244.
- 250mm diameter PVC sanitary sewer.
- 2 – 250mm diameter PVC sanitary stubs extend from the Culdaff Rd sanitary sewer main to the subject property, site 243 and 251. (*City of Ottawa MHSA76096, MHSA76099*)
- 1 – 250mm diameter PVC sanitary stubs extend from the Culdaff Rd sanitary sewer main to the subject property, site 244. (*City of Ottawa MHSA76100*)
- 825mm and 975mm diameter concrete storm sewer.
- 2 –750mm diameter concrete storm sewer stubs extend from the Culdaff Rd storm sewer to the subject property, site 243 and 251. (*City of Ottawa MHSA84407, MHSA84411*)

Stormwater Management Pond 7

The Kanata West Stormwater Management (SWM) Facility 7 (Pond 7) is located within the City of Ottawa in the 195 Huntmar Drive subdivision with discharge to the Feedmill Creek watercourse. The existing pond is located to the west of block 244.

As set out in the FSR, KWMSS, and DSEL Design Brief, Pond 7 is to provide quantity and quality treatment for 41.73 ha of the 195 Huntmar Drive development. Pond 7 outlets to Feedmill Creek and provides an Enhanced Level of quality control for the 41.73 Ha area.

One of the pond inlet sewers is located along the south property line between the existing townhouse block and block 244. The sewer is a 1650mm diameter concrete sewer and extends from Culdaff Rd to Pond 7, complete with a 3m wide bottom overland flow route swale located

above the sewer. (*MHST84403 to MHST84404*) An 825mm diameter storm stub is extended into block 244 for servicing. (*MHST84406)*

The pond outlet is a750mm concrete storm sewer located in a 6m easement (not registered) extending from the pond east towards Palladium Drive, along the north property line of the development between parcels 244 & 251 and the MTO lands to the north. (*MHST84430 through MHST84435*)

Watermain Looping Option:
A shown on the City of Ottawa as-builts a 200mm diameter PVC watermain extends from Utility Place, north through the walkway located in Block 234 and then follows the property line between the Pond 7 parcel the Block 244. The watermain dead ends at the MTO lands. The watermain is located within the Pond 7 parcel.

4 CONSULTATION AND REGULATORY APPROVALS

4.1 City of Ottawa Pre-consultation

A pre-consultation meeting for the proposed development was held on February 5, 2025 with the City of Ottawa.

Engineering Servicing City Pre-consultation comments:

- Two water services will be required when the water demand is expected to be 50m^3/d or more.
- Water looping will be required when the water demand is expected to be 50m^3/d or more.
- A downstream assessment will be needed if the site exceeds the allotted sanitary capacity designated for the site.
- The Culdaff Rd storm sewer system leads to the stormwater management pond.
- A 750mm diameter concrete sewer is located along the north property boundary of the site. The site shall not be connected to this sewer. A 6m wide easement is to be provided to the City, if one has not been provided.
- The need for an MECP ECA is to be confirmed with the MECP.

Regulatory approvals are included in ***Appendix A.***

4.2 MTO Pre-consultation

On May 11, 2026, a pre-consultation request was submitted to the Ministry of Transportation (MTO), and an email response was received on May 20, 2026. The letter has been included in ***Appendix A.***

Under the authority of Public Transportation and Highway Information Act (PTHIA), the MTO controls all land use within 45m of highway right-of-way and the area within 395m of the centre point of the highway intersection and any intersecting roads.

The stormwater management design must conform to the MTO requirements that post-development flow to the highway drainage system to not exceed pre-development flows.

5 GEOTECHNICAL CONSIDERATIONS

A revised geotechnical investigation was completed by LRL Engineering Ltd dated June 30th, 2026.

The subsurface profile generally consists of topsoil and localized loam overlying variable layers of fill, sand and silt, sandy silt, silty sand, silty clay, clayey silt, clay, and silt. Fill materials were encountered in portions of the site to depths of approximately 0.8 to 2.2 m below ground surface (bgs). Limestone bedrock or practical auger refusal was encountered between approximately 2.5 m and 9.2 m bgs, with Rock Quality Designation (RQD) values ranging from 66 to 100%, indicating fair to excellent rock quality. Laboratory testing indicated generally low-permeability native soils with limited infiltration potential.

Groundwater levels measured during the investigation ranged from approximately 1.75 m to 4.85 m bgs, although several boreholes remained dry. Groundwater levels are expected to fluctuate seasonally.

The geotechnical assessment identified a permissible grade raise limit of 3.0 m above existing grade and concluded that the proposed buildings can be supported on conventional shallow foundations bearing on competent native soils. Estimated total settlements are expected to be less than 25 mm, and liquefaction is not considered a concern.

The report also provides recommendations for foundations, structural fill, excavation and trenching, groundwater control, pipe bedding and backfill, slab-on-grade construction, pavement design, drainage, and corrosion protection, which will be incorporated into the detailed design and construction phases.

6 PROPOSED DEVELOPMENT

The proposed development consists of two parcels located on the east and west side of Culdaff Road. The east parcel (243/251) will be developed as one building with different usages which include a 7-storey hotel, a 2-storey family entertainment centre, a 1-storey support building, and an indoor water park, complete with parking area. The west parcel will be developed as a parking area and outdoor event space.

For additional detail of the proposed development, refer to the Site Plan & Architectural Floor Plans prepared by McRobie Architects included in ***Appendix B***.

7 SCOPE OF WORK

As per applicable guidelines, the scope of work includes the following:

Stormwater management

- Calculate the allowable stormwater release rate.
- Calculate the anticipated post-development stormwater release rates.
- Demonstrate how the target quantity and quality control objectives will be achieved.

Water services

- Calculate the expected water supply demand at average and peak conditions.
- Calculate the required fire flow as per the Fire Underwriters Survey (FUS) method.
- Confirm the adequacy of water supply and pressure during peak flow and fire flow.
- Describe the proposed water distribution network and connection to the existing system.

Sanitary services

- Describe the existing sanitary sewers available to receive wastewater from the proposed buildings.
- Calculate peak flow rates from the proposed development.
- Describe the proposed sanitary sewer system.

8 WATER SUPPLY AND FIRE PROTECTION

The subject property lies within the City of Ottawa's 3W pressure zone as shown in the City of Ottawa Water Distribution Mapping.

According to the City of Ottawa Water Distribution Guidelines (Technical Bulletin ISTB-2021-03), since the subject site is anticipated to have a water demand higher then 50m^3/d or more, it is required to be serviced by two water service laterals, separated by an isolation valve, for redundancy and to avoid creation of a vulnerable service area. Hence, the proposed development in Block 243/251 will be serviced by two (2) 250 mmØ service laterals connected to the 305 mmØ watermain within Culdaff Road. Servicing Plan C401 included in ***Appendix F*** depicts the location of the dual water service connection

Table 1 below summarizes the City of Ottawa Design Guidelines design parameters employed in the preparation of the water demand estimate.

Table 1: City of Ottawa Design Guidelines – Water Design Parameters

Average Day Demand	
Residential	280 L/c/d
Industrial – Light	35,000 L/gross ha/d
Industrial – Heavy	55,000 L/gross ha/d
Commercial Office Space	75 L/9.3m2/d
Hotel	225 L/Bed/d
Maximum Daily Demand	
Residential	2.5 x avg. day
Industrial	1.5 x avg. day
Commercial	1.5 x avg. day
Institutional	1.5 x avg. day
Maximum Hour Demand	
Residential	2.2 x max. day
Industrial	1.8 x max. day
Commercial	1.8 x max. day
Institutional	1.8 x max. day

8.1 Water Supply Servicing Design

8.1.1 Domestic Water Demand

A 305 mm diameter watermain was constructed from Dereen Avenue, north along Culdaff Road and capped at the MTO lands. Two (2) 203 mm diameter watermain stubs were installed at the property line to service both 2775 (Block 243) and 2785 (Block 251) Palladium Dr. In addition, an existing 203 mm diameter watermain was constructed from Unity Place north through the multi-use pathway and then continues north along the east pond property line of Pond 7 and is then capped at the MTO lands.



Figure 3: Existing Water supply

Anticipated population demands have been calculated from the architectural floor plan drawings completed by McRobie Architects. The proposed development is anticipated to include a 7-story Hotel with 236 Beds, complete with first floor hospitality rooms, fitness centre, and lobby. A 2-storey family entertainment centre with gifts shop on the first floor and a restaurant, kitchen area, and administration area on the second floor. The remainder of the development includes a 1,227 s.m. support building and a 6,643 s.m. indoor water park.

Per **Table 1** the hotel rooms were calculated at 225 L/bed space/d, and the hotel first floor, the entertainment centre, and the support building were calculated at 28,000 L/ha/d. The indoor waterpark demand required taking the historical average water usages from a similar waterpark located in Dallas Texas. **Table 3** below summarizes the average daily demand and max day demand for the years 2022, 2023, and 2024 from the Dallas Texas water park that were used in calculating the aquatic park demands. It should be noted that the Dallas water park is an 80,000 square foot indoor/outdoor waterpark in Texas and an outdoor wave pool. This is much larger

than the proposed Ottawa waterpark. In addition, the Dallas pools are drained daily during March break and daily for the summer months, June/July/August.

Table 2: Dallas Texas Yearly Water Usage

Year	Weekday/ Weekend	Average Daily Demand L/d	Average Max Day Demand L/d
2024	Wk day	92145.08	716547.83
	Wk end	113714.98	395658.62
2023	Wk day	102544.86	441261.46
	Wk end	159637.05	729702.13
2022	Wk day	92895.22	602822.76
	Wk end	121368.76	367729.87

The required water supply for the building areas has been calculated using the following formula:

Where,

$$\boldsymbol{Q = (q \times AorP \times M)}$$

q = average water consumption unit rate (L/gross ha/day)
A or P = area (ha) for industrial space and m^2 for office space) or design population (capita)
M = Peak factor

The following factors were used in calculations as per *Table 4.2* in the City of Ottawa Design Guidelines;

- Maximum Daily Demand Factor = **1.5**
- Peak Hour Demand Factor = **1.8**

Using the above-mentioned factors and design parameters listed in **Table 1**, total anticipated demands were calculated as follows:

Hotel, Entertainment, Support Building:

- Average daily domestic water demand is **0.882** L/s,
- Maximum daily demand is **1.324** L/s, and
- Maximum hourly is **2.383** L/s.

Aquatic Park: (Average Day and Max Day demand was taken directly from historical data)

- Average daily domestic water demand is **1.316** L/s,
- Maximum daily demand is **6.276** L/s, and
- Maximum hourly is **11.298** L/s.

Total Demands:

- Average daily domestic water demand is **2.20** L/s,
- Maximum daily demand is **7.60**L/s, and
- Maximum hourly is **13.68** L/s.

Water demand calculations are located in **Appendix C.**

8.1.2 Fire Flow Demands

The estimated fire flow for the proposed buildings was calculated in accordance with *IWSTB-2024-05*. The parameters such as Type of construction, Occupancy type, Sprinkler Protection were provided by the Architect.

The Fire Underwriters Survey 2020 was used to calculate the fire flow demand for the site. The total effective area considers the hotel ground floor, second floor and 50% of the 5 additional floors, the ground floor and second floor of the entertainment centre, the support building floor area, and the waterpark floor area.

The estimated fire flow for the proposed building was calculated in accordance with *ISTB-2018-02*. The following parameters were provided by the Architect:

- Type of construction – Non-Combustible Construction (Type II);
- Occupancy type – Limited Combustible; and
- Sprinkler Protection – Automatic Sprinkler System.

The estimated fire flow demand was estimated to be **14,000 L/min**. There are three (3) existing and two (2) proposed fire hydrants located in proximity to the proposed building that are available to provide the required fire flow demands. Refer to ***Appendix C*** for fire flow calculations and ***Appendix F*** for *Site Servicing Plan C.401* for fire hydrant locations.

Table 3 below summarizes the aggregate fire flow of the contributing hydrants in proximity to the proposed building based on Table 18.5.4.3 of *ISTB-2018-02*.

Table 3: Fire Protection Summary Table

Building	Fire Flow Demand (L/min)	Ex Fire Hydrants(s) within 75m	Available Combined Fire Flow (L/min)
Proposed Development	14,000	3	17,034

The total available fire flow from the contributing hydrants is equal to **17,034 L/min**, which is sufficient to provide adequate fire flow for the proposed development. A certified fire protection system specialist will need to be employed to design the building's fire suppression system and confirm the actual fire flow demand.

8.1.3 Hydraulic Analysis

The City of Ottawa was contacted to obtain boundary conditions associated with the calculated water demand. As indicated in the boundary condition request (correspondence included in ***Appendix C)***, Table 4 below summarizes the boundary conditions for the proposed development.

Table 4: Summary of Boundary Conditions

Design Parameters	Anticipated Demand (L/s)	Boundary Conditions	
		Connection 1* Culdaff Rd North (Head m / psi)	Connection 2** Culdaff Rd South (Head m / psi)
Maximum HGL	2.20	160.9 / 80	160.9 / 79
Max Day + Fire Flow (per FUS)	7.60 + 233.3	142.7 / 55	144.7 / 56
Peak Hour	13.68	154.6 / 71	154.6 / 70

**Assumed ground elevation at connection point 1 = 104.4 m*
***Assumed ground elevation at connection point 2 = 105.4 m*
Water demand calculation per City of Ottawa Water Design guidelines. ***See Appendix C*** *for details.*

As indicated in Table 4, pressures in all scenarios meet the required pressure range stated in the City of Ottawa Design Guidelines – Water Distribution (Section 4.2.2). Refer to ***Appendix C*** for Boundary Conditions.

Supporting hydraulic analysis have been performed using EPANET to ensure that the proposed and existing water service provides adequate pressure for the domestic demand and fire protection of proposed development and private hydrants. As the boundary conditions provided by the City account for existing system demands, no additional demand nodes for the existing buildings were incorporated into the analysis. The full length of both the proposed water service was considered in the calculations to determine residual pressure at the building connection.

The proposed development will connect to the municipal watermain at that existing stub located near Connection 1 (Culdaff Rd North) and Connection 2 (Culdaff Rd South), via two 200 mm diameter services. The water services are assumed to be looped within the building. Accordingly, building entry nodes J9 and J6 were connected in the EPANET model, with the total domestic demand assigned to a single node (J6). Three on-site fire hydrants (FH1, FH2 and FH3) are also proposed. Three (3) operating scenarios were evaluated to confirm the available pressure within the system for each proposed connection. The domestic water demands considered under all scenarios were as per City Guidelines, and the expected fire demand was derived as per FUS calculations.

Scenario 1: Average Day Demand

- An average demand of 2.20 L/s was applied at the building entry node J6.
- The modeled residual pressure ranged from 52.62 to 55.05 m (74.8 to 78.3 psi).
- The residual pressure at the building entry node J6 was 54.74 m (77.9 psi).
- Therefore, the modeled residual pressure is within the City guideline range of 50 to 80 psi.

Scenario 2: Peak Hour Demand

- A peak hour demand of 13.68 L/s was applied at the building entry node J6.
- The residual pressure ranged from 46.25 to 48.72 m (65.8 to 69.3 psi).
- The residual pressure at building entry node J6 was 48.37 m (68.8 psi).
- Therefore, the modeled residual pressure is above the City guideline minimum of 40 psi.

Scenario 3: Maximum Day Demand + Fire Flow

- A maximum demand of 7.60 L/s was applied at the building entry node J6.
- A designed fire flow of 95 L/s (5700 L/min) for a Class AA fire hydrant was simultaneously applied to FH1, FH2 and FH3.
- The modeled pressure ranged from 52.62 to 55.05m (74.8 to 78.3 psi).
- The residual pressure at the building entry node J6 was 54.74m (77.9 psi).
- Therefore, the modeled residual pressure is above the City guideline minimum of 20 psi under the maximum day demand and fire flow condition.

Overall, the hydraulic analysis confirms that, after accounting for both friction losses and static elevation difference, the residual pressure remains above the minimum required pressure ranges under all three (3) scenarios.

Based on these results, the proposed 200 mm PVC water services are hydraulically adequate and are expected to be able to deliver more than adequate pressure to the proposed building's domestic demands and private fire hydrant during a fire emergency.

8.1.4 Redundant Watermain Feed – Block 244

As shown on the City of Ottawa as-built records, an existing 200 mm diameter PVC watermain extends from Utility Place, north through the walkway located within Block 234, and continues along the property line between the Pond 7 parcel and Block 244. The watermain terminates in a dead end at the MTO lands and is located entirely within the Pond 7 parcel.

A redundant watermain feed is required to be installed within Block 244 to provide a secondary water supply connection servicing the proposed development, in accordance with City of Ottawa requirements for redundancy. This redundant feed was incorporated into the City's hydraulic model as part of the Watermain Boundary Conditions (WBC) analysis provided for this project and, as such, has not been independently modeled as part of the watermain hydraulic analysis presented herein.

Ownership of the redundant watermain feed (City-owned versus privately owned) is being discussed.

9 SANITARY SERVICE

9.1 Existing Sanitary Sewer Services

The site is within the Kanata West Pump Station (KWPS) catchment area. A 250mm diameter sanitary sewer extends on Culdaff Road to the MTO lands. Two (2) 250mm diameter stubs extend from the sewer main to service the two properties 2775 & 2785 Palladium Rd (Block 243/251). A 250mm diameter stub has also been provided for Block 244.

The following request has also been made to the City of Ottawa. The 195 Huntmar Dr. design report delineated the sanitary drainage areas as detailed in **Figure 5.** The corresponding sanitary sewer design sheets summarize the flows from the delineated area as follows:

- MTO lands (21.99ha) = Total Flow 17.97 L/s
- Block 244 (1.99ha) = Total Flow 1.62 L/s
- Block 251 (1.6ha) = Total Flow 1.35 L/s
- Block 243 (1.6ha) = Total Flow 1.35 L/s

Existing sewer design sheets have been provided in ***Appendix D.*** The following request has was presented to the city. The 21.99Ha MTO lands includes the HWY 417 off ramp and cloverleaf which will not be commercially developed. When removing these areas, the MTO lands decrease to approximately 16.2Ha. In additional the DSEL Functional Servicing Report for 2325483 Ontario Ltd, 195 Huntmar Drive, dated May 2019 Rev 3 Appendix A, storm servicing drawings sizes the MTO lands to be 16.5ha. This decreases in area would create additional capacity in the sewer which increase the allowable capacity within the Culdaff Rd sanitary sewer system. See ***Appendix E*** for correspondence with the city. The city requested that the MTO sanitary demands remain sized at a parcel of 21.99 Ha.

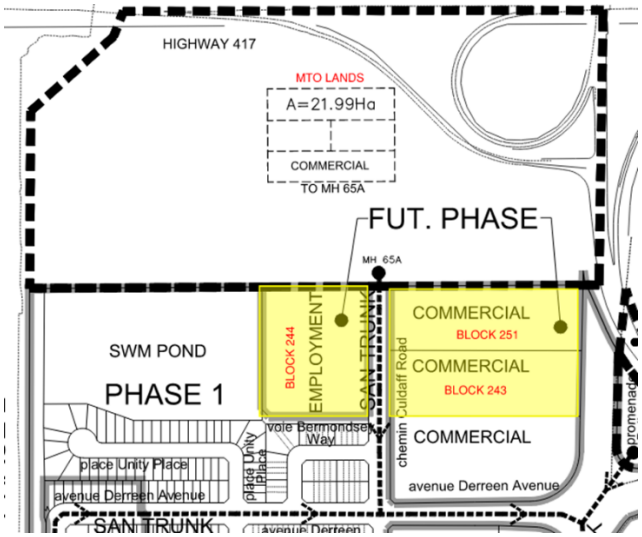


Figure 4: DSEL Sanitary Drainage Areas

9.2 Sanitary Sewer Servicing Design

We have requested with the city that the development (243/251 as one parcel of land) have two sanitary service laterals, one connection to each of the existing sanitary stubs for the east side of Culdaff Rd.

The sanitary sewer service to the north end of the Culdaff Rd sewer, MHSA76096 to MHSA76097, would provide servicing to the hotel and the family entertainment centre, 1.60 Ha. The total flow for this area was calculated to be 1.31 L/s. The parameters used to calculate the anticipated flows for this outlet were a commercial & Institutional flow of 28,000 L/ha/day as per the City of Ottawa Design Guidelines, and an infiltration allowance of 0.33 L/ha/s.

The sanitary sewer service to the south end of the Culdaff Rd sewer, MHSA76099 to MHSA76092, would provide servicing to the support building and the waterpark. The total flow for the area (1.59 Ha) was calculated to be 1.69 L/s. The waterpark average daily demand was assumed to be 113,717.7 L/day, derived from the Dallas Texas waterpark average historical data for year 2022, 2023, and 2024. In the absence of a facility specific water balance from the mechanical design team, a conservative return factor of 30% was applied to this demand to estimate the domestic sanitary flow from the waterpark. The support building was calculated as a commercial & Institutional flow of 28,000 L/ha/day as per the City of Ottawa Design Guidelines, and an infiltration allowance of 0.33 L/ha/s.

As requested by the city the west side of Culdaff Rd, Block 244 (1.99 Ha) will be developed as a parking lot with no buildings and therefore no development demands were calculated for the lands. An infiltration allowance of 0.33 L/ha/s allocated to the lands. The wet flow for this area was calculated to be 0.66 L/s.

Refer to LRL drawing *Site Servicing Plan C.401*, included in ***Appendix D*****,** for the proposed sanitary servicing.

Downstream, the proposed cumulative flow from the development area and future MTO lands total 21.72 L/s at the Bermondsey Way and Culdaff Rd MHSA76092. The existing design flow is 22.38 L/s. This represents a decrease of 0.66 L/s. Table 6 details the difference between the existing designed flows and the proposed design flows.

This sewer has a full-flow capacity of 32.57 L/s, yielding a Q/Q_{full} ratio of 0.66. As the downstream municipal sewer are operating at approximately 67% of full capacity under post-development conditions, the existing sanitary sewer system has significant reserve capacity to support the proposed development, and no concerns are anticipated with respect to sanitary servicing. Details of the sanitary flow calculations are provided in ***Appendix D*****.**

Table 5: Sanitary Demand comparison

Location	Existing Designed Demands C+I+I	Proposed Design Demands C+I+I	Infiltration Demands
	(L/s)	(L/s)	(L/s)
MTO Lands (21.99 ha)	17.97		7.26
Block 244 (1.99 ha) Parking Lot	0.97	0	0.66
Block 243 (1.60 ha) Hotel & Entertainment	0.78	0.78	0.53
Block 251 (1.59 ha)* Waterpark & Support	0.77	1.17	0.52
** Block 251 includes additional waterpark flows reflecting 30% of the Average water demand flow of 113,717.7L/d (0.81L/s [lands] + 0.39L/s [waterpark])*			

9.2.1 Waterpark Filter Flushing

The waterpark is equipped with nine (9) Regenerative Media Filters; each flushed individually on a bi-weekly basis. Sand filters were excluded from consideration due to their higher water consumption and associated water costs; Regenerative Media Filters were selected as a more cost-effective option with respect to water usage. See ***Appendix D*** for filter specification details. Flushing will be controlled such that only one filter is flush per day, resulting in a nine-day flushing cycle followed by a nine-day period with no flushing.

Based on preliminary design information the largest filter has a capacity of 1,340 litres. The tank outlet sewer is sized at 200mm in diameter, corresponding to an instantaneous peak flushing rate of 34L/s at the moment the valve is opened. Following this initial peak, the release rate decreases progressively as the tank empties.

A meeting with city staff was held on Friday, July 24th, for an initial discussion regarding this instantaneous peak release rate.

During this meeting, it was discussed that the peak release rate may need to be restricted to a lower rate to accommodate downstream municipal sewer capacity. The client understands that a holding tank may be required to reduce the flushing peak discharge to a release rate acceptable to the city. It is also understood that filter flushing will be restricted to hours when the waterpark is closed to the public, specifically before 10 am and after 8 pm.

It is understood that the design team will continue to work closely with the city staff to ensure that the filter flushing does not adversely affect the existing city infrastructure, with flushing schedule to align with the sanitary system's off-peak capacity.

10 STORMWATER MANAGEMENT

10.1 Existing Stormwater Infrastructure

The subject property is located within the 195 Huntmar Drive property boundary, within the Kanata West Concept Plan (KWCP) area, and is subject to the Kanata West Master Servicing Study (KWMSS).

The development is part of the Pond 7 - Feedmill Creek 58.59 ha drainage area. The existing stormwater management facility (Pond 7) is located on the west side of Block 244 and outlets to Feedmill Creek. Existing storm sewer infrastructure along Culdaff Rd includes two stubs to service Block 243 and 251. From Culdaff Rd the storm sewer flows through a 1650mm diameter concrete sewer which outlets to Pond 7. The 1650mm diameter sewer is located within a service easement along the south property line of Block 244. An existing 825 mm diameter storm sewer stub allows for the servicing of the west property (Block 244).

10.2 Design Criteria

The stormwater management criteria for this development are based on the Kanata West Master Servicing Study (KWMSS), 195 Huntmar Drive Design Brief and Functional Servicing Report, pre- and consultation with City of Ottawa officials, City's 'Ottawa Design Guidelines Sewer', Second Edition, document no. SDG002, October 2012, City of Ottawa, including technical bulletins: ISDTB-2014-01, PIEDTB-2016-01, ISTB 2018-01, ISTB-2018-04, ISTB-2019-02.

Pond 7 was designed to receive all stormwater runoff from the 195 Huntmar Drive development. This includes Block 243/251 and Block 244 The Functional Servicing Report storm servicing drawing has been included in ***Appendix E***. The estimated imperviousness for Pond 7 drainage area was designed at a 70% impervious.

The minor system (storm sewers) includes control of the post-development flows up to and including the 100-year storm event. The 195 Huntmar Drive storm sewer design sheet, designed the controlled runoff of Block 244, 243 and 251 to the 2-year storm event with a runoff coefficient of 0.80, providing the restricted flow requirement, 340L/s, 273 L/s and 272L/s, respectively for the ultimate design of the blocks. The storm sewer design sheet has been provided in ***Appendix E***.

The development blocks are identified as follows in the *Design Brief for SWM Pond 7, Appendix C – Drainage Areas and Target Release Rates, Table C-1: Drainage Area to SWM Facility*:

- Block 256(251) – Catchment area A088CM1, Area 1.588, Imperviousness 86%
- Block 243 – Catchment area A090CM1, Area 1.60, Imperviousness 86%
- Block 244 – Catchment area A091EM1, Area 1.994, Imperviousness 86%

Flow allowances for each catchment area are depicted in the SWMHYMO model completed by JFSA. The Pond 7 quantity parameters are stated to provide sufficient pond storage to control peak flow from a 100-year 12-hour SCS Type II design storm to 8.0 L/s/ha. **Table 6** provides the designed allowable release rate for each development area.

Table 6: 195 Huntmar Drive Design: Allowable release rate

Watersheds	Area (ha)	Outlet Location	Runoff Coefficient	Peak Flow (L/s)
Block 256(251) *A088CM1*	1.588	STM MH88 – MH89	0.80	271
Block 243 *A090CM1*	1.600	STM MH90 – MH92	0.80	273
Block 244 *A091EM1*	1.994	STM MH91 – MH95	0.80	340

Per the DSEL *195 Huntmar Development (D07-16-116-0011) Summary of Low Impact Development Measures*, memorandum dated July 9, 2020, a target 5mm retention volume for each block is as detailed in **Table 7**.

Table 7: 195 Huntmar Drive Low Impact Detention Volume

Watersheds	Area (ha)	Required LID Volume (cu.m.)
Block 256(251) *A088CM1*	1.588	47
Block 243 *A090CM1*	1.600	47
Block 244 *A091EM1*	1.994	144

The major storm event is represented by rainfall exceeding the capacity of the minor system. On site storage will be provided for storm events up to and including the 100-year storm event. The major overland flow route will demonstrate runoff being safely conveyed overland along designated flow routes to the outlet without adverse impact to adjacent properties or buildings.

10.3 Stormwater Management Design

Consistent with the division of the three existing Block parcels (243, 244, & 251), the stormwater management design remains divided into three corresponding drainage areas, each utilization one of the existing stormwater sewer servicing stubs. The north part of the east parcel (Block 251) will outlet to the existing north storm sewer stub on Culdaff Road. The south part of the east parcel (Block 243) will outlet to the existing south storm sewer stub on Culdaff Road. The west parcel (Block 244) will outlet to the existing storm stub at the existing easement on the south side of the parcel.

10.3.1 Watershed Areas

10.3.1.1 Pre-development Drainage

In pre-development conditions, drainage from the subject sites are depicted by existing catchment areas ECA-01 (west Block 244), ECA-01A (east Block 251), and ECA-02A (east Block 243). The stormwater runoff from the west and east sites drains uncontrolled toward the south.

Table 8: Pre-Development Drainage

Watersheds		**Area (ha)**	**Combined Runoff Coefficient (C)**	**Pre-Development Flow rate (L/s)**	
WEST *Block 244 A091EM1**	ECA-01B	1.994	0.20	2-yr	85.15
				5-yr	115.52
				100-yr	197.96
EAST *Block 243 A090CM1** & *Block 251 A088CM1**	ECA-01A	1.001	0.29	2-yr	43.10
				5-yr	58.47
				100-yr	144.95
	ECA-02A	2.321	0.20	2-yr	99.90
				5-yr	134.43
				100-yr	230.38

**This value represents the 2020 proposed pond 7 drainage areas sub-catchment ID.*

10.3.1.2 Post-development Drainage Areas

In post-development condition the sites have been analyzed as EAST-North & EAST-South (Block 243/251) and WEST (Block 244), and post-development catchments have been determined for each.

The WEST site is 1.99 ha and is divided into a total of twenty (20) controlled and three (3) uncontrolled catchment areas. Refer to Post-development Watershed Plan C702B included in ***Appendix F***. **Table 9** below summarize post-development drainage areas. Refer to ***Appendix D*** for storm sewer calculations.

Table 9: WEST Post – Development Drainage Areas

Watershed	Area (ha) C = 0.20	Area (ha) C = 0.90	Total Area (ha)	Combined C
CA-01B (controlled)	0.137	0.000	0.137	0.20
CA-02B (controlled)	0.000	0.039	0.039	0.90
CA-03B (controlled)	0.000	0.052	0.052	0.90
CA-04B (controlled)	0.000	0.050	0.050	0.90
CA-05B (controlled)	0.051	0.000	0.051	0.20
CA-06B (controlled)	0.004	0.067	0.070	0.86
CA-07B (controlled)	0.016	0.111	0.127	0.81
CA-08B (controlled)	0.146	0.000	0.146	0.20
CA-09B (controlled)	0.006	0.077	0.083	0.85
CA-10B (controlled)	0.016	0.113	0.129	0.81
CA-11B (controlled)	0.017	0.112	0.129	0.81
CA-12B (controlled)	0.017	0.110	0.127	0.81
CA-13B (controlled)	0.008	0.048	0.056	0.80
CA-14B (controlled)	0.009	0.044	0.053	0.78
CA-15B (controlled)	0.001	0.077	0.078	0.89
CA-16B (controlled)	0.001	0.065	0.066	0.89
CA-17B (controlled)	0.027	0.034	0.061	0.59
CA-18B (controlled)	0.024	0.036	0.060	0.62
CA-19B (controlled)	0.020	0.039	0.059	0.66
CA-20B (controlled)	0.019	0.040	0.059	0.67
Total (controlled)	**0.517**	**1.114**	**1.632**	**0.68**
CA-21B (uncontrolled)	0.168	0.000	0.168	0.20
CA-22B (uncontrolled)	0.077	0.000	0.077	0.20
CA-23B (uncontrolled)	0.116	0.001	0.117	0.21
Total (uncontrolled)	**0.362**	**0.001**	**0.363**	**0.20**

The EAST site is represented as two watersheds, East-North 1.001 ha and East-South 2.321 ha. East-North is divided into nine (9) controlled catchment areas and three (3) uncontrolled catchment areas. Refer to Post-development Watershed Plan C702A included in ***Appendix F***. **Table 10** below summarize post-development drainage areas. Refer to ***Appendix D*** for storm sewer calculations.

Table 10: EAST- NORTH Post – Development Drainage Areas

Watershed	Area (ha) C = 0.20	Area (ha) C = 0.90	Total Area (ha)	Combined C
CA-01A (controlled)	0.000	0.033	0.033	0.90
CA-02A (controlled)	0.010	0.038	0.047	0.76
CA-03A (controlled)	0.008	0.035	0.042	0.78
CA-04A (controlled)	0.018	0.037	0.055	0.68
CA-05A (controlled)	0.058	0.080	0.138	0.61
CA-08A (controlled)	0.000	0.056	0.056	0.90
CA-10A (controlled)	0.009	0.070	0.079	0.82
CA-100A (controlled)	0.000	0.148	0.148	0.90
CA-101A (controlled)	0.000	0.249	0.249	0.90
Total	**0.102**	**0.745**	**0.847**	**0.82**
CA-33A (uncontrolled)	0.015	0.000	0.015	0.20
CA-34A (uncontrolled)	0.126	0.006	0.132	0.23
CA-35A (uncontrolled)	0.005	0.003	0.007	0.46
Total	**0.145**	**0.009**	**0.154**	**0.24**

East-South is divided into twenty-five (25) controlled catchment areas. Refer to Post-development Watershed Plan C702A included in ***Appendix F***. **Table 11** below summarize post-development drainage areas. Refer to ***Appendix D*** for storm sewer calculations.

Table 11: EAST-SOUTH Post – Development Drainage Areas

Watershed	Area (ha) C = 0.20	Area (ha) C = 0.90	Total Area (ha)	Combined C
CA-102A (controlled)	0.000	0.409	0.409	0.90
CA-06A (controlled)	0.002	0.031	0.034	0.85
CA-07A (controlled)	0.013	0.068	0.081	0.79
CA-09A (controlled)	0.014	0.050	0.064	0.75
CA-11A (controlled)	0.014	0.041	0.055	0.72
CA-12A (controlled)	0.011	0.039	0.050	0.74
CA-13A (controlled)	0.000	0.061	0.061	0.90
CA-14A (controlled)	0.005	0.145	0.150	0.88
CA-15A (controlled)	0.004	0.145	0.149	0.88

CA-16A (controlled)	0.003	0.063	0.066	0.87
CA-17A (controlled)	0.004	0.058	0.062	0.85
CA-18A (controlled)	0.120	0.130	0.249	0.56
CA-19A (controlled)	0.011	0.067	0.078	0.80
CA-20A (controlled)	0.085	0.159	0.244	0.66
CA-21A (controlled)	0.086	0.000	0.086	0.20
CA-22A (controlled)	0.080	0.000	0.080	0.20
CA-23A (controlled)	0.029	0.054	0.083	0.66
CA-24A (controlled)	0.014	0.028	0.042	0.67
CA-25A (controlled)	0.028	0.020	0.048	0.49
CA-26A (controlled)	0.028	0.020	0.048	0.50
CA-27A (controlled)	0.039	0.020	0.060	0.44
CA-28A (controlled)	0.009	0.023	0.032	0.70
CA-29A (controlled)	0.007	0.023	0.030	0.74
CA-30A (controlled)	0.009	0.024	0.033	0.70
CA-31A (controlled)	0.006	0.023	0.029	0.76
Total	**0.621**	**1.700**	**2.321**	**0.71**

10.3.2 Design Parameters

The Rational method has been used to calculate the peak flow rate from the proposed site.

$$Q = 2.78CIA$$

where,

Q = Peak Flow (L/s)
C = Runoff Coefficient
I = Rainfall Intensity (mm/hr), determined from the City of Ottawa IDF curves
A = Area (ha)

The modified Rational method is used to quantify storage volume required for quantity control for the proposed development. Refer to ***Appendix E*** for runoff and storage calculations. For additional details, refer to Post-development Watershed Plan C702 (***Appendix F***).

Table 12 and 13 summarizes post-development release rates, required storage and available storage within the site. Refer to Drawings C601 and C702 in ***Appendix E*** for detailed layouts of Ponding extents, Spillover elevations, and Overland flow routing.

Three designated emergency overflow outlets for extreme events have been designed to discharge overland flow to Culdaff Rd. Refer to Drawing C301A & C301B in ***Appendix E*** for the location of the emergency overflow points.

10.3.3 WEST Stormwater Management Design

The West area is a total of 1.99 ha. Runoff from 1.666 ha of the total 1.99 ha West site area is captured and controlled. A proposed catch basins and catch basin manholes system conveys the controlled site runoff to the existing 825 mm diameter storm sewer stub located on at the south property line, *MHST84406 to MHAT84404*, and then the 1650 mm diameter concrete storm sewer outleting to Pond 7. An area of 0.328 ha drains uncontrolled toward the north, south, and west limits of the site, ultimately discharging to Pond 7.

Table 12: WEST Summary of Post-development Release Rates – Block 244

195 Huntmar Drive Servicing report - Watershed Block 244 - A091EM1 – 1.99 ha						
Watersheds	**Area (ha)**	**Combined Runoff Coefficient (C)**		**Storm Event**		
				100-yr	**5-yr**	**2-yr**
Controlled (CA-01B to CA-20B)	1.632	0.68	Release Rate (L/s)	686.41	320.43	236.20
			Controlled Release Rate (L/s)	184.58 L/s		
			Required Storage Volume (m^3)	331.84	81.51	87.90
Uncontrolled (CA-21B to CA-23B)	0.363	0.20	Uncontrolled Release Rate (L/s)	45.42	21.20	15.63
Total Area	**1.994**	**0.59**	**Total Release Rate (L/s)**	**230.00**	**205.78**	**200.21**
195 Huntmar Dr STM Design sheet Peak flow (L/s)				**340 L/s**		
Provided Storage Volume (m^3)				**629.58 m^3**		

Stormwater quantity control for the west site is provided through an ICD#3 outlet at proposed STM MH 18B controlling the 100-year storm event to 184.58 L/s (Design Head = 3.15m) and providing the design 629.58 m^3 of storage through ponding above the proposed CBMH structures. For the ICD design details, refer to ***Appendix E***.

10.3.4 East Stormwater Management Design

The two (2) existing storm outlet subs extending from Culdaff Rd will be used for storm servicing the East parcel.

East-North, *Watershed Block 251 - A088CM1,* is 1.001 ha with 0.847 ha being captured and controlled by a proposed catch basins and catch basin maintenance hole system that conveys the controlled site runoff to the existing 750 mm diameter storm sewer stub, MHST84407 to MHAT84408. An area of 0.154 ha drains uncontrolled toward the north and west limits of the site.

The entire East-South, *Watershed Block 243 A090CM1,* area will be controlled. The drainage area is 2.321 ha and will be captured and controlled by a proposed catch basins and catch basin maintenance hole system that conveys the controlled site runoff to the existing 750 mm diameter storm sewer stub, MHST84411 to MHAT84409.

The 195 Huntmar Drive servicing report provides controlled runoff rates of 273 L/s and 272 L/s for the east areas. Due to the limit available storage volume within the East-North area, the runoff from this area is proposed to release at a higher rate (382 L/s), the West (Block 244) at overcontrolled rate of 230 L/s and the East-South area will release at a designed rate of 273 L/s. The post-development release rate and storage for the East area in summarized in **Table 13**.

Table 13: East Summary of Post-development Release Rates

195 Huntmar Drive Servicing report - Watershed Block 251 - A088CM1 and Block 243 A090CM1							
Watersheds		**Area (ha)**	**Combined Runoff Coefficient (C)**		**Storm Event**		
					100-yr	**5-yr**	**2-yr**
EAST-NORTH Block 251	Uncontrolled (CA-33A to CA-35A)	0.154	0.24	Release Rate (L/s)	22.85	10.67	7.86
	Controlled (CA-01A to CA-101A)	0.847	0.82	Release Rate (L/s)	420.50	200.17	147.55
				Controlled Release Rate (L/s)	359.15		
				Required Storage Volume (m^3)	36.81	N/A	N/A
	Total Area	**1.001**	**0.73**	**Total Release rate (L/s)**	**382**	**210.84**	**155.42**
195 Huntmar Dr STM Design Sheet Peak Flow (L/s)					**272**		
Provided Storage Volume (m^3)					**41.66**		
EAST-SOUTH Block 243	Controlled (CA-01B to CA-20B)	2.321	0.71	Release Rate (L/s)	1026.23	598.83	429.22
				Controlled Release rate (L/s)	273 L/s		
				Required Storage Volume (m^3)	499.66	195.50	187.82
	Total Area	**2.321**	**0.71**	**Total Release Rate (L/s)**	**273**		
195 Huntmar Dr STM Design Sheet Peak Flow (L/s)					**273**		
Provided Storage Volume (m^3)					**544.56**		

Stormwater quantity control for the East site is provided through two (2) inlet control device (ICD)

- ICD#1 at the outlet STM MH03A controlling the 100-year storm event to 359.15 L/s (Design Head = 2.46m)
- ICD#2 at the outlet of STM MH28A controlling the 100-yr storm event to 273.00 L/s (Design Head = 2.75m)

For the ICD design details, refer to ***Appendix E***.

10.4 Low Impact Design

Consistent with the *Feedmill Creek Stormwater Management Criteria Study* (JFSA & Coldwater Consulting, April 2018), a 5 mm target retention volume is to be achieved for the site through the implementation of Low Impact Development (LID) measures. This translates to a retention volume of 265.8 m^3 for the entire site (5.32 ha).

Site plan level LID measures, infiltration trenches, will be implemented for the Block 243 and Block 244 development as per the 195 Huntmar Drive development, consistent with the approach outlined in the Water Budget Report (JFSA, July 2020) and the Summary of Low Impact Development Measures (DSEL, July 9, 2020). **Table 14** below show available retention volume for the entire site, calculated per City Guidelines.

Table 14: Available Retention Volume (Depression Storage)

	Landscaped	**Paved**
West (ha)	0.88	1.12
East (ha)	0.87	2.45
Total	**1.75**	**3.57**
Depression Storage (mm) per City Guidelines	4.67	1.57
Depression Storage (m^3)	**81.58**	**56.03**
Total Depression Storage (m^3)	**137.61**	

For Block 243/251 (East), the proposed stormwater management strategy provides on-site capture and infiltration of runoff from both asphalt and landscaped areas. Based on the contributing drainage areas, the calculated runoff capture volume is 8.12 m^3 from the contributing tributary areas of 0.162 ha. Two infiltration trenches each measuring 4 m wide × 21 m long × 0.15 m depth (below perforated pipe invert) provides 10.08 m^3 of storage within the clear stone reservoir (assuming 40% void space). Thus, the combined available infiltration volume exceeds the calculated runoff capture requirement (**Table 15**). It is important to note that a notable portion of the catchment could not be diverted via pipe network to the infiltration area due to design constrain, especially due to high groundwater reported in the geotechnical investigation.

For Block 244 (West), the proposed stormwater management strategy provides on-site capture and infiltration of runoff from both asphalt and landscaped areas. Based on the contributing drainage areas (0.955 ha), the calculated required infiltration volume is 47.77 m³. Two proposed infiltration trenches measuring 26 m long x 5 and 10 m wide × 0.35 m deep (below pipe invert) provides approximately 54.6 m³ of storage within the clear stone reservoir (assuming 40% void space), thus exceeds the required storage. Please note that a notable portion of the catchments could not be diverted via pipe network to the infiltration area due to design constrain, especially due to high groundwater reported in the geotechnical investigation.

Table 15: Drainage Area to LID and Required/Available Storage

*LID Tributary	Drainage Area (ha)	**Required Infiltration Storage (m^3)	Length (m)	Width (m)	Height (m)	***Provided Infiltration Storage (m^3)
West (LID1)	0.684	34.18	26	10	0.35	36.40
West (LID2)	0.272	13.59	26	5	0.35	18.20
East (LID3)	0.066	3.28	21	4	0.15	5.04
East (LID4)	0.097	4.84	21	4	0.15	5.04
Total	**1.118**	**55.89**				**64.68**

**Refer to post-development watershed plan C702 **5 mm retention target ***considering 40% porosity*

11 MINISTRY OF TRANSPORTATION (MTO) LANDS

The vacant lands located to the north of development Blocks 244 and 251 are owned by the Ministry of Transportation (MTO). Under pre-development conditions, a 6 m wide granular pathway runs along the north property lines of Block 244 and Block 251, directly south of the MTO lands, within an unregistered 6 m wide City of Ottawa easement. This easement accommodates the Pond 7 – 750 mm outlet sewer, and City requirements prohibit private structures within sewer easements.

As a result of this restriction, small contributing areas: CA-23B (0.117 ha), CA-33A (0.015 ha) and CA-34A (0.132 ha) — will drain toward the MTO lands under post-development conditions. Given the limited size of these areas, the resulting flows are minor and will not adversely affect the undeveloped MTO lands. All remaining stormwater runoff from Blocks 244 and 251 is directed away from the MTO lands and toward Pond 7.

Pond 7 has been designed to accommodate the development in accordance with its original design parameters, and the pond outlet flow will not increase as a result of this development.

We would also like to note that the Ministry's stated requirement is that post-development flows to the highway drainage system not exceed pre-development flows. The flows from CA-23B, CA-33A and CA-34A discharge to vacant MTO land, and not directly to a highway right-of-way or highway drainage infrastructure. A no-objection email correspondence from MTO is included in Appendix A.

12 Erosion and Sediment Control

During construction, erosion and sediment control (ESC) measures will be implemented to minimize the migration of sediment from the site. These measures will include the installation of sediment control fencing along the site perimeter where runoff has the potential to leave the property, inlet protection (silt sacks) within affected catch basins and manholes, and a stabilized construction entrance/mud mat to reduce tracking of sediment onto adjacent roadways.

All ESC measures will be installed, monitored, and maintained throughout construction in accordance with Ontario Provincial Standard Specification (OPSS) 577. Refer to LRL Associates Drawing C.101 in ***Appendix E*** for erosion and sediment control details.

13 Conclusion

This Stormwater Management and Servicing Report for the proposed development at 2775 & 2785 Palladium Drive (Blocks 243/251) and 350 Culdaff Road (Block 244), Ottawa, ON, presents the rationale and details of the servicing requirements for the subject property.

In accordance with the report objectives, the servicing requirements for the development are summarized below:

Water Service

- The proposed development (Block 243/251) will be serviced by two (2) 200 mmØ water service laterals connected to the existing 305 mmØ watermain within Culdaff Road, per the City of Ottawa's dual-service and looping requirements (Technical Bulletin ISTB-2021-03) for demands exceeding 50 m³/d.
- Total anticipated domestic water demand was calculated to be 2.2 L/s (average day), 7.60 L/s (maximum day), and 13.68 L/s (maximum hour).
- The required fire flow was calculated to be 14,000 L/min using the FUS method (per IWSTB-2024-05/ISTB-2018-02), based on Non-Combustible (Type II) construction, Limited Combustible occupancy, and an automatic sprinkler system.
- The available combined fire flow from three on-site fire hydrants within 75 m of the development is 17,034 L/min, which is sufficient to meet the calculated fire flow demand.

Sanitary Service

- The development will be serviced via two sanitary laterals connecting to the existing 250 mm diameter sanitary stubs on Culdaff Road: the north connection servicing the hotel and family entertainment centre, and the south connection servicing the support building and waterpark. Block 244 will be serviced via its own existing 250 mm diameter sanitary stub.

- The calculated wet wastewater flows are 0.78 L/s (hotel/entertainment centre), 1.17 L/s (support building/waterpark, including 0.39 L/s from the waterpark), and 0 L/s (Block 244).
- The cumulative downstream flow, including future MTO lands, is 21.72 L/s at Bermondsey Way and Culdaff Road (MHSA76092), representing approximately 67% of the sewer's 32.57 L/s full-flow capacity. The existing sanitary system therefore has sufficient reserve capacity to support the proposed development, with no concerns anticipated.

Stormwater Management

- The site has been analyzed as three catchments: East-North (Block 243/251, 1.001 ha), East-South (Block 243, 2.321 ha) and West (Block 244, 1.99 ha) with post-development watersheds allocated for each.
- Quantity control for the East-North site is provided via an ICD#1 outlet at proposed STM CBMH03A, restricting the 100-year event to 359.15 L/s and providing 41.66 m³ of storage through ponding above the proposed CBMH structures.
- Quantity control for the East-South site is provided via an ICD#2 outlet at proposed STM MH28A, restricting the 100-year event to 273.00 L/s and providing 544.56 m³ of storage through ponding above the proposed CBMH structures.
- Quantity control for the West site is provided via an ICD#3 outlet at proposed STM MH 18B, restricting the 100-year event to 184.58 L/s and providing 614.05 m³ of storage through ponding above the proposed CBMH structures.
- Both sites ultimately discharge to Pond 7, which provides quantity control and Enhanced Level quality treatment for the broader 41.73 ha 195 Huntmar Drive tributary area, outleting to Feedmill Creek.
- Consistent with the Feedmill Creek Stormwater Management Criteria Study, a 5 mm target retention volume will be achieved through site-level Low Impact Development (LID) measures using infiltration trenches, implemented for both Block 243/251 and Block 244.
- Three designated emergency overflow outlets have been provided to convey extreme-event overland flow to Culdaff Road.

14 Report Conditions and Limitations

The report conclusions are applicable only to this specific project described in the preceding pages. Any changes, modifications or additions will require a subsequent review by LRL Associates Ltd. to ensure compatibility with the recommendations contained in this document.

If you have any questions or comments, please contact the undersigned.

Prepared by:
LRL Associates Ltd.



Maxime Longtin
Civil Designer

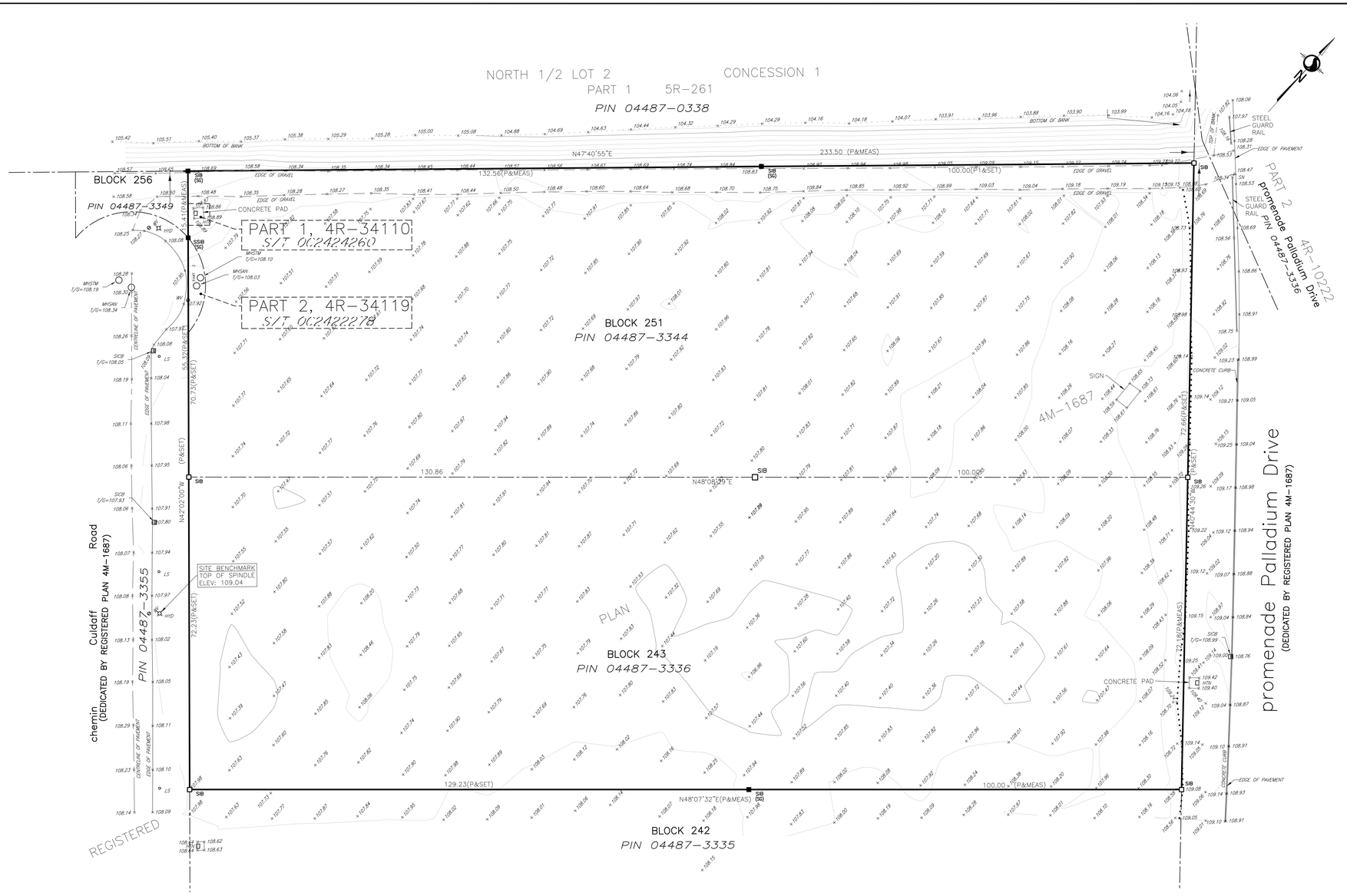
Mohan Basnet, P.Eng.
Civil Engineer

APPENDIX A

Correspondence / Regulatory Approvals / Topographical

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
V-21297

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR
In accordance with Regulation 1026, Section 29(3)



Stantec Geomatics Ltd.
300-1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

TOPOGRAPHIC PLAN OF SURVEY OF BLOCKS 243 AND 251 REGISTERED PLAN 4M-1687

(GEOGRAPHIC TOWNSHIP OF HUNTLEY)

CITY OF OTTAWA

Scale 1:500

10 0 10 20 30 METRES

Stantec Geomatics Ltd.

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METRIC CONVERSION

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

GRID SCALE CONVERSION

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999935.

BEARING NOTE

BEARINGS ARE GRID, DERIVED FROM CAN-NET VRS NETWORK GPS OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND 19680191, CENTRAL MERIDIAN, 76° 30' WEST LONGITUDE MTM ZONE 9, NAD83 (ORIGINAL).

19773035 N:5006060.42 E:324888.04
19680191 N:5033564.26 E:388064.94

ELEVATION NOTE

ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM VERTICAL CONTROL MONUMENT No. 88V502 HAVING AN ELEVATION OF 106.039.

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBΦ	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
M/MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
STANTEC	"	STANTEC GEOMATICS LTD.
P	"	REGISTERED PLAN 4M-1687
SICB	"	SIDE INLET CB
HTN	"	HYDRO TRANSFORMER
LS	"	LIGHT STANDARD
MHSA	"	MAINTENANCE HOLE SANITARY
MHST	"	MAINTENANCE HOLE STORM
SN	"	SIGN
WV	"	WATER VALVE

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 20th DAY OF MAY , 2022.

Jan. 23, 2023
DATE

FRANCIS LAU
ONTARIO LAND SURVEYOR

DRAWN: TMT CHECKED: FL PM: FL FIELD: CA PROJECT No.: 161614584-111

23 January 2023 11:52 AM

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum, derived from City of Ottawa benchmark No. 019680013 having an elevation of 77.204 metres.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

UTILITY NOTES

1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. Some features may have been derived from available records or similar data sources and have not been located (or visible) during the Field Survey. These sources are disclosed on the face of the plan where applicable.
4. Invert Elevations are derived from those shown within geoOttawa.
5. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.

Notes & Legend

	Denotes	
—□—	"	Survey Monument Planted
—■—	"	Survey Monument Found
SIB	"	Standard Iron Bar
SSIB	"	Short Standard Iron Bar
PB	"	Plastic Bar
Meas.	"	Measured
(AOG)	"	Annis, O'Sullivan, Vollebekk Ltd.
(PI)	"	Registered Plan 4M-1687
○ MH-ST	"	Maintenance Hole (Storm Sewer)
○ MH-S	"	Maintenance Hole (Sanitary)
○ LS	"	Light Standard
□ CB	"	Catch Basin
□ CBI	"	Catch Basin Inlet
FH	"	Fire Hydrant
WV	"	Water Valve
BF	"	Board Fence
▫ TB-B	"	Bell Terminal Box

	Denotes	
+ 65.00	"	Location of Elevations
+ 65.00*	"	Top of Concrete Curb Elevation
H-T	"	Hydro Transformer on Concrete Pad
△ S	"	Sign

Bearings are grid, derived from Can-Net 2016 Real Time Network GPS observations, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

Primary Contour Interval = 1.00 metres
Secondary Contour Interval = 0.25 metres.

TOPOGRAPHIC PLAN OF SURVEY OF

BLOCK 244, REGISTERED PLAN 4M-1687 CITY OF OTTAWA

Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Scale 1 : 300

12 9 6 3 0 6 12 Metres

Metric

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

Surveyor's Certificate

I CERTIFY THAT :

1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act and the regulations made under them.
2. The survey was completed on the 1st day of May, 2026.

May 6, 2026
Date

Andrew Handspiker
Ontario Land Surveyor

LOT 2 CONCESSION I (HUNTLEY)
PART 1 PLAN 5R - 261
PIN 04487 - 0338

N 47° 40' 55" E (Reference Bearing)
128.27 (PI)&Meas.

PART 19 PLAN 4R-34109
PIN 04487-3349
BLOCK 256

PART 21 PLAN 4R-34109

PART 1 PLAN 4R-34119
SUBJECT TO EASEMENT
INST. OC2422278

PART 5 PLAN 4R-34110
SUBJECT TO EASEMENT
INST. OC2424260

BLOCK 244

BLOCCK 245
REGISTERED
PIN 04487 - 3338

BLOCK 251

BLOCK 243

BLOCK 242

BLOCK 235
PIN 04487 - 3328

BLOCK 223
PLAN 4R - 34161

BLOCK 222
PLAN 4R - 34201

BLOCK 221
PLAN 4R - 34164

LOT 9
LOT 8
LOT 7

Approximate Crown of Road
Concrete Curb
Edge of Asphalt
Gravel
Culdaff Road
PIN 04487 - 3355
chemin

N42°00'50"W (PI)&Meas. 147.21 Meas. (147.18 PI)

N42°12'13"W 11.61 (PI)&Meas.

N 42° 02' 00" W (PI)&Meas. 140.76 (PI)&Meas.

Job Benchmark
FH Top of Spindle
Elevation = 109.04

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
V-130578

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ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com
Ontario Land Surveyors

Job No. N-24864_Verevas_Blk244 4M-687_O_F | FS

File No.: PC2025-0008

February 26, 2025

Tim Eisner
Planner, JFSA
Via email: teisner@jfsa.com

Subject: **Pre-Consultation: Meeting Feedback**
Proposed Zoning By-law Application – 2775 and 2785 Palladium Drive

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on February 5, 2025.

Pre-Consultation Preliminary Assessment

1 ☐	**2** ☒	**3** ☐	**4** ☐	**5** ☐

One (1) indicates that considerable major revisions are required while five (5) suggests that the proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken. Please provide your next submission together with the necessary Forms, studies and/or plans to planningcirculations@ottawa.ca, copy to: Kimberley Baldwin, Nishant Dave and Krishon Walker.

2. In your subsequent submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed is requested with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

3. Please note, if your development proposal changes significantly in scope, design, or density it is recommended that a subsequent pre-consultation application be submitted.

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.

Consultation with Technical Agencies

1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed.

Proposed Development

The proposal is for an indoor waterpark [amusement centre] (approx. 5500 m2) with an accessory restaurant (approx. 1000m2), support buildings (approx. 3800m2), and a 7-storey hotel. 422 parking spaces are required. The applicant's pre-consultation form notes that a Zoning By-law Amendment and Site Plan Control application will be required. The lot area is 33,197sq m.

Planning

Comments:

Official Plan Policies

1. The site is situated in the Suburban West Transect

    i. The east portion of the site abutting Palladium Drive, to a depth of 120 metres, is designated Minor Corridor

    ii. The west portion of the site abutting Culdaff is designated Mixed Industrial

2. In the Suburban Transect, along Minor Corridors, mid-rise buildings, between 5 to 7 storeys, may be considered through a rezoning. [Policy 5.4.1]

3. Provide rationale for how the proposed built form will provide 'appropriate transitions in height, use of land, site design and development character through the site, to where the Corridor designation meets abutting designations.' [Policy 6.2.1]

4. In Corridors, access shall generally be provided from a side street

5. In the Minor Corridor designation, development may include commercial uses which are meant to mainly serve local markets [Policy 6.2.2]. Similarly, the Mixed Industrial policies may permit commercial services that are of a scale that cater to a local neighbourhood clientele, including recreational, health and fitness uses and other service commercial uses. [Policy 6.5.3]. Please demonstrate how the

proposed uses will serve the local area and help achieve the 15-minute neighborhood objectives.

6. The policies in the Plan do not specifically address a large-scale entertainment, restaurant and hotel uses with surface parking under any designation within the Official Plan. That said, staff are of the opinion that of all the designations, the Mixed Industrial designation appears to be the best fit.

    i. Staff are recommending that the applicant submit an Official Plan Amendment to establish a new Area-Specific Policy for the proposed facility. An OPA would help the City assess the unique proposal and any mitigation measures that may be required. Please see Policy 12.3 for guidance and respond to the following:

        - How will the proposed uses impact mobility in the surrounding area? Please evaluate all potential access points and traffic fow for all transportaion modes, including vehicles, pedestrians, cyclist, and public transit.

        - Are there any opportunities to secure a secondary access through the undeveloped sites to the south?

        - Has your client considered any alternate sites within the City of Ottawa which are also designated Mixed Industrial that may already have multiple access points?

7. Both the Minor Corridor and Mixed Industrial designations prohibit uses that are likely to generate noise, fumes, or high levels of truck traffic impacts. Please demonstrate how the proposed uses will ensure no adverse impact on the adjacent properties designated Neighbourhood. [Policies 6.2.1 and 6.5.2]

8. Both the Minor Corridor and Mixed Industrial designations contain policies that support cycling and pedestrian facility upgrades where they are not currently available. [Policies 6.2.1 and 6.5.3]

    i. Please demonstrate how the proposal will improve cycling and pedestrian connections to/from the site.

Zoning By-law

9. The site is zoned IP (Business Park Industrial Zone)

    i. A hotel is a permitted use in this zone.

    ii. A restaurant is also a permitted use, provided it does not exceed 300m^2 of gross floor area. The proposed restaurant size (approximately 1000m^2) would require relief from Section 205 (2) (c) of the Zoning By-law.

iii. A zoning by-law amendment would be required to permit an amusement centre use in this zone.

iv. In this zone, there is a provision which limits the total cumulative gross floor area of commercial service uses (for example, 'recreational and athletic facility' use) to a maximum of 2,999m^2. Zoning relief would be required to permit the proposed 10,000m^2 mixed-use commercial building.

10. Staff note that the adjacent properties to the south are zoned General Mixed Use [Urban Exception 2654]. It is anticipated that the proposed amusement centre use would draw visitors from a broader area. Upon review of both the IP and GM zones, staff are of the opinion that a GM zone would be more appropriate zone to contemplate the proposal.

    i. The intent of the IP zone, among others, is to permit 'office and light industrial uses' and a 'variety of complementary uses such as recreational, health and fitness uses and service commercial uses [eg restaurant], …'to serve the employees' and "the general public in the immediate vicinity, and passing traffic".

    ii. The intent of the GM zone, among others, is to 'permit uses that are often large and serve or draw from broader areas than the surrounding community and which may generate traffic, noise or other impacts, provided the anticipated impacts are adequately mitigated or otherwise addressed".

    iii. A GM zone would require a site-specific exception to address the following:

        - To permit 'amusement centre' and 'hotel' uses.

        - To amend the maximum building height

11. It is understood that the proposed building may have slides on the exterior of the building. Staff recommend a site-specific provision which recognizes a slide as a permitted projection and subject to Section 64 and 65 of the Zoning By-law.

General comments:

12. Given the site's proximity to the highway, the applicant is encouraged consult with the Ministry of Transportation and Infrastructure Ontario as early as possible to understand any provincial requirements or restrictions that may relate to the subject site.

13. Consider internalizing the waste management to the interior of the building, especially at the southwest side of the site, closest to the zones which permit residential uses.

Economic Development Services

14. The Economic Development Services team is assessing this project's eligibility for the City's High Economic Impact Projects Program. Please complete the following intake form to assist us in our evaluation.

Urban Design

Comments:

15. As part of a formal submission, urban design staff require an Urban Design Brief (terms of reference attached), architectural drawings (including a Site Plan and Building Elevations), and a Landscape Plan.

16. As suggested at the meeting, flipping the hotel to the northern portion of the site might help increase visibility to the site from the highway as well as light access for the development parcel to the south.

17. If possible, the height of the hotel should be reduced to 6 storeys as there is sufficient space on site to accommodate a longer building at the 6 storey scale.

Feel free to contact Nader Kadri, Urban Design Planner, for follow-up questions.

Engineering

Comments:

General

18. The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/planning-development-and-construction/residential-property-regulations/development-application-review-process/development-application-submission/planning-application-submission-information-and-materials#section-3a671b1e-7fb3-4018-97f8-b5933fb3951a

19. Servicing and site works shall be in accordance with the following documents and their associated technical bulletins, if applicable:
    i. Ottawa Sewer Design Guidelines (October 2012)
    ii. Ottawa Design Guidelines – Water Distribution (2010)
    iii. City of Ottawa Low Impact Development Technical Guidance Report – Implementation in Areas with Potential Hydrogeological Constraints (February 2021)
    iv. Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)

v. City of Ottawa Slope Stability Guidelines for Development Applications (2012)

vi. City of Ottawa Accessibility Design Standards (November 2015)

vii. Ottawa Standard Tender Documents (latest version)

viii. Ontario Provincial Standards for Roads & Public Works (latest version)

20. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at geoinformation@ottawa.ca or by phone at (613) 580-2424 x.44455).

21. The Kanata West Master Servicing Study, the Carp River Subwatershed study, and the 195 Huntmar subdivision documents are to be followed for various targets and criteria. Some items may be specified below, but others may be found in the documents themselves. All requirements are to be addressed in the submission documents.

Watermain

22. There is a 305mm diameter PVC watermain available on Culdaff Rd fronting the site.

23. If the site's water demand is expected to be 50 m^3/d or more, then two water services will be required as per City of Ottawa Water Distribution Guidelines.

24. Watermain looping will be required if the Culdaff Rd watermain is expected to have more than 50 m^3/d demand in total. Please include this assessment in the Adequacy of Services report and Site Servicing report.

25. Water Boundary condition requests must include the location of the service (map or plan with connection location(s) indicated) and the expected loads required by the proposed development, including calculations. Please provide the following information:

    i. Location of service

    ii. Type of development and the amount of fire flow required (as per FUS).

        - If C value < 1.0, please note that correspondence from the designing architect will be required confirming the building material.

        - Average daily demand: ___ l/s.

        - Maximum daily demand: ___l/s.

        - Maximum hourly daily demand: ___ l/s.

Sanitary

26. There is a 250mm diameter PVC sanitary sewer on Culdaff Rd.

27. Given the nature of the development including an indoor water park, assessment of the downstream sanitary sewer many be required, potentially up to the Kanata West Pump Station to ensure there are no HGL concerns for any properties expected to connect to this system. Downstream assessment is only needed if the site exceeds the allotted sanitary capacity previously designated for the site in the subdivision documents.

Storm

28. There is an 825mm diameter concrete storm sewer on Culdaff Rd available for connection for this site. This storm sewer leads to the subdivision stormwater management pond. Please refer to the subdivision documents to determine if any on-site stormwater management quantity and/or quality control is required, that is not already provided by the subdivision stormwater management pond.

29. There is also a 750mm diameter concrete storm sewer located along the north property boundary of the site, on-site. The 750mm diameter sewer is the outlet pipe for the subdivision stormwater management pond. The 750mm diameter storm sewer on-site is not to be connected to and a 6m wide easement is to be provided to the City, if one has not been provided to the City already.

30. On-site infiltration targets are required as per subdivision agreement conditions. Please refer to the subdivision, and potentially higher-level documents, to the determine the infiltration requirements for this site.

MECP ECA

31. An MECP Environmental Compliance Approval for Industrial Sewage Works may be required for the proposed development. A Ministry contact has been provided. Please confirm if an ECA will be required. Please note Industrial ECAs are to go to the MECP via Direct Submission, and after the City has technically approved the site plan application documents.

    a. For I/C/I applications, please conect Shannon Hamilton-Browne at (613) 521-3450 or Shannon.Hamilton-Browne@ontario.ca.

Feel free to contact Gabrielle Schaeffer, Senior Engineer - Infrastructure Applications, for follow-up questions.

Noise

Comments:

32. Stationary Noise Impact Study required if there will be any exposed mechanical equipment due to the proximity to neighboring noise sensitive land uses.

Feel free to contact Josiane Gervais, TPM, for follow-up questions.

Transportation

Comments:

33. Follow Transportation Impact Assessment Guidelines:

    i. Note that the TIA Guidelines have been updated, the changes are available on the City's website.

    ii. A Transportation Impact Assessment is required. Please submit the Scoping/Forecasting report to josiane.gervais@ottawa.ca at your earliest convenience, or as part of the Phase 2 pre-con package. The applicant is responsible to submit the Scoping Report prior to application and must allow for a 14 day circulation period.

    iii. Regarding peak hours to be analyzed, the Scoping Report must provide the proposed peak hour and justification, as required. During the pre-consultation meeting it was noted the applicant has sister sites that are operational. Data from these sites may be used to support proposed peak hours.

    iv. The Strategy Report (including Synchro files) must be submitted with the formal submission to deem complete. The applicant is strongly encouraged to submit the Strategy Report to the TPM prior to formal submission and allow for a 14 day circulation period.

    v. If an RMA is required to support the proposed development, the functional plan and/or RMA plans must be submitted with the formal submission to deem complete. Request base mapping asap if RMA is required, contact Engineering Services

34. ROW Protection:

    i. Ensure that the development proposal complies with the Right-of-Way protection requirements of the Official Plan's Schedule C16.

    ii. Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

iii. Where applicable, ROW and corner triangles must be unincumbered and conveyed at no cost to the City. Note that conveyance of the ROW/corner triangle will be required prior to registration of the SP agreement. Additional information on the conveyance process can be provided upon request.

35. No access onto Palladium Dr is permitted.

36. Note that Culdaff is identified as a local on the OP Schedule C4, but is sized and designed as a collector.

37. Despite clear throat length requirements not typically required for accesses on local roads, strong consideration should be given to provide adequate clear throat lengths due to the nature of the site proposed.

38. As the proposed site is commercial and for general public use, AODA legislation applies.

    i. Ensure all crosswalks located internally on the site provide a TWSI at the depressed curb, per requirements of the Integrated Accessibility Standards Regulation under the AODA.

    ii. Clearly define accessible parking stalls and ensure they meet AODA standards (include an access aisle next to the parking stall and a pedestrian curb ramp at the end of the access aisle, as required).

    iii. Please consider using the City's Accessibility Design Standards, which provide a summary of AODA requirements.

39. On site plan:

    i. Ensure site accesses meets the City's Private Approach Bylaw.

    ii. Show all details of the roads abutting the site; include such items as pavement markings, signage, accesses, on-street parking, and/or sidewalks.

    iii. Turning movement diagrams required for all accesses showing the largest vehicle to access/egress the site.

    iv. Turning movement diagrams required for internal movements (loading areas, garbage).

    v. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible and fall within TAC guidelines (Figure 8.5.1).

    vi. Show dimensions for site elements (i.e. lane/aisle widths, access width and throat length, parking stalls, sidewalks, pedestrian pathways, etc.)

vii. Sidewalk and cycle track are to be constructed along Culdaff frontage. Sidewalk is to be continuous across access as per City Specification 7.1.

viii. Sidewalk and cycling infrastructure along Palladium Dr would be DC eligible.

Feel free to contact Josiane Gervais, Transportation Project Manager, for follow-up questions.

Environment

Comments:

40. The subdivision that created this parcel undertook an Environmental Impact Statement (EIS) and identified the Feedmill Creek and the riparian lands as a significant natural feature. This feature is over 120 m from this proposed development, as such an up-dated EIS is required at this time scoped to address the species at risk.

41. Species at risk – the EIS completed for the subdivision did identify several species at risk and implemented several mitigation measures through the subdivision approval. Since the EIS was prepared in 2018 there have been an number of changes to the species listed.

42. The EIS for the subdivision (EIS and TCR Proposed Mixed Use Development Kanata West Lands a report for 2325483 Ontario by Muncaster Environmental Planning (revised May 2018) should be reviewed and the recommendations implemented including:

    i. As part of the landscape plan for each Block the developers are encouraged to plant a mix of native species such as sugar maple, red maple, tamarack, white spruce, white cedar, red oak, bur oak, bitternut hickory and basswood. To maximize the success of the plantings, it is strongly encouraged that stock from a local seed base be utilized. Due to the clay soils tree and shrub species that have a high water demand are generally not recommended. These species include willows, poplars, Manitoba maple and elm.

    ii. Given the location of the proposal, please implement the wildlife oriented mitigation measures are detailed in the City's Protocol for Wildlife Protection during Construction (City of Ottawa, 2015). Contractors are to review in detail and understand the City's Protocol for Wildlife Protection during Construction prior to commencement of construction.

    iii. The contractor is to be aware of the potential Species at Risk in the vicinity of the site including Blanding's turtle, barn swallow and butternut. Although unlikely since the subdivision is in the advanced stages of development, any Species at Risk sightings are to be immediately

reported to the contractor administrator/ City project manager and the Ministry of Environment, Consevration and Parks and work that may impact the species suspended immediately.

43. Bird-Safe Design Guidelines – Please review and incorporate bird safe design elements. Some of the risk factors include glass and related design traps such as corner glass and fly-through conditions, ventilation grates and open pipes, landscaping, light pollution. More guidance and solutions are available in the guidelines which can be found here: https://documents.ottawa.ca/sites/documents/files/birdsafedesign_guidelines_en.pdf

44. Please consider if there are features that can be added reduce the urban heat island effect (see OP 10.3.3). For example, this impact can be reduced by adding large canopy trees, green roofs or vegetation walls, or incorporating building with low heat absorbing materials.

Feel free to contact Matthew Hayley, Environmental Planner, for follow-up questions.

Forestry

Comments:

45. Tree Removal Requirements

    i. A tree permit will be required if there are trees on site that are greater than 10cm in diameter. Please contact the Planning Forester if a tree permit is required

46. Tree Planting Requirements

47. Minimum Setbacks

    i. Maintain 1.5m from sidewalk, MUP/cycle track, water service laterals.

    ii. Maintain 2.5m from curb.

    iii. Coniferous species require a minimum 4.5m setback from curb, sidewalk, or MUP/cycle track/pathway.

48. Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing, except where otherwise approved in naturalization / afforestation areas.

49. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

50. Tree specifications

    i. Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.

    ii. Maximize the use of large deciduous species wherever possible to maximize future canopy coverage.

51. Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; if possible, include watering and warranty as described in the specification.

52. No root barriers, dead-man anchor systems, or planters are permitted.

53. No tree stakes unless necessary

54. Hard surface planting

    i. If there are hard surface plantings, a planting detail must be provided.

    ii. Curb style planter are highly recommended.

    iii. No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.

55. Trees are to be planted at grade.

56. Soil Volume - Please demonstrate as per the Landscape Plan Terms of Reference that the available soil volumes for new plantings will meet or exceed the following:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

57. Sensitive Marine Clay - Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines.

58. The city requests that consideration be given to planting native species wherever there is a high probability of survival to maturity.

59. Efforts shall be made to provide as much future canopy cover as possible at a site level, through tree planting and tree retention. The Landscape Plan shall show/document that the proposed tree planting and retention will contribute to the City's overall canopy cover over time. Please provide a projection of the future canopy cover for the site to 40 years.

60. Page 7 of the Landscape Plan Terms of Reference requires applicants to submit a digital, georeferenced CAD or GIS file of the final approved LP. Please follow this link to review the submission requirements: https://documents.ottawa.ca/sites/documents/files/landscape_tor_en.pdf . The file can be sent to the Planning Forester or Planning File Lead.

Feel free to contact Mark Richardson, Planning Forester, for follow-up questions.

Parkland

Comments:

61. Please confirm if parkland dedication was provided during the subdivision process.

62. If not, parkland dedication is applicable – for commercial and industrial uses at rate of 2% of the gross land area, as per the Parkland Dedication By-law No. 2022-280

Feel free to contact Diane Emmerson, Parks Planner, for follow-up questions.

Submission Requirements and Fees

1. Please submit the following applications:
   - Official Plan Amendment [recommended]
   - Zoning By-law Amendment (Major)
   - Site Plan Control (Complex)
   a. Additional information regarding fees related to planning applications can be found here.
2. The attached **Study and Plan Identification List** outlines the information and material that has been identified as either required (R) or advised (A) as part of a future complete application submission.
   a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.

3. All of the above comments or issues should be addressed to ensure the effectiveness of the application submission review.

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Kimberley Baldwin

Encl. Plans and Studies List

c.c. Nishant Dave, Planner (Support)
Gabi Schaeffer, Infrastructure Project Manager
Rubina Rasool, Infrastructure Project Manager (Support)
Josiane Gervais, Transportation Project Manager
Nader Kadri, Urban Design
Matthew Hayley, Environmental Planner
Mark Richardson, Forester
Diane Emmerson, Parks Planner

LAND DEVELOPMENT REVIEW CORRESPONDENCE

Correspondence: 2785 Palladium Dr, Ottawa; MTO-LD-2026-41K-000616

Brian Hickey (Regional Planner (CMP/SPM))
Tuesday September 15, 2026 2:27 p.m.

To: Tim Eisner <teisner@jfsacanada.com>
Attachments: 2785 Palladium Dr, Ottawa; MTO-LD-2026-41K-000616.msg

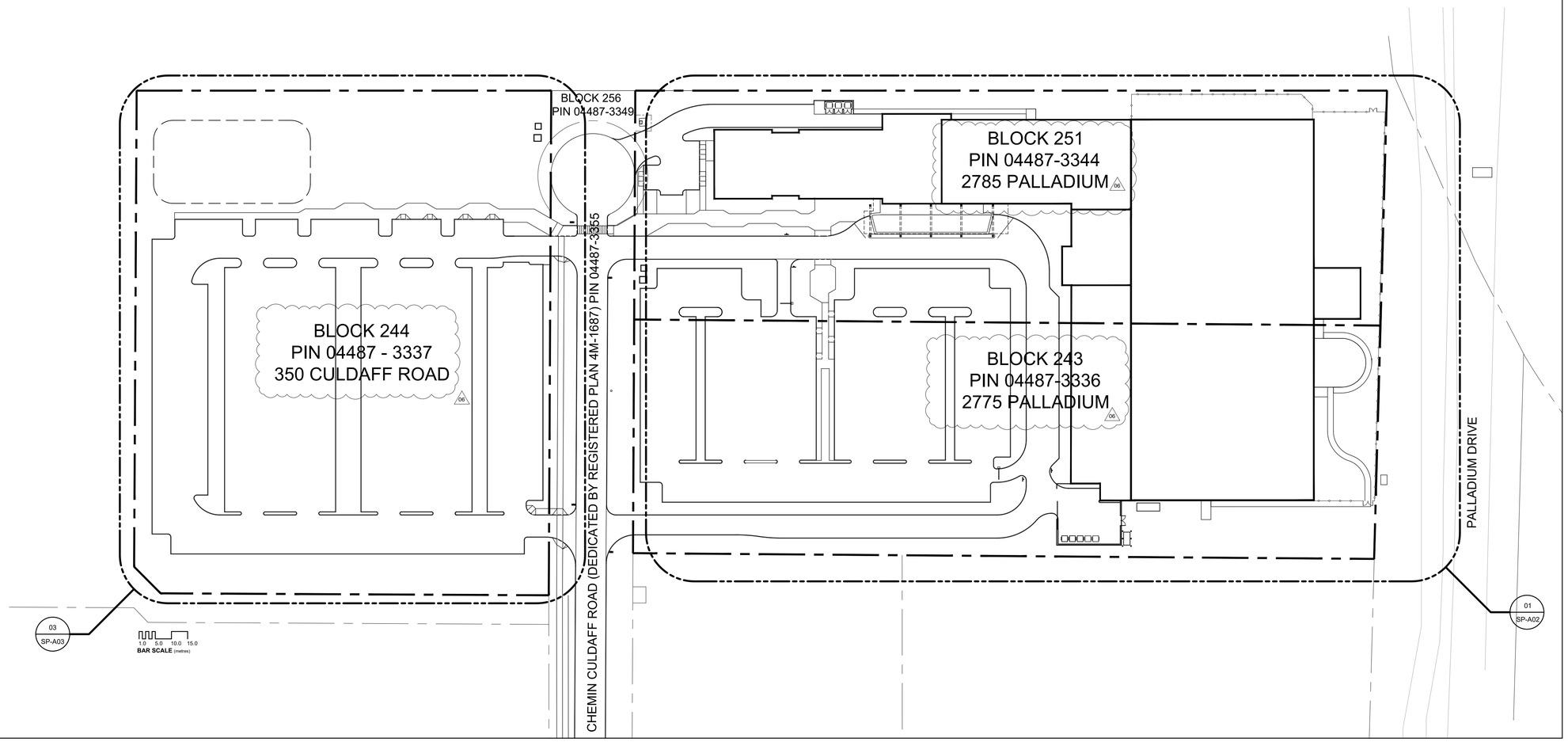
Hi Tim,
I received your email message. I was able to make a change to your email address within the HCMS system so I hope that the correspondence is now operational.
We have completed our review of the Photometric Plan and the Stormwater Management Report and have no concerns.
The Traffic Impact Study is currently under review by our Traffic Section. They are currently dealing with a high number of files and apologize for the delay. I will advise when I receive their comments and hoping to have them within 2 weeks.

Thank you,

Brian Hickey
Corridor Management Planner
Highway Corridor Management
Ministry of Transportation of Ontario

APPENDIX B

Site Plan and Architectural Floor Plans



01 SP-A01 SITE PLAN - EAST AND WEST SECTORS

SCALE: 1:750

02 SP-A01 RESERVED

SCALE: NTS

SITE INFORMATION

SITE AREA: 53,236sm / 5.3ha

WEST SECTOR PARKING LOT:
AREA: 12,577sm
LANDSCAPING: 2,071sm (16.5%)

EAST SECTOR PARKING LOT:
AREA: 8,245sm
LANDSCAPING: 1,279sm (15.5%)

BUILDING DATA:

AREA CALCULATIONS:

HOTEL (238 GUEST ROOMS):	13,742sm / 147,918sf	(7 STOREYS)
FAMILY ENTERTAINMENT CENTRE:	4,444sm / 47,835sf	(2 STOREYS)
SUPPORT WING:	1,296sm / 13,950sf	(1 STOREY)
AQUATIC FACILITY:	6,636sm / 71,429sf	(1 STOREY)
TOTAL	27,823sm / 281,132sf	

03 SP-A01 SITE INFO. & BUILDING DATA

SCALE: NTS

PROPERTY BOUNDARY SOURCES:

PROPERTY BOUNDARY OF BLOCK 251, PIN 04487-3344 AND BLOCK 243 PIN 04487-3336 OBTAINED FROM:

TOPOGRAPHIC PLAN OF SURVEY OF BLOCKS 243 AND 251 REGISTERED PLAN 4M-1687 (GEOGRAPHIC TOWNSHIP OF HUNTLEY), CITY OF OTTAWA BY STANTEC GEOMATICS LTD., DATED MAY 20, 2022

PROPERTY BOUNDARY OF BLOCK 244, PIN 04487 - 3337 OBTAINED FROM:

TOPOGRAPHIC PLAN OF SURVEY OF BLOCK 422, REGISTED PLAN 4M-1687, CITY OF OTTAWA, SURVERYED BY ANNIS, O'SULLIVAN. VOLLEBEKK LTD., DATED MAY 6, 2026

04 SP-A01 PROPERTY BOUNDARY SOURCES

SCALE: NTS

ZONING REVIEW BASED ON 2026-050

SCHEDULE A1 - TRANSECTS
Area E - Suburban

DESIGNATION:
CURRENT: IM - (MIXED INDUSTRIAL ZONE)
PROPOSED: IM[XXXX] - (MIXED INDUSTRIAL ZONE)

SCHEDULE A4 - TRANSIT STATIONS
Not applicable - more than 600m to the nearest transit station

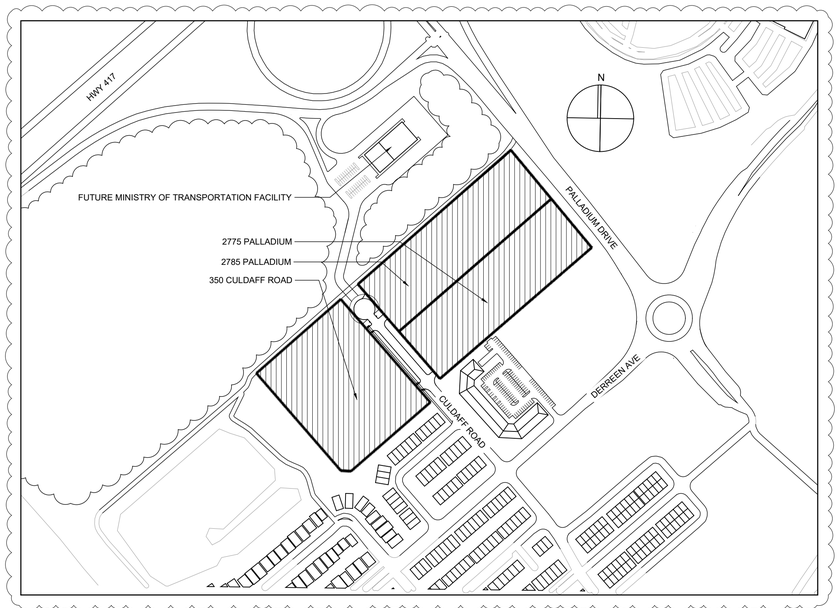
PROPOSED USES:
Hotel
Restaurant
Indoor Entertainment Facility
Parking Lot

TABLE 1003 - IM [XXXX] ZONE PROVISIONS

MINIMUM LOT AREA:	**Required**	**Proposed**	
	1,000sm	53,236sm	
MINIMUM LOT WIDTH:	**Required**	**Proposed**	
	No minimum	144m	
SETBACKS:	**Required**	**Proposed**	
Front yard:	3.0m	25.8m	
Interior side yard:	3.0m	6.0m	
Rear yard:	3.0m	7.137m	
MAX. BUILDING HEIGHT:	**Permitted**	**Proposed**	
All other cases:	27m	26.31m	Hotel - top of parapet
LOT COVERAGE:	**Permitted**	**Proposed**	
Maximum:	65%	21.9%	
WIDTH OF LANDSCAPING:	**Required**	**Proposed**	
Abutting N1-6, INZ:	3m	6m	
All other cases:	no minimum		
PART 6 - PARKING	**Required**	**Proposed**	
Typical spaces:		682	
Barrier free spaces:		22	
Total spaces:		704	
BICYCLE PARKING	**Required**	**Proposed**	
Short term bicycles:	58	58	
Inclusive bicycles:	3	3	
Total bicycles	61	61	
LOADING SPACES	**Required**	**Proposed**	
	2	2	

05 SP-A01 ZONING REVIEW 2026-050

SCALE: NTS



06 SP-A01 LOCATION PLAN: SUBJECT SITES

SCALE: NTS

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LRL ENGINEERING

CIVIL ENGINEER
LRL ENGINEERING

PLANNING CONSULTANT
JFSA CANADA

TRAFFIC ENGINEER
CGH TRANSPORTATION

LANDSCAPE ARCHITECT
NAK DESIGNS

WATERPARK BUILDING
OPENAIRE INC.

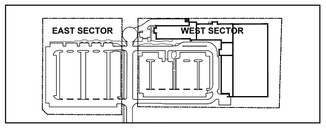
WATERPARK AQUATICS SYSTEMS
MARTIN AQUATICS

WATERPARK INTERIOR LANDSCAPING
EDSA

North

Revisions

No.	By	Description	Date
06	JT	SITE PLAN APPLICATION	2026-10-02
05	JT	ISSUED FOR REVIEW	2026-10-01
04	JT	REVISED FOR DISCUSSION	2026-08-31
03	JT	SITE PLAN APPLICATION	2026-07-15
02	JT	ISSUED FOR PRICING	2026-06-26
01	JT	ISSUED FOR DISCUSSION	2026-06-26



KEY PLAN - EAST AND WEST SECTORS

Project

OTTAWA INDOOR AQUATIC & RECREATION FACILITY

2775 & 2785 PALLADIUM DRIVE, OTTAWA ON

Drawing

SITE PLAN EAST AND WEST SECTORS LOCATION PLAN

Scale: 1:400

Drawn: IEW

Checked: JT

Stamp

ONTARIO ASSOCIATION OF ARCHITECTS
JILL TROWER
LICENCE 5833

Project No.: 24-210

Drawing No.: SP-A01

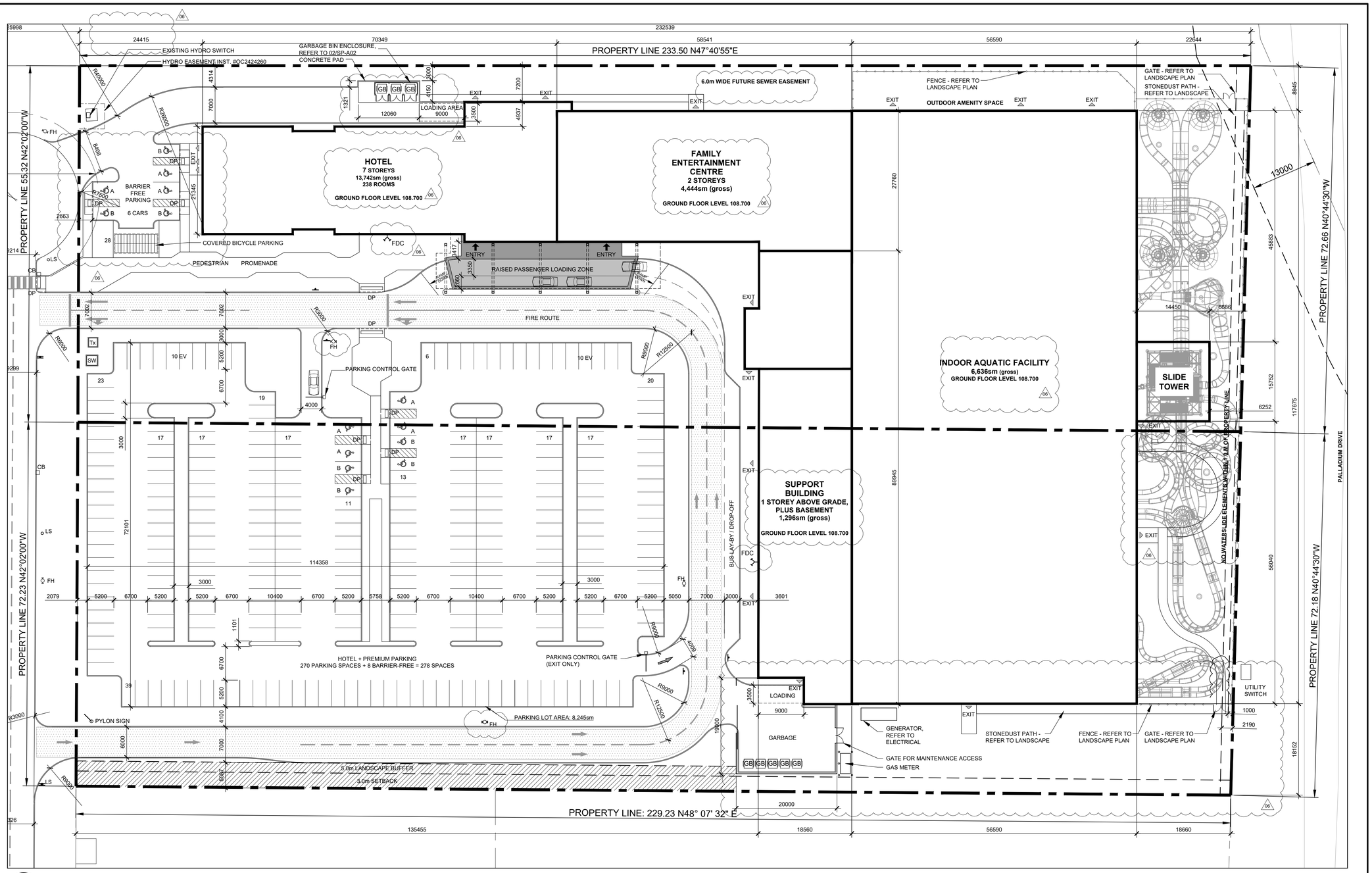
Date: JUN. 2026

D07-12-26-0085

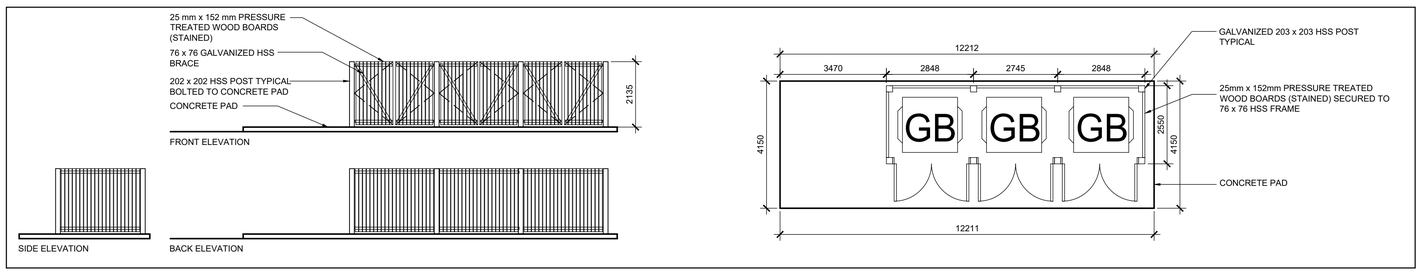
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594 X 841 – PLOT A1

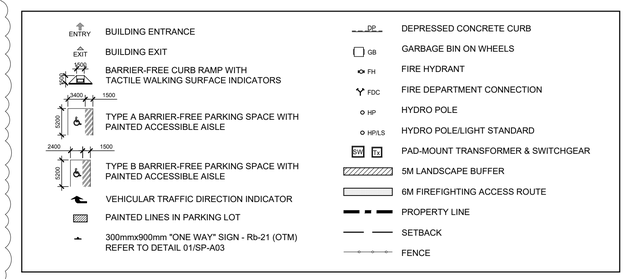
PLAN #19492



01 SP-A02 SITE PLAN - EAST SECTOR
SCALE: 1:400



02 SP-A02 GARBAGE ENCLOSURE PLAN AND ELEVATION
SCALE: 1:100



03 SP-A02 LEGEND
SCALE: NTS

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JFSA CANADA

TRAFFIC ENGINEER
CGH TRANSPORTATION

LANDSCAPE ARCHITECT
NAK DESIGNS

WATERPARK BUILDING
OPENAIRE INC.

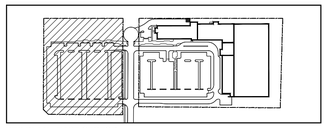
WATERPARK AQUATICS SYSTEMS
MARTIN AQUATICS

WATERPARK INTERIOR LANDSCAPING
EDSA

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03	JT	SITE PLAN APPLICATION	2026-07-15
02	JT	ISSUED FOR PRICING	2026-06-26
01	JT	ISSUED FOR DISCUSSION	2026-06-26



KEY PLAN - EAST SECTOR

Project

OTTAWA INDOOR AQUATIC & RECREATION FACILITY

2775 & 2785 PALLADIUM DRIVE, OTTAWA ON

Drawing

SITE PLAN EAST SECTOR

Scale: 1:400

Drawn: IEW

Checked: JT

Stamp: ONTARIO ASSOCIATION OF ARCHITECTS — JILL TROWER — LICENCE 5833

Project No.: 24-210

Date: JUN. 2026

Drawing No.: SP-A02

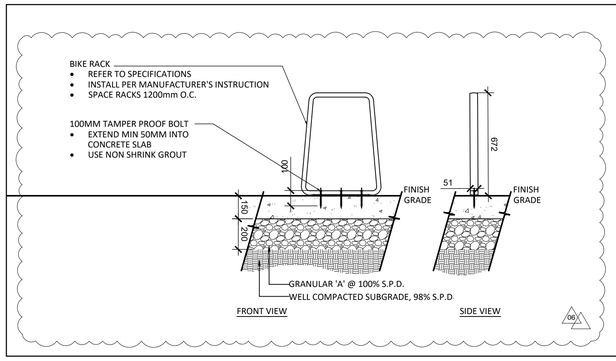
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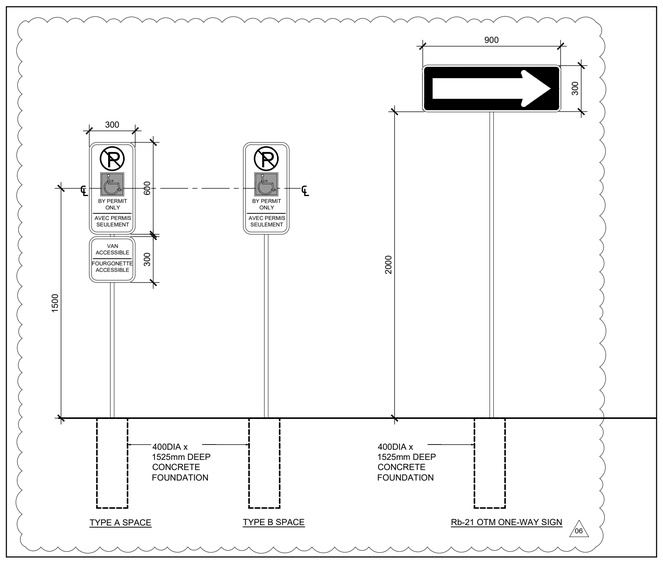
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594 X 841 – PLOT A1

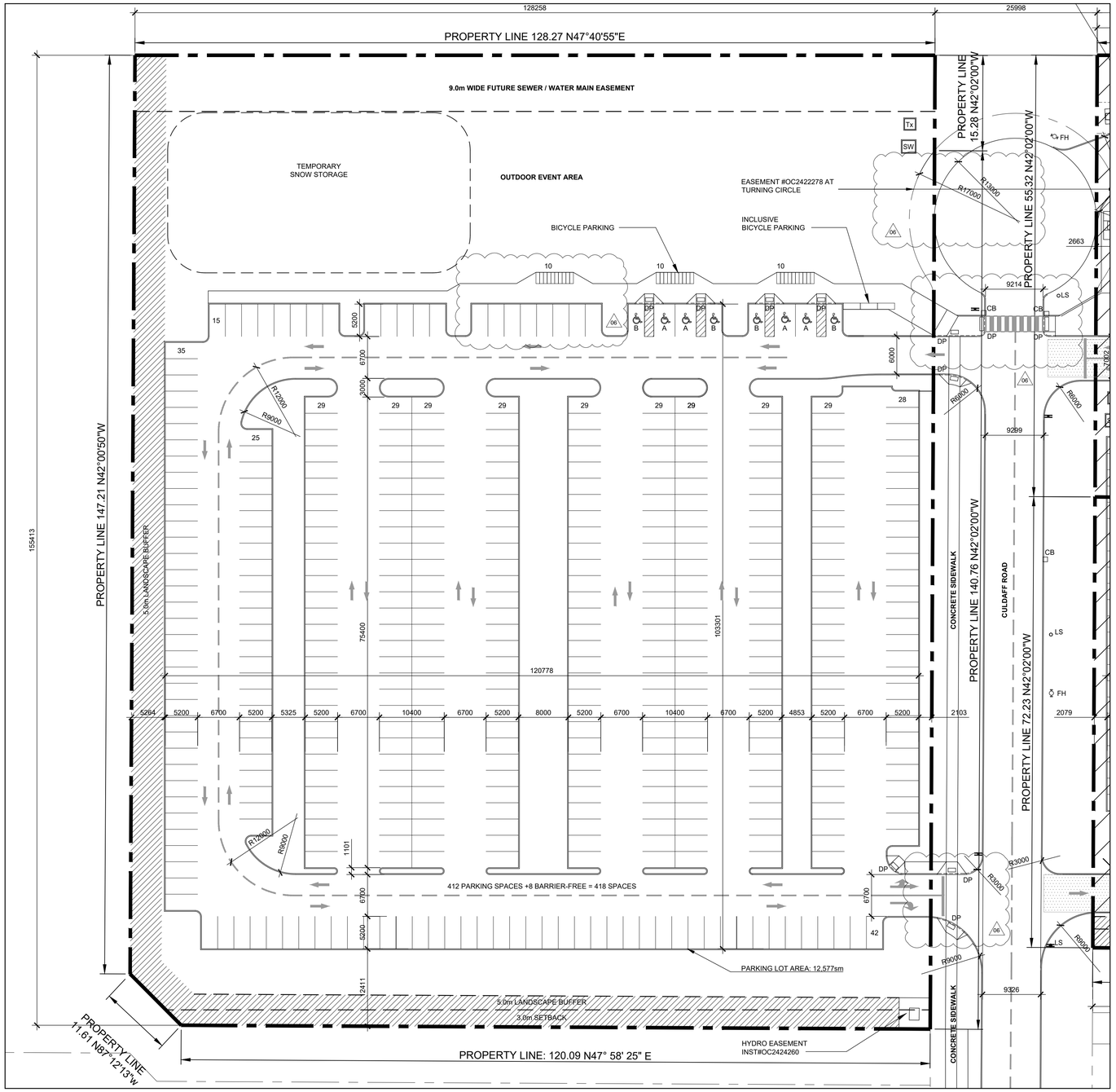
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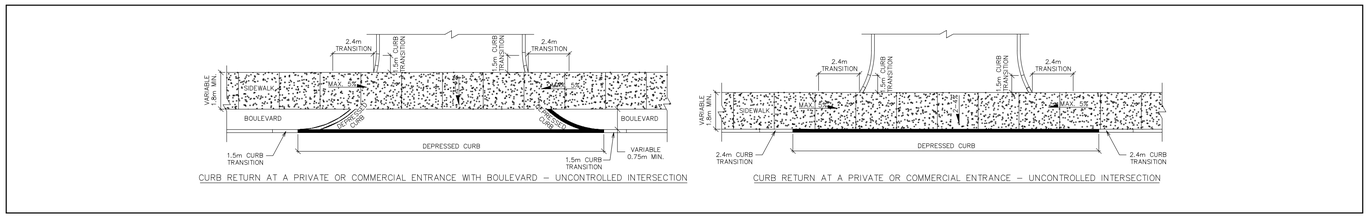
02 BICYCLE RACKS - REFER TO LANDSCAPE PLAN
SP-A03 SCALE: SP-A02



01 TYPICAL SIGN DETAILS
SP-A03 SCALE: 1:20



03 SITE PLAN - WEST SECTOR
SP-A03 SCALE: 1:400



04 CITY OF OTTAWA STANDARD DETAIL SC7.1 CURB RETURN ENTRANCES
SP-A03 SCALE: NTS

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LANDSCAPE ARCHITECT
NAK DESIGNS

WATERPARK BUILDING
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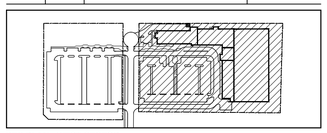
WATERPARK AQUATICS SYSTEMS
MARTIN AQUATICS

WATERPARK INTERIOR LANDSCAPING
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Revisions

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02	JT	ISSUED FOR PRICING	2026-06-26
01	JT	ISSUED FOR DISCUSSION	2026-06-26



KEY PLAN - WEST SECTOR

Project

OTTAWA INDOOR AQUATIC & RECREATION FACILITY

2775 & 2785 PALLADIUM DRIVE, OTTAWA ON

Drawing

SITE PLAN WEST SECTOR

Scale 1:400

Drawn IEW

Checked

Stamp

ONTARIO ASSOCIATION OF ARCHITECTS
JILL TROWER
LICENCE 5833

Project No. 24-210

Date JUN. 2026

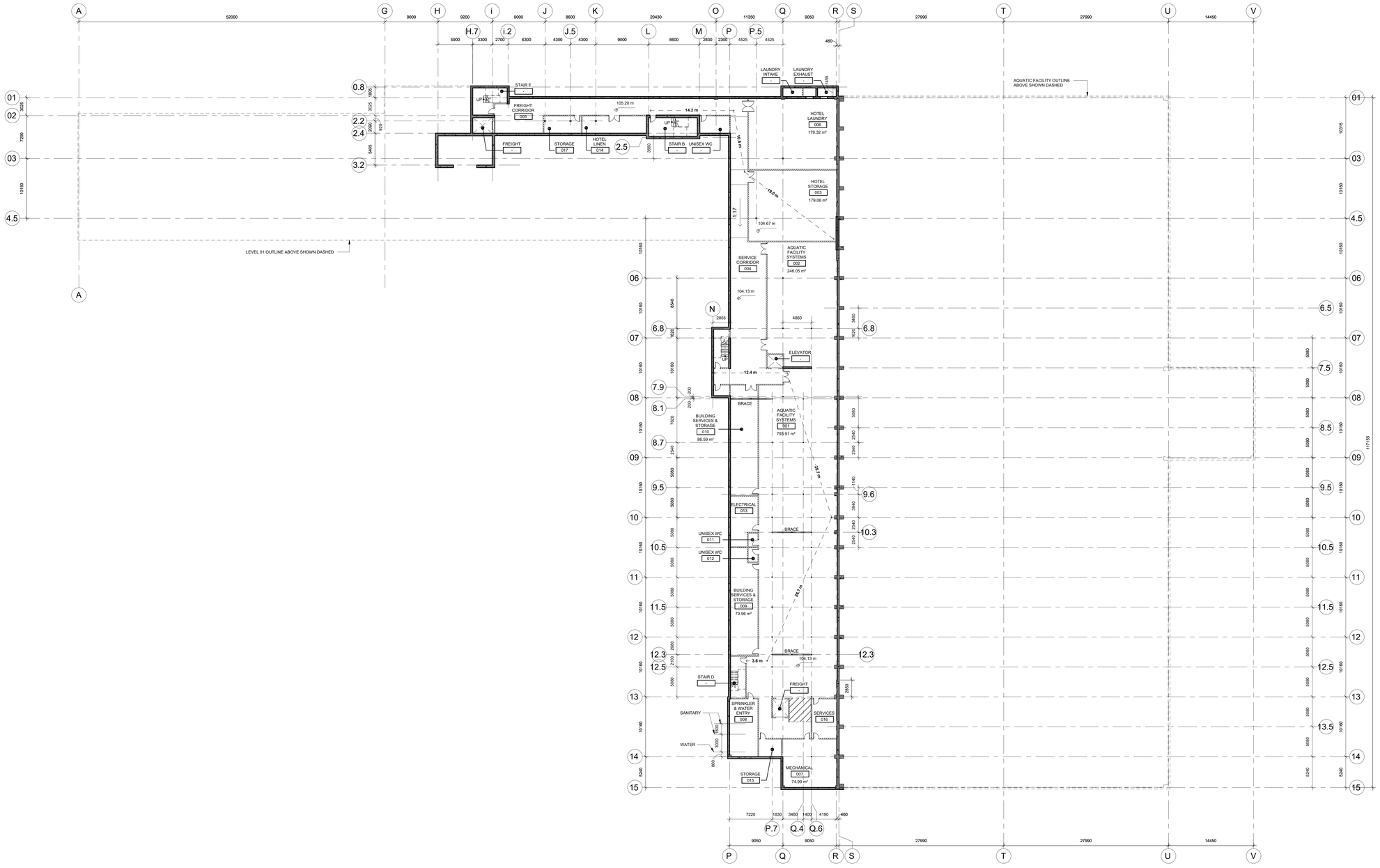
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D07-12-26-0085

PLAN #19492

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594 X 841 – PLOT A1



01 LOWER LEVEL KEY FLOOR PLAN
A100 Scale: 1 : 250

5

02 RESERVED
A100 Scale:N/A

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PROJECT TRUE

Revisions

Revision Number	Description	Date
1	ISSUED FOR COORDINATION	2026-09-04
2	ISSUED FOR COORDINATION	2026-09-11
3	ISSUED FOR COORDINATION	2026-09-18
4	ISSUED FOR COORDINATION	2026-09-25
5	ISSUED FOR SITE PLAN	2026-10-02

Project

PALLADIUM RESORT DEVELOPMENT

2775 & 2785 PALLADIUM DR.
OTTAWA, ON.

Drawing

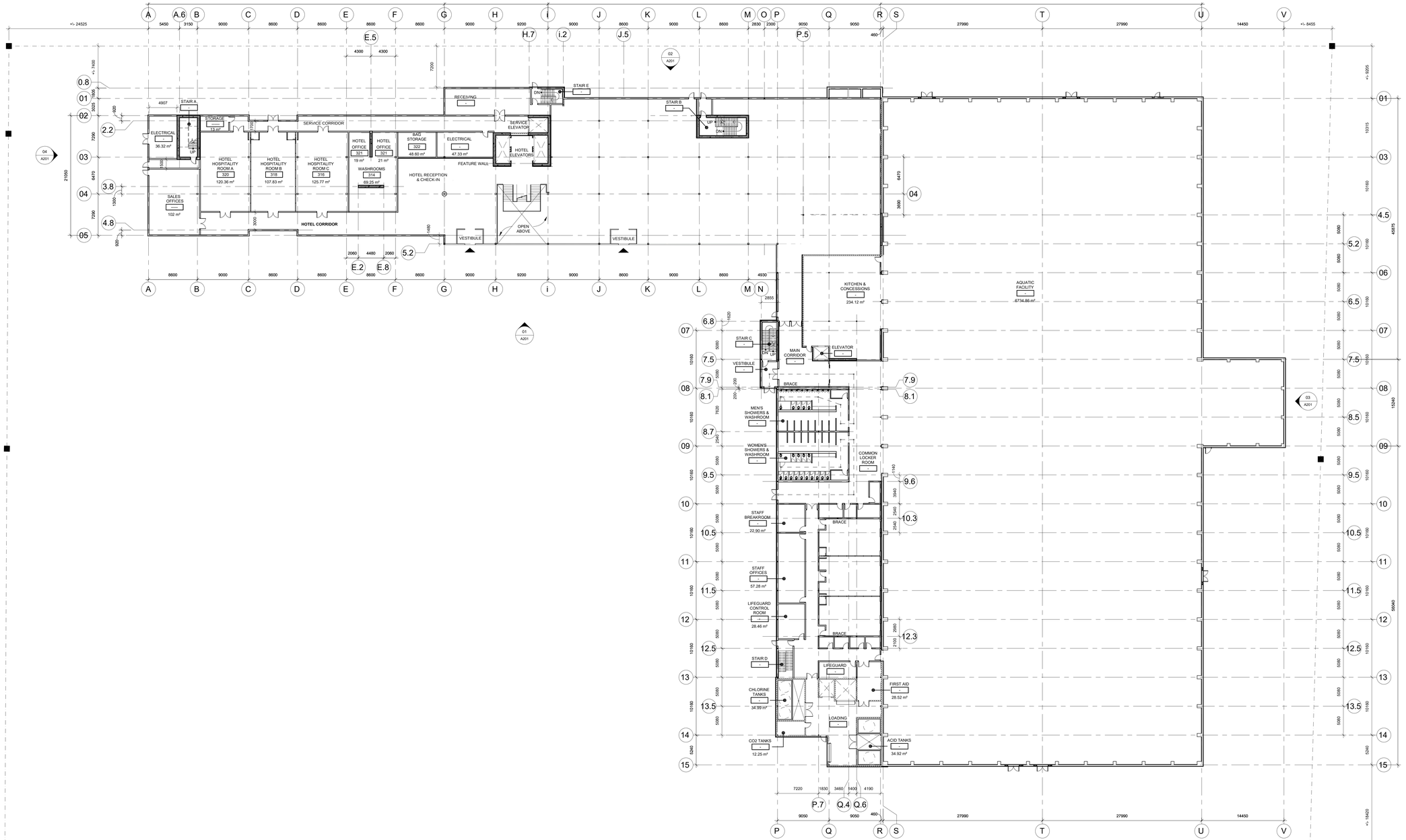
KEY FLOOR PLAN - LOWER LEVEL

Scale 1 : 250
Drawn ERM JT
Checked ERM JT

Stamp: ONTARIO ASSOCIATION OF ARCHITECTS — JILL TROWER LICENCE 5833

Project No. 24-210
Drawing No. A100
Date AUG 2026

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MAIN LEVEL TRAVEL DISTANCE SCHEDULE	
TRAVEL PATH	MAXIMUM TRAVEL LENGHT
MEN'S SHOWERS	43.7 m
WOMEN'S SHOWERS	42.7 m

0 5.0 m 10.0 m 20.0 m

SCALE: 1:250

01 A101 LEVEL 01 - KEY FLOOR PLAN
Scale: 1 : 250

5

02 A101 RESERVED
Scale:N/A

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Revisions

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1	ISSUED FOR COORDINATION	2026-09-04
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4	ISSUED FOR COORDINATION	2026-09-25
5	ISSUED FOR SITE PLAN	2026-10-02

Project

PALLADIUM RESORT DEVELOPMENT

2775 & 2785 PALLADIUM DR.
OTTAWA, ON.

Drawing

KEY FLOOR PLAN - LEVEL 01

Scale 1 : 250

Drawn ERM JT

Checked ERM JT

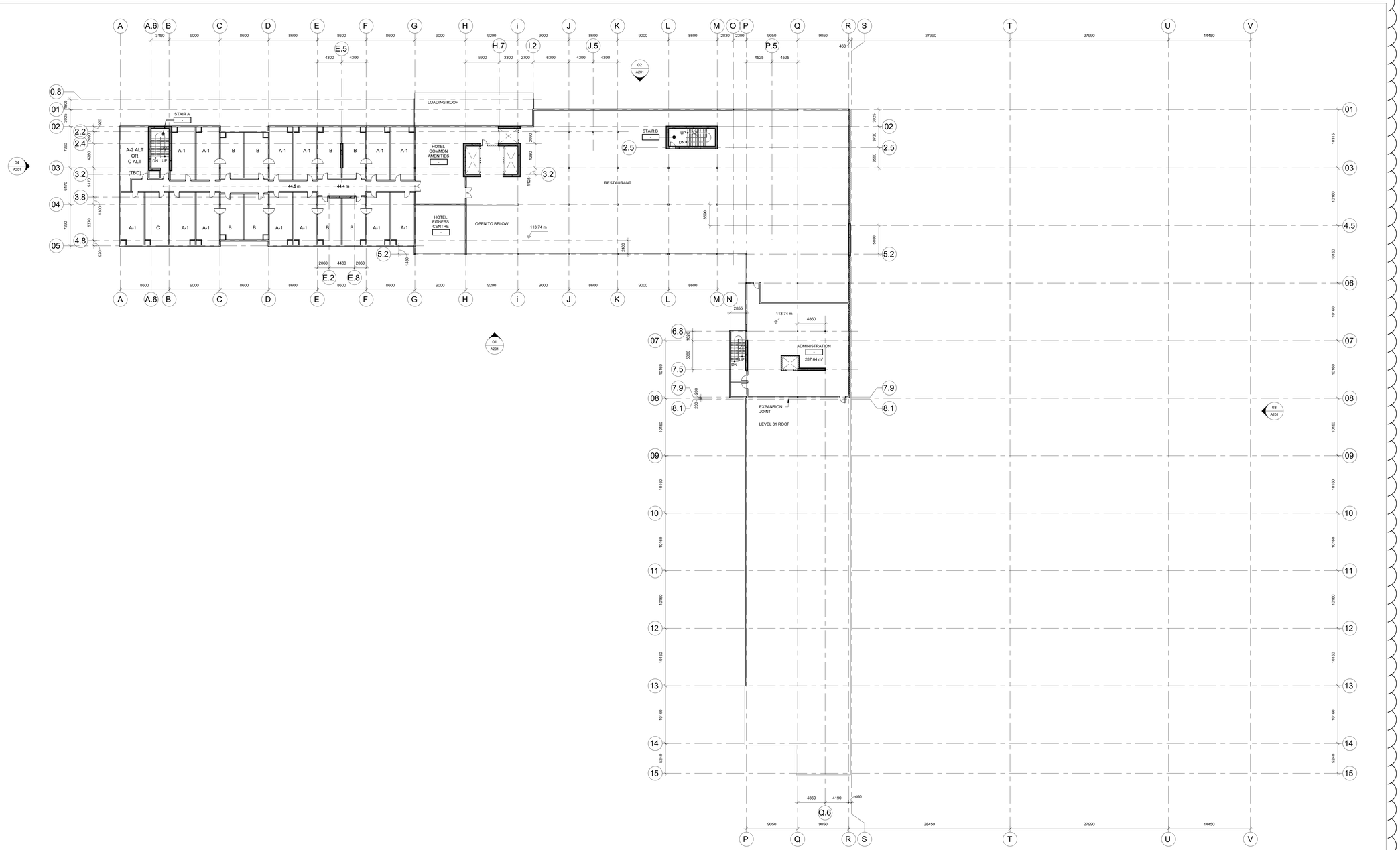
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Project No. 24-210

Drawing No. A101

Date AUG 2026

2026-09-25 1:42:57 PM



0 5.0 m 10.0 m 20.0 m

SCALE: 1:250

01 A102 LEVEL 02 - KEY FLOOR PLAN

Scale: 1 : 250

02 A102 RESERVED

Scale:N/A

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Revisions

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1	ISSUED FOR COORDINATION	2026-09-04
2	ISSUED FOR COORDINATION	2026-09-11
3	ISSUED FOR COORDINATION	2026-09-18
4	ISSUED FOR COORDINATION	2026-09-25
5	ISSUED FOR SITE PLAN	2026-10-02

Project

PALLADIUM RESORT DEVELOPMENT

2775 & 2785 PALLADIUM DR.
OTTAWA, ON.

Drawing

KEY FLOOR PLAN - LEVEL 02

Scale 1 : 250

Drawn ERM JT

Checked ERM JT

Stamp

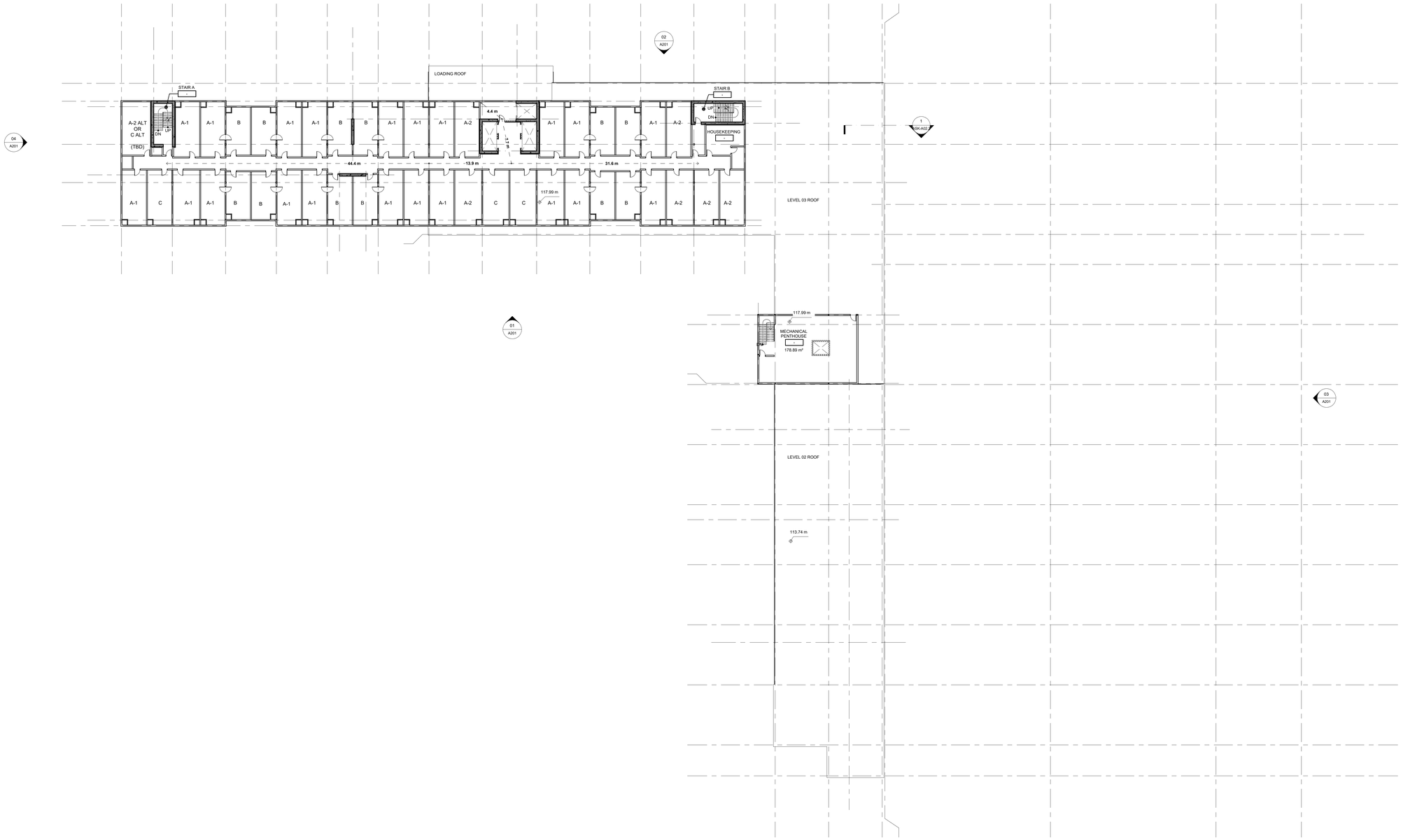
ONTARIO ASSOCIATION OF ARCHITECTS
JILL TROWER
LICENCE 5833

Project No. 24-210

Drawing No. A102

Date AUG 2026

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THIRD LEVEL TRAVEL DISTANCE SCHEDULE	
TRAVEL PATH	MAXIMUM TRAVEL LENGHT
STAIR A	44.4 m
STAIR B	43.7 m

0 5.0 m 10.0 m 20.0 m

SCALE: 1:250

01 A103 LEVEL 03 - KEY FLOOR PLAN
Scale: 1 : 250

5

02 A103 RESERVED
Scale:N/A

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3	ISSUED FOR COORDINATION	2026-09-18
4	ISSUED FOR COORDINATION	2026-09-25
5	ISSUED FOR SITE PLAN	2026-10-02

Project

PALLADIUM RESORT DEVELOPMENT

2775 & 2785 PALLADIUM DR.
OTTAWA, ON.

Drawing

KEY FLOOR PLAN - LEVEL 03

Scale 1 : 250

Drawn ERM JT

Checked ERM JT

Stamp

ONTARIO ASSOCIATION OF ARCHITECTS
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LICENCE
5833

Project No. 24-210

Drawing No. A103

Date AUG 2026

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APPENDIX C

Water Demand Calculations

Water Supply Calculations

LRL File No. : 240720
Project: Ottawa Waterpark
Location: Palladium Resort Development Limited Partnership
Date: 2026-08-06
Designed: K.P.
Checked:
Dwg Reference:

Water Demand based on the City of Ottawa Design Guidelines-Water Distribution, 2010

Industrial Demand

Property Type	Unit Rate	# of Beds	Demand (L/d)	Demand (L/s)
Hotel (225 L/Bed space/d)	225	236	53100	0.615
Property Type	**Unit Rate**	**Area (ha)**		
Hotel ground floor [Other commercial space] (L/ha/d)	28000	0.15	4284	0.050
Entertainment Center [Other commercial space] (L/ha/d)	28000	0.33	9147.6	0.106
Support Building [Other commercial space] (L/ha/d)	28000	0.35	9713.2	0.112
Aquatic park Demands, *Average daily water per water usage bills at existing facilities.*			113717.7	1.316

Hotel, Entertainment, Support Bldg					
Average Day Demand	**76,245**	**L/d**		**0.882**	**L/s**
Maximum Day Factor	1.5		(Design Guidelines-Water Distribution Table 4.2)		
Maximum Daily Demand	**114,367**	**L/d**		**1.324**	**L/s**
Peak Hour Factor	1.8		(Design Guidelines-Water Distribution Table 4.2)		
Maximum Hour Demand	**205,861**	**L/d**		**2.383**	**L/s**

Aquatic Park					
Average Day Demand (historical)	**113,718**	**L/d**		**1.316**	**L/s**
Maximum Day Factor			(Design Guidelines-Water Distribution Table 4.2)		
Maximum Daily Demand (historical)	**542,287**	**L/d**		**6.276**	**L/s**
Peak Hour Factor	1.8		(Design Guidelines-Water Distribution Table 4.2)		
Maximum Hour Demand	**976,117**	**L/d**		**11.298**	**L/s**

TOTAL DEMAND				
Average Day Demand	**189,962**	**L/d**	**2.20**	**L/s**
Maximum Daily Demand	**656,654**	**L/d**	**7.60**	**L/s**
Maximum Hour Demand	**1,181,978**	**L/d**	**13.68**	**L/s**

Water Service Pipe Sizing

Q = VA

Where: V = velocity (m/s)
A = area of pipe (m^2)
Q = flow rate (L/s)

Assuming a maximum velocity of 1.8m/s, the diameter of pipe is calculated as:

Minimum pipe diameter (d) = $(4Q/\pi V)^{1/2}$
= 0.098 m
= 98 mm

Proposed pipe diameter (d) = **200** mm (to be confirmed with hydraulic pressure analysis)
= **8** Inches

Fire Flow Calculations
LRL File No. 240720
Project: Proposed Development
Location: Palladium Resort Development Limited Partnership
Date: July 8, 2026
Method: Fire Underwriter's Survey (FUS)

BUILDING - A1

Step	Task	Term	Options	Multiplier	Choose:	Value	Unit	Fire Flow
Construction Coefficient (C)								
1	Choose frame used for building	Coefficient C related to the type of construction	Wood Frame Construction (Type V)	1.5	Noncombustible Construction (Type II)	**0.8**		
			Mass Timber Construction (Type IV-A)	0.8				
			Mass Timber Construction (Type IV-B)	0.9				
			Mass Timber Construction (Type IV-C)	1.0				
			Mass Timber Construction (Type IV-D)	1.5				
			Ordinary Construction (Type III)	1.0				
			Noncombustible Construction (Type II)	0.8				
			Fire Resistive Construction (Type I)	0.6				
Floor Gross Area (A)								
2	Total Effective Gross Floor Area = Hotel (Ground Floor 1530sm + 2nd floor 1301sm + Addition floors (5) 2043sm [use 50%]), Family Entertainment Center (Ground floor 1788sm+1479sm), Waterpark (6643sm), Support Bldg (3469)					**21,318**	m^2	
3	Obtain fire flow before reductions	Required fire flow (rounded to nearest 1000)	Fire Flow = 220 x C x $A^{0.5}$				L/min	**26,000**
Occupancy and Contents Adjustment								
4	Choose combustibility of contents	Occupancy hazard reduction or surcharge	Noncombustible	-25%	Limited combustible	**-15%**	L/min	**22,100**
			Limited combustible	-15%				
			Combustible	0%				
			Free burning	15%				
			Rapid burning	25%				
Sprinkler Protection								
5	Choose reduction for sprinklers	Sprinkler reduction	Automatic sprinkler protection designed & installed in accordance with NFPA 13	-30%	True	**-30%**	L/min	**11,050**
			Water supply is standard for both the system and fire department hose lines	-10%	True	**-10%**		
			Fully supervised system	-10%	True	**-10%**		
Exposure Adjustment								
6	Choose separation	Exposure distance	North side	>30m	0%	**15%**	L/min	**14,365**
			East side	>30m	0%			
			South side	10.1 to 20m	15%			
			West side	>30m	0%			
Net Required Fire Flow								
7	Obtain fire flow and duration				Minimum required fire flow (rounded to nearest 1000)		L/min	**14,000**
					Minimum required fire flow		L/s	**233.3**
					Required duration of fire flow		hr	**2**

Outlook

RE: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

From Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>
Date Thu 2026-07-23 4:07 PM
To Kelly Paradis <kparadis@lrl.ca>; Maxime Longtin <mlongtin@lrl.ca>
Cc Virginia Johnson <vjohnson@lrl.ca>; Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>

1 attachment (961 KB)
2775 & 2785 Palladium_Condition (22July2026).docx;

Hi Kelly,

Please find the attached WBC for the site. The HGLs have been provided at the two existing stubs, as this is the City's preference in terms of connection points to avoid having to blank the existing stub to 2785 Palladium.

We kindly ask that you update the site servicing and SWM report as soon as possible to include 1) the WBC and 2) the hydraulic analysis for the private watermain, as it will help confirm that pressure requirements are met on site as well. While we understand that the details of the watermain hydraulic analysis can be reviewed in depth at the Site Plan stage, we would like to see an updated report to give us the confidence that the site is serviceable ahead of the PHC on September 2nd.

We are also actively working on resolving the sanitary component (allowable discharge) for this file. Tim and Krishon have coordinated a meeting for tomorrow to give us an opportunity to discuss the proposed discharge to the sanitary sewer for this site. I found some mistakes in the sanitary design sheet that you prepared which I will raise in the meeting tomorrow, but the focus of tomorrow's conversation will really be on the assumptions made for the peak flow of the water park (currently estimated at 0.46 l/s).

Once we sort through this sanitary release rate conversation, we also expect the site servicing and SWM report to be updated based on these discussions ahead of the PHC on September 2nd.

Thank you Kelly, looking forward to tomorrow's meeting.

Best,
Jean-Miguel Roy, P.Eng
Project Manager, Infrastructure Approvals
Development and Building Services |
Direction générale des services de la planification, de l'aménagement et du bâtiment
110 Laurier Avenue West | 110 avenue Laurier Ouest
City of Ottawa | Ville d'Ottawa
613.580.2424 x 30902

From: Kelly Paradis <kparadis@lrl.ca>
Sent: July 21, 2026 3:41 PM
To: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>; Maxime Longtin <mlongtin@lrl.ca>
Cc: Virginia Johnson <vjohnson@lrl.ca>; Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon

<krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>
Subject: Re: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

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Jean-Miguel,

I have adjusted the demands as requested.

Here are the average demands for the years 2022, 2023, 2024

Aquatic Park Day Demand Average taken from historic data	L/d	
2024	92145.08	Wk day
	113714.98	Wk end
2023	102544.86	Wk day
	159637.05	Wk end
2022	92895.22	Wk day
	121368.76	Wk end
Aquatic Park Max Day Demand Average taken from historic data	**L/d**	
2024	716547.83	Wk day
	395658.62	Wk end
2023	441261.46	Wk day
	729702.13	Wk end
2022	602822.76	Wk day
	367729.87	Wk end

The above values provide an average demand of 113,717.7 L/d and an average max demand of 542,287 L/s

These updated values provide the following total demands

Water Demand based on the City of Ottawa Design Guidelines-Water Distribution, 2010

Industrial Demand

Property Type	Unit Rate	# of Beds	Demand (L/d)	Demand (L/s)
Hotel (225 L/Bed space/d)	225	236	53100	0.615
Property Type	**Unit Rate**	**Area (ha)**		
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Aquatic park Demands, *Average daily water per water usage bills at existing facilities.*			113717.7	1.316

Page 1

Hotel, Entertainment, Support Bldg				
Average Day Demand	**76,245**	**L/d**	**0.882**	**L/s**
Maximum Day Factor	1.5		(Design Guidelines-Water Distribution Table 4.2)	
Maximum Daily Demand	**114,367**	**L/d**	**1.324**	**L/s**
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TOTAL DEMAND				
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Maximum Daily Demand	**656,654**	**L/d**	**7.60**	**L/s**
Maximum Hour Demand	**1,181,978**	**L/d**	**13.68**	**L/s**

Given that the updated calculations have now been provided, can we confirm that the Site Plan Application will continue to be processed, with final confirmation on water demands and boundary conditions handled concurrently with the SPA review?

Please let us know if there are any questions or if additional information is needed.

Kelly Paradis, P.Eng., PMP
Senior Manager of Civil Engineering
LRL ENGINEERING | INGÉNIERIE
C +1 343-549-8105 - **E** kparadis@lrl.ca'

From: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>
Sent: July 21, 2026 9:15 AM
To: Kelly Paradis <kparadis@lrl.ca>; Maxime Longtin <mlongtin@lrl.ca>
Cc: Virginia Johnson <vjohnson@lrl.ca>; Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>
Subject: RE: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

Good morning Kelly and Maxime,

I am kindly following up with your team on these updated demands, as they are required to finalize the water boundary conditions for this site.

Thank you,
Jean-Miguel

From: Roy, Jean-Miguel
Sent: July 10, 2026 8:56 AM
To: 'Kelly Paradis' <kparadis@lrl.ca>; Maxime Longtin <mlongtin@lrl.ca>
Cc: Virginia Johnson <vjohnson@lrl.ca>; Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>
Subject: RE: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

Hi Kelly,

We've received the following comments from our unit in charge of reviewing your proposed water demands and the available sanitary capacity for your site:

My team completed a review of the data shared by LRL and compared to historical data for the largest pool within the city. Please find below our feedback:

1. *Average Day*

   The projected waterpark average day demands are 100,000 L/d, which were derived from the existing Texas waterpark's historical demands from 2021-2024. Demands from the City's largest pool from 2022-2025 are barely lower than the projected demands for the proposed waterpark, even though the waterpark will likely be a larger facility. Dallas 2021 demands are noticeably lower than other years, thus driving the average down. In 2021, countries were still recovering from Covid19 pandemic shutdowns, so 2021 is not a representative year for the waterpark activity. Year 2021 should be excluded from the historical average. We don't need to default to the largest number (159,000L/d) considering that the proposed facility will be smaller than the one in Texas.

2. *Maximum Day*

   A peaking factor of 1.5 x AVDY from the Design Guidelines is applied. The City's pools, on average (across all facilities) show an average peaking factor of ~2 to 2.5 x AVDY. The Texas waterpark historical demands include maximum day demands with peaking factors varying from 3 to 8 x AVDY. Applying the blanket MXDY peaking factor might not be appropriate for the waterpark. A higher peaking factor should be used for the maximum day demand. The average of MXDY demands can be considered for 2022-2025, similar to the AVDY demand calculations.

3. *PKHR peaking factors*

   The City's pools, on average show a PKHR peaking factor of 1.5 to 2 x MXDY. Based on this, the use of PKHR peaking factor 1.8 x MXDY should be appropriate for the waterpark demands.

Please have LRL update their calculations

Let me know if you have any questions.

Regards,
Jean-Miguel Roy, P.Eng
Project Manager, Infrastructure Approvals
Development and Building Services |

Direction générale des services de la planification, de l'aménagement et du bâtiment
110 Laurier Avenue West | 110 avenue Laurier Ouest
City of Ottawa | Ville d'Ottawa
613.580.2424 x 30902

From: Kelly Paradis <kparadis@lrl.ca>
Sent: July 06, 2026 10:57 AM
To: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>; Maxime Longtin <mlongtin@lrl.ca>
Cc: Virginia Johnson <vjohnson@lrl.ca>; Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>
Subject: Re: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

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Jean-Miguel,

Thank you for the update.

The SPA will be submitted to the city within the next few days and therefore we can provide the following information that is included in the final report, section 9.

Sanitary Design - design sheet attached
The sanitary sewer service to the north end of the Culdaff Rd sewer, MHSA76096 to MHSA76097, would provide servicing to the hotel and the family entertainment centre, 1.66 Ha. The wet flow for this area was calculated to be 5.08 L/s. The parameters used to calculate the anticipated flows for this outlet were 225L/bed/d, a commercial & Institutional flow of 28,000 L/ha/day as per the City of Ottawa Design Guidelines, and an infiltration allowance of 0.33 L/ha/s.

The sanitary sewer service to the south end of the Culdaff Rd sewer, MHSA76099 to MHSA76092, would provide servicing to the support building and the waterpark. The wet flow for the area (1.66 Ha) was calculated to be 1.64 L/s. The waterpark average daily demand was assumed to be 100,000 L/day, derived from the Dallas Texas waterpark. In the absence of a facility specific water balance from the mechanical design team, a conservative return factor of 40% was applied to this demand to estimate the domestic sanitary flow from the waterpark. The wet flow for the waterpark was calculated to be 0.46L/s.

The west side of Culdaff Rd, Block 244 (1.99 Ha), was allocated parameters used to calculate the anticipated flows as commercial & Institutional flow of 28,000 L/ha/day per the City of Ottawa Design Guidelines, and an infiltration allowance of 0.33 L/ha/s. The wet flow for this area was calculated to be 1.62 L/s.

Attached is the external SAN drainage plan from 195 Huntmar Drive Design City file no D07-16-16-0011 City plan 18059



No.	BY	DATE	DESCRIPTION
2	W.L.	20-04-03	2nd SUBMISSION
1	W.L.	19-12-23	1st SUBMISSION

CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
21-09-20
PROVINCE OF ONTARIO

© DSEL

EXTERNAL SAN DRAINAGE PLAN

2325483 ONTARIO LTD.

195 HUNTMAR DRIVE

DSEL
david schaeffer engineering ltd

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY: R.A./A.K.	CHECKED BY: W.L.	SHEET NO.
DESIGNED BY: W.L.	CHECKED BY: C.M.	87
SCALE: 1:5000	DATE: DECEMBER 2019	

CITY FILE No. D07-16-16-0011 CITY PLAN No. 18059

If additional information is needed please let me know.

Kelly Paradis, P.Eng., PMP
Senior Manager of Civil Engineering
LRL ENGINEERING | INGÉNIERIE
C +1 343-549-8105 - **E** kparadis@lrl.ca'

From: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>
Sent: July 6, 2026 9:27 AM
To: Maxime Longtin <mlongtin@lrl.ca>; Kelly Paradis <kparadis@lrl.ca>
Cc: Virginia Johnson <vjohnson@lrl.ca>; Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>
Subject: RE: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

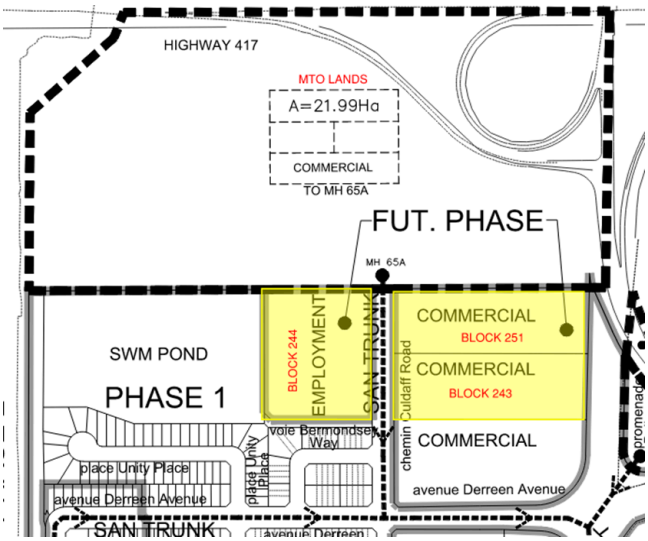
Salut Maxime,

I apologize for the delay in my response.

The Water Resources Planning & Engineering team is still reviewing your inquiries at this time for a) the allowable sanitary capacity discharge rate, b) the water boundary conditions and c) the required water looping configuration. This is taking a bit longer than usual since this development is both large and unique.

Their team recently asked for the following information from you to help process these inquiries:

1. Your proposed sanitary release rates. What we've received so far are the allocated release rates from the MSS design sheets, but what are you actually proposing to discharge?
2. To provide the whole sanitary drainage plan where the following excerpt comes from.



With regards to having a second sanitary connection, I do not have immediate concerns with that approach as long as you use the existing infrastructure installed to your property line.

Regards,
Jean-Miguel Roy, P.Eng
Project Manager, Infrastructure Approvals
Development and Building Services |
Direction générale des services de la planification, de l'aménagement et du bâtiment
110 Laurier Avenue West | 110 avenue Laurier Ouest
City of Ottawa | Ville d'Ottawa
613.580.2424 x 30902

From: Maxime Longtin <mlongtin@lrl.ca>
Sent: June 25, 2026 11:46 AM
To: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>; Kelly Paradis <kparadis@lrl.ca>
Cc: Virginia Johnson <vjohnson@lrl.ca>; Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>
Subject: RE: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

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Good morning Jean-Miguel,

I hope you're doing well.

As we are preparing our first Site Plan Control submission for the above-noted development, we would like to request consideration for a secondary sanitary connection to service the site.

As shown on the attached snip, 2775 Culdaff Road is currently serviced by a 250 mm sanitary sewer connected to MHSA76099, while 2785 Culdaff Road is serviced by a separate 250 mm sanitary sewer connected to MHSA76096.

Given the overall size and layout of the proposed building, relying on a single sanitary outlet would create additional challenges for the internal plumbing design and result in longer internal service runs. We are therefore proposing to connect the hotel portion of the development to the sanitary service

associated with MHSA76096, while the remainder of the building would continue to discharge through the existing service at MHSA76099.

The intent remains to provide dual water service connections, as previously discussed.

Do you foresee any concerns with proceeding on this basis, or are there any additional requirements we should be aware of before advancing the design?

Additionally, we would appreciate an update regarding the boundary conditions and the allowable sanitary release rate when available.

Thank you, and please don't hesitate to call if you would like to discuss further.

Maxime Longtin, Civil Project Manager

LRL ENGINEERING | INGÉNIERIE

Head Office – 5430 Canotek Rd., Ottawa, ON
C +1 613-915-8043 **E** mlongtin@lrl.ca
Ottawa | *Pembroke* | *Moncton*
www.lrl.ca

From: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>
Sent: Saturday, June 20, 2026 11:01 AM
To: Kelly Paradis <kparadis@lrl.ca>
Cc: Virginia Johnson <vjohnson@lrl.ca>; Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>; Maxime Longtin <mlongtin@lrl.ca>
Subject: RE: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

Thank you Kelly, I believe that is all we need on our end to process everything. I will touch base with your team if we need anything else!

Regards,
Jean-Miguel

From: Kelly Paradis <kparadis@lrl.ca>
Sent: June 18, 2026 3:03 PM
To: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>
Cc: Virginia Johnson <vjohnson@lrl.ca>; Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>; Maxime Longtin <mlongtin@lrl.ca>
Subject: Re: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

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Jean-Miguel,

See attached the sanitary design sheet from Append D of the DSEL servicing report and drawing.

Let me know if anything else is needed.

Kelly Paradis, P.Eng., PMP
Senior Manager of Civil Engineering
LRL ENGINEERING | INGÉNIERIE
C +1 343-549-8105 - **E** kparadis@lrl.ca'

From: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>
Sent: June 18, 2026 10:08 AM
To: Kelly Paradis <kparadis@lrl.ca>
Cc: Virginia Johnson <vjohnson@lrl.ca>; Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>; Maxime Longtin <mlongtin@lrl.ca>
Subject: RE: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

Hi Kelly,

I reviewed your water demands and have no additional comments. We will re-engage our conversations with internal SMEs about the preferred watermain looping configuration to achieve redundancy for your site.

Just one more question regarding the allowable sanitary release rates for your site. Could you please clarify how you've found the values shared in your May 26, 2026 email, as we found slightly different values in the design sheets (Block 243, 244, 256 & MTO Lands have a 1.05 l/s, 1.30 l/s, 1.04 l/s & 14.41 l/s allowable release rate respectively)? If you found those values in the 195 Huntmar Design Brief prepared by DSEL, could you please share that study with our team, and point us where in the study you found these allowable release rates?

Thank you Kelly.

Jean-Miguel

From: Kelly Paradis <kparadis@lrl.ca>
Sent: June 11, 2026 7:54 PM
To: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>
Cc: Virginia Johnson <vjohnson@lrl.ca>; Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>; Maxime Longtin <mlongtin@lrl.ca>
Subject: Re: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

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Jean-Miguel,

See attached and responses in green below.

If additional information is needed, please let me know.

Here is a link to the FUS. I wasn't able to attach the file for some reason. Please let me know if the link does not work.

240720 Ottawa Waterpark FUS 2026-06-11.pdf

Kelly Paradis, P.Eng., PMP
Senior Manager of Civil Engineering
LRL ENGINEERING | INGÉNIERIE
C +1 343-549-8105 - **E** kparadis@lrl.ca'

From: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>
Sent: Tuesday, June 02, 2026 12:28 PM
To: Kelly Paradis <kparadis@lrl.ca>
Cc: Virginia Johnson <vjohnson@lrl.ca>; Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>; Maxime Longtin <mlongtin@lrl.ca>
Subject: RE: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

Hi Kelly,

Thank you for providing your demands. I have a few comments/questions for your team before I can forward them to our IWS team that issues WBC:

- Is one of the proposed 7 floors for the hotel being used as a dinning / bar lounge? If so, these non-residential demands should be accounted for in your total anticipated demands for the hotel. Please revise your demands accordingly. The values have been updated to account for the non-residential "ground" floor.
- Could you kindly provide additional information about the anticipated use for the proposed entertainment center? The entertainment center includes a tickets and gift shop and arcade games.
- Could you please provide a proof of a water consumption bill received for one of the existing indoor waterpark facilities to support your proposed demands of 100,000 l/day?

Attached are yearly summary of the Dallas Epic Water park. An 80,000 square foot indoor/outdoor waterpark with the longest lazy river in Texas and an outdoor wave pool. This water park is 10,000 square feet larger than the Ottawa park and the Ottawa Park does not have the outdoor wave pool. In addition, the Dallas pools are drained daily during March break and daily for the summer months, June/July/August.

- With regards to the FUS calcs:
  - I am calculating a slightly higher total floor area (A) for the calculations: Waterpark (6,643 m2) + Support Building (3,469 m2) + Family Centre (3,267 m2) + Hotel (1,530 m2 + 1,301 m2 + 50% of remaining floors [10,215 m2 * 50%]). The total floor area I obtain is 21,318 m2. I believe in your calculations you only consider 50% of the above 4 floors, but since there are 7 floors total and the FUS asks to apply 50% to a maximum of eight floors (see snapshot provided below), I believe this values should be revised to account for 5 floors instead of 4. The values have been revised to reflect the 21,318 m2.
  - Unless there is a mistake with the scale on the site plan provided by your team, it is my understanding that the proposed buildings on this site are located 18 m away from the southern property line; therefore, it is my understanding that the exposure charge applied for the future residential developments to the south can be capped at 15% instead of 20%. What do you think? The distance is 17.5m the values have been updated to reflect this change.

2) For a building classified with a Construction Coefficient below 1.0:
   a) if any vertical openings in the building (ex. interconnected floor spaces, atria, elevators, escalators, etc.) are unprotected, consider the two largest adjoining floor areas plus 50% of all floors immediately above them up to a maximum of eight; or

Please note that once these demands are revised per the above comments, we will have internal discussions about the allowable sanitary release rate for your site and your proposal below.

Best Regards,

Jean-Miguel Roy

Project Manager, Infrastructure Approvals

Development and Building Services |

Direction générale des services de la planification, de l'aménagement et du bâtiment

110 Laurier Avenue West | 110 avenue Laurier Ouest

City of Ottawa | Ville d'Ottawa

613.580.2424 x 30902

Classified as City of Ottawa - Internal / Ville d'Ottawa - classé interne

From: Kelly Paradis <kparadis@lrl.ca>
Sent: May 26, 2026 6:21 AM
To: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>
Cc: Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>; Virginia Johnson <vjohnson@lrl.ca>
Subject: Re: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

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Hello Jean-Miguel,

I am working with Virginia on this file and can provide the following information.

The preliminary estimated water demands are as follows.

We are currently waiting for additional information from the architect to finalize the preliminary FUS demands.

Water Demand based on the City of Ottawa Design Guidelines-Water Distribution, 2010

Industrial Demand

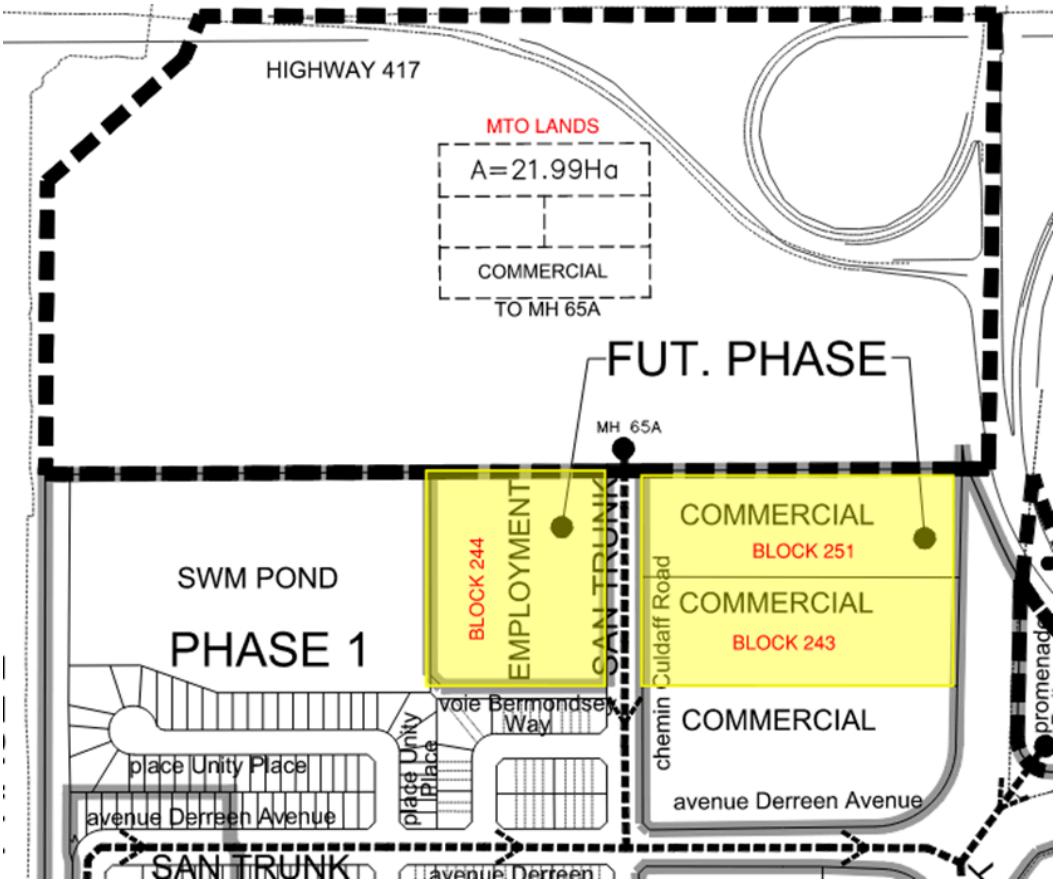
Property Type	Unit Rate	Area (ha)	Demand (L/d)
Hotel (225 L/Bed space/d)	225	236	53100
Entertainment Center [Other commercial space] (L/ha/d)	28000	0.33	9147.6
Support Building [Other commercial space] (L/ha/d)	28000	0.35	9713.2
Aquatic park Demands, *Average daily water per water usage bills at existing facilities.*			100000

Average Day Demand	**171,961**	**L/d**	**1.990**	**L/s**
Maximum Day Factor	1.5		(Design Guidelines-Water Distribution Table 4.2)	
Maximum Daily Demand	**257,941**	**L/d**	**2.985**	**L/s**
Peak Hour Factor	1.8		(Design Guidelines-Water Distribution Table 4.2)	
Maximum Hour Demand	**464,294**	**L/d**	**5.374**	**L/s**

TOTAL DEMAND				
Average Day Demand	**171,961**	**L/d**	**1.99**	**L/s**
Maximum Daily Demand	**257,941**	**L/d**	**2.99**	**L/s**
Maximum Hour Demand	**464,294**	**L/d**	**5.37**	**L/s**

We would also like to discuss the existing sanitary capacity for the existing 250mm dia PVC sanitary sewer located on Culdaff Rd. It appears that sewer design sheets account for a larger MTO land then is actually developable.

The DSEL Design Brief for 2325483 Ontario Ltd, 195 Huntmar Drive, dated July 2020 (2nd submission), delineates the drainage areas depicted in the image below.



Sanitary demands from sewer design sheets:

Commercial & Institutional Flow = 28000 L/ha/day

- MTO lands 21.99ha = Total Flow 17.97 L/s
- Block 244 (1.99ha) = Total Flow 1.62 L/s
- Block 251 (1.6ha) = Total Flow 1.35 L/s
- Block 243 (1.6ha) = Total Flow 1.35 L/s

It appears that the 21.99Ha MTO lands includes the HWY 417 off ramp and cloverleaf. When removing these areas that MTO lands decrease to approximately 16.2Ha. In additional the DSEL Functional Servicing Report for 2325483 Ontario Ltd, 195 Huntmar Drive, dated May 2019 Rev 3 Appendix A storm servicing drawings sizes the MTO lands to be 16.5ha. This decreases in area would create additional capacity in the sewer which we would like to discuss that availability of allocating this additional capacity to the aquatic development lands.

I will provide the fire demand calculations when they are completed. If there are any questions, please do not hesitate to reach out.

Thank you

Kelly Paradis, P.Eng., PMP
Senior Manager of Civil Engineering

LRL ENGINEERING | INGÉNIERIE

C +1 343-549-8105 - **E** kparadis@lrl.ca'

*** I will be away on PTO starting June 3 and returning June 9th.*

From: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>
Sent: May 20, 2026 10:58 AM
To: Virginia Johnson <vjohnson@lrl.ca>
Cc: Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>; Kelly Paradis <kparadis@lrl.ca>
Subject: RE: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

Hi Virginia,

We had our first internal meeting this morning to discuss potential watermain extension configurations. We've determined that knowing the approximate water demands for your site may influence our preferred configuration.

When you have a moment, could you please share your estimated water demands (including fire flow) for your site?

Thank you,

Jean-Miguel

Classified as City of Ottawa - Internal / Ville d'Ottawa - classé interne

From: Roy, Jean-Miguel
Sent: May 14, 2026 8:43 AM
To: Virginia Johnson <vjohnson@lrl.ca>
Cc: Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>; Tim Eisner <teisner@jfsa.com>; Kelly Paradis <kparadis@lrl.ca>
Subject: RE: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

Hi Virginia,

You mentioned below that you've reviewed various servicing studies dating back to 2019 that address the sanitary servicing for these three parcels. Could you please start by sharing your findings from the various studies with us?

I can look into the City's preferred water servicing approach while you provide us with your sanitary servicing findings for this property. I will schedule a meeting with internal stakeholders to hold this discussion about the watermain. Understanding that your water demands may be high, I could see benefit in sharing these with me ahead of the meeting (an approximation would be good enough for now).

I'm also getting up to speed on this file. It seems, per your email below, that parcel #3 is also under the same ownership. However, based on the latest Site Plan available to us (dated from the pre-con), it is not being developed. Could you please confirm what the intentions are with this parcel, as it may influence our decision process for the servicing? I would also appreciate if you could confirm that the Site Plan, dated January 13, 2025, is still the latest version. Otherwise, please provide your latest Site Plan to us.

Thank you,

Jean-Miguel Roy

Project Manager, Infrastructure Approvals

Development and Building Services |

Direction générale des services de la planification, de l'aménagement et du bâtiment

110 Laurier Avenue West | 110 avenue Laurier Ouest

City of Ottawa | Ville d'Ottawa

613.580.2424 x 30902

From: Virginia Johnson <vjohnson@lrl.ca>
Sent: Thursday, May 7, 2026 10:23
To: Rasool, Rubina <Rubina.Rasool@ottawa.ca>; Walker, Krishon <krishon.walker@ottawa.ca>
Cc: Tim Eisner <teisner@jfsa.com>; Kelly Paradis <kparadis@lrl.ca>
Subject: LRL 240720 - 2775 and 2785 Palladium File No.: PC2025-0008

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Hello,

As you may be aware, this project is currently advancing through detailed design, and am hoping you can assit in confirming key servicing parameters and obtaining a point of contact for ongoing coordination, as we understand Gabi Schaeffer is no longer assigned to this file. I know you, Rubina, were in a support role at the initial pre-consult, so please let me know if this is now your file.

There are two critical servicing items we need the city's input on:

1. SANITARY SEWER – ALLOTTED CAPACITY CONFIRMATION

We have reviewed various servicing studies dating back to 2019 that address sanitary servicing for each of the three parcels under development, however, as you know there are several different reports linked to this section of Kanata west. I assume the Kanata west pump station model is the governing constraint here.

Could you please confirm the allotted sanitary capacity previously designated for each of the three parcels?

Error! Filename not specified.

2. WATERMAIN – LOOPING STRATEGY FOR CULDAFF ROAD

As noted in the pre-consultation, watermain looping will be required if the Culdaff Road 305mm PVC watermain is anticipated to service more than 50 m^3/d in total demand across the development. To inform our design approach, we would appreciate the City's input on the preferred looping strategy for the existing dead-end condition on Culdaff Road. With the development to the south, has there been a servicing easement reserved for this? Is the City contemplating a secondary watermain connection running north along Culdaff Road as part of the looping solution?

Please do not hesitate to reach out if you require any additional information from our end to keep this moving rapidly.

Thanks,

Virginia Johnson, P.Eng.
Director of Civil Engineering

LRL ENGINEERING | INGÉNIERIE

Head Office – 5430 Canotek Rd., Ottawa, ON
Pembroke Office – 1344 Pembroke St W, Pembroke ON
C +1 613-915-9503 **E** vjohnson@lrl.ca

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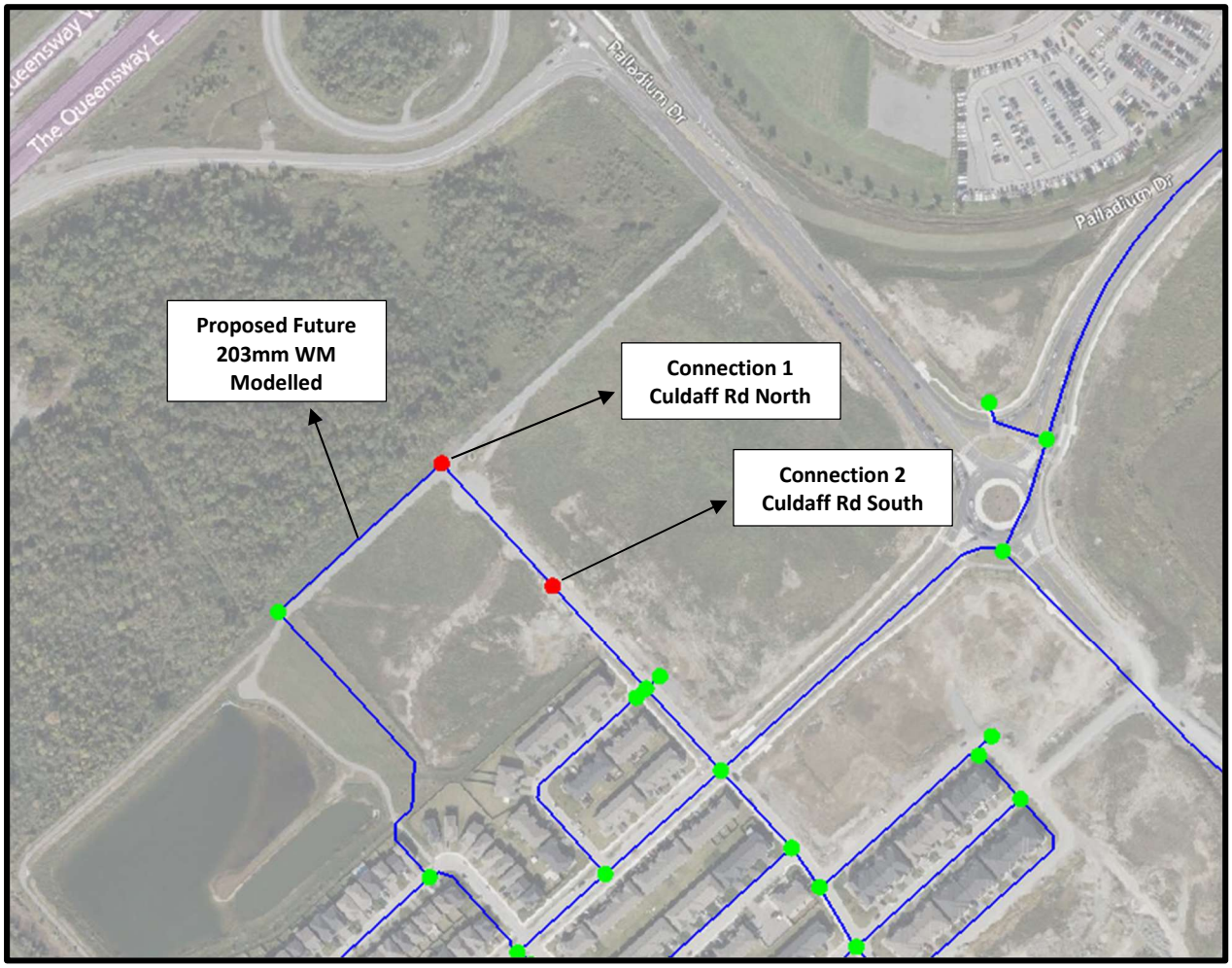
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Boundary Conditions
2775 & 2785 Palladium – 2026

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	132.0	2.20
Maximum Daily Demand	456.0	7.60
Peak Hour	820.8	13.68
Fire Flow Demand #1	14,000.0	233.33

Location



Results

Connection 1 - Culdaff Rd North

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.9	80
Peak Hour	154.6	71
Max Day plus Fire Flow #1	142.7	55

[1] Ground Elevation = 104.4 m

Connection 2 - Culdaff Rd South

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.9	79
Peak Hour	154.6	70
Max Day plus Fire Flow #1	144.7	56

[1] Ground Elevation = 105.4 m

Notes

1. Demands for proposed Connection 4 at existing stub off Culdaff Rd were assigned to the upstream junction of the existing stub at Culdaff Rd off the public looped watermains (Connection 2 – Culdaff Rd South).

2. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:

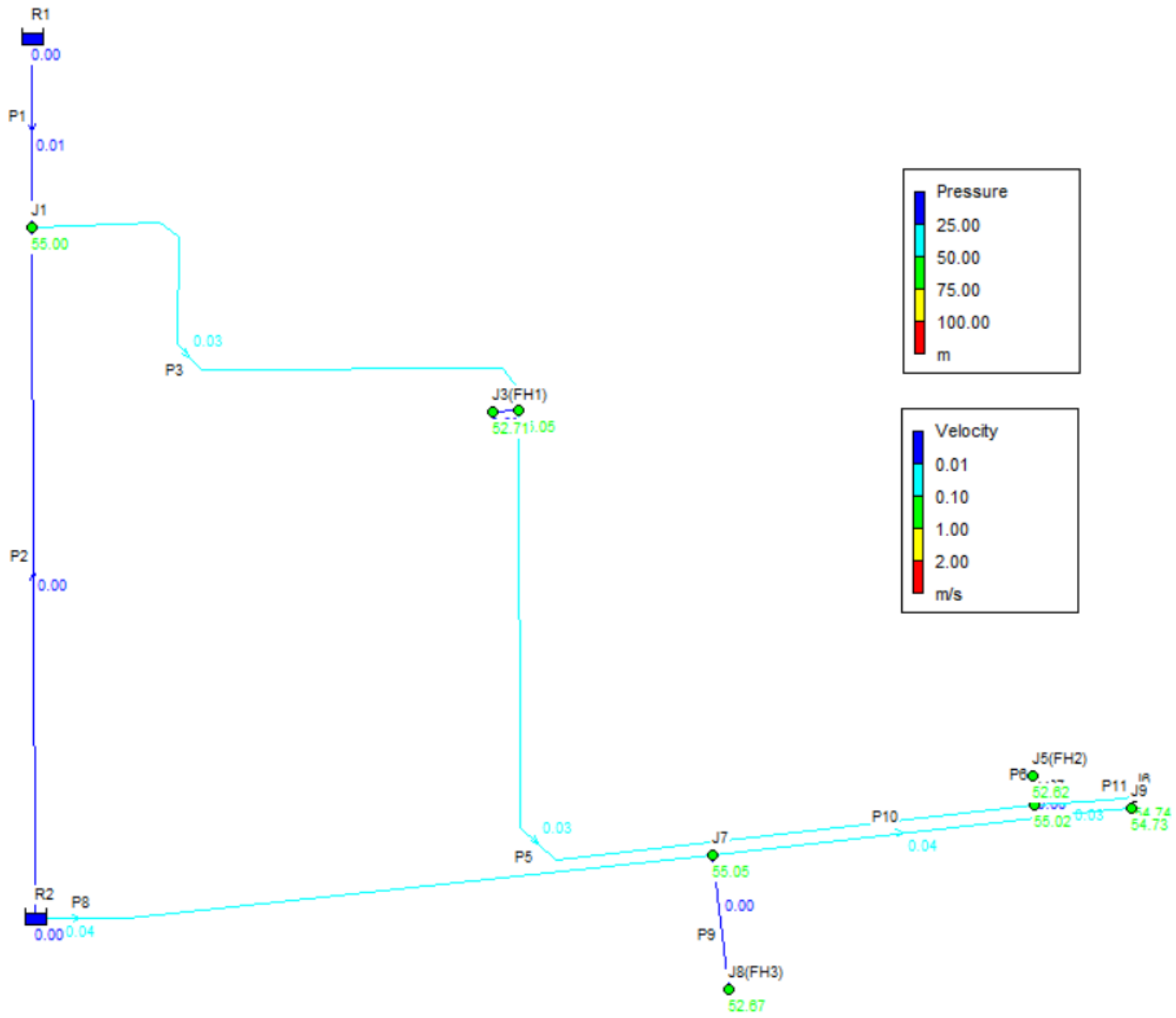
    - If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
    - Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

Hydraulic Analysis
using
EPANET

Scenario 1: Avg Day



```
*********************************************************************
*                            E P A N E T                            *
*                     Hydraulic and Water Quality                   *
*                     Analysis for Pipe Networks                    *
*                           Version 2.2                             *
*********************************************************************
```

Input File: 240720_Hydraulic Modeling_Avg Day.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P1	J1	R1	24.6	297
P2	R2	J1	90.8	297
P3	J1	J2	83.7	204
P4	J2	J3(FH1)	3	155
P5	J2	J4	124.1	204
P6	J4	J5(FH2)	4.3	155
P7	J4	J6	9.6	204
P8	R2	J7	89.6	204
P9	J7	J8(FH3)	18.1	155
P10	J7	J9	55.4	204
P11	J9	J6	1.5	204

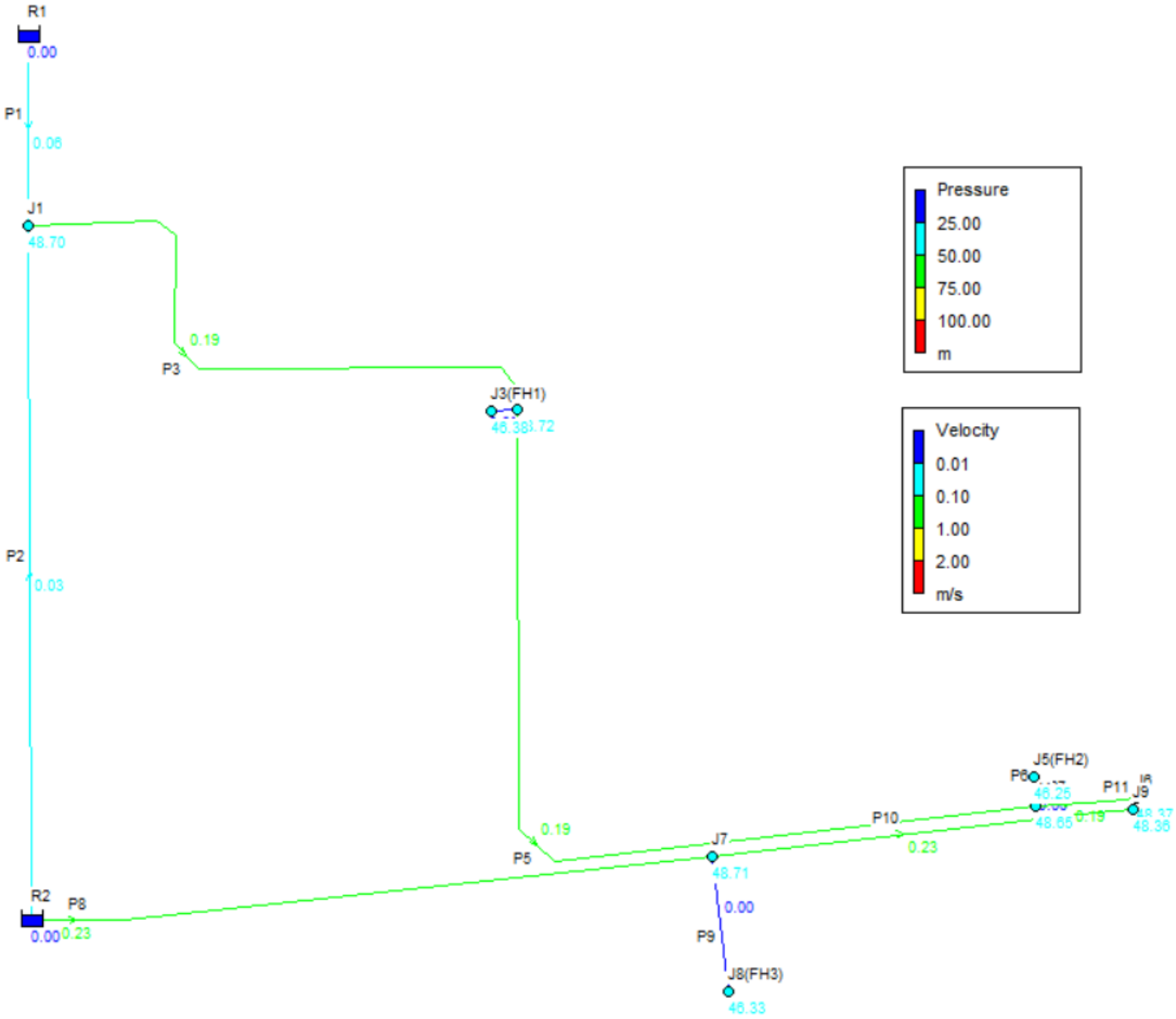
Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
J1	0.00	160.90	55.00	0.00	
J2	0.00	160.90	55.05	0.00	
J3(FH1)	0.00	160.90	52.71	0.00	
J4	0.00	160.90	55.02	0.00	
J5(FH2)	0.00	160.90	52.62	0.00	
J6	2.20	160.90	54.74	0.00	
J7	0.00	160.90	55.05	0.00	
J8(FH3)	0.00	160.90	52.67	0.00	
J9	0.00	160.90	54.73	0.00	
R2	-1.54	160.90	0.00	0.00	Reservoir
R1	-0.66	160.90	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
P1	-0.66	0.01	0.00	Open
P2	0.32	0.00	0.00	Open
P3	0.98	0.03	0.01	Open
P4	0.00	0.00	0.00	Open
P5	0.98	0.03	0.01	Open
P6	0.00	0.00	0.00	Open
P7	0.98	0.03	0.01	Open
P8	1.22	0.04	0.02	Open
P9	0.00	0.00	0.00	Open
P10	1.22	0.04	0.02	Open
P11	1.22	0.04	0.01	Open

Scenario 2: Peak Hour



```
*********************************************************************
*                          E P A N E T                              *
*                   Hydraulic and Water Quality                     *
*                   Analysis for Pipe Networks                      *
*                         Version 2.2                               *
*********************************************************************
```

Input File: 240720_Hydraulic Modeling_Peak Hour.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P1	J1	R1	24.6	297
P2	R2	J1	90.8	297
P3	J1	J2	83.7	204
P4	J2	J3(FH1)	3	155
P5	J2	J4	124.1	204
P6	J4	J5(FH2)	4.3	155
P7	J4	J6	9.6	204
P8	R2	J7	89.6	204
P9	J7	J8(FH3)	18.1	155
P10	J7	J9	55.4	204
P11	J9	J6	1.5	204

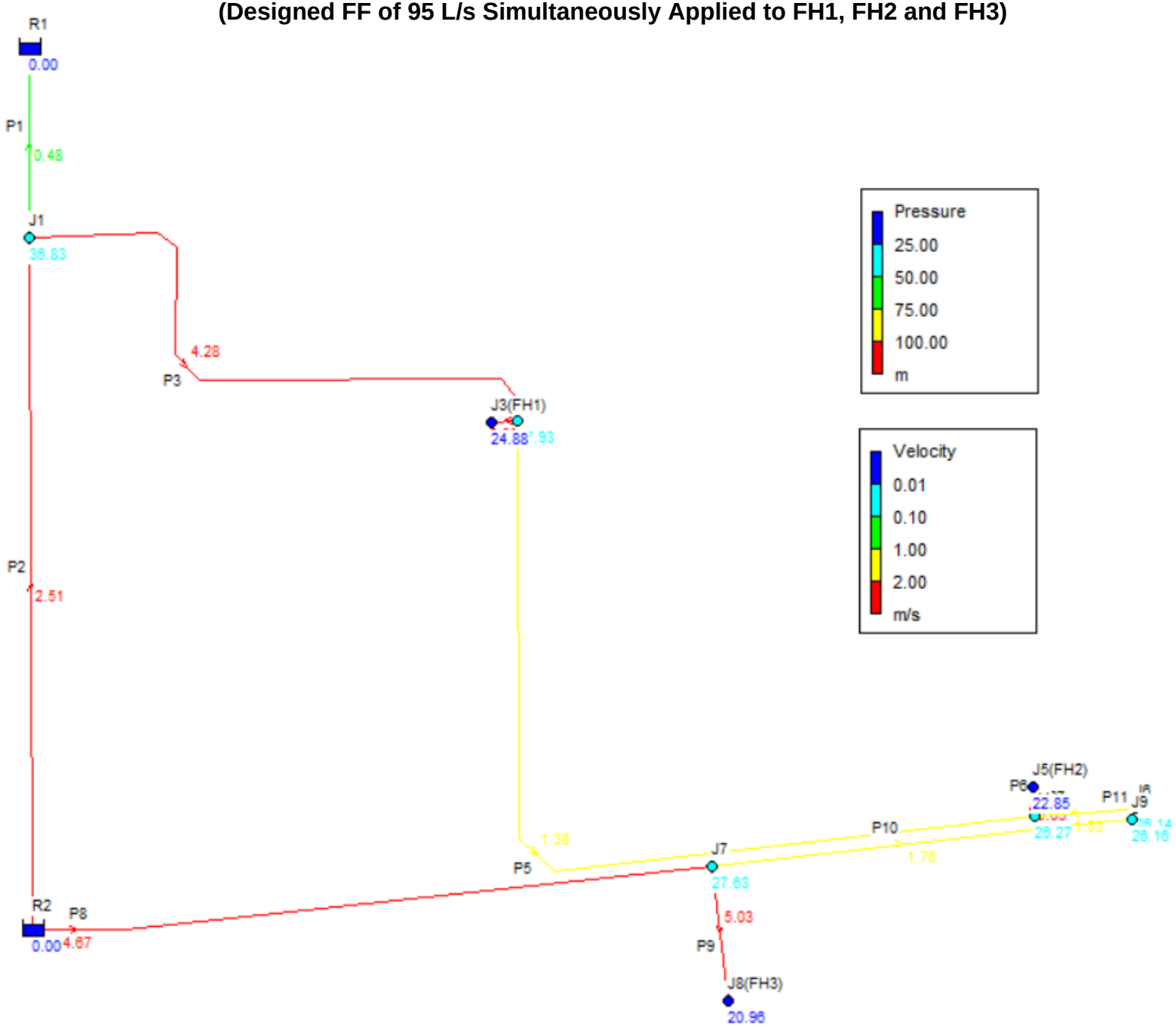
Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
J1	0.00	154.60	48.70	0.00	
J2	0.00	154.57	48.72	0.00	
J3(FH1)	0.00	154.57	46.38	0.00	
J4	0.00	154.53	48.65	0.00	
J5(FH2)	0.00	154.53	46.25	0.00	
J6	13.68	154.53	48.37	0.00	
J7	0.00	154.56	48.71	0.00	
J8(FH3)	0.00	154.56	46.33	0.00	
J9	0.00	154.53	48.36	0.00	
R2	-9.60	154.60	0.00	0.00	Reservoir
R1	-4.08	154.60	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
P1	-4.08	0.06	0.02	Open
P2	2.02	0.03	0.01	Open
P3	6.10	0.19	0.32	Open
P4	0.00	0.00	0.00	Open
P5	6.10	0.19	0.32	Open
P6	0.00	0.00	0.00	Open
P7	6.10	0.19	0.32	Open
P8	7.58	0.23	0.48	Open
P9	0.00	0.00	0.00	Open
P10	7.58	0.23	0.48	Open
P11	7.58	0.23	0.48	Open

Scenario 3: Max Day + Fire Flow
(Designed FF of 95 L/s Simultaneously Applied to FH1, FH2 and FH3)



```
*********************************************************************
*                          E P A N E T                              *
*                    Hydraulic and Water Quality                    *
*                    Analysis for Pipe Networks                     *
*                         Version 2.2                               *
*********************************************************************
```

Input File: 240720_Hydraulic Modeling.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P1	J1	R1	24.6	297
P2	R2	J1	90.8	297
P3	J1	J2	83.7	204
P4	J2	J3(FH1)	3	155
P5	J2	J4	124.1	204
P6	J4	J5(FH2)	4.3	155
P7	J4	J6	9.6	204
P8	R2	J7	89.6	204
P9	J7	J8(FH3)	18.1	155
P10	J7	J9	55.4	204
P11	J9	J6	1.5	204

Node Results:

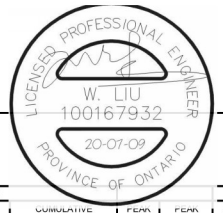
Node ID	Demand LPS	Head m	Pressure m	Quality	
J1	0.00	142.73	36.83	0.00	
J2	0.00	133.78	27.93	0.00	
J3(FH1)	95.00	133.07	24.88	0.00	
J4	0.00	132.15	26.27	0.00	
J5(FH2)	95.00	131.13	22.85	0.00	
J6	7.60	132.30	26.14	0.00	
J7	0.00	133.48	27.63	0.00	
J8(FH3)	95.00	129.19	20.96	0.00	
J9	0.00	132.33	26.16	0.00	
R2	-326.18	144.70	0.00	0.00	Reservoir
R1	33.58	142.70	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
P1	33.58	0.48	1.04	Open
P2	173.63	2.51	21.75	Open
P3	140.05	4.28	106.92	Open
P4	95.00	5.03	236.96	Open
P5	45.05	1.38	13.09	Open
P6	95.00	5.03	236.96	Open
P7	-49.95	1.53	15.84	Open
P8	152.55	4.67	125.27	Open
P9	95.00	5.03	236.96	Open
P10	57.55	1.76	20.60	Open
P11	57.55	1.76	20.59	Open

APPENDIX D

Sanitary Calculations



SANITARY SEWER CALCULATION SHEET

Ottawa

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION								COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE					VEL.	
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	UNITS Singles	UNITS Townhouse	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	(FULL) (m/s)	(ACT.) (m/s)
Block 240 (Commercial)																													
	76A	77A						0.00				0.64	0.64		0.00		0.00	0.31	0.64	0.64	0.21	0.52	16.0	250	0.65	47.94	0.01	0.98	0.31
To avenue Derreen Avenue, Pipe 77A - 78A								0.00	0				0.64		0.00		0.00			0.64									
Block 241 (Commercial)																													
	74A	75A						0.00				1.06	1.06		0.00		0.00	0.52	1.06	1.06	0.35	0.87	15.5	250	0.65	47.94	0.02	0.98	0.37
To avenue Derreen Avenue, Pipe 75A - 77A								0.00	0				1.06		0.00		0.00			1.06									
Block 244 (Employment)																													
	68A	70A PARKING AREA						0.00				1.99	1.99		0.00		0.00	0.97	1.99	1.99	0.66	1.62	15.0	250	0.65	47.94	0.03	0.98	0.45
To chemin Culdaff Road, Pipe 70A - 72A								0.00	0				1.99		0.00		0.00			1.99									
Block 243 (Commercial)																													
	69A	70A						0.00				1.60	1.60		0.00		0.00	0.78	1.60	1.60	0.53	1.31	15.0	250	0.65	47.94	0.03	0.98	0.42
To chemin Culdaff Road, Pipe 70A - 72A								0.00	0				1.60		0.00		0.00			1.60									
Block 256 (Commercial)																													
BLOCK 251	66A	67A						0.00				1.59	1.59		0.00		0.00	0.77	1.59	1.59	0.52	1.30	15.0	250	0.65	47.94	0.03	0.98	0.42
To chemin Culdaff Road, Pipe 67A - 70A								0.00	0				1.59		0.00		0.00			1.59									
Block 233 (Servicing Block)																													
Contribution From cours Curraglass Walk, Pipe 30A - 33A								1.42	139				0.00		0.00		0.00		1.42	1.42									
Contribution From cours Curraglass Walk, Pipe 32A - 33A								1.15	120				0.00		0.00		0.00		1.15	1.15									
	33A	34A	0.01				0	2.58	259	3.48	2.92		0.00		0.00		0.00	0.00	0.01	2.58	0.85	3.78	12.0	200	0.40	20.74	0.18	0.66	0.50
	34A	37A	0.05				0	2.63	259	3.48	2.92		0.00		0.00		0.00	0.00	0.05	2.63	0.87	3.79	60.5	200	0.45	22.00	0.17	0.70	0.52
To terrasse Crossway Terrace, Pipe 37A - 39A								2.63	259				0.00		0.00		0.00			2.63									
terrasse Crossway Terrace																													
	35A	36A	0.49	12	12		41	0.49	41	3.67	0.49		0.00		0.00		0.00	0.00	0.49	0.49	0.16	0.65	63.5	200	0.65	26.44	0.02	0.84	0.35
	36A	37A	0.53	15	15		51	1.02	92	3.60	1.07		0.00		0.00		0.00	0.00	0.53	1.02	0.34	1.41	77.5	200	0.70	27.44	0.05	0.87	0.45
Contribution From Block 223, Pipe 34A - 37A								2.63	259				0.00		0.00		0.00		2.63	2.63									
	37A	39A	0.19	4	4		14	3.84	365	3.43	4.06		0.00		0.00		0.00	0.00	0.19	3.84	1.27	5.33	46.5	250	0.30	32.57	0.16	0.66	0.49
Contribution From Block 236 (Park), Pipe 38A - 39A								0.00	0				0.00		0.00		0.53		0.53	0.53	0.17	0.17	11.0	200	0.65	26.44	0.01	0.84	0.23
	400A	640A	0.67	23		23	63	0.67	63	3.63	0.74		0.00		0.00		0.00	0.00	0.67	0.67	0.22	0.96	94.5	200	0.65	26.44	0.04	0.84	0.40
	640A	641A						0.67	63	3.63	0.74		0.00		0.00		0.00	0.00	0.00	0.67	0.22	0.96	2.5	200	1.00	32.80	0.03	1.04	0.46
	39A	40A	0.39	13		13	35	4.23	400	3.42	4.43		0.00		0.00		0.53	0.09	0.39	4.76	1.57	6.09	79.0	250	0.30	32.57	0.19	0.66	0.51
	40A	641A						4.23	400	3.42	4.43		0.00		0.00		0.53	0.00	0.00	4.76	1.57	6.00	89.5	250	0.30	32.57	0.18	0.66	0.51
	641A	64A						4.90	463	3.39	5.09		0.00		0.00		0.53	0.00	0.00	5.43	1.79	6.88	6.0	250	0.30	32.57	0.21	0.66	0.52
To chemin Culdaff Road, Pipe 64A - 73A								4.90	463				0.00		0.00		0.53			5.43									
rang Kindred Row																													
	45A	46A	0.71	22		22	60	0.71	60	3.64	0.71		0.00		0.00		0.00	0.00	0.71	0.71	0.23	0.94	78.5	200	0.65	26.44	0.04	0.84	0.39
	46A	47A	0.58	22		22	60	1.29	120	3.58	1.39		0.00		0.00		0.00	0.00	0.58	1.29	0.43	1.82	90.5	200	0.65	26.44	0.07	0.84	0.48
To placette Allied Mews, Pipe 47A - 48A								1.29	120				0.00		0.00		0.00			1.29									
ruelle Ballinora Lane																													
	56A	57A	0.39	18		18	49	0.39	49	3.65	0.58		0.00		0.00		0.00	0.00	0.39	0.39	0.13	0.71	61.5	200	0.65	26.44	0.03	0.84	0.36
	57A	58A	0.30			17	46	0.69	95	3.60	1.11		0.00		0.00		0.00	0.00	0.30	0.69	0.23	1.34	66.0	200	0.40	20.74	0.06	0.66	0.37
	58A	59A	0.01					0.70	95	3.60	1.11		0.00		0.00		0.00	0.00	0.01	0.70	0.23	1.34	10.5	200	0.40	20.74	0.06	0.66	0.37
To chemin Culdaff Road, Pipe 59A - 63A								0.70	95				0.00		0.00		0.00			0.70									

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha			
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =	0.330	L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =	0.600	m/s
Max Res. Peak Factor =	4.00				Manning's n = (Conc)	0.013	(Pvc) 0.013
Commercial/Inst./Park Peak Factor =	1.50				Townhouse coeff=	2.7	
Institutional =	0.32	l/s/Ha			Single house coeff=	3.4	

Designed: R.A.

Checked: W.L.

Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 87-93

PROJECT: **195 Huntmar Drive**

LOCATION: **City of Ottawa**

File Ref: 12-624 | Date: **July 2020** | Sheet No. 1 of 5

624_San3.xlsx



SANITARY SEWER CALCULATION SHEET

Ottawa

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION									COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	UNITS Singles	UNITS Townhouse	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
placette Allied Mews																													
	41A	42A	0.71	22		22	60	0.71	60	3.64	0.71		0.00		0.00		0.00	0.00	0.71	0.71	0.23	0.94	79.0	200	0.80	29.34	0.03	0.93	0.42
	42A	43A	0.57	22		22	60	1.28	120	3.58	1.39		0.00		0.00		0.00	0.00	0.57	1.28	0.42	1.81	83.0	200	0.40	20.74	0.09	0.66	0.40
	43A	44A	0.03			0	0	1.31	120	3.58	1.39		0.00		0.00		0.00	0.00	0.03	1.31	0.43	1.82	11.0	200	0.40	20.74	0.09	0.66	0.41
	44A	47A	0.24	7		7	19	1.55	139	3.56	1.60		0.00		0.00		0.00	0.00	0.24	1.55	0.51	2.12	61.0	200	0.40	20.74	0.10	0.66	0.42
Contribution From rang Kindred Row, Pipe 46A - 47A								1.29	120				0.00		0.00		0.00		1.29	1.29									
	47A	48A	0.30	9		9	25	3.14	284	3.47	3.19		0.00		0.00		0.00	0.00	0.30	3.14	1.04	4.23	62.0	200	0.40	20.74	0.20	0.66	0.52
	48A	59A						3.14	284	3.47	3.19		0.00		0.00		0.00	0.00	0.00	3.14	1.04	4.23	10.0	200	0.40	20.74	0.20	0.66	0.52
To chemin Culdaff Road, Pipe 59A - 63A								3.14	284				0.00		0.00		0.00			3.14									
cercle Leinster Circle																													
	49A	50A	0.22	7		7	19	0.22	19	3.71	0.23		0.00		0.00		0.00	0.00	0.22	0.22	0.07	0.30	49.5	200	0.80	29.34	0.01	0.93	0.30
	50A	51A	0.26	11		11	30	0.48	49	3.65	0.58		0.00		0.00		0.00	0.00	0.26	0.48	0.16	0.74	80.5	200	0.65	26.44	0.03	0.84	0.36
	51A	55A	0.01					0.49	49	3.65	0.58		0.00		0.00		0.00	0.00	0.01	0.49	0.16	0.74	10.5	200	0.40	20.74	0.04	0.66	0.30
To chemin Culdaff Road, Pipe 55A - 59A								0.49	49				0.00		0.00		0.00			0.49									
	60A	61A						0.00				1.67	1.67		0.00		0.00	0.81	1.67	1.67	0.55	1.36	23.5	250	0.65	47.94	0.03	0.98	0.43
	61A	62A	0.45	18		18	49	0.45	49	3.65	0.58		1.67		0.00		0.00	0.81	0.45	2.12	0.70	2.09	120.0	250	0.65	47.94	0.04	0.98	0.48
	62A	63A	0.01				0	0.46	49	3.65	0.58		1.67		0.00		0.00	0.81	0.01	2.13	0.70	2.09	9.5	250	0.65	47.94	0.04	0.98	0.48
To chemin Culdaff Road, Pipe 63A - 64A								0.46	49				1.67		0.00		0.00			2.13									
Block 232 (Condo)																													
	53A	54A	1.75				446	1.75	446	3.40	4.91		0.00		0.00		0.00	0.00	1.75	1.75	0.58	5.49	11.0	250	0.65	47.94	0.11	0.98	0.64
To chemin Culdaff Road, Pipe 54A - 55A								1.75	446				0.00		0.00		0.00			1.75									
chemin Culdaff Road																													
Block 251? MTO lands	65A	67A	0.07				0	0.07	0			21.99	21.99		0.00		0.00	10.69	22.06	22.06	7.28	17.97	26.5	250	0.30	32.57	0.55	0.66	0.68
Contribution From Block 256, Pipe 66A - 67A								0.00	0				1.59		0.00		0.00		1.59	1.59									
Road DA	67A	70A	0.25				0	0.32	0				23.58		0.00		0.00	11.46	0.25	23.90	7.89	19.35	97.0	250	0.30	32.57	0.59	0.66	0.69
Contribution From Block 244, Pipe 68A - 70A								0.00	0				1.99		0.00		0.00		1.99	1.99									
Contribution From Block 243, Pipe 69A - 70A								0.00	0				1.60		0.00		0.00		1.60	1.60									
			0.12				0	0.44	0				27.17		0.00		0.00		0.12	27.61									
	70A	72A	0.19				0	0.63	0				27.17		0.00		0.00	13.21	0.19	27.80	9.17	22.38	76.0	250	0.30	32.57	0.69	0.66	0.71
Contribution From Block 242, Pipe 71A - 72A								0.00	0				2.70		0.00		0.00		2.70	2.70									
	72A	73A	0.16				0	0.79	0				29.87		0.00		0.00	14.52	0.16	30.66	10.12	24.64	74.0	250	0.30	32.57	0.76	0.66	0.73
To avenue Derreen Avenue, Pipe 73A - 75A								0.79	0				29.87		0.00		0.00			30.66									
chemin Culdaff Road																													
	52A	54A	0.74	15		15	41	0.74	41	3.67	0.49		0.00		0.00		0.00	0.00	0.74	0.74	0.24	0.73	102.5	200	0.65	26.44	0.03	0.84	0.36
Contribution From Block 232, Pipe 53A - 54A								1.75	446				0.00		0.00		0.00		1.75	1.75									
	54A	55A	0.09	3		3	9	2.58	496	3.38	5.43		0.00		0.00		0.00	0.00	0.09	2.58	0.85	6.29	21.0	250	0.30	32.57	0.19	0.66	0.51
Contribution From cercle Leinster Circle, Pipe 51A - 55A								0.49	49				0.00		0.00		0.00		0.49	0.49									
	55A	59A	0.15	4		4	11	3.22	556	3.36	6.05		0.00		0.00		0.00	0.00	0.15	3.22	1.06	7.12	45.0	250	0.30	32.57	0.22	0.66	0.53
Contribution From placette Allied Mews, Pipe 48A - 59A								3.14	284				0.00		0.00		0.00		3.14	3.14									
Contribution From ruelle Ballinora Lane, Pipe 58A - 59A								0.70	95				0.00		0.00		0.00		0.70	0.70									
	59A	63A	0.07				0	7.13	935	3.25	9.86		0.00		0.00		0.00	0.00	0.07	7.13	2.35	12.22	45.0	250	0.30	32.57	0.38	0.66	0.61
Contribution From cercle Leinster Circle, Pipe 62A - 63A								0.46	49				1.67		0.00		0.00		2.13	9.26									
	63A	64A	0.03				0	7.62	984	3.24	10.34		1.67		0.00		0.00	0.81	0.03	9.29	3.07	14.22	27.5	250	0.30	32.57	0.44	0.66	0.64

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha			
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =	0.330	L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =	0.600	m/s
Max Res. Peak Factor =	4.00				Manning's n = (Conc)	0.013 (Pvc)	0.013
Commercial/Inst./Park Peak Factor =	1.50				Townhouse coeff=	2.7	
Institutional =	0.32	l/s/Ha			Single house coeff=	3.4	

Designed: R.A.	PROJECT: **195 Huntmar Drive**		
Checked: W.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 87-93	File Ref: 12-624	Date: **July 2020**	Sheet No. 2 of 5

624_San3.xlsx

LRL Associates Ltd.

Sanitary Sewer Design Sheet

LRL File No.: 240720.00
Project: Ottawa Waterpark
Location: 2775 & 2785 Palladium Drive
Designed: KP
Checked:
Date: August 6, 2026
DWG. Reference:

Sanitary Design Parameters

Commercial & Institutional Flow = 28000 L/ha/day
Light Industrial Flow = 35000 L/ha/day
Heavy Industrial Flow = 55000 L/ha/day
Office Space = 75L/9.3m2/d
Commercial & Institutional Peak Factor = 1.5
Average Daily Flow = 280 L/p/day
Industrial Peak Factor = as per Appendix 4-B
Extraneous Flow = 0.33 L/s/ha
Hotel = 225 L/bed/d (MEO Table 5-3)

Pipe Design Parameters

Maximum Velocity = 3.00 m/s
Minimum Velocity = 0.60 m/s
Manning's n = 0.013

LOCATION			Residential and Populations						COMMERCIAL		LIGHT-INDUSTRIAL			INSTITUTIONAL		C+I+I	INFILTRATION			TOTAL FLOW, Q	PIPE						
STREET	FROM	TO	AREA	POP.	ACCU. AREA	ACCU. POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FACT.	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW		LENGTH	DIA.	SLOPE	MATERIAL	CAP. Q(FULL)	VEL. V(FULL)	RATIO Q /QFULL
			(Ha)		(Ha)			(L/s)	(Ha)	(Ha)		(Ha)		(Ha)	(Ha)	(L/s)	(Ha)	(Ha)	(L/s)	(L/s)	(m)	(mm)	(%)		(L/s)	(m/s)	
Culdaff Road (MTO lands Block 256*)	MH65A MHSA76101	MH67A MHSA76097							21.990	21.990			1.5			10.69	21.990	21.990	7.26	17.95	15.0	250	0.65%	PVC	47.94	0.98	0.37
Hotel & Entertainment Centre	**MH66A MHSA76096**	**MH67A MHSA76097**							**1.600**	**1.600**			**1.5**			**0.78**	**1.600**	**1.600**	**0.53**	**1.31**	**15.0**	**250**	**0.65%**	**PVC**	**47.94**	**0.98**	**0.03**
Culdaff Road Roadway*																	0.250	0.250	0.08	0.08							
Culdaff Road Roadway*																	0.120	0.120	0.04	0.04							
	MH67A MHSA76097	MH70A MHSA76098																		**19.37**	97.0	250	0.30%	PVC	32.57	0.66	0.59
Water Park & Support Building*	**MH69A MHSA76099**	**MH70A MHSA844098**						**0.39**	**1.590**	**1.590**			**1.5**			**1.17**	**1.590**	**1.590**	**0.52**	**1.69**	**15.0**	**250**	**0.65%**	**PVC**	**47.94**	**0.98**	**0.04**
Culdaff Road (Block 244) parking area*	**MH68A MHSA76100**	**MH70A MHSA76098**							**0.000**	**0.000**			**1.5**			**0.00**	**1.990**	**1.990**	**0.66**	**0.66**	**15.0**	**250**	**0.65%**	**PVC**	**47.94**	**0.98**	**0.01**
	MH70A MHSA76098	MH72A MHSA76092																		**21.72**	**97.0**	**250**	**0.30%**	**PVC**	**32.57**	**0.66**	**0.67**

	Rate	Unit/Ha	Avg Flow L/d	
Hotel (225L/Bed/Day)	225	236	53100	
Hotel 1st & 2nd floor	28000	0.15	4200	
Entertainment	28000	0.33	9240	
Support	28000	0.35	9800	
Water park	95861.7	1	113717.7	*Assume a 30% usage*

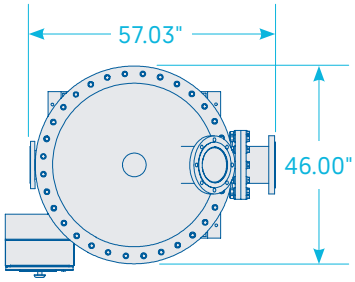
**MTO lands remain at 21.99 Ha as per ex sewer design sheets.*
** Culdaff Road way taken from ex. Sewer design sheets.*
**Waterpark water balance usage percentage of 30% was used.*
**As requested by the city parking area peak flow is 0L/s, due to no building development.*

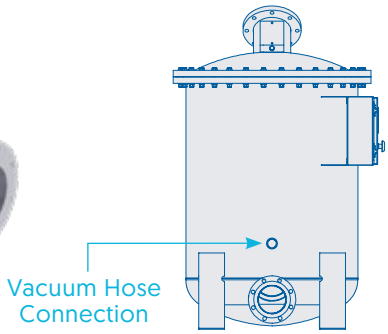
Blue Mar Basins Filter Series

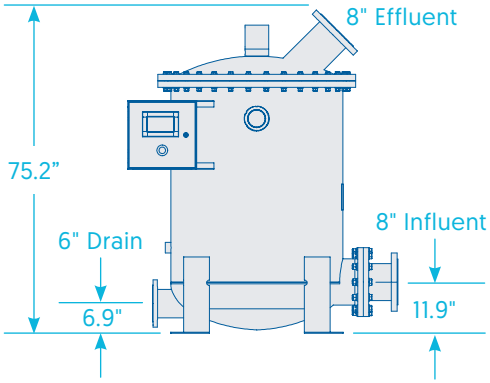
BMB-F-410S

BMB-F-410S	Imperial	Metric
Filter Area	705 sq ft	65.5 sq m
Flow Range	235-2,115 gpm	53-480 m³/hr
Dry Weight	1,387 lb	629 kg
Operating Weight	4,388 lb	1,990 kg
Tank Volume	354 usg	1.34 m³
Media Charge	53 lb	24 kg









BMB-F-410S Technical Info

Standard max. operating pressure	50 psi
NSF approved cleaning method	CIP (clean-in-place)
Automated cleaning cycle	Standard. No disassembly.
Control voltage	24VDC
Control valve actuation	Compressed air via 24VDC control
Supplied automated butterfly valves	8" Effluent, 6" Precoat
Supplied butterfly valves	8" strainer isolation, 8" pump throttle, 6" drain, 8" manual fill
Supplied ball valves	Media fill, system vent, tank vent, vacuum
Supplied Perlite media	Purelite 1000 or Harborlite AP25

Notes

- No length of straight pipe is required on influent or effluent.
- Elbows directly on influent or effluent are permitted.
- Control may be rotated or wall mounted.
- Effluent nozzle may be rotated through 360 degrees.
- Approved cleaning solutions are environmentally friendly.

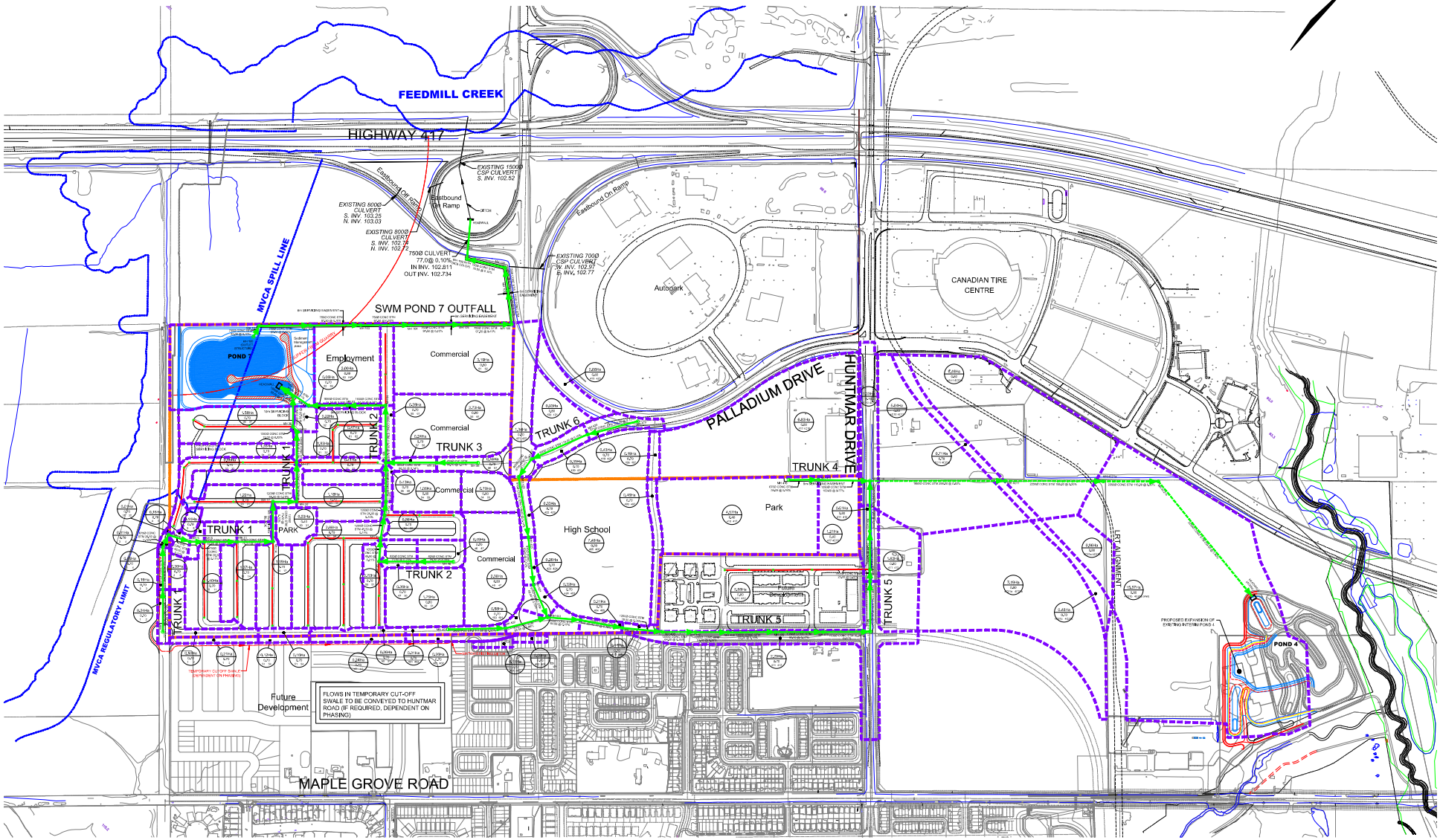
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APPENDIX E

Stormwater Management Design Calculations



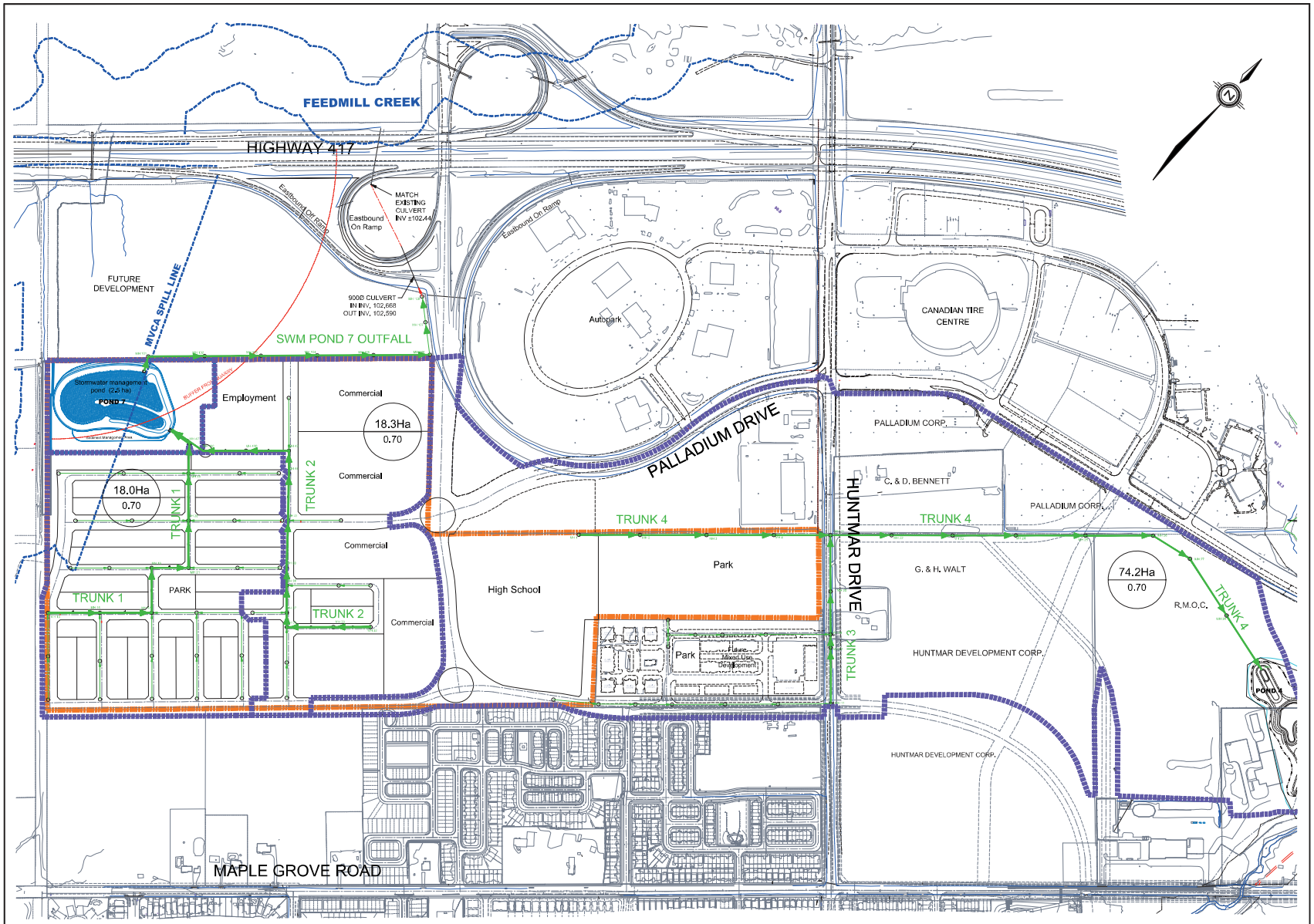
david schaeffer engineering ltd
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

LEGEND:
- STUDY LIMIT
- PROPOSED STORM TRUNK
- KWMSS STORM TRUNK
- LOCAL STORM SEWER
- STORM MANHOLE
- STORM TRIBUTARY BOUNDARY
- EXISTING DITCH
- DRAINAGE AREAS (HA) RUNOFF COEFFICIENT UPSTREAM/DOWNSTREAM MH

KANATA WEST - 195 HUNTMAR DRIVE
CONCEPTUAL STORM SERVICING PLAN
CITY OF OTTAWA

PROJECT No. :	12-624
SCALE	1:2500
DATE:	April 2019
DRAWING No.	2

CITY FILE No. D07-16-16-0011 CITY PLAN No. 1714



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120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
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LEGEND:
- STUDY LIMIT
- EXISTING DITCH
- MAJOR OVERLAND FLOW

KANATA WEST - 195 HUNTMAR DRIVE
CONCEPTUAL STORM SERVICING PLAN
CITY OF OTTAWA

PROJECT No.:	14-824
SCALE	1:2000
DATE:	MAY 2018
DRAWING No.	2

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS

52 Springbrook Drive
Ottawa (Stittsville), ON K2S 1B9
TEL: (613) 836-3884
FAX: (613) 836-0332
WEB: www.jfsa.com

February 6, 2019

David Schaeffer Engineering Limited
120 Iber Road, Unit 103
Ottawa, Ontario K2S 1E9

Attention: **Laura Maxwell**

Subject: **Preliminary Kanata West Pond 7 Sizing** *our file: 1476-16*

As requested by your office, we have evaluated, based on the information described below, the minimum volumes required to meet quality, erosion and quantity control requirements for proposed Kanata West Pond 7 in the City of Ottawa. Also as requested, we have summarized the work completed for this project to date.

Note that the current memo is an update of the May 22, 2018 version of this memo, revised in response to City comments received August 9, 2018. City comment C36 states that "...the Carp River PCSWMM interim condition model is now outdated as the Carp River Restoration Plan has almost been completed. Only the ultimate condition model should be used for the analysis." As such, reference to the interim conditions modelling has been removed from the updated memo to avoid confusion.

BACKGROUND INFORMATION - FLOOD LEVEL ANALYSIS

Ultimate conditions PCSWMM models of the Carp River were prepared by the City of Ottawa as per the February 24, 2017 *Carp River PCSWMM Model Documentation*. The 12-hour SCS Type II MTO design storm distribution, as provided with the model, was used to generate 2- to 100-year peak flows and water levels along the Carp River and its tributaries. The ultimate conditions model was modified for the June 13, 2017 *Kanata West Pond 4 and 7 / Impact of Proposed Changes on Carp River Model* memo by JFSA as described below:

- In the City of Ottawa ultimate conditions Carp River PCSWMM model, Pond 4 has a drainage area of 279.234 ha at 62% imperviousness and discharges to the Carp River, and Pond 7 has a drainage area of 34.54 ha at 85% imperviousness, and discharges to Feedmill Creek. Note that the Pond 4 drainage area is slightly off from the 278.288 ha ultimate drainage area at 62% imperviousness documented in the December 2014 *Design Brief for Pond 4, Kanata West, Mattamy Homes*.

- Per information provided by DSEL, approximately 35.640 ha of drainage area in the northwest corner of the Pond 4 catchment area was modelled as redirected to the Kanata West Pond 7, for revised ultimate conditions drainage areas of 243.594 ha at 64% imperviousness to Pond 4 and 57.30 ha at 70% imperviousness to Pond 7 (including 16.5 ha of MTO lands).

- The model was also modified to reflect a 10.50 ha development area at 70% imperviousness discharging uncontrolled to Feedmill Creek, including a Highway 417 ramp. Note that the ultimate conditions PCSWMM model provided by the City has a 4.9 mm initial abstraction value for impervious areas in the 34.54 ha drainage area to Pond 7. This was assumed to be representative of required LID measures on-site, and was carried forward in PCSWMM modelling of the revised drainage area to Pond 7, but not the 10.50 ha uncontrolled area.

- A second scenario was also considered, wherein 16.50 ha of the ultimate drainage area to Pond 7 (MTO lands) was treated as currently developed at 30% imperviousness and discharging uncontrolled to Feedmill Creek. The two scenarios were referred to as Ultimate Scenario A (40.80 ha to Pond 7, 16.50 ha to Feedmill Creek) and Ultimate Scenario B (57.30 ha to Pond 7).

- In the City of Ottawa ultimate conditions Carp River PCSWMM model, the Pond 4 stage-storage-area-discharge relationship was modelled as per the ultimate conditions design presented in the December 2014 *Design Brief for Pond 4*. For the June 2017 analysis, the interim pond stage-storage-area relationship presented in the December 2014 *Design Brief for Pond 4* was inserted into the ultimate conditions PCSWMM model, with changes to the outlet control structure to accommodate ultimate conditions runoff. Note that the revised ultimate Pond 4 design does not meet the 100-year quantity control target specified in the December 2014 *Design Brief for Pond 4*, but instead relies upon the earlier June 2006 *Kanata West Master Servicing Study*, where quantity control is required only up to the 10-year level. In order to respect hydraulic gradeline analyses completed for existing and future upstream developments, the 100-year ultimate pond level was maintained below the 94.74 m elevation simulated in the June 2006 *Kanata West Master Servicing Study* and the December 2014 *Design Brief for Pond 4*.

- In the City of Ottawa ultimate conditions Carp River PCSWMM model, the Pond 7 preliminary stage-storage-area-discharge relationship was modelled to meet unit release rates of 0.51 L/s/ha for the 15 mm 3-hour Chicago design storm and 8 L/s/ha for the 100-year 12-hour SCS Type II design storm, based on the 34.54 ha drainage area and the April 2017 *Feedmill Creek Stormwater Management Criteria Study*. These target release rates of 17.7 L/s and 276.3 L/s were not revised based on the proposed drainage area revisions; instead the volume available in Pond 7 was adjusted in the PCSWMM model for each scenario to meet the established target release rates.

These scenarios were prepared for the purpose of testing their impact on ultimate conditions 2- to 100-year water levels and flows in the Carp River PCSWMM model. Refer to the June 13, 2017 memo for further details. The summary above is provided for background information only, and is superseded by the analyses below.

BACKGROUND INFORMATION - EROSION ANALYSIS

Subsequent to and superseding the June 2017 analysis, an erosion analysis by Coldwater Consulting Limited was undertaken to understand the impact of proposed Pond 7 Scenario B on erosion in Feedmill Creek. Based on information provided by the City of Ottawa and DSEL, the ultimate conditions Scenario B model was revised to Scenario “B2" for the erosion analysis, as follows:

- The 10.50 ha development area at 70% imperviousness discharging uncontrolled to Feedmill Creek and including a Highway 417 ramp was revised to 8.95 ha at 35% imperviousness.

- The Pond 4 stage-storage curve was revised to approximately 1.6 times the interim Pond 4 stage-storage curve and the outlet controls revised to achieve 0 cm of increase in the 2- to 100-year flood levels on the Carp River.

Details and conclusions of the erosion analysis are presented in the March 13, 2018 *Feedmill Creek SWM Criteria Study - Pond 7 Increased Drainage Area - Erosion and In-Stream Works Analysis* report by Coldwater Consulting Ltd. We understand that an addendum will be prepared to describe addition in-stream erosion protection measures required under the proposed development scenario in greater detail.

The Scenario B2 PCSWMM modelling files prepared for continuous simulation of 1967-2007 Ottawa Airport hourly rainfall data in support of the erosion analysis are attached for ultimate conditions. The summary above is provided for background information only, and is superseded by the analysis below.

CURRENT ANALYSIS - PRELIMINARY SIZING OF POND 7

The current analysis supersedes the background sections above, as well as the previous May 22, 2018 version of this memo.

DSEL has provided a drainage area of 40.8 ha to Pond 7 at 71% imperviousness, per the drainage plan provided in Attachment A. Note that this drainage plan excludes the 16.5 ha MTO lands, similar to Scenario A. However, unlike Scenario A, the target release rates from Pond 7 have been pro-rated to allow for potential development of the MTO lands with separate SWM servicing. The target release rates were calculated based on the original Pond 7 drainage area of 34.54 ha from the February 24, 2017 *Carp River Ultimate Conditions PCSWMM model* by the City of Ottawa, less the 16.5 ha occupied by the MTO lands (undeveloped or separately serviced), leaving 18.04 ha. Henceforth, this scenario may be referred to as Scenario D2. Note that although drainage boundaries to Pond 7 may be refined at the detailed design stage, the target release rates from Pond 7 will be unaffected, as they are based on the original area of 34.54 ha and not the latest post-development area.

Changes made to the PCSWMM ultimate conditions model subcatchments to reflect the proposed drainage area revisions for Scenario D2 are summarized in Table A-1 of Attachment A. Note that the following changes were made to the ultimate conditions PCSWMM modelling in response to the August 9, 2018 City of Ottawa comments:

- The April 2017 *Feedmill Creek Stormwater Management Criteria Study* was updated in April 2018, and several revisions to the PCSWMM modelling of Feedmill Creek were proposed, in part to reflect field survey data gathered on November 23, 2017. The PCSWMM model revisions from the April 2018 *Feedmill Creek Stormwater Management Criteria Study* were incorporated into the ultimate conditions base model dated February 2017, as well as the ultimate conditions Scenario D2 modelling.

- The 8.95 ha area at 35% imperviousness discharging uncontrolled to Feedmill Creek and including a Highway 417 ramp has been split in the ultimate conditions Scenario D2 modelling such that 2.14 ha at 27% imperviousness (FJ107_4) outlets to node FJ020 (shared outlet with the Palladium Autopark), and the remaining 6.81 ha at 38% imperviousness (FS107_2) continues to outlet to node FJ209 (shared outlet with Pond 7). The percent imperviousness characteristics of these areas were measured using satellite images.

Minimum volume requirements for Pond 7 were estimated in PCSWMM and in a simple SWMHYMO model for the purpose of this analysis; the maximum of either modelling approach will be considered as the minimum volume required. Note that additional volume may be required to respect the limitations of real world outlet controls, to provide some degree of construction tolerance, and to allow for a reasonable range of design variation as the development proceeds through later design stages.

Table 1: Simulated Release Rates and Volumes for Kanata West Pond 7 (40.8 ha, 71% imperviousness)

Component	Unit Release Rate [1] (L/s/ha)	Target Release Rate [1] (L/s)	Required Storage (m^3)	
			SWMHYMO	PCSWMM
Permanent Pool [3]	N/A	N/A	7616	
Quality Control [3]	N/A	N/A	1632	
15 mm 3-hour Chicago	0.51	9	3540	2583
100-Year 12-Hour SCS	8	144	20995	20995

[1] Unit release rates as per the April 2018 *Feedmill Creek Stormwater Management Criteria Study* by JFSA Inc. and Coldwater Consulting Ltd.
[2] Target release rates calculated based on the original Pond 7 drainage area of 34.54 ha from the February 2017 Carp River Ultimate Conditions PCSWMM model by the City of Ottawa, less the 16.5 ha occupied by the MTO lands (undeveloped or separately serviced), leaving 18.04 ha.
[3] Quality control and permanent pool requirements based on MOE guidelines for enhanced quality control for wet ponds.

Note that the volume requirements estimated by SWMHYMO are higher than those estimated in PCSWMM due to differences in the modelling programs. Additionally, as noted above, an initial abstraction of 4.9 mm for impervious areas is included in the PCSWMM modelling of the drainage area to Pond 7, as a high-level representation of low impact development measures required per the April 2018 *Feedmill Creek Stormwater Management Criteria Study* as an erosion control measure. The standard City of Ottawa initial abstraction value of 1.57 mm for impervious areas was applied to the SWMHYMO model for the purposes of preliminary pond sizing.

The ultimate conditions 2- to 100-year 12-hour SCS Type II design storm flows and water levels at key points on Carp River and Feedmill Creek are summarized in Table B-1 of Attachment B for the ultimate conditions base model and ultimate conditions Scenario D2. As may be seen from the attached, water levels increase between the two scenarios by up to 7 cm on Feedmill Creek. Water levels do not increase on the Carp River under ultimate conditions Scenario D2. The ultimate base and Scenario D2 PCSWMM modelling files for the 2- to 100-year 12-hour SCS design storms are attached, as well as the Scenario D2 15 mm 3-hour Chicago storm PCSWMM modelling files for the preliminary pond sizing exercise. The SWMHYMO modelling files prepared for the preliminary pond sizing exercise are also attached.

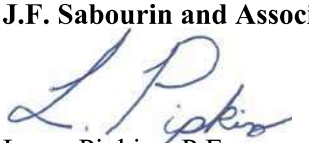
A comparison of 10- and 100-year storm Pond 4 outflow hydrographs for the ultimate base and Scenario D2 models are also included in Attachment B in response to City comments.

MINOR AND MAJOR SYSTEM DESIGN

As per the new approach formalized in the September 2016 *City of Ottawa Technical Bulletin PIEDTB-2016-01*, the subdivision is to be designed to fully contain the 100-year major system flows in road ponding areas up to 35 cm deep, with a 2-year minor system level of service on local roads, 5-year on collector roads, and 10-year on arterial roads. The calculation sheet presented in Attachment C, sourced from the May 2014 *Stormwater Management Guidelines for New Developments Draft Report* prepared for the City of Ottawa by JFSA, demonstrates on a high level that 35 cm deep road ponding areas with a high point to high point slope of 0.15% are sufficient to contain 100-year flows, less 2-year minor system capture, from local drainage areas of up to 75% imperviousness.

If the storage on a specific street segment is surpassed due to blockage or an event greater than the 100-year storm, the excess water will flow towards the next downstream street sag, and eventually to the pond. The major system will be designed such that no flooding of the properties within the subdivision would occur under the 100-year + 20% stress test.

Yours truly,
J.F. Sabourin and Associates Inc.



Laura Pipkins, P.Eng.

cc: J.F. Sabourin, M.Eng, P.Eng.
Director of Water Resources Projects

Attachment A:	Conceptual Storm Servicing (DSEL, May 2018) Revised Catchment Boundaries in the Carp River Model
Attachment B:	Comparison of 2- to 100-Year Water Levels and Flows at Key Points on Carp River and Feedmill Creek 10- and 100-Year Outflow Hydrographs from Kanata West Pond 4 to the Carp River
Attachment C:	100-Year Road Ponding Volume Calculation Sheet

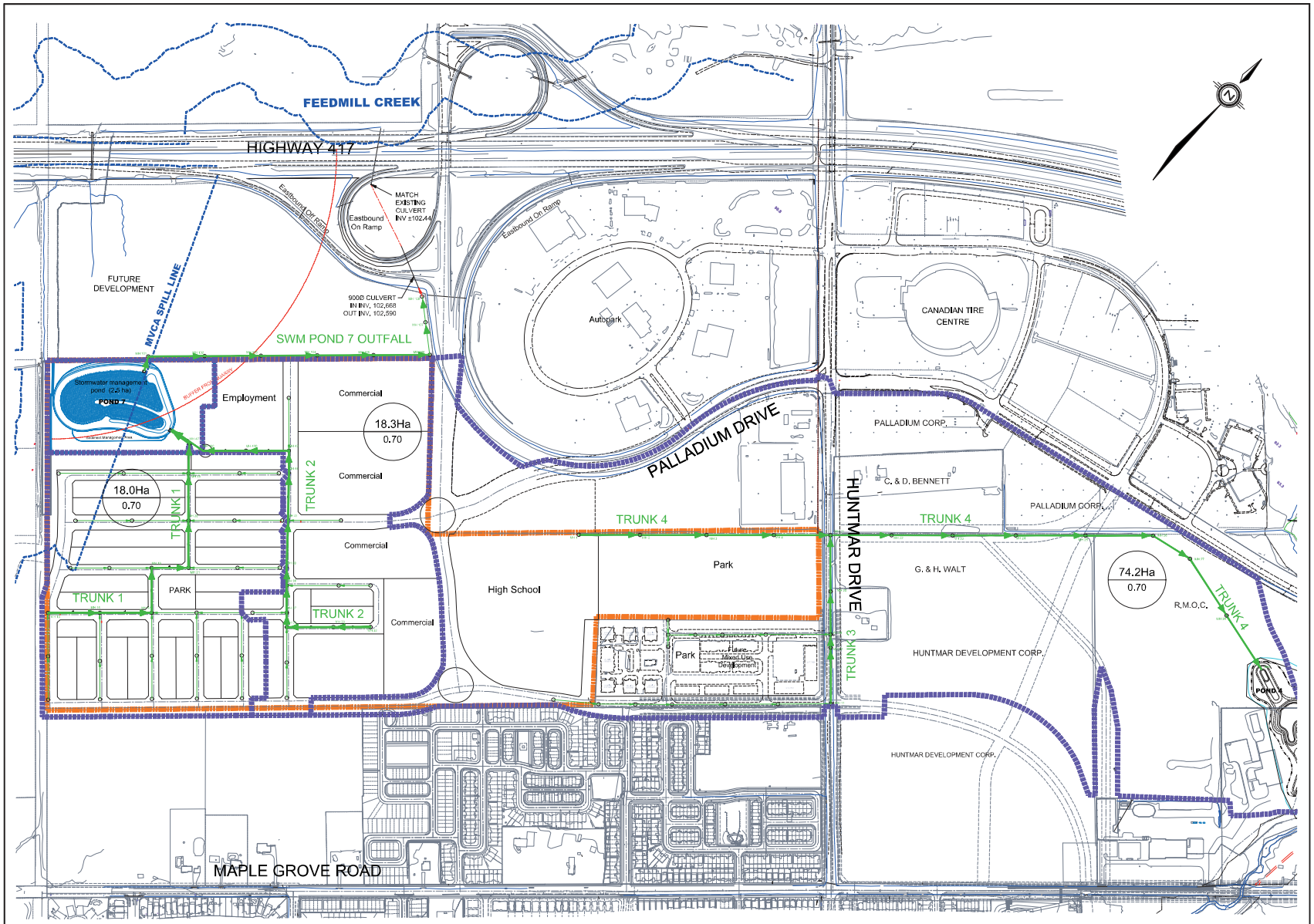
ATTACHMENT

A

Conceptual Storm Servicing Plan (DSEL, May 2018)

Revised Catchment Boundaries in the Carp River Ultimate Conditions Model

JFSA Water Resources and Environmental Consultants



DSEL
david schaeffer engineering ltd

120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

LEGEND:
- STUDY LIMIT
- EXISTING DITCH
- MAJOR OVERLAND FLOW

KANATA WEST - 195 HUNTMAR DRIVE
CONCEPTUAL STORM SERVICING PLAN
CITY OF OTTAWA

PROJECT No.:	14-824
SCALE	1:2000
DATE:	MAY 2018
DRAWING No.	2

Table A-1: Catchment Boundaries in the Carp River Ultimate Conditions Base Model Revised to Represent Ultimate Scenario D2

PCSWMM Catchment ID	February 2017 Base Model [1]			D2 - KWMSS Pond 4/7 Update [2]			Difference			Notes
	Area (ha)	Imperviousness (%)	Width (m)	Area (ha)	Imperviousness (%)	Width (m)	Area (ha)	Imperviousness (%)	Width (m)	
Base										
PS202	106.24	71.045	708.27	73.89	81.207	493.00	-32.35	10.162	-215.27	
PS230	26.10	69.428	325.00	26.35	69.428	328.07	-28.85	22.132	-1345.29	
PS241_1	18.55	57.689	480.00	18.82	57.689	486.94				
PS241_2	29.29	45.360	379.25	29.29	45.360	366.10				
PS252	17.36	40.873	291.16	17.36	40.873	284.56	0.00	0.000	-6.60	
FS020	7.28	27.000	870.00	6.84	27.000	817.25				
FS022	23.42	95.000	397.00	23.17	95.000	392.72				
FS043	8.39	15.800	200.00	9.48	15.800	226.06				
FS070	7.54	2.600	241.00	7.35	2.600	234.97				
FS081_2	6.94	54.000	192.28	7.20	54.000	199.22	0.25	0.000	6.95	
FS107	34.54	85.000	430.00	40.80	71.000	507.95	6.26	-14.000	77.95	Development to Pond 7
FS107_1				6.81	37.800	279.00	6.81	37.800	279.00	Highway 417 Ramp
FS107_3				16.50	0.000	498.00	16.50	0.000	498.00	MTO Lands Undeveloped to Feedmill Creek
FS107_4				2.14	27.400	88.00	2.14	27.400	88.00	Highway 417 Ramp

[1] As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa dated February 2017.

[2] Modified to accommodate revised Kanata West Pond 4 and 7 drainage areas.

ATTACHMENT

B

Comparison of 2- to 100- Year Water Levels and Flows at Key Points on Carp River and Feedmill Creek

10- and 100- Year Outflow Hydrographs from Kanata West Pond 4 to the Carp River

JFSA Water Resources and Environmental Consultants

Table B-1A: 2-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Scenario D2

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Ultimate Base [1]		D2 - KWMSS Pond 4/7 Update [2]		Difference	
		Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	3.83	93.68	3.82	93.68	-0.01	0.00
Near Fernbank Pond 2 Outfall	CJ200	5.75	93.64	5.75	93.64	0.00	0.00
Hazeldean Road	CJ199	5.64	93.61	5.64	93.61	0.00	0.00
Maple Grove Road	CJ172	5.77	93.45	5.41	93.45	-0.36	0.00
Palladium Drive (Near Pond 4 Outfall)	CJ150	23.97	93.37	22.94	93.37	-1.03	0.00
Highway 417	CJ120	11.42	93.10	11.36	93.10	-0.06	0.00
Feedmill Creek	CJ106	14.34	92.88	14.28	92.88	-0.06	0.00
Richardson Side Road	CJ050	12.93	92.57	12.83	92.57	-0.10	0.00
Huntmar Drive	CJ032	14.71	91.72	14.34	91.70	-0.37	-0.02
Downstream of Eco Woods Pond	FJ105	0.51	117.52	0.51	117.52	0.00	0.00
Upstream of Overland Drive	FJ094	0.97	113.35	0.97	113.35	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	0.64	110.51	0.64	110.51	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	0.77	110.44	0.76	110.44	-0.01	0.00
Adjacent to future Expansion Area 3	FJ085	0.77	110.43	0.76	110.43	-0.01	0.00
Downstream of future Expansion Area 3	FJ074	0.94	107.03	0.94	107.03	0.00	0.00
Existing major system spill point (Interim model)	FJ073	0.98	106.71	0.98	106.71	0.00	0.00
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	0.94	106.50	0.93	106.50	-0.01	0.00
Upstream of Highway 417*	FJ063	2.12	105.37	2.12	105.37	0.00	0.00
Downstream of Highway 417	FJ062	1.97	105.34	1.97	105.34	0.00	0.00
Upstream of Palladium Dr.	FJ038	3.41	99.63	3.45	99.64	0.04	0.01
Upstream of 417 on-ramp	FJ034	3.38	98.77	3.42	98.78	0.04	0.01
Upstream of 417 off-ramp	FJ032	3.37	98.70	3.41	98.71	0.04	0.01
Upstream of Tanger access road	FJ027	3.38	97.46	3.41	97.47	0.03	0.01
Upstream of Huntmar Drive	FJ019	4.53	96.89	4.57	96.90	0.04	0.01
Between Huntmar Drive and the Carp River	FJ007	4.48	94.46	4.52	94.47	0.04	0.01

[1] As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017, modified to reflect April 2018 "Feedmill Creek SWM Criteria Final Report".

[2] Ultimate base model modified to reflect revised Kanata West Pond 4 and Pond 7 drainage areas and designs, and surrounding areas draining uncontrolled to Feedmill Creek.

Table B-1B: 5-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Scenario D2

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Ultimate Base [1]		D2 - KWMSS Pond 4/7 Update [2]		Difference	
		Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	5.50	93.88	5.49	93.88	-0.01	0.00
Near Fernbank Pond 2 Outfall	CJ200	8.70	93.84	8.70	93.84	0.00	0.00
Hazeldean Road	CJ199	8.50	93.82	8.50	93.82	0.00	0.00
Maple Grove Road	CJ172	9.02	93.66	8.45	93.65	-0.57	-0.01
Palladium Drive (Near Pond 4 Outfall)	CJ150	42.48	93.61	37.51	93.60	-4.97	-0.01
Highway 417	CJ120	17.13	93.39	16.97	93.39	-0.16	0.00
Feedmill Creek	CJ106	22.33	93.15	22.19	93.15	-0.14	0.00
Richardson Side Road	CJ050	20.20	92.85	20.11	92.84	-0.09	-0.01
Huntmar Drive	CJ032	24.31	92.05	24.02	92.04	-0.29	-0.01
Downstream of Eco Woods Pond	FJ105	0.66	117.59	0.66	117.59	0.00	0.00
Upstream of Overland Drive	FJ094	1.20	113.40	1.20	113.40	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	0.82	110.59	0.82	110.59	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	1.15	110.52	1.15	110.52	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	1.15	110.51	1.15	110.51	0.00	0.00
Downstream of future Expansion Area 3	FJ074	1.48	107.07	1.48	107.07	0.00	0.00
Existing major system spill point (Interim model)	FJ073	1.48	106.83	1.48	106.83	0.00	0.00
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	1.49	106.61	1.49	106.61	0.00	0.00
Upstream of Highway 417*	FJ063	2.79	105.57	2.79	105.57	0.00	0.00
Downstream of Highway 417	FJ062	2.75	105.49	2.75	105.49	0.00	0.00
Upstream of Palladium Dr.	FJ038	5.60	100.02	5.71	100.04	0.11	0.02
Upstream of 417 on-ramp	FJ034	5.45	99.27	5.61	99.29	0.16	0.02
Upstream of 417 off-ramp	FJ032	5.49	99.16	5.67	99.17	0.18	0.01
Upstream of Tanger access road	FJ027	6.08	97.78	6.30	97.79	0.22	0.01
Upstream of Huntmar Drive	FJ019	7.37	97.18	7.57	97.19	0.20	0.01
Between Huntmar Drive and the Carp River	FJ007	7.02	94.79	7.06	94.86	0.04	0.07

[1] As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017, modified to reflect April 2018 "Feedmill Creek SWM Criteria Final Report".

[2] Ultimate base model modified to reflect revised Kanata West Pond 4 and Pond 7 drainage areas and designs, and surrounding areas draining uncontrolled to Feedmill Creek.

Table B-1C: 10-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Scenario D2

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Ultimate Base [1]		D2 - KWMSS Pond 4/7 Update [2]		Difference	
		Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	6.44	94.00	6.44	94.00	0.00	0.00
Near Fernbank Pond 2 Outfall	CJ200	10.49	93.96	10.49	93.96	0.00	0.00
Hazeldean Road	CJ199	10.21	93.95	10.22	93.95	0.01	0.00
Maple Grove Road	CJ172	11.42	93.80	10.54	93.79	-0.88	-0.01
Palladium Drive (Near Pond 4 Outfall)	CJ150	47.05	93.75	42.30	93.74	-4.75	-0.01
Highway 417	CJ120	21.25	93.55	20.96	93.55	-0.29	0.00
Feedmill Creek	CJ106	27.96	93.29	27.72	93.29	-0.24	0.00
Richardson Side Road	CJ050	24.98	93.03	24.74	93.03	-0.24	0.00
Huntmar Drive	CJ032	31.02	92.23	30.59	92.22	-0.43	-0.01
Downstream of Eco Woods Pond	FJ105	0.78	117.64	0.78	117.64	0.00	0.00
Upstream of Overland Drive	FJ094	1.24	113.41	1.24	113.41	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	0.91	110.65	0.91	110.65	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	1.53	110.60	1.53	110.60	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	1.53	110.58	1.53	110.58	0.00	0.00
Downstream of future Expansion Area 3	FJ074	1.97	107.10	1.97	107.10	0.00	0.00
Existing major system spill point (Interim model)	FJ073	1.97	106.95	1.97	106.95	0.00	0.00
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	2.00	106.66	2.00	106.66	0.00	0.00
Upstream of Highway 417*	FJ063	3.26	105.71	3.26	105.71	0.00	0.00
Downstream of Highway 417	FJ062	3.26	105.58	3.26	105.58	0.00	0.00
Upstream of Palladium Dr.	FJ038	7.28	100.30	7.45	100.32	0.17	0.02
Upstream of 417 on-ramp	FJ034	7.29	99.49	7.44	99.51	0.15	0.02
Upstream of 417 off-ramp	FJ032	7.31	99.29	7.45	99.30	0.14	0.01
Upstream of Tanger access road	FJ027	7.52	97.91	7.74	97.93	0.22	0.02
Upstream of Huntmar Drive	FJ019	9.10	97.37	9.25	97.39	0.15	0.02
Between Huntmar Drive and the Carp River	FJ007	8.70	94.96	8.89	94.97	0.19	0.01

[1] As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017, modified to reflect April 2018 "Feedmill Creek SWM Criteria Final Report".

[2] Ultimate base model modified to reflect revised Kanata West Pond 4 and Pond 7 drainage areas and designs, and surrounding areas draining uncontrolled to Feedmill Creek.

Table B-1D: 25-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Scenario D2

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Ultimate Base [1]		D2 - KWMSS Pond 4/7 Update [2]		Difference	
		Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	7.34	94.14	7.35	94.14	0.01	0.00
Near Fernbank Pond 2 Outfall	CJ200	12.59	94.11	12.59	94.11	0.00	0.00
Hazeldean Road	CJ199	12.08	94.10	12.11	94.09	0.03	-0.01
Maple Grove Road	CJ172	12.31	93.96	12.34	93.95	0.03	-0.01
Palladium Drive (Near Pond 4 Outfall)	CJ150	38.62	93.91	36.81	93.91	-1.81	0.00
Highway 417	CJ120	25.99	93.73	25.67	93.73	-0.32	0.00
Feedmill Creek	CJ106	34.82	93.46	34.57	93.45	-0.25	-0.01
Richardson Side Road	CJ050	32.84	93.18	32.59	93.18	-0.25	0.00
Huntmar Drive	CJ032	40.79	92.47	40.41	92.46	-0.38	-0.01
Downstream of Eco Woods Pond	FJ105	1.01	117.73	1.01	117.73	0.00	0.00
Upstream of Overland Drive	FJ094	1.27	113.42	1.27	113.42	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	1.16	110.76	1.16	110.76	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	2.09	110.71	2.09	110.71	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	2.09	110.68	2.09	110.68	0.00	0.00
Downstream of future Expansion Area 3	FJ074	2.67	107.14	2.67	107.14	0.00	0.00
Existing major system spill point (Interim model)	FJ073	2.67	107.02	2.67	107.02	0.00	0.00
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	2.72	106.75	2.72	106.75	0.00	0.00
Upstream of Highway 417*	FJ063	4.20	105.92	4.20	105.92	0.00	0.00
Downstream of Highway 417	FJ062	4.21	105.74	4.21	105.74	0.00	0.00
Upstream of Palladium Dr.	FJ038	9.67	100.64	9.92	100.68	0.25	0.04
Upstream of 417 on-ramp	FJ034	9.40	99.85	9.62	99.89	0.22	0.04
Upstream of 417 off-ramp	FJ032	9.40	99.53	9.62	99.55	0.22	0.02
Upstream of Tanger access road	FJ027	9.55	98.10	9.77	98.12	0.22	0.02
Upstream of Huntmar Drive	FJ019	11.44	97.63	11.64	97.65	0.20	0.02
Between Huntmar Drive and the Carp River	FJ007	11.33	95.10	11.59	95.11	0.26	0.01

[1] As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017, modified to reflect April 2018 "Feedmill Creek SWM Criteria Final Report".

[2] Ultimate base model modified to reflect revised Kanata West Pond 4 and Pond 7 drainage areas and designs, and surrounding areas draining uncontrolled to Feedmill Creek.

Table B-1E: 50-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Scenario D2

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Ultimate Base [1]		D2 - KWMSS Pond 4/7 Update [2]		Difference	
		Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	7.91	94.23	7.91	94.23	0.00	0.00
Near Fernbank Pond 2 Outfall	CJ200	14.09	94.21	14.07	94.20	-0.02	-0.01
Hazeldean Road	CJ199	13.34	94.20	13.35	94.19	0.01	-0.01
Maple Grove Road	CJ172	13.99	94.07	13.87	94.06	-0.12	-0.01
Palladium Drive (Near Pond 4 Outfall)	CJ150	42.08	94.02	38.46	94.01	-3.62	-0.01
Highway 417	CJ120	29.30	93.84	28.88	93.84	-0.42	0.00
Feedmill Creek	CJ106	39.47	93.55	39.16	93.55	-0.31	0.00
Richardson Side Road	CJ050	37.44	93.29	37.25	93.29	-0.19	0.00
Huntmar Drive	CJ032	47.33	92.62	46.97	92.61	-0.36	-0.01
Downstream of Eco Woods Pond	FJ105	1.20	117.79	1.20	117.79	0.00	0.00
Upstream of Overland Drive	FJ094	1.16	113.44	1.16	113.44	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	1.45	110.83	1.45	110.83	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	2.51	110.78	2.51	110.78	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	2.51	110.75	2.51	110.75	0.00	0.00
Downstream of future Expansion Area 3	FJ074	3.19	107.14	3.19	107.14	0.00	0.00
Existing major system spill point (Interim model)	FJ073	3.19	107.06	3.19	107.06	0.00	0.00
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	3.26	106.82	3.26	106.82	0.00	0.00
Upstream of Highway 417*	FJ063	4.92	106.08	4.92	106.08	0.00	0.00
Downstream of Highway 417	FJ062	4.94	105.85	4.94	105.85	0.00	0.00
Upstream of Palladium Dr.	FJ038	11.07	100.84	11.34	100.91	0.27	0.07
Upstream of 417 on-ramp	FJ034	10.79	100.12	11.00	100.16	0.21	0.04
Upstream of 417 off-ramp	FJ032	10.79	99.70	10.99	99.73	0.20	0.03
Upstream of Tanger access road	FJ027	10.96	98.23	11.16	98.25	0.20	0.02
Upstream of Huntmar Drive	FJ019	12.78	97.79	13.01	97.82	0.23	0.03
Between Huntmar Drive and the Carp River	FJ007	12.92	95.16	13.16	95.16	0.24	0.00

[1] As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017, modified to reflect April 2018 "Feedmill Creek SWM Criteria Final Report".

[2] Ultimate base model modified to reflect revised Kanata West Pond 4 and Pond 7 drainage areas and designs, and surrounding areas draining uncontrolled to Feedmill Creek.

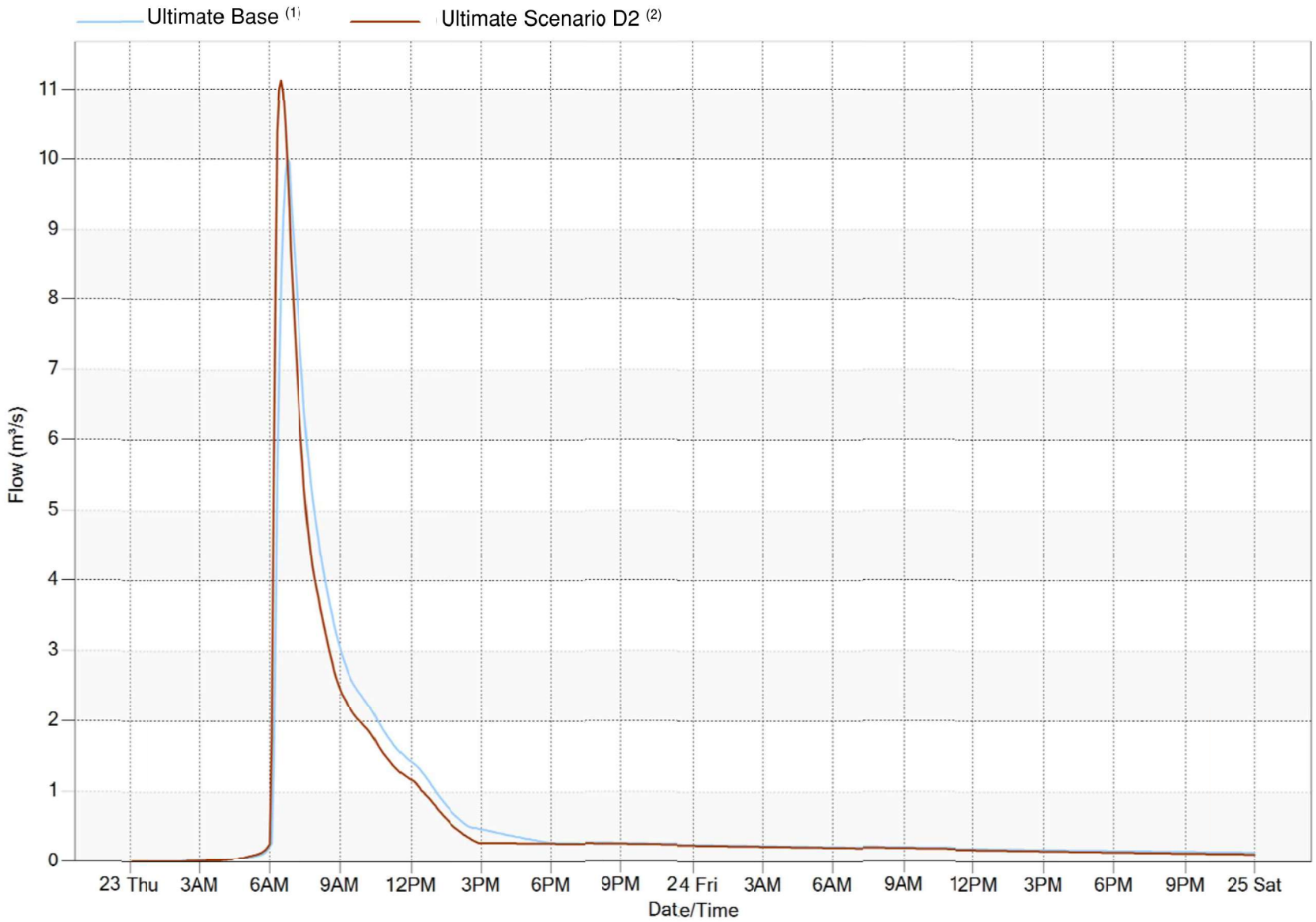
Table B-1F: 100-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Scenario D2

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Ultimate Base [1]		D2 - KWMSS Pond 4/7 Update [2]		Difference	
		Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	8.52	94.33	8.50	94.32	-0.02	-0.01
Near Fernbank Pond 2 Outfall	CJ200	14.98	94.31	14.94	94.30	-0.04	-0.01
Hazeldean Road	CJ199	13.98	94.30	14.00	94.30	0.02	0.00
Maple Grove Road	CJ172	16.24	94.18	15.95	94.18	-0.29	0.00
Palladium Drive (Near Pond 4 Outfall)	CJ150	35.73	94.14	37.07	94.13	1.34	-0.01
Highway 417	CJ120	32.41	93.98	31.95	93.97	-0.46	-0.01
Feedmill Creek	CJ106	44.38	93.69	44.03	93.68	-0.35	-0.01
Richardson Side Road	CJ050	43.51	93.46	43.23	93.45	-0.28	-0.01
Huntmar Drive	CJ032	57.07	93.10	56.75	93.10	-0.32	0.00
Downstream of Eco Woods Pond	FJ105	1.46	117.87	1.46	117.87	0.00	0.00
Upstream of Overland Drive	FJ094	1.71	113.57	1.71	113.57	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	1.70	110.89	1.71	110.89	0.01	0.00
Downstream of Maple Grove open road allowance	FJ087	2.92	110.85	2.94	110.85	0.02	0.00
Adjacent to future Expansion Area 3	FJ085	2.92	110.81	2.93	110.81	0.01	0.00
Downstream of future Expansion Area 3	FJ074	3.71	107.16	3.71	107.16	0.00	0.00
Existing major system spill point (Interim model)	FJ073	3.71	107.10	3.71	107.10	0.00	0.00
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	3.79	106.86	3.79	106.86	0.00	0.00
Upstream of Highway 417*	FJ063	5.55	106.25	5.55	106.25	0.00	0.00
Downstream of Highway 417	FJ062	5.56	105.94	5.56	105.93	0.00	-0.01
Upstream of Palladium Dr.	FJ038	12.00	101.17	12.24	101.24	0.24	0.07
Upstream of 417 on-ramp	FJ034	11.84	100.34	12.07	100.39	0.23	0.05
Upstream of 417 off-ramp	FJ032	11.84	99.84	12.07	99.87	0.23	0.03
Upstream of Tanger access road	FJ027	12.00	98.32	12.23	98.35	0.23	0.03
Upstream of Huntmar Drive	FJ019	13.85	97.91	14.13	97.95	0.28	0.04
Between Huntmar Drive and the Carp River	FJ007	14.04	95.19	14.31	95.20	0.27	0.01

[1] As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017, modified to reflect April 2018 "Feedmill Creek SWM Criteria Final Report".

[2] Ultimate base model modified to reflect revised Kanata West Pond 4 and Pond 7 drainage areas and designs, and surrounding areas draining uncontrolled to Feedmill Creek.

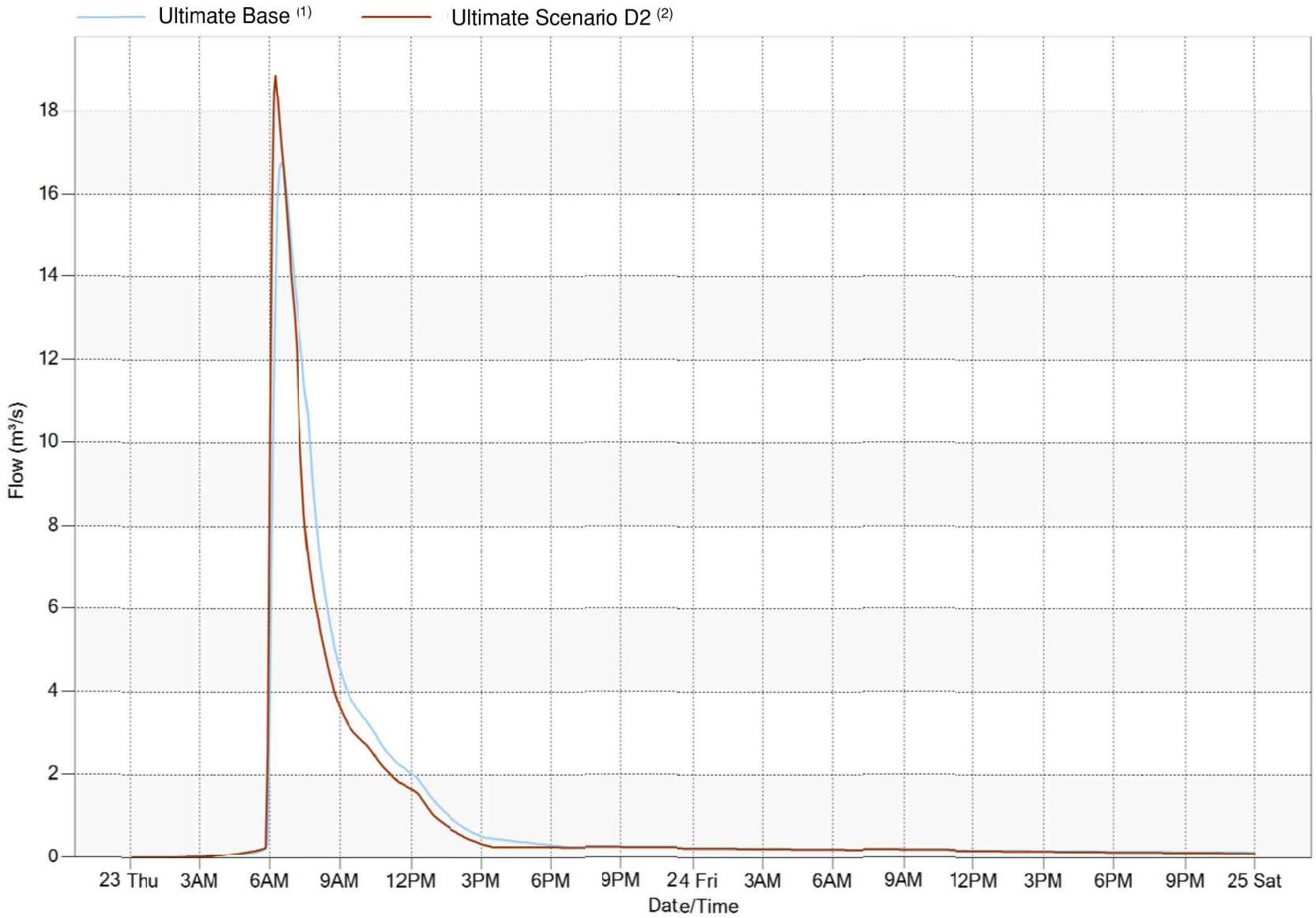
Figure B-1: 10-Year Outflow Hydrographs from Kanata West Pond 4 to the Carp River



(1) As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017, modified to reflect April 2018 "Feedmill Creek SWM Criteria Final Report".

(2) Ultimate base model modified to reflect revised Kanata West Pond 4 and Pond 7 drainage areas and designs, and surrounding areas draining uncontrolled to Feedmill Creek.

Figure B-2: 100-Year Outflow Hydrographs from Kanata West Pond 4 to the Carp River



(1) As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017, modified to reflect April 2018 "Feedmill Creek SWM Criteria Final Report".

(2) Ultimate base model modified to reflect revised Kanata West Pond 4 and Pond 7 drainage areas and designs, and surrounding areas draining uncontrolled to Feedmill Creek.

ATTACHMENT

C

100- Year Road Ponding Volume Calculation Sheet

JFSA Water Resources and Environmental Consultants

Calculation Sheet C-1: Road Ponding Volumes Required to Contain 100% of the 100-Year Flow, Less Minor System Capture

User Input Characteristics

IDF Parameters, Intensity = A / (B + Tc) ^ C

Parameter	2-Year	5-Year	100-Year
A	732.951	998.071	1735.688
B	6.199	6.053	6.014
C	0.810	0.814	0.820

Road Width	8.5	m
Road Cross-Slope	0.020	m/m
Right-of-Way Cross-Slope	0.035	m/m
Curb Height	0.15	m
Street Crown	0.0850	m

Lot Depth	30	m
Right Of Way Width	20	m
Difference in Elevation between High Points	0.115	m
Longitudinal Slope (U/S High Point to U/S Exte	2	%
Longitudinal Slope (U/S Ponding Extent to LP)	0.5	%
Longitudinal Slope (LP to D/S Spill Point)	0.5	%
Time of Concentration	10	minutes
Length of Unit Hydrograph	3.5	x Time of Conc.
Minor System Capture (Year or L/s/ha)	2	Year

Calculated Results

2-Year Rainfall Intensity	76.81	mm/hour
5-Year Rainfall Intensity	104.19	mm/hour
100-Year Rainfall Intensity	178.56	mm/hour

Note: Static Volume as per "*Calculation Sheet: Storage In Typical Road Ponding Area*". For Minor System Capture, enter either a 2- or 5-year return period, or a unit capture rate. Drawdown Time is the time to drain the 100-year volume after the peak of the storm, and is not dependent on drainage area. Volume calculated based on the Rational Method as runoff volume exceeding minor system capture, where Q = CIA / 360 and $V = (Q_{100} - Q_5)\,(1 - Q_5 / Q_{100})\,(LT_c)\,(60/2)$, and

Q = Flow (m^3/s) — A = Area (ha)
V = Volume (m^3) — L = Length of Unit Hydrograph
C = Runoff Coefficient — T_c = Time of Concentration (minutes)
I = Intensity (mm/hour)

Imperviousness (%)	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Runoff Coeff. (2-, 5-Year)	0.340	0.375	0.410	0.445	0.480	0.515	0.550	0.585	0.620	0.655	0.690	0.725	0.760	0.795	0.830
Runoff Coeff. (100-Year)	0.400	0.438	0.475	0.513	0.550	0.588	0.625	0.663	0.700	0.738	0.775	0.813	0.850	0.888	0.925
Drawdown Time (minutes)	19.3	18.9	18.6	18.4	18.2	18.0	17.9	17.7	17.6	17.5	17.4	17.3	17.2	17.2	17.1

Static Depth (m)	Static Volume (m^3)	Drainage Area (ha)	Static Volume (m^3/ha)	Static Volume Required to Contain 100% of the 100-Year Flow, Less Minor System Capture (m^3)														
0.000	0.00	0.046	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.005	0.00	0.062	0.01	5.2	5.6	6.1	6.5	6.9	7.4	7.8	8.2	8.7	9.1	9.5	10.0	10.4	10.8	11.3
0.010	0.01	0.078	0.09	6.5	7.1	7.6	8.2	8.7	9.3	9.8	10.4	10.9	11.4	12.0	12.5	13.1	13.6	14.2
0.015	0.02	0.094	0.24	7.9	8.5	9.2	9.8	10.5	11.2	11.8	12.5	13.1	13.8	14.4	15.1	15.8	16.4	17.1
0.020	0.05	0.110	0.48	9.2	10.0	10.8	11.5	12.3	13.1	13.8	14.6	15.4	16.1	16.9	17.7	18.4	19.2	20.0
0.025	0.10	0.126	0.83	10.6	11.4	12.3	13.2	14.1	15.0	15.8	16.7	17.6	18.5	19.4	20.2	21.1	22.0	22.9
0.030	0.18	0.142	1.27	11.9	12.9	13.9	14.9	15.9	16.9	17.9	18.8	19.8	20.8	21.8	22.8	23.8	24.8	25.8
0.035	0.29	0.158	1.81	13.2	14.3	15.5	16.6	17.7	18.8	19.9	21.0	22.1	23.2	24.3	25.4	26.5	27.6	28.7
0.040	0.43	0.174	2.45	14.6	15.8	17.0	18.2	19.4	20.7	21.9	23.1	24.3	25.5	26.7	28.0	29.2	30.4	31.6
0.045	0.61	0.190	3.20	15.9	17.3	18.6	19.9	21.2	22.6	23.9	25.2	26.5	27.9	29.2	30.5	31.9	33.2	34.5
0.050	0.83	0.206	4.05	17.3	18.7	20.1	21.6	23.0	24.5	25.9	27.3	28.8	30.2	31.7	33.1	34.5	36.0	37.4
0.055	1.11	0.222	5.00	18.6	20.2	21.7	23.3	24.8	26.4	27.9	29.5	31.0	32.6	34.1	35.7	37.2	38.8	40.3
0.060	1.44	0.238	6.05	20.0	21.6	23.3	24.9	26.6	28.3	29.9	31.6	33.2	34.9	36.6	38.2	39.9	41.6	43.2
0.065	1.83	0.254	7.21	21.3	23.1	24.8	26.6	28.4	30.2	31.9	33.7	35.5	37.3	39.0	40.8	42.6	44.4	46.1
0.070	2.29	0.270	8.47	22.6	24.5	26.4	28.3	30.2	32.1	33.9	35.8	37.7	39.6	41.5	43.4	45.3	47.2	49.0
0.075	2.81	0.286	9.83	24.0	26.0	28.0	30.0	32.0	34.0	36.0	38.0	40.0	42.0	44.0	45.9	47.9	49.9	51.9
0.080	3.41	0.302	11.30	25.3	27.4	29.5	31.6	33.7	35.9	38.0	40.1	42.2	44.3	46.4	48.5	50.6	52.7	54.9
0.085	4.09	0.318	12.87	26.7	28.9	31.1	33.3	35.5	37.8	40.0	42.2	44.4	46.6	48.9	51.1	53.3	55.5	57.8
0.090	4.86	0.334	14.55	28.0	30.3	32.7	35.0	37.3	39.7	42.0	44.3	46.7	49.0	51.3	53.7	56.0	58.3	60.7
0.095	5.71	0.350	16.31	29.3	31.8	34.2	36.7	39.1	41.6	44.0	46.4	48.9	51.3	53.8	56.2	58.7	61.1	63.6
0.100	6.64	0.366	18.15	30.7	33.2	35.8	38.3	40.9	43.5	46.0	48.6	51.1	53.7	56.2	58.8	61.4	63.9	66.5
0.105	7.66	0.382	20.06	32.0	34.7	37.4	40.0	42.7	45.4	48.0	50.7	53.4	56.0	58.7	61.4	64.0	66.7	69.4
0.110	8.77	0.398	22.03	33.4	36.1	38.9	41.7	44.5	47.3	50.0	52.8	55.6	58.4	61.2	63.9	66.7	69.5	72.3
0.115	9.96	0.414	24.06	34.7	37.6	40.5	43.4	46.3	49.2	52.0	54.9	57.8	60.7	63.6	66.5	69.4	72.3	75.2
0.120	11.23	0.430	26.13	36.0	39.0	42.0	45.0	48.1	51.1	54.1	57.1	60.1	63.1	66.1	69.1	72.1	75.1	78.1
0.125	12.59	0.446	28.24	37.4	40.5	43.6	46.7	49.8	53.0	56.1	59.2	62.3	65.4	68.5	71.7	74.8	77.9	81.0
0.130	14.04	0.462	30.39	38.7	42.0	45.2	48.4	51.6	54.9	58.1	61.3	64.5	67.8	71.0	74.2	77.5	80.7	83.9
0.135	15.57	0.478	32.57	40.1	43.4	46.7	50.1	53.4	56.8	60.1	63.4	66.8	70.1	73.5	76.8	80.1	83.5	86.8
0.140	17.18	0.494	34.79	41.4	44.9	48.3	51.8	55.2	58.7	62.1	65.6	69.0	72.5	75.9	79.4	82.8	86.3	89.7

Calculation Sheet C-1: Road Ponding Volumes Required to Contain 100% of the 100-Year Flow, Less Minor System Capture

User Input Characteristics

IDF Parameters, Intensity = A / (B + Tc) ^ C

Parameter	2-Year	5-Year	100-Year
A	732.951	998.071	1735.688
B	6.199	6.053	6.014
C	0.810	0.814	0.820

Road Width	8.5	m
Road Cross-Slope	0.020	m/m
Right-of-Way Cross-Slope	0.035	m/m
Curb Height	0.15	m
Street Crown	0.0850	m

Lot Depth	30	m
Right Of Way Width	20	m
Difference in Elevation between High Points	0.115	m
Longitudinal Slope (U/S High Point to U/S Exte	2	%
Longitudinal Slope (U/S Ponding Extent to LP)	0.5	%
Longitudinal Slope (LP to D/S Spill Point)	0.5	%
Time of Concentration	10	minutes
Length of Unit Hydrograph	3.5	x Time of Conc.
Minor System Capture (Year or L/s/ha)	2	Year

Calculated Results

2-Year Rainfall Intensity	76.81	mm/hour
5-Year Rainfall Intensity	104.19	mm/hour
100-Year Rainfall Intensity	178.56	mm/hour

Note: Static Volume as per "*Calculation Sheet: Storage In Typical Road Ponding Area*". For Minor System Capture, enter either a 2- or 5-year return period, or a unit capture rate. Drawdown Time is the time to drain the 100-year volume after the peak of the storm, and is not dependent on drainage area. Volume calculated based on the Rational Method as runoff volume exceeding minor system capture, where Q = CIA / 360 and $V = (Q_{100} - Q_5)\,(1 - Q_5 / Q_{100})\,(LT_c)\,(60/2)$, and

Q = Flow (m^3/s) — A = Area (ha)
V = Volume (m^3) — L = Length of Unit Hydrograph
C = Runoff Coefficient — T_c = Time of Concentration (minutes)
I = Intensity (mm/hour)

Imperviousness (%)	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Runoff Coeff. (2-, 5-Year)	0.340	0.375	0.410	0.445	0.480	0.515	0.550	0.585	0.620	0.655	0.690	0.725	0.760	0.795	0.830
Runoff Coeff. (100-Year)	0.400	0.438	0.475	0.513	0.550	0.588	0.625	0.663	0.700	0.738	0.775	0.813	0.850	0.888	0.925
Drawdown Time (minutes)	19.3	18.9	18.6	18.4	18.2	18.0	17.9	17.7	17.6	17.5	17.4	17.3	17.2	17.2	17.1

Static Depth (m)	Static Volume (m^3)	Drainage Area (ha)	Static Volume (m^3/ha)	Static Volume Required to Contain 100% of the 100-Year Flow, Less Minor System Capture (m^3)													
0.145	18.88	0.510	37.03	42.8	46.3	49.9	53.4	57.0	60.6	64.1	67.7	71.2	74.8	78.4	81.9	85.5	89.1	92.6
0.150	20.67	0.526	39.29	44.1	47.8	51.4	55.1	58.8	62.5	66.1	69.8	73.5	77.2	80.8	84.5	88.2	91.9	95.5
0.155	22.54	0.542	41.59	45.4	49.2	53.0	56.8	60.6	64.4	68.1	71.9	75.7	79.5	83.3	87.1	90.9	94.7	98.4
0.160	24.50	0.558	43.90	46.8	50.7	54.6	58.5	62.4	66.3	70.2	74.0	77.9	81.8	85.7	89.6	93.6	97.5	101.4
0.165	26.55	0.574	46.25	48.1	52.1	56.1	60.1	64.1	68.2	72.2	76.2	80.2	84.2	88.2	92.2	96.2	100.2	104.3
0.170	28.69	0.590	48.63	49.5	53.6	57.7	61.8	65.9	70.1	74.2	78.3	82.4	86.5	90.7	94.8	98.9	103.0	107.2
0.175	30.93	0.606	51.04	50.8	55.0	59.3	63.5	67.7	72.0	76.2	80.4	84.7	88.9	93.1	97.4	101.6	105.8	110.1
0.180	33.27	0.622	53.48	52.1	56.5	60.8	65.2	69.5	73.9	78.2	82.5	86.9	91.2	95.6	99.9	104.3	108.6	113.0
0.185	35.71	0.638	55.97	53.5	57.9	62.4	66.8	71.3	75.8	80.2	84.7	89.1	93.6	98.0	102.5	107.0	111.4	115.9
0.190	38.25	0.654	58.49	54.8	59.4	64.0	68.5	73.1	77.7	82.2	86.8	91.4	95.9	100.5	105.1	109.6	114.2	118.8
0.195	40.91	0.670	61.05	56.2	60.8	65.5	70.2	74.9	79.6	84.2	88.9	93.6	98.3	103.0	107.6	112.3	117.0	121.7
0.200	43.67	0.686	63.66	57.5	62.3	67.1	71.9	76.7	81.5	86.2	91.0	95.8	100.6	105.4	110.2	115.0	119.8	124.6
0.205	46.55	0.702	66.31	58.9	63.7	68.6	73.5	78.4	83.4	88.3	93.2	98.1	103.0	107.9	112.8	117.7	122.6	127.5
0.210	49.54	0.718	69.00	60.2	65.2	70.2	75.2	80.2	85.3	90.3	95.3	100.3	105.3	110.3	115.4	120.4	125.4	130.4
0.215	52.66	0.734	71.74	61.5	66.7	71.8	76.9	82.0	87.2	92.3	97.4	102.5	107.7	112.8	117.9	123.1	128.2	133.3
0.220	55.89	0.750	74.52	62.9	68.1	73.3	78.6	83.8	89.1	94.3	99.5	104.8	110.0	115.3	120.5	125.7	131.0	136.2
0.225	59.25	0.766	77.35	64.2	69.6	74.9	80.3	85.6	90.9	96.3	101.7	107.0	112.4	117.7	123.1	128.4	133.8	139.1
0.230	62.74	0.782	80.23	65.6	71.0	76.5	81.9	87.4	92.8	98.3	103.8	109.2	114.7	120.2	125.6	131.1	136.6	142.0
0.235	66.36	0.798	83.16	66.9	72.5	78.0	83.6	89.2	94.7	100.3	105.9	111.5	117.1	122.6	128.2	133.8	139.4	144.9
0.240	70.11	0.814	86.13	68.2	73.9	79.6	85.3	91.0	96.6	102.3	108.0	113.7	119.4	125.1	130.8	136.5	142.2	147.9
0.245	74.00	0.830	89.16	69.6	75.4	81.2	87.0	92.8	98.5	104.3	110.1	115.9	121.7	127.5	133.3	139.2	145.0	150.8
0.250	78.03	0.846	92.23	70.9	76.8	82.7	88.6	94.5	100.4	106.4	112.3	118.2	124.1	130.0	135.9	141.8	147.7	153.7
0.255	82.20	0.862	95.36	72.3	78.3	84.3	90.3	96.3	102.3	108.4	114.4	120.4	126.4	132.5	138.5	144.5	150.5	156.6
0.260	86.51	0.878	98.54	73.6	79.7	85.9	92.0	98.1	104.2	110.4	116.5	122.7	128.8	134.9	141.1	147.2	153.3	159.5
0.265	90.98	0.894	101.77	74.9	81.2	87.4	93.7	99.9	106.1	112.4	118.6	124.9	131.1	137.4	143.6	149.9	156.1	162.4
0.270	95.59	0.910	105.05	76.3	82.6	89.0	95.3	101.7	108.0	114.4	120.8	127.1	133.5	139.8	146.2	152.6	158.9	165.3
0.275	100.36	0.926	108.38	77.6	84.1	90.6	97.0	103.5	109.9	116.4	122.9	129.4	135.8	142.3	148.8	155.2	161.7	168.2
0.280	105.28	0.942	111.77	79.0	85.5	92.1	98.7	105.3	111.8	118.4	125.0	131.6	138.2	144.8	151.3	157.9	164.5	171.1
0.285	110.37	0.958	115.21	80.3	87.0	93.7	100.4	107.1	113.7	120.4	127.1	133.8	140.5	147.2	153.9	160.6	167.3	174.0

Calculation Sheet C-1: Road Ponding Volumes Required to Contain 100% of the 100-Year Flow, Less Minor System Capture

User Input Characteristics

IDF Parameters, Intensity = A / (B + Tc) ^ C

Parameter	2-Year	5-Year	100-Year
A	732.951	998.071	1735.688
B	6.199	6.053	6.014
C	0.810	0.814	0.820

Road Width	8.5	m
Road Cross-Slope	0.020	m/m
Right-of-Way Cross-Slope	0.035	m/m
Curb Height	0.15	m
Street Crown	0.0850	m

Lot Depth	30	m
Right Of Way Width	20	m
Difference in Elevation between High Points	0.115	m
Longitudinal Slope (U/S High Point to U/S Exte	2	%
Longitudinal Slope (U/S Ponding Extent to LP)	0.5	%
Longitudinal Slope (LP to D/S Spill Point)	0.5	%
Time of Concentration	10	minutes
Length of Unit Hydrograph	3.5	x Time of Conc.
Minor System Capture (Year or L/s/ha)	2	Year

Calculated Results

2-Year Rainfall Intensity	76.81	mm/hour
5-Year Rainfall Intensity	104.19	mm/hour
100-Year Rainfall Intensity	178.56	mm/hour

Note: Static Volume as per "*Calculation Sheet: Storage In Typical Road Ponding Area*". For Minor System Capture, enter either a 2- or 5-year return period, or a unit capture rate. Drawdown Time is the time to drain the 100-year volume after the peak of the storm, and is not dependent on drainage area. Volume calculated based on the Rational Method as runoff volume exceeding minor system capture, where Q = CIA / 360 and $V = (Q_{100} - Q_5)\,(1 - Q_5 / Q_{100})\,(LT_c)\,(60/2)$, and

Q = Flow (m^3/s) — A = Area (ha)
V = Volume (m^3) — L = Length of Unit Hydrograph
C = Runoff Coefficient — T_c = Time of Concentration (minutes)
I = Intensity (mm/hour)

Imperviousness (%)	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Runoff Coeff. (2-, 5-Year)	0.340	0.375	0.410	0.445	0.480	0.515	0.550	0.585	0.620	0.655	0.690	0.725	0.760	0.795	0.830
Runoff Coeff. (100-Year)	0.400	0.438	0.475	0.513	0.550	0.588	0.625	0.663	0.700	0.738	0.775	0.813	0.850	0.888	0.925
Drawdown Time (minutes)	19.3	18.9	18.6	18.4	18.2	18.0	17.9	17.7	17.6	17.5	17.4	17.3	17.2	17.2	17.1

Static Depth (m)	Static Volume (m^3)	Drainage Area (ha)	Static Volume (m^3/ha)	Static Volume Required to Contain 100% of the 100-Year Flow, Less Minor System Capture (m^3)														
0.290	115.61	0.974	118.70	81.7	88.4	95.2	102.0	108.8	115.6	122.5	129.3	136.1	142.9	149.7	156.5	163.3	170.1	176.9
0.295	121.02	0.990	122.25	83.0	89.9	96.8	103.7	110.6	117.5	124.5	131.4	138.3	145.2	152.1	159.1	166.0	172.9	179.8
0.300	126.60	1.006	125.85	84.3	91.4	98.4	105.4	112.4	119.4	126.5	133.5	140.5	147.6	154.6	161.6	168.7	175.7	182.7
0.305	132.35	1.022	129.50	85.7	92.8	99.9	107.1	114.2	121.3	128.5	135.6	142.8	149.9	157.1	164.2	171.3	178.5	185.6
0.310	138.27	1.038	133.21	87.0	94.3	101.5	108.7	116.0	123.2	130.5	137.7	145.0	152.3	159.5	166.8	174.0	181.3	188.5
0.315	144.37	1.054	136.98	88.4	95.7	103.1	110.4	117.8	125.1	132.5	139.9	147.2	154.6	162.0	169.3	176.7	184.1	191.4
0.320	150.65	1.070	140.79	89.7	97.2	104.6	112.1	119.6	127.0	134.5	142.0	149.5	157.0	164.4	171.9	179.4	186.9	194.4
0.325	157.11	1.086	144.67	91.0	98.6	106.2	113.8	121.4	128.9	136.5	144.1	151.7	159.3	166.9	174.5	182.1	189.7	197.3
0.330	163.76	1.102	148.60	92.4	100.1	107.8	115.5	123.1	130.8	138.5	146.2	153.9	161.6	169.3	177.0	184.8	192.5	200.2
0.335	170.59	1.118	152.58	93.7	101.5	109.3	117.1	124.9	132.7	140.6	148.4	156.2	164.0	171.8	179.6	187.4	195.3	203.1
0.340	177.61	1.134	156.63	95.1	103.0	110.9	118.8	126.7	134.6	142.6	150.5	158.4	166.3	174.3	182.2	190.1	198.0	206.0
0.345	184.83	1.150	160.72	96.4	104.4	112.5	120.5	128.5	136.5	144.6	152.6	160.6	168.7	176.7	184.8	192.8	200.8	208.9
0.350	192.25	1.166	164.88	97.8	105.9	114.0	122.2	130.3	138.4	146.6	154.7	162.9	171.0	179.2	187.3	195.5	203.6	211.8
0.355	199.86	1.182	169.09	99.1	107.3	115.6	123.8	132.1	140.3	148.6	156.9	165.1	173.4	181.6	189.9	198.2	206.4	214.7
0.360	207.67	1.198	173.35	100.4	108.8	117.1	125.5	133.9	142.2	150.6	159.0	167.4	175.7	184.1	192.5	200.8	209.2	217.6
0.365	215.69	1.214	177.67	101.8	110.2	118.7	127.2	135.7	144.1	152.6	161.1	169.6	178.1	186.6	195.0	203.5	212.0	220.5
0.370	223.92	1.230	182.05	103.1	111.7	120.3	128.9	137.5	146.0	154.6	163.2	171.8	180.4	189.0	197.6	206.2	214.8	223.4
0.375	232.36	1.246	186.49	104.5	113.1	121.8	130.5	139.2	147.9	156.6	165.4	174.1	182.8	191.5	200.2	208.9	217.6	226.3
0.380	241.01	1.262	190.98	105.8	114.6	123.4	132.2	141.0	149.8	158.7	167.5	176.3	185.1	193.9	202.8	211.6	220.4	229.2
0.385	249.88	1.278	195.53	107.1	116.1	125.0	133.9	142.8	151.7	160.7	169.6	178.5	187.5	196.4	205.3	214.3	223.2	232.1
0.390	258.97	1.294	200.13	108.5	117.5	126.5	135.6	144.6	153.6	162.7	171.7	180.8	189.8	198.9	207.9	216.9	226.0	235.0
0.395	268.28	1.310	204.80	109.8	119.0	128.1	137.2	146.4	155.5	164.7	173.8	183.0	192.2	201.3	210.5	219.6	228.8	237.9
0.400	277.82	1.326	209.52	111.2	120.4	129.7	138.9	148.2	157.4	166.7	176.0	185.2	194.5	203.8	213.0	222.3	231.6	240.8
0.405	287.58	1.342	214.29	112.5	121.9	131.2	140.6	150.0	159.3	168.7	178.1	187.5	196.8	206.2	215.6	225.0	234.4	243.8

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS

52 Springbrook Drive
Ottawa (Stittsville), ON K2S 1B9
TEL: (613) 836- 3884
FAX: (613) 836- 0332
WEB: www.jfsa.com

May 3, 2019

David Schaeffer Engineering Limited
120 Iber Road, Unit 103
Ottawa, Ontario K2S 1E9

Attention: **Laura Maxwell**

Subject: **195 Huntmar Drive / Flood Analysis of Feedmill Creek Crossings** *our file: 1476-16*

As requested by your office, we have evaluated, based on the information described below, the peak flow, water level and velocity requirements and model results at Feedmill Creek crossings during the 50-year design storm and 100-year regulatory storm under near future and modified ultimate development conditions for Feedmill Creek. Note that the proposed 195 Huntmar development site is represented under pre-development conditions in the near future conditions model.

The April 2018 *Feedmill Creek Stormwater Management Criteria Study Final Report* by J.F. Sabourin and Associates Inc. and Coldwater Consulting Ltd. evaluated erosion and flooding on Feedmill Creek under three development conditions: (1) interim conditions (2015 existing conditions); (2) near future conditions; and (3) ultimate development conditions Stormwater Management (SWM) control scenario B. Water levels and flows on Feedmill Creek were simulated using PCSWMM modelling prepared by the City of Ottawa and modified by JFSA. The proposed development at 195 Huntmar Drive in Ottawa was partly included in the ultimate conditions model, with the included development area to be serviced by proposed SWM Pond 7 discharging to Feedmill Creek, and the unmodelled development area expected to be treated separately by proposed SWM Pond 4 discharging to the Carp River. Note that approximately 16.5 ha of land belonging to the Ontario Ministry of Transportation (MTO) were also modelled as developed under ultimate conditions and serviced by proposed SWM Pond 7.

We understand that an expanded drainage area to Pond 7 from 195 Huntmar Drive of 40.8 ha at 71% imperviousness is now proposed, and have modified the ultimate conditions PCSWMM model of Feedmill Creek to reflect the updated drainage area. We also understand from the City of Ottawa that the 16.5 ha lands owned by MTO are to be treated as undeveloped and not tributary to Pond 7 under these modified ultimate conditions, with the opportunity to be developed and serviced separately in the future. The target release rates for the modified drainage area to Pond 7 were calculated based on the April 2018 *Feedmill Creek* Report SWM criteria B unit release rates, and the original ultimate conditions drainage area to Pond 7 of 34.54 ha, less the 16.5 ha occupied by the MTO lands (undeveloped or separately serviced), leaving 18.04 ha. Refinements were also made to the modelling of areas bordering the modified Pond 7 catchment area based on information provided by DSEL and the City of Ottawa.

The April 2018 *Feedmill Creek* Report evaluated the performance of four MTO culverts and two City of Ottawa crossings of Feedmill Creek during the 50-year design storm. The characteristics of these culverts as modelled in PCSWMM are summarized in Table 1 for reference, along with the characteristics of four MTO crossings of Highway 417 in the channel conveying flows to Feedmill Creek from Pond 7 and surrounding areas; (i) the existing Highway 417 crossing (ID 250) included in the April 2018 *Feedmill Creek* models; (ii /iii) the two existing culverts under the 417 East off-ramp and on-ramp, respectively, added to the model for the purposes of the current analysis; and (iv) the proposed culvert under the 417 East ramps, added to the model for the purposes of the current analysis, which conveys outflows from proposed Pond 7 and areas surrounding the culvert entrance. Figure 3a of the April 2018 *Feedmill Creek* Report is included in Attachment A and presents the locations of the culverts in question, as well as the four added culverts marked in magenta.

Table 1: PCSWMM Model Culvert Data for Key Feedmill Creek Crossings

Road/Crossing Name	Ownership	Culvert Type	Height (m)	Width (m)	Upstream Invert (m)	Edge of Travelled Lane Elevation (m)
Highway 417 (ID 220)	MTO	Concrete Box	1.35	2.4	104.27	107.3
417 East Off-Ramp	MTO	Circular CSP	0.80	N/A	103.25	105.5
417 East On-Ramp	MTO	Circular CSP	0.80	N/A	102.74	106.5
Highway 417 (ID 250)	MTO	Circular CSP	1.50	N/A	102.52	107.47
417 East Ramps (Pond 7)	MTO	Circular Concrete	0.75	N/A	102.811	107.75
Palladium Drive	MTO	Concrete Box	2.00	2.4	98.65	108.4
417 West On-Ramp	MTO	Concrete Box	2.00	2.4	97.32	104.25
417 West Off-Ramp	MTO	Concrete Box	2.00	2.4	97.08	103.9
Tanger Access Road	City of Ottawa	Concrete Box	2.15	4.2	96.4	100.5
Huntmar Drive	City of Ottawa	Elliptical CSP	1.80	3.7	95.79	100.75

Following the same approach as the April 2018 *Feedmill Creek* Report and in accordance with the *MTO Drainage Design Standards* (MTO, 2008), peak flow, water level and velocity requirements and model results at the crossings above during the 50-year 12-hour SCS Type II design storm are presented in Table 2A for the modified ultimate development conditions. Note that a 50-year 12-hour SCS Type II design storm volume of 84.7 mm was applied as calculated for this location based on the October 28, 2016 Implementation of the *Ministry Updated IDF Curves Online Application Version 3 2016-03* memorandum and associated MTO web-based rainfall IDF curves (refer to Attachment B). In accordance with the October 28, 2016 *Implementation of the Ministry's Climate Change Consideration in the Design of Highway Drainage Infrastructure 2016-04* memorandum, we understand that 2010 is the base year for current IDF values.

Table 2A: Modified Ultimate Development Conditions
50-Year Allowable and Simulated Water Levels, Flows and Velocities at Feedmill Creek Culverts

Road/Crossing Name	Maximum Allowable Water Level (m)[a]	50-Year Results for Modified Ultimate Development Conditions					
		Peak Water Level (m)	Peak Flow (m^3/s)	Freeboard (m)	Surcharge Ratio (HW/D)	Peak Velocity (m/s)	Peak Velocity x 1.5 (m/s)
Highway 417 (ID 220)	106.30	106.03	4.68	1.27	1.30	1.44	2.16
417 East Off-Ramp	104.45	104.35	0.34	1.15	1.37	1.27	1.91
417 East On-Ramp	103.94	104.28	1.08	2.22	1.93	2.27	3.41
Highway 417 (ID 250)	104.77	103.28	1.64	4.19	0.51	2.71	4.07
417 East Ramps (Pond 7)	103.94	103.47	0.42	4.28	0.88	1.16	1.74
Palladium Drive	101.65	100.82	10.95	7.58	1.08	2.36	3.54
417 West On-Ramp	100.32	100.09	10.64	4.16	1.39	2.22	3.33
417 West Off-Ramp	100.08	99.68	10.64	4.22	1.30	2.22	3.33
Tanger Access Road	99.50	98.21	10.79	2.29	0.84	1.45	2.18
Huntmar Drive	98.49	97.77	12.58	2.98	1.10	2.40	3.60

[a]Maximum allowable water level based on: Highway Drainage Design Standards - Ministry of Transportation Ontario (January, 2008). The MTO Drainage Standards call for a 50-year design flow freeway crossings with span lengths of less than 6 m.
1) Requirement for a minimum of 1.0 m freeboard between design water level and edge of pavement.
2) Requirement for upstream design flood depth (HW) as a ratio of the culvert diameter (D), limit based on HW/D <= 1.5 (for culverts up to 3.0 m diameter/rise).
3) Requirement for rip-rap protective apron sizing based on 1.5 times the velocity of the design flow.

As may be seen above, all crossings considered in the April 2018 *Feedmill Creek* Report perform in accordance with standards, as do three of the four culverts added to the model for the purposes of this analysis. Note in particular that

the proposed culvert under the Highway 417 East ramps servicing Pond 7 performs in accordance with standards. However, the 50-year water level at the 417 East on-ramp crossing under modified ultimate conditions exceeds the maximum allowable water level by 34 cm, and the culvert has a surcharge ratio of 1.93 (greater than the maximum allowable ratio of 1.5). These modified ultimate conditions violations at the existing Highway 417 East on-ramp crossing are in fact an improvement from near future conditions, where the proposed 195 Huntmar development site is represented under pre-development conditions, as discussed below.

The April 2018 *Feedmill Creek* Report used the near future conditions model as a baseline for comparison of design flood values for the ultimate development conditions; for reference, near future conditions results are presented in Table 2B. Note that the near future model has been updated to include the three added culverts in the channel conveying flows to Feedmill Creek from Pond 7 and surrounding areas, as described above. As noted above, the proposed 195 Huntmar development site is represented under pre-development conditions in the near future conditions model.

Table 2B: Near Future Development Conditions
50-Year Allowable and Simulated Water Levels, Flows and Velocities at Feedmill Creek Culverts

Road/Crossing Name	Maximum Allowable Water Level (m)[a]	50-Year Results for Near Future Development Conditions					
		Peak Water Level (m)	Peak Flow (m^3/s)	Freeboard (m)	Surcharge Ratio (HW/D)	Peak Velocity (m/s)	Peak Velocity x 1.5 (m/s)
Highway 417 (ID 220)	106.30	106.06	4.76	1.24	1.33	1.47	2.21
417 East Off-Ramp	104.45	105.35	0.75	0.15	2.62	1.49	2.24
417 East On-Ramp	103.94	105.03	1.46	1.47	2.23	2.96	4.44
Highway 417 (ID 250)	104.77	103.29	1.67	4.18	0.51	2.72	4.08
417 East Ramps (Pond 7)	103.83	N/A	N/A	N/A	N/A	N/A	N/A
Palladium Drive	101.65	100.84	11.11	7.56	1.10	2.38	3.57
417 West On-Ramp	100.32	100.12	10.79	4.13	1.40	2.25	3.38
417 West Off-Ramp	100.08	99.70	10.79	4.20	1.31	2.25	3.38
Tanger Access Road	99.50	98.23	10.94	2.27	0.85	1.46	2.19
Huntmar Drive	98.49	97.78	12.84	2.97	1.11	2.45	3.68

[a]Maximum allowable water level based on: Highway Drainage Design Standards - Ministry of Transportation Ontario (January, 2008). The MTO Drainage Standards call for a 50-year design flow freeway crossings with span lengths of less than 6 m.
1) Requirement for a minimum of 1.0 m freeboard between design water level and edge of pavement.
2) Requirement for upstream design flood depth (HW) as a ratio of the culvert diameter (D), limit based on HW/D <= 1.5 (for culverts up to 3.0 m diameter/rise).
3) Requirement for rip-rap protective apron sizing based on 1.5 times the velocity of the design flow.

As shown in Table 3, 50-year water levels at the 417 East on-ramp crossing exceeds the maximum allowable water level by 109 cm under near future conditions, and the culvert has a surcharge ratio of 2.23 (greater than the maximum allowable ratio of 1.5). Similarly, 50-year water levels at the 417 East off-ramp crossing exceeds the maximum allowable water level by 90 cm under near future conditions, and the culvert has a surcharge ratio of 2.62; furthermore, the crossing has a freeboard of 0.15 m between the 50-year water level and the edge of pavement elevation. These violations are improved or eliminated under modified ultimate conditions, as discussed above.

In accordance with the October 28, 2016 *Implementation of the Ministry's Climate Change Consideration in the Design of Highway Drainage Infrastructure 2016-04* memorandum, the proposed culvert under the Highway 417 East ramps has also been evaluated based on a 50-year 12-hour SCS Type II design storm volume of 92.4 mm at the end of a 75-year design life (2085 as measured from the base year of 2010; refer to Attachment B), as summarized in Table 2C.

Table 2C: Modified Ultimate Development Conditions (75-Year Design Life)
50-Year Allowable and Simulated Water Levels, Flows and Velocities at Highway 417 East Ramp Culvert

Road/Crossing Name	Maximum Allowable Water Level (m)[a]	50-Year Results for Modified Ultimate Development Conditions (Year 2085)					
		Peak Water Level (m)	Peak Flow (m^3/s)	Freeboard (m)	Surcharge Ratio (HW/D)	Peak Velocity (m/s)	Peak Velocity x 1.5 (m/s)
417 East Ramps (Pond 7)	103.94	103.54	0.47	4.21	0.97	1.17	1.76

[a]Maximum allowable water level based on: Highway Drainage Design Standards - Ministry of Transportation Ontario (January, 2008). The MTO Drainage Standards call for a 50-year design flow freeway crossings with span lengths of less than 6 m.
1) Requirement for a minimum of 1.0 m freeboard between design water level and edge of pavement.
2) Requirement for upstream design flood depth (HW) as a ratio of the culvert diameter (D), limit based on HW/D <= 1.5 (for culverts up to 3.0 m diameter/rise).
3) Requirement for rip-rap protective apron sizing based on 1.5 times the velocity of the design flow.

As may be seen above, the proposed culvert under the Highway 417 East ramps servicing Pond 7 performs in accordance with standards for the duration of the expected 75-year design life.

In response to MTO comments received for the previous version of this report, peak flows, water levels and velocities for the culverts are presented below in Tables 3A and 3B for the 100-year 12-hour SCS Type II regulatory design storm, under modified ultimate and near future conditions, respectively. Note that a 100-year 12-hour SCS Type II design storm volume of 93.2 mm was applied as calculated for this location based on the October 28, 2016 Implementation of the *Ministry Updated IDF Curves Online Application Version 3 2016-03* memorandum and associated MTO web-based rainfall IDF curves (refer to Attachment B).

Table 3A: Modified Ultimate Development Conditions
100-Year Simulated Water Levels, Flows and Velocities at Feedmill Creek Culverts

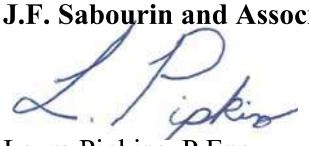
Road/Crossing Name	100-Year Results for Modified Ultimate Development Conditions					
	Peak Water Level (m)	Peak Flow (m^3/s)	Freeboard (m)	Surcharge Ratio (HW/D)	Peak Velocity (m/s)	Peak Velocity x 1.5 (m/s)
Highway 417 (ID 220)	106.18	5.39	1.12	1.41	1.66	2.49
417 East Off-Ramp	104.76	0.44	0.74	1.89	1.29	1.94
417 East On-Ramp	104.64	1.27	1.86	2.38	2.62	3.93
Highway 417 (ID 250)	103.35	1.91	4.12	0.55	2.83	4.25
417 East Ramps (Pond 7)	103.55	0.48	4.20	0.99	1.17	1.76
Palladium Drive	101.09	11.89	7.31	1.22	2.51	3.77
417 West On-Ramp	100.29	11.60	3.96	1.49	2.42	3.63
417 West Off-Ramp	99.81	11.60	4.09	1.37	2.42	3.63
Tanger Access Road	98.31	11.76	2.19	0.89	1.50	2.25
Huntmar Drive	97.90	13.71	2.85	1.17	2.61	3.92

Table 3B: Near Future Development Conditions
100-Year Simulated Water Levels, Flows and Velocities at Feedmill Creek Culverts

Road/Crossing Name	100-Year Results for Near Future Development Conditions					
	Peak Water Level (m)	Peak Flow (m^3/s)	Freeboard (m)	Surcharge Ratio (HW/D)	Peak Velocity (m/s)	Peak Velocity x 1.5 (m/s)
Highway 417 (ID 220)	106.23	5.50	1.07	1.45	1.70	2.55
417 East Off-Ramp	105.73	0.78	-0.23	3.10	1.55	2.33
417 East On-Ramp	105.33	1.59	1.17	2.60	3.20	4.80
Highway 417 (ID 250)	103.33	1.82	4.14	0.54	2.79	4.19
417 East Ramps (Pond 7)	N/A	N/A	N/A	N/A	N/A	N/A
Palladium Drive	101.21	12.07	7.19	1.28	2.53	3.80
417 West On-Ramp	100.37	11.98	3.88	1.53	2.50	3.75
417 West Off-Ramp	99.86	11.98	4.04	1.39	2.50	3.75
Tanger Access Road	98.33	12.13	2.17	0.90	1.53	2.30
Huntmar Drive	97.92	14.05	2.83	1.18	2.68	4.02

Note that the 100-year water level does not reach the edge of travelled lane elevation for any of the modelled crossings under modified ultimate conditions. Additionally, the modified ultimate conditions 100-year water levels are less than the near future conditions 100-year water levels at all crossings assessed except for Highway 417 crossing 250, where the freeboard between the 100-year water level and the edge of pavement elevation exceeds 1.0 m even during the 100-year regulatory event.

Yours truly,
J.F. Sabourin and Associates Inc.



Laura Pipkins, P.Eng.

cc: J.F. Sabourin, M.Eng, P.Eng.
Director of Water Resources Projects

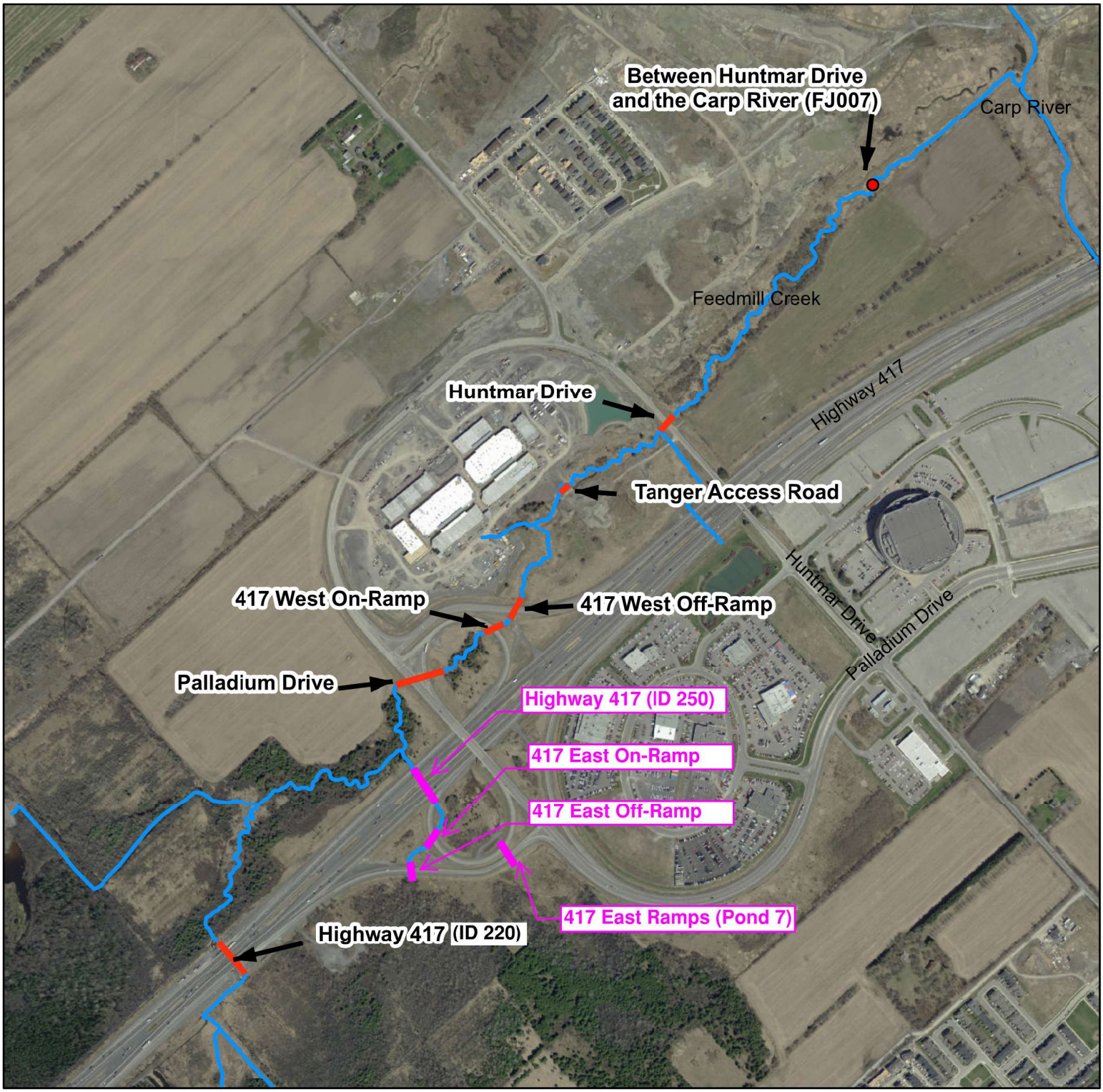
Attachment A: Feedmill Creek Culvert and Junction Location Plan
Attachment B: MTO IDF Curve Lookup Results

ATTACHMENT

A

Feedmill Creek Culvert and Junction Location Plan

JFSA Water Resources and Environmental Consultants



Legend

- Culverts
- Model Junctions
- Watercourse

NOTES:
Aerial phtotography base mapping provided by the City of Ottawa (2014)

N

CLIENT: Ottawa

SCALE:
0 50 100 200 300 400 500 Metres

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS
52 Springbook Drive, Ottawa, ON, K2S 1B9
(613) 836-3884
www.jfsa.com

PROJECT:
Feedmill Creek
SWM Criteria Study

TITLE:
Feedmill Creek Culvert and Junction Location Plan

PROJECT No.	1307-15
DRAWN:	JB
DATE:	APRIL 2017

FIGURE 3a

ATTACHMENT

B

MTO IDF Curve Lookup Results

JFSA Water Resources and Environmental Consultants

Active coordinate

45° 17' 45" N, 75° 56' 15" W (45.295833,-75.937500)

Retrieved: Wed, 24 Apr 2019 20:04:34 GMT



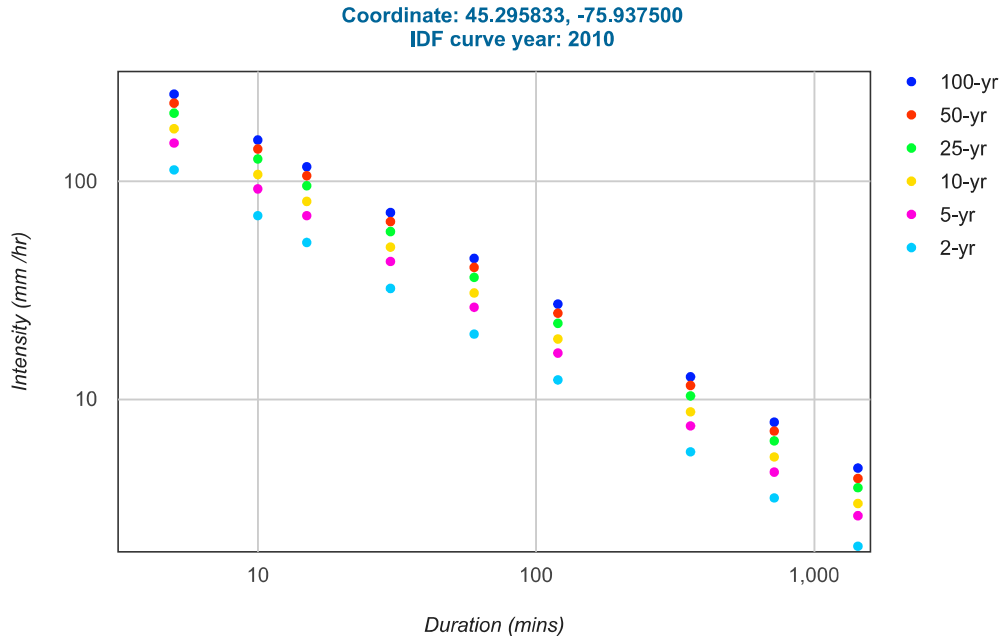
Location summary

These are the locations in the selection.

IDF Curve: 45° 17' 45" N, 75° 56' 15" W (45.295833,-75.937500)

Results

An IDF curve was found.



Coefficient summary

IDF Curve: 45° 17' 45" N, 75° 56' 15" W (45.295833,-75.937500)

Retrieved: Wed, 24 Apr 2019 20:04:34 GMT

Data year: 2010
IDF curve year: 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	19.8	26.3	30.6	36.1	40.1	44.1
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

Statistics

Rainfall intensity (mm hr^{-1})

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	112.5	69.3	52.2	32.1	19.8	12.2	5.7	3.5	2.1
5-yr	149.4	92.0	69.3	42.7	26.3	16.2	7.5	4.6	2.9
10-yr	173.8	107.1	80.6	49.7	30.6	18.8	8.7	5.4	3.3
25-yr	205.0	126.3	95.1	58.6	36.1	22.2	10.3	6.4	3.9
50-yr	227.8	140.3	105.7	65.1	40.1	24.7	11.5	7.1	4.3
100-yr	250.5	154.3	116.2	71.6	44.1	27.2	12.6	7.8	4.8

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	9.4	11.5	13.0	16.1	19.8	24.4	34.0	41.8	51.5
5-yr	12.4	15.3	17.3	21.3	26.3	32.4	45.1	55.6	68.5
10-yr	14.5	17.8	20.2	24.8	30.6	37.7	52.5	64.6	79.6
25-yr	17.1	21.1	23.8	29.3	36.1	44.5	61.9	76.3	94.0
50-yr	19.0	23.4	26.4	32.5	40.1	49.4	68.8	84.7	104.4
100-yr	20.9	25.7	29.1	35.8	44.1	54.3	75.6	93.2	114.8

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Active coordinate

45° 17' 45" N, 75° 56' 15" W (45.295833,-75.937500)

Retrieved: Wed, 24 Apr 2019 20:18:28 GMT



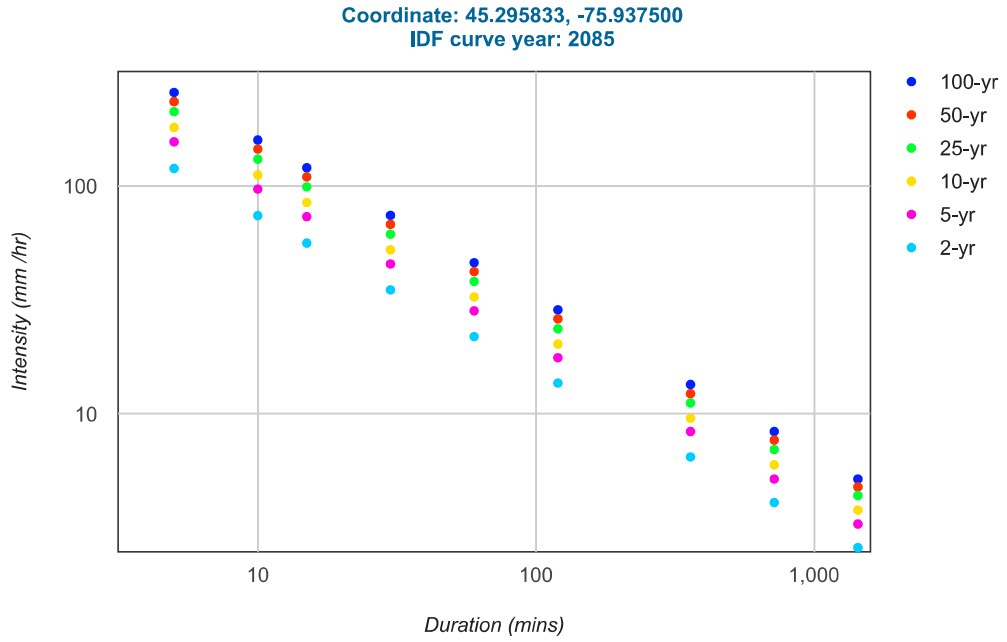
Location summary

These are the locations in the selection.

IDF Curve: 45° 17' 45" N, 75° 56' 15" W (45.295833,-75.937500)

Results

An IDF curve was found.



Coefficient summary

IDF Curve: 45° 17' 45" N, 75° 56' 15" W (45.295833,-75.937500)

Retrieved: Wed, 24 Apr 2019 20:18:28 GMT

Data year: 2010
IDF curve year: 2085

Statistics

Rainfall intensity (mm hr^{-1})

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	119.6	74.3	56.3	35.1	21.9	13.7	6.5	4.1	2.6
5-yr	156.5	97.1	73.5	45.6	28.4	17.7	8.4	5.2	3.3
10-yr	180.9	112.1	84.8	52.6	32.7	20.3	9.6	6.0	3.8
25-yr	212.2	131.4	99.3	61.6	38.2	23.7	11.2	7.0	4.4
50-yr	234.9	145.4	109.8	68.0	42.2	26.2	12.3	7.7	4.8
100-yr	257.6	159.4	120.4	74.5	46.2	28.7	13.5	8.4	5.2

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	10.0	12.4	14.1	17.6	21.9	27.4	39.0	49.2	62.4
5-yr	13.0	16.2	18.4	22.8	28.4	35.4	50.4	62.4	79.2
10-yr	15.1	18.7	21.2	26.3	32.7	40.6	57.6	72.0	91.2
25-yr	17.7	21.9	24.8	30.8	38.2	47.4	67.2	84.0	105.6
50-yr	19.6	24.2	27.4	34.0	42.2	52.4	73.8	92.4	115.2
100-yr	21.5	26.6	30.1	37.3	46.2	57.4	81.0	100.8	124.8

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STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

LOCATION			AREA (Ha) 2 YEAR				5 YEAR				10 YEAR				100 YEAR				FLOW						SEWER DATA											
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA.	DIA.	TYPE	SLOPE	LENGTH	INV	OBV	T/G	CAPACITY	VELOCITY	TIME OF	RATIO
																			Conc.	2 Year	5 Year	10 Year	100 Year		(mm)	(mm)				UPS	UPS	UPS			FLOW	
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)				(l/s)	(m/s)	(min.)	Q/Q full
			0.13	0.59	0.21	0.79			0.00	0.00			0.00	0.00			0.00	0.00																		
	43	44	0.59	0.73	1.20	1.98			0.00	0.00			0.00	0.00			0.00	0.00	10.34	75.51	102.41	120.04	175.47	150	600	600	CONC	0.15	75.0	104.997	105.597	108.131	238	0.84	1.49	0.63
	44	45			0.00	1.98			0.00	0.00			0.00	0.00			0.00	0.00	11.83	70.42	95.42	111.81	163.39	140	600	600	CONC	0.15	71.5	104.864	105.464	108.180	238	0.84	1.42	0.59
	45	46			0.00	1.98			0.00	0.00			0.00	0.00			0.00	0.00	13.25	66.24	89.68	105.06	153.47	131	600	600	CONC	0.15	11.0	104.697	105.297	107.849	238	0.84	0.22	0.55
To Block 234, Pipe 46 - TEE47						1.98				0.00				0.00				0.00	13.47																	
Contribution From place Unity Place, Pipe 34 - 40						10.25				0.00				0.00				0.00	17.55																	
Contribution From avenue Derreen Avenue, Pipe 20 - 40						4.16				5.70				0.00				0.00	21.93																	
Contribution From avenue Derreen Avenue, Pipe 39 - 40						1.85				1.38				0.00				0.00	14.16																	
			0.09	0.59	0.15	16.41			0.00	7.08			0.00	0.00			0.00	0.00																		
			0.10	0.59	0.16	16.57			0.00	7.08			0.00	0.00			0.00	0.00																		
			0.17	0.73	0.34	16.92			0.00	7.08			0.00	0.00			0.00	0.00																		
	40	41	0.29	0.59	0.48	17.39			0.00	7.08			0.00	0.00			0.00	0.00	21.93	49.13	66.29	77.56	113.13	1324	1350	1350	CONC	0.11	63.5	104.088	105.438	108.142	1770	1.24	0.86	0.75
	41	46	0.42	0.73	0.85	18.24			0.00	7.08			0.00	0.00			0.00	0.00	22.78	47.95	64.68	75.67	110.36	1333	1350	1350	CONC	0.11	25.5	103.988	105.338	107.944	1770	1.24	0.34	0.75
To Block 234, Pipe 46 - TEE47						18.24				7.08				0.00				0.00	23.12																	
place Unity Place																																				
	33	34	0,53	0,40	0,59	0,59			0,00	0,00			0,00	0,00			0,00	0,00	10,00	76,81	104,19	122,14	178,56	45	375	375	PVC	0,30	10,5	105,183	105,558	108,299	96	0,87	0,20	0,47
Contribution From terrasse Crossway Terrace, Pipe 30 - 34						6.54				0,00				0.00				0.00	16.28																	
Contribution From terrasse Crossway Terrace, Pipe 32 - 34						1.72				0.00				0.00				0.00	13.06																	
			0.07	0.74	0.14	9.00			0.00	0.00			0.00	0.00			0.00	0.00																		
			0,19	0.59	0,31	9,31			0,00	0,00			0,00	0,00			0,00	0,00																		
			0.24	0.73	0.49	9,79			0.00	0.00			0.00	0.00			0.00	0.00																		
	34	40	0.28	0.59	0.46	10.25			0.00	0.00			0.00	0.00			0.00	0.00	16.28	58.91	79.64	93.25	136.14	604	1050	1050	CONC	0.11	80.0	104.476	105.526	108.299	906	1.05	1.27	0.67
To place Unity Place, Pipe 40 - 41						10.25				0.00				0.00				0.00	17.55																	
Block 234																																				
Contribution From place Unity Place, Pipe 41 - 46						18.24				7.08				0.00				0.00	23.12																	
Contribution From place Unity Place, Pipe 45 - 46						1.98				0.00				0.00				0.00	13.47																	
	46	47			0.00	20.23			0.00	7.08			0.00	0.00			0.00	0.00	23.12	47.49	64.06	74.94	109.30	1414	1350	1350	CONC	0.11	34.5	103.930	105.280	107.970	1770	1.24	0.46	0.80
	47	HW			0.00	20.23			0.00	7.08			0.00	0.00			0.00	0.00	23.59	46.89	63.24	73.98	107.89	1396	1350	1350	CONC	0.11	8.5	103.859	105.209	107.970	1770	1.24	0.11	0.79
To POND 7						20.23				7.08				0.00				0.00	23.70																	
Block 244																																				
	91	95	1.99	0.80	4.43	4.43			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	340	825	825	CONC	0.15	6.5	104.776	105.601	107.450	556	1.04	0.10	0.61
To Block 235, Pipe 95 - TEE96						4.43				0.00				0.00				0.00	10.10																	
Block 243																																				
	90	92	1.60	0.80	3.56	3.56			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	273	750	750	CONC	0.15	19.0	105.205	105.955	108.580	431	0.98	0.32	0.63
To chemin Culdaff Road, Pipe 92 - 93						3.56				0.00				0.00				0.00	10.32																	
Block 256 Block 251																																				
	88	89	1.59	0.80	3.54	3.54			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	272	750	750	CONC	0.15	19.0	105.358	106.108	108.640	431	0.98	0.32	0.63
To chemin Culdaff Road, Pipe 89 - 92						3.54				0.00				0.00				0.00	10.32																	
Block 242																																				
	85	86	2.70	0.80	6.00	6.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	461	900	900	CONC	0.15	19.0	105.071	105.971	108.395	701	1.10	0.29	0.66
To chemin Culdaff Road, Pipe 86 - 87						6.00				0.00				0.00				0.00	10.29																	
voie Bermondsey Way																																				
	35	36	0,17	0,74	0,35	0,35			0,00	0,00			0,00	0,00			0,00	0,00	10,00	76,81	104,19	122,14	178,56	27	300	300	PVC	0,35	76,5	105,705	106,005	108,204	57	0,81	1,58	0,47
	36	37			0.00	0.35			0.00	0.00			0.00	0.00			0.00	0.00	11.58	71.24	96.55	113.14	165.34	25	300	300	PVC	0.35	11.5	105.407	105.707	108.155	57	0.81	0.24	0.44
			0.21	0.59	0.34	0.69			0.00	0.00			0.00	0.00			0.00	0.00																		
	37	39	0.41	0.74	0.84	1.54			0.00	0.00			0.00	0.00			0.00	0.00	11.81	70.48	95.51	111.91	163.53	108	525	525	CONC	0.20	65.0	105.142	105.667	108.085	192	0.89	1.22	0.56
To avenue Derreen Avenue, Pipe 39 - 40						1.54				0.00				0.00				0.00	13.03																	
Block 241																																				
	82	83	1.06	0.80	2.36	2.36			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	181	675	675	CONC	0.15	19.5	105.489	106.164	108.350	326	0.91	0.36	0.56
To avenue Derreen Avenue, Pipe 83 - 84						2.36				0.00				0.00				0.00	10.36																	

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
20-07-09
PROVINCE OF ONTARIO

Designed: W.L.	PROJECT: 195 Huntmar Drive		
Checked: P.P.	LOCATION: City of Ottawa		
Dwg. Reference: STM Drainage Plan, Dwgs 95 to 98	File Ref: 12-624		Date: July 2020
			Sheet No. SHEET 2 OF 5

624_Stm3.xlsx

LRL Associates Ltd.
Storm Watershed Summary

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 1, 2026
Designed: M. Longtin
Checked: M.Basnet
Dwg Reference: C701, C702 **(WEST)**

Pre-Development Catchments

	Area (ha)				
Watershed	**C = 0.20**	**C = 0.80**	**C = 0.90**	**Total Area (ha)**	**Combined C**
ECA-01B (uncontrolled)	1.994	0.000	0.000	1.994	0.20
Total	**1.994**	**0.000**	**0.000**	**1.994**	**0.20**

Post-Development Catchments

	Area (ha)				
Watershed	**C = 0.20**	**C = 0.8**	**C = 0.90**	**Total Area (ha)**	**Combined C**
CA-01B (controlled)	0.137	0.000	0.000	0.137	0.20
CA-02B (controlled)	0.000	0.000	0.039	0.039	0.90
CA-03B (controlled)	0.000	0.000	0.052	0.052	0.90
CA-04B (controlled)	0.000	0.000	0.050	0.050	0.90
CA-05B (controlled)	0.051	0.000	0.000	0.051	0.20
CA-06B (controlled)	0.004	0.000	0.067	0.070	0.86
CA-07B (controlled)	0.016	0.000	0.111	0.127	0.81
CA-08B (controlled)	0.146	0.000	0.000	0.146	0.20
CA-09B (controlled)	0.006	0.000	0.077	0.083	0.85
CA-10B (controlled)	0.016	0.000	0.113	0.129	0.81
CA-11B (controlled)	0.017	0.000	0.112	0.129	0.81
CA-12B (controlled)	0.017	0.000	0.110	0.127	0.81
CA-13B (controlled)	0.008	0.000	0.048	0.056	0.80
CA-14B (controlled)	0.009	0.000	0.044	0.053	0.78
CA-15B (controlled)	0.001	0.000	0.077	0.078	0.89
CA-16B (controlled)	0.001	0.000	0.065	0.066	0.89
CA-17B (controlled)	0.027	0.000	0.034	0.061	0.59
CA-18B (controlled)	0.024	0.000	0.036	0.060	0.62
CA-19B (controlled)	0.020	0.000	0.039	0.059	0.66
CA-20B (controlled)	0.019	0.000	0.040	0.059	0.67
Total	**0.517**	**0.000**	**1.114**	**1.632**	**0.68**
CA-21B (uncontrolled)	0.168	0.000	0.000	0.168	0.20
CA-22B (uncontrolled)	0.077	0.000	0.000	0.077	0.20
CA-23B (uncontrolled)	0.116	0.000	0.001	0.117	0.21
Total	**0.362**	**0.000**	**0.001**	**0.363**	**0.20**

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 1, 2026
Designed: M. Longtin
Checked: M.Basnet
Drawing Ref.: C701, C702

WEST - Stormwater Management Design Sheet

STORM - 100 YEAR

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) = $A / (Td + C)^B$
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Catchment within Development Area

	Total Area =	**1.994**	ha	**∑R=**	**0.20**	**Flow Rates (L/s)**
Pre-Development (Uncontrolled)	ECA-01B	1.994	ha	R=	0.20	197.96
	Total Uncontrolled =	**1.994**	**ha**	**∑R=**	**0.20**	**197.96**

Allowable Release Rate = 340 L/s
Proposed Release Rate = 230 L/s
(195 Huntmar Drive, 2yr C=0.80)

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**1.994**	ha	**∑R=**	**0.59**	**0.74**
Controlled	CA-01B (controlled)	0.137	ha	R=	0.20	0.25
	CA-02B (controlled)	0.039	ha	R=	0.90	1.00
	CA-03B (controlled)	0.052	ha	R=	0.90	1.00
	CA-04B (controlled)	0.050	ha	R=	0.90	1.00
	CA-05B (controlled)	0.051	ha	R=	0.20	0.25
	CA-06B (controlled)	0.070	ha	R=	0.86	1.00
	CA-07B (controlled)	0.127	ha	R=	0.81	1.00
	CA-08B (controlled)	0.146	ha	R=	0.20	0.25
	CA-09B (controlled)	0.083	ha	R=	0.85	1.00
	CA-10B (controlled)	0.129	ha	R=	0.81	1.00
	CA-11B (controlled)	0.129	ha	R=	0.81	1.00
	CA-12B (controlled)	0.127	ha	R=	0.81	1.00
	CA-13B (controlled)	0.056	ha	R=	0.80	1.00
	CA-14B (controlled)	0.053	ha	R=	0.78	0.98
	CA-15B (controlled)	0.078	ha	R=	0.89	1.00
	CA-16B (controlled)	0.066	ha	R=	0.89	1.00
	CA-17B (controlled)	0.061	ha	R=	0.59	0.74
	CA-18B (controlled)	0.060	ha	R=	0.62	0.78
	CA-19B (controlled)	0.059	ha	R=	0.66	0.83
	CA-20B (controlled)	0.059	ha	R=	0.67	0.84
	Total Contolled =	**1.632**	**ha**	**∑R=**	**0.68**	**0.85**
Uncontrolled	CA-21B (uncontrolled)	0.168	ha	R=	0.20	0.25
	CA-22B (uncontrolled)	0.077	ha	R=	0.20	0.25
	CA-23B (uncontrolled)	0.117	ha	R=	0.21	0.26
	Total Uncontolled =	**0.363**	**ha**	**∑R=**	**0.20**	**0.25**

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 1, 2026
Designed: M. Longtin
Checked: M.Basnet
Drawing Ref.: C701, C702

WEST - Stormwater Management Design Sheet

STORM - 100 YEAR

Post-development Stormwater Management (100-Yr)

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$

A = 1735.688 **B =** 0.820 **C =** 6.014

Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	178.56	686.41	301.10	184.58	45.42	230.00
15	142.89	549.31	328.26	184.58	36.35	220.93
20	119.95	461.11	331.84	184.58	30.51	215.09
25	103.85	399.21	321.94	184.58	26.42	211.00
30	91.87	353.16	303.44	184.58	23.37	207.95
35	82.58	317.45	279.02	184.58	21.01	205.59
40	75.15	288.87	250.30	184.58	19.11	203.69
45	69.05	265.44	218.33	184.58	17.56	202.14
50	63.95	245.85	183.81	184.58	16.27	200.85
55	59.62	229.20	147.26	184.58	15.17	199.75
60	55.89	214.87	109.04	184.58	14.22	198.80
65	52.65	202.38	69.43	184.58	13.39	197.97
70	49.79	191.40	28.65	184.58	12.66	197.24
75	47.26	181.66	0.00	184.58	12.02	196.60
80	44.99	172.95	0.00	184.58	11.44	196.02
85	42.95	165.12	0.00	184.58	10.93	195.51
90	41.11	158.04	0.00	184.58	10.46	195.04
95	39.43	151.59	0.00	184.58	10.03	194.61
100	37.90	145.71	0.00	184.58	9.64	194.22
105	36.50	140.30	0.00	184.58	9.28	193.86
110	35.20	135.32	0.00	184.58	8.95	193.53
115	34.01	130.72	0.00	184.58	8.65	193.23
120	32.89	126.45	0.00	184.58	8.37	192.95

On-site stormwater detention

Storage required = **331.84** **m^3**

Surface storage provided = 726.22 m^3 (See Dwg C601)

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 1, 2026
Designed: M. Longtin
Checked: M.Basnet
Drawing Ref.: C701, C702

Stormwater Management Design Sheet

STORM - 5 YEAR

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) = A / (Td + C)^{B}
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Catchment within Development Area

	Total Area =	**1.994**	ha	**∑R=**	**0.20**	**Flow Rates (L/s)**
Pre-Development (Uncontrolled)	ECA-01	1.994	ha	R=	0.20	115.52
	Total Uncontrolled =	**1.994**	**ha**	**∑R=**	**0.20**	**115.52**

Allowable Release Rate = 340 L/s
Actual Release Rate = 206 L/s

(195 Huntmar Drive, 2yr C=0.80)

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**1.994**	ha	**∑R=**	**0.59**	**0.74**
Controlled	CA-01B (controlled)	0.137	ha	R=	0.20	0.25
	CA-02B (controlled)	0.039	ha	R=	0.90	1.00
	CA-03B (controlled)	0.052	ha	R=	0.90	1.00
	CA-04B (controlled)	0.050	ha	R=	0.90	1.00
	CA-05B (controlled)	0.051	ha	R=	0.20	0.25
	CA-06B (controlled)	0.070	ha	R=	0.86	1.00
	CA-07B (controlled)	0.127	ha	R=	0.81	1.00
	CA-08B (controlled)	0.146	ha	R=	0.20	0.25
	CA-09B (controlled)	0.083	ha	R=	0.85	1.00
	CA-10B (controlled)	0.129	ha	R=	0.81	1.00
	CA-11B (controlled)	0.129	ha	R=	0.81	1.00
	CA-12B (controlled)	0.127	ha	R=	0.81	1.00
	CA-13B (controlled)	0.056	ha	R=	0.80	1.00
	CA-14B (controlled)	0.053	ha	R=	0.78	0.98
	CA-15B (controlled)	0.078	ha	R=	0.89	1.00
	CA-16B (controlled)	0.066	ha	R=	0.89	1.00
	CA-17B (controlled)	0.061	ha	R=	0.59	0.74
	CA-18B (controlled)	0.060	ha	R=	0.62	0.78
	CA-19B (controlled)	0.059	ha	R=	0.66	0.83
	CA-20B (controlled)	0.059	ha	R=	0.67	0.84
	Total Contolled =	**1.632**	**ha**	**∑R=**	**0.68**	**0.85**
Uncontrolled	CA-21B (uncontrolled)	0.168	ha	R=	0.20	0.25
	CA-22B (uncontrolled)	0.077	ha	R=	0.20	0.25
	CA-23B (uncontrolled)	0.117	ha	R=	0.21	0.26
	Total Uncontolled =	**0.363**	**ha**	**∑R=**	**0.20**	**0.25**

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 1, 2026
Designed: M. Longtin
Checked: M.Basnet
Drawing Ref.: C701, C702

Stormwater Management Design Sheet

STORM - 5 YEAR

Post-development Stormwater Management (5-Yr)

$I_5 = 998.071 / (Td + 6.053)^{0.814}$

A = 998.071 **B =** 0.814 **C =** 6.053

Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	104.19	320.43	81.51	184.58	21.20	205.78
15	83.56	256.97	65.15	184.58	17.00	201.58
20	70.25	216.05	37.76	184.58	14.30	198.88
25	60.90	187.28	4.04	184.58	12.39	196.97
30	53.93	165.85	0.00	184.58	10.97	195.55
35	48.52	149.21	0.00	184.58	9.87	194.45
40	44.18	135.88	0.00	184.58	8.99	193.57
45	40.63	124.95	0.00	184.58	8.27	192.85
50	37.65	115.80	0.00	184.58	7.66	192.24
55	35.12	108.02	0.00	184.58	7.15	191.73
60	32.94	101.31	0.00	184.58	6.70	191.28
65	31.04	95.47	0.00	184.58	6.32	190.90
70	29.37	90.33	0.00	184.58	5.98	190.56
75	27.89	85.77	0.00	184.58	5.68	190.26
80	26.56	81.69	0.00	184.58	5.41	189.99
85	25.37	78.02	0.00	184.58	5.16	189.74
90	24.29	74.70	0.00	184.58	4.94	189.52
95	23.31	71.67	0.00	184.58	4.74	189.32
100	22.41	68.91	0.00	184.58	4.56	189.14
105	21.58	66.37	0.00	184.58	4.39	188.97
110	20.82	64.04	0.00	184.58	4.24	188.82
115	20.12	61.87	0.00	184.58	4.09	188.67
120	19.47	59.87	0.00	184.58	3.96	188.54

On-site stormwater detention

Storage required = **81.51** **m^3**

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 2, 2026
Designed: M. Longtin
Checked: M.Basnet
Drawing Ref.: C701, C702

Stormwater Management Design Sheet

STORM - 2 YEAR

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) $= A / (Td + C)^B$
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Catchment within Development Area

	Total Area =	**1.994**	ha	**∑R=**	**0.20**	**Flow Rates (L/s)**
Pre-Development (Uncontrolled)	ECA-01	1.994	ha	R=	0.20	85.15
	Total Uncontrolled =	**1.994**	**ha**	**∑R=**	**0.20**	**85.15**

Allowable Release Rate = 340 L/s
Actual Release Rate = 200 L/s

(195 Huntmar Drive, 2yr C=0.80)

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**1.994**	ha	**∑R=**	**0.59**	**0.74**
Controlled	CA-01B (controlled)	0.137	ha	R=	0.20	0.25
	CA-02B (controlled)	0.039	ha	R=	0.90	1.00
	CA-03B (controlled)	0.052	ha	R=	0.90	1.00
	CA-04B (controlled)	0.050	ha	R=	0.90	1.00
	CA-05B (controlled)	0.051	ha	R=	0.20	0.25
	CA-06B (controlled)	0.070	ha	R=	0.86	1.00
	CA-07B (controlled)	0.127	ha	R=	0.81	1.00
	CA-08B (controlled)	0.146	ha	R=	0.20	0.25
	CA-09B (controlled)	0.083	ha	R=	0.85	1.00
	CA-10B (controlled)	0.129	ha	R=	0.81	1.00
	CA-11B (controlled)	0.129	ha	R=	0.81	1.00
	CA-12B (controlled)	0.127	ha	R=	0.81	1.00
	CA-13B (controlled)	0.056	ha	R=	0.80	1.00
	CA-14B (controlled)	0.053	ha	R=	0.78	0.98
	CA-15B (controlled)	0.078	ha	R=	0.89	1.00
	CA-16B (controlled)	0.066	ha	R=	0.89	1.00
	CA-17B (controlled)	0.061	ha	R=	0.59	0.74
	CA-18B (controlled)	0.060	ha	R=	0.62	0.78
	CA-19B (controlled)	0.059	ha	R=	0.66	0.83
	CA-20B (controlled)	0.059	ha	R=	0.67	0.84
	Total Contolled =	**1.632**	**ha**	**∑R=**	**0.68**	**0.85**
Uncontrolled	CA-21B (uncontrolled)	0.168	ha	R=	0.20	0.25
	CA-22B (uncontrolled)	0.077	ha	R=	0.20	0.25
	CA-23B (uncontrolled)	0.117	ha	R=	0.21	0.26
	Total Uncontolled =	**0.363**	**ha**	**∑R=**	**0.20**	**0.25**

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 2, 2026
Designed: M. Longtin
Checked: M.Basnet
Drawing Ref.: C701, C702

Stormwater Management Design Sheet

Post-development Stormwater Management (2-Yr)

$I_2 = 732.951 / (Td + 6.199)^{0.810}$ **A =** 732.951 **B =** 0.810 **C =** 6.199

Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	*Controlled Release Rate (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	76.81	236.20	86.35	92.29	15.63	107.92
15	61.77	189.96	87.90	92.29	12.57	104.86
20	52.03	160.01	81.27	92.29	10.59	102.88
25	45.17	138.90	69.92	92.29	9.19	101.48
30	40.04	123.15	55.54	92.29	8.15	100.44
35	36.06	110.89	39.07	92.29	7.34	99.63
40	32.86	101.07	21.07	92.29	6.69	98.98
45	30.24	93.00	1.91	92.29	6.15	98.44
50	28.04	86.24	0.00	92.29	5.71	98.00
55	26.17	80.48	0.00	92.29	5.33	97.62
60	24.56	75.52	0.00	92.29	5.00	97.29
65	23.15	71.20	0.00	92.29	4.71	97.00
70	21.91	67.39	0.00	92.29	4.46	96.75
75	20.81	64.01	0.00	92.29	4.24	96.53
80	19.83	60.98	0.00	92.29	4.04	96.33
85	18.94	58.26	0.00	92.29	3.86	96.15
90	18.14	55.80	0.00	92.29	3.69	95.98
95	17.41	53.55	0.00	92.29	3.54	95.83
100	16.75	51.50	0.00	92.29	3.41	95.70
105	16.13	49.62	0.00	92.29	3.28	95.57
110	15.57	47.88	0.00	92.29	3.17	95.46
115	15.05	46.27	0.00	92.29	3.06	95.35
120	14.56	44.78	0.00	92.29	2.96	95.25

*Average Release Rate (50% of Maximum Release Rate) for Underground Storage Consideration

On-site stormwater detention

Storage required = 87.90 m^3

Storage provided = 90.15 m^3 (Underground Storage)

STM Pipe			Volume (m^3)	STM Structures	Dia. (m)	Depth (m)	Volume (m^3)
Segment	Dia. (m)	Length (m)					
CB01B-CBMH02B	0.300	29.6	2.09	CB01B	1.2	1.04	1.18
CBMH02B-CBMH03B	0.300	28.7	2.03	CBMH02B	1.2	1.07	1.21
CBMH03B-CB19B	0.300	16.9	1.20	CB19B	1.2	1.44	1.63
CB08B-CB05B	0.300	33.5	2.37	CB08B	1.2	0.87	0.98
CB05B-CBMH06B	0.300	29.9	2.11	CB05B	1.2	1.05	1.19
CBMH06B-CBMH07B	0.300	29.9	2.11	CBMH06B	1.2	1.05	1.19
CBMH07B-CB19B	0.375	24.6	2.72	CBMH07B	1.2	1.1	1.24
Perforated Subdrain	0.300	26.2	1.85	CBMH06B	1.2	1.03	1.17
CB20B-CBMH04B	0.300	17.6	1.24	CBMH04B	1.2	2.62	2.96
CBMH04B-CBMH18B	0.450	28.8	4.58	CBMH04B	1.2	2.62	2.96
CB09B-CBMH10B	0.300	24.5	1.73	CB09B	0.6	1	0.36
CBMH10B-CB21B	0.375	20.0	2.21	CBMH10B	1.2	1.1	1.24
CB14B-CBMH13B	0.300	32.3	2.28	CB14B	0.6	1	0.36
CBMH13B-CB21B	0.300	14.8	1.05	CBMH10B	1.2	1.12	1.27
Perforated Subdrain	0.375	24.2	2.67	CB21B	1.2	1.42	1.61
CB22B-CBMH11B	0.300	24.9	1.76	CB22B	1.2	1.54	1.74
CBMH11B-CBMH12B	0.450	34.2	5.44	CBMH11B	1.2	2.51	2.84
CBMH12B-CBMH17B	0.450	29.5	4.69	CBMH12B	1.2	2.69	3.04
CBMH16B-CBMH17B	0.450	54.2	8.62	CB16B	0.6	2.52	0.91
CBMH17B-MH18B	0.600	18.0	5.09	CBMH17B	1.2	2.82	3.19
Total			**57.87**			**Total**	**32.28**

LRL Associates Ltd.
Storm Design Sheet

LRL File No.	240720
Project:	Palladium Resort Development Limited Partnership
Location:	Culdaff Rd, Kanata
Date:	October 2, 2026
Designed:	M. Longtin
Checked:	M.Basnet
Drawing Reference:	C702, C401

Storm Design Parameters

Rational Method
Q = 2.78CIA
Q = Peak flow (L/s)
A = Drainage area (ha)
C = Runoff coefficient
I = Rainfall intensity (mm/hr)

Runoff Coefficient (C)

Grass	0.20
Gravel	0.80
Asphalt / rooftop	0.90

City of Ottawa IDF curve equation
(5 year event, intensity in mm/hr)
$I_5 = 998.071 / (Td + 6.053)^{0.814}$
Min. velocity = 0.80 m/s
Manning's "n" = 0.013

LOCATION			AREA (ha)			FLOW						STORM SEWER							
WATERSHED / STREET	From MH	To MH	C = 0.20	C = 0.80	C = 0.90	Indiv. 2.78AC	Accum. 2.78AC	Time of Conc. (min.)	Rainfall Intensity (mm/hr)	Peak Flow Q (L/s)	Controlled Flow Q (L/s)	Pipe Diameter (mm)	Type	Slope (%)	Length (m)	Capacity Full (L/s)	Velocity Full (m/s)	Time of Flow (min.)	Ratio (Q/Q_{FULL})
CA-01B	Landscape CB01B	CBMH02B	0.137	0.000	0.000	0.076	0.076	10.00	104.19	7.93		300	PVC	0.35%	29.6	57.2	0.81	0.61	0.14
CA-02B	CBMH02B	CBMH03B	0.000	0.000	0.039	0.098	0.174	10.61	101.08	17.63		300	PVC	0.35%	28.7	57.2	0.81	0.59	0.31
CA-03B	CBMH03B	CB19B	0.000	0.000	0.052	0.129	0.304	11.20	98.25	29.82		300	PVC	0.35%	16.9	57.2	0.81	0.35	0.52
CA-08B	Landscape CB08B	CB05B	0.146	0.000	0.000	0.081	0.081	10.00	104.19	8.48		300	PVC	0.35%	33.5	57.2	0.81	0.69	0.15
CA-05B	Landscape CB05B	CBMH06B	0.051	0.000	0.000	0.028	0.110	10.69	100.68	11.05		300	PVC	0.35%	29.9	57.2	0.81	0.62	0.19
CA-06B	CBMH06B	CBMH07B	0.004	0.000	0.067	0.169	0.278	11.31	97.77	27.22		300	PVC	0.35%	26.2	57.2	0.81	0.54	0.48
CA-07B	CBMH07B	CB19B	0.016	0.000	0.111	0.287	0.565	11.85	95.36	53.87		375	PVC	0.35%	24.6	103.7	0.94	0.44	0.52
CA-17B	CB19B	CB20B	0.027	0.000	0.034	0.101	0.970	12.28	93.51	90.66		375	PVC	0.50%	24.1	124.0	1.12	0.36	0.73
	CB20B	CBMH04B	0.000	0.000	0.000	0.000	0.970	12.64	92.05	89.24		300	PVC	3.75%	17.6	187.3	2.65	0.11	0.48
CA-04B	CBMH04B	MH18B	0.000	0.000	0.050	0.126	1.095	12.75	91.61	100.32		450	PVC	0.40%	28.8	180.3	1.13	0.42	0.56
CA-09B	CB09B	CBMH10B	0.006	0.000	0.077	0.197	0.197	10.00	104.19	20.50		300	PVC	0.35%	24.5	57.2	0.81	0.50	0.36
CA-10B	CBMH10B	CB21	0.016	0.000	0.113	0.292	0.488	10.50	101.60	49.61		375	PVC	0.30%	38.8	96.0	0.87	0.74	0.52
CA-14B	CB14B	CBMH13B	0.009	0.000	0.044	0.115	0.115	10.00	104.19	11.99		300	PVC	0.35%	32.3	57.2	0.81	0.67	0.21
CA-13B	CBMH13B	CB21	0.008	0.000	0.048	0.123	0.238	10.67	100.81	24.04		250	PVC	0.50%	38.8	42.0	0.86	0.75	0.57
CA-18B	CB21	CB22	0.024	0.000	0.036	0.104	0.831	11.42	97.25	80.80		375	PVC	0.50%	24.2	124.0	1.12	0.36	0.65
	CB22	CBMH11B	0.000	0.000	0.000	0.000	0.831	11.78	95.65	79.48		300	PVC	2.50%	24.9	152.9	2.16	0.19	0.52
CA-11B	CBMH11B	CBMH12B	0.017	0.000	0.112	0.290	1.121	11.97	94.82	106.30		375	PVC	0.35%	34.2	103.7	0.94	0.61	1.02
CA-12B	CBMH12B	CBMH17B	0.017	0.000	0.110	0.285	1.406	12.58	92.30	129.79		450	PVC	0.25%	29.5	142.6	0.90	0.55	0.91
CA-15B	CB16B	CBMH17B	0.001	0.000	0.077	0.192	0.192	10.00	104.19	20.04		450	PVC	0.40%	54.2	180.3	1.13	0.80	0.11
CA-16B	CBMH17B	MH18B	0.001	0.000	0.065	0.163	1.762	13.13	90.14	158.81		600	PVC	0.30%	18.0	336.3	1.19	0.25	0.47
	MH18B	EX MH	0.000	0.000	0.000	0.000	2.857	15.10	83.24	237.81	184.58	525	PVC	0.25%	15.2	215.0	0.99	0.26	0.86

LRL Associates Ltd.
Storm Watershed Summary

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 1, 2026
Designed: M. Longtin
Checked: M.Basnet
Dwg Reference: C701, C702

(EAST)

Pre-Development Catchments

	Area (ha)				
Watershed	**C = 0.20**	**C = 0.80**	**C = 0.90**	**Total Area (ha)**	**Combined C**
North					
ECA-01A (uncontrolled)	0.870	0.000	0.131	1.001	0.29
Total	**0.870**	**0.000**	**0.131**	**1.001**	**0.29**
South					
ECA-02A (uncontrolled)	2.315	0.000	0.005	2.321	0.20
Total	**2.315**	**0.000**	**0.005**	**2.321**	**0.20**

Post-Development Catchments

	Area (ha)				
Watershed	**C = 0.20**	**C = 0.8**	**C = 0.90**	**Total Area (ha)**	**Combined C**
East-North					
CA-01A (controlled)	0.000	0.000	0.033	0.033	0.90
CA-02A (controlled)	0.010	0.000	0.038	0.047	0.76
CA-03A (controlled)	0.008	0.000	0.035	0.042	0.78
CA-04A (controlled)	0.018	0.000	0.037	0.055	0.68
CA-05A (controlled)	0.058	0.000	0.080	0.138	0.61
CA-08A (controlled)	0.000	0.000	0.056	0.056	0.90
CA-10A (controlled)	0.009	0.000	0.070	0.079	0.82
CA-100A (controlled)	0.000	0.000	0.148	0.148	0.90
CA-101A (controlled)	0.000	0.000	0.249	0.249	0.90
Total	**0.102**	**0.000**	**0.745**	**0.847**	**0.82**
CA-33A (uncontrolled)	0.015	0.000	0.000	0.015	0.20
CA-34A (uncontrolled)	0.126	0.000	0.006	0.132	0.23
CA-35A (uncontrolled)	0.005	0.000	0.003	0.007	0.46
Total	**0.145**	**0.000**	**0.009**	**0.154**	**0.24**

LRL Associates Ltd.

Storm Watershed Summary

LRL File No. 240720

Project: Palladium Resort Development Limited Partnership

Location: Culdaff Rd, Kanata

Date: October 1, 2026

Designed: M. Longtin

Checked: M.Basnet

Dwg Reference: C701, C702

(EAST)

East-South					
CA-102A (controlled)	0.000	0.000	0.409	0.409	0.90
CA-06A (controlled)	0.002	0.000	0.031	0.034	0.85
CA-07A (controlled)	0.013	0.000	0.068	0.081	0.79
CA-09A (controlled)	0.014	0.000	0.050	0.064	0.75
CA-11A (controlled)	0.014	0.000	0.041	0.055	0.72
CA-12A (controlled)	0.011	0.000	0.039	0.050	0.74
CA-13A (controlled)	0.000	0.000	0.061	0.061	0.90
CA-14A (controlled)	0.005	0.000	0.145	0.150	0.88
CA-15A (controlled)	0.004	0.000	0.145	0.149	0.88
CA-16A (controlled)	0.003	0.000	0.063	0.066	0.87
CA-17A (controlled)	0.004	0.000	0.058	0.062	0.85
CA-18A (controlled)	0.120	0.000	0.130	0.249	0.56
CA-19A (controlled)	0.011	0.000	0.067	0.078	0.80
CA-20A (controlled)	0.085	0.000	0.159	0.244	0.66
CA-21A (controlled)	0.086	0.000	0.000	0.086	0.20
CA-22A (controlled)	0.080	0.000	0.000	0.080	0.20
CA-23A (controlled)	0.029	0.000	0.054	0.083	0.66
CA-24A (controlled)	0.014	0.000	0.028	0.042	0.67
CA-25A (controlled)	0.028	0.000	0.020	0.048	0.49
CA-26A (controlled)	0.028	0.000	0.020	0.048	0.50
CA-27A (controlled)	0.039	0.000	0.020	0.060	0.44
CA-28A (controlled)	0.009	0.000	0.023	0.032	0.70
CA-29A (controlled)	0.007	0.000	0.023	0.030	0.74
CA-30A (controlled)	0.009	0.000	0.024	0.033	0.70
CA-31A (controlled)	0.006	0.000	0.023	0.029	0.76
Total	**0.621**	**0.000**	**1.700**	**2.321**	**0.71**

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 1, 2026
Designed: M. Longtin
Checked: M.Basnet
Drawing Ref.: C701, C702

EAST-North Stormwater Management Design Sheet

STORM - 100 YEAR

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) $= A / (Td + C)^B$
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Catchment within Development Area

	Total Area =	**1.001**	ha	**∑R=**	**0.00**	**Flow Rates (L/s)**
Pre-Development Uncontrolled	ECA-01A	1.001	ha	R=	0.29	144.95
	Total pre-development =	**1.001**	**ha**			**144.95**

Allowable Release Rate = 272 L/s *(195 Huntmar Drive, 2yr C=0.80)*
Proposed Release Rate = 382 L/s

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**1.001**	ha	**∑R=**	**0.73**	**0.91**
Controlled	CA-01A (controlled)	0.033	ha	R=	0.90	1.00
	CA-02A (controlled)	0.047	ha	R=	0.76	0.95
	CA-03A (controlled)	0.042	ha	R=	0.78	0.97
	CA-04A (controlled)	0.055	ha	R=	0.68	0.85
	CA-05A (controlled)	0.138	ha	R=	0.61	0.76
	CA-08A (controlled)	0.056	ha	R=	0.90	1.00
	CA-10A (controlled)	0.079	ha	R=	0.82	1.00
	CA-100A (controlled)	0.148	ha	R=	0.90	1.00
	CA-101A (controlled)	0.249	ha	R=	0.90	1.00
	Total Contolled =	**0.847**	**ha**	**∑R=**	**0.82**	**1.00**
Uncontrolled	CA-33A (uncontrolled)	0.015	ha	R=	0.20	0.25
	CA-34A (uncontrolled)	0.132	ha	R=	0.23	0.29
	CA-35A (uncontrolled)	0.007	ha	R=	0.46	0.57
	Total Uncontolled =	**0.154**	**ha**	**∑R=**	**0.24**	**0.30**

Post-development Stormwater Management (100-Yr)

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ **A = 1735.688** **B = 0.820** **C = 6.014**

Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	178.56	420.50	36.81	359.15	22.85	382.00
15	142.89	336.51	0.00	359.15	18.29	377.44
20	119.95	282.48	0.00	359.15	15.35	374.50
25	103.85	244.55	0.00	359.15	13.29	372.44
30	91.87	216.34	0.00	359.15	11.76	370.91
35	82.58	194.47	0.00	359.15	10.57	369.72
40	75.15	176.96	0.00	359.15	9.62	368.76
45	69.05	162.61	0.00	359.15	8.84	367.98
50	63.95	150.61	0.00	359.15	8.19	367.33
55	59.62	140.41	0.00	359.15	7.63	366.78
60	55.89	131.63	0.00	359.15	7.15	366.30
65	52.65	123.98	0.00	359.15	6.74	365.89
70	49.79	117.25	0.00	359.15	6.37	365.52
75	47.26	111.28	0.00	359.15	6.05	365.20
80	44.99	105.95	0.00	359.15	5.76	364.91
85	42.95	101.15	0.00	359.15	5.50	364.64
90	41.11	96.81	0.00	359.15	5.26	364.41
95	39.43	92.87	0.00	359.15	5.05	364.19
100	37.90	89.26	0.00	359.15	4.85	364.00
105	36.50	85.95	0.00	359.15	4.67	363.82
110	35.20	82.90	0.00	359.15	4.51	363.65
115	34.01	80.08	0.00	359.15	4.35	363.50
120	32.89	77.47	0.00	359.15	4.21	363.36

On-site stormwater detention

Storage required = 36.81 m^3
Surface storage provided = 41.66 m^3 (See Dwg C601A)

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 1, 2026
Designed: M. Longtin
Checked: M.Basnet
Drawing Ref.: C701, C702

EAST-North Stormwater Management Design Sheet

STORM - 5 YEAR

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) = A / (Td + C)^{B}
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Catchment within Development Area

	Total Area =	**1.001**	ha	**∑R=**	**0.20**	**Flow Rates (L/s)**
Pre-Development Uncontrolled	ECA-01A	1.001	ha	R=	0.20	58.47
	Total Uncontrolled =	**1.001**	**ha**	**∑R=**	**0.20**	**58.47**

Allowable Release Rate = 382.00 L/s
Actual Release Rate = 369.82 L/s

(195 Huntmar Drive, 2yr C=0.80)

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**1.001**	ha	**∑R=**	**0.73**	**0.91**
Controlled	CA-01A (controlled)	0.033	ha	R=	0.90	1.00
	CA-02A (controlled)	0.047	ha	R=	0.76	0.95
	CA-03A (controlled)	0.042	ha	R=	0.78	0.97
	CA-04A (controlled)	0.055	ha	R=	0.68	0.85
	CA-05A (controlled)	0.138	ha	R=	0.61	0.76
	CA-08A (controlled)	0.056	ha	R=	0.90	1.00
	CA-10A (controlled)	0.079	ha	R=	0.82	1.00
	CA-100A (controlled)	0.148	ha	R=	0.90	1.00
	CA-101A (controlled)	0.249	ha	R=	0.90	1.00
	Total Contolled =	**0.847**	**ha**	**∑R=**	**0.82**	**1.00**
	CA-33A (uncontrolled)	0.015	ha	R=	0.20	0.25
	CA-34A (uncontrolled)	0.132	ha	R=	0.23	0.29
	CA-34A (uncontrolled)	0.007	ha	R=	0.46	0.57
	Total Uncontolled =	**0.154**	**ha**	**∑R=**	**0.24**	**0.30**

Post-development Stormwater Management (5-Yr)

$I_5 = 998.071 / (Td + 6.053)^{0.814}$ **A = 998.071** **B = 0.814** **C = 6.053**

Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	104.19	200.17	0.00	359.15	10.67	369.82
15	83.56	160.53	0.00	359.15	8.56	367.70
20	70.25	134.96	0.00	359.15	7.19	366.34
25	60.90	116.99	0.00	359.15	6.23	365.38
30	53.93	103.60	0.00	359.15	5.52	364.67
35	48.52	93.21	0.00	359.15	4.97	364.12
40	44.18	84.88	0.00	359.15	4.52	363.67
45	40.63	78.05	0.00	359.15	4.16	363.31
50	37.65	72.34	0.00	359.15	3.86	363.00
55	35.12	67.48	0.00	359.15	3.60	362.74
60	32.94	63.29	0.00	359.15	3.37	362.52
65	31.04	59.64	0.00	359.15	3.18	362.33
70	29.37	56.43	0.00	359.15	3.01	362.15
75	27.89	53.58	0.00	359.15	2.86	362.00
80	26.56	51.03	0.00	359.15	2.72	361.87
85	25.37	48.74	0.00	359.15	2.60	361.74
90	24.29	46.66	0.00	359.15	2.49	361.63
95	23.31	44.77	0.00	359.15	2.39	361.53
100	22.41	43.05	0.00	359.15	2.29	361.44
105	21.58	41.46	0.00	359.15	2.21	361.36
110	20.82	40.00	0.00	359.15	2.13	361.28
115	20.12	38.65	0.00	359.15	2.06	361.21
120	19.47	37.40	0.00	359.15	1.99	361.14

On-site stormwater detention

Storage required = 0.00 m^3

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 1, 2026
Designed: M. Longtin
Checked: M.Basnet
Drawing Ref.: C701, C702

EAST-North Stormwater Management Design Sheet

STORM - 2 YEAR

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) $= A / (Td + C)^B$
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Catchment within Development Area

	Total Area =	**1.001**	ha	**∑R=**	**0.20**	**Flow Rates (L/s)**
Pre-Development Uncontrolled	ECA-01A	1.001	ha	R=	0.20	43.10
	Total Uncontrolled =	**1.001**	**ha**	**∑R=**	**0.20**	**43.10**

Allowable Release Rate = 382.00 L/s *(195 Huntmar Drive, 2yr C=0.80)*
Actual Release Rate = 367.01 L/s

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**1.001**	ha	**∑R=**	**0.73**	**0.91**
Controlled	CA-01A (controlled)	0.033	ha	R=	0.90	1.00
	CA-02A (controlled)	0.047	ha	R=	0.76	0.95
	CA-03A (controlled)	0.042	ha	R=	0.78	0.97
	CA-04A (controlled)	0.055	ha	R=	0.68	0.85
	CA-05A (controlled)	0.138	ha	R=	0.61	0.76
	CA-08A (controlled)	0.056	ha	R=	0.90	1.00
	CA-10A (controlled)	0.079	ha	R=	0.82	1.00
	CA-100A (controlled)	0.148	ha	R=	0.90	1.00
	CA-101A (controlled)	0.249	ha	R=	0.90	1.00
	Total Contolled =	**0.847**	**ha**	**∑R=**	**0.82**	**1.00**
Uncontrolled	CA-33A (uncontrolled)	0.015	ha	R=	0.20	0.25
	CA-34A (uncontrolled)	0.132	ha	R=	0.23	0.29
	CA-35A (uncontrolled)	0.007	ha	R=	0.46	0.57
	Total Uncontolled =	**0.154**	**ha**	**∑R=**	**0.24**	**0.30**

Post-development Stormwater Management (2-Yr)

$I_2 = 732.951 / (Td + 6.199)^{0.810}$ **A = 732.951** **B = 0.810** **C = 6.199**

Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	*Controlled Release Rate (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	76.81	147.55	0.00	179.57	7.86	187.44
15	61.77	118.66	0.00	179.57	6.32	185.90
20	52.03	99.96	0.00	179.57	5.33	184.90
25	45.17	86.77	0.00	179.57	4.62	184.20
30	40.04	76.93	0.00	179.57	4.10	183.67
35	36.06	69.28	0.00	179.57	3.69	183.27
40	32.86	63.14	0.00	179.57	3.36	182.94
45	30.24	58.09	0.00	179.57	3.10	182.67
50	28.04	53.87	0.00	179.57	2.87	182.44
55	26.17	50.28	0.00	179.57	2.68	182.25
60	24.56	47.18	0.00	179.57	2.51	182.09
65	23.15	44.48	0.00	179.57	2.37	181.94
70	21.91	42.10	0.00	179.57	2.24	181.82
75	20.81	39.99	0.00	179.57	2.13	181.70
80	19.83	38.10	0.00	179.57	2.03	181.60
85	18.94	36.40	0.00	179.57	1.94	181.51
90	18.14	34.86	0.00	179.57	1.86	181.43
95	17.41	33.45	0.00	179.57	1.78	181.36
100	16.75	32.17	0.00	179.57	1.71	181.29
105	16.13	31.00	0.00	179.57	1.65	181.23
110	15.57	29.91	0.00	179.57	1.59	181.17
115	15.05	28.91	0.00	179.57	1.54	181.11
120	14.56	27.98	0.00	179.57	1.49	181.06

*Average release rate taken as 50% of max. allowable controlled release rate for an underground storage calculation

On-site stormwater detention

Storage required = 0.00 m^3

LRL File No.	240720
Project:	Palladium Resort Development Limited Partnership
Location:	Culdaff Rd, Kanata
Date:	October 1, 2026
Designed:	M. Longtin
Checked:	M.Basnet
Drawing Ref.:	C701, C702

EAST-South Stormwater Management Design Sheet

STORM - 100 YEAR

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) = $A / (Td + C)^B$
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Catchment within Development Area

	Total Area =	**2.321**	ha	**∑R=**	**0.00**	**Flow Rates (L/s)**
Pre-Development Uncontrolled						
	ECA-02A	2.321	ha	R=	0.20	230.38
	Total pre-development =	**2.321**	**ha**			**230.38**

Allowable Release Rate = 273.00 L/s
Proposed Release Rate = 273.00 L/s

(195 Huntmar Drive, 2yr C=0.80)

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**2.321**	ha	**∑R=**	**0.71**	**0.89**
Controlled	CA-102A (controlled)	0.409	ha	R=	0.90	1.00
	CA-06A (controlled)	0.034	ha	R=	0.85	1.00
	CA-07A (controlled)	0.081	ha	R=	0.79	0.98
	CA-09A (controlled)	0.064	ha	R=	0.75	0.94
	CA-11A (controlled)	0.055	ha	R=	0.72	0.90
	CA-12A (controlled)	0.050	ha	R=	0.74	0.93
	CA-13A (controlled)	0.061	ha	R=	0.90	1.00
	CA-14A (controlled)	0.150	ha	R=	0.88	1.00
	CA-15A (controlled)	0.149	ha	R=	0.88	1.00
	CA-16A (controlled)	0.066	ha	R=	0.87	1.00
	CA-17A (controlled)	0.062	ha	R=	0.85	1.00
	CA-18A (controlled)	0.249	ha	R=	0.56	0.70
	CA-19A (controlled)	0.078	ha	R=	0.80	1.00
	CA-20A (controlled)	0.244	ha	R=	0.66	0.82
	CA-21A (controlled)	0.086	ha	R=	0.20	0.25
	CA-22A (controlled)	0.080	ha	R=	0.20	0.25
	CA-23A (controlled)	0.083	ha	R=	0.66	0.82
	CA-24A (controlled)	0.042	ha	R=	0.67	0.84
	CA-25A (controlled)	0.048	ha	R=	0.49	0.61
	CA-26A (controlled)	0.048	ha	R=	0.50	0.62
	CA-27A (controlled)	0.060	ha	R=	0.44	0.55
	CA-28A (controlled)	0.032	ha	R=	0.70	0.88
	CA-29A (controlled)	0.030	ha	R=	0.74	0.93
	CA-30A (controlled)	0.033	ha	R=	0.70	0.88
	CA-31A (controlled)	0.029	ha	R=	0.76	0.94
	Total Contolled =	**2.321**	**ha**	**∑R=**	**0.71**	**0.89**
Uncontrolled						
	Total Uncontolled =	**0.000**	**ha**	**∑R=**	**0.00**	**0.00**

Post-development Stormwater Management (100-Yr)

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ **A = 1735.688** **B = 0.820** **C = 6.014**

Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	178.56	1026.23	451.94	273.00	0.00	273.00
15	142.89	821.25	493.43	273.00	0.00	273.00
20	119.95	689.39	499.66	273.00	0.00	273.00
25	103.85	596.84	485.76	273.00	0.00	273.00
30	91.87	527.99	458.98	273.00	0.00	273.00
35	82.58	474.60	423.36	273.00	0.00	273.00
40	75.15	431.88	381.31	273.00	0.00	273.00
45	69.05	396.85	334.40	273.00	0.00	273.00
50	63.95	367.56	283.68	273.00	0.00	273.00
55	59.62	342.67	229.92	273.00	0.00	273.00
60	55.89	321.24	173.67	273.00	0.00	273.00
65	52.65	302.57	115.34	273.00	0.00	273.00
70	49.79	286.15	55.25	273.00	0.00	273.00
75	47.26	271.59	0.00	273.00	0.00	273.00
80	44.99	258.57	0.00	273.00	0.00	273.00
85	42.95	246.87	0.00	273.00	0.00	273.00
90	41.11	236.28	0.00	273.00	0.00	273.00
95	39.43	226.64	0.00	273.00	0.00	273.00
100	37.90	217.84	0.00	273.00	0.00	273.00
105	36.50	209.76	0.00	273.00	0.00	273.00
110	35.20	202.32	0.00	273.00	0.00	273.00
115	34.01	195.44	0.00	273.00	0.00	273.00
120	32.89	189.06	0.00	273.00	0.00	273.00

On-site stormwater detention

Storage required = 499.66 m^3
Surface storage provided = 550.87 m^3 (See Dwg C601A)

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 1, 2026
Designed: M. Longtin
Checked: M.Basnet
Drawing Ref.: C701, C702

EAST-South Stormwater Management Design Sheet

STORM - 5 YEAR

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) $= A / (Td + C)^B$
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Catchment within Development Area

	Total Area =	**2.321**	ha	**∑R=**	**0.20**	**Flow Rates (L/s)**
Pre-Development Uncontrolled	ECA-02A	2.321	ha	R=	0.20	134.43
	Total Uncontrolled =	**2.321**	**ha**	**∑R=**	**0.20**	**134.43**

Allowable Release Rate = 273.00 L/s
Proposed Release Rate = 273.00 L/s
(195 Huntmar Drive, 2yr C=0.80)

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**2.321**	ha	**∑R=**	**0.71**	**0.89**
Controlled	CA-102A (controlled)	0.409	ha	R=	0.90	1.00
	CA-06A (controlled)	0.034	ha	R=	0.85	1.00
	CA-07A (controlled)	0.081	ha	R=	0.79	0.98
	CA-09A (controlled)	0.064	ha	R=	0.75	0.94
	CA-11A (controlled)	0.055	ha	R=	0.72	0.90
	CA-12A (controlled)	0.050	ha	R=	0.74	0.93
	CA-13A (controlled)	0.061	ha	R=	0.90	1.00
	CA-14A (controlled)	0.150	ha	R=	0.88	1.00
	CA-15A (controlled)	0.149	ha	R=	0.88	1.00
	CA-16A (controlled)	0.066	ha	R=	0.87	1.00
	CA-17A (controlled)	0.062	ha	R=	0.85	1.00
	CA-18A (controlled)	0.249	ha	R=	0.56	0.70
	CA-19A (controlled)	0.078	ha	R=	0.80	1.00
	CA-20A (controlled)	0.244	ha	R=	0.66	0.82
	CA-21A (controlled)	0.086	ha	R=	0.20	0.25
	CA-22A (controlled)	0.080	ha	R=	0.20	0.25
	CA-23A (controlled)	0.083	ha	R=	0.66	0.82
	CA-24A (controlled)	0.042	ha	R=	0.67	0.84
	CA-25A (controlled)	0.048	ha	R=	0.49	0.61
	CA-26A (controlled)	0.048	ha	R=	0.50	0.62
	CA-27A (controlled)	0.060	ha	R=	0.44	0.55
	CA-28A (controlled)	0.032	ha	R=	0.70	0.88
	CA-29A (controlled)	0.030	ha	R=	0.74	0.93
	CA-30A (controlled)	0.033	ha	R=	0.70	0.88
	CA-31A (controlled)	0.029	ha	R=	0.76	0.94
	Total Contolled =	**2.321**	**ha**	**∑R=**	**0.71**	**0.89**
	Total Uncontolled =	**0.000**	**ha**	**∑R=**		**0.00**

Post-development Stormwater Management (5-Yr)

$I_5 = 998.071 / (Td + 6.053)^{0.814}$ **A = 998.071** **B = 0.814** **C = 6.053**

Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	104.19	598.83	195.50	273.00	0.00	273.00
15	83.56	480.23	186.50	273.00	0.00	273.00
20	70.25	403.75	156.90	273.00	0.00	273.00
25	60.90	349.99	115.48	273.00	0.00	273.00
30	53.93	309.94	66.49	273.00	0.00	273.00
35	48.52	278.84	12.27	273.00	0.00	273.00
40	44.18	253.94	0.00	273.00	0.00	273.00
45	40.63	233.50	0.00	273.00	0.00	273.00
50	37.65	216.40	0.00	273.00	0.00	273.00
55	35.12	201.86	0.00	273.00	0.00	273.00
60	32.94	189.33	0.00	273.00	0.00	273.00
65	31.04	178.42	0.00	273.00	0.00	273.00
70	29.37	168.81	0.00	273.00	0.00	273.00
75	27.89	160.28	0.00	273.00	0.00	273.00
80	26.56	152.66	0.00	273.00	0.00	273.00
85	25.37	145.80	0.00	273.00	0.00	273.00
90	24.29	139.59	0.00	273.00	0.00	273.00
95	23.31	133.94	0.00	273.00	0.00	273.00
100	22.41	128.78	0.00	273.00	0.00	273.00
105	21.58	124.04	0.00	273.00	0.00	273.00
110	20.82	119.67	0.00	273.00	0.00	273.00
115	20.12	115.63	0.00	273.00	0.00	273.00
120	19.47	111.89	0.00	273.00	0.00	273.00

On-site stormwater detention

Storage required = 195.50 m^3

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 2, 2026
Designed: M. Longtin
Checked: M.Basnet
Drawing Ref.: C701, C702

EAST-South Stormwater Management Design Sheet

STORM - 2 YEAR

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) $= A / (Td + C)^B$
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Catchment within Development Area

	Total Area =	**2.321**	ha	**∑R=**	**0.20**	**Flow Rates (L/s)**
Pre-Development Uncontrolled	ECA-01A	2.321	ha	R=	0.20	99.90
	Total Uncontrolled =	**2.321**	**ha**	**∑R=**	**0.20**	**99.90**

Allowable Release Rate = 273.00 L/s
Proposed Release Rate = 273.00 L/s
(195 Huntmar Drive, 2yr C=0.80)

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**2.321**	ha	**∑R=**	**0.69**	**0.87**
Controlled	CA-102A (controlled)	0.409	ha	R=	0.85	1.00
	CA-06A (controlled)	0.034	ha	R=	0.79	0.98
	CA-07A (controlled)	0.081	ha	R=	0.90	1.00
	CA-09A (controlled)	0.064	ha	R=	0.72	0.90
	CA-11A (controlled)	0.055	ha	R=	0.74	0.93
	CA-12A (controlled)	0.050	ha	R=	0.90	1.00
	CA-13A (controlled)	0.061	ha	R=	0.88	1.00
	CA-14A (controlled)	0.150	ha	R=	0.88	1.00
	CA-15A (controlled)	0.149	ha	R=	0.87	1.00
	CA-16A (controlled)	0.066	ha	R=	0.85	1.00
	CA-17A (controlled)	0.062	ha	R=	0.56	0.70
	CA-18A (controlled)	0.249	ha	R=	0.80	1.00
	CA-19A (controlled)	0.078	ha	R=	0.66	0.82
	CA-20A (controlled)	0.244	ha	R=	0.20	0.25
	CA-21A (controlled)	0.086	ha	R=	0.20	0.25
	CA-22A (controlled)	0.080	ha	R=	0.66	0.82
	CA-23A (controlled)	0.083	ha	R=	0.67	0.84
	CA-24A (controlled)	0.042	ha	R=	0.49	0.61
	CA-25A (controlled)	0.048	ha	R=	0.50	0.62
	CA-26A (controlled)	0.048	ha	R=	0.44	0.55
	CA-27A (controlled)	0.060	ha	R=	0.70	0.88
	CA-28A (controlled)	0.032	ha	R=	0.74	0.93
	CA-29A (controlled)	0.030	ha	R=	0.70	0.88
	CA-30A (controlled)	0.033	ha	R=	0.76	0.94
	CA-31A (controlled)	0.029	ha	R=	0.71	0.89
	Total Contolled =	**2.321**	**ha**	**∑R=**	**0.69**	**0.87**
	Total Uncontolled =	**0.000**	**ha**	**∑R=**		**0.00**

Post-development Stormwater Management (2-Yr)

$I_2 = 732.951 / (Td + 6.199)^{0.810}$ **A = 732.951** **B = 0.810** **C = 6.199**

Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	*Controlled Release Rate (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	76.81	429.22	175.63	136.50	0.00	136.50
15	61.77	345.18	187.82	136.50	0.00	136.50
20	52.03	290.77	185.13	136.50	0.00	136.50
25	45.17	252.41	173.87	136.50	0.00	136.50
30	40.04	223.78	157.10	136.50	0.00	136.50
35	36.06	201.51	136.53	136.50	0.00	136.50
40	32.86	183.66	113.18	136.50	0.00	136.50
45	30.24	168.99	87.73	136.50	0.00	136.50
50	28.04	156.71	60.62	136.50	0.00	136.50
55	26.17	146.25	32.18	136.50	0.00	136.50
60	24.56	137.24	2.66	136.50	0.00	136.50
65	23.15	129.38	0.00	136.50	0.00	136.50
70	21.91	122.46	0.00	136.50	0.00	136.50
75	20.81	116.31	0.00	136.50	0.00	136.50
80	19.83	110.82	0.00	136.50	0.00	136.50

LRL File No. 240720
Project: Palladium Resort Development Limited Partnership
Location: Culdaff Rd, Kanata
Date: October 2, 2026
Designed: M. Longtin
Checked: M.Basnet
Drawing Ref.: C701, C702

EAST-South Stormwater Management Design Sheet

85	18.94	105.87	0.00	136.50	0.00	136.50
90	18.14	101.39	0.00	136.50	0.00	136.50
95	17.41	97.31	0.00	136.50	0.00	136.50
100	16.75	93.59	0.00	136.50	0.00	136.50
105	16.13	90.16	0.00	136.50	0.00	136.50
110	15.57	87.01	0.00	136.50	0.00	136.50
115	15.05	84.09	0.00	136.50	0.00	136.50
120	14.56	81.38	0.00	136.50	0.00	136.50

*Average release rate taken as 50% of max. allowable controlled release rate for an underground storage calculation

On-site stormwater detention

Storage required = 187.82 m^3

Storage provided = 189.22 m^3 (Underground Storage)

	STM Pipe			Volume (m^3)	STM Structures	Dia. (m)	Depth (m)	Volume (m^3)
	Segment	Dia. (m)	Length (m)					
South	CB06A-MH90A	0.300	13.5	0.95	CB06A	0.6	1.00	0.36
	MH90A-CB30A	0.300	12.8	0.91	MH90A	1.2	1.36	1.96
	Perforated Subdrain	0.300	16.7	1.18	CB30A	1.2	1.35	1.94
	CB31A-CBMH07A	0.300	13.3	0.94	CB31A	1.2	1.43	2.06
	CBMH07A-MH28A	0.375	27.0	2.98	CBMH07A	1.2	2.39	2.70
	CB09A-MH88A	0.300	20.1	1.42	CB09A	0.6	1.00	0.36
	MH88A-CB32A	0.300	12.8	0.91	MH90A	1.2	1.36	1.96
	Perforated Subdrain	0.300	18.2	1.29	CB32A	1.2	1.2	1.73
	CB33A-CBMH16A	0.300	26.5	1.87	CB33A	1.2	1.29	1.86
	CB16A-CBMH17A	0.600	50.8	14.37	CBMH16A	1.2	2.21	3.18
	CBMH11A-CBMH13A	0.450	18.2	2.90	CBMH11A	1.2	2.2	2.49
	CB12A-CBMH13A	0.250	13.0	0.64	CB12A	0.6	2.18	0.78
	CBMH13A-CBMH14A	0.525	32.2	6.97	CBMH13A	1.5	1.98	3.50
	CBMH14A-CBMH15A	0.600	40.0	11.31	CBMH14A	1.5	2.14	3.78
	CBMH15A-CBMH17A	0.600	30.1	8.51	CBMH15A	1.5	2.31	4.08
	CBMH17A-MH28A	0.600	26.6	7.52	CBMH17A	1.5	2.49	4.40
	CB18A-CB19A	0.300	32.1	2.27	CB18A	1.2	1.67	1.89
	CB19A-CB20A	0.375	27.9	3.08	CB19A	1.2	1.83	2.07
	CB20A-CB21A	0.450	45.5	7.24	CB20A	1.2	1.94	2.19
	CB21A-CB22A	0.450	40.2	6.40	CB21A	1.2	2.11	2.39
	CB22A-CBMH23A	0.450	44.7	7.11	CB22A	1.2	2.24	2.53
	CBMH23A-CBMH24A	0.450	24.6	3.91	CBMH23A	1.2	2.38	2.69
	CBMH24A-CBMH25A	0.450	26.3	4.18	CBMH24A	1.2	2.47	2.79
	CBMH25A-CBMH26A	0.450	29.6	4.71	CBMH25A	1.2	2.57	2.91
	CBMH26A-CBMH27A	0.600	29.8	8.43	CBMH26A	1.2	2.69	3.04
	CBMH27A-MH28A	0.600	10.6	3.00	CBMH27A	1.8	2.82	7.18
					MH28A	1.8	2.89	7.36
	Total			**115.02**			**Total**	**74.21**

LRL Associates Ltd.
Storm Design Sheet

LRL File No.	240720
Project:	Palladium Resort Development Limited Partnership
Location:	Culdaff Rd, Kanata
Date:	June 12, 2025
Designed:	M. Longtin
Checked:	M.Basnet
Drawing Reference:	C702, C401

Storm Design Parameters

Rational Method	Runoff Coefficient (C)		City of Ottawa IDF curve equation
Q = 2.78CIA	Grass	0.20	(5 year event, intensity in mm/hr)
Q = Peak flow (L/s)	Gravel	0.80	$I_5 = 998.071 / (Td + 6.053)^{0.814}$
A = Drainage area (ha)	Asphalt / rooftop	0.90	Min. velocity = 0.80 m/s
C = Runoff coefficient			Manning's "n" = 0.013
I = Rainfall intensity (mm/hr)			

LOCATION			AREA (ha)			FLOW						STORM SEWER							
WATERSHED / STREET	From MH	To MH	C = 0.20	C = 0.80	C = 0.90	Indiv. 2.78AC	Accum. 2.78AC	Time of Conc. (min.)	Rainfall Intensity (mm/hr)	Peak Flow Q (L/s)	Controlled Flow Q (L/s)	Pipe Diameter (mm)	Type	Slope (%)	Length (m)	Capacity Full (L/s)	Velocity Full (m/s)	Time of Flow (min.)	Ratio (Q/Q_{FULL})
CA-101A	Roof	CBMH10A	0.000	0.000	0.249	0.622	0.622	10.00	104.19	64.81		300	PVC	1.00%	10.4	96.7	1.37	0.13	0.67
CA-10A	CBMH10A	CBMH08A	0.009	0.000	0.070	0.180	0.802	10.13	103.53	83.00		375	PVC	0.50%	28.9	124.0	1.12	0.43	0.67
CA-100A	Roof	CBMH08A	0.000	0.000	0.148	0.371	0.371	10.00	104.19	38.63		300	PVC	1.00%	10.1	96.7	1.37	0.12	0.40
	CBMH08A	CBMH05A	0.000	0.000	0.000	0.000	1.173	11.20	98.27	115.23		450	PVC	0.40%	45.7	180.3	1.13	0.67	0.64
CA-05A	CBMH05A	CBMH04A	0.058	0.000	0.080	0.233	1.405	11.87	95.27	133.88		450	PVC	0.45%	29.7	191.3	1.20	0.41	0.70
CA-04A	CBMH04A	CBMH03A	0.018	0.000	0.037	0.103	1.509	12.28	93.52	141.09		450	PVC	0.45%	26.4	191.3	1.20	0.37	0.74
CA-01A	CB01A	CBMH02A	0.000	0.000	0.033	0.082	0.082	10.00	104.19	8.50		250	PVC	0.50%	44.9	42.0	0.86	0.87	0.20
CA-02A	CBMH02A	CBMH03A	0.010	0.000	0.038	0.100	0.182	10.87	99.79	18.13		250	PVC	0.50%	17.5	42.0	0.86	0.34	0.43
CA-03A	CBMH03A	EX MH	0.008	0.000	0.035	0.091	1.782	13.86	87.43	155.79	359.15	525	PVC	0.30%	8.5	235.6	1.09	0.13	0.66
CA-102A	Roof	CBMH11A	0.000	0.000	0.409	1.023	1.023	10.00	104.19	106.60		375	PVC	1.00%	12.1	175.3	1.59	0.13	0.61
CA-11A	CBMH11A	CBMH13A	0.014	0.000	0.041	0.110	1.133	10.13	103.53	117.30		450	PVC	0.30%	18.2	156.2	0.98	0.31	0.75
CA-12A	CB12A	CBMH13A	0.011	0.000	0.039	0.103	0.103	10.00	104.19	10.69		250	PVC	0.50%	13.0	42.0	0.86	0.25	0.25
CA-13A	CBMH13A	CBMH14A	0.000	0.000	0.061	0.152	1.388	10.69	100.69	139.75		450	PVC	0.40%	32.2	180.3	1.13	0.47	0.78
CA-14A	CBMH14A	CBMH15A	0.005	0.000	0.145	0.366	1.754	11.16	98.43	172.64		525	PVC	0.25%	40.0	215.0	0.99	0.67	0.80
CA-15A	CBMH15A	CBMH17A	0.004	0.000	0.145	0.366	2.120	11.83	95.41	202.25		600	PVC	0.40%	30.1	388.3	1.37	0.37	0.52
CA-09A	CB09A	MH88	0.014	0.000	0.050	0.133	0.133	10.00	104.19	13.85		300	PVC	0.35%	20.1	57.2	0.81	0.41	0.24
	MH88	CB32A	0.000	0.000	0.000	0.000	0.133	10.41	102.06	13.57		300	PVC	0.35%	8.0	57.2	0.81	0.16	0.24
CA-30A	CB32A	CB33A	0.009	0.000	0.024	0.064	0.197	10.58	101.23	19.97		300	PVC	0.50%	18.2	68.4	0.97	0.31	0.29
CA-31A	CB33A	CBMH16A	0.006	0.000	0.023	0.061	0.258	10.89	99.70	25.74		300	PVC	2.30%	26.5	146.7	2.07	0.21	0.18

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Drawing Reference:	C702, C401

Storm Design Parameters

Rational Method
Q = 2.78CIA
Q = Peak flow (L/s)
A = Drainage area (ha)
C = Runoff coefficient
I = Rainfall intensity (mm/hr)

Runoff Coefficient (C)

Grass	0.20
Gravel	0.80
Asphalt / rooftop	0.90

City of Ottawa IDF curve equation
(5 year event, intensity in mm/hr)
$I_5 = 998.071 / (Td + 6.053)^{0.814}$
Min. velocity = 0.80 m/s
Manning's "n" = 0.013

CA-16A	CBMH16A	CBMH17A	0.003	0.000	0.063	0.160	0.418	11.11	98.70	41.24		300	PVC	0.50%	50.8	68.4	0.97	0.88	0.60
CA-17A	CBMH17A	MH28A	0.004	0.000	0.058	0.146	2.684	13.07	90.34	242.46		675	PVC	0.25%	26.6	420.3	1.17	0.38	0.58
CA-18A	CB18A	CB19A	0.120	0.000	0.130	0.391	0.391	10.00	104.19	40.69		300	PVC	0.40%	31.9	61.2	0.87	0.61	0.67
CA-19A	CB19A	CB20A	0.011	0.000	0.067	0.173	0.564	10.61	101.06	56.95		375	PVC	0.30%	27.6	96.0	0.87	0.53	0.59
CA-20A	CB20A	CB21A	0.085	0.000	0.159	0.444	1.008	11.14	98.52	99.28		450	PVC	0.25%	46.0	142.6	0.90	0.86	0.70
CA-21A	CB21A	CB22A	0.086	0.000	0.000	0.048	1.056	12.00	94.70	99.98		450	PVC	0.25%	40.2	142.6	0.90	0.75	0.70
CA-22A	CB22A	CBMH23A	0.080	0.000	0.000	0.044	1.100	12.75	91.62	100.79		450	PVC	0.25%	44.7	142.6	0.90	0.83	0.71
CA-23A	CBMH23A	CBMH24A	0.029	0.000	0.054	0.152	1.252	13.58	88.45	110.71		450	PVC	0.25%	24.6	142.6	0.90	0.46	0.78
CA-24A	CBMH24A	CBMH25A	0.014	0.000	0.028	0.078	1.329	14.03	86.81	115.39		450	PVC	0.25%	26.3	142.6	0.90	0.49	0.81
CA-25A	CBMH25A	CBMH26A	0.028	0.000	0.020	0.066	1.395	14.52	85.13	118.76		450	PVC	0.30%	29.6	156.2	0.98	0.50	0.76
CA-26A	CBMH26A	CBMH27A	0.028	0.000	0.020	0.066	1.461	15.03	83.47	121.98		450	PVC	0.35%	29.8	168.7	1.06	0.47	0.72
CA-27A	CBMH27A	MH28A	0.039	0.000	0.020	0.072	1.534	15.49	81.99	125.75		450	PVC	0.35%	10.6	168.7	1.06	0.17	0.75
CA-06A	CB06A	MH90A	0.002	0.000	0.031	0.079	0.079	10.00	104.19	8.27		300	PVC	0.35%	13.5	57.2	0.81	0.28	0.14
	MH90A	CB30A	0.000	0.000	0.000	0.000	0.079	10.28	102.75	8.15		300	PVC	0.35%	12.8	57.2	0.81	0.26	0.14
CA-28A	CB30A	CB31A	0.009	0.000	0.023	0.063	0.142	10.54	101.42	14.40		300	PVC	0.50%	16.7	68.4	0.97	0.29	0.21
CA-29A	CB31A	CBMH07A	0.007	0.000	0.023	0.061	0.203	10.83	100.01	20.33		300	PVC	4.59%	13.3	207.2	2.93	0.08	0.10
CA-07A	CBMH07A	MH28A	0.013	0.000	0.068	0.177	0.380	10.90	99.64	37.90		375	PVC	0.35%	27.0	103.7	0.94	0.48	0.37
	MH28A	EXIST MH	0.000	0.000	0.000	0.000	4.598	15.66	81.48	374.63	273.00	675	PVC	0.30%	6.8	460.4	1.29	0.09	0.81

LRL File No.	240720
Project:	Palladium Resort Development
Location:	Culdaff Rd, Kanata
Date:	October 1, 2026
Designed:	M. Basnet
Drawing Ref.:	C401

Orifice Equation

(Orifice # 1, East-North)

$$Q = C_d A \sqrt{2gH}$$

Where:

Q = discharge (m³/s)
C_d = coefficient of discharge
A = area of orifice (m²)
g = acceleration due to gravity (= 9.81 m/s²)
H = head above centreline of orifice

Design Flow (Q) =	359.15	L/s
Design Head (H) =	2.46	m
C_d =	0.6	
g =	9.81	m/s^2
A =	0.08608	m^2
Calculated Orifice Dia (d) =	331.06	mm
Proposed Orifice Dia (d) =	**331**	**mm**
A =	0.08605	m^2
Actual Q =	**359.01**	**L/s**

LRL File No.	240720
Project:	Palladium Resort Development
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Date:	October 1, 2026
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Drawing Ref.:	C401

Orifice Equation

(Orifice # 2, East-South)

$$Q = C_d A \sqrt{2gH}$$

Where:

Q = discharge (m³/s)
C_d = coefficient of discharge
A = area of orifice (m²)
g = acceleration due to gravity (= 9.81 m/s²)
H = head above centreline of orifice

Design Flow (Q) =	273.00	L/s
Design Head (H) =	2.75	m
C_d =	0.6	
g =	9.81	m/s^2
A =	0.06194	m^2
Calculated Orifice Dia (d) =	280.84	mm
Proposed Orifice Dia (d) =	**280**	**mm**
A =	0.06158	m^2
Actual Q =	**271.38**	**L/s**

LRL File No.	240720
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Drawing Ref.:	C401

Orifice Equation

(Orifice # 3, West)

$$Q = C_d A \sqrt{2gH}$$

Where:

Q = discharge (m³/s)
C_d = coefficient of discharge
A = area of orifice (m²)
g = acceleration due to gravity (= 9.81 m/s²)
H = head above centreline of orifice

Design Flow (Q) =	184.58	L/s
Design Head (H) =	3.15	m
C_d =	0.6	
g =	9.81	m/s^2
A =	0.03914	m^2
Calculated Orifice Dia (d) =	223.24	mm
Proposed Orifice Dia (d) =	**223**	**mm**
A =	0.03906	m^2
Actual Q =	**184.18**	**L/s**

TEMPEST Product Submittal Package



Date: October 2, 2026

Customer: LRL Engineering

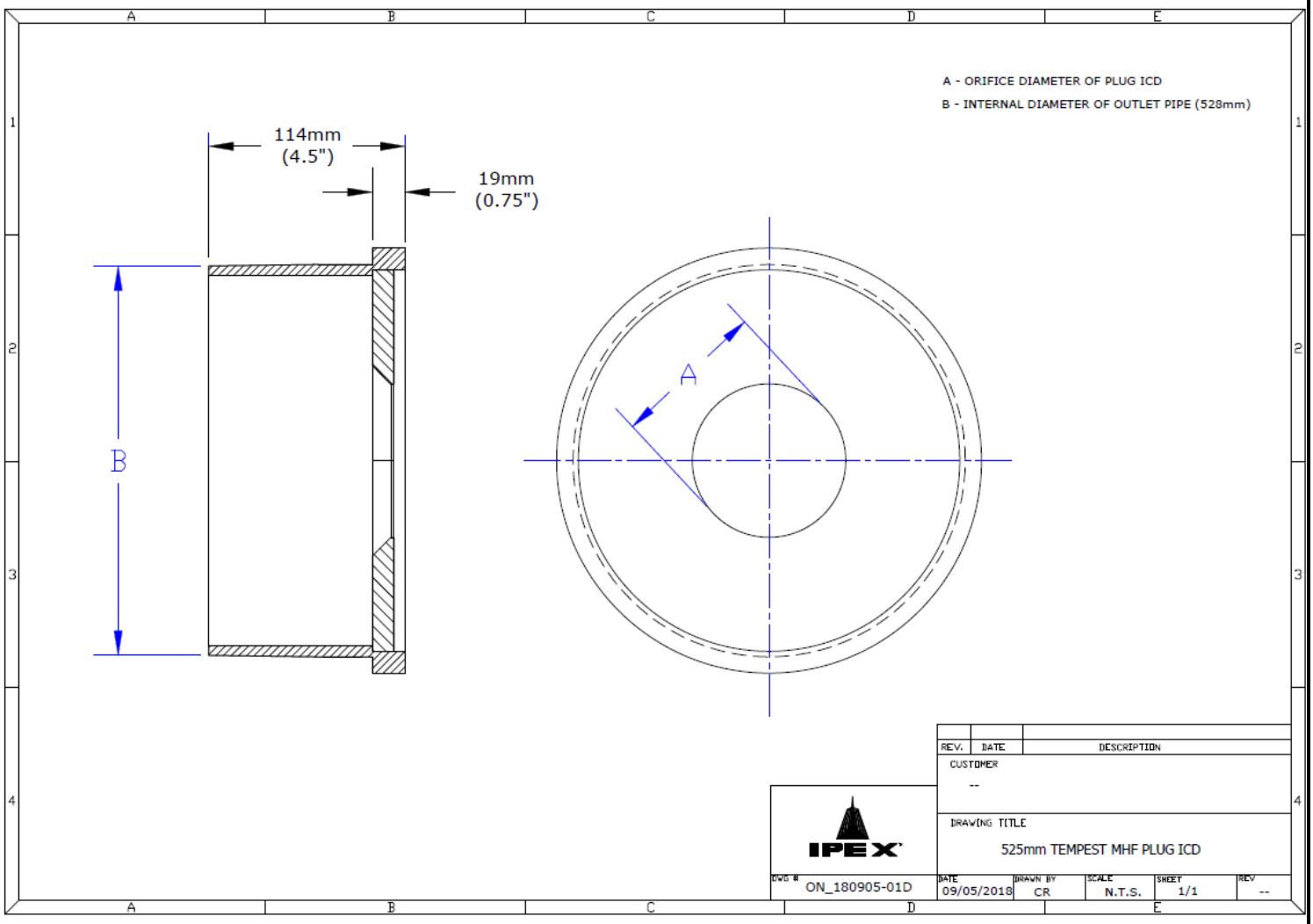
Contact: Mohan Basnet

Location: Kanata

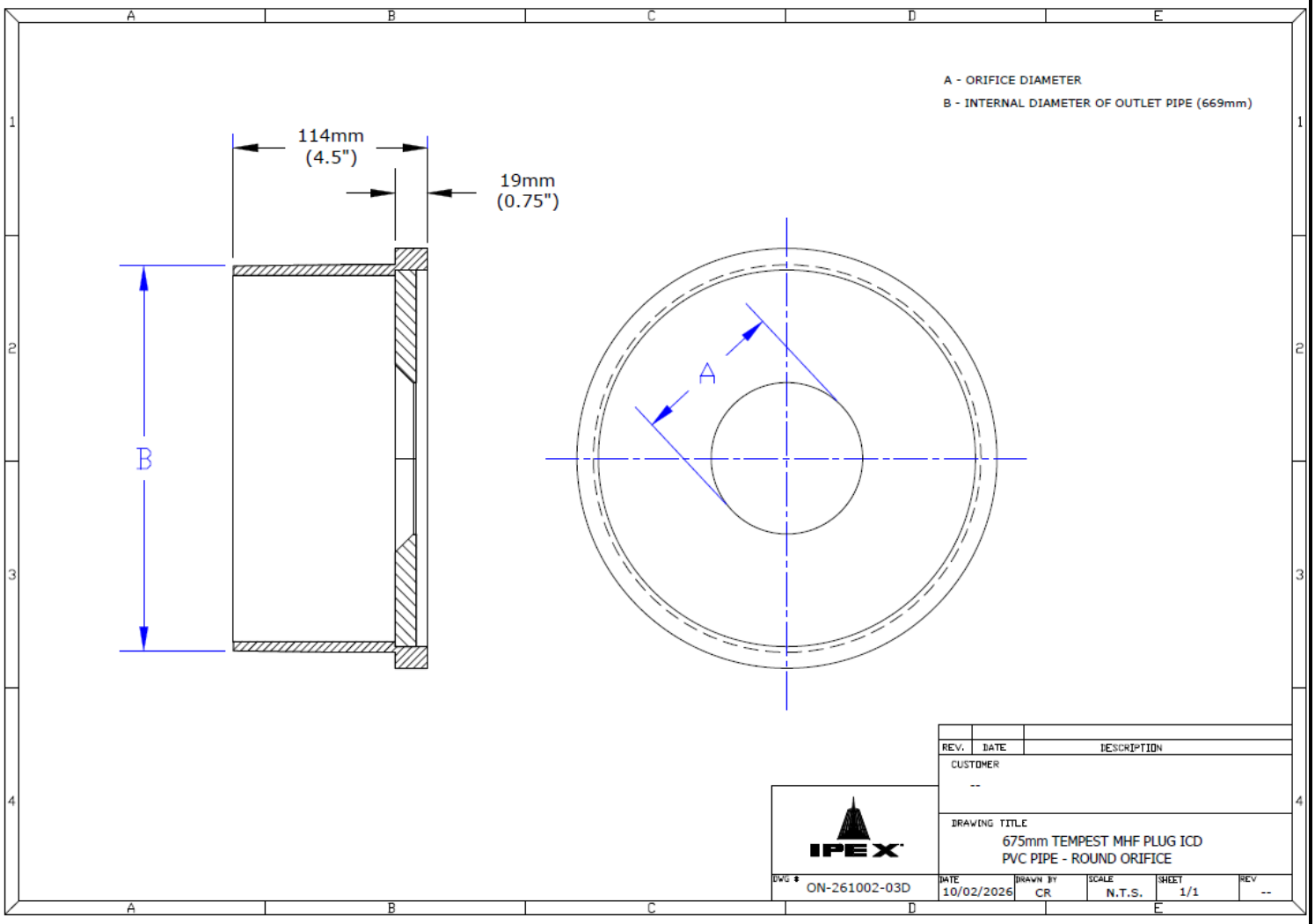
Project Name: Palladium Resort Development

IPEX

PVC Plug ICD Shop Drawing



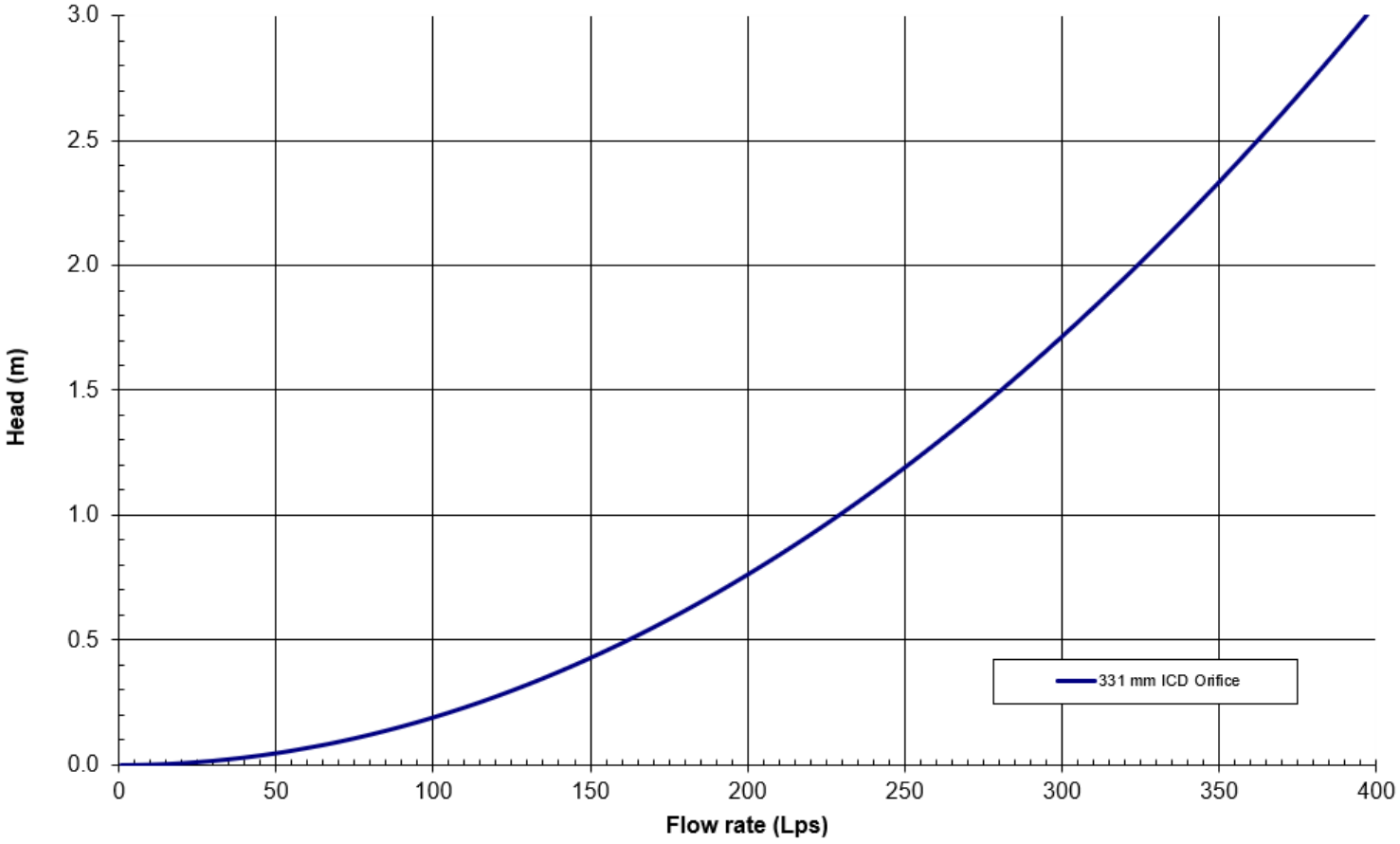
PVC Plug ICD Shop Drawing



IPEX

PVC Plug ICD Flow Curve

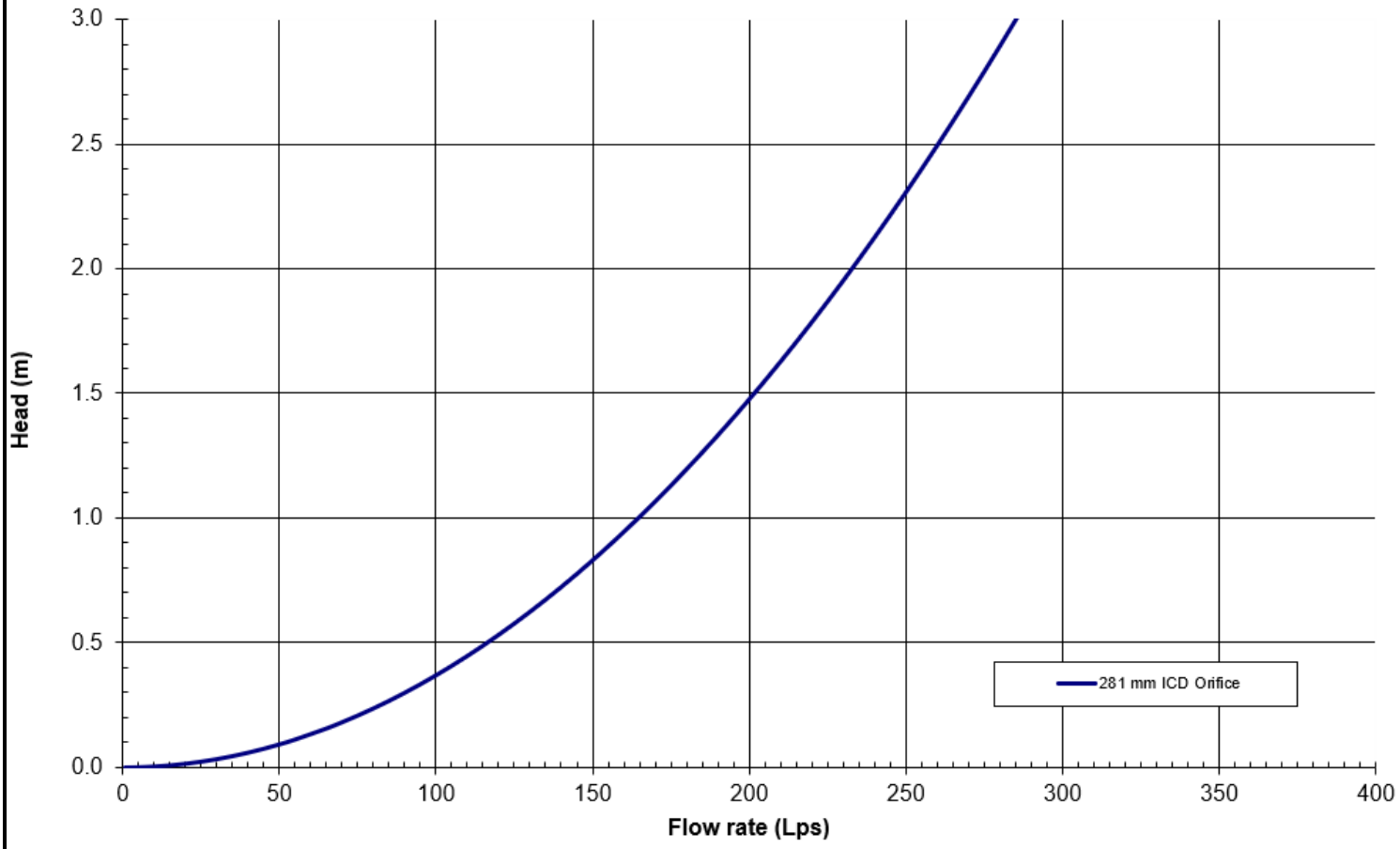
Flow: **359.15 L/s**
Head: **2.46 m**
ICD#1 – 525mm pipe



IPEX

PVC Plug ICD Flow Curve

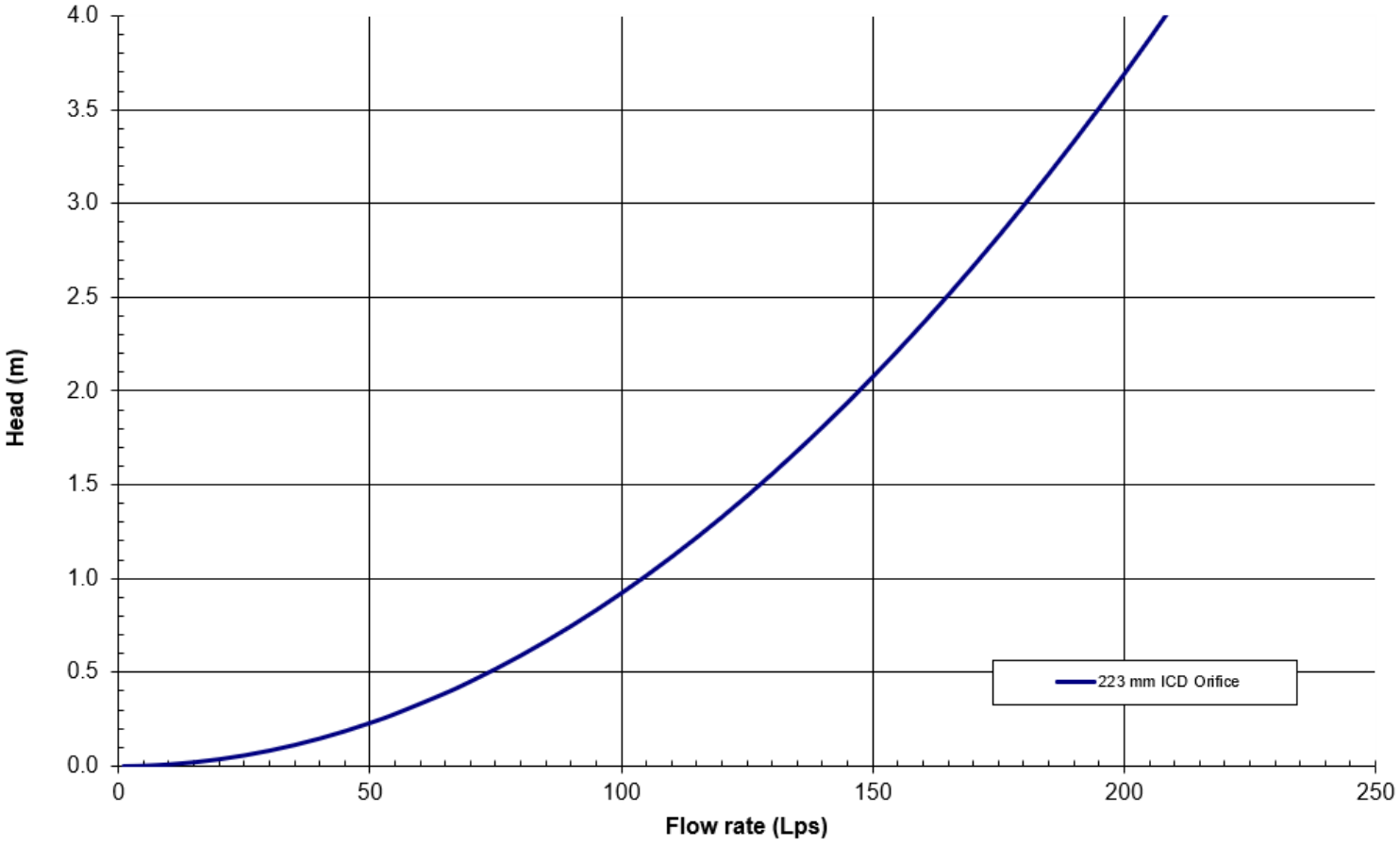
Flow: **273 L/s**
Head: **2.75 m**
ICD#2 – 675mm pipe



IPEX

PVC Plug ICD Flow Curve

Flow: **184.58 L/s**
Head: **3.15 m**
ICD#3 – 525mm pipe



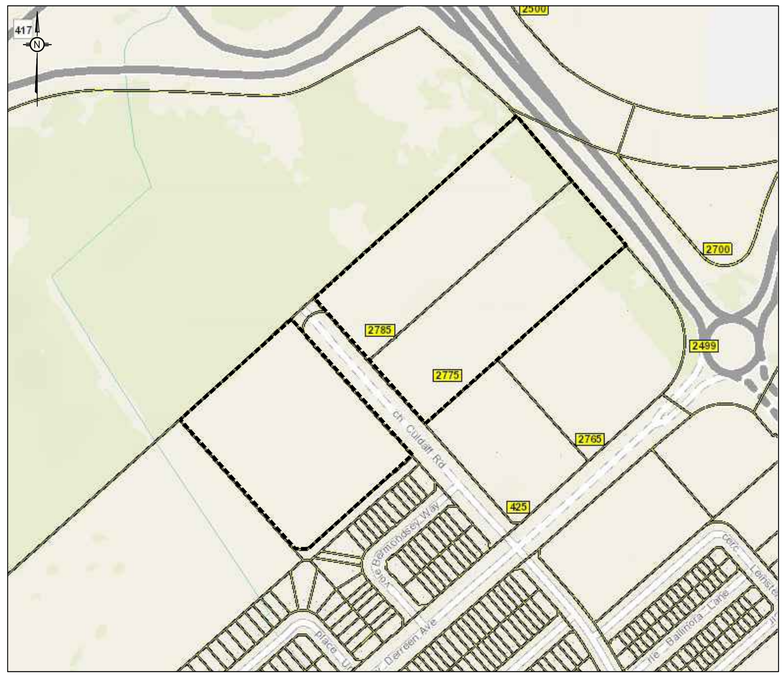
IPEX

APPENDIX F

Civil Engineering Drawings

PALLADIUM RESORT DEVELOPMENT
2775 & 2785 PALLADIUM DRIVE / UNADDRESSED PARCEL CULDAFF ROAD
OTTAWA, ON

REVISION 01



KEY PLAN (N.T.S.)

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

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USE AND INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE USE AND INTENT OF THE DRAWING. THE CONTRACT DOCUMENTS INCLUDE NOT ONLY THE DRAWINGS, BUT ALSO THE OWNER-CONTRACTOR AGREEMENTS, CONDITIONS OF THE CONTRACT, THE SPECIFICATIONS, ADDENDA, AND MODIFICATIONS ISSUED AFTER EXECUTION OF THE CONTRACT. THESE CONTRACT DOCUMENTS ARE COMPLEMENTARY, AND WHAT IS REQUIRED BY ANY ONE SHALL BE BINDING AS IF REQUIRED BY ALL. WORK NOT COMPLETELY DELINEATED HEREON SHALL BE CONSTRUCTED OF THE SAME MATERIALS AND DETAILED SIMILARLY AS WORK SHOWN MORE COMPLETELY ELSEWHERE IN THE CONTRACT DOCUMENTS.

BY USE OF THE DRAWINGS FOR CONSTRUCTION OF THE PROJECT, THE OWNER CONFIRMS THAT HE HAS REVIEWED AND APPROVED THE DRAWINGS. THE CONTRACTOR CONFIRMS THAT HE HAS VISITED THE SITE, FAMILIARIZED HIMSELF WITH THE LOCAL CONDITIONS, VERIFIED FIELD DIMENSIONS AND CORRELATED HIS OBSERVATIONS WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

AS INSTRUMENTS OF SERVICE, ALL DRAWINGS, SPECIFICATIONS, CADD FILES OR OTHER ELECTRONIC MEDIA AND COPIED THERE OF FURNISHED BY THE ENGINEER ARE HIS PROPERTY. THEY ARE TO BE USED ONLY FOR THIS PROJECT AND ARE NOT TO BE USED ON ANY OTHER PROJECT, INCLUDING REPEATS OF THE PROJECT. CHANGES TO THE DRAWINGS MAY ONLY BE MADE BY THE ENGINEER.

UNLESS THE REVISION TITLE IS "ISSUED FOR CONSTRUCTION", THESE DRAWINGS SHALL BE CONSIDERED PRELIMINARY AND SHALL NOT BE USED AS A CONSTRUCTION DOCUMENT.

THESE DRAWINGS ILLUSTRATES THE WORK TO BE DONE. THE ENGINEER IS NOT RESPONSIBLE FOR THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES USED TO DO THE WORK, OR THE SAFETY ASPECTS OF CONSTRUCTION, AND NOTHING ON THESE DRAWINGS EXPRESSED OR IMPLIED CHANGES THIS CONDITION. CONTRACTOR SHALL DETERMINE ALL CONDITIONS AT THE SITE AND SHALL BE RESPONSIBLE FOR KNOWING HOW THEY AFFECT THE WORK. SUBMITTAL OF A BID TO PERFORM THIS WORK IS ACKNOWLEDGEMENT OF THE RESPONSIBILITIES, AND THAT THEY HAVE BEEN FULLY CONSIDERED IN PLANNING OF THE WORK, AND THE BID PRICE. NO CLAIMS FOR EXTRA CHARGES DUE TO THESE CONDITIONS WILL BE FORTHCOMING.

UNAUTHORIZED CHANGES:

IN THE EVENT THE CLIENT, THE CLIENT'S CONTRACTORS OR SUBCONTRACTORS, OR ANYONE FOR WHOM THE CLIENT IS LEGALLY LIABLE MAKES OR PERMITS TO BE MADE ANY CHANGES TO ANY REPORTS, PLANS, SPECIFICATIONS OR OTHER CONSTRUCTION DOCUMENTS PREPARED BY LRL ASSOCIATES LTD. (LRL) WITHOUT OBTAINING LRL'S PRIOR WRITTEN CONSENT, THE CLIENT SHALL ASSUME FULL RESPONSIBILITY FOR THE RESULTS OF SUCH CHANGES. THEREFORE THE CLIENT AGREES TO WAIVE ANY CLAIM AGAINST LRL AND TO RELEASE LRL FROM ANY LIABILITY ARISING DIRECTLY OR INDIRECTLY FROM SUCH UNAUTHORIZED CHANGES.

IN ADDITION, THE CLIENT AGREES, TO THE FULLEST EXTENT PERMITTED BY LAW, TO INDEMNIFY AND HOLD HARMLESS LRL FROM ANY DAMAGES, LIABILITIES OR COST, INCLUDING REASONABLE ATTORNEY'S FEES AND COST OF DEFENSE, ARISING FROM SUCH CHANGES.

IN ADDITION, THE CLIENT AGREES TO INCLUDE IN ANY CONTRACTS FOR CONSTRUCTION APPROPRIATE LANGUAGE THAT PROHIBITS THE CONTRACTOR OR ANY SUBCONTRACTORS OF ANY TIER FROM MAKING ANY CHANGES OR MODIFICATIONS TO LRL'S CONSTRUCTION DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF LRL AND THAT FURTHER REQUIRES THE CONTRACTOR TO INDEMNIFY BOTH LRL AND THE CLIENT FROM ANY LIABILITY OR COST ARISING FROM SUCH CHANGES MADE WITHOUT SUCH PROPER AUTHORIZATION.

GENERAL NOTES:

EXISTING SERVICES AND UTILITIES SHOWN ON THESE DRAWINGS ARE TAKEN FROM THE BEST AVAILABLE RECORDS, BUT MAY NOT BE COMPLETE OR TO DATE. CONTRACTOR SHALL VERIFY IN FIELD FOR LOCATION AND ELEVATION OF PIPES AND CHECK WITH THE UTILITY COMPANIES BEFORE DIGGING OR PERFORMING WORK.

CONTRACTOR IS ADVISED TO COLLECT INFORMATION ON SOIL CONDITIONS BEFORE START OF CONSTRUCTION.

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.

No.	REVISIONS	BY	DATE
02	ISSUED FOR APPROVAL	M.L.	02 OCT 2026
01	ISSUED FOR APPROVAL	M.L.	06 AUG 2026

LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2026/10/02
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
PALLADIUM RESORT DEVELOPMENT LIMITED PARTNERSHIP
2962 CARP ROAD, OTTAWA ON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
2775 & 2785 PALLADIUM DRIVE /
UNADDRESSED PARCEL, CULDAFF ROAD
OTTAWA, ON

DRAWING TITLE
TITLE PAGE

PROJECT NO.
240720

C000

GENERAL NOTES

1. ALL WORKS MATERIALS SHALL CONFIRM TO THE LAST REVISION OF THE STANDARDS AND SPECIFICATIONS FOR THE CITY OF OTTAWA, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS), WHERE APPLICABLE. LOCAL UTILITY STANDARDS AND MINISTRY OF TRANSPORTATION STANDARDS WILL APPLY WHERE REQUIRED.
2. THE CONTRACTORS SHALL CONFIRM THE LOCATION OF ALL EXISTING UTILITIES WITHIN THE SITE AND ADJACENT WORK AREAS. THE CONTRACTORS SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION , TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION.
3. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION, ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER. LOST TIME DUE TO FAILURE OF THE CONTRACTORS TO CONFIRM UTILITY LOCATIONS AND NOTIFY ENGINEER OF POSSIBLE CONFLICTS PRIOR TO CONSTRUCTION WILL BE AT CONTRACTORS EXPENSE.
4. ANY AREA BEYOND THE LIMIT OF THE SITE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION AT THE CONTRACTOR'S EXPENSE. RELOCATING OF EXISTING SERVICES AND/OR UTILITIES SHALL BE AS SHOWN ON THE DRAWINGS OR DETECTED BY THE ENGINEER AT THE EXPENSE OF DEVELOPERS.
5. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE 'OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS'. THE GENERAL CONTRACTORS SHALL BE DEEMED TO BE THE 'CONTRACTOR' AS DEFINED IN THE ACT.
6. ALL THE CONSTRUCTION SIGNAGE MUST CONFIRM TO THE MINISTRY OF TRANSPORTATION OF ONTARIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES PER LATEST AMENDMENT.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING DURING THE PERIOD OF THE CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES TO PREVENT CONFLICTS.
8. ALL DIMENSIONS ARE IN METRES UNLESS SPECIFIED OTHERWISE.
9. THERE WILL BE NO SUBSTITUTION OF MATERIALS UNLESS PRIOR WRITTEN APPROVAL IS RECEIVED FROM THE ENGINEER.
10. ALL CONSTRUCTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE RECOMMENDATIONS MADE IN THE GEOTECHNICAL REPORT.
11. FOR DETAILS RELATING TO STORMWATER MANAGEMENT AND ROOF DRAINAGE REFER TO THE SITE SERVICING AND STORMWATER MANAGEMENT REPORT.
12. ALL SEWERS CONSTRUCTED WITH GRADES LESS THAN 1.0% SHALL BE INSTALLED USING LASER ALIGNMENT AND CHECKED WITH LEVEL INSTRUMENT PRIOR TO BACKFILLING.
13. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND TO BEAR THE COST OF THE SAME.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADDITIONAL BEDDING, OR ADDITIONAL STRENGTH PIPE IF THE MAXIMUM TRENCH WIDTH AS SPECIFIED BY OPSD IS EXCEEDED.
15. ALL PIPE/CULVERT SECTION SIZES REFER TO INSIDE DIMENSIONS.
16. SHOULD DEEPLY BURIED ARCHAEOLOGICAL REMAINS BE FOUND ON THE PROPERTY DURING CONSTRUCTION ACTIVITIES, THE HERITAGE OPERATIONS UNIT OF THE ONTARIO MINISTRY OF CULTURE MUST BE NOTIFIED IMMEDIATELY.
17. ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEW WITH CONTRACT ADMINISTRATOR AND THE CITY OF OTTAWA PRIOR TO ANY TREE CUTTING/REMOVAL.
18. DRAWINGS SHALL BE READ ON CONJUNCTION WITH ARCHITECTURAL SITE PLAN.
19. THE CONTRACTOR SHALL PROVIDE THE PROJECT ENGINEER ON SET OF AS CONSTRUCTED SITE SERVICING AND GRADING DRAWINGS.
20. BENCHMARKS: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THAT THE SITE BENCHMARK(S) HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION DEPICTED ON THIS PLAN.
21. THE CONTRACTOR IS TO PERFORM TESTING AT EACH PROJECT MILESTONE AND SEND TO THE ENGINEER FOR REVIEW. THESE TESTS WILL BE REQUIRED FOR PROJECT SIGNOFF.

EROSION AND SEDIMENT CONTROL NOTES

GENERAL

THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

THE CONTRACTOR ACKNOWLEDGES THAT SURFACE EROSION AND SEDIMENT RUNOFF RESULTING FROM THEIR CONSTRUCTION OPERATIONS HAS POTENTIAL TO CAUSE A DETRIMENTAL IMPACT TO ANY DOWNSTREAM WATERCOURSE OR SEWER, AND THAT ALL CONSTRUCTION OPERATIONS THAT MAY IMPACT UPON WATER QUALITY SHALL BE CARRIED OUT IN MANNER THAT STRICTLY MEETS THE REQUIREMENT OF ALL APPLICABLE LEGISLATION AND REGULATIONS.

AS SUCH, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CARRYING OUT THEIR OPERATIONS, AND SUPPLYING AND INSTALLING ANY APPROPRIATE CONTROL MEASURES, SO AS TO PREVENT SEDIMENT LADEN RUNOFF ENTERING ANY SEWER OR WATERCOURSE WITHIN OR DOWNSTREAM OF THE WORKING AREA.

THE CONTRACTOR ACKNOWLEDGES THAT NO ONE MEASURE IS LIKELY TO BE 100% EFFECTIVELY FOR EROSION PROTECTION AND CONTROLLING SEDIMENT RUNOFF AND DISCHARGES FROM THE SITE. THEREFORE, WHERE NECESSARY THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL MEASURES ARRANGED IN SUCH MANNER AS TO MITIGATE SEDIMENT RELEASE FROM THE CONSTRUCTION OPERATIONS AND ACHIEVE SPECIFIC MAXIMUM PERMITTED CRITERIA WHERE APPLICABLE. SUGGESTED ON-SITE MEASURES MAY INCLUDE, BUT SHALL NOT BE LIMITED TO, THE FOLLOWING METHODS: SEDIMENT PONDS, FILTER BAGS, PUMP FILTERS, SETTLING TANKS, SILT FENCE, STRAW BALES, FILTER CLOTHS, CATCH BASIN FILTERS, CHECK DAMS AND/OR OTHER RECOGNIZED TECHNOLOGIES AND METHOD AVAILABLE AT THE TIME OF CONSTRUCTION. SPECIFIC MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS OF OPSS 577 WHERE APPROPRIATE, OR IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

WHERE, IN THE OPINION OF THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY, THE INSTALLED CONTROL MEASURES FAIL TO PERFORM ADEQUATELY, THE CONTRACTOR SHALL SUPPLY AND INSTALL ADDITIONAL OR ALTERNATIVE MEASURES AS DIRECTED BY THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY, AS SUCH, THE CONTRACTOR SHALL HAVE ADDITIONAL CONTROL MATERIALS ON SITE AT ALL TIME WHICH ARE EASILY ACCESSIBLE AND MAY BE IMPLEMENTED BY HIM AT THE MOMENT'S NOTICE.

PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL SUBMIT TO THE CONTRACT ADMINISTRATOR SIX COPIES OF A DETAILED EROSION AND SEDIMENT CONTROL PLAN (ESCP). THE ESCP WILL CONSIST OF WRITTEN DESCRIPTION AND DETAILED DRAWINGS INDICATING THE ON-SITE ACTIVITIES AND MEASURES TO BE USED TO CONTROL EROSION AND SEDIMENT MOVEMENT FOR EACH STEP OF THE WORK.

CONTRACTOR'S RESPONSIBILITIES

THE CONTRACTOR SHALL ENSURE THAT ALL WORKERS, INCLUDING SUB-CONTRACTOR, IN THE WORKING ARE ARE AWARE OF THE IMPORTANCE OF THE EROSION AND SEDIMENT CONTROL MEASURES AND INFORMED OF THE CONSEQUENCES OF THE FAILURE TO COMPLY WITH THE REQUIREMENTS OF ALL REGULATORY AGENCIES.

THE CONTRACTOR SHALL PERIODICALLY (WEEKLY), AND WHEN REQUESTED BY THE CONTRACT ADMINISTRATOR, CLEAN OUT ACCUMULATED SEDIMENT DEPOSITS AS REQUIRED AT THE SEDIMENT CONTROL DEVICES, INCLUDING THOSE DEPOSITS THAT MAY ORIGINATE FROM OUTSIDE THE CONSTRUCTION AREA. ACCUMULATED SEDIMENT SHALL BE REMOVED IN SUCH A MANNER THAT PREVENTS THE DEPOSITION OF THIS MATERIAL INTO THE WATERCOURSE AND AVOIDS DAMAGE TO EXISTING SITE FEATURES. THE SEDIMENT SHALL BE REMOVED FROM THE SITE AT THE CONTRACTOR'S EXPENSE AND MANAGED IN COMPLIANCE WITH REQUIREMENTS FRO EXCESS EARTH MATERIAL, AS SPECIFIED ELSEWHERE IN THE CONTRACT.

THE CONTRACTOR IS REQUIRED TO IMPLEMENT SEDIMENT AND EROSION CONTROL MEASURES AT LEAST ONE WEEK BEFORE THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES. THESE MEASURES SHOULD BE THOROUGHLY INSTALLED TO EFFECTIVELY MANAGE SOIL EROSION AND SEDIMENT RUNOFF. FOLLOWING INSTALLATION, THE CONTRACTOR MUST CONDUCT INSPECTIONS OF THESE CONTROL MEASURES ON A WEEKLY BASIS TO ENSURE THEIR ONGOING EFFECTIVENESS AND FUNCTIONALITY.

IN ADDITION TO THE REGULAR WEEKLY INSPECTIONS, THE CONTRACTOR MUST ALSO CARRY OUT ADDITIONAL INSPECTIONS IN THE AFTERMATH OF ANY MAJOR RAINFALL EVENTS. THIS WILL HELP ASSESS THE PERFORMANCE OF THE EROSION CONTROL MEASURES UNDER INCREASED WATER FLOW CONDITIONS. ANY DEFICIENCIES OR DAMAGES IDENTIFIED DURING THESE INSPECTIONS MUST BE PROMPTLY REPAIRED TO MAINTAIN COMPLIANCE AND ENSURE THE INTEGRITY OF THE CONSTRUCTION SITE.

THE CONTRACTOR SHALL PERIODICALLY, AND WHEN REQUESTED BY THE CONTRACT ADMINISTRATOR, CLEAN OUT ACCUMULATED SEDIMENT DEPOSITS AS REQUIRED AT THE SEDIMENT CONTROL DEVICES, INCLUDING THOSE DEPOSITS THAT MAY ORIGINATE FROM OUTSIDE THE CONSTRUCTION AREA. ACCUMULATED SEDIMENT SHALL BE REMOVED IN SUCH A MANNER THAT PREVENTS THE DEPOSITION OF THIS MATERIAL INTO THE SEWER WATERCOURSE AND AVOIDS DAMAGE TO CONTROL MEASURES. THE SEDIMENT SHALL BE REMOVED FROM THE SITE AT THE CONTRACTOR'S EXPENSE AND MANAGED IN COMPLIANCE WITH REQUIREMENTS FRO EXCESS EARTH MATERIAL, AS SPECIFIED ELSEWHERE IN THE CONTRACT.

THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE CONTRACT ADMINISTRATOR ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO EITHER THE WATERCOURSE OR THE STORM SEWER SYSTEM. FAILURE TO REPORT WILL BE CONSTITUTE A BRACH OF THIS SPECIFICATION AND THE CONTRACTOR MAY ALSO BE SUBJECT TO THE PENALTIES IMPOSED BY THE APPLICABLE REGULATORY AGENCY. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.

THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE CONTRACT ADMINISTRATOR, THE MEASURE OR MEASURES, IS NO LONGER REQUIRED. NO CONTROL MEASURE MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE CONTRACT ADMINISTRATOR. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED IN A MANNER THAT AVOIDS THE ENTRY OF ANY EQUIPMENT, OTHER THAN HAND-HELD EQUIPMENT, INTO ANY WATERCOURSE, AND PREVENTS THE RELEASE OF ANY SEDIMENT OR DEBRIS INTO ANY SEWER OR WATERCOURSE WITHIN OR DOWNSTREAM OF THE WORKING AREA. ALL ACCUMULATED SEDIMENT SHALL BE REMOVED FROM THE WORKING AREA AT THE CONTRACTOR'S EXPENSE AND MANAGED IN COMPLIANCE WITH THE REQUIREMENTS FOR EXCESS EARTH MATERIAL

WHERE, IN THE OPINION OF EITHER THE CONTRACT ADMINISTRATOR OR A REGULATORY AGENCY, ANY OF THE TERMS SPECIFIED HEREIN HAVE NOT BEEN COMPLIED WITH OR PERFORMED IN A SUITABLE MANNER, OR TAT ALL, THE CONTRACTOR ADMINISTRATOR OR A REGULATORY AGENCY HAS THE RIGHT TO IMMEDIATELY WITHDRAW ITS PERMISSION TO CONTINUE THE WORK BUT MAY RENEW ITS PERMISSION UPON BEING SATISFIED THAT THE DEFAULTS OR DEFICIENCIES IN THE PERFORMANCE OF THIS SPECIFICATION BY THE CONTRACTOR HAVE BEEN REMEDIED.

SPILL CONTROL NOTES

1. ALL CONSTRUCTION EQUIPMENT SHALL BE RE-FUELED, MAINTAINED, AND STORED NO LESS THAN 30 METRES FROM WATERCOURSE, STEAMS, CREEKS, WOODLOTS, AND ANY ENVIRONMENTALLY SENSITIVE AREAS, OR AS OTHERWISE SPECIFIED.
2. THE CONTRACTOR MUST IMPLEMENT ALL NECESSARY MEASURES IN ORDER TO PREVENT LEAKS, DISCHARGES OR SPILLS OF POLLUTANTS, DELETERIOUS MATERIALS, OR OTHER SUCH MATERIALS OR SUBSTANCES WHICH WOULD OR COULD CAUSE AN ADVERSE IMPACT TO THE NATURAL ENVIRONMENT.
3. IN THE EVENT OF A LEAK, DISCHARGE OR SPILL OF POLLUTANT, DELETERIOUS MATERIAL OR OTHER SUCH MATERIAL OR SUBSTANCE WHICH WOULD OR COULD CAUSE AN ADVERSE IMPACT TO THE NATURAL ENVIRONMENT, THE CONTRACTOR SHALL:
   - 3.1. IMMEDIATELY NOTIFY APPROPRIATE FEDERAL, PROVINCIAL, AND LOCAL GOVERNMENT MINISTRIES, DEPARTMENTS, AGENCIES, AND AUTHORITIES OF THE INCIDENT IN ACCORDANCE WITH ALL CURRENT LAWS, LEGISLATION, ACTS, BY-LAWS, PERMITS, APPROVALS, ETC.
   - 3.2. TAKE IMMEDIATE MEASURES TO CONTAIN THE MATERIAL OR SUBSTANCE, AND TO TAKE SUCH MEASURES TO MITIGATE AGAINST ADVERSE IMPACTS TO THE NATURAL ENVIRONMENT.
   - 3.3. RESTORE THE AFFECTED AREA TO THE ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITIES HAVING JURISDICTION.

MUD MAT NOTES

1. THE GRANULAR MATERIAL WILL REQUIRE PERIODIC REPLACEMENT AS IT BECOMES CONTAMINATED BY VEHICLE TRAFFIC.
2. SEDIMENT SHALL BE CLEANED FROM PUBLIC ROADS AT THE END OF EACH DAY.
3. SEDIMENT SHALL BE REMOVED FROM PUBLIC ROADS BY SHOVELING OR SWEEPING AND DISPOSED OR PROPERLY IN A CONTROLLED SEDIMENT DISPOSAL AREA.

SITE GRADING NOTES

1. PRIOR TO THE COMMENCEMENT OF THE SITE GRADING WORKS, ALL SILTATION CONTROL DEVICES SHALL BE INSTALLED AND OPERATIONAL PER EROSION CONTROL PLAN.
2. ALL GRANULAR AND PAVEMENT FOR ROADS/PARKING AREAS SHALL BE CONSTRUCTED IN ACCORDANCE WITH GEOTECHNICAL ENGINEER'S RECOMMENDATIONS.
3. ALL TOPSOIL AND ORGANIC MATERIAL SHALL BE STRIPPED WITHIN THE ROAD AND PARKING AREAS ALLOWANCE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
4. CONCRETE CURB SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. SC1.1 PROVISION SHALL BE MADE OR CURB DEPRESSIONS AS INDICATED ON ARCHITECTURAL SITE PLAN. CONCRETE SIDEWALK SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD SC1.4. ALL CURBS, CONCRETE ISLANDS, AND SIDEWALKS SHOWN O THIS DRAWING ARE TO BR PRICED IN SITE WORKS PORTION OF THE CONTRACT.
5. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. R10 AND OPSD 509.010 AND OPSS 310.
6. GRANULAR 'A' SHALL BE PLACED TO A MINIMUM THICKNESS OF 30MM AROUND ALL STRUCTURES WITHIN THE PAVEMENT AREA.
7. SUB-EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'B' COMPACTED IN MAXIMUM 30MM LIFTS.
8. ALL WORK ON THE MUNICIPAL RIGHT OF WAY AND EASEMENTS TO BE INSPECTED BY THE MUNICIPALITY PRIOR BACKFILLING.
9. CONTRACTOR TO OBTAIN A ROAD OCCUPANCY PERMIT 48 HOURS PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL ROAD ALLOWANCE, IF REQUIRED BY THE MUNICIPALITY.
10. ALL PAVEMENT MARKING FEATURES AND SITE SIGNAGE SHALL BE PLACED PER ARCHITECTURAL SITE PLAN. LINE PAINTING AND DIRECTIONAL SYMBOLS SHALL BE APPLIED WITH A MINIMUM OF TWO COATS OF ORGANIC SOLVENT PAINT.
11. REFER TO ARCHITECTURAL SITE PLAN FOR DIMENSIONS AND SITE DETAILS.
12. STEP JOINTS ARE TO BE USED WHERE PROPOSED ASPHALT MEETS EXISTING ASPHALT. ALL JOINTS MUST BE SEALED.
13. SIDEWALKS TO BE 13MM & BEVELED AT 2:1 OR 6MM WITH NO BEVEL REQUIRED BELOW THE FINISHED FLOOR SLAB ELEVATION AT ENTRANCES REQUIRED TO BE BARRIER-FREE, UNLESS OTHERWISE NOTED. ALL IN ACCORDANCE WITH OBC 3.8.1.3 & OTTAWA ACCESSIBILITY DESIGN STANDARDS.
14. WHERE APPLICABLE THE CONTRACTOR IS TO SUBMIT SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION. SHOP DRAWINGS MUST BE SITE SPECIFIC, SIGNED AND SEALED BY A LICENSED STRUCTURAL ENGINEER. THE CONTRACTOR WILL ALSO BE REQUIRED TO SUPPLY AND GEOTECHNICAL CERTIFICATION OF THE AS-CONSTRUCTED RETAINING WALL TO THE ENGINEER PRIOR TO FINAL ACCEPTANCE.

ROADWORK SPECIFICATIONS

15. ROADWORK TO BE COMPLETED IN ACCORDANCE WITH GEOTECHNICAL REPORT, PREPARED BY LRL ASSOCIATES. DATED JUNE 2026.
16. AL TOPSOIL AND ORGANIC MATERIAL SHALL BE STRIPPED WITHIN THE ROAD ALLOWANCE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND STOCK PILLED ON SITE AS DIRECTED BY NATIONAL MUNICIPALITY.
17. THE SUBGRADE SHALL BE CROWNED AND SLOPED AT LEAST 2% AND PROOF ROLLED WITH HEAVY ROLLERS.
18. SUB-EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'A', TYPE II COMPACTED IN MAXIMUM 300MM LIFTS.
19. ALL GRANULAR FOR ROADS SHALL BE COMPACTED TO MINIMUM OF 100% STANDARD PROCTOR DENSITY MAXIMUM DRY DENSITY (SPMDD).
20. CONCRETE RAMP C/W TACTILE WALKING SURFACE INDICATORS COMPONENT AS PER OPSD 310.039. TACTILE WALKING SURFACE INDICATORS TO BE INSTALLED AT ALL RAMPS. MATERIAL TO BE POLYMER COMPOSITE, COLOR GREY.

SANITARY, FOUNDATION DRAIN, STORM SEWER AND WATERMAIN NOTES

GENERAL

1. LASER ALIGNMENT CONTROL TO BE UTILIZED ON ALL SEWER INSTALLATIONS.
2. CLAY SEALS TO BE INSTALLED AS PER CITY STANDARD DRAWING S8. THE SEALS SHOULD BE AT LEAST 1.5M LONG (IN THE TRENCH DIRECTION) AND SHOULD EXTEND FROM TRENCH WALL TO TRENCH WALL. THE SEALS SHOULD EXTEND FROM THE FROST LINE AND FULLY PENETRATE THE BEDDING, SUB-BEDDING, AND COVER MATERIAL. THE BARRIERS SHOULD CONSIST OF RELATIVELY DRY AND COMPATIBLE BROWN SILTY CLAY PLACED IN MAXIMUM 225MM LIFTS AND COMPACTED TO A MINIMUM OF 95% SPMDD. THE CLAY SEALS SHOULD BE PLACED AT THE SITE BOUNDARIES AND AT 60M INTERVALS IN THE SERVICE TRENCHES.
3. SERVICES TO BUILDING TO BE TERMINATED 1.0M FROM THE OUTSIDE FACE OF BUILDING UNLESS OTHERWISE NOTED.
4. ALL MAINTENANCE STRUCTURE AND CATCH BASIN EXCAVATIONS TO BE BACKFILLED WITH GRANULAR MATERIAL COMPACTED TO 98% STANDARD PROCTOR DENSITY. A MINIMUM OF 300MM AROUND STRUCTURES.
5. "MODULOC" OR APPROVED PRE-CAST MAINTENANCE STRUCTURE AND CATCH BASIN ADJUSTERS TO BE USED IN LIEU OF BRICKING. PARGE ADJUSTING UNITS ON THE OUTSIDE ONLY.
6. SAFETY PLATFORMS SHALL BE PER OPSD 404.02.
7. DROP STRUCTURES SHALL BE IN ACCORDANCE WITH OPSD 1003.01, IF APPLICABLE.
8. THE CONTRACTOR IS TO PROVIDE CCTV CAMERA INSPECTIONS OF ALL SEWERS, INCLUDING PICTORIAL REPORT, ONE (1) CD COPY AND TWO (2) VIDEO RECORDING IN A FORMAT ACCEPTABLE TO ENGINEER. ALL SEWER ARE TO BE FLUSHED PRIOR TO CAMERA INSPECTION. ASPHALT WEAR COURSE SHALL NOT BE PLACED UNTIL THE VIDEO INSPECTION OF SEWERS AND NECESSARY REPAIRS HAVE BEEN COMPLETED TO THE SATISFACTION OF THE ENGINEER.
9. CONTRACTOR SHALL PERFORM LEAKAGE TESTING, IN THE PRESENCE OF THE CONSULTANT, FOR SANITARY SEWERS IN ACCORDANCE WITH OPSS 407. CONTRACTOR SHALL PERFORM VIDEO INSPECTION OF ALL SEWERS. A COPY OF THE VIDEO AND INSPECTION REPORT SHALL BE SUBMITTED TO THE CONSULTANT FOR REVIEW AND APPROVAL PRIOR TO PLACEMENT OF WEAR COURSE ASPHALT.

SANITARY

10. ALL SANITARY SEWER INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE CITY OF OTTAWA AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD). AND SPECIFICATIONS (OPSS).
11. ALL SANITARY GRAVITY SEWER SHALL BE PVC SDR 35, IPEX 'RING-TITE' (OR APPROVED EQUIVALENT) PER CSA STANDARD B182.2 OR LATEST AMENDMENT, UNLESS SPECIFIED OTHERWISE.
12. EXISTING MAINTENANCE STRUCTURES TO BE RE-BENCHED WHERE A NEW CONNECTION IS MADE.
13. SANITARY GRAVITY SEWER TRENCH AND BEDDING SHALL BE PER CITY OF OTTAWA STD. S6 AND S7 CLASS 'B' BEDDING, UNLESS SPECIFIED OTHERWISE.
14. SANITARY MAINTENANCE STRUCTURE FRAME AND COVERS SHALL BE PER CITY OF OTTAWA STD. S24 AND S25.
15. SANITARY MAINTENANCE STRUCTURES SHALL BE BENCHED PER OPSD 701.021.
16. 100MM THICK HIGH-DENSITY GRADE 'A' POLYSTYRENE INSULATION TO BE INSTALLED IN ACCORDANCE WITH CITY STD W22 WHERE INDICATED ON DRAWING SSP-1.

STORM

17. ALL REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.2, OR LATEST AMENDMENT. ALL NON-REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.1, OR LATEST AMENDMENT. PIPE SHALL BE JOINED WITH STD. RUBBER GASKETS AS PER CSA A257.3, OR LATEST AMENDMENT.
18. ALL STORM SEWER TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. S6 AND S7 CLASS 'B' UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
19. ALL PVC STORM SEWERS ARE TO BE SDR 35 APPROVED PER C.S.A. B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE SPECIFIED.
20. CATCH BASIN SHALL BE IN ACCORDANCE WITH OPSD 705.010.
21. CATCH BASIN LEADS SHALL BE IN 200MM DIA. AT 1% SLOPE (MIN) UNLESS SPECIFIED OTHERWISE.
22. ALL CATCH BASINS SHALL HAVE 600MM SUMPS, UNLESS SPECIFIED OTHERWISE.
23. ALL CATCH BASIN LEAD INVERTS TO BE 1.5M BELOW FINISHED GRADE UNLESS SPECIFIED OTHERWISE.
24. THE STORM SEWER CLASSES HAVE BEEN DESIGNED BASED ON BEDDING CONDITIONS SPECIFIED ABOVE. WHERE THE SPECIFIED TRENCH WIDTH IS EXCEEDED , THE CONTRACTOR IS REQUIRED TO PROVIDE AND SHALL BE RESPONSIBLE FOR EXTRA TEMPORARY AND/OR PERMANENT REPAIRS MADE NECESSARY BY THE WIDENED TRENCH.
25. ALL ROAD AND PARKING LOT CATCH BASINS TO BE INSTALLED WITH ORTHOGONALLY PLACED SUBDRAINS IN ACCORDANCE WITH DETAIL. PERFORATED SUBDRAIN FOR ROAD AND PARKING LOT CATCH BASIN SHALL BE INSTALLED PER CITY STD R1 UNLESS OTHERWISE NOTED.
26. PERFORATED SUBDRAIN FOR REAR YARD AND LANDSCAPING APPLICATIONS SHALL BE INSTALLED PER CITY STD S29, S30 AND S31, WHERE APPLICABLE.
27. RIP-RAP TREATMENT SEWER AND CULVERT OUTLETS PER OPSD 810.010.
28. ALL STORM SEWER/ CULVERTS TO BE INSTALLED WITH FROST TREATMENT PER OPSD 803.031 WHERE APPLICABLE.
29. ALL STORM MANHOLES WITH PIPE LESS THAN 900MM IN DIAMETER SHALL BE CONSTRUCTED WITH A 300MM SUMP AS PER SDG, CLAUSE 6.2.6.

WATERMAIN

30. ALL WATERMAIN INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE CITY OF OTTAWA AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
31. ALL PVC WATERMAINS SHALL BE AWWA C-900 CLASS 150, SDR 18 OR APPROVED EQUIVALENT.
32. ALL WATER SERVICES LESS THAN OR EQUAL TO 50MM IN DIAMETER TO BE TYPE 'K' COPPER.
33. WATERMAIN TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD W17. UNLESS SPECIFIED OTHERWISE. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY THE PROJECT GEOTECHNICAL ENGINEER.
34. ALL PVC WATERMAINS, SHALL BE INSTALLED WITH A 10 GAUGE STRANDED COPPER TWU OR RWU TRACER WIRE IN ACCORDANCE WITH CITY OF OTTAWA STD. W.36.
35. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS PER CITY OF OTTAWA STD.25.5 AND W25.6.
36. VALVE BOXES SHALL BE INSTALLED PER CITY OF OTTAWA STD W24.
37. WATERMAIN IN FILL AREAS TO BE INSTALLED WITH RESTRAINED JOINTS PER CITY OF OTTAWA STD.25.5 AND W25.6.
38. THRUST BLOCKING OF WATERMAINS TO BE INSTALLED PER CITY OF OTTAWA STD. W25.3 AND W25.4.
39. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY CAPS, PLUGS, BLOW-OFFS, AND NOZZLES REQUIRED FOR TESTING AND DISINFECTION OF THE WATERMAIN.
40. WATERMAIN CROSSING OVER AND BELOW SEWERS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. W25,2 AND W25, RESPECTIVELY.
41. WATER SERVICES ARE TO BE INSULATED PER CITY STD. W23 WHERE SEPARATION BETWEEN SERVICES AND MAINTENANCE HOLES ARE LESS THAN 2.4M.
42. THE MINIMUM VERTICAL CLEARANCE BETWEEN WATERMAIN AND SEWER/UTILITY IS 0.5M PER MOE GUIDELINES. FOR CROSSING UNDER SEWERS, ADEQUATE STRUCTURAL SUPPORT FOR THE SEWER IS REQUIRED TO PREVENT EXCESSIVE DEFLECTION OF JOINTS AND SETTLING. THE LENGTH OF WATER PIPE SHALL BE CENTERED AT THE POINT OF CROSSING TO ENSURE THAT THE JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER.
43. ALL BURIED WATER INFRASTRUCTURE, INCLUDING WATERMAINS, PRIVATE FIRE PROTECTION LINES, AND SERVICE CONNECTIONS, SHALL HAVE A MINIMUM COVER OF 2.4 M. WHERE MINIMUM COVER CANNOT BE ACHIEVED, THERMAL INSULATION SHALL BE PROVIDED IN ACCORDANCE WITH STD DWG W22.
44. GENERAL WATER PLANT TO UTILITY CLEARANCE AS PER STD DWG R20.
45. FIRE HYDRANT INSTALLATION AS PER STD DWG W19, ALL BOTTOM OF HYDRANT FLANGE ELEVATIONS TO BE INSTALLED 0.10M ABOVE PROPOSED FINISHED GRADE AT HYDRANT; FIRE HYDRANT LOCATION AS PER STD DWG W18.
46. BUILDING SERVICE TO BE CAPPED 1.0M OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED AND MUST BE RESTRAINED A MINIMUM OF 12M BACK FROM STUB.
47. ALL WATERMAINS SHALL BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH THE CITY OF OTTAWA AND ONTARIO GUIDELINES UNLESS OTHERWISE DIRECTED. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED.
48. ALL WATERMAINS SHALL BE BACTERIOLOGICALLY TESTED IN ACCORDANCE WITH THE CITY OF OTTAWA AND ONTARIO GUIDELINES. ALL CHLORINATED WATER TO BE DISCHARGED AND PRETREATED TO ACCEPTABLE LEVELS PRIOR TO DISCHARGE. ALL DISCHARGED WATER MUST BE CONTROLLED AND TREATED SO AS NOT TO ADVERSELY EFFECT ENVIRONMENT. IT IS RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL MUNICIPAL AND/OR PROVINCIAL REQUIREMENTS ARE FOLLOWED.
49. ALL WATERMAIN STUBS SHALL BE TERMINATED WITH A PLUG AND 50MM BLOW OFF UNLESS OTHERWISE NOTED.

PAVEMENT STRUCTURE

COURSE	MATERIAL	THICKNESS (mm) AUTOMOBILE PARKING	THICKNESS (mm) TRUCK ROUTE (HEAVY TRAFFIC)
SURFACE	HL.3 A/C (PG 58-34)	50	40
BINDER	HL.8 A/C (PG 58-34)	--	50
BASECOURSE	OPSS GRANULAR "A"	150	150
SUBBASE	OPSS GRANULAR "B" TYPE II	300	450

NOTE:
IN PREPARATION FOR PAVEMENT CONSTRUCTION AT THIS SITE, ANY SURFICIAL OR NEAR SURFACE/SUBGRADE LEVEL TOPSOIL AND ANY SOFT, WET OR DELETERIOUS MATERIALS SHOULD BE REMOVED FROM THE PROPOSED PAVED AREAS. THE EXPOSED SUBGRADE SHOULD BE INSPECTED AND APPROVED BY GEOTECHNICAL PERSONNEL AND ANY SOFT AREAS EVIDENT SHOULD BE SUBEXCAVATED AND REPLACED WITH SUITABLE EARTH BORROW APPROVED BY THE GEOTECHNICAL ENGINEER. THE SUBGRADE SHOULD BE SHAPED AND CROWNED TO PROMOTE DRAINAGE OF THE SITE DRAINAGE STRUCTURES. FOLLOWING APPROVAL OF THE PREPARATION OF THE SUBGRADE, THE PAVEMENT GRANULARS MAY BE PLACED.

REFER TO LATEST GEOTECHNICAL REPORT PREPARED BY LRL ENGINEERING, JUNE 2026.

LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- DC — PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED GRASS AREA (100mm TOP SOIL & SOD)
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- ×50.00 — PROPOSED ELEVATION
- ×50.00BC — PROPOSED BOTTOM OF CURB / ASPHALT ELEVATION
- ×50.00TC — PROPOSED TOP OF CURB ELEVATION
- ×50.00EX — MATCH INTO EXISTING ELEVATION
- ×70.19 — EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- SUB — PROPOSED 100mmØ PERFORATED SUBDRAIN
- STM — PROPOSED STORM SEWER
- SAN — PROPOSED SANITARY SEWER
- WTR — PROPOSED WATERMAIN
- STM — EXISTING STORM SEWER
- SAN — EXISTING SANITARY SEWER
- WTR — EXISTING WATERMAIN
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX — WATERSHED NAME
- CONTROLLED — RUNOFF COEFFICIENT
- AREA / RUNOFF — AREA IN HECTARES

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No.	REVISIONS	BY	DATE
02	ISSUED FOR APPROVAL	M.L.	02 OCT 2026
01	ISSUED FOR APPROVAL	M.L.	06 AUG 2026

LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2026/10/02
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
PALLADIUM RESORT DEVELOPMENT LIMITED PARTNERSHIP
2962 CARP ROAD, OTTAWA ON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
2775 & 2785 PALLADIUM DRIVE /
UNADDRESSED PARCEL, CULDAFF ROAD
OTTAWA, ON

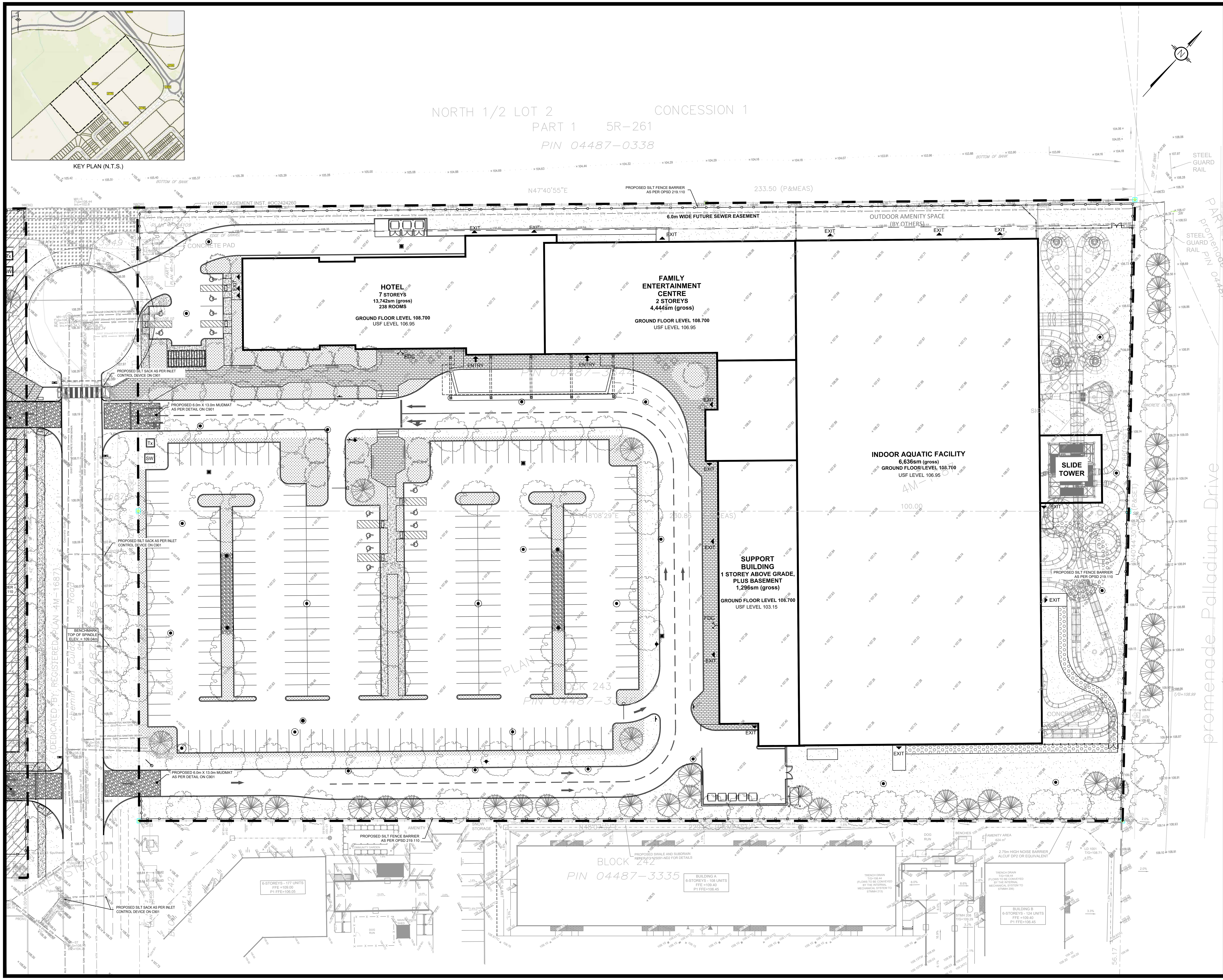
DRAWING TITLE
GENERAL NOTES

PROJECT NO.
240720

C001

D07-12-26-0085

19492



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5m 0 10 20m

SCALE: 1:400

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02	ISSUED FOR APPROVAL	M.L.	02 OCT 2026
01	ISSUED FOR APPROVAL	M.L.	06 AUG 2026

LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2026/10/02
PROVINCE OF ONTARIO

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CLIENT
PALLADIUM RESORT DEVELOPMENT
LIMITED PARTNERSHIP
2962 CARP ROAD, OTTAWA ON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
2775 & 2785 PALLADIUM DRIVE
OTTAWA, ON

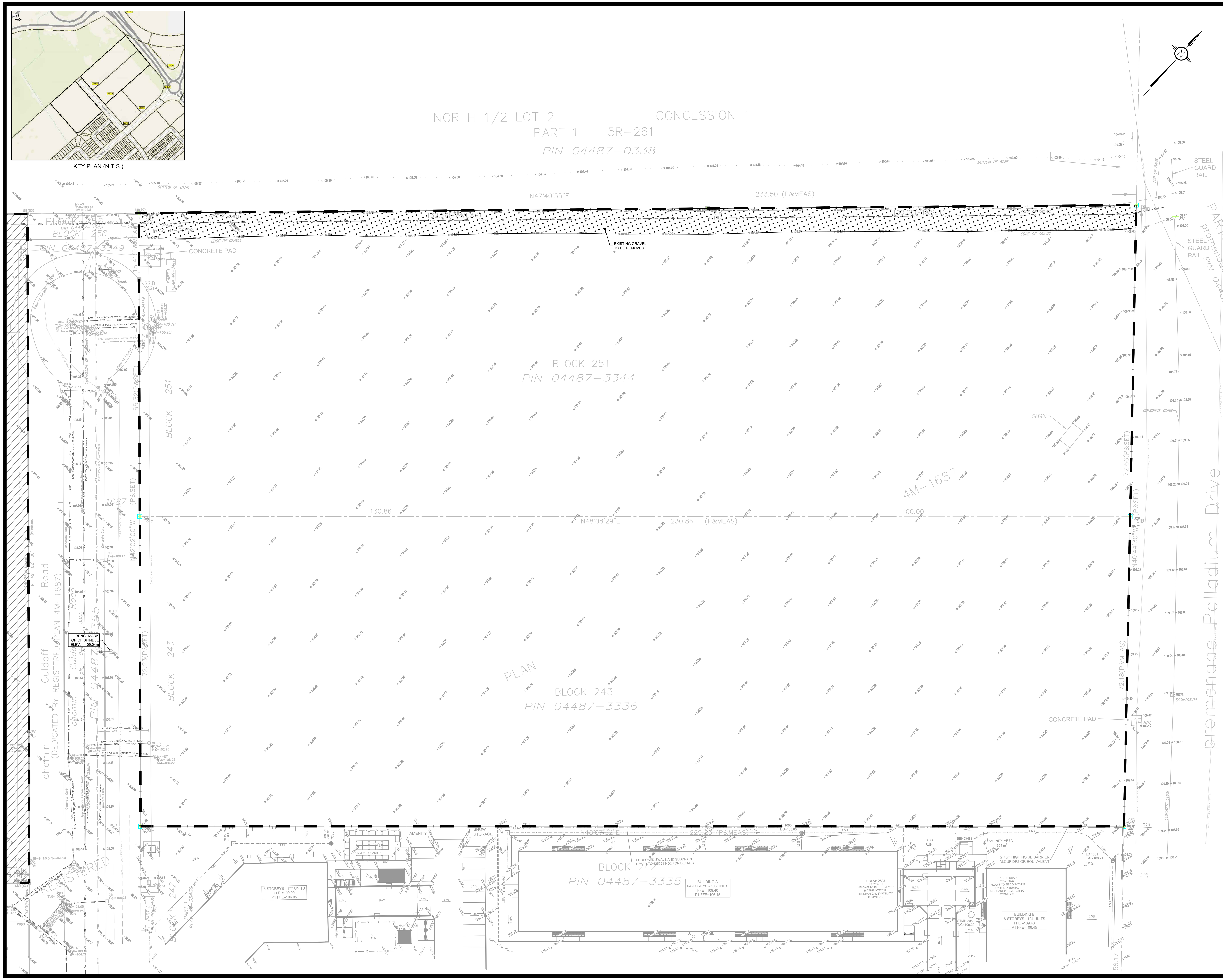
DRAWING TITLE
EROSION AND SEDIMENT
CONTROL PLAN

PROJECT NO.
240720

C101A

D07-12-26-0085

19492



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5m 0 10 20m

SCALE: 1:400

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02	ISSUED FOR APPROVAL	M.L.	02 OCT 2026
01	ISSUED FOR APPROVAL	M.L.	06 AUG 2026

LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2026/10/02
PROVINCE OF ONTARIO

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LIMITED PARTNERSHIP
2962 CARP ROAD, OTTAWA ON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
2775 & 2785 PALLADIUM DRIVE
OTTAWA, ON

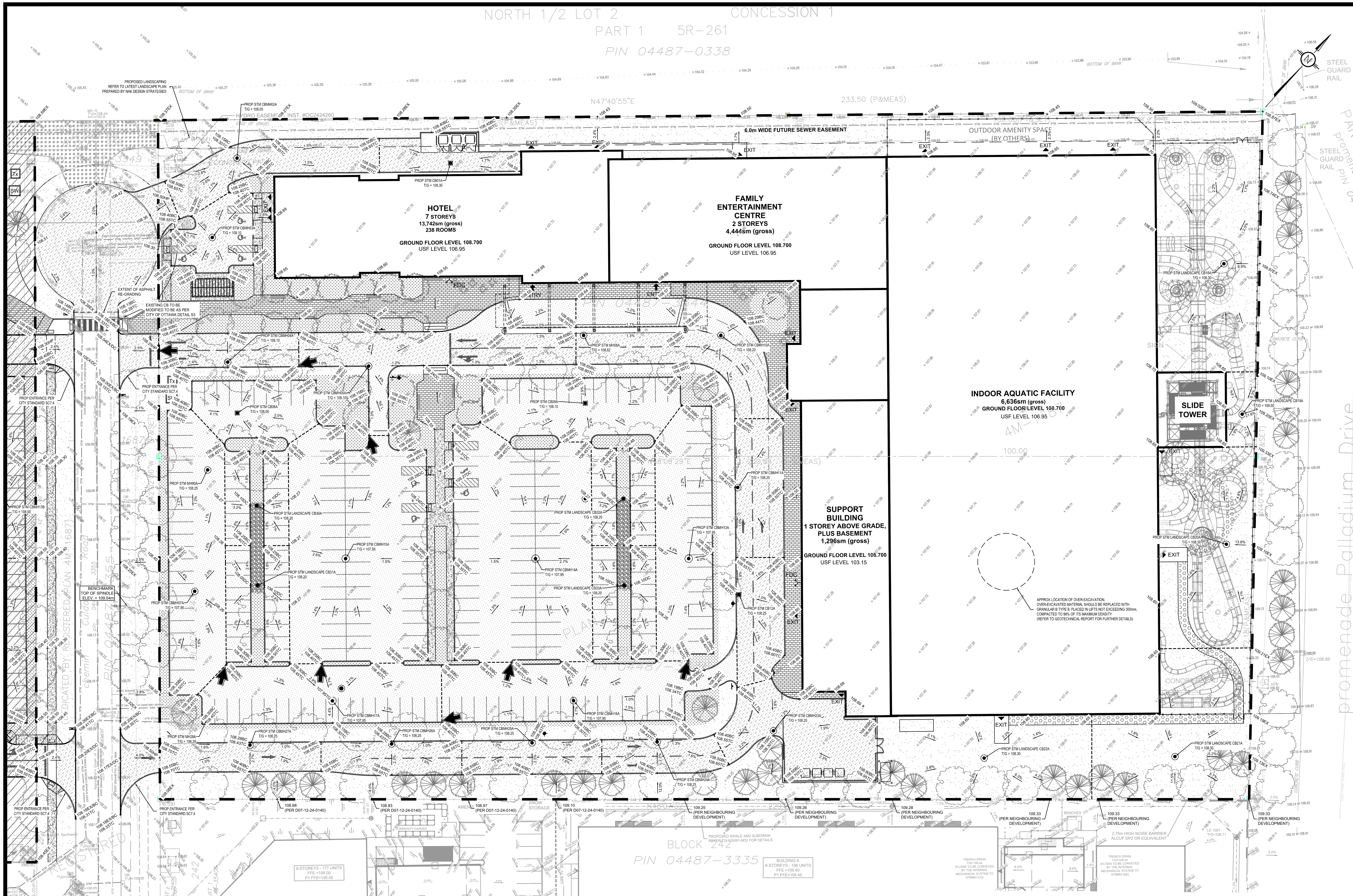
DRAWING TITLE
DEMOLITION PLAN

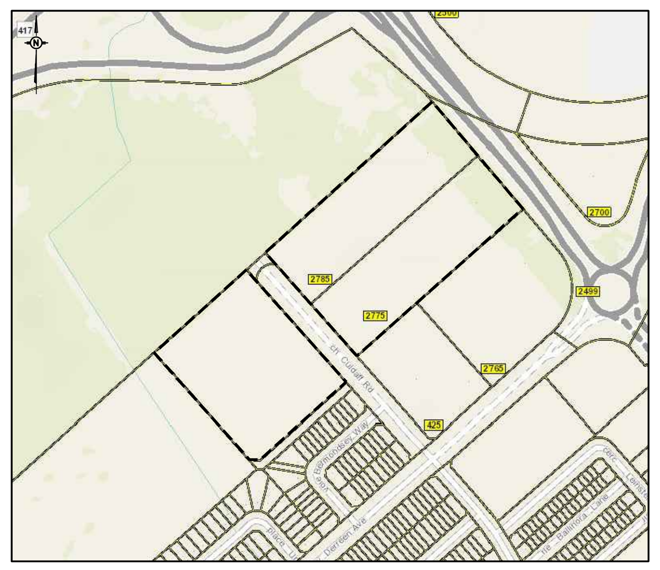
PROJECT NO.
240720

C102A

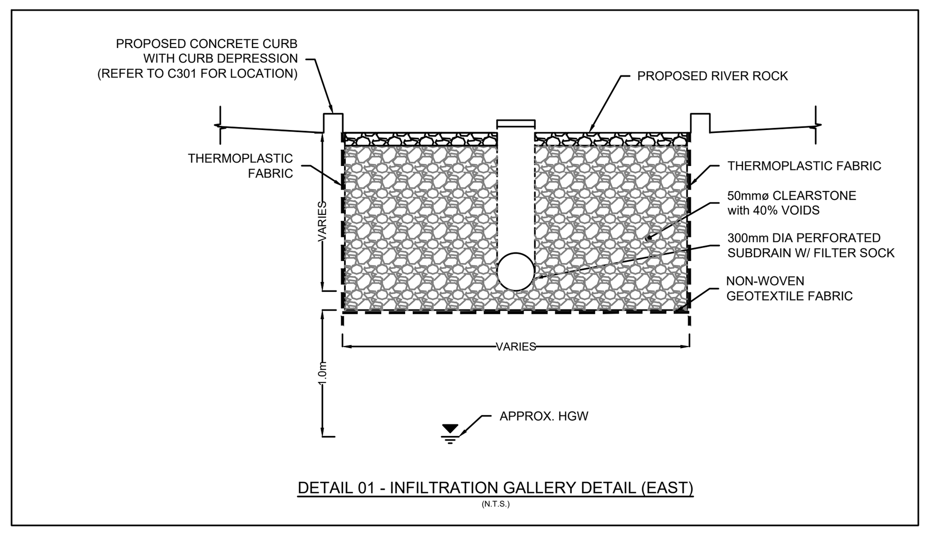
D07-12-26-0085

19492





KEY PLAN (N.T.S.)



DETAIL 01 - INFILTRATION GALLERY DETAIL (EAST)
(N.T.S.)

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5m 0 10 20m

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DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
2775 & 2785 PALLADIUM DRIVE
OTTAWA, ON

DRAWING TITLE
GRADING AND DRAINAGE PLAN

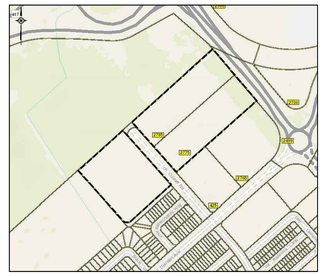
PROJECT NO.
240720
C301A

D07-12-26-0085

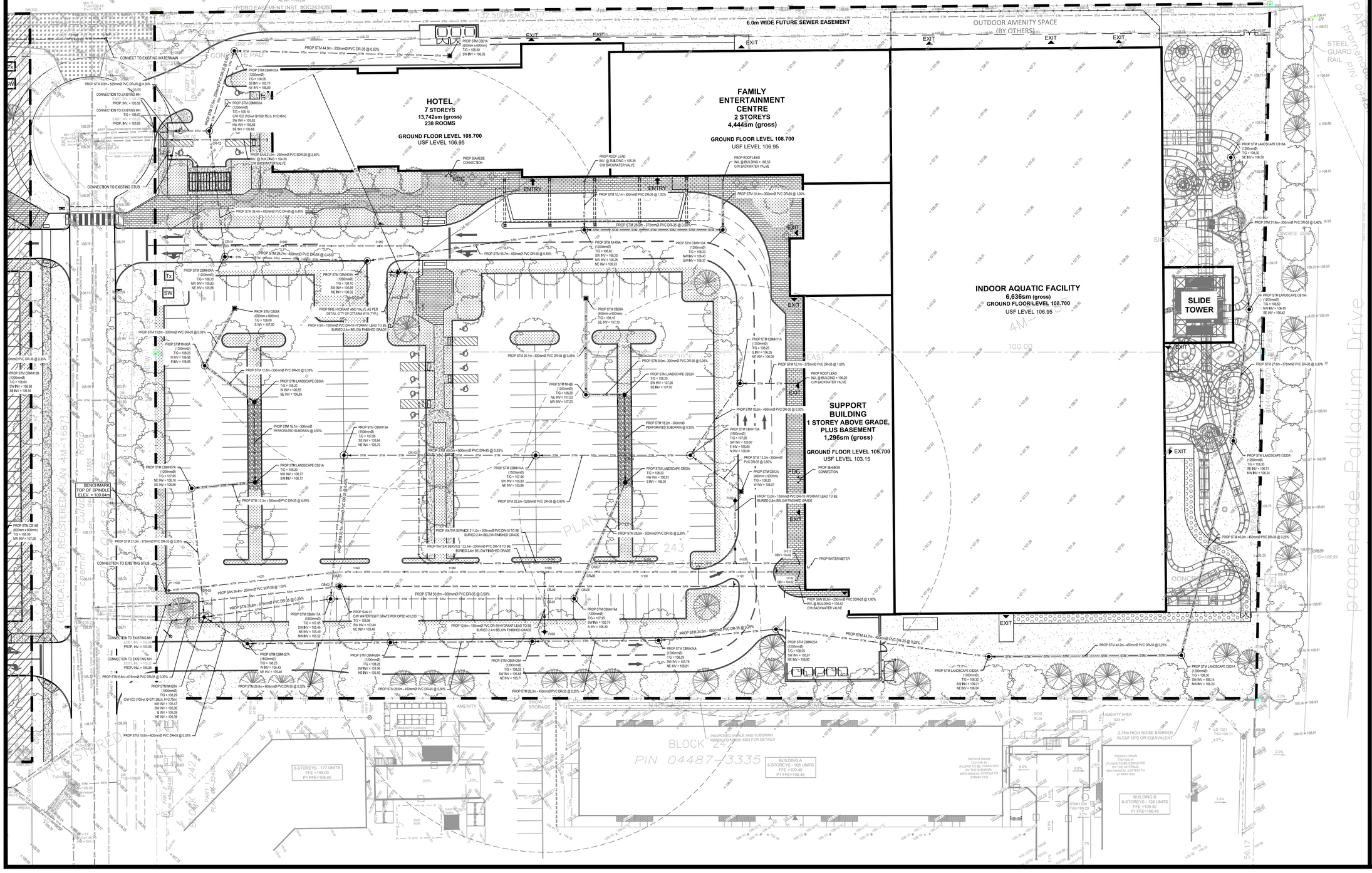
19492

WM	0+000	108.40	106.00	2.40
45degree bend	0+005	108.19	105.79	2.40
45degree bend	0+007	108.19	105.79	2.40
WM	0+020	108.40	105.85	2.55
45degree bend	0+021	108.25	105.85	2.40
45degree bend	0+025	108.20	105.80	2.40
WM	0+040	108.27	105.87	2.40
WM	0+060	108.16	105.76	2.40
45degree bend	0+067	108.24	105.84	2.40
45degree bend	0+069	108.24	105.56	2.68
Tee	0+073	108.30	105.90	2.40
WM	0+080	108.50	106.10	2.40
WM	0+100	108.23	105.83	2.40
WM	0+120	108.24	105.84	2.40
45degree bend	0+132	108.30	105.90	2.40
45degree bend	0+134	108.30	105.90	2.40
WM	0+140	108.27	105.87	2.40
WM	0+160	108.24	105.84	2.40
WM	0+180	108.28	105.88	2.40
Tee	0+198	108.34	105.94	2.40
WM	0+200	108.34	105.94	2.40
WM	0+212	108.65	106.25	2.40
WM	1+000	108.50	106.10	2.40
WM	1+020	108.14	105.74	2.40
WM	1+040	108.25	105.85	2.40
WM	1+060	108.26	105.86	2.40
Tee	1+079	108.16	105.76	2.40
WM	1+080	108.16	105.76	2.40
WM	1+100	108.28	105.88	2.40
WM	1+120	108.39	105.99	2.40
WM	1+133	108.65	106.25	2.40

Crossing #	WM	Inv./obv.	STM	Inv./obv.	SAN	Inv./obv.	Depth Separation (m)
CR-01	106.54	inv.	106.04	obv.	N/A		0.50
CR-02	N/A		105.53	inv.	103.64	obv.	1.89
CR-03	106.64	inv.	106.14	obv.	N/A		0.50
CR-04	N/A		105.40	inv.	103.37	obv.	2.11
CR-05	106.37	inv.	105.87	obv.	N/A		0.50
CR-06	105.88	obv.	106.44	inv.	N/A		0.56
CR-07	105.90	obv.	106.49	inv.	N/A		0.59
CR-08	N/A		106.36	inv.	104.21	obv.	2.15
CR-09	105.47	obv.	N/A		104.14	obv.	1.33
CR-10	106.76	inv.	106.26	obv.	N/A		0.50
CR-11	106.74	inv.	106.24	obv.	N/A		0.50
CR-12	N/A		105.69	inv.	104.34	obv.	1.35
CR-13	105.56	obv.	106.06	inv.	N/A		0.50
CR-14	N/A		106.36	obv.	106.82	inv.	0.46



KEY PLAN (N.T.S.)



02	ISSUED FOR APPROVAL	M.L.	02 OCT 2026
01	ISSUED FOR APPROVAL	M.L.	06 AUG 2026
No.	REVISIONS	BY	DATE

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5m 0 10 20m

SCALE: 1:400

LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2026/10/02
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
PALLADIUM RESORT DEVELOPMENT LIMITED PARTNERSHIP
2962 CARP ROAD, OTTAWA ON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
2775 & 2785 PALLADIUM DRIVE
OTTAWA, ON

DRAWING TITLE
SERVICING PLAN

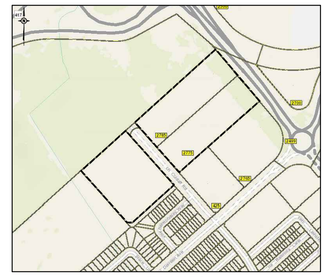
PROJECT NO.
240720

C401A

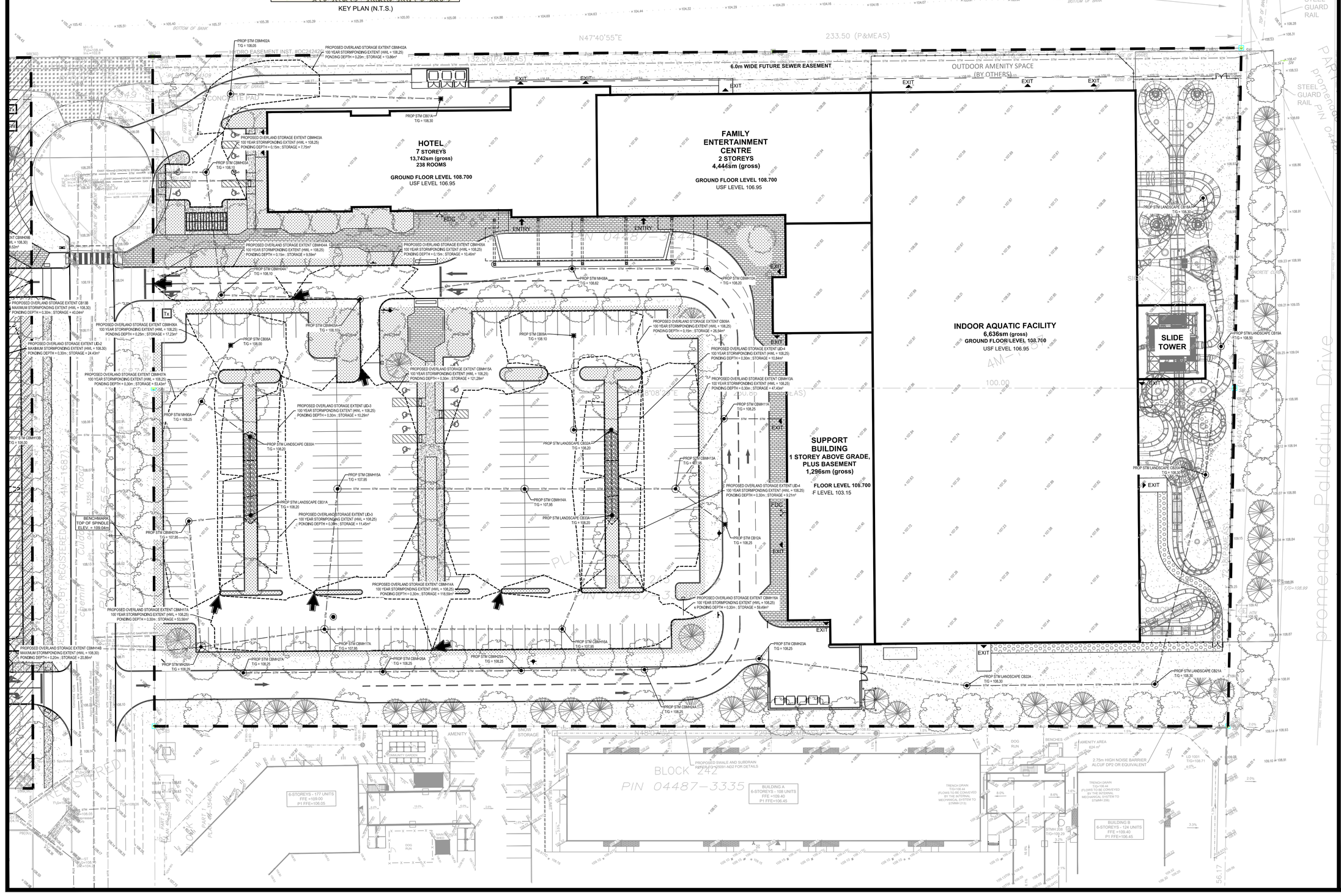
D07-12-26-0085

19492

Structure	T/G	HWL (100yr event) (m)	Ponding Depth (100yr event) (m)	Storage (100yr event) (m3)
CBMH02A	108.05	108.25	0.20	13.86
CBMH03A	108.10	108.25	0.15	7.75
CBMH04A	108.10	108.25	0.15	9.59
CB05A	108.10	108.25	0.15	10.46
		Total		**41.66**
CBMH06A	108.00	108.25	0.15	17.23
CBMH07A	107.95	108.25	0.25	53.43
CB09A	108.10	108.25	0.15	26.54
CBMH13A	108.00	108.25	0.25	47.43
CBMH14A	107.95	108.25	0.30	118.59
CBMH15A	107.95	108.25	0.30	121.28
CB16A	107.95	108.25	0.30	59.49
CBMH17A	107.95	108.25	0.30	53.56
CBMH30A	108.20	108.25	0.15	10.29
CBMH31A	108.20	108.25	0.15	11.45
CBMH32A	108.20	108.25	0.15	10.84
CBMH33A	108.20	108.25	0.15	9.21
		Total		**539.34**



KEY PLAN (N.T.S.)



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5m 0 10 20m

SCALE: 1:400

No.	REVISIONS	BY	DATE
02	ISSUED FOR APPROVAL	M.L.	02 OCT 2026
01	ISSUED FOR APPROVAL	M.L.	06 AUG 2026

LICENSED PROFESSIONAL ENGINEER M. BASNET 100501996 2026/10/02 PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
PALLADIUM RESORT DEVELOPMENT LIMITED PARTNERSHIP
2962 CARP ROAD, OTTAWA ON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
2775 & 2785 PALLADIUM DRIVE
OTTAWA, ON

DRAWING TITLE
STORMWATER MANAGEMENT PLAN

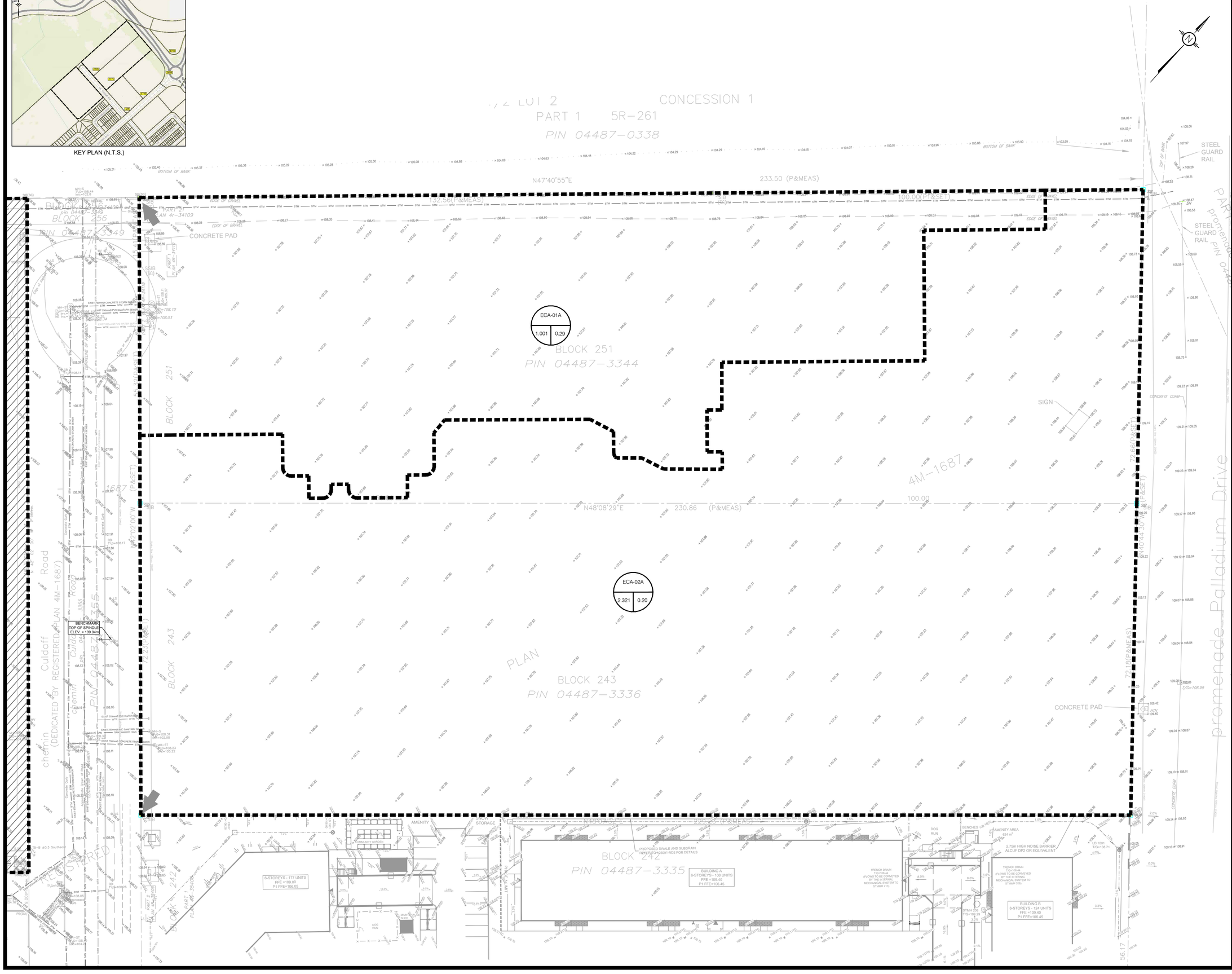
PROJECT NO.
240720

C601A

D07-12-26-0085

19492

KEY PLAN (N.T.S.)



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2962 CARP ROAD, OTTAWA ON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
2775 & 2785 PALLADIUM DRIVE
OTTAWA, ON

DRAWING TITLE
PRE-DEVELOPMENT WATERSHED PLAN

PROJECT NO.
240720

C701A

D07-12-26-0085

19492



KEY PLAN (N.T.S.)

NORTH 1/2 LOT 2 CONCESSION 1
PART 1 5R-261
PIN 04487-0338

N47°40'55"E 233.50 (P&MEAS)

HOTEL
7 STOREYS
13,742sm (gross)
238 ROOMS
GROUND FLOOR LEVEL 108.700
USF LEVEL 106.95

FAMILY ENTERTAINMENT CENTRE
2 STOREYS
4,444sm (gross)
GROUND FLOOR LEVEL 108.700
USF LEVEL 106.95

INDOOR AQUATIC FACILITY
6,636sm (gross)
GROUND FLOOR LEVEL 108.700
USF LEVEL 106.95

SUPPORT BUILDING
1 STOREY ABOVE GRADE, PLUS BASEMENT
1,296sm (gross)
GROUND FLOOR LEVEL 108.700
USF LEVEL 103.15

OUTDOOR AMENITY SPACE (BY OTHERS)

6.0m WIDE FUTURE STREET EXTENSION

SLIDE TOWER

STEEL GUARD RAIL

PROP STM CB6H02A T/G = 108.05

PROP STM CB6H01A T/G = 108.30

PROP STM CB6H09A T/G = 108.10

PROP STM CB6H08A T/G = 108.62

PROP STM CB6H10A T/G = 108.20

PROP STM CB6H07A T/G = 108.25

PROP STM CB6H06A T/G = 108.10

PROP STM CB6H05A T/G = 108.25

PROP STM CB6H04A T/G = 108.25

PROP STM CB6H03A T/G = 108.25

PROP STM CB6H11A T/G = 108.25

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PROP STM MH90A T/G = 108.25

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CA-01A CONTROLLED 0.033 0.90
CA-02A CONTROLLED 0.047 0.76
CA-03A CONTROLLED 0.042 0.78
CA-04A CONTROLLED 0.055 0.68
CA-05A CONTROLLED 0.167 0.66
CA-06A CONTROLLED (UD-3) 0.034 0.85
CA-07A CONTROLLED 0.081 0.79
CA-10A CONTROLLED 0.106 0.84
CA-11A CONTROLLED 0.055 0.72
CA-12A CONTROLLED 0.050 0.74
CA-13A CONTROLLED 0.061 0.90
CA-14A CONTROLLED 0.150 0.88
CA-15A CONTROLLED 0.149 0.88
CA-16A CONTROLLED 0.066 0.87
CA-17A CONTROLLED 0.062 0.85
CA-18A CONTROLLED 0.249 0.56
CA-19A CONTROLLED 0.078 0.80
CA-20A CONTROLLED 0.244 0.66
CA-21A CONTROLLED 0.086 0.20
CA-22A CONTROLLED 0.080 0.20
CA-23A CONTROLLED 0.083 0.66
CA-24A CONTROLLED 0.042 0.67
CA-25A CONTROLLED 0.048 0.49
CA-26A CONTROLLED 0.048 0.50
CA-27A CONTROLLED 0.060 0.44
CA-28A CONTROLLED (UD-3) 0.029 0.67
CA-29A CONTROLLED (UD-3) 0.033 0.68
CA-30A CONTROLLED (UD-4) 0.029 0.70
CA-31A CONTROLLED (UD-4) 0.033 0.72
CA-33A UN-CONTROLLED 0.015 0.20
CA-34A UN-CONTROLLED 0.132 0.23
CA-35A UN-CONTROLLED 0.007 0.46
CA-100A CONTROLLED 0.148 0.90
CA-101A CONTROLLED 0.249 0.90
CA-102A CONTROLLED 0.409 0.90

BENCHMARK: TOP OF SPINDLE ELEV. = 109.04m

PROPOSED SWALE AND SUBDRAIN, REFER TO G-10501-IND1 FOR DETAILS

BLOCK 242
PIN 04487-3335

BUILDING A
6-STOREYS - 108 UNITS
FFE =109.40
P1 FFE=106.45

6-STOREYS - 177 UNITS
FFE =109.00
P1 FFE=106.05

BUILDING B
6-STOREYS - 124 UNITS
FFE =109.40
P1 FFE=106.45

AMENITY AREA 824 m²

2.75m HIGH NOISE BARRIER ALCUF DP2 OR EQUIVALENT

TRENCH DRAIN T/G=106.44 (FLOWS TO BE CONVEYED BY THE INTERNAL MECHANICAL SYSTEM TO STMH-01R)

STMH-20B T/G=109.29

LD 1001 T/G=108.71

BENCHES

DOG RUN

COMMUNITY GARDEN

AMENITY

STORAGE

MAIL

SIGN

5m 0 10 20m

SCALE: 1:400

No.	REVISIONS	BY	DATE
02	ISSUED FOR APPROVAL	M.L.	02 OCT 2026
01	ISSUED FOR APPROVAL	M.L.	06 AUG 2026

LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2026/10/02
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
PALLADIUM RESORT DEVELOPMENT LIMITED PARTNERSHIP
2962 CARP ROAD, OTTAWA ON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
2775 & 2785 PALLADIUM DRIVE
OTTAWA, ON

DRAWING TITLE
POST-DEVELOPMENT WATERSHED PLAN

PROJECT NO.
240720

C702A

D07-12-26-0085

19492

USE AND INTERPRETATION OF DRAWINGS

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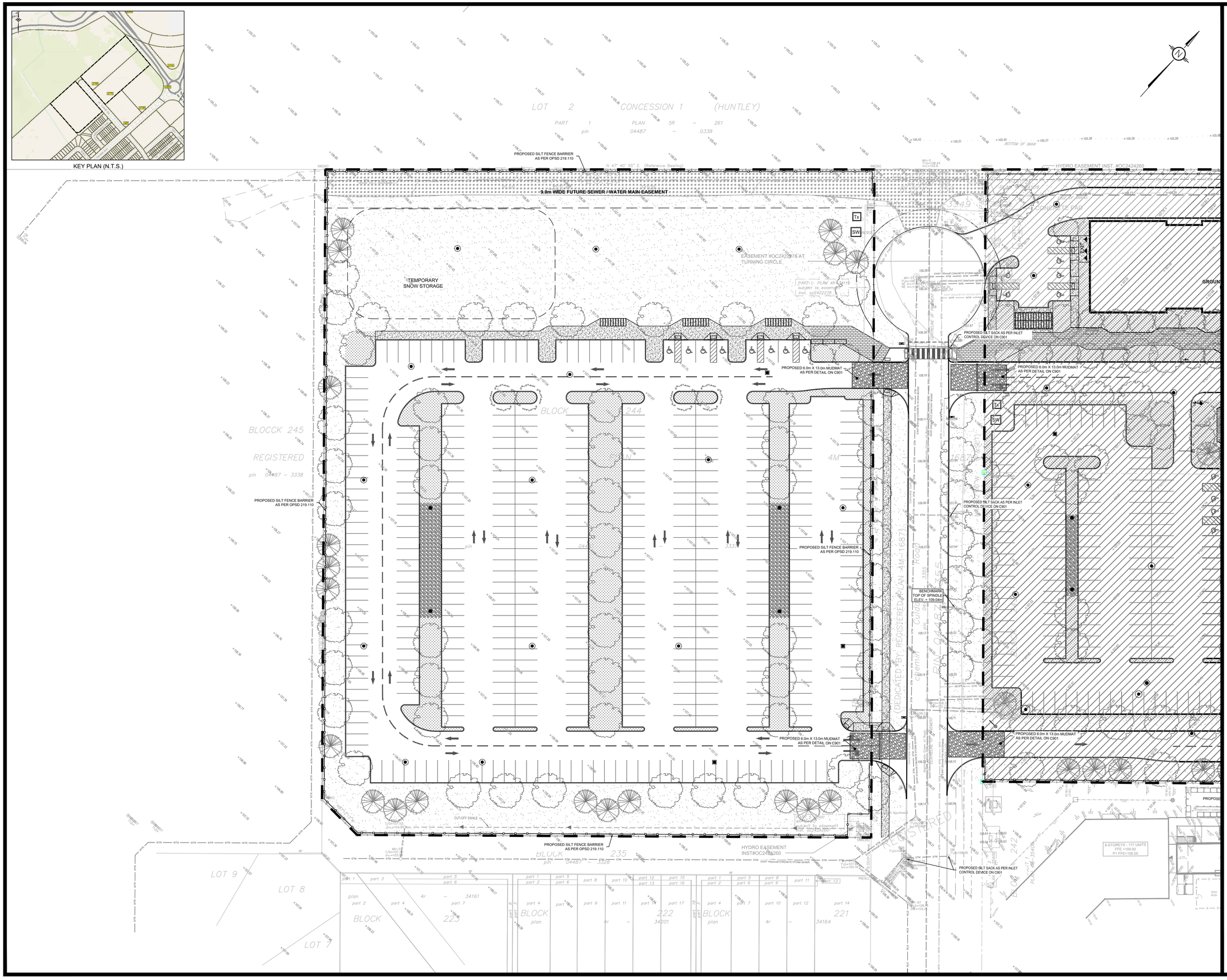
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KEY PLAN (N.T.S.)



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5m 0 10 20m

SCALE: 1:400

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02	ISSUED FOR APPROVAL	M.L.	02 OCT 2026
01	ISSUED FOR APPROVAL	M.L.	06 AUG 2026

LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2026/10/02
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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CLIENT
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2962 CARP ROAD, OTTAWA ON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
350 CULDAFF ROAD
OTTAWA, ON

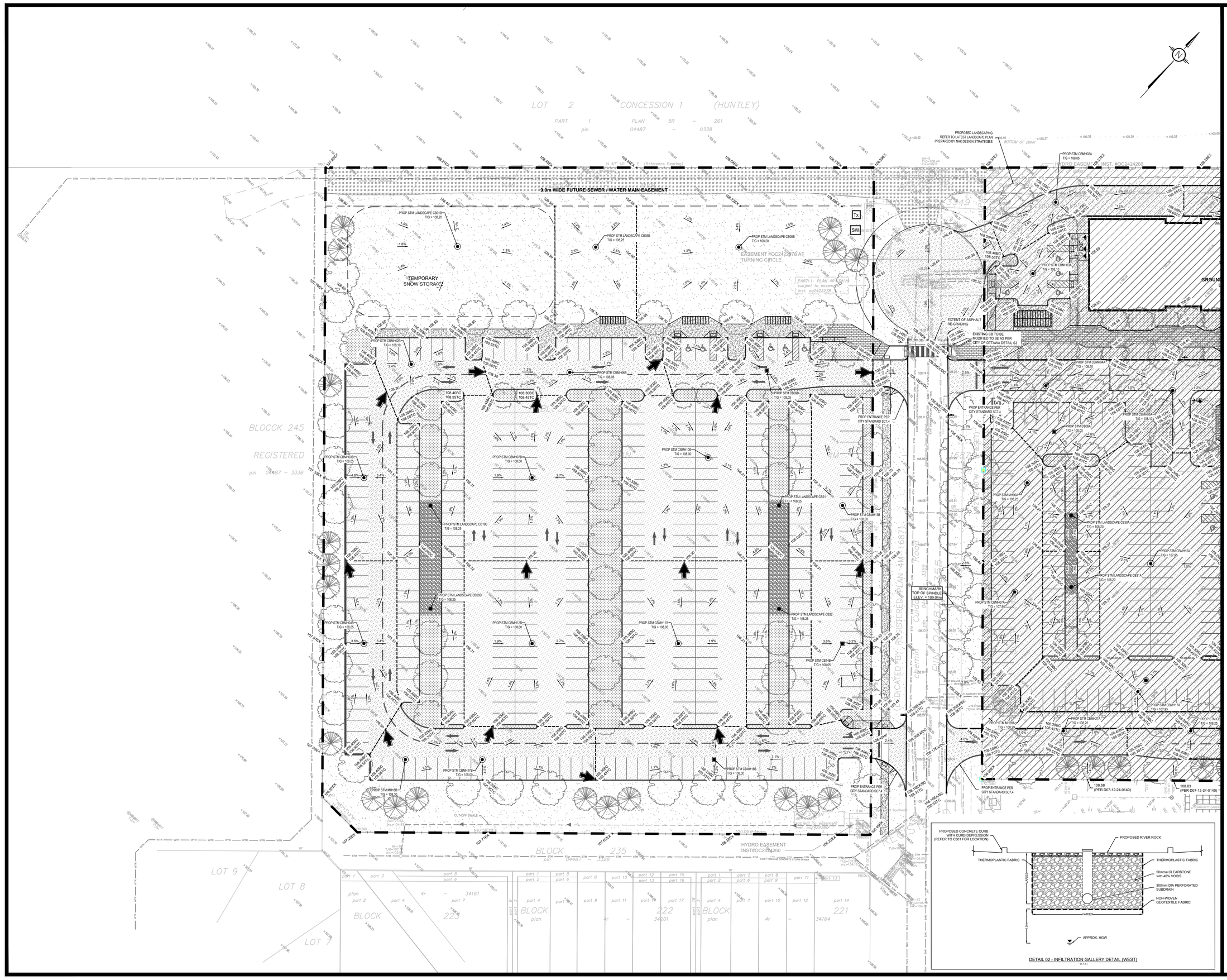
DRAWING TITLE
EROSION AND SEDIMENT CONTROL PLAN

PROJECT NO.
240720

C101B

D07-12-26-0085

19492



DETAIL 02 - INFILTRATION GALLERY DETAIL (WEST)
N.T.S.

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5m 0 10 20m

SCALE: 1:400

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LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2026/10/02
PROVINCE OF ONTARIO

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CLIENT
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2962 CARP ROAD, OTTAWA ON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
350 CULDAFF ROAD
OTTAWA, ON

DRAWING TITLE
GRADING AND DRAINAGE PLAN

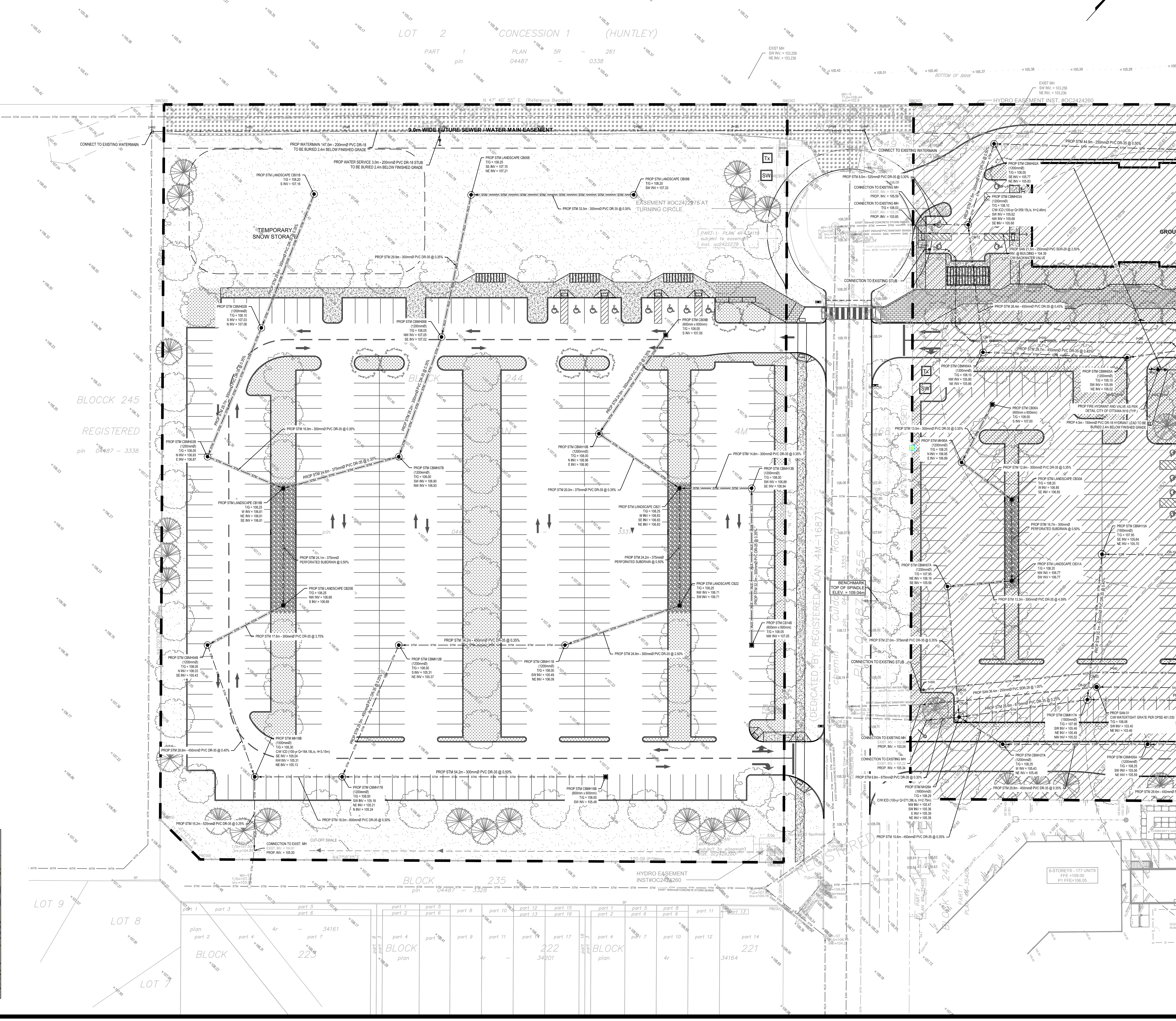
PROJECT NO.
240720

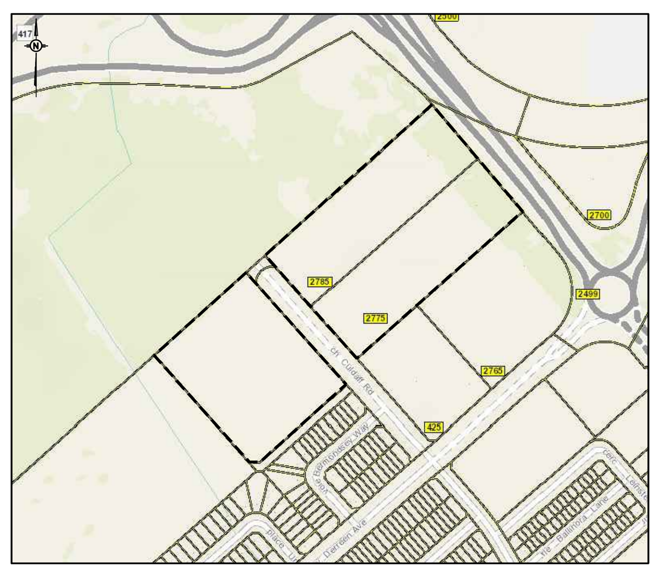
C301B

D07-12-26-0085

19492

Description	Chainage	Finish Grade	Min. Top of Watermain Elev.	Cover (m)
WM	2+000	107.57	105.17	2.40
WM	2+020	108.42	106.02	2.40
WM	2+040	108.42	106.02	2.40
Tee	2+059	108.45	106.05	2.40
WM	2+060	108.45	106.05	2.40
WM	2+080	108.50	106.10	2.40
WM	2+100	108.71	106.31	2.40
WM	2+120	108.60	106.20	2.40
WM	2+140	108.58	106.18	2.40
WM	2+147	108.47	106.07	2.40




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PROJECT
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350 CULDAFF ROAD
OTTAWA, ON

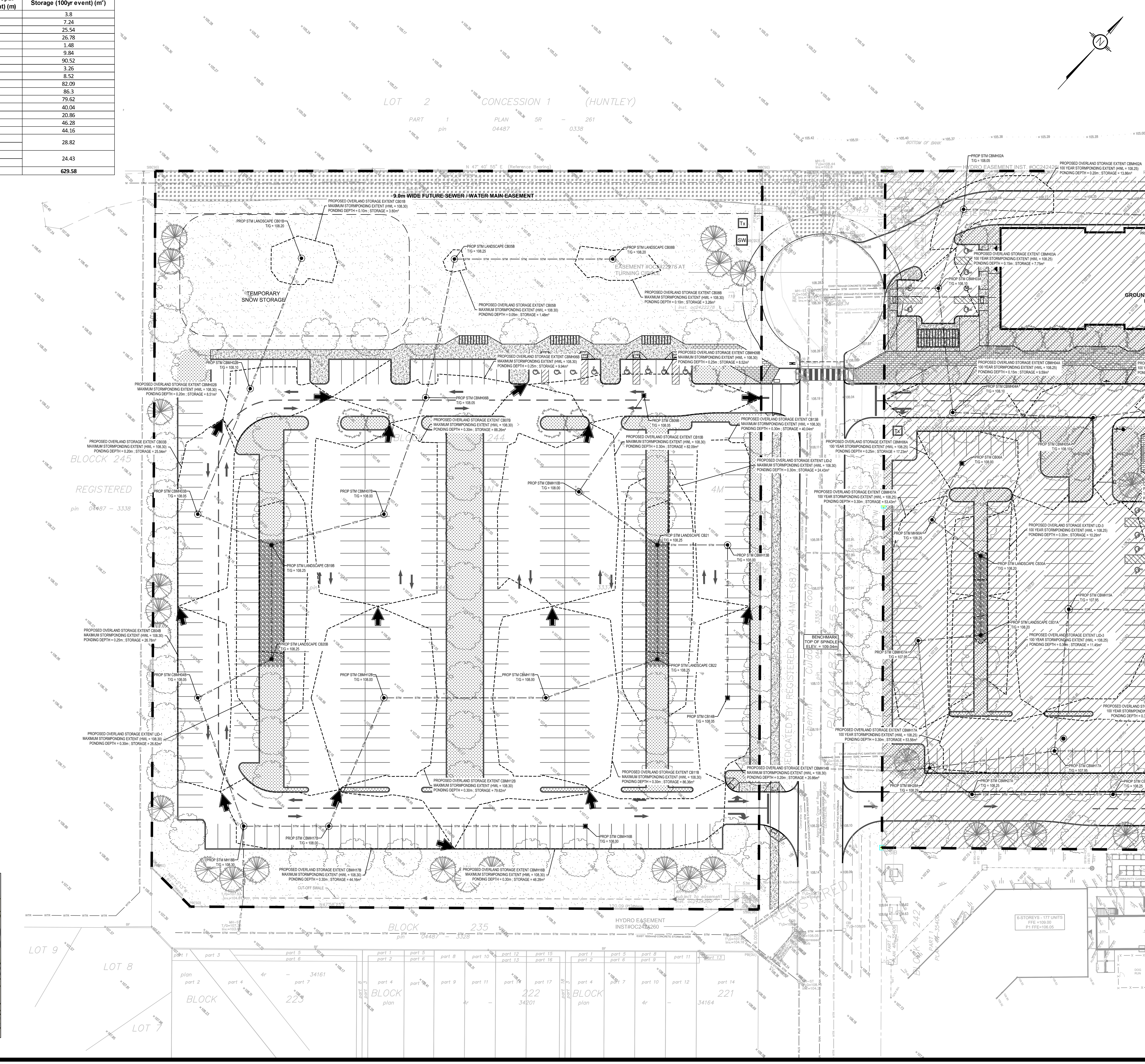
DRAWING TITLE
SERVICING PLAN

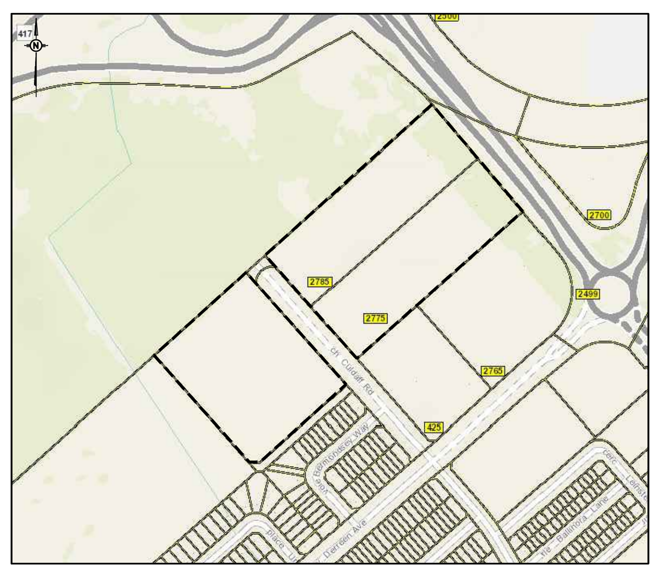
PROJECT NO.
240720

C401B

D07-12-26-0085

Structure	T/G (m)	HWL (100yr event) (m)	Ponding Depth (100yr event) (m)	Storage (100yr event) (m^3)
CB01B	108.00	108.30	0.30	3.8
CBMH02B	108.10	108.30	0.15	7.24
CBMH03B	108.05	108.30	0.20	25.54
CBMH04B	108.05	108.30	0.25	26.78
CBMH05B	108.15	108.30	0.15	1.48
CBMH06B	108.05	108.30	0.25	9.84
CBMH07B	108.00	108.30	0.30	90.52
CBMH08B	108.00	108.30	0.30	3.26
CBMH09B	108.05	108.30	0.25	8.52
CBMH10B	108.00	108.30	0.30	82.09
CBMH11B	108.00	108.30	0.30	86.3
CBMH12B	108.00	108.30	0.30	79.62
CB13B	108.10	108.30	0.20	40.04
CBMH14B	108.10	108.30	0.20	20.86
CBMH16B	108.00	108.30	0.30	46.28
CBMH17B	108.00	108.30	0.30	44.16
CB19B	108.25	108.30	0.30	28.82
CB20B	108.25	108.30	0.30	
CB21B	108.25	108.30	0.30	24.43
CB22B	108.25	108.30	0.30	
			Total	629.58





KEY PLAN (N.T.S.)

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SCALE: 1:400

No.	REVISIONS	BY	DATE
02	ISSUED FOR APPROVAL	M.L.	02 OCT 2026
01	ISSUED FOR APPROVAL	M.L.	06 AUG 2026

LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2026/10/02
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
PALLADIUM RESORT DEVELOPMENT
LIMITED PARTNERSHIP
2962 CARP ROAD, OTTAWA ON

DESIGNED BY: M.L.
DRAWN BY: M.L.
APPROVED BY: M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
350 CULDAFF ROAD
OTTAWA, ON

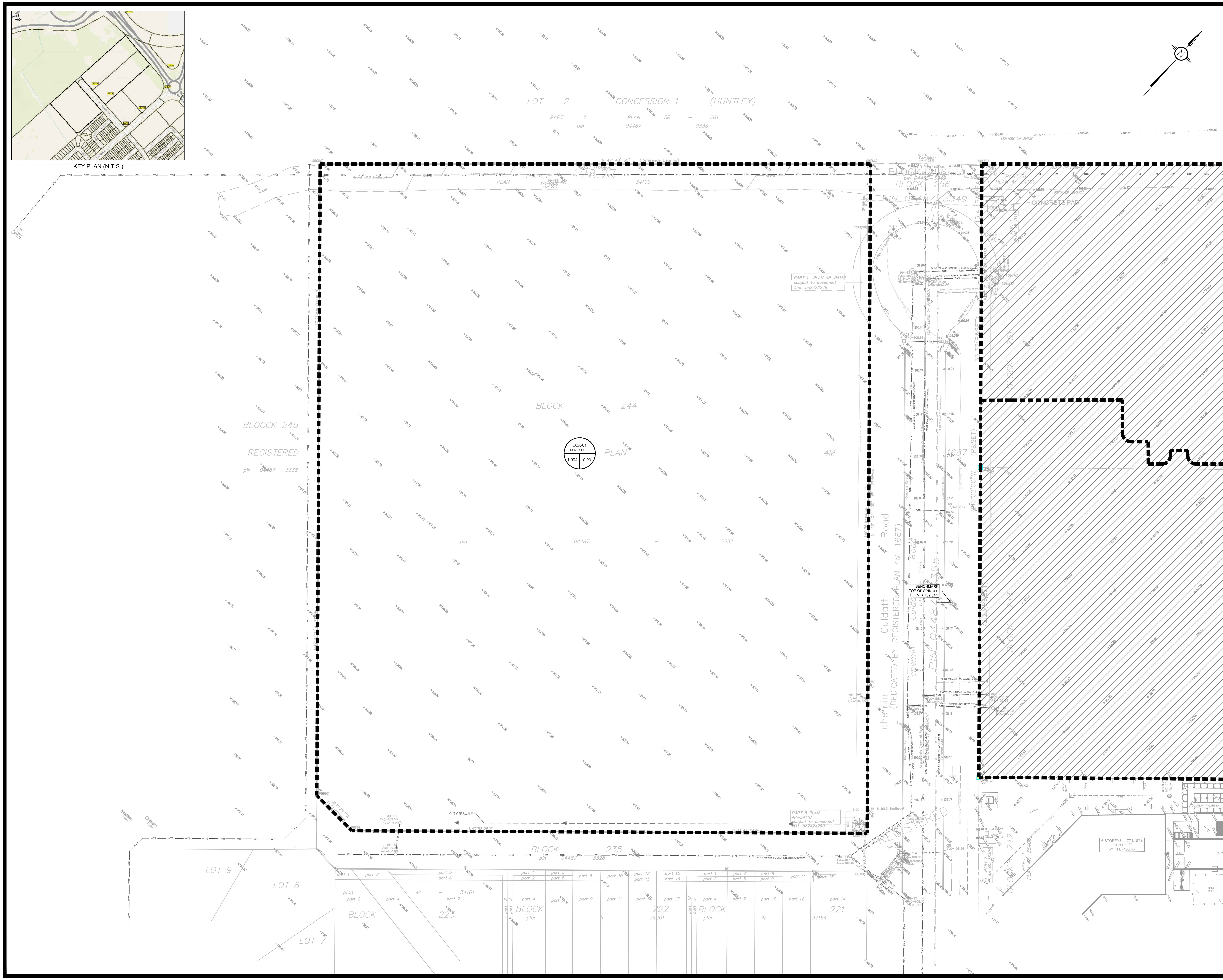
DRAWING TITLE
STORMWATER MANAGEMENT PLAN

PROJECT NO.
240720

C601B

D07-12-26-0085

19492



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5m 0 10 20m

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LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2026/10/02
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LIMITED PARTNERSHIP
2962 CARP ROAD, OTTAWA ON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
350 CULDAFF ROAD
OTTAWA, ON

DRAWING TITLE
PRE-DEVELOPMENT
WATERSHED PLAN

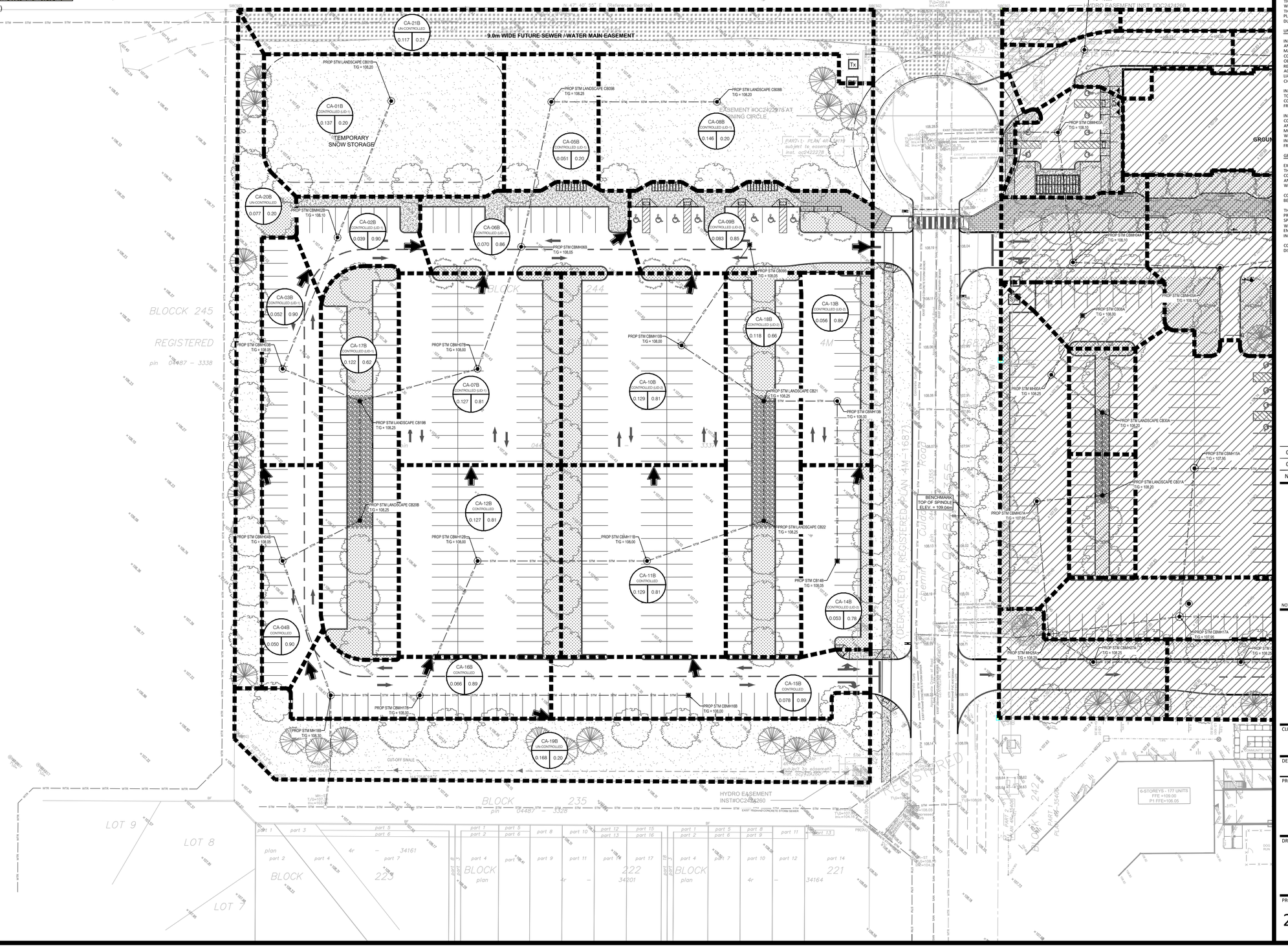
PROJECT NO.
240720
C701B

D07-12-26-0085

19492



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LICENSED PROFESSIONAL ENGINEER
M. BASNET
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2026/10/02
PROVINCE OF ONTARIO

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CLIENT
PALLADIUM RESORT DEVELOPMENT LIMITED PARTNERSHIP
2962 CARP ROAD, OTTAWA ON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT
350 CULDAFF ROAD
OTTAWA, ON

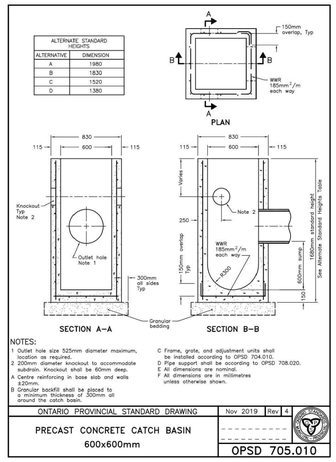
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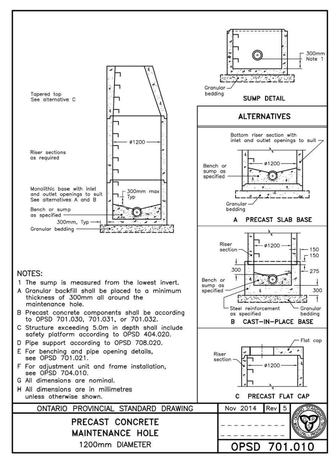
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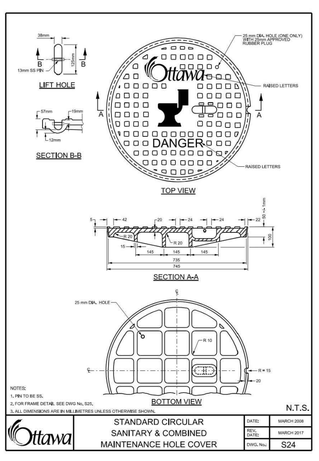
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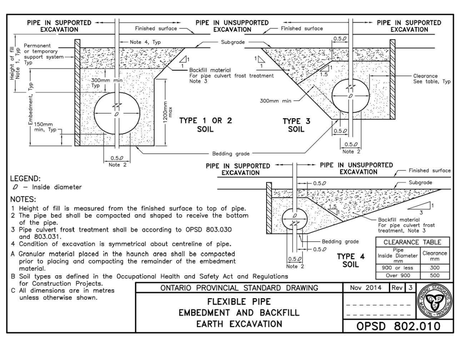
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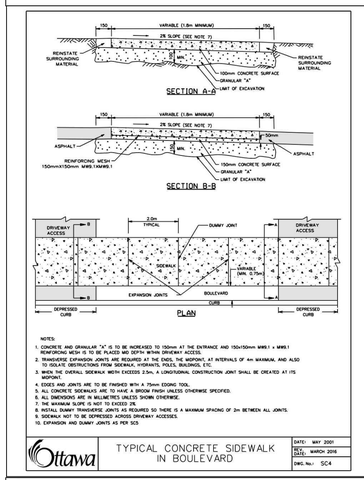
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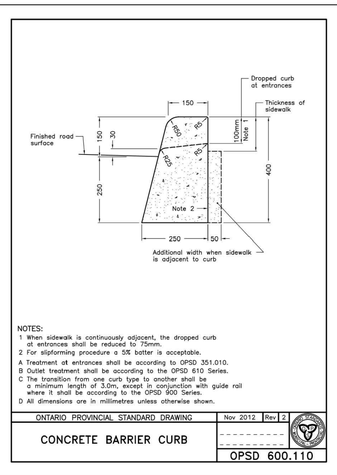


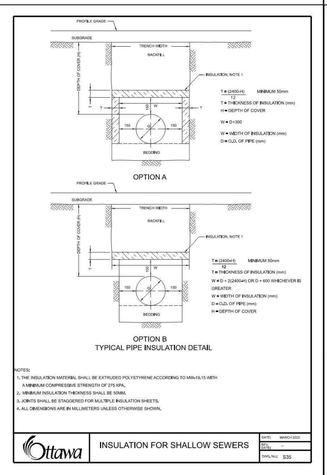


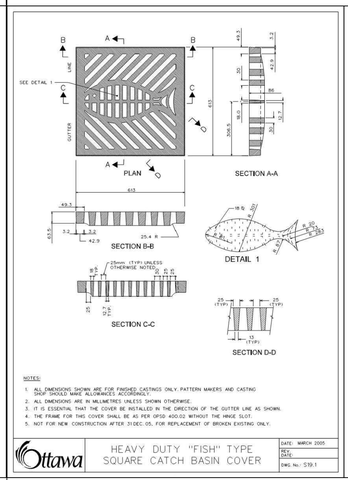


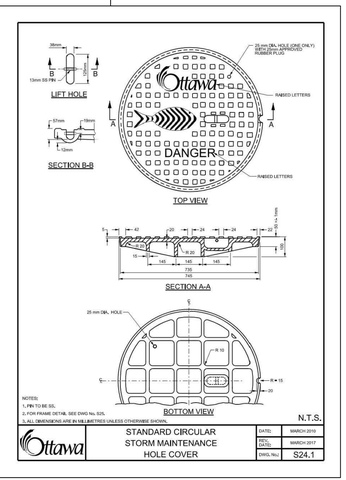


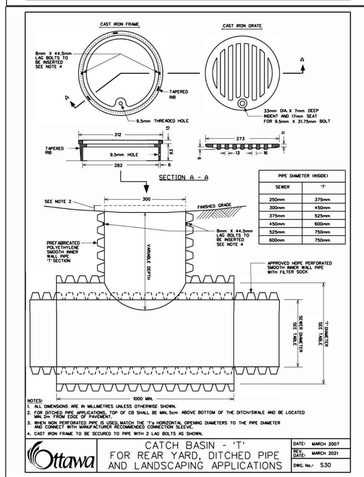


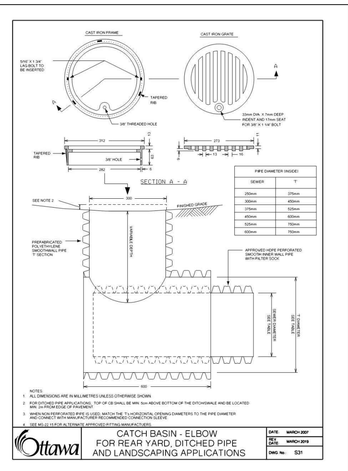


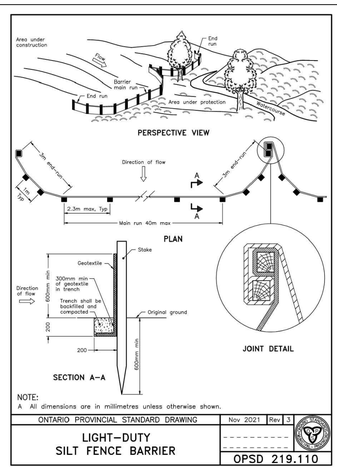


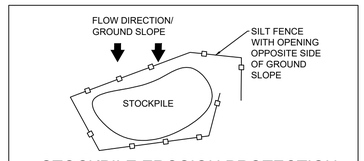


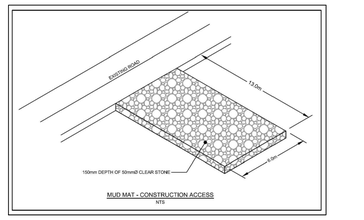


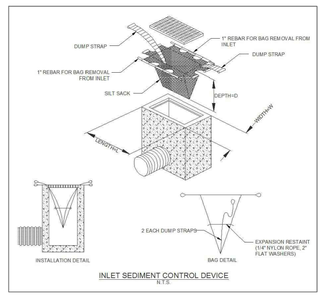












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AS INSTRUMENTS OF SERVICE, ALL DRAWINGS, SPECIFICATIONS, CADD FILES OR OTHER ELECTRONIC MEDIA AND COPIED THERE OF FURNISHED BY THE ENGINEER ARE HIS PROPERTY. THEY ARE TO BE USED ONLY FOR THIS PROJECT AND ARE NOT TO BE USED ON ANY OTHER PROJECT, INCLUDING REPEATS OF THE PROJECT. CHANGES TO THE DRAWINGS MAY ONLY BE MADE BY THE ENGINEER.

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THESE DRAWINGS ILLUSTRATES THE WORK TO BE DONE. THE ENGINEER IS NOT RESPONSIBLE FOR THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES USED TO DO THE WORK, OR THE SAFETY ASPECTS OF CONSTRUCTION, AND NOTHING ON THESE DRAWINGS EXPRESSED OR IMPLIED CHANGES THIS CONDITION. CONTRACTOR SHALL DETERMINE ALL CONDITIONS AT THE SITE AND SHALL BE RESPONSIBLE FOR KNOWING HOW THEY AFFECT THE WORK. SUBMITTAL OF A BID TO PERFORM THIS WORK IS ACKNOWLEDGEMENT OF THE RESPONSIBILITIES, AND THAT THEY HAVE BEEN FULLY CONSIDERED IN PLANNING OF THE WORK, AND THE BID PRICE. NO CLAIMS FOR EXTRA CHARGES DUE TO THESE CONDITIONS WILL BE FORTHCOMING.

UNAUTHORIZED CHANGES:

IN THE EVENT THE CLIENT, THE CLIENT'S CONTRACTORS OR SUBCONTRACTORS, OR ANYONE FOR WHOM THE CLIENT IS LEGALLY LIABLE MAKES OR PERMITS TO BE MADE ANY CHANGES TO ANY REPORTS, PLANS, SPECIFICATIONS OR OTHER CONSTRUCTION DOCUMENTS PREPARED BY LRL ASSOCIATES LTD. (LRL) WITHOUT OBTAINING LRL'S PRIOR WRITTEN CONSENT, THE CLIENT SHALL ASSUME FULL RESPONSIBILITY FOR THE RESULTS OF SUCH CHANGES, THEREFORE THE CLIENT AGREES TO WAIVE ANY CLAIM AGAINST LRL AND TO RELEASE LRL FROM ANY LIABILITY ARISING DIRECTLY OR INDIRECTLY FROM SUCH UNAUTHORIZED CHANGES.

IN ADDITION, THE CLIENT AGREES, TO THE FULLEST EXTENT PERMITTED BY LAW, TO INDEMNIFY AND HOLD HARMLESS LRL FROM ANY DAMAGES, LIABILITIES OR COST, INCLUDING REASONABLE ATTORNEY'S FEES AND COST OF DEFENSE, ARISING FROM SUCH CHANGES.

IN ADDITION, THE CLIENT AGREES TO INCLUDE IN ANY CONTRACTS FOR CONSTRUCTION APPROPRIATE LANGUAGE THAT PROHIBITS THE CONTRACTOR OR ANY SUBCONTRACTORS OF ANY TIER FROM MAKING ANY CHANGES OR MODIFICATIONS TO LRL'S CONSTRUCTION DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF LRL AND THAT FURTHER REQUIRES THE CONTRACTOR TO INDEMNIFY BOTH LRL AND THE CLIENT FROM ANY LIABILITY OR COST ARISING FROM SUCH CHANGES MADE WITHOUT SUCH PROPER AUTHORIZATION.

GENERAL NOTES:

EXISTING SERVICES AND UTILITIES SHOWN ON THESE DRAWINGS ARE TAKEN FROM THE BEST AVAILABLE RECORDS, BUT MAY NOT BE COMPLETE OR TO DATE. CONTRACTOR SHALL VERIFY IN FIELD FOR LOCATION AND ELEVATION OF PIPES AND CHECK WITH THE UTILITY COMPANIES BEFORE DIGGING OR PERFORMING WORK.

CONTRACTOR IS ADVISED TO COLLECT INFORMATION ON SOIL CONDITIONS BEFORE START OF CONSTRUCTION.

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.

No.	REVISIONS	BY	DATE
02	ISSUED FOR APPROVAL	M.L.	02 OCT 2026
01	ISSUED FOR APPROVAL	M.L.	06 AUG 2026

LICENSED PROFESSIONAL ENGINEER M. BASNET 100501996 2026/10/02 PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
PALLADIUM RESORT DEVELOPMENT LIMITED PARTNERSHIP
2962 CARP ROAD, OTTAWA ON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
PALLADIUM RESORT DEVELOPMENT

DRAWING TITLE
CONSTRUCTION DETAIL PLAN

PROJECT NO.
240720

C901

D07-12-26-0085

APPENDIX G

195 Huntmar Drive Design Brief (*Appendices not included*)