1095 KINGSTON ROAD LTD.

Rail Safety and Risk Mitigation Study

1095 Kingston Road, Pickering, Ontario

April 2025 – 24-8956

Table of Contents

Figures

Figures (Appended)

Tables

Appendices

Definitions

Annual Individual Risk – The annual frequency at which an individual may be expected to sustain a given level of harm (e.g., fatality) from the realization of specified hazards.

Dangerous Goods Release – Loss of control over a dangerous good in transportation.

Gross Ton-Mile – The movement of total train weight over a distance of one mile. Total train weight is comprised of the freight cars, their contents, and any inactive locomotives. It excludes the weight of the locomotives pulling the trains.

Hazard – A chemical, physical, social, or political condition that has the potential to cause damage or any kind of harm to people, property, environment, or business continuity.

Inherent Risk:

1. A risk which is impossible to manage or transfer away is said to be an inherent risk; and
2. The risk that exists when no controls have been put in place.

Rail Proximity Envelope – Areas of the proposed Development that could be exposed to the physical hazards of a train derailment involving two or more derailed rail cars – 30 m setback from the property line and 7 m high. The 30 m distance reflects the length of the longest rail car that is typically utilized in Canada that would be involved in a jackknife type derailment.

Risk – The chance of injury or loss, measured as the probability and severity of an adverse effect on health, property, the environment, or other things of value. "Risk" is a way of expressing damage to a receptor due to a hazard, taking into account both the likelihood and magnitude of damage. The concept of risk includes four components:

- Hazard inherent in an activity;
- Consequence of an undesirable event;
- Likelihood that an undesirable event will occur; and
- Perception about the combined importance of the first three.

Risk = Likelihood of undesirable event x Consequences of that event

Risk Assessment – A process for making quantitative and/or qualitative assessment, analysis, and evaluation of risks and hazards.

1.0 Introduction

1095 Kingston Road Ltd. (herein referred to as Client) is proposing a residential development located at 1095 Kingston Road in Pickering, Ontario (referred to as the Development), which will contain:

- Four residential towers with a combined gross building area (GBA) ranging from 1,520,232 to 1,568,670 square feet;
- A total of 1,498 to 1,564 residential units distributed across the four towers; and
- A multi-level parking facility spanning the P1 level, ground floor, mezzanine, and levels 2-6, providing a total of 1,068 parking spaces.

The proposed Development is located adjacent to active freight rail operations conducted by Canadian National Railway (CN). It is understood that the property of 1095 Kingston Road is presently developed as a commercial plaza. To the south lies Highway 401, while an active CN rail corridor, including a bridge structure, is situated immediately to the west.

Given the proximity of the Development to active freight rail operations, the Client retained Dillon Consulting Limited (Dillon) to undertake an assessment of safety matters as described under the Federation of Canadian Municipalities (FCM) and The Railway Association of Canada (RAC) Guidelines for New Development in Proximity to Railway Operations (FCM-RAC Guidelines). After a review of the Development, it was determined that the prescribed mitigation measures within FCM-RAC Guidelines could not be fully integrated into the design, and therefore, a Development Viability Assessment (DVA) as detailed in Appendix A of the FCM-RAC Guidelines was undertaken. To be consistent with terminology utilized in Ontario, the DVA will herein be called a Rail Safety and Risk Mitigation Study (or Report).

The goal of the Report is to demonstrate that the risks associated with the proposed Development are:

- Recognized;
- Understood; and
- Mitigated, such that it does not impede current and future rail operations, and it addresses public safety issues.

The report is designed to inform and support the City in making decisions about the proposed development of the subject land.

The Report methodology focuses on environmental and health and safety risks to the public and operational risks to CN. The risks, including physical and chemical hazards, were evaluated during construction and at full occupancy for two time periods (2028-2030 and 2031-2105 respectively).

Sections 2.0, **3.0** and **4.0** of the report summarizes the project setting, which includes details of the proposed Development, including during construction and at full occupancy, description of the parcels including topographic details and site drainage, and an overview of the rail infrastructure and traffic adjacent to the proposed Development. **Section 5.0** highlights where the proposed Development deviates from the prescribed mitigation measures within the FCM-RAC Guidelines while **Sections 6.0** and **8.0** provides details of the Rail Safety and Mitigation Study methodology, analysis and findings. Conclusions and recommendations are provided in **Section 8.0**.

1.1 Assumptions

Information was obtained from the following sources to complete the analysis in this report:

- Railway operators and regulatory subject matter experts;
- Publicly available databases, documents and records; and
- Information provided by 1095 Kingston Road Ltd.

1.2 Rail Safety Study Team

Dillon's project team has extensive experience across Canada working with developers, Class 1 Railways (e.g., CPKC, CN) and municipalities to address rail proximity issues associated with various types of land development. This includes not only conducting property-specific Development Viability Assessments, but also supporting the development of a new land use policy for developments adjacent to rail corridors. Credentials of the key project team members are provided below.

Dave Poole, M.Sc., P.Eng. (AB), CRM – Project Lead and Technical Rail Risk Expert

Dave is a Partner at Dillon with over 30 years of experience conducting risk assessments, due diligence assessments and strategic advisory services. He is a Certified Risk Manager (CRM) through the Global Risk Management Institute and has extensive experience advising the railway industry, municipalities, and developers on the risks, developing frameworks and management plans related to rail operations and proximity issues in Canada and the United States.

Tiffany Stephan, B.Sc., M.Sc. – Risk Analyst

Tiffany is a Risk Analyst with experience in risk management, research, and data analysis. She has been working with developers and railway companies for a variety of risk assessment projects such as Development Viability Assessments in proximity to railway corridors; Risk Assessments of railyard fueling and transloading operations; and Risk Assessments of highway construction work adjacent to railway corridors.

Saheli Hazra Chakraborty, B.Sc., M.B.A. – Risk Analyst

Saheli is a Risk Analyst with a strong foundation in data analytics, risk modeling, and sustainability, committed to identifying and mitigating potential risks for her clients. Her proficiency in data analytics enables her to derive actionable insights that support strategic decision-making and risk management.

Her expertise in risk modeling techniques allows her to identify potential challenges and vulnerabilities, facilitating the development of effective mitigation strategies. Saheli is skilled in multiple software applications, including Qualtrics for surveys and Tableau for analytics, as well as programming languages like R and Python.

1.3 Limitations

The data utilized for the risk assessment included data from various sources, as outlined throughout this report. We have assumed that this data is complete and correct. Regardless, there may be errors and omissions of which the authors are unaware, and which may lead to some variations in the outcomes.

2.0 Site Details

2.1 Proposed Development Overview

The proposed Development will be located at 1095 Kingston Road (**Figure 1**) in Pickering, adjacent to CN's main track freight corridor (**outlined in red in Figure 1**). This section of the York Subdivision is designated for CN freight rail traffic. It is our understanding that the proposed Development will consist of (**Figure 2**):

- Four residential towers with a combined gross building area (GBA) ranging from 1,520,232 to 1,568,670 square feet.
- A total of 1,498 to 1,564 residential units distributed across the four towers.
- A multi-level parking facility spanning the P1 level, ground floor, mezzanine, and levels 2-6, providing a total of 1,068 parking spaces.

It is assumed that construction of the proposed Development will commence in 2028 and end by 2030 with occupancy beginning in 2031.

There is a 30 m setback from the shared CN main track rail freight corridor property line to the proposed Development, which consists of a Regional Servicing Easement that varies in width between 12-14 m, Multiuse path that is 6 m wide and a 14 m wide setback as required by Ontario Ministry of Transportation (MTO) on the southeast end. To the southwest it also consists of the private terraces planned for 7th floor residents with intermittent occupancy, which will be positioned overtop the parkade.

The rail corridor sits between an approximate elevation of 91.44 – 94.26 metres above sea level (m asl) adjacent to the Development, and along the south end of the property, the at-grade elevation of the proposed Development is 89.5 m asl (**Appendix A.1**).

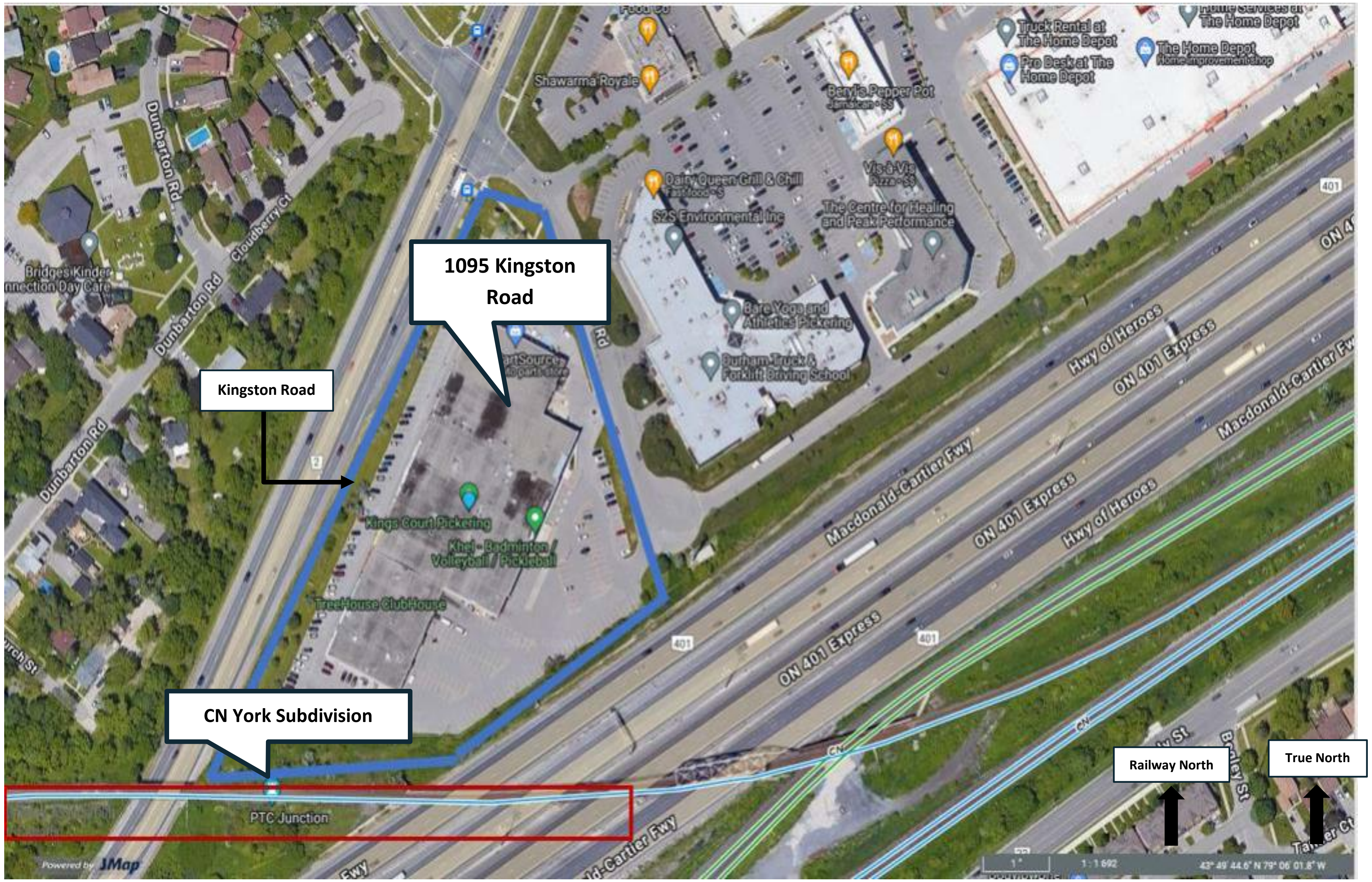


Figure 1: General Location of Proposed Development

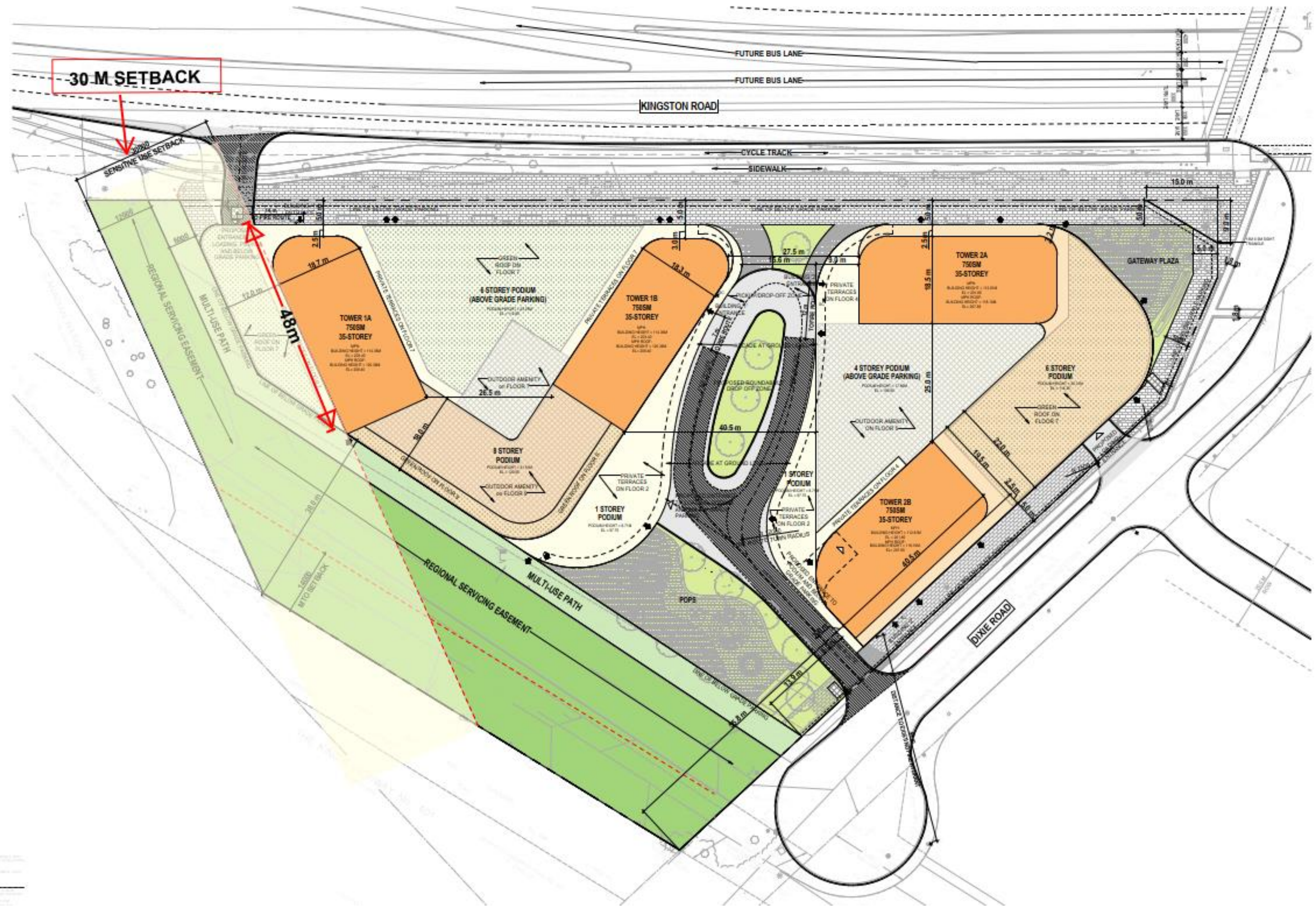


Figure 2: Proposed Development – General Site Layout

2.2 Site Environmental Setting

2.2.1 Existing State of the Site and Features

The existing state of the proposed Development parcel is developed land with a paved parking lot surrounding the property, which includes commercial and retail outlets (like Tasco Appliances, Khel, Part Source, etc.). Bands of grass and trees/shrubs are present along the Property perimeter (**Figure 3**). Currently, a continuous concrete sidewalk exists on one side of 1095 Kingston Road along the northeastern portion of the proposed Development parcel (**Figure 4**).

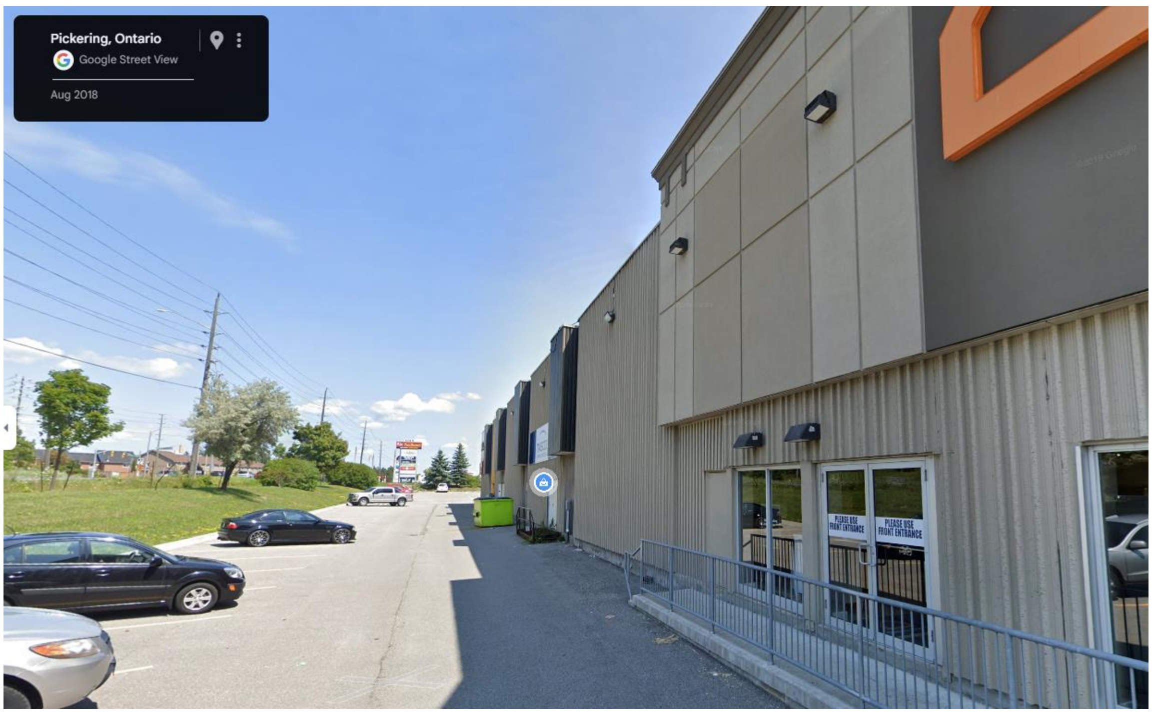


Figure 3: View of the proposed Development Parcel from 1095 Kingston Road looking North (Google Street View)

Figure 4: View of the proposed Development Parcel from 1095 Kingston Road looking Northeast (Google Street View)

2.2.2 Surrounding Land Use Context

The lands to the north, east and west of the proposed Development are primarily for commercial and residential uses. Kingston Road is bordering the west to northwest, beyond which are residential properties, and Dixie Road runs along the east and north with a mix of commercial and residential uses respectively. To the south of the Development is the CN York Subdivision along with ON 401 Highway towards the southeast.

2.2.3 Site Topography and Drainage

The topography of the site was reviewed using the topography survey provided by Holding Jones Vanderveen Inc. The topography of the site is gradually sloped. Along the northern frontage of the site, adjacent to Dixie Road, the site sits between 90.50 m asl on the north side and 85.50 m asl on the east side. Along the southern frontage of the site, the at-grade elevation of the site adjacent to the York Subdivision, is between 88.60 m asl to the west and 86.00 m asl to the east.

Overall, the site is sloped from the west toward the east with the lowest site elevation being in the south-eastern corner of the site. An additional topographic review of the railway cross sections as shared by the client revealed that the top of rail elevation of the York Subdivision is between 91.44 – 94.26 m asl adjacent to the proposed Development and is 88.6m asl to 86.14m asl at the shared property line. There is a ditch at the bottom of the rail line berm which directs stormwater toward the MTO corridor. No stormwater from the railway berm enters the site.

Surface water drainage on the proposed Development site will be managed through the onsite stormwater management system and outlet to municipal storm sewers as per City of Pickering stormwater management guidelines. No site drainage directed to the rail corridor. Attached to the Report is the current Concept Grading Plan and Concept Servicing Plan for the proposed Development – see **Appendix A.2.1 and A.2.2**.

2.3 Wind Speed and Direction

A wind speed and direction analysis were conducted based on the conditions observed at the Fairport Beach weather station located approximately 1.5 km to the southwest of the proposed Development[1]. The directional and speed analysis is shown in **Figure 5**.

The analysis shows that the prevailing winds blowing from the rail operations (York Subdivision) towards the proposed Development ranges between East Northeast (ENE) to West (W) 59% of the time in a year. That means that for 41% of the time in any given year, the wind is not blowing from rail operations toward the proposed Development.

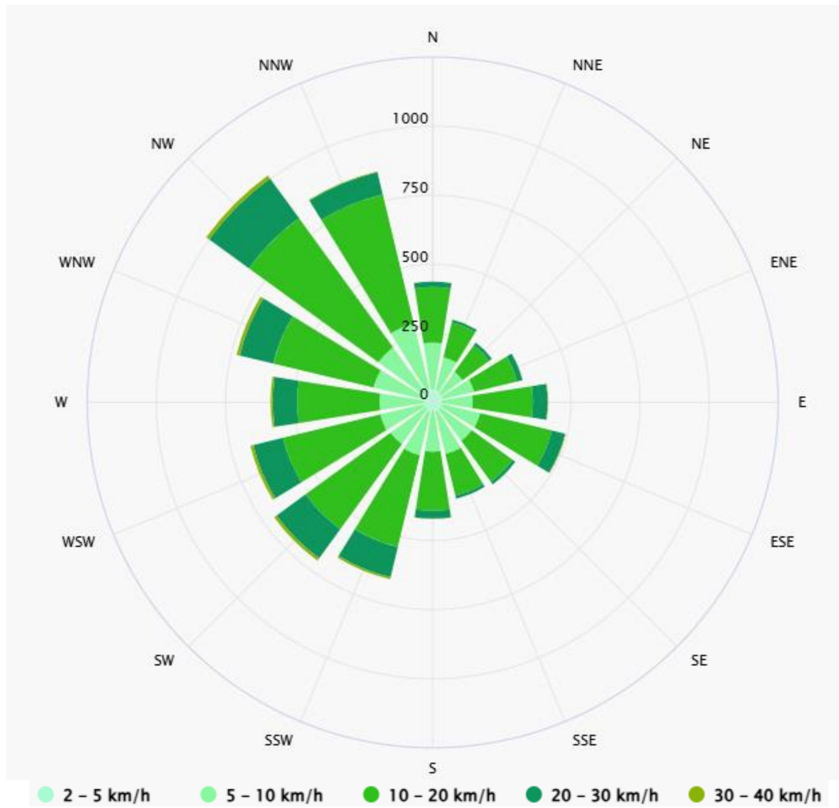


Figure 5: Wind Rose at Fairport Beach Weather Station - Prevailing Winds Blowing from Rail Operations toward the proposed Development (adapted from Meteoblue wind rose)

[1] https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/fairport-beach_canada_5951020 Located 43.81°N, 79.10°W, 89 m asl.

3.0 Railway Details

3.1 Proximity to Rail Operations

A review of the Canadian Rail Atlas indicates that the rail corridor adjacent to the proposed Development is the York Subdivision owned by CN and consists of one active tracks. Rail operations along this track is through freight[2]. The proposed Development is located between MP 1 of the Subdivision to the east and MP 3 to the west with the closest proximity to MP 2. A grade-separated crossing of Kingston Road is located west of the proposed Development, for vehicle traffic (**Figure 1**).

There is no grade level crossing within 800 m of the Development; however, the bordering Kingston Road underpass and Dixie Road provides access to pedestrian, cyclists, and vehicular traffic. There is no rail yard located within 2 km of the proposed Development.

3.2 Communication with Rail Operator/Owner

To obtain a site-specific understanding and confirmation of current and future rail operations, Dillon submitted an information request to CN on October 30, 2024, and requested to meet and discuss the proposed Development. A formal response was received on November 18, 2024 (see **Appendix A.3)**, within which CN stated that the proponent is required to have a crash wall in place if the 30 m setback and 2.5 m high safety berm are not integrated into the proposed Development site design. The crash wall design is required to be reviewed by AECOM. Lastly, CN expressed the need to review the noise and vibration study, and storm water management report.

Since site-specific information on current and future operations were not available at the time this Report was prepared, publicly available information was collected and used.

3.3 Railway Operations

Using the Transport Canada Grade Crossings Inventory, the Transportation Safety Board (TSB) database and the Canadian Rail Atlas, the following determinations were made:

- There is one operational rail track adjacent to the proposed Development site — designated as Main Track[3];
- An average of 31 freight trains per day (11,315 per year) travel along the York Subdivision[4];

[2] Rail Operation Typology as defined in https://www.toronto.ca/wp-content/uploads/2019/05/960c-City-Planning-Final-Report-City-Wide-Land-Use-Study-Development-in-Proximity-to-Rail-Operations-Phase-2-March-21-2019.pdf

[3] Source: https://rac.jmaponline.net/canadianrailatlas/

[4] Source: https://open.canada.ca/data/en/dataset/d0f54727-6c0b-4e5a-aa04-ea1463cf9f4c

- The posted train speed limit along the York Subdivision between MP 1 and MP 3 is 50 mph (or 80.5 km/hr)[4];
- There is no rail yard within 2 km of the proposed Development;
- The TSB designated the York Subdivision as a "Main Track" for tracking of rail accidents on this Subdivision; and
- The York Subdivision is classified as a "Principal Main Line" under the FCM-RAC Guidelines rail classification given the volume and speed of freight rail traffic.

3.4 Rail Incidents and Accidents within Proximity of the proposed Development

Accidents occurring between MP 1 and MP 3 of the York Subdivision from 2004 to 2024, as recorded in the TSB database, were reviewed and are compiled in **Table 1** below. None of these accidents occurred adjacent to the proposed Development.

Table 1: Railway Accidents between Milepost 1 and Milepost 3 of the York Subdivision Relevant to the Study, 2004-2024 (adapted from TSB Rail Occurrence Database)

Accident Type	Milepost Range	Number of Accidents	Timeframe	Number of Fatalities	Number of Injuries
Trespasser	3.5	1	2021	1	0

3.5 Current and Future Rail Traffic

Growth projections for freight train traffic along the York Subdivision were determined using a financial model developed by Dillon that correlates rail traffic to Canada's GDP, as shown in **Figure 6**. The FCM-RAC Guidelines recommends the Rail Safety and Mitigation Study to consider the whole life cycle of the development[5]. Life expectancy of residential and non-residential developments vary but for purpose of the Report, we assumed 75 years based on 2004 survey on actual services lives for North American buildings[6]. The Rail Safety and Mitigation Study assumed an occupancy time frame between 2031 and 2105 (a total of 75 years).

[5] Source: FCM-RAC. (2013). Guidelines for New Development in Proximity to Railway Operations. p. 73

[6] Source: Jennifer O'Connor, Forintek Canada Corp., Vancouver, BC, Canada. Survey on actual service lives for North American buildings.

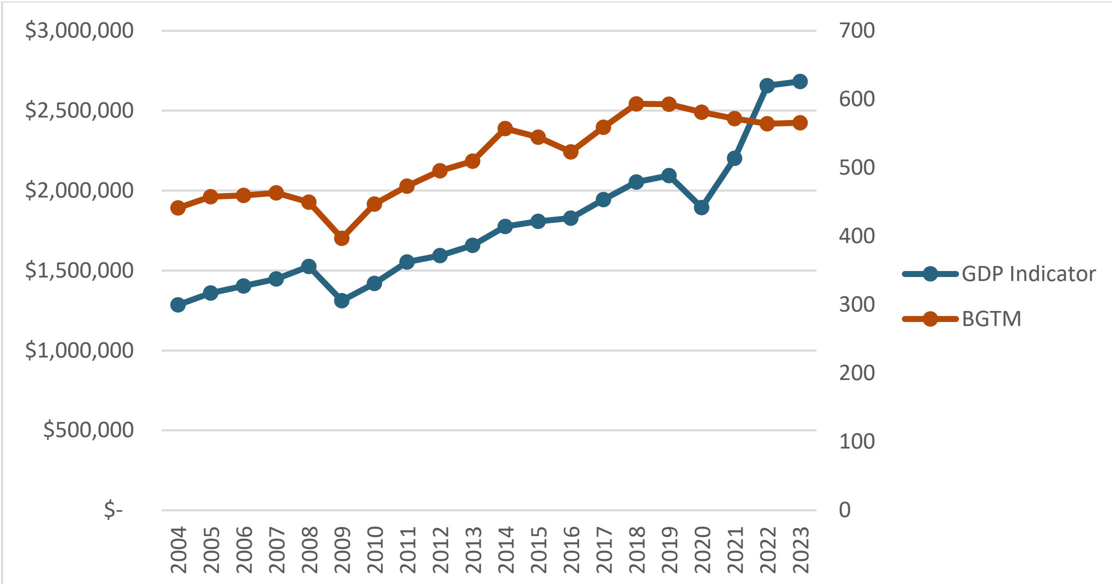


Figure 6: Canadian Freight Rail Forecast Model – Correlation between Freight Hauled in Canada to Gross Domestic Product Indicator (2004 – 2023)

4.0 Construction Details

The Proposed Development will be built in phases based on market conditions with an estimated start date in 2028. Demolition of existing infrastructures will be required. Services and utilities will be in an area that will not require to cross the railway ROW. Construction details are not available at this stage, but in general all earthworks will take place within the property lines of the Proposed Development and no access to the railway corridor or disruption to the railway operation are anticipated. Typical plans such as grading, stormwater management as well as sediment an erosion control will be issued and reviewed by the authority having jurisdiction prior to construction.

It is assumed one or more stationary tower cranes will be used, such as the one shown in **Figure 7**[7]. According to the reference, the maximum boom length for a tower crane is 60 m. Given that the Proposed Development is 30 m from the rail property line, the boom may swing onto rail property.

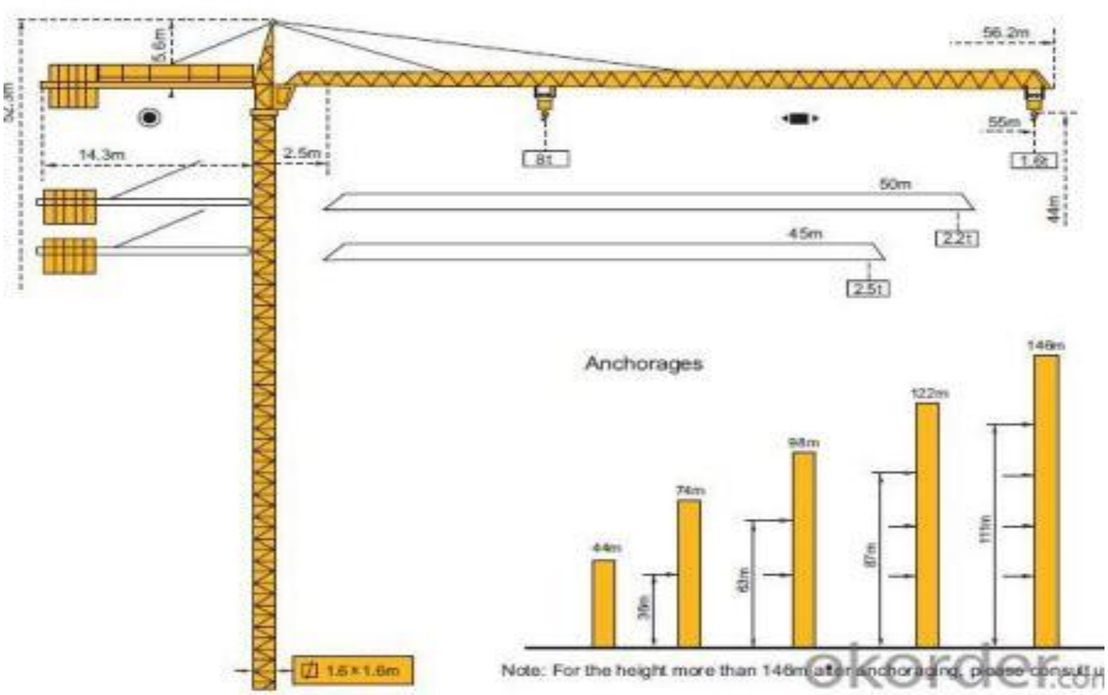


Figure 7: Example Tower Crane

[7] Source : https://www.gruasyaparejos.com/en/tower-crane/tower-crane-dimensions/

5.0 Rail Proximity Requirements for Proposed Development

5.1 FCM-RAC Guidelines

The FCM-RAC Guidelines communicate relevant information to parties interested in undertaking development projects adjacent to railway operations.

The York Subdivision is classified as a "Main Line" under the FCM-RAC Guidelines rail classification. The "Main Line" (typically separated into "Principal" and "Secondary) classification is defined as:

- Volume generally exceeds five trains per day;
- High Speeds, frequently exceeding 80 km/hr; and
- Crossings, gradients, etc. may increase normal railway noise and vibration.

Using the above information, the standard FCM-RAC safety mitigation measures would be as follows and it should be noted that any deviation from the identified requirements would be taken into consideration within the Report.

5.1.1 Building Setbacks

The recommended building setbacks for new residential and sensitive use development adjacent to a Main Line is 30 m. The setback is to be measured as a straight-line horizontal distance from the mutual property line to the building face. It is measured from the mutual property line to ensure the entire railway property is protected for potential future rail expansion. Appropriate uses within the setback area include roads, parkland and other outdoor recreational space, unenclosed gazebos, garages, and other parking structures and storage sheds. Additional details can be found in Section 3.3 of the FCM-RAC Guidelines.

5.1.2 Earthen Berm

An earthen berm provides a safety barrier to afford a maximum level of mitigation when combined with the setback described above. Berms are to be constructed adjoining and parallel to the railway right-of-way. The following specifications apply to a principal main line: 2.5 metres above grade with side slopes not steeper than 2.5 m to 1 m. If applicable to the site conditions, in lieu of the recommended berm, a ditch or valley between the railway and the subject new development property that is generally equivalent to or greater than the inverse of the berm could be considered. Additional details can be found in Section 3.6 of the FCM-RAC Guidelines.

5.1.3 Security Fencing

According to the RAC-FCM Guidelines, residential developments must include a 1.83 m high chain link fence along the entire mutual property line, to be constructed by the owner entirely on private property. Other materials may also be considered, in consultation with the relevant railway and the municipality. Additional details can be found in Section 3.7 of the FCM-RAC Guidelines.

5.1.4 Stormwater Management and Drainage

Stormwater management and drainage infrastructure proposed with the proposed Development will be managed onsite and should not adversely impact the function, operation, or maintenance of the corridor or should not adversely affect area development. Additional details can be found in Section 3.8 of the FCM-RAC Guidelines.

5.1.5 Noise and Vibrations Considerations

The level and impact of noise in each site located within the noise and vibration influence areas should be assessed through noise and vibration impact studies to determine appropriate control measures. Additional details can be found in Section 3.4 and 3.5 of the FCM-RAC Guidelines. These recommendations are only required for residential developments.

5.1.6 Air Quality Considerations

Although not explicitly addressed in the FCM-RAC Guidelines, air quality considerations are generally expected for developments situated along railway corridors. Emissions from rail operations, alongside noise and vibrations, can lead to complaints from building occupants. Factors such as idling locomotives on main tracks, as well as rail-related incidents and accidents—including the release of dangerous goods and fires—can significantly affect air quality in nearby developments. To mitigate these air quality issues, various building design elements can be implemented, such as strategically oriented fresh air intake systems and the use of air filtration technologies.

5.2 Summary

Based on our research, the current operation of the York Subdivision does meet the “Principal Main Line” classification defined by the FCM-RAC Guidelines. There are currently approximately 31 trains per day and the posted track speed in the study area is not to exceed 80.5 km/hr (50 mph).

The proposed Development deviates from the following standard mitigation measures within the FCM-RAC Guidelines:

- Building setback is <30m from the shared CN York Subdivision property line to the edges of the buildings (**Figure 2**), although there are no proposed residential or sensitive/collective facility occupancies within the 30m setback. The uses within the 30m setback will consist of multi-level parkade with a 7^{th} floor outdoor terrace, a multiuse path and a regional servicing easement; and

- An earthen berm, or a crash berm are not included within the 30m setback. The 30 m setback from the shared CN main track rail freight corridor property line to the proposed Development, consists of a Regional Servicing Easement that varies in width between 12-14 m, a Multiuse path that is 6 m wide and a 14 m wide setback as required by Ontario Ministry of Transportation (MTO) on the southeast end. As noted in the INDENTURE made in duplicate on 13th November 1975, between the Bramalea Consolidated Development Limited (Grantor) and The Regional Municipality of Durham (Grantee) that the easement should be “free and clear of any buildings, structure or obstructions, not to deposit on or remove any fill from the said lands, and not to do or suffer to be done any other thing which may or might injure or damage any of the works of the Grantee herein.”

These deviations are acknowledged and taken into consideration when completing the Report.

6.0 Rail Safety and Risk Mitigation Methodology

6.1 Overview

The approach to conducting the rail safety analysis aligns with the International Organization for Standardization (ISO) 31000:2018-02 Risk Management - Guidelines (ISO 31000), and more specifically the process for conducting a risk assessment, which is summarized in **Figure 8**. Further details on how we applied the ISO 31000 methodology is provided in the following sections.

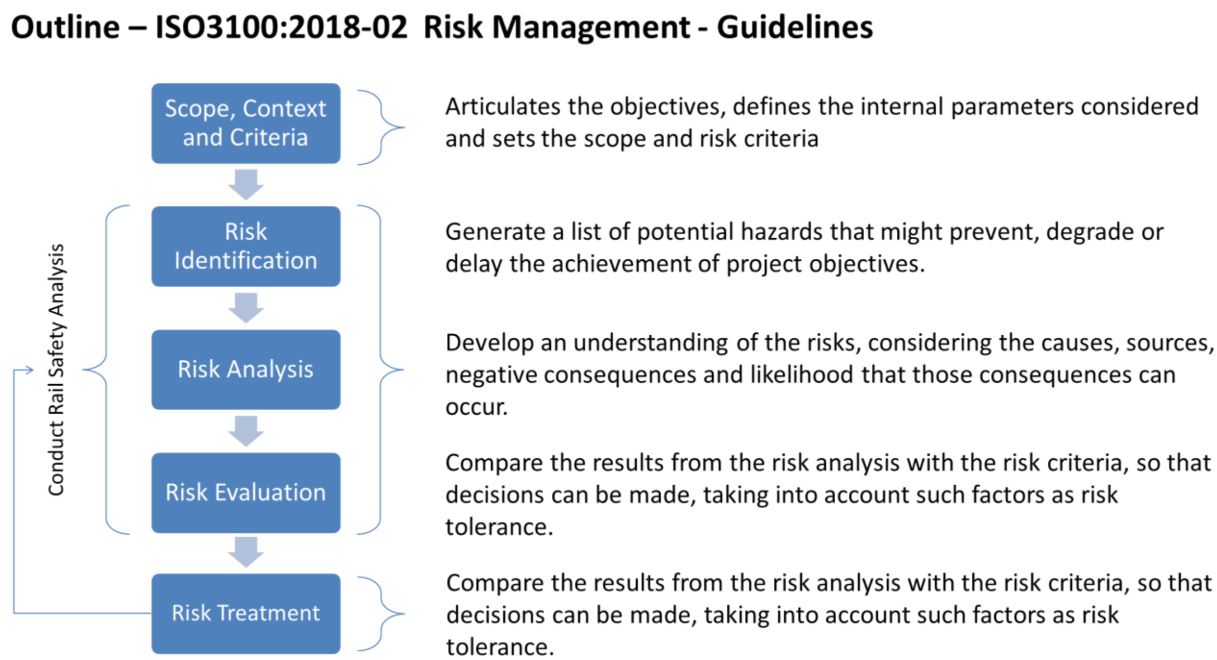


Figure 8: ISO-31000:2018-02 Risk Assessment Process

Our approach aligns with the Development Viability Assessment (DVA) exercise presented in the FCM-RAC Guidelines which must:

i. Identify all potential hazards to the operational railway, its staff, customers and the future residents of the development;
ii. Take into account the operational requirements of the railway facilities and the whole life cycle of the development;
iii. Identify design and construction issues that may impact on the feasibility of the new development;
iv. Identify the potential risks and necessary safety controls and design measures required to reduce the risks to the safety and operational integrity of the railway corridor and avoid long-term disruptions to railway operations that would arise from a defect or failure of structure elements; and
v. Identify how an incident could be managed if it were to occur.

Further details on the Scope, Context and Criteria are provided in the following sections. Additional details on conducting the rail safety analysis and provided in **Sections 7.0** and **8.0**.

6.2 Scope, Context and Criteria

The section below outlines the applicable risk criterion for the proposed Development which have been identified under:

- Risk Criteria – Public Fatality
- Risk Criteria – Public Evacuation

6.2.1 Risk Criteria – Public Fatality

When dealing with industrial-based hazards, such as freight rail, and its potential to impact the general public, the Major Industrial Accidents Council of Canada (MIACC) developed risk criteria to help evaluate the tolerance level of fatality-based risks based on the type of land use (**Table 2**). This table outlines the various categories and their associated maximum tolerable frequencies. Another way of interpreting this information would be to say that for a risk frequency of $\leq 1.00 \times 10^{-4}$, someone would have to be standing in the location of the associated hazard for a period of 10,000 years and at some point, during that time, a fatality would occur from the hazard.

Table 2: MIACC Risk Criteria – Public Fatality

Land Use/Occupancy Definition	Applicability to the Development	Maximum Tolerable Frequency Each year, there is a [insert] chance of a Fatality	Minimum Tolerable Return Period The chances of a Fatality are 1 in [insert] years	Annual Probability of Occurrence Each year there is a [insert] chance of fatality
Manufacturing (industrial, warehouses, open space, parkland, golf courses)	Parking Lot, Open space and Private Terrace with intermittent occupancy (for 7th floor residents)	$\leq 1.00 \times 10^{-4}$	≥10,000	0.01%
Low-Density (single family residential, townhouses, recreation centres, entertainment complexes)	Not Applicable – no use within the RPE	$\leq 1.00 \times 10^{-5}$	≥100,000	0.001%
High-Density (high-density residential, motels, hotels)	Not Applicable – no use within the RPE	$\leq 1.00 \times 10^{-6}$	≥1,000,000	0.0001%
Sensitive (day cares, hospitals, group homes)	Not Applicable – no use within the RPE	$\leq 0.30 \times 10^{-6}$	≥3,333,333	0.00003%

The MIACC Risk Criteria – Public Fatality reflects that no mitigation for a specific parcel is deemed necessary, as long as the Maximum Tolerable Frequency for the specific land use(s) or occupancy is met; otherwise, mitigation is needed

The following land use criterion is applicable for the proposed Development:

- **Manufacturing** – during construction phase of the proposed Development, the occupancy within the Property aligns with manufacturing. Within the proposed Development, the parkade (parking lot) along the shared property line, the open outdoor spaces and private terrace meet the MIACC definition of manufacturing uses because the occupancy of these spaces by people do not approach 24 hours a day, 7 days a week. The parkade is expected to typically see people coming and going for shorter periods of time thus reducing exposure to risk significantly.

6.2.2 Risk Criteria – Public Evacuation

The MIACC Risk Criteria (as shown in **Table 3**) was developed for individual *fatality* frequencies, not public evacuation frequencies; therefore, the MIACC Risk Criteria needed to be adapted. Historical records[8] of industrial incidents were reviewed to compare the number of incidents that resulted in public evacuations (to prevent fatalities) versus the number of incidents that resulted in public fatalities. Over the 30-year timeframe, there were 92.8 incidents that resulted in public evacuations for every one incident that resulted in one or more fatalities – an indication of the threshold that emergency responders gauge the need to evacuate in order to prevent public fatalities. As such, this "threshold" was utilized as a proxy to reflect the public "tolerance" to what is considered an acceptable level of risk for a freight train incident that necessitates public evaluation and determine whether a site-specific evacuation plan that takes rail-based hazards into consideration is necessary. The corresponding adjustment to the MIACC Risk Criteria is summarized in **Table 3**.

[8] Public Safety Canada's Canadian Disaster Database for Technology- Related Incidents (e.g., fire, hazardous chemical, transportation accident, infrastructure failure, explosion) from 1991-2020, a 30-year timeframe.

Table 3: Evacuation-Based Risk Criteria (Adaptation of MIACC Risk Criteria)

Land Use/Occupancy Definition	Applicability to the Development	Maximum Tolerable Frequency Each year, there is a [insert] chance of an Evacuation	Minimum Tolerable Return Period The chances of an Evacuation are 1 in [insert] years	Annual Probability of Occurrence Each year there is a [insert] chance of an Evacuation
Manufacturing (industrial, warehouses, open space, parkland, golf courses)	Parking Lot, Open space and Private Terrace with intermittent occupancy (for 7th floor residents)	≤9.28×10^{-3}	≥108	0.93%
Low-Density (single family residential, townhouses, recreation centres, entertainment complexes)	Not Applicable	≤9.28×10^{-4}	≥1,078	0.09%
High-Density (high-density residential, motels, hotels)	Not Applicable	≤9.28×10^{-5}	≥10,777	0.009%
Sensitive (day cares, hospitals, group homes)	Not Applicable	≤2.78×10^{-5}	≥35,923	0.003%

7.0 Risk Safety Analysis – Risk Identification

The first step to conducting the rail safety analysis, as illustrated in **Figure 8**, is Risk Identification, which requires the development of credible scenarios that take into consideration the relevant hazards pertaining to:

- Site details;
- Railway details; and
- Construction and development details.

Further details that rationalize the scenarios are provided below.

7.1 Scenarios – Site Details

The site details that need to be considered when developing credible "what-if" scenarios include existing site drainage patterns of the proposed Development, topography, and environmental setting. Based on our understanding of the site details for the Proposed Development, the following scenarios were identified:

- **Scenario 1 –** Topography is such that there is a limited risk of surface water runoff generated from within the proposed Development towards the York Subdivision. The elevation of the top of track for the York Subdivision is between 91.44 - 94.26 m asl, whereas the at-grade elevation of the proposed Development is 89.5 m asl. The standard construction practices to limit sediment runoff during construction would be appropriate and no further risk analysis is deemed necessary. See **Table 8** of **Section 9.2** for additional details.
- **Scenario 2** – Encountering contaminated soils within proximity of the property line to the York Subdivision during construction activities are considered a risk. No further risk analysis is deemed necessary and specific mitigation measures are identified in **Table 8** of **Section 9.2** for consideration.

The meteorological conditions (wind speed and direction) were considered when evaluating scenarios under Railway Details (see **Section 7.2**).

7.2 Scenarios – Railway Details

Due to the nature of rail operations that are taking place adjacent to the proposed Development, the following scenarios were analyzed:

- **Scenario 3** – Physical hazards of a train derailment that would impact the proposed Development and cause one or more public fatalities.
- **Scenario 4** – Chemical hazards due to the releases of Dangerous Goods (DG) from a train accident on the York Subdivision that has the potential to cause a public fatality; therefore, requiring public evacuation of the Proposed Development.

7.2.1 Scenario 3 – Train Derailment Leading to Public Fatality

Train traffic within proximity of the proposed Development was analyzed to determine the public fatality risk due to the physical hazards of a train derailment, using the concept called the Rail Proximity Envelope (RPE) as shown in **Figure 9**. The RPE reflects the areas of the Proposed Development that could be exposed to the physical hazards of a train derailment involving two or more derailed rail cars – 30 m setback from the property line and 7 m high. The 30 m distance reflects the length of the longest rail car that is typically utilized in Canada that would be involved in a jackknife type derailment.

Figure 9: Rail Proximity Envelope Concept Illustration

As stated in **Section 2.1**, the proposed Development is within 30 m from the mutual property line with the York Subdivision; therefore, there is a risk of a train derailment that would physically impact the proposed Development, leading to one or more fatalities. As such, this scenario was brought forward in the analysis. However, it should be noted that 30 m setback consists of a 12 m Regional Servicing Easement, a 6 m wide Multi-use path and a 12 m wide open space within the proposed development (which includes the parkade and Private Terrace with intermittent occupancy for 7th floor residents). There are no residential and sensitive use occupancy present within the 30 m setback from the property line.

The secondary or consequential damages of a derailment extends past the direct physical impact, as debris can be propelled far beyond the physical footprint of the incident. The scattered debris poses significant risk to the surrounding areas which includes the proposed Development within the 30 m proximity. This scenario was also brought forward in the assessment.

7.2.2 Scenario 4 – Dangerous Good Release Leading to Public Evacuation

Requirements of Section 113 and 114 of the *Canada Transportation Act* state that “Federal railways must, without delay, carry all traffic tendered by shippers”. This includes DG, which must be transported following the Transportation of Dangerous Goods Regulations. Therefore, the transportation of DG by rail is considered an inherent risk, as it cannot be avoided.

Due to the inherent risks posed by DG, we focused on the likelihood of evacuations related to DG releases due to a rail accident (derailment, collision, etc.) to determine the need for a rail-specific

Emergency Response and Management Plan for the proposed Development. As such, this scenario was brought forward in the analysis.

7.3 Scenarios – Construction and Development Details

During construction of the proposed Development, the following scenarios were identified:

- **Scenario 5** – Construction debris falling onto the rail tracks from a crane.
- **Scenario 6** – Construction worker getting struck by passing train. Given there is a shared property line between the rail corridor and the proposed Development property, there is potential for a construction worker to be unaware of rail operations and inadvertently enter the railway property.

During occupancy of the proposed Development, the following scenario was identified:

- **Scenario 7** – Pedestrian originating from the proposed Development that trespasses and is struck by a train.

7.3.1 Scenario 5 – Construction Debris falling onto the Rail Tracks from a Crane

As stated in **Section 4**, the boom from a tower crane at the Development could potentially extend onto the railway ROW. As such, mitigation measures must be in place should the construction phase require a tower crane that would have to swing overtop of the railway ROW. As a mitigation strategy, it is advisable to ensure clearance envelope[9] are not violated at all times during construction.

It is standard practice for developers to negotiate crane swing agreements with third parties. As such it is anticipated that the Client will contact CN prior to the issuance of building permits to obtain permission to conduct any ground or air activities within the railway property if required. There should also be a plan in place between CN and the Proponent highlighting the process and communication protocol to follow if equipment or debris falls onto the railway property.

It is recommended that the Proponent coordinate with CN on safety procedures prior to construction. No further analysis is deemed necessary for this scenario. See **Table 8** of **Section 9.2** for additional details.

7.3.2 Scenario 6 – Construction Worker Struck by Passing Train

Given the proximity of construction activities adjacent to the CN York Subdivision, there is the potential for a construction worker to be unaware of active rail operations and inadvertently enter the rail corridor and walk onto the railway tracks, which could result in being struck by a passing train. This is

[9] Canadian National. (2022). *Customer Safety Handbook*. https://www.cn.ca/-/media/Files/Delivering-Responsibly/Safety/Customer-Safety-Handbook-en.pdf?la=en&hash=8C8A55F23C9CBCE5A49C7FB5322280DC82ADAA54

considered highly unlikely due to the elevation of the York Subdivision relative to the Development (see **Appendix A.1**). No further analysis was deemed necessary for this scenario.

7.3.3 Scenario 7 – Trespassing from the Development

Given that there will be an increase in population living within proximity of a railway corridor, there is a corresponding increased risk of trespassing, especially if there are:

- Specific ingress and/or egress points from the proposed Development;
- Unfenced or unsecured points along the property line; and
- Insufficient pedestrian and cyclist access to existing rail crossings.

As mentioned in **Section 3.4**, only 1 trespassing accident was identified along the York Subdivision between 2004 and 2024, leading to 1 fatality. However, this accident did not occur near MP 2, where the proposed Development is located. The Kingston Road underpass is situated to the west of the proposed Development, which is intended for only vehicular traffic and no pedestrian walking. On the east, is the Dixie Road with residential and commercial establishments and equipped with sidewalks for safe and convenient travel for pedestrians. South the proposed Development is bordered by ON 401 Highway.

Given the current information and considering the type of users that the new development will attract, the risk that someone might unintentionally wander onto the rail right of way (ROW), potentially leading to an accident with a moving train, is considered unlikely. No further risk analysis is deemed necessary. As such, Scenario 7 was not brought forward in the analysis.

7.4 Summary – Scenario Development

In total, seven scenarios were identified (summarized in **Table 4**). Two scenarios were brought forward to the risk assessment, while risk mitigation measures were identified for the remaining five scenarios. Further details on the risk assessment are provided in **Section 8.0** of this report.

Table 4: Summary of Identified Scenarios

Scenario	Recommendations
Site Details	
Scenario 1 – Stormwater runoff and sediment loading onto York Subdivision during construction	Mitigation – refer to **Section 7.1**
Scenario 2 – Encountering contaminated soils within proximity of the property line	Mitigation – refer to **Section 7.1**
Railway Details	
Scenario 3 – Train derailment leading to public fatality	Risk Assessment – see **Section 8.1**
Scenario 4 – DG release leading to public evacuation	Risk Assessment – see **Section 8.2**

Scenario	Recommendations
Construction and Operations Details	
Scenario 5 – Construction debris falling onto rail tracks	Mitigation – refer to **Section 7.1**
Scenario 6 – Construction worker struck by passing train	Mitigation – refer to **Section 7.1**
Scenario 7 – Trespassing from the Proposed Development	Mitigation – refer to **Section 7.1**

8.0 Risk Safety Analysis – Risk Analysis and Evaluation

Following the completion of the Risk Identification, two scenarios were brought forward for further analysis:

- **Scenario 3** – Train derailment of two or more derailed cars leading to public fatality – See **Section 7.2.1**; and
- **Scenario 4** – DG release leading to public evacuation – **See Section 7.2.2**.

The risks that are analyzed for each of the two scenarios were evaluated using the risk criteria presented in **Section 6.2.1** for public fatalities and **Section 6.2.2** for public evacuations.

8.1 Risk Assessment Results: Scenario 3 – Train Derailment Leading to Public Fatality

The focus for the rail safety analysis is on the risks due to a freight train derailment on the York Subdivision that would impact the proposed Development and cause one or more fatalities. The public fatality risk for a development due to the physical hazards of a train derailment is evaluated using the concept called the Rail Proximity Envelope (RPE) as stated in **Section 7.2.1.**

The physical hazards of a train derailment can be further broken down into two categories:

1. Physical impact of derailment; and
2. Debris generated by the derailment.

8.1.1 Physical Impact of Derailment

As stated in **Section 7.2.1**, the proximity of the proposed Development to adjacent rail operations is such that there is the risk of a train derailment that, if it were to occur, can result in public fatalities within the RPE. The likelihood of a train derailment that could lead to one or more public fatalities within the RPE is based on the analysis of the TSB Rail Occurrence database from the period of January 1, 2004, to December 31, 2024, that took the following factors into consideration:

1. **Accident Type:** The frequency of main-track derailments including two or more derailed cars leading to one or more fatalities;
2. **Rail Activity Type:** All rail activities were included, with the exception of switching, inspection, and maintenance;
3. **Train Type:** All train types were included, except commuter and passenger trains;
4. **Approximate Train Speed:** The speed of the train, which determines how many cars are likely to derail (potential impact zones);

5. **Approximate Train Speed:** The speed of the train, which influences the likelihood of a derailment; and
6. **Train traffic:** the volume of freight hauled within Proximity of the proposed Development between the following time periods:
   a. **2028 to 2030** – Construction period; and
   b. **2031 to 2105** – Occupancy of the proposed Development.

The risk assessment also took into account two factors, which are specific to the proposed Development**:**

1. The width of the regional servicing easement, multiuse path and the corresponding parkade that are within the RPE – 30 m (**Figure 2**); and
2. The corresponding occupancy type within the RPE between 2028 and 2030, and 2031 to 2105.

The size of a train derailment, measured by the number of railcars that derail, is linked to the speed of the train at the time of the derailment. The TSB Rail Occurrence database was analyzed between January 1, 2004, to December 31, 2024, to determine the average number of railcars that would derail per accident for the maximum train speeds on the York Subdivision at 50 mph. At 50 mph, a freight train derailment will result in an average of 11 cars derailed.

Utilizing the information above, Dillon estimated the frequency (as Return Period) of train derailments of two or more derailed cars, both present and future, which could lead to a fatality for the occupancy type within the RPE. Findings are summarized in **Table 5**.

Table 5: Risk Assessment Findings: Scenario 3 – Train Derailment Leading to Public Fatality

Occupancy/Location within the RPE	Return Period Threshold	Findings (Colour coding represents the applicable Land Use/Occupancy Definition – see Table 3
Year 2028 to 2030 (Construction)		
Construction Site	> 1 in 10,000 years in 2028 > 1 in 10,000 years in 2030	**No exceedance of Risk Criteria**
Year 2031 to 2105 (Occupancy)		
Parking Lot, Open space and Private Terrace with intermittent occupancy (for 7th floor residents)	> 1 in 10,000 years in 2031 > 1 in 10,000 years in 2105	**No exceedance of Risk Criteria**

The findings show that there are no exceedances of the Risk Criteria, for both Year 2028 train traffic and Year 2105 train traffic.

8.1.2 Debris Generated from Derailment

The secondary effect of a derailment is the generation of debris that could travel within the RPE and physically strike a resident within the Proposed Development. To better understand the hazards associated with debris from a derailment, research of derailments in Canada and globally was completed. Specifically, we investigated the following accidents:

- Lac-Mégantic train derailment, July 6, 2013; and
- Greece Passenger Rail Accident, February 28, 2023.

The following findings can be drawn regarding the physical hazards applicable to the Proposed Development:

Finding 1. A derailment (either of a single train or due to a collision of 2 or more trains) is the primary hazard associated with an accident occurring adjacent to the Proposed Development, that is relevant within the RPE.

Finding 2. Debris is a consequential outcome of the primary hazard (being a train accident such as a derailment or collision) and is a relevant physical hazard within the RPE.

Finding 3. Debris generated from collisions involving freight trains is limited and does not extend beyond the footprint of the accident.

Supplemental information is appended to this report – see **Appendix A.4**.

8.2 Risk Assessment Results: Scenario 4 – Dangerous Good Release Leading to Public Evacuation

This scenario is based on rail incidents or accidents (derailment, collision, etc.) resulting in a DG release, requiring the evacuation of the public from the proposed Development (see **Section 7.2.2**). The likelihood of this scenario is based on the analysis of the TSB Rail Occurrence database that took the following factors into consideration:

1. **Accident Type**: All accident types excluding passenger and non-main track accidents leading to an evacuation;
2. **Rail Activity Type**: All rail activities with the exception of switching, inspection, and maintenance;
3. **Train Type**: All train types except commuter and passenger trains;
4. **Approximate Train Speed**: 0 to 50 mph; and
5. **Train Traffic**: the volume of freight hauled within Proximity of the proposed Development between the following time periods:
    a. 2028 to 2030 – Construction period; and
    b. 2031 to 2105 – Occupancy of the proposed Development.

The risk assessment also took into account two factors which are specific to the proposed Development:

1. The length of exposure along the York Subdivision where the event can occur, which is 1,600 m on either direction from the proposed Development based on total evacuation distance for a Class 2 Dangerous Goods (anhydrous ammonia) spill; and
2. The corresponding occupancy type within the RPE between 2028 and 2030, and 2031 to 2105.

Sections 113 and 114 of the *Canadian Transportation Act* state that "Federal railways must, without delay, carry all traffic tendered by shippers". This includes DG, which must be transported following the Transportation of Dangerous Goods Regulations; therefore, the transportation of DG by rail is considered an inherent risk of freight rail and cannot be avoided by developments adjacent to rail. This analysis considered the worst-case DG release, that of anhydrous ammonia.

According to the 2024 Edition of the Emergency Response Plan prepared by Transport Canada (called CANUTEC), which would be referenced by the City's Fire and Paramedic Services when responding to a derailment involving an anhydrous ammonia car, the minimum evacuation distance if there is a risk of a fire is 1,600 m in all direction. Details are found in Guide 125 of the CANUEC Guide[10].

Given that emergency responders tend to evacuate the public within a specified radius of the accident in all directions, the prevailing wind direction at the time of the accident may not influence the frequency and therefore, it was not taken into consideration within the risk analysis; this is considered a conservative assumption.

Utilizing the information above, Dillon estimated the frequency (as Return Period) of an accident and/or incident resulting in an evacuation, both present and future. As shown in **Table 6**, no exceedance of the Risk Criteria was found for this event for the Construction site, Parking lot, Open Space and Private Terrace with intermittent occupancy (7th floor residence), starting from 2028 till the Year 2105.

Table 6: Risk Assessment Findings: Scenario 4 – Dangerous Good Release Leading to Public Evacuation

Occupancy/Location	Return Period Threshold	Findings (Colour coding represents the applicable Land Use/Occupancy Definition – see Table 4)
Year 2028 to 2030 (Construction)		
Construction Site	> 1 in 108 years in 2028 > 1 in 108 years in 2030	**No exceedance of Risk Criteria**
Year 2031 to 2105 (Occupancy)		
Parking Lot, Open space and Private Terrace with intermittent occupancy (for 7th floor residents)	> 1 in 108 years in 2031 > 1 in 108 years in 2105	**No exceedance of Risk Criteria**

[10] CANUTEC. (2020). Guide 125. https://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx/guide125/id119/mnid195

9.0 Conclusions and Recommendations

A residential development is proposed at 1095 Kingston Road in Pickering, Ontario, which will contain:

- Four residential towers with a combined gross building area (GBA) ranging from 1,520,232 to 1,568,670 square feet;
- A total of 1,498 to 1,564 residential units distributed across the four towers; and
- A multi-level parking facility spanning the P1 level, ground floor, mezzanine, and levels 2-6, providing a total of 1,068 parking spaces.

Given the proximity of the proposed Development to active freight rail operations conducted by CN, Dillon completed a rail safety and risk mitigation study to determine whether the proposed Development satisfies the safety requirements presented within the FCM-RAC Guidelines. Although the proposed Development does deviate from the standard mitigation measures within the FCM-RAC Guidelines, overall, the proposed Development is considered safe, substantiated by the specific conclusions and recommendations provided in the following sections.

9.1 Conclusions

A total of seven scenarios were identified and analyzed within the Rail Safety Study that cover risks associated with:

1. Site Details;
2. Railway Details; and
3. Construction and Development.

Of the seven, only two were identified that required a risk assessment to be completed that considered:

- **Scenario 3** – Train derailment leading to public fatality; and
- **Scenario 4** – DG release leading to public evacuation.

The MIACC risk-based land use standards were utilized to determine whether the risks were considered acceptable based on the occupancy and land-use activities that will be taking place at the proposed Development as it is currently proposed. Our conclusions are summarized in **Table 7**.

Table 7: Risk Assessment Conclusions for Scenarios 3 and 4

Total Risk	Conclusions
Scenario 3 – Risk of a public fatality	The parking lot, open space and Private Terrace with intermittent occupancy (for 7th floor residents) are located within the RPE and would be exposed to a derailment, if it were to occur. Based on our analysis, there is an acceptable level of risk based on the current and future forecasted train traffic.

Total Risk	Conclusions
	Residential occupancy is located beyond the RPE and although the proposed Development deviates from the FCM-RAC Guidelines (no earthen berm or other physical barriers within the RPE), it should be noted that the physical footprint of a derailment is highly improbable to extend beyond the RPE. Further, the consequential outcome of a derailment – debris – tend to be contained within the footprint of the derailment. As such, the physical risks associated with a train derailment leading to one or fatalities should not extend beyond the RPE and thus do not pose a risk to the residential occupants that would justify additional mitigation measures. Therefore, there is no need for a crash wall or other physical barriers to protect the uses within the RPE or the adjacent residential uses. **No additional mitigation measures are required.**
Scenario 4 – Risk of a public evacuation of the development due to a DG release	No exceedance of Risk Criteria for either Construction or Parking lot – **A site-specific evacuation plan based on rail-related accidents is not required.**

The risks associated with the remaining five scenarios are considered manageable based on proposed design and construction measures outlined in **Section 9.2**.

9.2 Recommendations

A summary of the recommendations for the remaining five scenarios are summarized in **Table 8**.

Table 8: Summary of Recommendations

Scenario	Recommendations
Scenario 1 – Stormwater runoff and sediment loading onto York Subdivision during construction	Topography is such that there is a limited to no risk of surface water runoff generated from within the proposed Development towards the York Subdivision. Surface water drainage on the Proposed Development site will be managed through the onsite stormwater management system and outlet to municipal storm sewers as per City of Pickering stormwater management guidelines.
Scenario 2 – Encountering contaminated soils within proximity of the York Subdivision during construction activities	If suspected contaminated soils are encountered during construction within proximity of the property line to the rail corridor, the property owner should **initiate discussions with CN on next steps**.

Scenario	Recommendations
Scenario 5 – Construction debris falling onto rail track	Panels will be required to be lifted to the south of the building using a crane. Thus, it is probable for the boom of the crane swing onto the railway property. **Should the crane need to swing overtop the rail ROW, it is recommended to determine if an Air Right Agreement / Crane Swing Agreement with CN is needed.** Also, there should be a **plan in place between CN and the Proponent highlighting the process and communication protocol to follow if equipment or debris fall onto the railway property.** **Construction screening** should be utilized along the mutual property line to contain any fallen equipment/debris within the Property.
Scenario 6 – Construction worker getting struck by passing train	Given the proximity of the construction of the proposed Development to the adjacent York Subdivision, there is limited to no potential for a construction worker to be unaware of active rail operations and inadvertently enter the rail corridor and walk onto the railway tracks, resulting in being struck by a passing train.
Scenario 7 – Pedestrian originating from the Development that trespasses and is struck by a train	There is a shared property line between the York Subdivision and the proposed Development which generates a risk of trespassing originating from the proposed Development entering the rail property. However, the York Subdivision is between 1.94 to 4.76 m higher than the proposed Development along the shared property line which will discourage trespassers. There are also no “attractive nuisances” to the south of the York Subdivision that would draw trespassers. Nevertheless, to discourage trespassing and align with the FCM-RAC Guidelines, Dillon recommends that that a 1.83 m-high temper proof fence be integrated within the Project design along the mutual property line. A pro-active public safety communication such as Operations Lifesaver is recommended to advise people (residents, users) of the dangers of trespassing and to increase overall rail safety awareness. Rail operation awareness should be included in any site-specific Health and Safety Plan for maintenance operations. Dillon also recommends “No Trespassing” signages to be erected on the fence to remind pedestrians that they are not allowed on the rail corridor and that suitable rail crossings are accessible in close proximity. In addition to the above, Dillon recommends that behavior patterns of occupants within the proposed Development be monitored to determine if trespassing is occurring.

10.0 Closure

This report has been prepared for 1095 Kingston Road Ltd. This report may become a public document upon submission. The report is based on information provided to or obtained by Dillon Consulting Limited (Dillon) as indicated in the report and applies solely to site conditions existing at the time of the Rail Safety and Mitigation Study and on future projected traffic.

The material has been prepared by Dillon in accordance with the standards of care and skill commonly exercised by professionals practicing in this field and based on the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report
Sincerely,

DILLON CONSULTING LIMITED

81164

2025-04-03

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED

RM SIGNATURE:

RM APEGA ID #: 100600

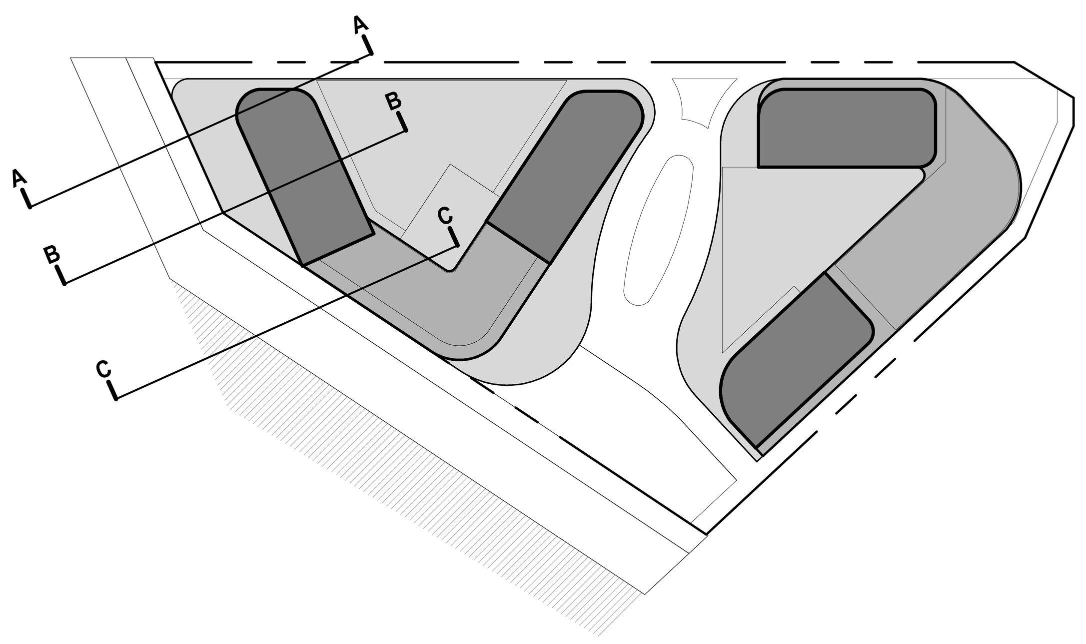
DATE: 2025-04-03

PERMIT NUMBER: P002528
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

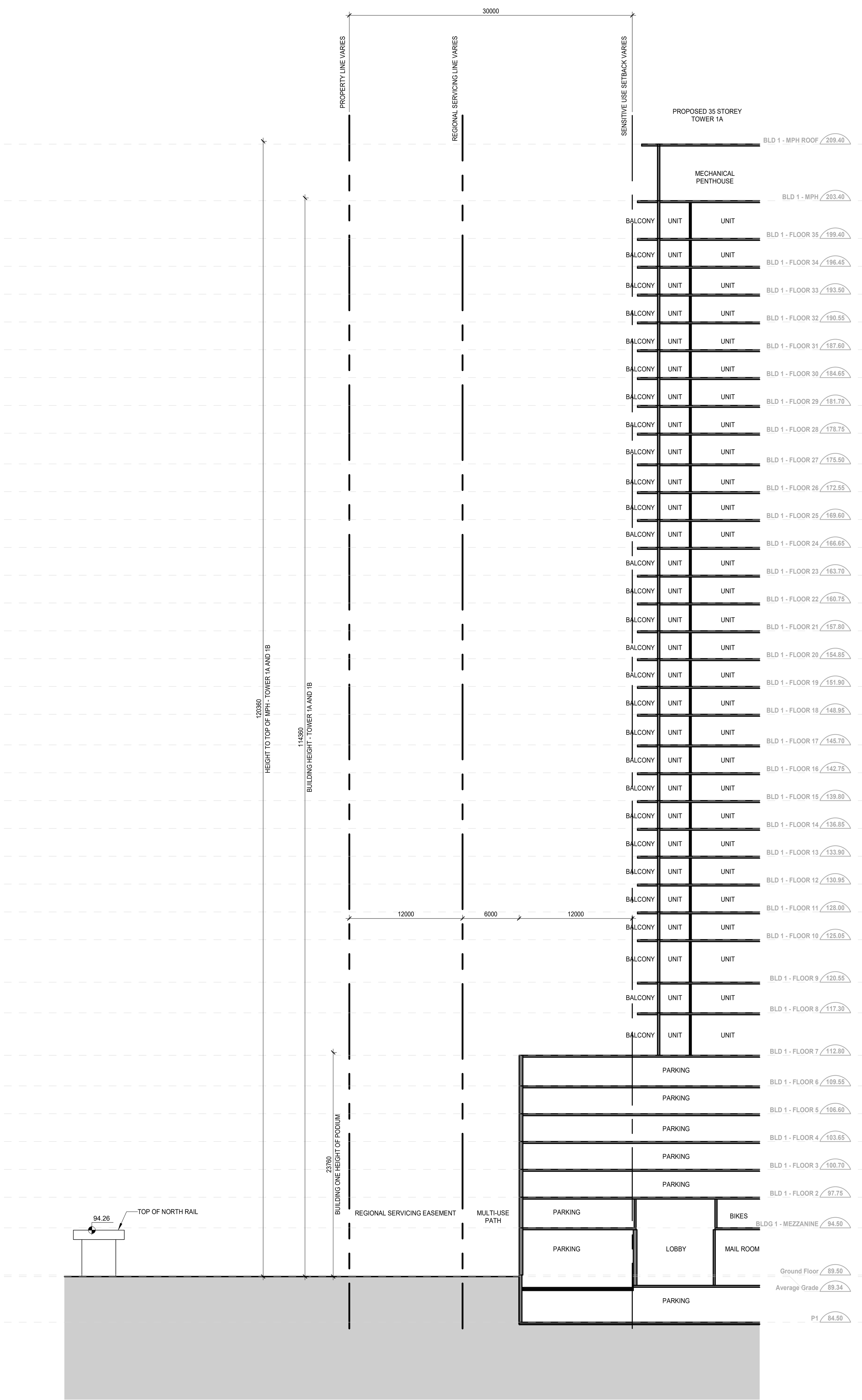
Dave Poole, M.Sc., P.Eng. (AB), CRM
Project Lead

Appendix A.1

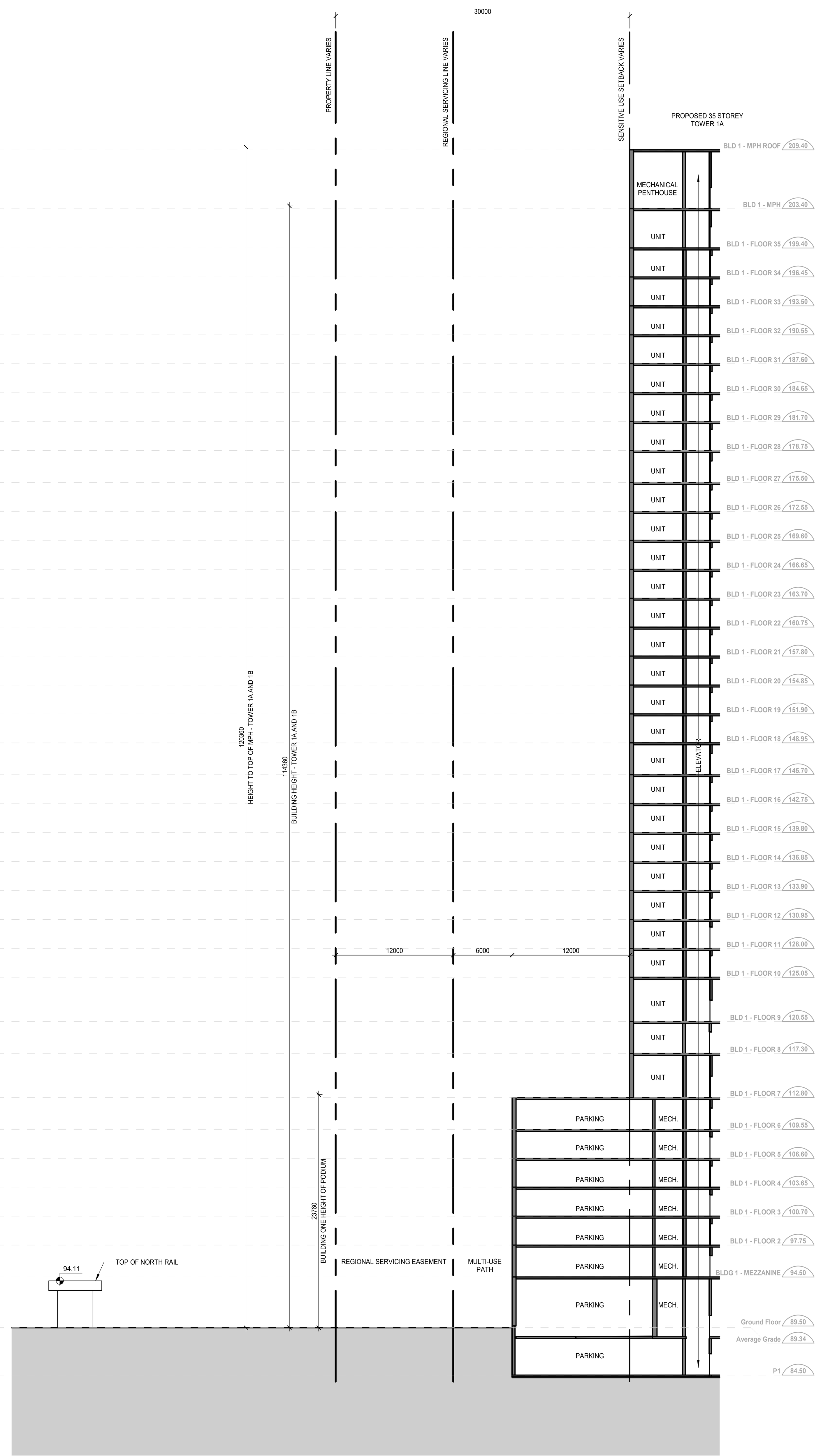
1095 Kingston Rd - Railway Cross Sections



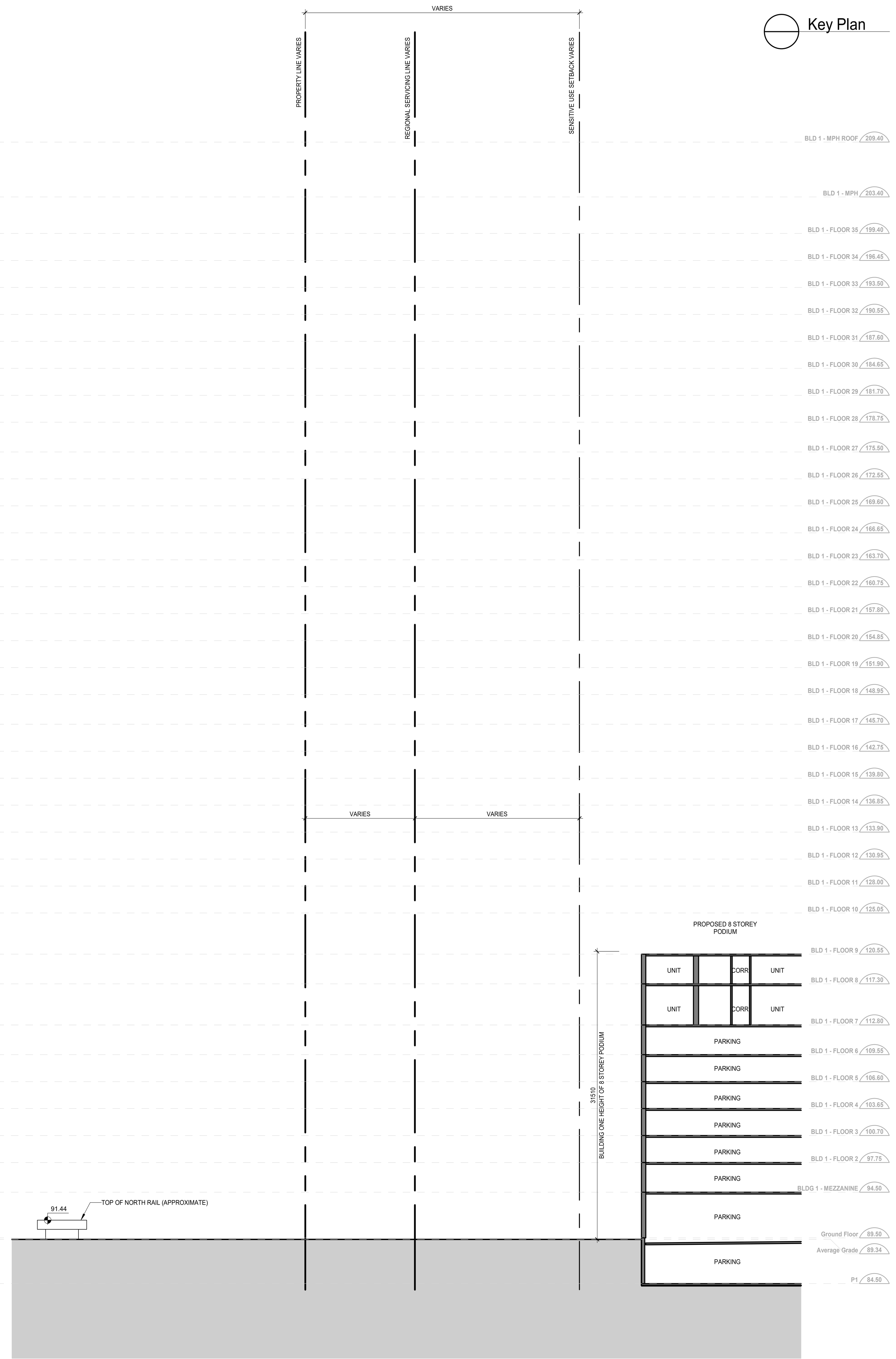
Key Plan



1 A450.S Railway Cross Section A-A



2 A450.S Railway Cross Section B-B



3 A450.S Railway Cross Section C-C

REVISION RECORD

DRAFT

ISSUE RECORD

BDP. Quadrangle

Quadrangle Architects Limited
The Well, 8 Spadina Avenue, Suite 2100, Toronto, ON M5V 0S8
t 416 598 1240 www.bdpquadrangle.com

1095 Kingston Road, Pickering

Ontario, Canada

for
Resident

21068	1:250	ML/ME/JK	SR
PROJECT	SCALE	DRAWN	REVIEWED

Railway Cross Sections

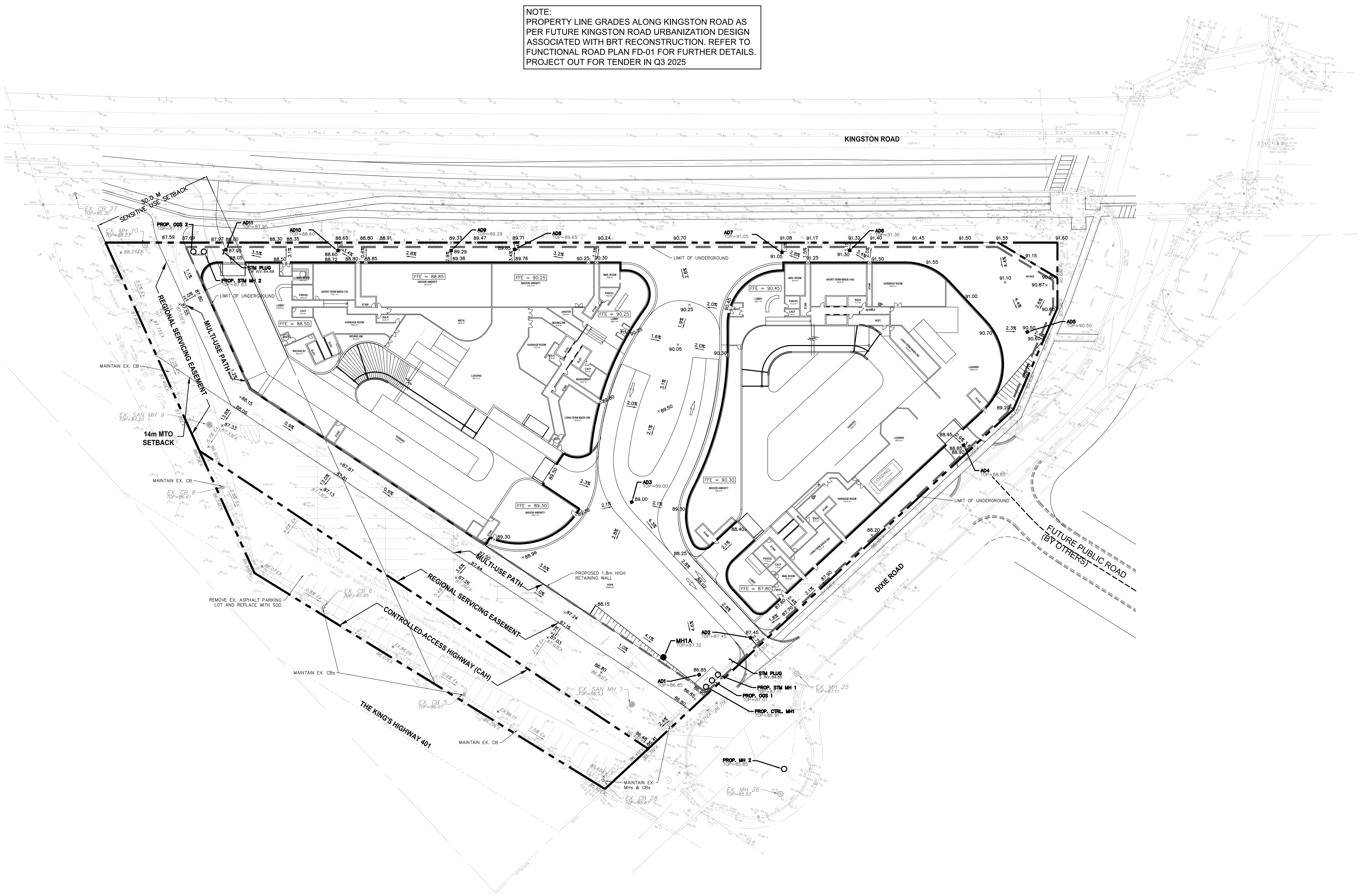
A450.S

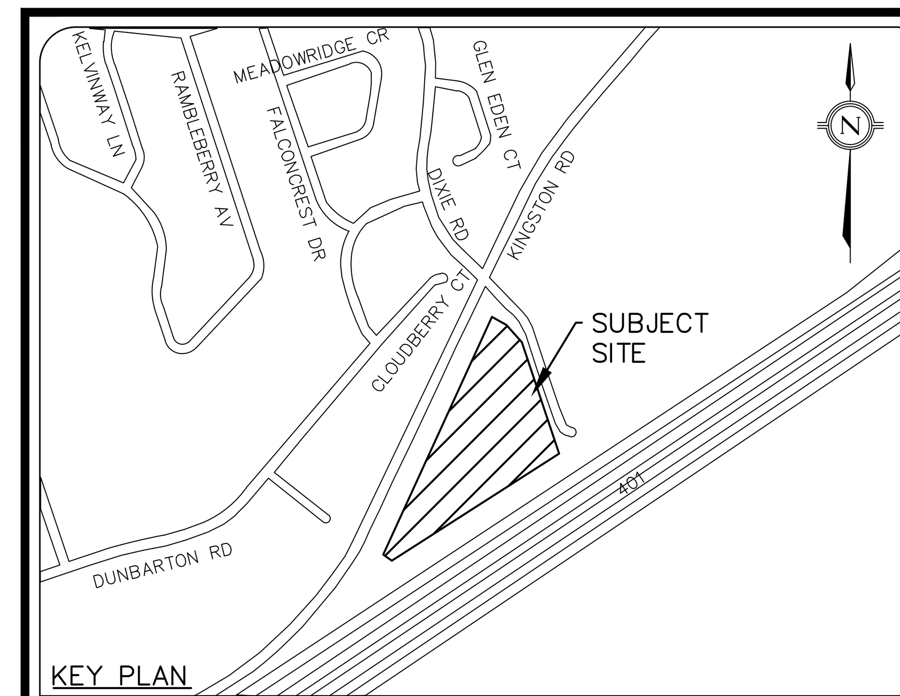
2025-02-14 4:14:14 PM

Appendix A.2.1

Concept Grading Plan

DILLON CONSULTING





KEY PLAN

LEGEND

- 88.90 PROPOSED GRADES
- EXISTING GRADES
- EXISTING MANHOLE
- EXISTING TREE
- EXISTING LIGHT STANDARD
- EXISTING HYDRANT AND VALVE
- EXISTING ROAD SINGLE/DOUBLE CATCHBASIN
- PROPOSED STORM SEWER OGS / MH
- PROPOSED SANITARY SEWER AND MH
- PROPOSED CATCH BASIN / AREA DRAIN
- PROPOSED HYDRANT & VALVE/ VALVE & BOX
- PROPERTY LINE
- LIMIT OF UNDERGROUND

ISSUED FOR COORDINATION
FEBRUARY 27, 2025

LEGAL & TOPOGRAPHY

PROVIDED BY: HOLDING JONES VANDERVEEN INC.
1700 LANGSTAFF ROAD, SUITE 1002
VAUGHN, ON, L4K 3S3
PHONE: 905-660-4000

BENCHMARK AND ELEVATION

ELEVATIONS ARE GEODETIC AND REFERRED TO MINISTRY OF NATURAL RESOURCES AND FORESTRY COSINE BENCHMARK NO. 00820188081 AND HAVING A PUBLISHED ELEVATION OF 84.112 METERS.

No.	REVISIONS/ISSUED	DATE	BY	CITY
01.	ISSUED FOR COORDINATION	18/02/2025	G.D.	

counterpoint ENGINEERING
COUNTERPOINT ENGINEERING INC.
8395 Jane St., Suite 100, Vaughan, ON L4K 5Y2 Phone 905.326.1404 Fax 905.326.1405

ENGINEER'S STAMP

APPLICANT:
1095 KINGSTON ROAD LIMITED
22 ST CLAIR AVE E, SUITE 1203
TORONTO, ON M4T 2S5
PHONE: 416 932 6634
CONTACT: NIK PAPAPETROU

SITE LOCATION:
1095 KINGSTON ROAD
PICKERING, ON L1V B15

SITE PLAN FILE No.:

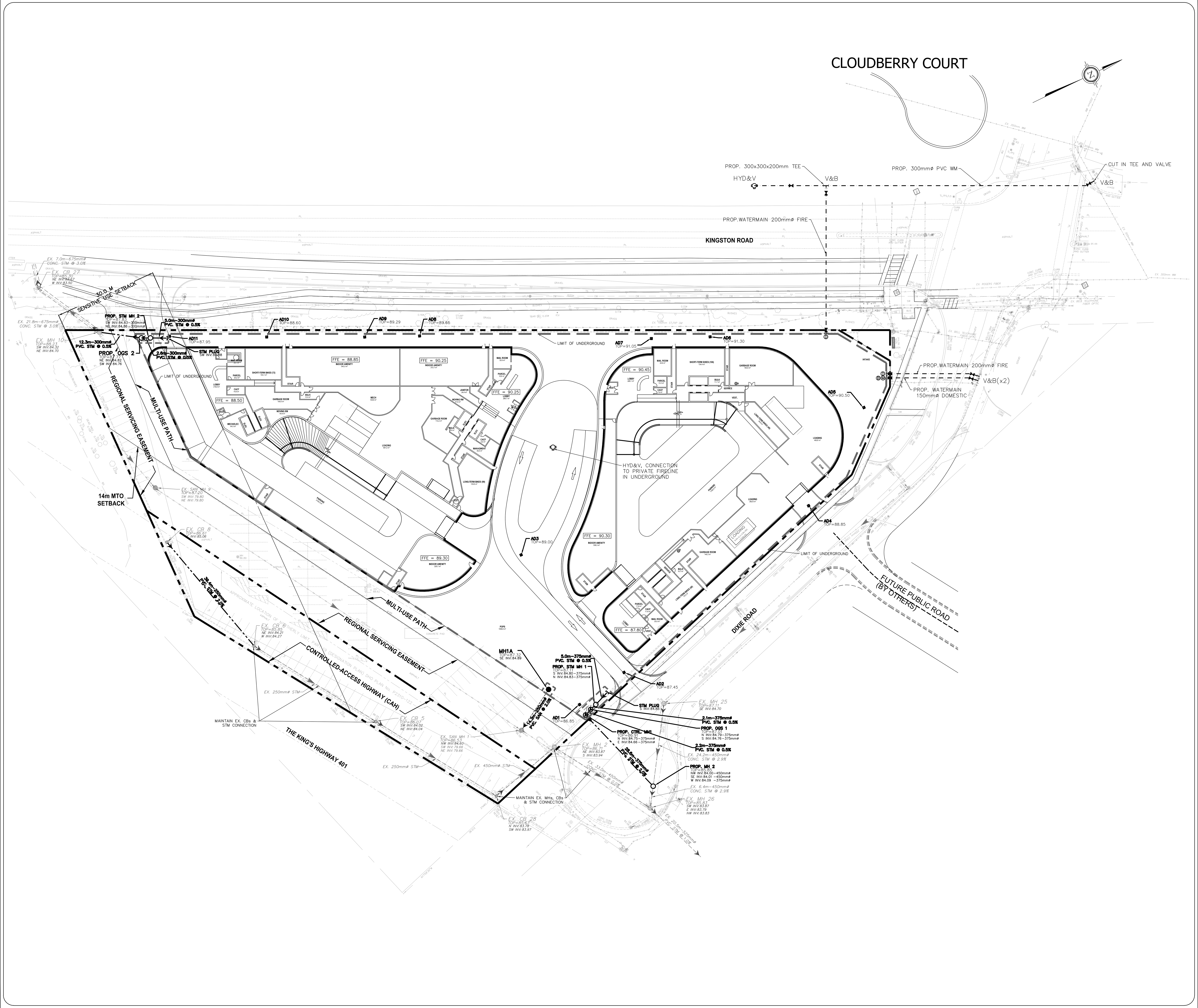
CONCEPT GRADING PLAN

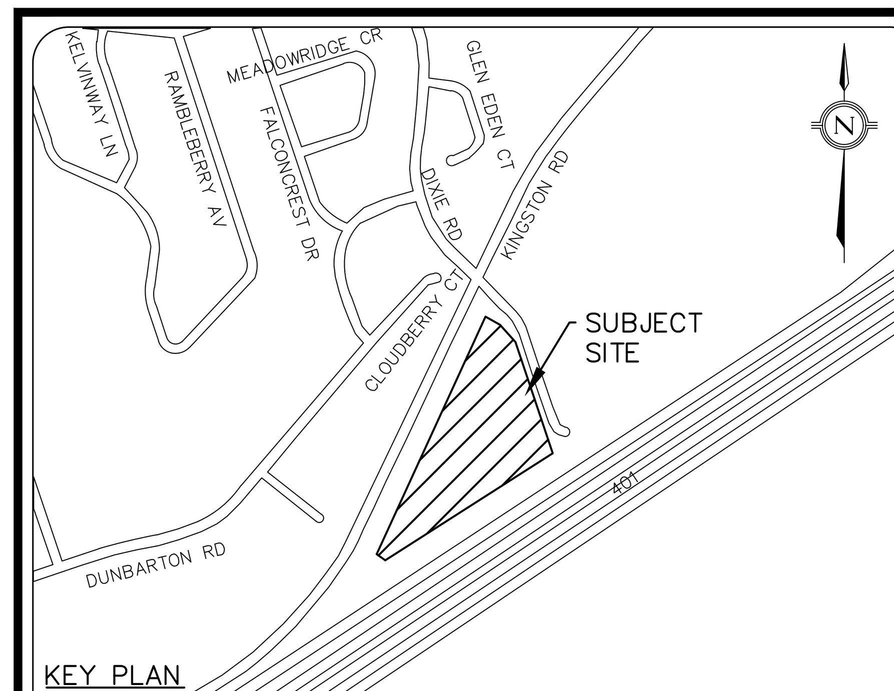
DESIGNED BY: G.L	CHECKED BY: G.L	DATE: DECEMBER 02, 2024
DRAWING BY: H.A	CHECKED BY: G.L	PROJECT NO. 23062
SWM BY:	CHECKED BY:	
SCALE: 1:500m (0m 10m 20m 30m)		DRAWING NO. CGP1

REGION FILE No.:

Appendix A.2.2

Concept Servicing Plan





KEY PLAN

LEGEND

- HYDRANT AND VALVE
- EXISTING TREE
- EXISTING GAS VALVE
- EXISTING LIGHT STANDARD
- EXISTING HYDRO POLE
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED VALVE AND BOX
- PROPOSED SIAMESE CONN.
- PROPERTY LINE
- LIMIT OF UNDERGROUND
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING GAS SERVICE
- EXISTING GAS MAIN
- EXISTING TELEPHONE CABLE
- PROPOSED STORM SEWER AND MH
- PROPOSED STORM CATCH BASIN
- PROPOSED AREA DRAIN
- PROPOSED SANITARY SEWER AND MH
- PROPOSED WATERMAIN
- Ⓜ PROPOSED WATER METER
- Ⓑ PROPOSED BACKFLOW PREVENTOR
- Ⓓ PROPOSED DOUBLE CHECK DETECTOR ASSEMBLY

ISSUED FOR COORDINATION
FEBRUARY 27, 2025

LEGAL & TOPOGRAPHY

PROVIDED BY: HOLDING JONES VANDERVEEN INC.
1700 LANGSTAFF ROAD, SUITE 1002
VAUGHN, ON, L4K 3S3
PHONE: 905-660-4000

BENCHMARK AND ELEVATION

ELEVATIONS ARE GEODETIC AND REFERRED TO MINISTRY OF NATURAL RESOURCES AND FORESTRY COSINE BENCHMARK NO. 00820188081 AND HAVING A PUBLISHED ELEVATION OF 84.112 METERS.

No.	REVISIONS/ISSUED	DATE	BY	CITY
01.	ISSUED FOR COORDINATION	18/02/2025	G.D.	

counterpoint ENGINEERING

COUNTERPOINT ENGINEERING INC.
8395 Jane St., Suite 100, Vaughan, ON L4K 5Y2 Phone 905.326.1404 Fax 905.326.1405

ENGINEER'S STAMP

APPLICANT:
1095 KINGSTON ROAD LIMITED
22 ST CLAIR AVE E, SUITE 1203
TORONTO, ON M4T 2S5
PHONE: 416 932 6634
CONTACT: NIK PAPAPETROU

SITE LOCATION:
1095 KINGSTON ROAD
PICKERING, ON L1V B15

SITE PLAN FILE No.:

CONCEPT SERVICING PLAN

DESIGNED BY: G.L	CHECKED BY: G.L	DATE: DECEMBER 02, 2024
DRAWING BY: H.A	CHECKED BY: G.L	PROJECT NO. 23062
SWM BY:	CHECKED BY:	
SCALE: 1:500m (0m 10m 20m 30m)		DRAWING NO. CSP1

REGION FILE No.:

Appendix A.3

CN Correspondence

DILLON
CONSULTING

2024-11-18_CN Comments_Proposed Development Adjacent to York Subdivision near MP2.0

1 message

Proximity <proximity@cn.ca> 18 November 2024 at 12:34
To: "Poole, Dave" <dpoole@dillon.ca>

Hello Dave,

If the minimum 30 meter setback and a 2.5 meter high safety berm will not integrated into the proposed development's site design, CN will require for the construction of a crash wall. I appreciate communicating the attached methodology, however, CN will require a crash wall design including the technical plans and calculations to be submitted. CN dose not review crash wall designs therefore, CN requests for the crash wall design technical plans and calculations to be reviewed by AECOM. CN will require a copy of the AECOM approved plans prior to the application approval.

Please note that one of CN's conditions is for the proponent to enter into a development agreement with CN and to grant an environmental easement in favor of CN. Prior to drafting a CN development agreement, CN counsel must have a copy of the approved crash wall design by AECOM, a satisfactory CN peer review of the Noise and Vibration study and the Storm Water management report.

CN will provide the municipality with a CN clearance of conditions once the CN development agreement and easement are executed and registered on title.

Thank you

CN Proximity

proximity@cn.ca

From: Poole, Dave <dpoole@dillon.ca>
Sent: Friday, November 15, 2024 9:54 AM
To: Proximity <proximity@cn.ca>
Cc: Nik Papapetrou <npapa@resident.ca>; Emily Davis <edavis@dillon.ca>; Tiffany Stephan <tstephan@dillon.ca>; 248956@dillon.ca; GLD-Permits <permits.gld@cn.ca>
Subject: Re: 2024-10-31_CN Comments_Proposed Development Adjacent to York Subdivision near MP2.0

Hi Ashkan,

Attached for your consideration is our proposed methodology to complete the rail safety study.

There isn't an Application file number as a formal application submission has not been made.

If you have any questions, let me know.

Kind Regards,

Dave Poole, M.Sc., P.Eng.(Ab), CRM, SCR
Partner
Dillon Consulting Limited
334-11th Avenue SE Suite 200
Calgary, Alberta, T2G 0Y2
T - 403.215.8885 ext. 4324
M - 403.835.8831
DPoole@dillon.ca
www.dillon.ca

https://www.linkedin.com/in/dave-poole-4a060a29/

On Fri, 1 Nov 2024 at 12:12, Proximity <proximity@cn.ca> wrote:

Hello Dave,

CN requires for the crash barriers such as reinforced berms and crash walls to be designed according to standards developed by AECOM (attached). The proposed design must be peer reviewed and approved by AECOM before receiving a sign off from CN.

May I also ask for the municipal address and the application file number at the City.

Thank you

Ashkan Matlabi, Urb. OUQ. MCIP, MBA

Urbaniste sénior / Senior Planner (CN Proximity)

Planning, Landscape Architecture and Urban Design

Urbanisme, architecture de paysage et design urbain

E : proximity@cn.ca

From: Poole, Dave <dpoole@dillon.ca>
Sent: Thursday, October 31, 2024 8:53 PM
To: Proximity <proximity@cn.ca>
Cc: Nik Papapetrou <npapa@resident.ca>; Emily Davis <edavis@dillon.ca>; Tiffany Stephan <tstephan@dillon.ca>; 248956@dillon.ca; GLD-Permits <permits.gld@cn.ca>
Subject: Re: 2024-10-31_CN Comments_Proposed Development Adjacent to York Subdivision near MP2.0

Hi Ashkan,

I'm aware that evaluating the need for and characteristics of safety barriers is one aspect of the rail safety study, my request is about CN's expectations on methodology to conduct the study.

I'm interpreting your response then that CN does not require discussion on our methodology and therefore we will proceed accordingly.

Please confirm.

Dave Poole
Partner
Dillon Consulting Limited
334-11th Avenue SE Suite 200
Calgary, Alberta, T2G 0Y2
T - 403.215.8885 ext. 4324
F - 403.215.8889
M - 403.835.8831
DPoole@dillon.ca
www.dillon.ca

https://www.linkedin.com/in/dave-poole-4a060a29/

On Thu, Oct 31, 2024, 6:44 PM Proximity, <proximity@cn.ca> wrote:

> Hello Dave,
>
> The purpose for the Rail Safety Study is to evaluate the characteristics of a crash wall to compensate the use of a safety berm?
>
> Thank you

Ashkan Matlabi, Urb. OUQ. MCIP, MBA

Urbaniste sénior / Senior Planner (CN Proximity)

Planning, Landscape Architecture and Urban Design

Urbanisme, architecture de paysage et design urbain

wsp

E : proximity@cn.ca

From: Poole, Dave <dpoole@dillon.ca>
Sent: Wednesday, October 30, 2024 4:35 PM
To: GLD-Permits <permits.gld@cn.ca>; Proximity <proximity@cn.ca>
Cc: Nik Papapetrou <npapa@resident.ca>; Emily Davis <edavis@dillon.ca>; Tiffany Stephan <tstephan@dillon.ca>; 248956@dillon.ca
Subject: Proposed Development Adjacent to York Subdivision near MP2.0

Good day,

Dillon Consulting Limited (Dillon) was retained by the developer Resident, to conduct a Rail Safety Study for a proposed development that will be adjacent to the York Subdivision near MP2.0 (screenshot is below). The purpose of my email is to schedule a pre-con meeting with CN to discuss the proposed development and confirm the approach to be taken to complete the Rail Safety Study. Please let us know your availability to discuss and we'll make sure to accommodate your schedule.

Additional details on the proposed development are provided below:

- Four residential towers with a combined gross building area ranging from 1,520,232 to 1,568,670 square feet. Attached is a Site Plan annotated with the proximate location of the York Subdivision for reference.
- A total of 1,498 to 1,564 residential units distributed across the four towers.
- A multi-level parking facility spanning the P1 level, ground floor, mezzanine and levels 2 to 5, providing a total of 1,068 parking spaces.

We appreciate you taking time to consider our request and look forward to discussing this further with you.

Kind Regards - Dave Poole

Dave Poole, M.Sc., P.Eng.(Ab), CRM, SCR
Partner
Dillon Consulting Limited
334-11th Avenue SE Suite 200
Calgary, Alberta, T2G 0Y2
T - 403.215.8885 ext. 4324
M - 403.835.8831
DPoole@dillon.ca
www.dillon.ca

https://www.linkedin.com/in/dave-poole-4a060a29/

This message is directed in confidence solely to the person(s) named above and may contain privileged, confidential or private information which is not to be disclosed. If you are not the addressee or an authorized representative thereof, please contact the undersigned and then destroy this message.

Ce message est destiné uniquement aux personnes indiquées dans l'entête et peut contenir une information privilégiée, confidentielle ou privée et ne pouvant être divulguée. Si vous n'êtes pas le destinataire de ce message ou une personne autorisée à le recevoir, veuillez communiquer avec le soussigné et ensuite détruire ce message.

This message is directed in confidence solely to the person(s) named above and may contain privileged, confidential or private information which is not to be disclosed. If you are not the addressee or an authorized representative thereof, please contact the undersigned and then destroy this message.

Letter for CN - 1095 Kingston Road.pdf
712K

November 14, 2024

Canadian National
935 Rue de La Gauchetière Ouest
Montreal, Quebec
H3B 2M9

Attention: Ashkan Matlabi
Senior Planner – CN Proximity

Rail Safety Study Methodology – 1095 Kingston Road, Pickering, Ontario

Dear Ashkan Matlabi:

Dillon Consulting Limited (Dillon) was retained by 1095 Kingston Road Ltd. (the Development Proponent) to conduct a rail safety study for the Proposed Development located at 1095 Kingston Road, Pickering, Ontario, adjacent to active freight rail operations conducted by Canadian National (CN) on the York Subdivision. Dillon is pleased to present our proposed methodology for a rail safety study for CN review and comments.

Sincerely,

DILLON CONSULTING LIMITED

Dave Poole
Partner

TCS:tjs

Our file: 24-8956

DILLON
CONSULTING

334-11th Avenue SE
Suite 200
Calgary, Alberta
Canada
T2G 0Y2
Telephone
403.215.8880
Fax
403.215.8889

Dillon Consulting Limited

1.0 Proposed Development Context

It is understood that the property of 1095 Kingston Road is presently developed as a commercial plaza along the CN rail corridor.

The proposed Development of the property is to consist of the following:

- Four residential towers with a combined gross building area (GBA) ranging from 1,520,232 to 1,568,670 square feet;
- A total of 1,498 to 1,564 residential units distributed across the four towers; and
- A multi-level parking facility spanning the P1 level, ground floor, mezzanine, and levels 2-4, providing a total of 1,068 parking spaces.

Dillon has identified the location of the Development and has reviewed the Canadian Railway Atlas information, which is shown in Figure 1. The Development is located adjacent to CN's main track freight corridor (outlined below in red). This section of the York Subdivision is designated for CN freight rail traffic.

Figure 1: Location Plan – 1095 Kingston Road, Pickering, Ontario

Given the proximity of the Development to active freight rail operations, there are design and occupancy considerations to consider. As per the Federation of Canadian Municipalities (FCM) and the Railway Association of Canada (RAC) Guidelines (FCM-RAC Guidelines) for New Development in Proximity to Railway Operations (May 2013), the standard recommended building setbacks for new residential development in proximity to railway operations for a principal main line is 30 meters.

2.0 Proposed Methodology

As stated in the FCM-RAC Guidelines, the goal of the rail safety study is to identify the individual risks and evaluate those risks taking into consideration current mitigation measures, from which the residual risks would be evaluated to determine if they are acceptable. Therefore, Dillon will employ the standardized risk assessment and management process from ISO 31000:2018 Risk Management Guidelines, which is structured as shown in Figure 2. Further details of our approach are provided in the following sections.

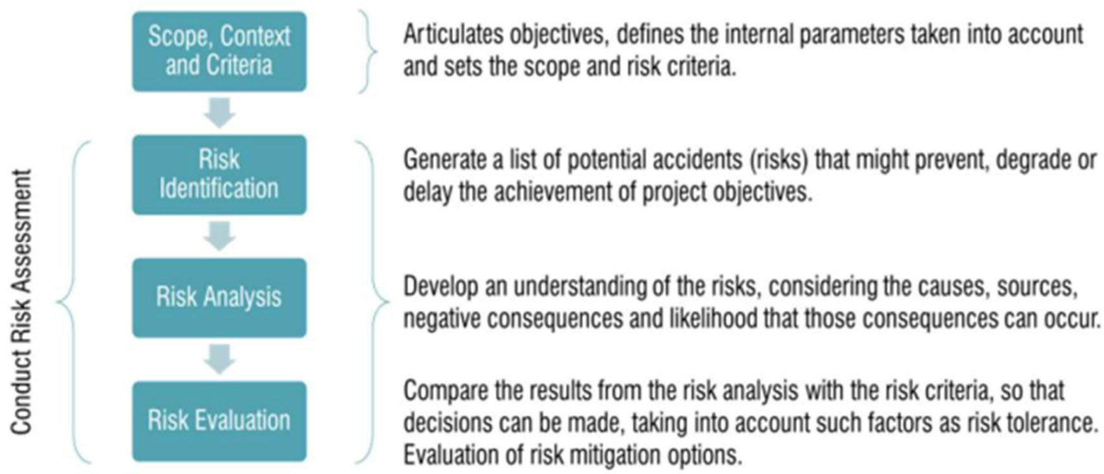


Figure 2: ISO-31000:2018 Risk Management Process

2.1 Scope, Context and Criteria

In order to complete our assessment and meet the criteria for the CN and FCM-RAC development guidelines, adequate information is needed in the following areas that Dillon will obtain from either public sources, CN and/or 1095 Kingston Road Ltd.:

- Site Details – In addition to the list provided in the FCM-RAC Guidelines, meteorological data will be obtained to determine the prevailing wind directions and speed, which is an important site detail to consider when analyzing the hazards. Land surveys will also be completed to confirm the elevation difference between the York Subdivision and the Proposed Development.

- Railway Details – If CN is unable to provide rail operations information – number of trains per day and track speed, Dillon will access the Transport Canada grade crossing inventory database to obtain "estimates" of train counts and track speed limits. The Transportation Safety Board rail occurrence database will be utilized to analyze local, regional and national rail accidents that are relevant to the hazards in question.

Dillon has developed a financial model to estimate future growth of rail traffic based on gross domestic product forecasts by Finance Canada, which we will employ for the rail safety study (as shown in Figure 3).

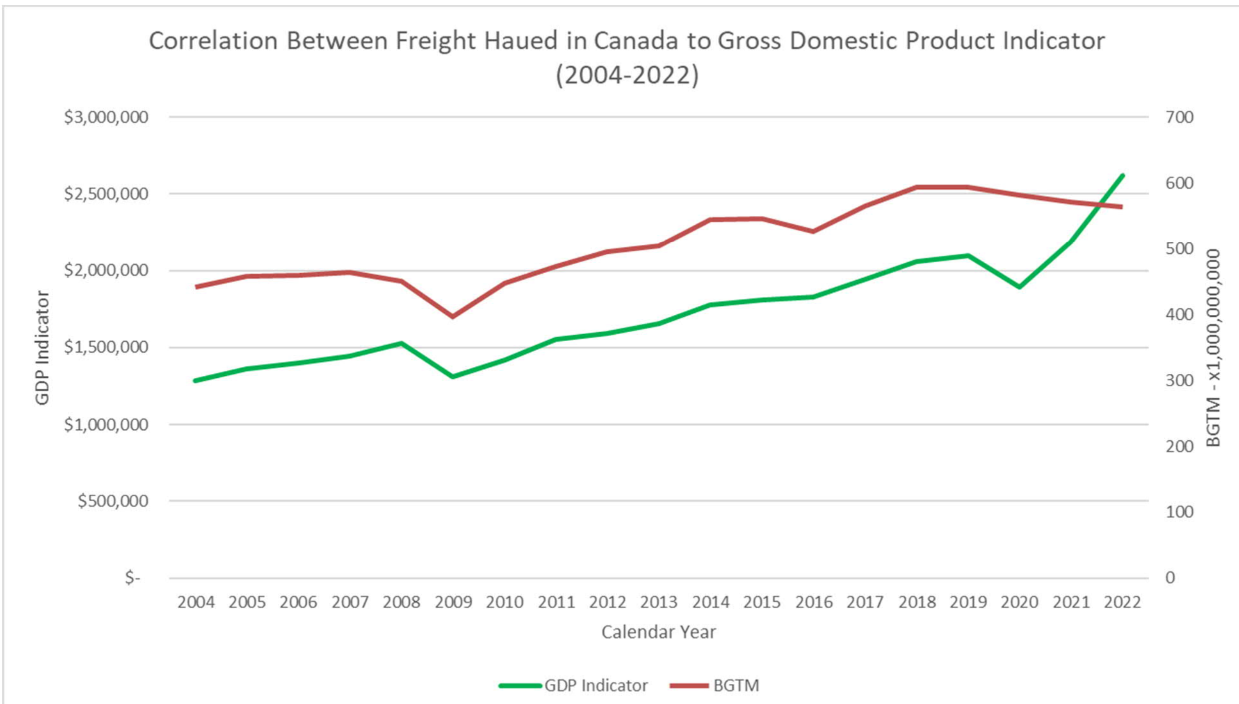


Figure 3: Forecas ng Model – Future Growth of Rail Traffic

- Construction and Development Details – Details on site security for the Proposed Development, both during construction and after occupation, is important. Emergency response plans and access plans for fire and emergency services will be analyzed. Plan and profile drawings will enable a 3-dimensional perspective on occupancies that would be exposed to any upset events on the CN York Subdivision. Further, details such as fresh air intake locations, orientation of exterior façade features such as patios and window will be considered.

Regarding the proximity of land development next to freight rail corridors, our proposed methodology will focus on environmental risks, health and safety risks to the public, and operational risks to CN. The risks will be evaluated during construction and at completion of the Development. The following hazard categories need to be considered:

1. Physical Hazards – this includes derailed rail cars that impact the Proposed Development (either during construction or upon occupancy), and trains impacting members of public that trespass from the Property or impacting construction materials/debris from the Property.
2. Chemical Hazards – release of a commodity in the event of a train derailment on the York Subdivision.

When dealing with the risks of freight rail operations to a development, Dillon's approach to rail safety studies is to focus attention on the risks within proximity of the rail corridor, using a concept called the Rail Proximity Envelope (RPE) as shown in Figure 4. The RPE is utilized as the basis for identifying and analyzing the physical hazards associated with a train derailment impacting the Proposed Development. Regarding the chemical hazards, we tend to focus on the entire Proposed Development, not just the RPE.

Figure 4: Rail Proximity Envelope along Rail Corridors

It has been our past experiencing analyzing the hazards associated with development within proximity of rail corridors that the risks can be mitigated either through site specific evacuation plans and/or appropriate occupancy type (i.e., commercial and retail within the RPE and daycare outside of the RPE). By aligning the occupancy type within the RPE to the level of risk, this can avoid expensive engineering controls such as crash walls to protect more sensitive occupancies such as daycare centres.

Defining appropriate evidence-based criteria is important to defend and rationalize any mitigation measures that may be needed, or conversely support the justification that the risks are considered appropriate. When dealing with industrial-based hazards such as freight rail, and its potential to impact the general public, the Major Industrial Accidents Council of Canada (MIACC) developed risk criteria to help evaluate the acceptability of fatality-based risks based on the type of land use – see Table 1. Dillon has successfully utilized MIACC in other rail safety studies across Canada.

Table 1: MIACC Risk Criteria – Public Fatality

Land Use/Occupancy **Definition**	Applicability to the Development	Maximum Tolerable Frequency Each year, there is a [insert] chance of a Fatality	Minimum Tolerable Return Period The chances of a Fatality are 1 in [insert] years	Annual Probability of Occurrence Each year there is a [insert] chance of fatality
Manufacturing and Open Space (industrial, warehouses, open space, parkland, golf courses)	Multi-Level Parking Facility and Open Space	≤1.00×10^{-4}	≥10,000	0.01%
Low-Density (single family residential, townhouses, recreation centres, entertainment complexes)	Buildings Common Areas, Retail Spaces	≤1.00×10^{-5}	≥100,000	0.001%
High-Density (high-density residential, motels, hotels)	Residential Units	≤1.00×10^{-6}	≥1,000,000	0.0001%
Sensitive (day cares, hospitals, group homes)	Not Applicable	≤0.30×10^{-6}	≥3,333,333	0.00003%

The table outlines the various categories and their associated maximum acceptable frequencies. Another way of interpreting this information would be to say that for a risk frequency of ≤1.00×10^{-4} someone would have to be standing in the location of the associated frequency for a period of 10,000 years, and at some point during that time, a fatality would occur. Dillon will utilize the appropriate MIACC criteria for the relevant occupancy/usages within the Proposed Development.

The MIACC criteria (as shown in Table 1) was developed for the risk of individual fatalities, not public evacuation risks to address more frequent/less severe events. Dillon has developed an adjusted MIACC criteria that will be used to determine whether a site-specific evacuation plan is necessary, as part of the rail safety study.

2.2 Risk Identification, Risk Analysis and Risk Evaluation

As shown in Figure 2, the first step in conducting the risk assessment is to identify the potential accidents that might prevent, degrade or delay the achievement of the project objective, which in this case involves asking the following questions:

1. What are the chances of a train derailment that physically impacts the Proposed Development (during construction and upon occupancy) causing one or more serious injuries and/or fatalities?

2. What are the chances of a train derailment that physically impacts the Proposed Development causing structural damage that result in progressive failure of the building?
3. What are the chances of a rail accident that would result in a release of a chemical hazard that could cause one or more serious injuries and/or fatalities?
4. What are the chances of a rail accident that would require evacuation of the Proposed Development?
5. Can someone from the Proposed Development access the York Subdivision and trespasses onto the rail property resulting in serious injury or fatality? Conversely, will there be increased pedestrian traffic than can increase grade crossing safety risks?
6. What are the chances during construction of the Proposed Development, of construction debris/equipment being on the rail property, causing a train accident?
7. Will the construction of the Proposed Development require excavating or importing soils within proximity of the CN right-of-way?
8. Are there extreme weather events (such as a rain event) that if it were to occur, would impact the Project, or impact rail operations due to the Proposed Development?

For Questions 1 to 4, we will analyze the existing and forecasted future rail traffic along the York Subdivision. We will determine the frequency (or likelihood) for each scenario that could cause a chemical release resulting in one or more fatalities using incident rates that Dillon has developed for other rail risk assessments. If the frequency calculations do not exceed the MIACC criteria, the risk will be considered acceptable, and no further analysis will be necessary. For Question 5, we will look at whether the proximity of the Proposed Development to rail operations would create and/or increase the inherent risks of public trespassing. Consideration will need to be given to origin-destination routes that pedestrians from the Proposed Development will take and whether it would expose vulnerable points for trespassing to occur. From a public safety perspective, this will be a concern for CN.

For Questions 6 and 7, Dillon will work with the Development Proponent to determine the site-specific circumstances that would need to take place in order for these events to occur. Given the separation distance between the Proposed Development and CN's operations, the answers to these questions should not be a concern to CN. Similarly, for Question 8, it is not anticipated that extreme rain events will impact rail operations given that the York Subdivision is elevated in comparison to the Proposed Development

The results from the rail safety study will substantiate the need for any new risk mitigation measures that are over and above what is currently proposed or already in place. Our scope of work will be limited to the identification of additional risk measures that would be brought forward to the Development Proponent for consideration.

Appendix A.4

Debris Generated from Derailment

DILLON
CONSULTING

Canada – Lac-Mégantic[11]

On July 6, 2013, a runaway eastbound Montreal, Maine & Atlantic (MM&A) freight train approached the Lac-Mégantic town centre when it entered a curve at 65 mph – which was more than 3 times the design speed. A total of 63 tanker cars carrying crude oil and 2 box cars derailed – see **Figure A-1**. The adjacent buildings and structures and fatalities (total of 47) were caused by the 6 million litres of crude oil that spilled and subsequently ignited as it flowed downslope through the town centre.

Photo 29. Location of the train when the brake pipe pressure dropped to 0 psi (sources: AeroPhoto and locomotive event recorder data)

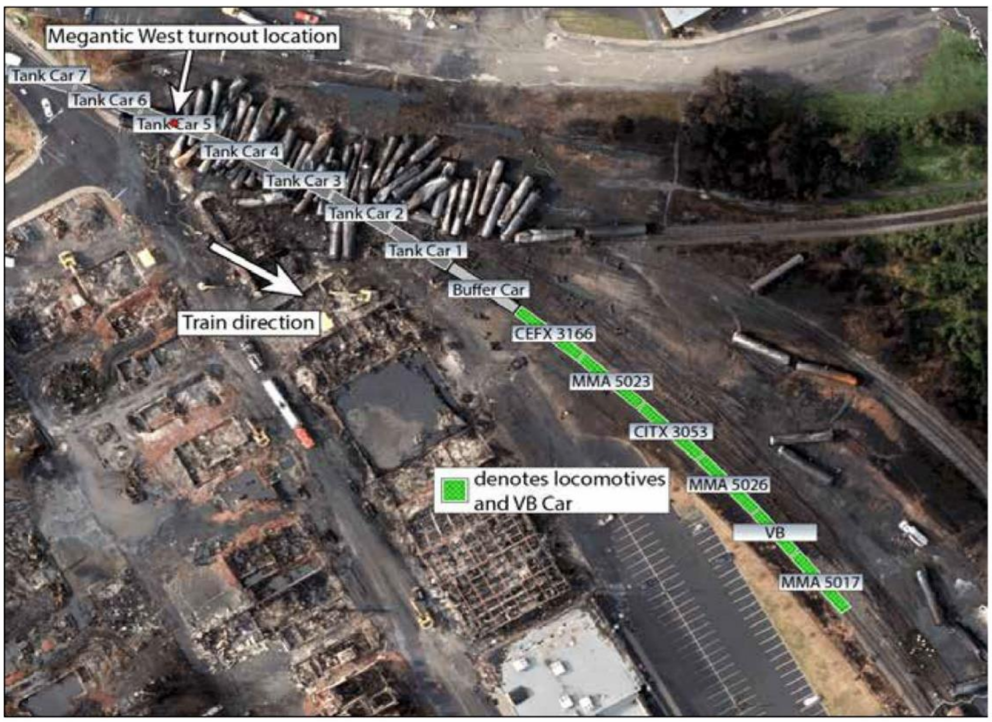


Figure A- 1: Photo of Lac-Mégantic Derailment

According to the TSB investigation report, “the debris from the derailed equipment was confined to the derailment site.”

Greece – Passenger Train Accident[12]

On the evening of February 28, 2023, a passenger train with 352 passengers traveling from Athens to Thessaloniki at 150 km/hr (93 mph) collided with a freight train traveling at 90 km/hr (56 mph) in the opposite direction. The resulting collision and derailment resulted in 57 fatalities and 180 injuries.

---

[11] Source: https://www.tsb.gc.ca/eng/enquetes-investigations/rail/2013/R13D0054/r13d0054.html

[12] https://www.protothema.gr/files/2025-02-27/eodasaam_accident_investigation_tempi-1_2.pdf

Figure A-2 highlights the location of the collision between the passenger and freight train with additional details provided in **Figure A-3**. The freight locomotive (L1) collided against a concrete retaining wall that separated the right-of-way (ROW) from an adjacent highway.

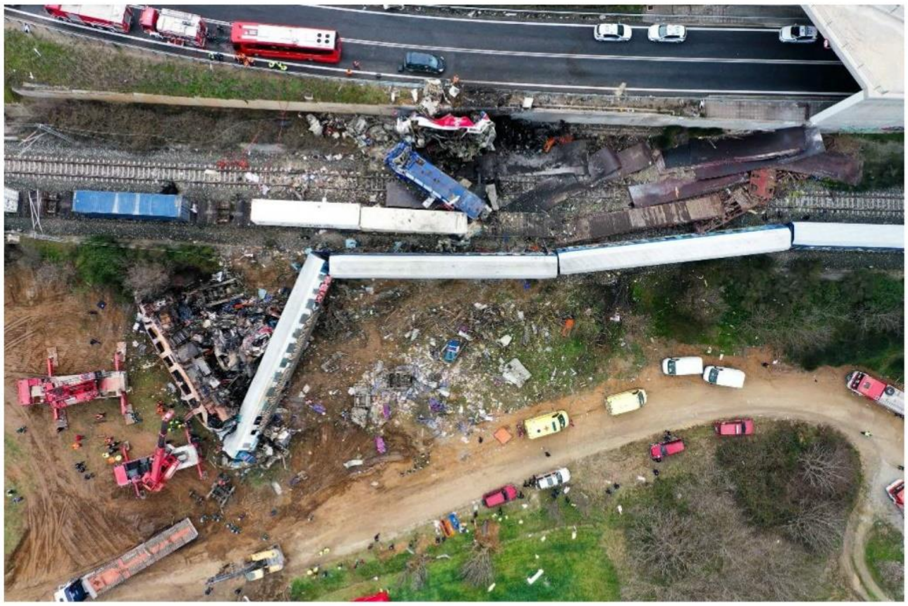


Figure 10. The end position of the 3 locomotives and some of the passengers coaches and freight wagons (http://www.intime.gr/).

Figure A- 2: Photo of Collision between Passenger Train and Freight Train

Debris that was generated from the derailment, mainly from the passenger train, was contained within the footprint of the collision and derailment. Although it is not explicitly stated, it can be inferred from the report and photographs, that there was limited debris that extended beyond the concrete retaining wall onto the adjacent highway. It should also be kept in mind that the force of the collision is based on a combined speed of 93 + 56 = 149 mph.

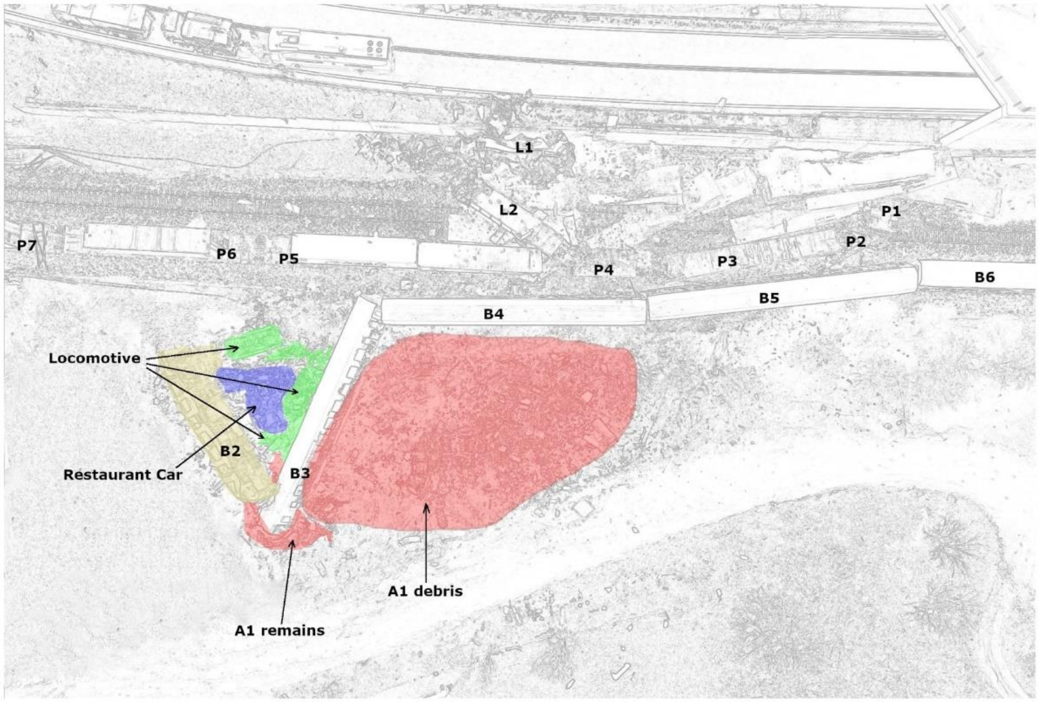


Figure 12. The accident site.

*Best estimated point of the 1st collision: **X**, Freight locomotive 120-022: **L1**, and 120-012: **L2,** Passenger train locomotive 120-023: **Locomotive areas**, First-class A1 coach: **A1 areas**, **Restaurant Car** area, Second-class **B2** on B3 head, then **B3, B4, B5, B6**, (B7 under the tunnel), Freight train platforms **P** 1-2-3-4, and freight wagons 4-7 (and other 6 not on the figure).*

Figure A- 3: Details of Collision and Derailment