



LeBreton Library Parcel

Constructability Report

February 2023 | TYLin Ref. 10399

Dream Asset Management



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1 INTRODUCTION

TYLin has been retained by Dream Asset Management to compile a Constructability Report for the proposed redevelopment of the LeBreton Library Parcel (LBLEP), located at 665 Albert Street, Ottawa, Ontario (“the site”).

The intent of this report is to consolidate project information relevant to protection of existing buried City infrastructure in the vicinity of the site – and to document the proposals in place for the necessary protection of this infrastructure through the construction and operation of the redeveloped site.

The report should be read in conjunction with supporting Site Plan Application materials – including, but not limited to the Geotechnical Investigation Report, Site Servicing/Grading drawing package, as well as the Architectural and Landscape Architecture drawing sets.

1.1 Existing Infrastructure

In existing conditions, the site generally consists of hard-packed gravel areas used for vehicular access – understood to remain from its previous use as a construction staging area for the City’s Stage 1 Light Rail Transit (OLRT) project. The site generally falls to the north and slopes down relatively steeply along the northern edge to the elevation of the OLRT tracks.

The key pieces of City infrastructure in the vicinity of the project site are:

- ▶ 2400 mm internal diameter concrete sewer pipe (“EWT”, East-West Tunnel), which crosses the northwest corner of the site and connects the diversion chamber within Booth Street to the Combined Sewer Storage Tunnel (CSST) east of the site.
 - ▶ As per City as-built drawings provided (and through reference to the City’s GeoOttawa online portal data) the invert elevation of this pipe at the western edge of the site is approximately 45.7 m (and it drops at around 0.25% as it runs east).
- ▶ 1800 mm internal diameter concrete Interceptor Outfall Sewer (IOS) trunk sanitary sewer, which crosses the northwest corner of the site.
 - ▶ With reference to the City’s GeoOttawa online portal data, the invert elevation of this IOS pipe at the western edge of the site is approximately 44.8 m (and it drops as it runs east).
- ▶ 3000 mm internal diameter concrete storm sewer pipe, which crosses the northwest corner of the site before turning north and passing below the OLRT tracks.
 - ▶ As per City as-built drawings provided (and through reference to GeoOttawa) the invert elevation of this pipe at the western edge of the site is approximately 46.7 m

(and it drops at around 0.25% as it runs east).

- ▶ 1220 mm internal diameter steel high pressure water main (HPWM) running east-west with Albert Street, to the south of the site.

Please refer to **Figure 1-1** for illustration of the existing infrastructure described above, relative to proposed site plan development.

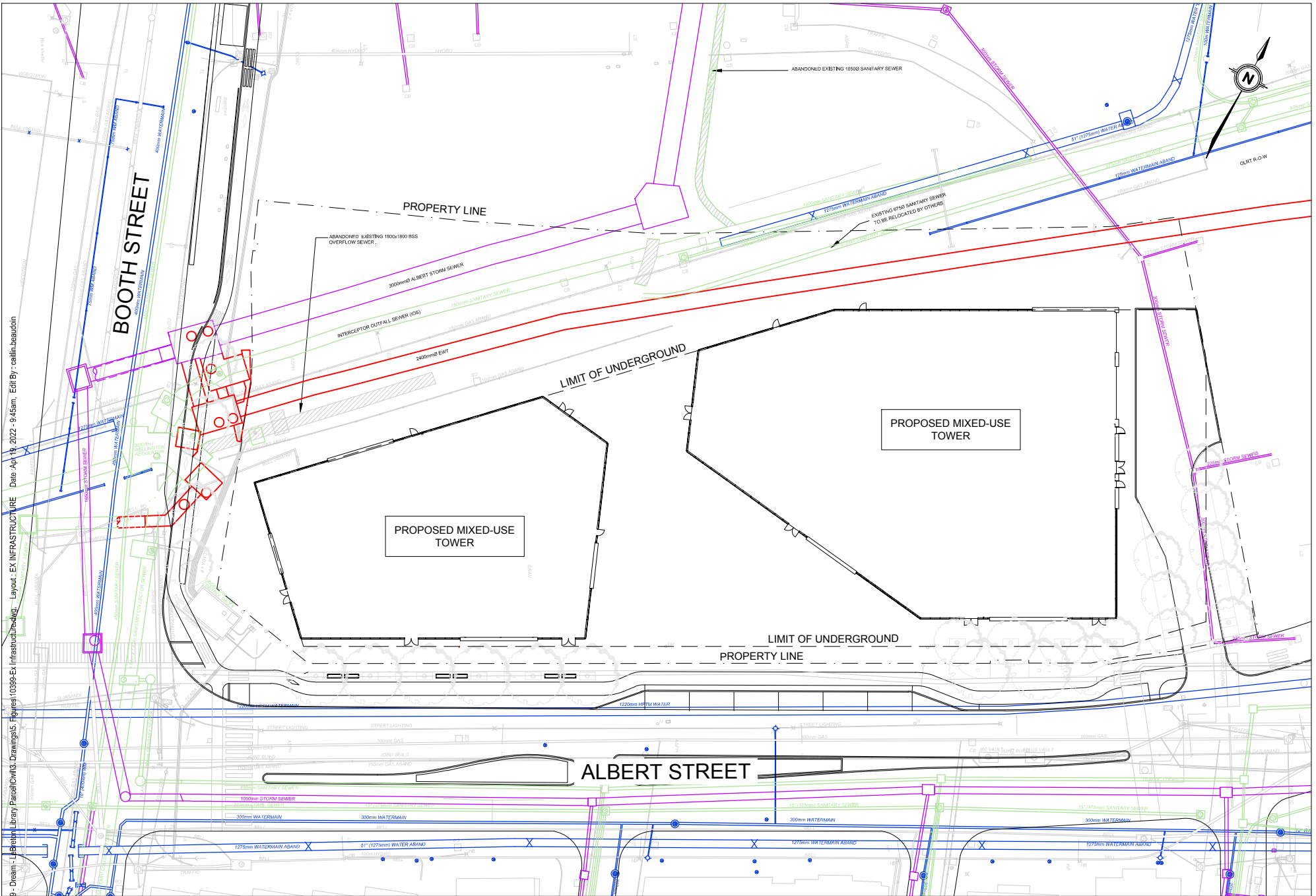
1.2 Existing Geotechnical Conditions

Golder Associates Ltd. completed a Geotechnical Investigation for the site (Golder Report Ref. 22511882, dated April 2022). The report describes the results of fieldwork investigations undertaken on site – including 6 no. boreholes (BHs) previously completed by Golder as part of a previous assignment on the project site in 2011, supplemented by an additional 5 no. BH locations advanced in February 2022.

The study documents a subsurface stratigraphy within the project area of surficial fill materials overlying glacial till, which in turn overlies limestone and shale bedrock.

- ▶ **Fill Material** was encountered in each of the boreholes from ground surface (to depths ranging from 2.1 to 3.7 m below the existing surface) – generally heterogeneous in nature ranging from silty sand to sand. The fill also contained gravel, brick fragments, concrete and mortar fragments, glass, wood and layers of organic material and clay – as well cobbles and boulders encountered during drilling. Testing indicated that the fill has a highly variable very loose to very dense state of packing.
- ▶ **Glacial Till** deposits were encountered beneath the fill material at all boreholes, typically consisting of a heterogeneous mixture of gravel, cobbles, and boulders in a matrix of sand and silt with a trace to some clay. The 2011 boreholes did not fully penetrate the till layer, however the five boreholes drilled during the 2022 investigation were all extended through the till and into the underlying bedrock, confirming the till extended to depths of 11.2 to 14.7 m below existing ground. Standard penetration testing indicated that the majority of the till has a dense to very dense state of packing.
- ▶ **Bedrock:** The 2011 boreholes were all terminated at refusal at depths of 4.2 m to 10.0 m below existing surface, however it is considered unlikely that these refusals were the result of encountering bedrock. The 2022 boreholes were extended through the glacial till deposit into the underlying bedrock and provided elevations of between 48.2 m and 50.5 m (masl) for bedrock elevation. The bedrock consists of limestone with shale interbeds of the Verulam formation.
- ▶ **Groundwater** levels have been measured (February 2022) at elevations ranging from 48.7 m to 55.1 m (masl), although it is noted that these elevations will vary seasonally.

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EXISTING CITY INFRASTRUCTURE
665 ALBERT STREET
DREAM ASSET MANAGEMENT

SCALE:	1:750	PROJECT No.	10399
DATE:	APRIL 2022	FIGURE No.	1-1
DESIGNED BY:	n/a		
CHECKED BY:	C.B.		

2 PROPOSED SITE DEVELOPMENT

2.1 Overview

The proposed site development consists of two towers over low-rise podium structures, with a single two-level basement structure extending over the footprint of both towers. Vehicular access to the site will be via an extension of Empress Avenue at the eastern edge of the site (north off Albert Street) and into the basement via a ramp in the north-east corner of the structure. The current architectural design proposals have set the finished elevation of the P2 basement level 8.7 m below finished ground floor of the new structure (at 54.0 m).

The majority of the ground-level space outside the new buildings will be non-vehicular public realm. A new retaining wall structure will address the grade change between plaza level (which is continuous with Booth Street) and the new multi-use pathway (MUP) running east-west alongside the OLRT line (and passing below Booth Street) along the north edge of the site.

The podiums will contain a variety of commercial and community uses at lower levels, before a shared terrace area marks the transition to the residential apartments in the towers. The residential component will include a high proportion of affordable housing units.

Please refer to the associated Architectural drawing set (Perkins & Will and KPMB) for full details of the proposed development, and the Landscape Architectural set (PFS) for at-grade public realm design. The TYLin/TMIG engineering drawing set shows proposed grading and servicing details.

2.2 Site Grading

In the current (vacant) site conditions the lands fall to the north; at a relatively gentle grade initially, but with a steeper slope as the site approaches the OLRT corridor and transitions down to track level. Grades at the Albert Street interface are currently between 62 and 63 m, dropping to around 61 m at the top of the existing embankment, and interfacing with existing OLRT track level at approximately 56 m along the north property limits. There is a small existing retaining wall along the west edge of the site to manage grade differential between the Booth Street sidewalk elevation and the site grades. There is also an existing gabion basket wall in the northeast corner of the site constructed as part of the City's OLRT works – further discussion on this is provided in the following **Section 2.3**.

In proposed conditions the site will be raised to provide a flatter, plateau area for tower construction and surrounding public realm (also facilitating at-grade connection into the site from Booth Street). Proposed grading will tie-in to existing Albert Street elevations along the

southern limits and the finished grade will generally be maintained at elevations between 62 and 63 m throughout. As noted above, a retaining wall is proposed to manage the grade change from the public realm to the MUP (adjacent to the OLRT). The wall will be around 6-7 m high at the west end, tapering down to the east (as the MUP elevation rises to meet the site grades). These proposals will result in finished grades being raised by between 1 and 3 m over the northern portion of the site.

Appendix A contains the Site Grading plan for reference.

2.3 Retaining Walls & OLRT Interface

As described above, two retaining wall structures are required to manage the elevation transitions along the northern edge of the site. The first one of these is set back within the property limits and will separate the public realm area from the MUP running east-west along the OLRT interface. It will be approximately 7m high at the Booth Street end and taper down to zero as it runs east (and the MUP rises). Construction proposals for this structure are still being advanced, however current design intent is to use a precast block product engineered through a supplier-design arrangement.

The second retaining wall will be located directly along the property limits, managing the grade difference between the MUP (as it drops to pass below the Booth Street Bridge) and the OLRT lands to the north. As noted previously, there is an existing gabion basket wall in the north-east corner of the site (understood to have been constructed during Stage 1 OLRT works) partially fulfilling this function based on existing site grades. To implement the MUP connection, this existing retaining structure needs to be extended, both vertically and horizontally (to the west). Noting that this MUP connection along the north edge of the site has been planned for a number of years (per NCC Master Plan requirements), the LBLP team would welcome confirmation from City staff as to whether any allowances were made during initial design/construction of the gabion wall to facilitate future extension. If available, the team would seek to incorporate these allowances as part of the proposed design, to ensure the works can be completed in an expedient and cost-effective manner.

Appendix B contains drawings extracted from the Landscape Architecture package that show sections through the retaining wall proposals along the north edge of the site.

2.4 Air Ducts

To serve HVAC systems for the new building, an air vent structure is required to connect plant rooms at the first basement level to louvres on the face of the retaining wall to the north. The Project Mechanical Engineer (Smith & Anderson) has developed minimum cross-sectional area

requirements for these conduits (6.3 m² enlarging to 11.0 m² at the retaining wall face), and the team is currently developing proposals for their construction. Current intent is that precast box culvert sections will be used to create the connection. These proposals are noted here only in the context of providing an overview of all works being undertaken in the north portion of the site (crossing the deep City services).

Appendix C contains a copy of the Architectural Site Plan drawing with the Air Duct features highlighted, for reference.

2.5 Albert-Slater Reconstruction Project

It is noted that the City is currently at a relatively advanced stage in terms of planned reconstruction works for Albert Street, as part of the Albert-Slater Reconstruction Project. It is understood that there are two ongoing projects associated with this, and that the split of work occurs just west of Empress Avenue – works along Albert Street east of this point are ahead in terms of schedule, with works to the west following as part of a second design/construction process.

The LBLP design team are in the process of developing proposed modifications to the City's current Empress/Albert intersection design, to incorporate the north extension of Empress, an eastbound left turn lane, as well as the required signalization updates. These plans will be shared with City staff for review and approval via the established contacts within the Albert-Slater Reconstruction team.

Coordination is also ongoing with City staff engaged on the Albert-Slater works west of Empress. Current design plans for the LBLP site (and adjacent streetscape for frontages along Albert and Booth) have been shared with City staff here, and the understanding is that the City design will seek to incorporate these aspects as their design develops. The LBLP team will remain available to City staff in this regard to facilitate any further coordination necessary as proposals are advanced.

2.6 Albert-Booth Vault Infrastructure

The design team are aware of existing City infrastructure within the streetscape at the north-east corner of the Albert-Booth intersection (i.e. south-west corner of LBLP site), consisting of pad-mounted vents and control cabinet, as well as a subsurface vault. Please refer to the Architectural and Landscape Architecture drawing packages for illustration of design proposals developed to allow these features to be maintained alongside the proposed works. Note also though that conversations with City staff are ongoing regarding coordination of the supply, exhaust and access hatch at the control vault.

2.7 Sewer Heat Recovery System

It is noted that proposals are being developed to implement a Sewer Heat Recovery system as part of the LBLP project, using the deep trunk sewers as heat sinks for the building's heating and cooling needs. These proposals are being advanced on behalf of Dream by Eequinox, with support on the Civil Engineering aspects (E.g., access chambers from surface level) from Stantec. For further details on this proposed system, reference should be made to separate discussions with City staff.

3 INFRASTRUCTURE PROTECTION REQUIREMENTS

For the Albert Street HPWM, initial City Engineering feedback provided on the bid-level submission (comments document dated December 2021) requested a 6-9 m setback from the water main, depending on depth and soil conditions. The document also noted that Vibration and Settlement Monitoring Programs will be required during construction (to be prepared by a specialist Vibration Monitoring Engineer and Geotechnical Engineer, respectively).

City staff have subsequently provided specific requirements for the Settlement and Vibration Monitoring Program, as well as confirming that the applicable limit would be a maximum vibration of up to 15 mm/s for frequencies exceeding 40 Hz (noting that exceedances require work to be ceased immediately and the City to be notified within 2 hours). Please refer to **Section 4.2** for further discussion.

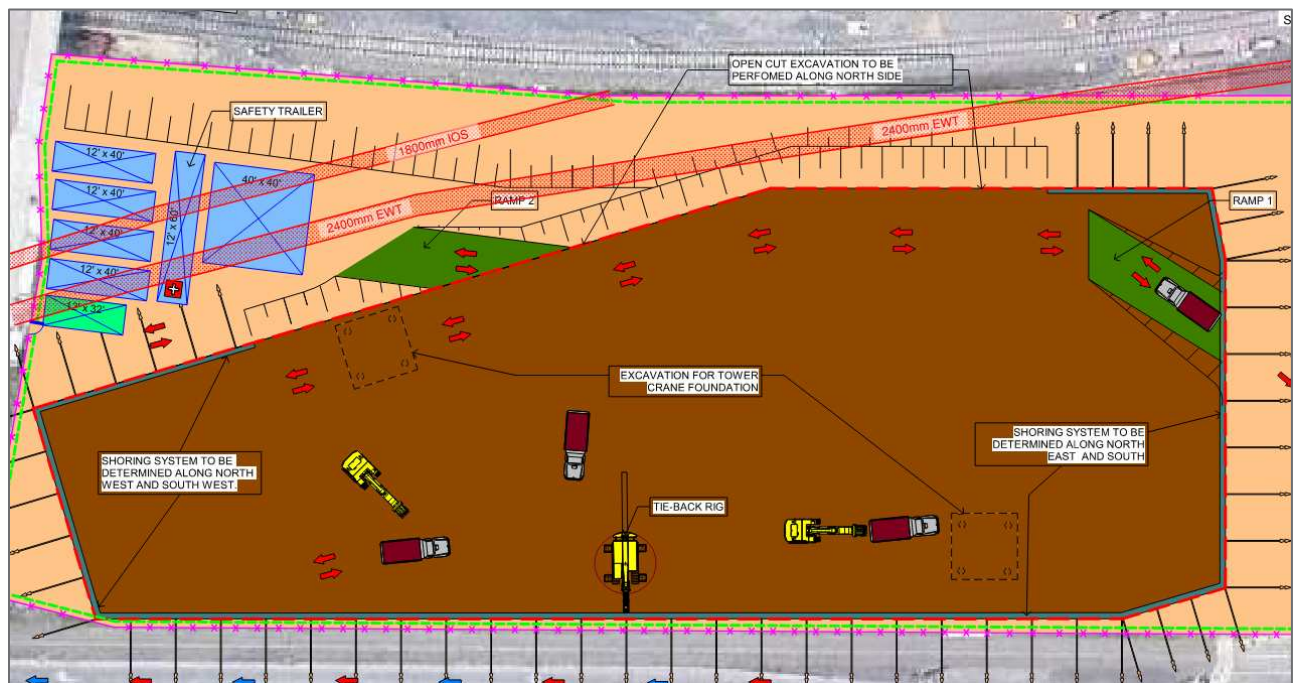
It is also noted that the team has reviewed the City of Ottawa *Infrastructure Build Over Policy* document (dated January 21, 2014 and understood to have been provided as a report to Planning Committee and Council during the Confederation Line Stage 1 OLRT project). This report is supportive of Transit-Oriented Development (TOD) such as the Library Parcel project, and the recommendations direct City staff to implement a uniform, risk-based approach to the assessment of development applications that build over (or adjacent) to City infrastructure. However, no *specific* protection requirements appear to be set out in this document that would dictate provisions for the buried pipework crossing the north-west corner of the site – including the 2400 mm diameter Combined EWT Sewer Pipe (CSST connection), 1800 mm diameter Interceptor Outfall Sewer, or the 3000 mm diameter storm sewer pipe.

As part of the City review process, the LBLP team received third party review comments on the 2nd submission of the Constructability Report (December 2022) via a Stantec Memo (“CSST: 665 Albert Development Review Package Rev.1 Review”, dated January 19, 2023). This memo noted that all previous comments had been addressed apart from point 4.c., regarding maximum excavation depths over City services during construction:

Revised report does not address comment fully. However, landscaping cross-sections illustrate that final grades for the MUP (lowest elevation area of site) will be at 56.0m at a minimum, consistent with the grades of the existing LRT tracks that are above-adjacent to the existing sewer infrastructure. It is assumed that the construction site overtop of the EWT and IOS will not be excavated lower than 56.0m outside of the shoring system (essentially existing grades). Provide confirmation whether any protective measures would be required to protect the sewers from construction activity/equipment.

In response to this comment, we note that no excavation lower than 56.0m is proposed over City infrastructure. As per the ED Logistics Plan Excavation Figure LLP-LOG-02 (**Appendix F**) and Marathon Shoring Plan (**Appendix E**), construction site grades in the northern portion of the site over existing City infrastructure will generally not vary significantly from the existing condition. As indicated in **Figure 3-1** (a marked-up extract of the Ellis Don Logistics Plan Grading Figure LLP-LOG-02 to show approximate alignment of EWT/IOS), City infrastructure lies outside of, or close to, the indicated top of slope linework. In localized areas some precut (to an elevation of 59.0m) will be necessary as part of excavation shoring (see Marathon Drg. MU4). On this basis, no additional protective measures are considered necessary.

Figure 3-1 LLP-LOG-02 Extract

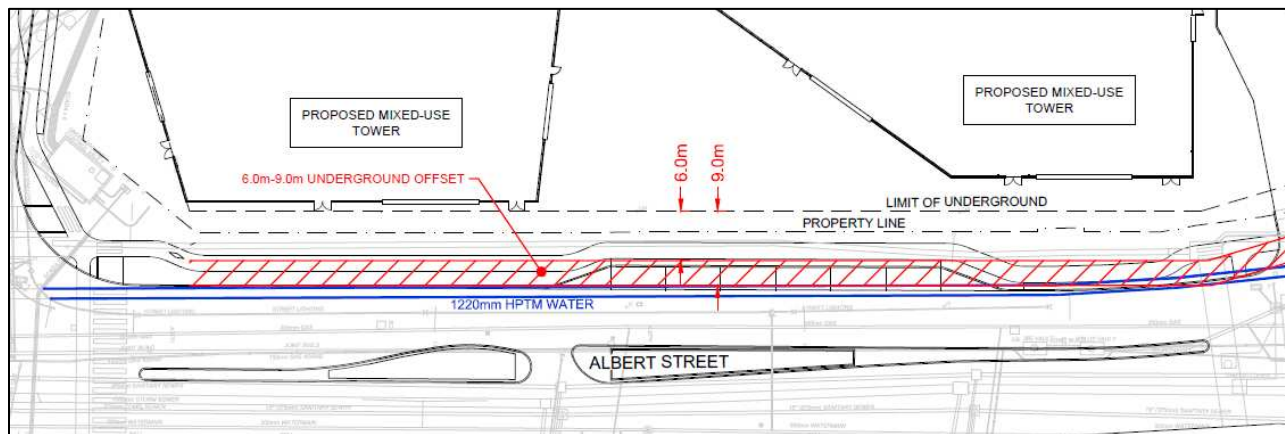


4 PROPOSED PROTECTION MEASURES

4.1 Setbacks and Temporary Shoring Design

As illustrated below in **Figure 4-1** the proposed basement structure along Albert Street is horizontally set back from the HPWM by a minimum of 9.0 m along the majority of the project frontage. There is an inflection point in the basement wall alignment close to the south-east corner where the setback temporarily reduces to approximately 7.7 m, however the proposals are considered compliant with the City requirement for a 6.0 to 9.0 m setback.

Figure 4-1 Albert Street HPWM Setback



Through discussion with the project construction partner (Ellis Don) it is understood that current intent is to provide perimeter shoring along Albert Street and Booth Street – created by driven H-piles, with standard strand cable tiebacks and walers – with the remainder of the basement extent to be constructed via open cut. While this represents the current planned approach, it is noted that construction approach remains subject to change as the design progresses and more information becomes available.

For reference, **Appendix E** contains the current shoring design package and **Appendix F** contains the current Ellis Don Construction Logistics Plan. Note that this information will continue to be developed as construction plans are advanced and updates will be provided as needed.

4.2 Settlement and Vibration Monitoring

As noted in **Section 3**, City staff have provided specific requirements for the Settlement and Vibration Monitoring Program, as well as confirming that the applicable limit would be a

maximum vibration of up to 15 mm/s for frequencies exceeding 40 Hz (noting that exceedances require work to be ceased immediately and the City to be notified within 2 hours). The City requirements received are as follows:

In order to help ensure the integrity of the high-pressure transmission main located close the west boundary of the site carries a significant portion of the entire water supply for the City of Ottawa, the Owner acknowledges and agrees to undertake the following:

- 1. A site-specific Settlement and Vibration Monitoring Program (the "Program") shall be developed and stamped by a professional Engineer in the province of Ontario and shall be submitted to the City for their review and approval before the inclusion of the Program in the contract documents.*
- 2. Should monitoring levels of vibration and underground soil movement exceed the maximum limits outline in the Program, the Owner agrees to cease all construction activities immediately, and will take necessary correction option and at the same time will report to the City immediately and will resubmit a revised work plan and Program to the City.*
- 3. In the event that the levels of vibration momentarily exceed the maximum limits outlined in the submitted report/plan but the Owner's on-site consultant is of the professional opinion that no danger exists, the Owner may continue to proceed with the work by a different means, consistent with the report, that does not further cause the levels of vibration /settlement to exceed the maximum limits outlined in the Program. Priors to so proceeding with the work, the exceedance shall be reported to the Construction Services Branch of the City.*
- 4. In the event of any requirement for emergency repairs of this transmission main, the Owner shall reimburse the City for the cost of such repair to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department.*
- 5. The City reserves the right to issue a stop work order for the construction in the event of an incident which would adversely affect the City's requirement to provide safe drinking water. This may include, but is not limited to, a leak or failure of the high pressure transmission main and /or a failure at one of the water purification plans. Where the stop work order is for a period of 24 hours or less, the City is not responsible for any delay claim billed by the developer. No inference of liability is to be taken from these conditions for any period longer than 24 hours.*
- 6. A certificate of liability insurance shall be submitted to the City wherein the Owner is the named insured and the City of Ottawa is an additional insured. The limits of the policy shall be in the amount of \$25,000,000 and shall be kept in full force and effect for the term of the construction work.*

The LBLP team acknowledges these requirements and commits to developing the required site-specific Settlement and Vibration Monitoring Program and submitting for City review/approval prior to the work being included in contract documents. We note that the construction team has recent experience working under similar constraints within the City of Ottawa and does not foresee any issues maintaining compliance with these requirements.

4.3 Structural Loading

Please refer to **Appendix G** for further details of the proposed structural/foundation design, developed by the Project Structural Engineer (RJC) in conjunction with the Project Geotechnical Engineer (Golder) – this appendix includes a drawing set showing current foundation design alongside estimated locations of City services (specifically EWT and IOS pipes), in both plan and section.

In summary though, the proposed structure will be supported on reinforced concrete caissons drilled down and socketed into the bedrock for all heavily loaded tower structural elements. For the lightly loaded columns and walls, smaller “pipe piles” drilled and socketed to rock will be provided. No conduits pass beneath the footprint of the proposed building. The closest service (2400mm diameter EWT concrete sewer pipe) runs approximately parallel to the north foundation wall with an invert elevation of approximately 45.6m and maintains a horizontal clearance from the proposed foundation wall of between 3 and 10m.

In accordance with Geotechnical recommendations, the deep foundation system underneath the foundation wall and adjacent columns will be socketed 1m into the bedrock, hence loading the rock in friction approximately between elevation 47m and 48m. Based on the provided as-built drawings of the existing services, the minimum horizontal distance from the buried pipe to the edge of the caisson is at least 3m (refer to RJC drawings S198-S198E-S198W-S702 included in the appendix). The invert elevation of the pipe is around elev. 45m, providing a minimum 1H:1V slope from the invert to the highest point of application of the deep foundation force in the rock. Based on Geotechnical recommendations, these conditions should not impose any significant stress increase to the existing services.

The team acknowledges receipt of City comments on the initial issue of the Constructability Report (transmitted by email on November 8th 2022), comprising a memo by Stantec with comments on various aspects of the project in relation to CSST Infrastructure. Please refer to **Appendix H** for a copy of the Stantec memo, along with a response memo from Golder describing additional analyses undertaken and point-by-point responses to the Stantec comments.

4.4 Pre and Post Construction CCTV Surveys

As per City requirements, the contractor will be responsible for undertaking pre and post-development CCTV surveys of the identified buried infrastructure crossing the project site to document the existing conditions and demonstrate that works were completed without damage to City infrastructure.

5 CONCLUSIONS

This Constructability Report is provided to document the presence of existing buried City infrastructure crossing (or in close proximity to) the project site, and to summarize the current design/construction intent with respect to protection of these existing City assets through development. The LBLP team remains available to engage with City staff following their review of this submission to discuss and refine the proposals as needed to advance the project.

Respectfully submitted,

On behalf of TYLin,



Ben Worth, P.Eng.

Senior Project Manager

Disclaimer:

This report includes numerous references to investigations, findings and recommendations of third parties – specifically, from the project Geotechnical Engineer (Golder Associates Ltd.), the project Structural Engineer (RJC Ltd.), and the project construction partner (Ellis Don). This information is consolidated in the Constructability Report for the purposes of City review, however TYLin does not take responsibility for the approval, validation, or ownership of these recommendations from third parties.



APPENDIX A

Site Grading Plan



NO.	DESCRIPTION	DATE
1	ISSUED FOR SPA RESUBMISSION	2022-11-09
2	ISSUED FOR SPA RESUBMISSION	2022-11-09
3	ISSUED FOR SPA RESUBMISSION	2022-11-09
4	ISSUED FOR SPA RESUBMISSION	2022-11-09
5	ISSUED FOR SPA RESUBMISSION	2022-11-09

ISSUED FOR SPA RESUBMISSION - NOT FOR CONSTRUCTION 2022 - 11 - 09



KEY PLAN

N.T.S.

SEE ABBREVIATIONS BELOW

- 200.00, 0.5% PROPOSED ITEMS
- 200.00, 0.5% EXISTING ITEMS
- LIMIT OF PROPERTY LINE
- LIMIT OF UNDERGROUND STRUCTURE
- PROP ELEVATION TO MATCH EXISTING
- EMERGENCY OVERLAND FLOW ROUTE
- MH / CBM / DCBM / OGS
- CB / DCB / AD / TD
- HYDRANT / SIAMERE / VALVE BOX

BENCHMARK: ELEVATIONS ARE GEODETIC, IN METRES, AND DERIVED FROM THE CAN-NET VRS NETWORK MONUMENT, OTTAWA ELEVATION: 62.200

BEARING: BEARINGS ARE GRID, DERIVED FROM THE CAN-NET VRS NETWORK OBSERVATIONS ON NAD 83 CONTROL MONUMENTS 1977303 & 1960731, CENTRAL MERIDIAN, 76°30' W, LONGITUDE, NAD 83, ZONE 18

DRAWING NOTES

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- THIS DRAWING IS NOT TO BE ISSUED FOR CONSTRUCTION UNTIL ALL REQUIRED PERMITS HAVE BEEN ISSUED.
- THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, INVERTS AND DATA ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO TMG 48 HOURS PRIOR TO ANY CONSTRUCTION.

ABBREVIATIONS

GENERAL:	TW = TOP OF WALL	HDPE = HIGH DENSITY POLYETHYLENE
PROP = PROPOSED	BW = BOTTOM OF WALL	CONC = CONCRETE
EX = EXISTING	CONG = CONCRETE	MH = MAINTENANCE HOLE
STW = STORM	CR = CATCH BASIN	DCB = DOUBLE CATCH BASIN
SAN = SANITARY	AD = AREA DRAIN	TD = TRENCH DRAIN
WAT = WATER	AD = AREA DRAIN	
PVC = POLYVINYL CHLORIDE	AD = AREA DRAIN	
TC = TOP OF CURB	AD = AREA DRAIN	
BC = BOTTOM OF CURB	AD = AREA DRAIN	

SCALE: 1:200 4m TMG PROJECT # 10399

DATE: APRIL 2022

DRAWN BY: B.G.

DESIGNED BY: B.G.

CHECKED BY: B.D.



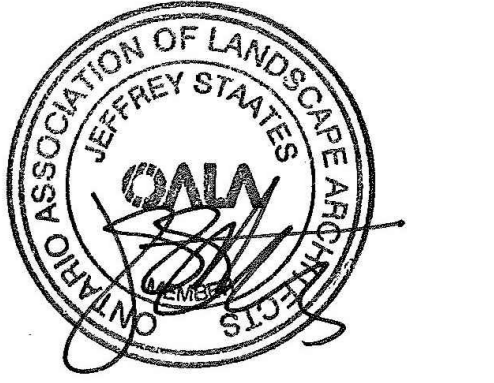


APPENDIX B

Landscape Architecture Drawings (Retaining Walls)

CONSULTANTS

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- MEP Smith+Andersen
1600 Carling Ave., Suite 530, Ottawa, ON K1Z 1G3
- LANDSCAPE PFS Studio
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- CONSULTANT Two Row Architect
1804 6th Line, Chatham, ON N0A 1M0
- CONTRACTOR ElisDon
2680 Queensview Dr., Ottawa, ON K2B 6J9



PROJECT

LEBRETON LIBRARY PARCEL
665 Albert St
Ottawa, ON
Canada



DREAM
30 Adelaide St. E., Suite 301,
Toronto, ON M5C 3H1
KEYPLAN

ISSUED FOR SPA RESUBMISSION - NOT FOR CONSTRUCTION 2022-11-09

ISSUE CHART

NO.	DESCRIPTION	DATE
2	ISSUED FOR SPA RESUBMISSION	2022-11-09
1	ISSUED FOR SPA RESUBMISSION	2022-04-11
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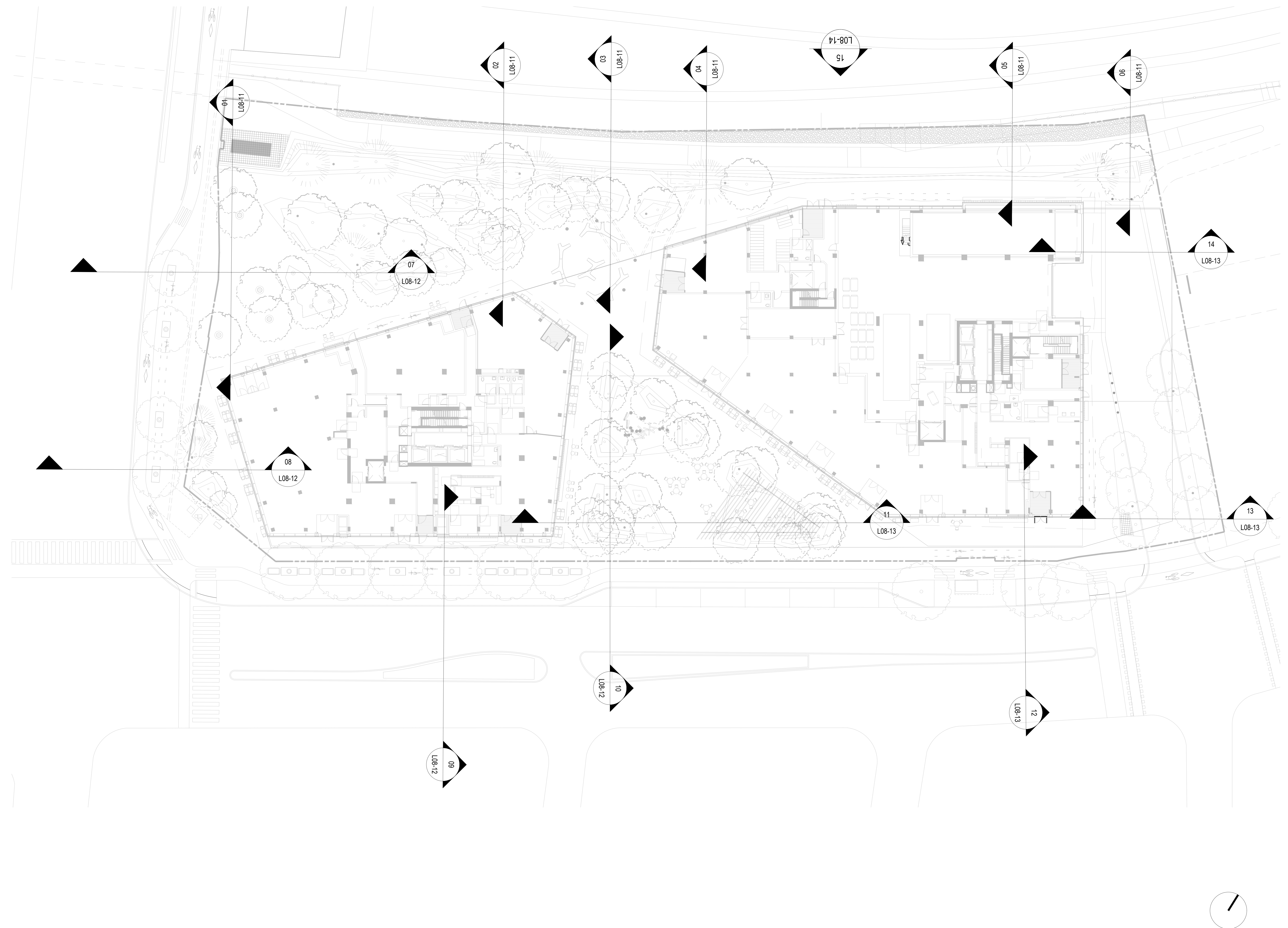
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SECTION

SHEET NUMBER

L08-10

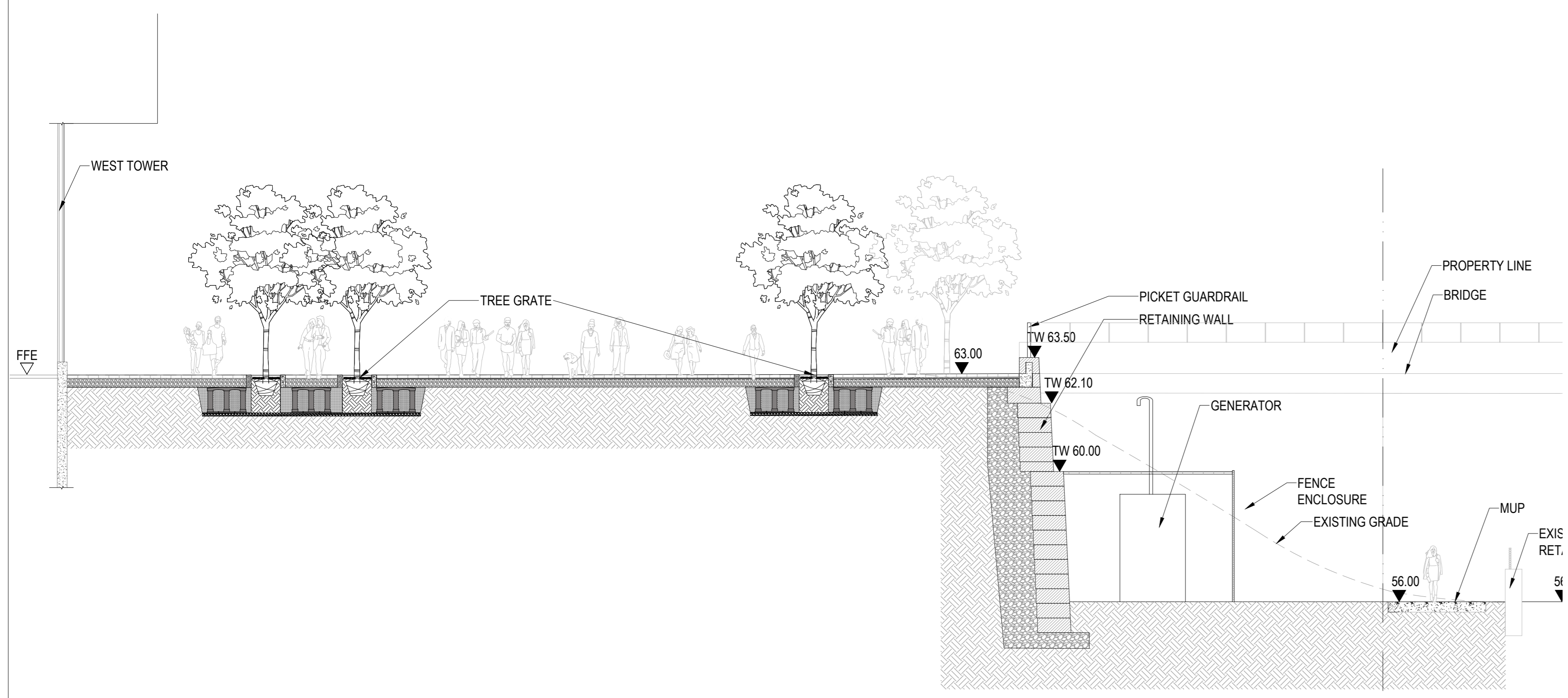
© 2022 Perkins and Will



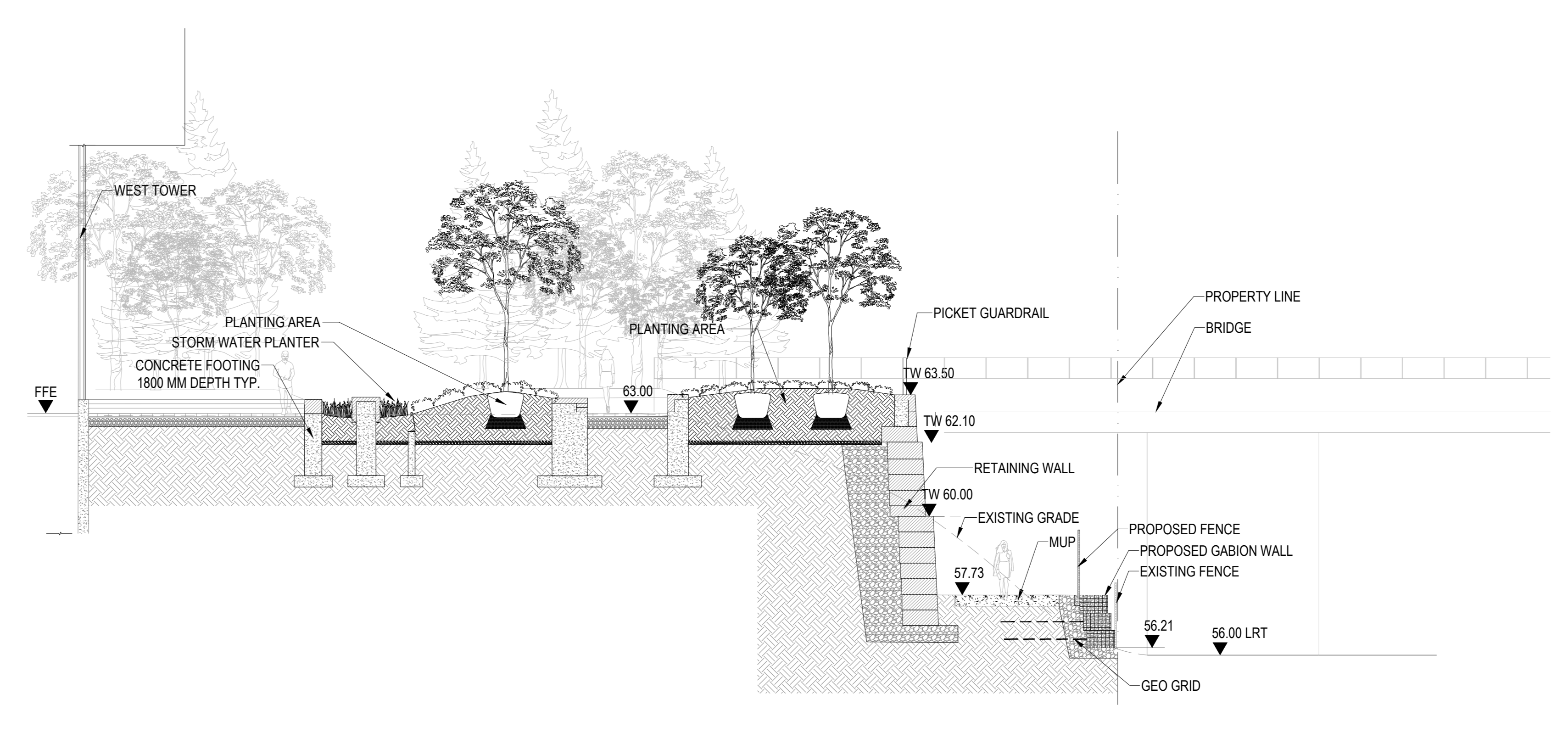
NOTE THAT THESE DRAWINGS ARE EXTRACTED FROM THE LBLP NOVEMBER 2022 CITY SUBMISSION PACKAGE AND ARE APPENDED TO THE LBLP CONSTRUCTABILITY REPORT FOR INFORMATION ONLY - PLEASE REFER TO MOST RECENT DRAWING SETS FOR CURRENT DEVELOPMENT PROPOSALS.

CONSULTANTS

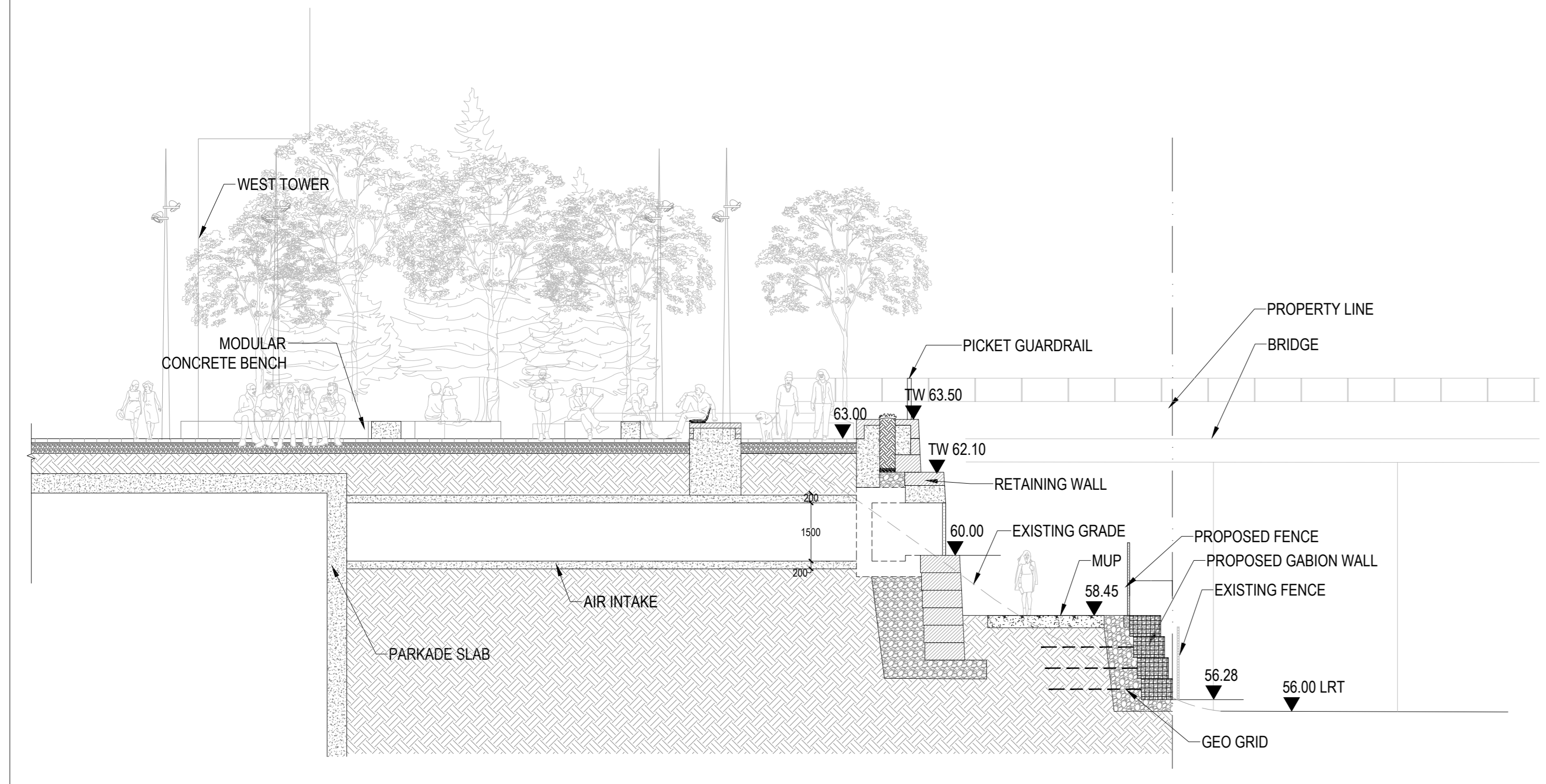
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8800 Dufferin St., Suite 200, Vaughan, ON L4K 0C5
- struct. RJC Engineers
1545 Carlin Ave., Suite 304, Ottawa, ON K1Z 6P9
- Smith+Andersen
1600 Carling Ave., Suite 530, Ottawa, ON K1Z 1G3
- LANDSCAPE PFS Studio
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- CONSULTANT Two Row Architect
1804 6th Line, Châteauguay, ON N0A 1M0
- CONTRACTOR ElisDon
2680 Queensview Dr., Ottawa, ON K2B 6J9



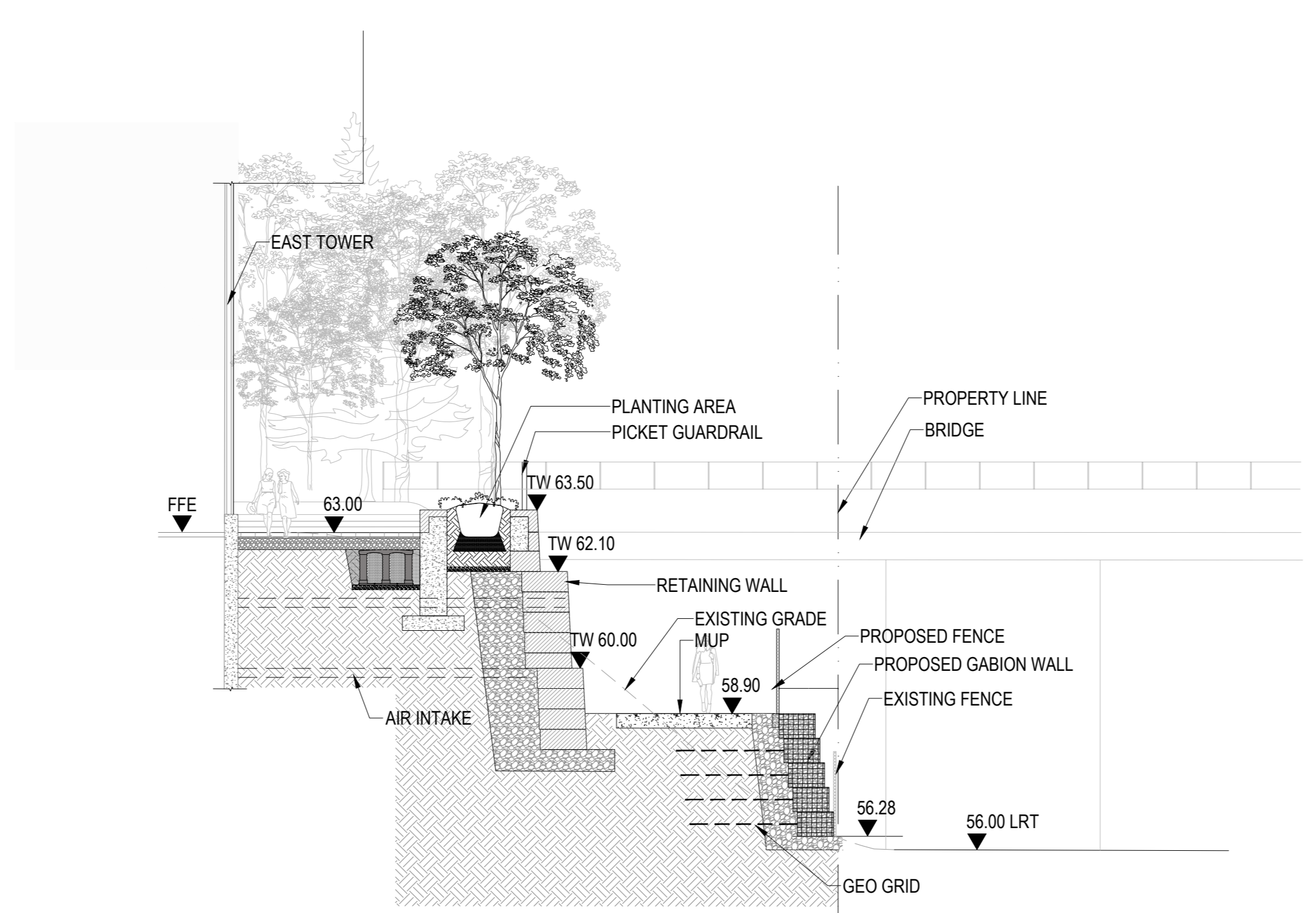
01 MUP TO NORTHWEST UPPER PLAZA
SCALE: 1:100



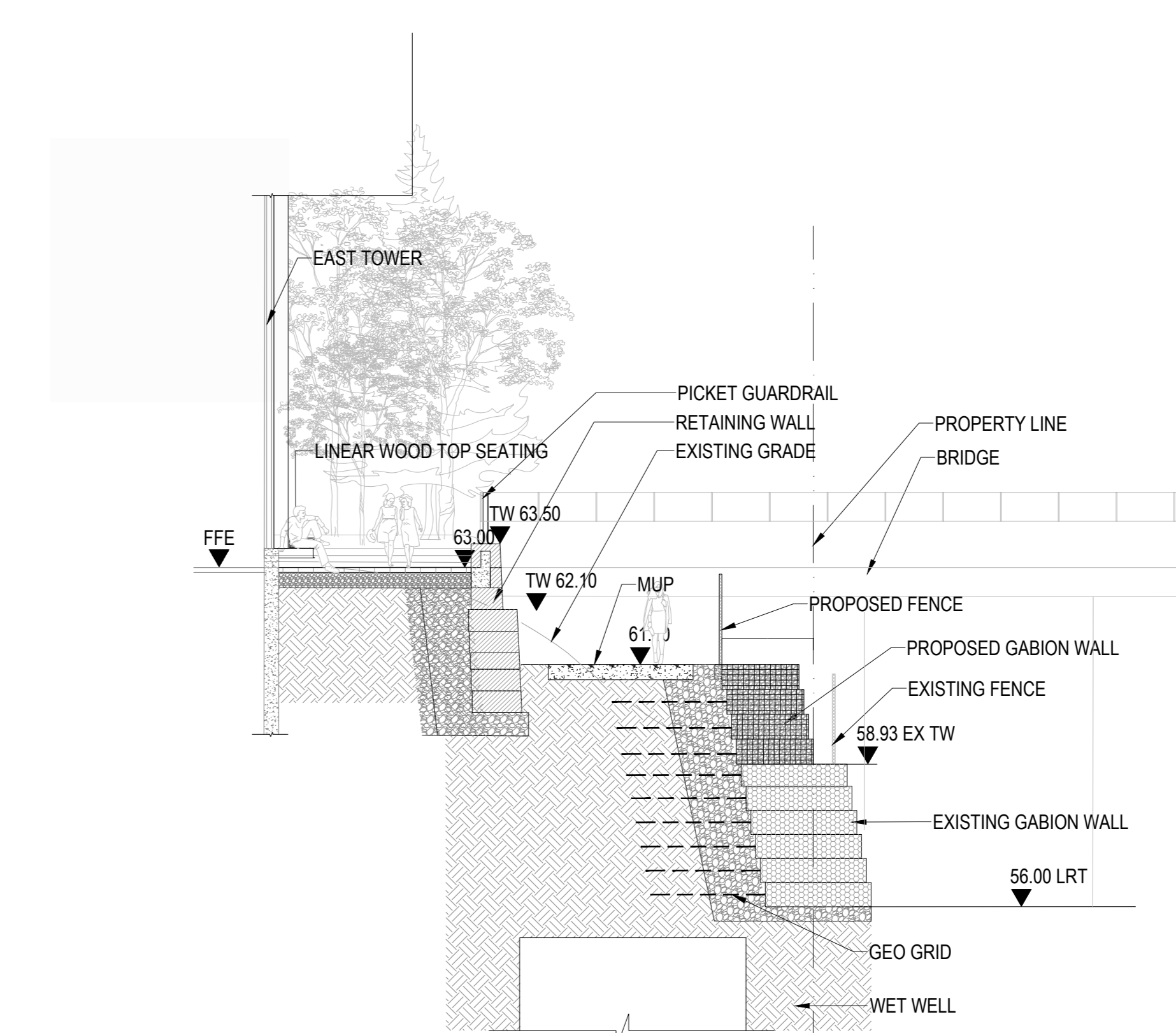
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SCALE: 1:100



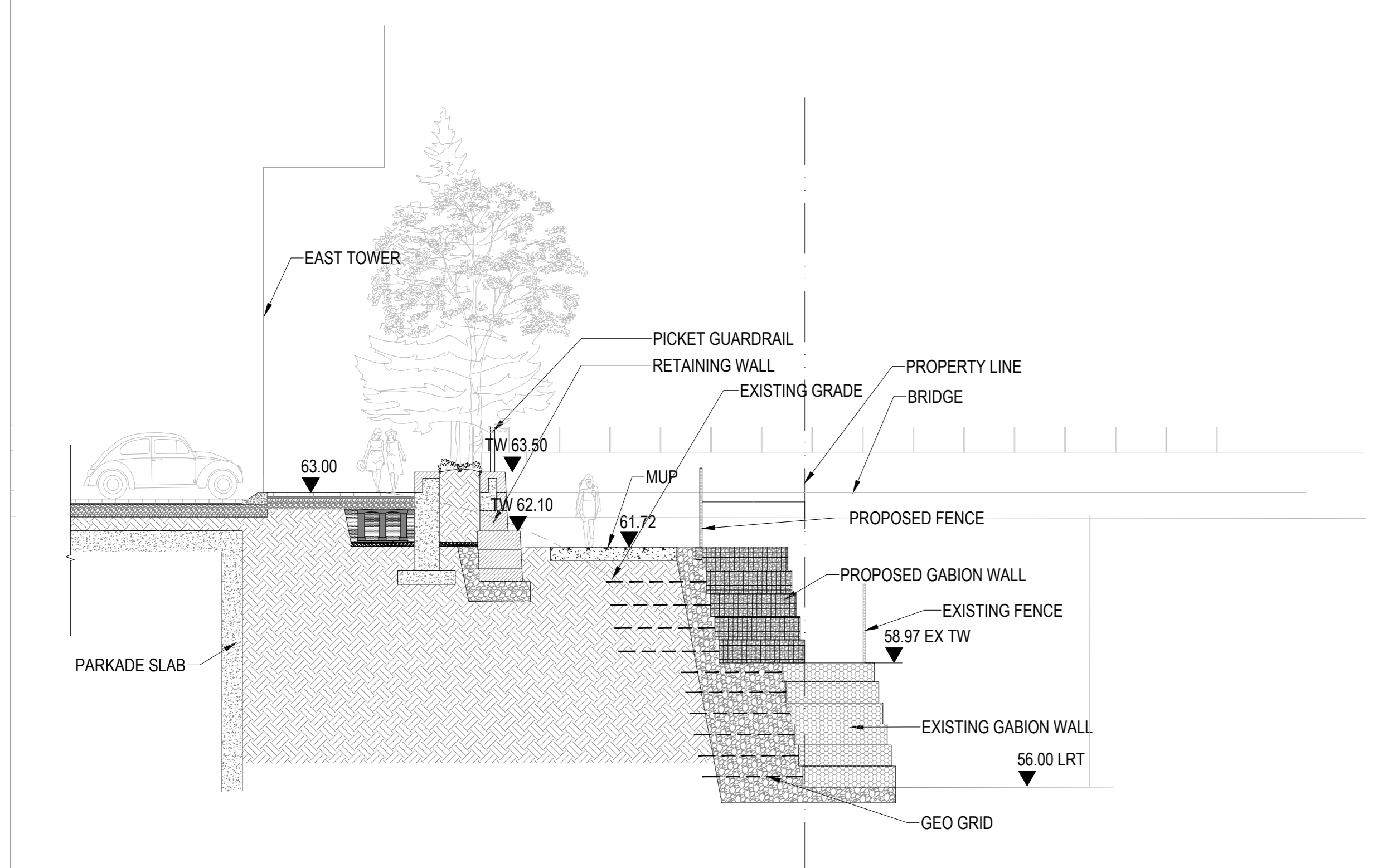
03 MUP TO GATHERING CIRCLE
SCALE: 1:100



04 MUP TO NORTHEAST UPPER PLAZA
SCALE: 1:100

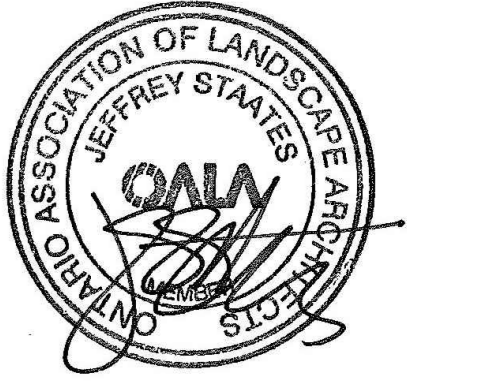


05 MUP TO NORTHEAST UPPER PLAZA
SCALE: 1:100



06 MUP TO NORTHEAST UPPER PLAZA
SCALE: 1:100

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PROJECT

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DREAM
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Toronto, ON M5C 3H1
KEYPLAN

ISSUED FOR SPA RESUBMISSION - NOT FOR CONSTRUCTION 2022-11-09

ISSUE CHART

NO.	ISSUED FOR SPA RESUBMISSION	DATE
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2	ISSUED FOR SPA RESUBMISSION	2022-11-09

SECTION

SHEET NUMBER

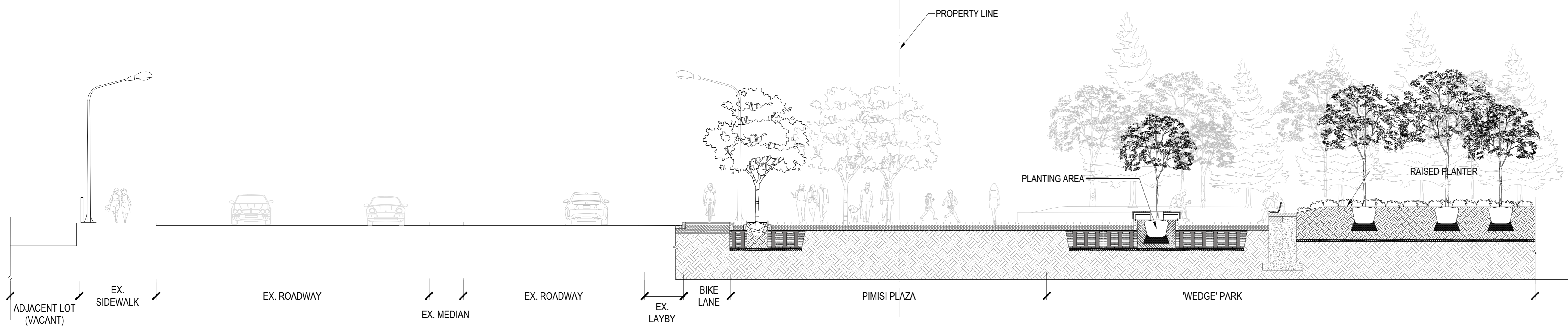
L08-11

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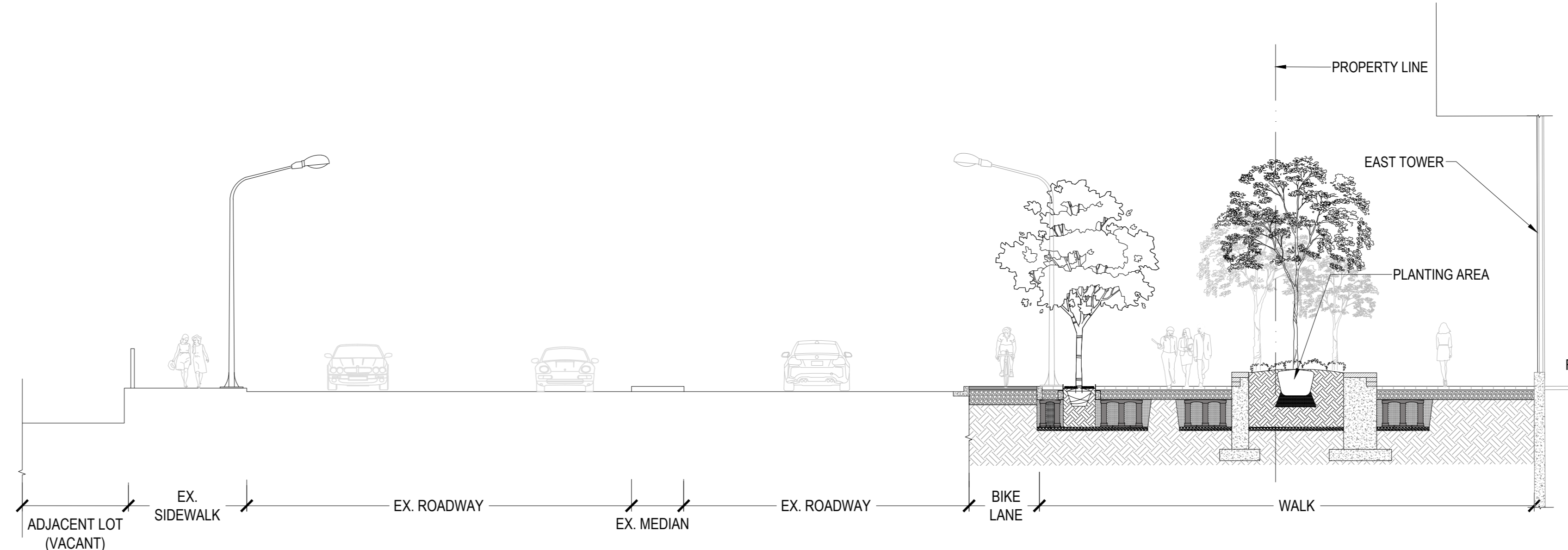
CONSULTANTS

civil
TMIG
8800 Dufferin St., Suite 200, Vaughan, ON L4K 0C5
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RJC Engineers
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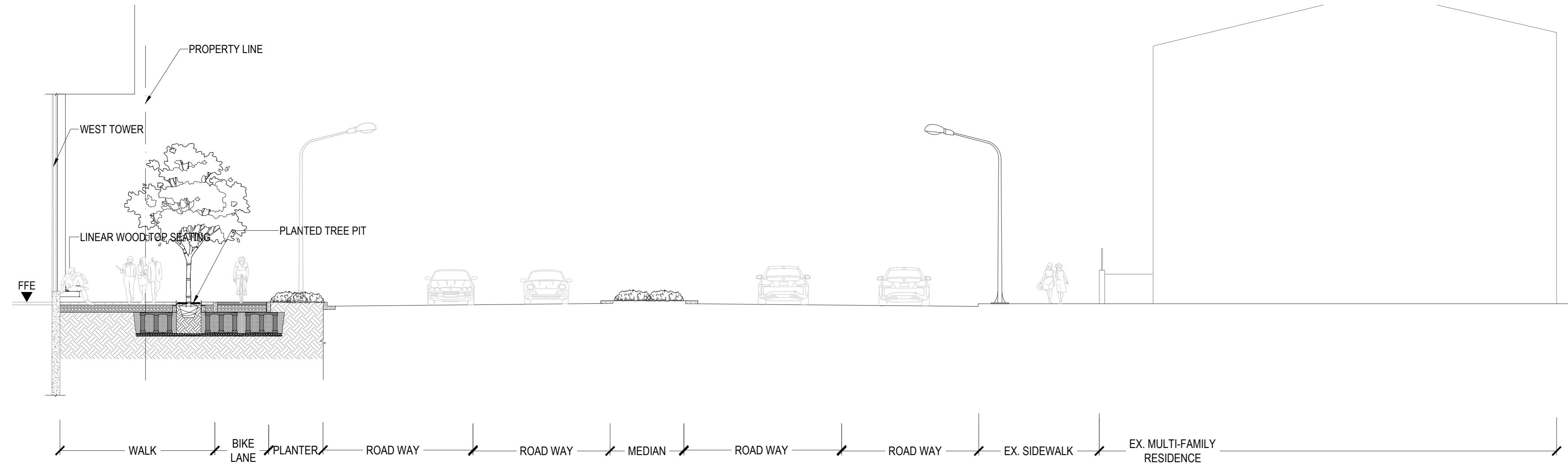
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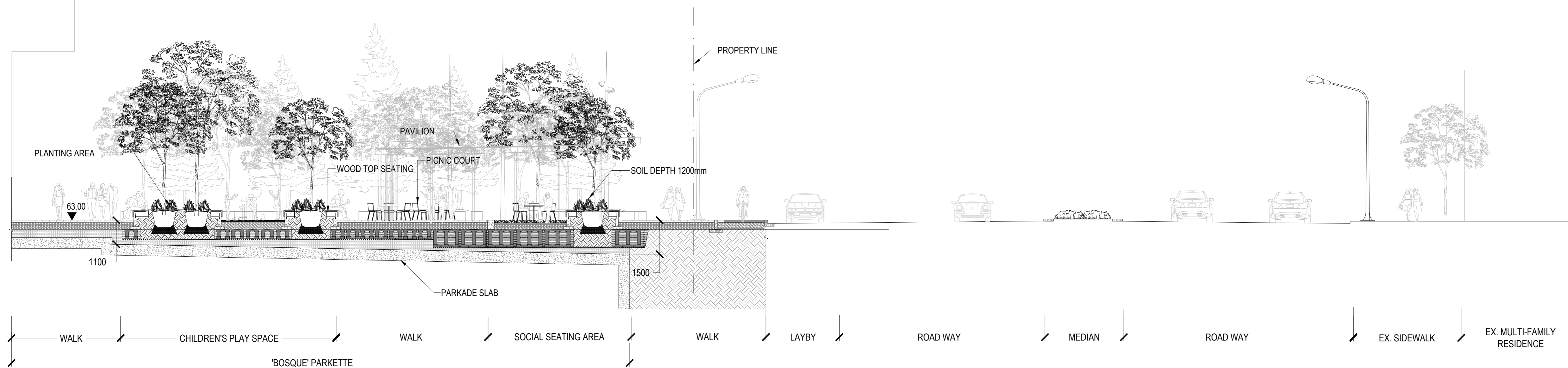
07 **BOOTH STREET AND WEDGE PLAZA**
SCALE: 1:100



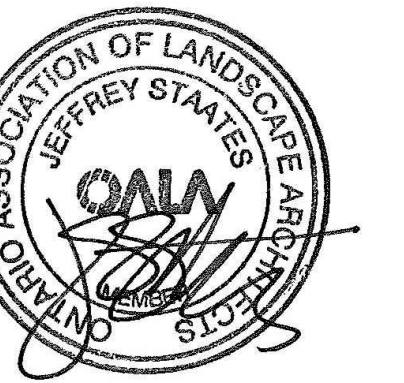
08 **BOOTH STREET**
SCALE: 1:100



09 **ALBERT STREET**
SCALE: 1:100



10 **ALBERT STREET AND 'BOSQUE'**
SCALE: 1:100



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Job Number

SECTION

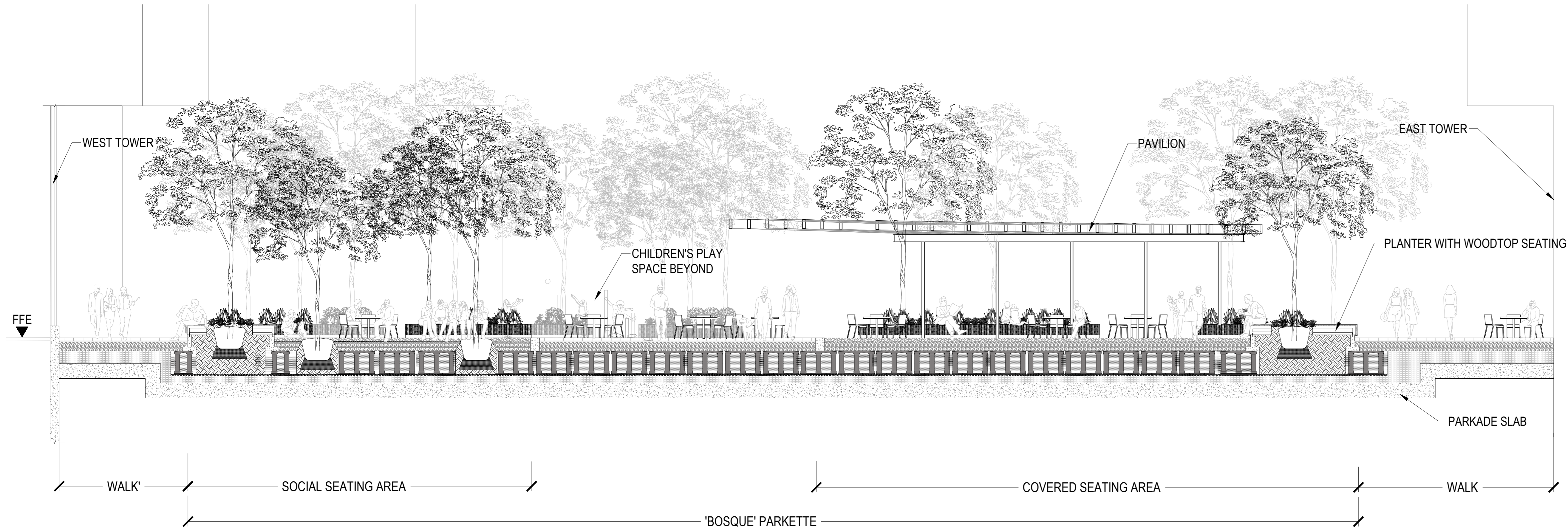
SHEET NUMBER

L08-12

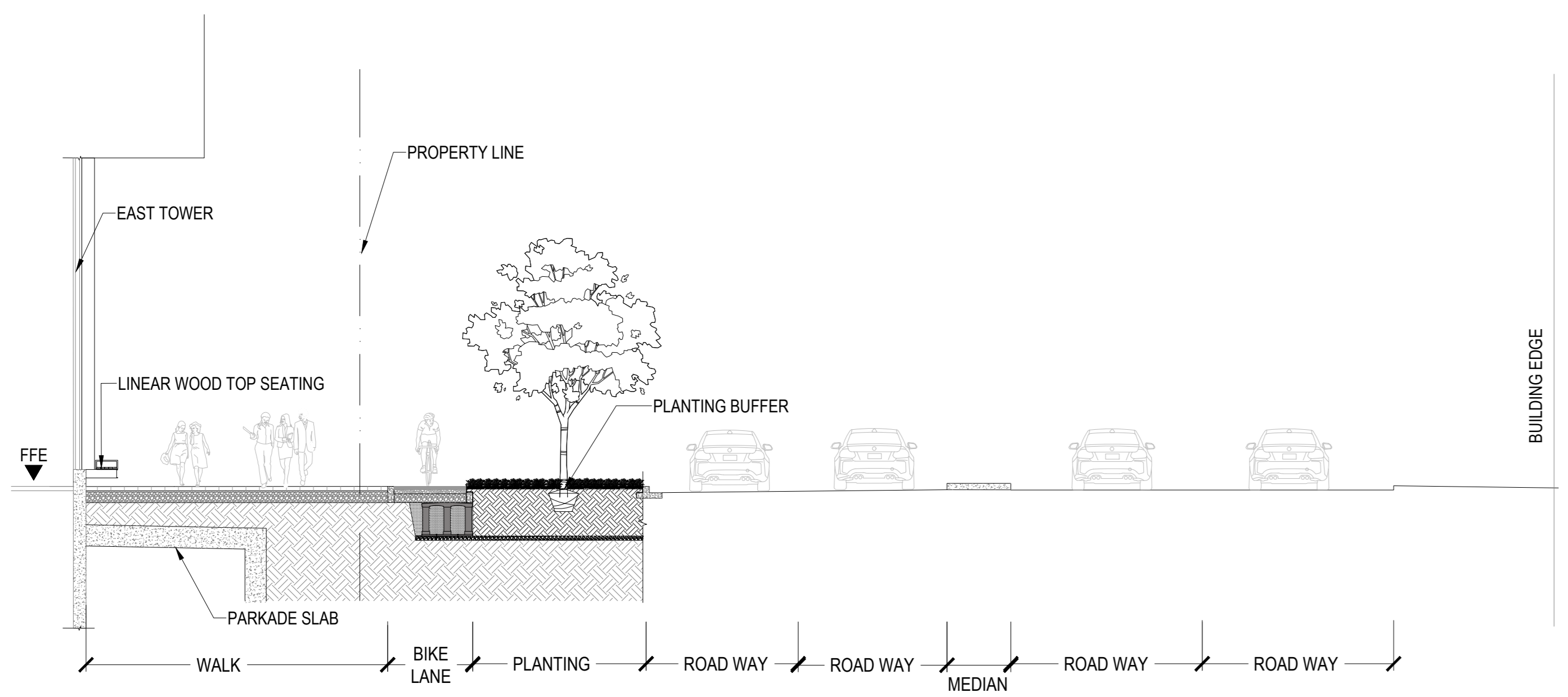
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CONSULTANTS

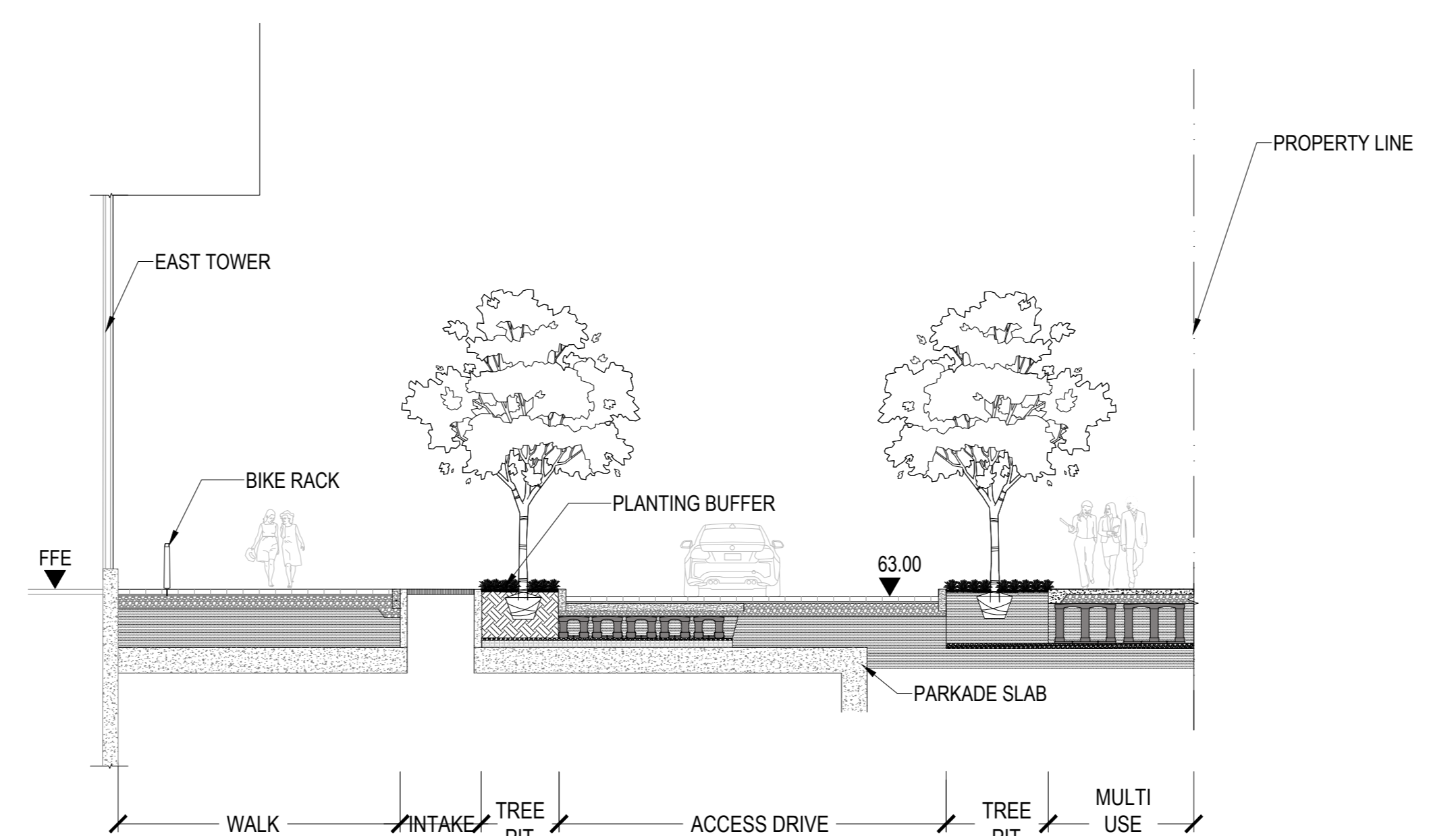
- civil
TMIG
8800 Dufferin St., Suite 200, Vaughan, ON L4K 0C5
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SEP
- Smith+Andersen
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LANDSCAPE
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- CONTRACTOR
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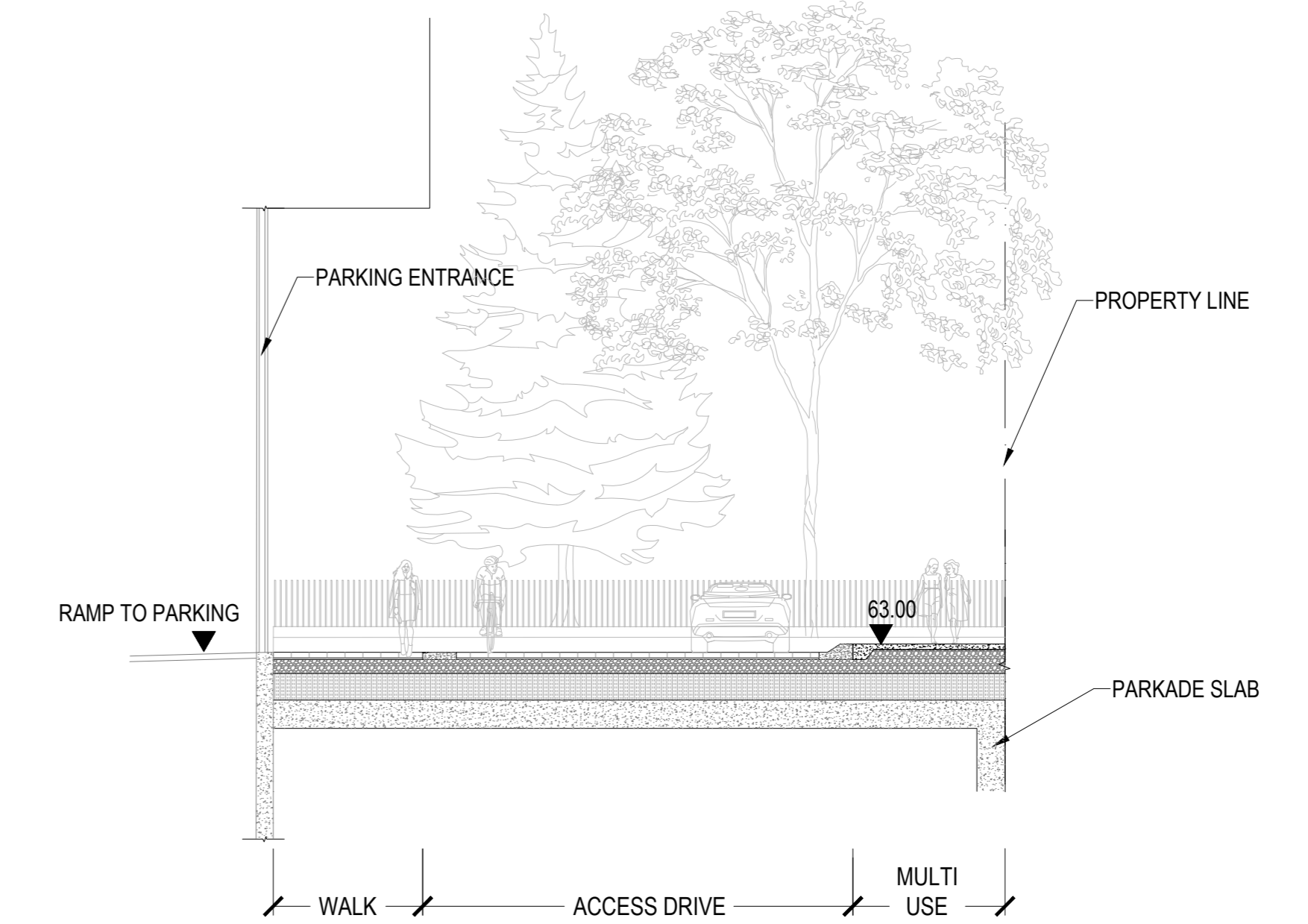
11 'BOSQUE' WEST TO EAST
SCALE: 1:75



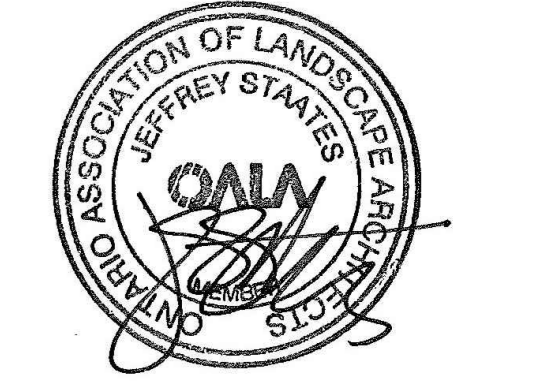
12 ALBERT STREET
SCALE: 1:100



13 SOUTH EMPRESS ACCESS LANE
SCALE: 1:100



14 NORTH EMPRESS ACCESS LANE
SCALE: 1:100



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ISSUE CHART

NO.	DESCRIPTION	DATE
1	ISSUED FOR SPA RESUBMISSION	2022-11-09
2	ISSUED FOR SPA RESUBMISSION	2022-11-09
3	ISSUED FOR SPA RESUBMISSION	2022-11-09

Job Number _____ TITLE _____

SECTION

SHEET NUMBER

L08-13

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APPENDIX C

Architectural Site Plan

(Air Ducts)

CONSULTANTS

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ISSUE CHART

NO.	DATE	DESCRIPTION
1	2022-04-29	ISSUED FOR SPA / ZBA / SPA
2	2022-05-27	ISSUED FOR 60% SD
3	2022-06-10	ISSUED FOR 100% SD
4	2022-08-19	ISSUED FOR 60% SD
5	2022-09-30	ISSUED FOR 100% SD
6	2022-11-09	ISSUED FOR SPA RESUBMISSION
7	2022-11-09	ISSUED FOR KCC 9% FLOTTA

ISSUED FOR APPROVALS - NOT FOR CONSTRUCTION 2022-11-09

NOTES

SITE PLAN BASED ON TOPOGRAPHIC SURVEY BY: STANTEC GEOMATICS LTD.
300-1331 CLYDE AVENUE,
OTTAWA, ON K2C 2A9
C/O R. G. BENNETT
DATE: APRIL 7, 2022

SITE / ZONING DATA

	REQUIRED	PROVIDED
TOTAL LOT AREA	9,629 m ²	9,629 m ²
GROSS FLOOR AREA	38,275.26 m ²	38,275.26 m ²
FLOOR SPACE INDEX	3.97	3.97
LOT FRONTAGE ON ALBERT STREET	144.0 m	144.0 m
LOT FRONTAGE ON BOOTH STREET	77.9 m	77.9 m
LOT FRONTAGE ON LRT	138.6 m	138.6 m
LOT FRONTAGE ON EAST PROPERTY LINE	63.8 m	63.8 m
PROPOSED BUILDING LENGTH AT GRADE ON ALBERT STREET		
EAST TOWER (PARALLEL)	29.5 m	29.5 m
EAST TOWER (ANGLED)	43.3 m	43.3 m
WEST TOWER (PARALLEL)	42.7 m	42.7 m
WEST TOWER (ANGLED)	30.2 m	30.2 m
PROPOSED BUILDING LENGTH AT GRADE ON BOOTH STREET		
WEST TOWER	24.7 m	24.7 m
PROPOSED BUILDING LENGTH AT GRADE ON LRT		
EAST TOWER (PARALLEL)	42.7 m	42.7 m
EAST TOWER (ANGLED)	21.2 m	21.2 m
EAST TOWER (ANGLED)	15.2 m	15.2 m
WEST TOWER (PARALLEL)	46.2 m	46.2 m
WEST TOWER (ANGLED)	11.4 m	11.4 m
PROPOSED BUILDING LENGTH AT GRADE ON EAST PROPERTY LINE		
EAST TOWER	46.8 m	46.8 m
SETBACK DATA		
FRONT YARD (ALBERT STREET)	NO MIN	1.8 m-4.9 m
CORNER SIDE YARD SETBACK	NO MIN	0.0 m-9.9 m
EASTERLY INTERIOR SIDE YARD SETBACK	NO MIN	9.1 m
REAR YARD SETBACK (LRT)	NO MIN	10 m
TOWER SETBACK FROM EASTERLY SIDE YARD	NO MIN	15.7 m
TOWER DATA		
TOWER SEPARATION	23.0 m	55.3 m
TOWER FLOORPLATE AREA	750 m ² MAX	759 m ²
BUILDING HEIGHT		
EAST TOWER AVERAGE GRADE		62.91 m
MIDPOINT OF EAST TOWER ROOF		167.52 m
EAST TOWER BUILDING HEIGHT	110 m	104.61 m
WEST TOWER AVERAGE GRADE		62.58 m
MIDPOINT OF WEST TOWER ROOF		153.37 m
WEST TOWER BUILDING HEIGHT	127 m	120.79 m

AMENITY AREA

AMENITY LOCATION	AMENITY FUNCTION	AREA
INDOOR AMENITY	COMMUNAL AMENITY	1753.91 m ²
OUTDOOR AMENITY	COMMUNAL AMENITY	2474.59 m ²
OUTDOOR AMENITY	PRIVATE AMENITY	986.16 m ²
TOTAL AMENITY SPACE		5214.57 m²

PARKING SPACES

TYPE	REQUIRED	REQUIRED	PROPOSED
RESIDENT	N/A, MAX 1.5 per 0 MIN, 910 MAX	0	122
RESIDENT BARRIER-FREE	N/A	0	7
TOTAL RESIDENTIAL			129
VISITOR RESIDENTIAL	0.10 unit	61	58 (+3 B-F)
RETAIL	N/A, MAX 10	0	6
DAY CARE	N/A	0	8
RETAIL/DAYCARE BARRIER-FREE	20-99 spaces = 1 (of 61)	1	1
TOTAL VISITOR			76
GRAND TOTAL		61 MIN	205

NOTES
REFER TO A10-008 FOR FURTHER INFORMATION ON VEHICULAR PARKING SPACE SIZES AND WASTE STATISTICS.

LOADING SPACES

TYPE	REQUIRED	PROPOSED
RETAIL	0	SHARED
OTHER (DAY CARE)	1	1
RESIDENTIAL	0	SHARED
TOTAL TYP LOADING SPACES	1	1

1 TYPE G LOADING SPACE IS PROVIDED FOR WASTE COLLECTION
1 ADDITIONAL LSU LOADING SPACE IS LOCATED IN P1 FOR WEST TOWER LOADING CONVENIENCE

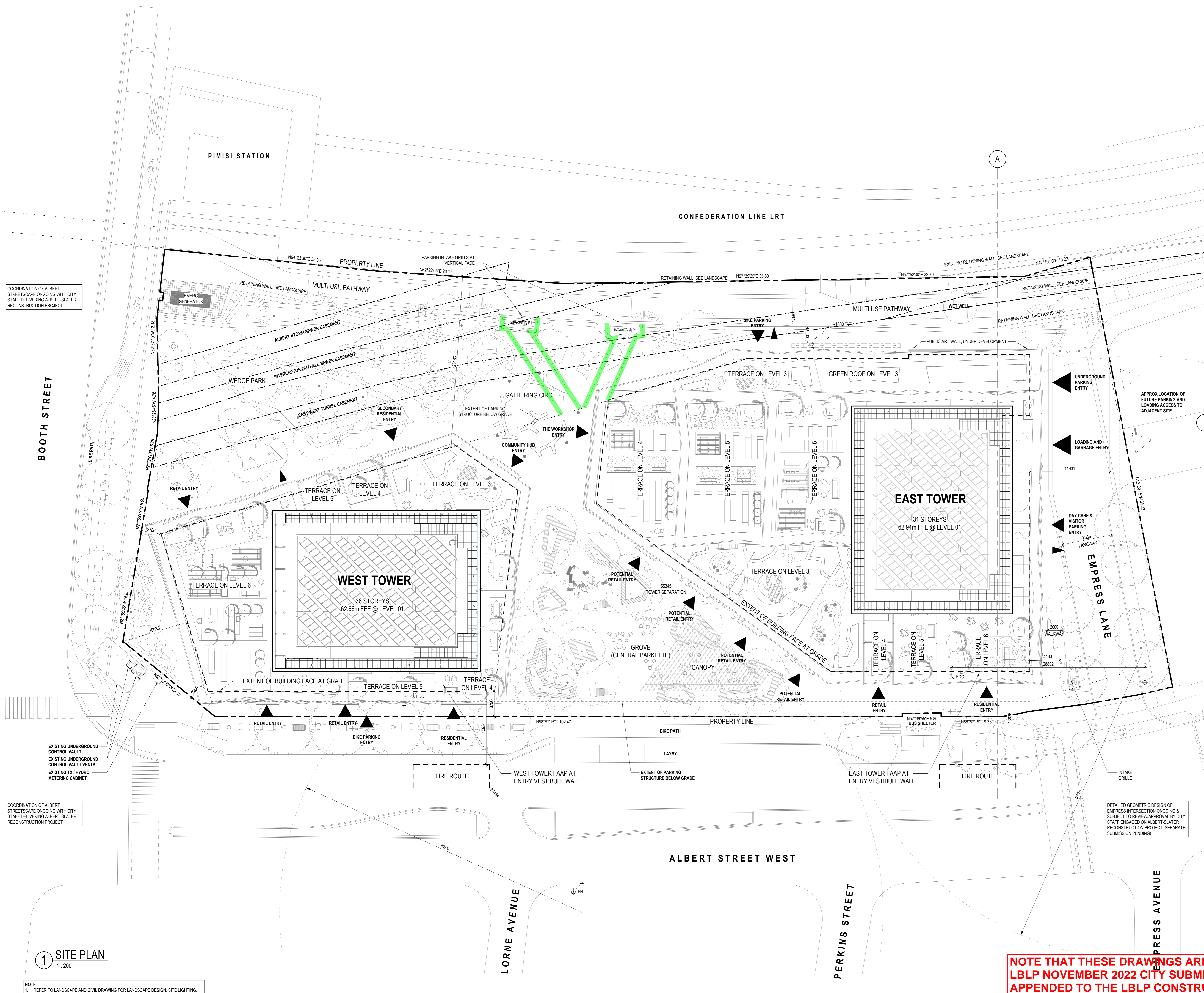
BICYCLE PARKING SPACES

TYPE	PROVISION	REQUIRED	PROPOSED
REQUIRED SPACES			
RESIDENTIAL	0.50 unit	304	
RETAIL	1000 m ²	6	
DAY CARE	1000 m ²	5	
TOTAL REQUIRED		315	
PROVIDED SPACES			
INTERIOR SECURE SPACES	MIN 25%	79	640
EXTERIOR SPACES	MAX 50%	N/A	132
TOTAL PROVIDED			772

NUMBER OF SPACES ABOVE AT GROUND LEVEL HORIZONTAL 50% OF REQD 158
INTERIOR 27
EXTERIOR 132
TOTAL 159

STORAGE LOCKERS

TOTAL: 345



1 SITE PLAN
1:200

NOTE
1. REFER TO LANDSCAPE AND CIVIL DRAWING FOR LANDSCAPE DESIGN, SITE LIGHTING, SITE SERVICING, AND GRADING INFORMATION.

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Job Number 44200
TITLE

SITE PLAN & STATISTICS

SHEET NUMBER

G01-01



APPENDIX D

Architectural Drg. A40-02

(City Vault, South-West Corner of Site)

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CONSULTANTS

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- Smith+Anderson
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- CONSULTANT
Two Row Architect
1804 6th Line, Oshawa, ON N4A 1M0
- CONTRACTOR
EllisDon
2680 Queensview Dr., Ottawa, ON K2B 8J9

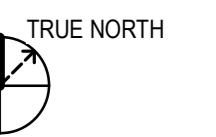
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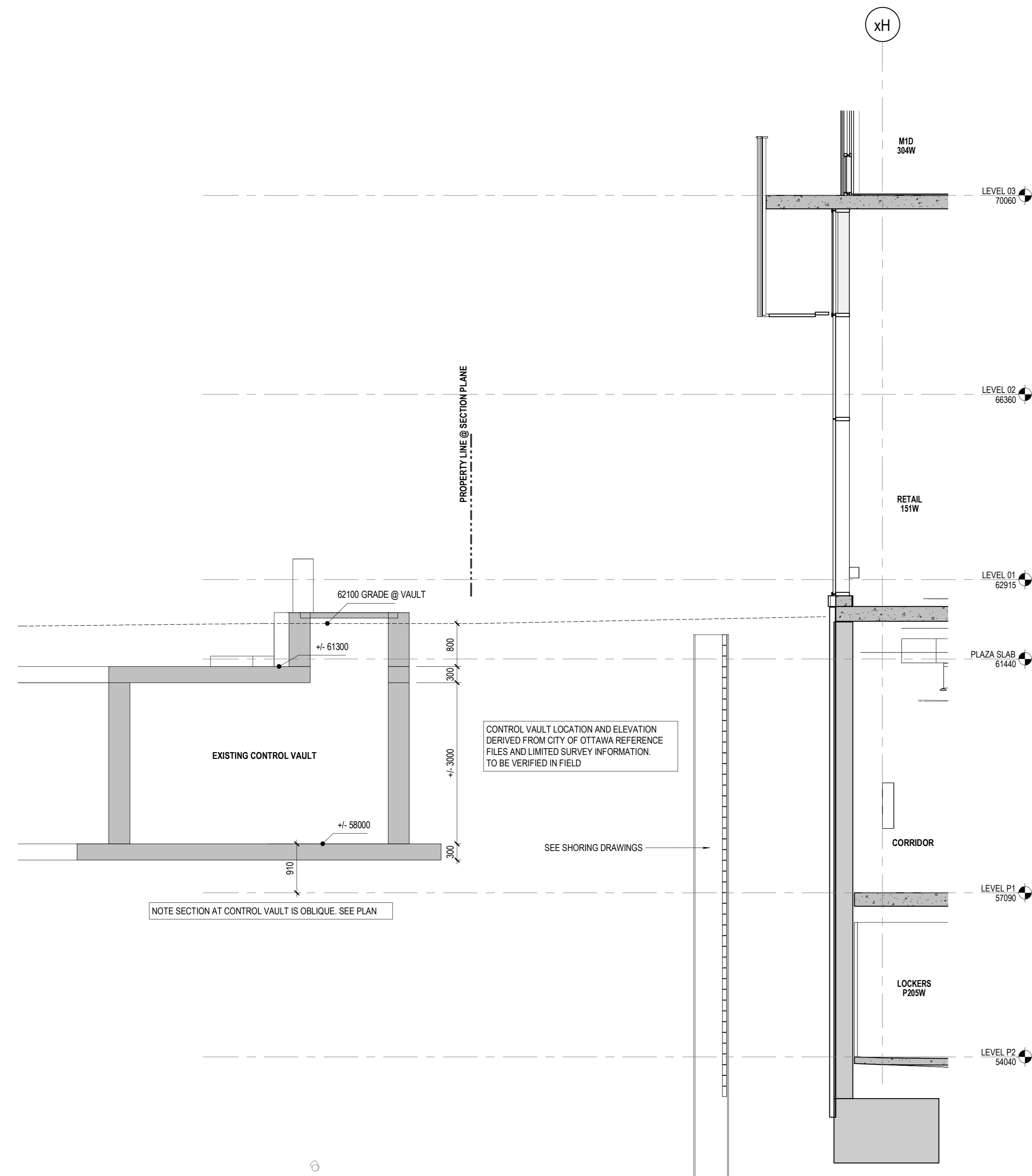


DREAM
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Toronto, ON M5C 3H1
KEYPLAN

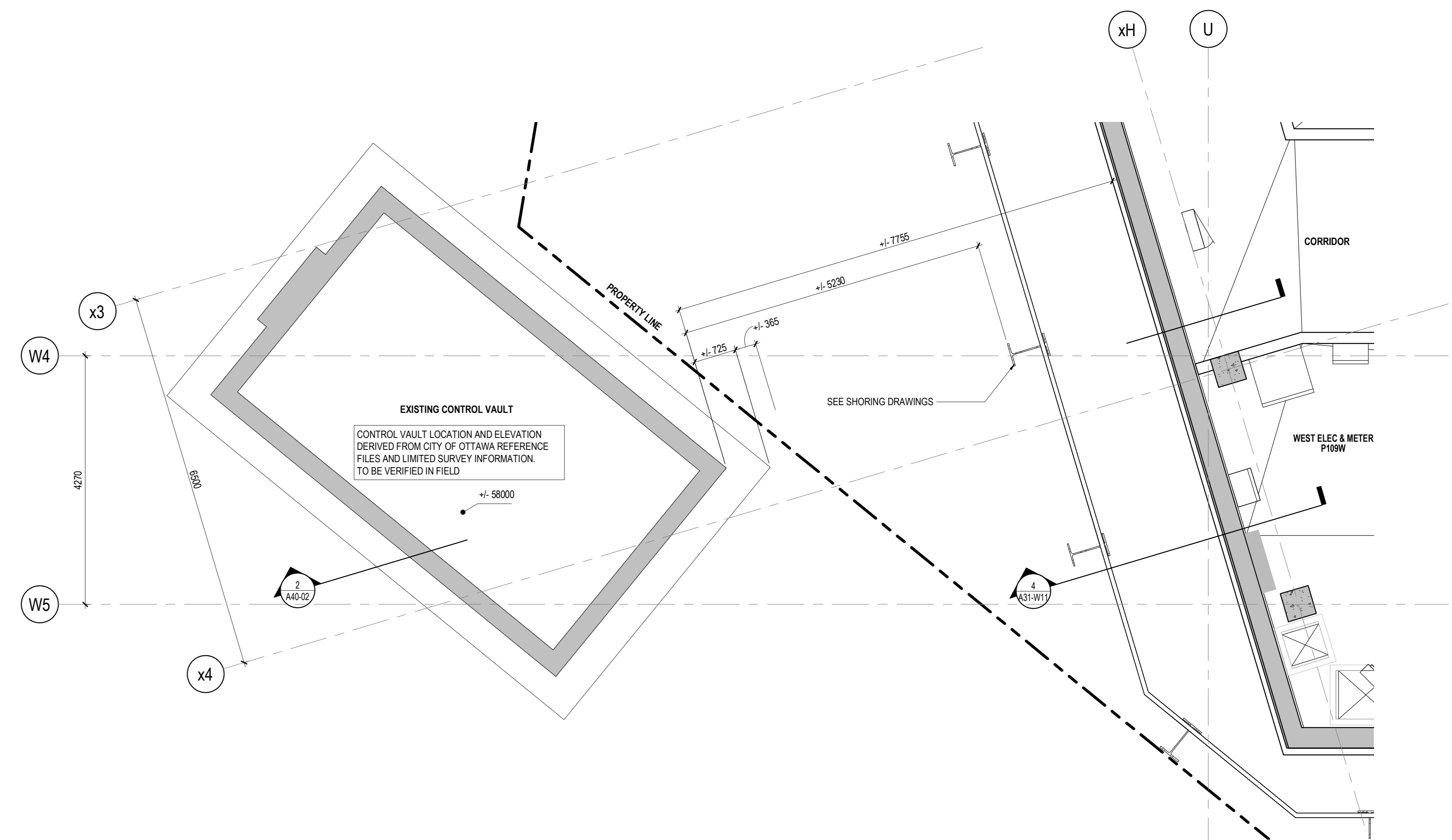


ISSUE CHART

NO.	DATE	DESCRIPTION



② WEST PODIUM - WEST WALL SECTION @ EXISTING CONTROL VAULT
1:50



① EXISTING CONTROL VAULT P1 LEVEL PLAN
1:50



APPENDIX E

Shoring Design Package



MARATHON

6847 HIRAM DRIVE. GREELY, ON. K4P 1A2. OFFICE (613)-821-4800. FAX (613)-821-3182 TOLL FREE: 1(800)669-2086
WWW.MARATHONUNDERGROUND.COM

February 6, 2023

22409

Re: RESPONSE TO CITY OF OTTAWA COMMENTS
EXCAVATION SHORING DRAWINGS
LEBRETON LIBRARY PARCEL PROJECT
OTTAWA, ONTARIO

Please find attached to this document Marathon's response to City of Ottawa comments on Marathon's drawings for the excavation shoring for this project (drawings dated December 16, 2022).

Please don't hesitate to contact the undersigned if you have any questions.

Yours truly.

Marathon Underground Constructors Corp.



Mike Cunningham, P.Eng.,

Senior Engineer

Item No.	Review Category	City Comment	Dream Comments
6	Structural	Please provide the name of the engineer who is taking responsibility for the review on a continuous basis, of the excavation and shoring installation.	EOR is Mike Cunningham, P.Eng.
7	Structural	As per drawing MU0, under general notes, provide the edition year of the standards used for the design of the shoring.	The edition years of the standards used for the design are added to the drawing sheet MU0.
8	Structural	Please show the earth pressure distribution, used to design the shoring.	The earth pressure diagram is added to drawing MU0.
9	Structural	What is the safety factor used, in the shoring design?	The factor of safety used for the shoring design is 2.0 on stability.
10	Structural	For the tieback installation, provide both the test load and the lock-off loads.	Test loads and lock-off loads are added to the shoring drawings.
11	Structural	What is the design life of the shoring?	The shoring is adequate for a design life of 2 years.
12	Structural	Does the shoring design have to take into consideration any hydrostatic groundwater pressures?	No hydrostatic groundwater pressures were taken into considerations since the shoring is pervious. (See general note 6.C in MU0)

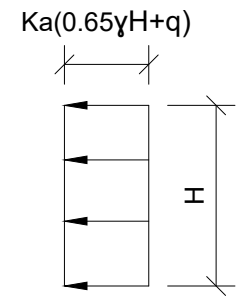
SPECIAL NOTES:

- S1. EXACT SHORING WALL ALIGNMENT TO BE CONFIRMED PRIOR TO PILE INSTALLATION BASED ON PROPERTY LINE, ALIGNMENT OF FOUNDATION WALL, AND LOCATION OF UNDERGROUND UTILITIES.
- S2. DESIGN SHOWN ON THESE DRAWINGS IS FOR CONSTRUCTION BY MARATHON UNDERGROUND CONSTRUCTORS CORPORATION ONLY.

GENERAL NOTES:

- 1. STRUCTURAL DESIGN OF SHORING COMPLETED IN ACCORDANCE WITH:
 - a. CANADIAN FOUNDATION ENGINEERING MANUAL (4TH EDITION)
 - b. CSA S16-14 DESIGN OF STEEL STRUCTURES (MEMBER STRENGTH PROVISIONS) (2014 EDITION)
 - c. OBC (2012) - SECTIONS 4.2 AND 4.3
- 2. GROUND CONDITIONS EVALUATED FROM GEOTECHNICAL REPORT "LEBRETON LIBRARY PARCEL, 665 ALBERT STREET OTTAWA, ONTARIO", BY GOLDER DATED APRIL 2022 (REF NO. 22511882).
- 3. FOUNDATION WALL POSITION FOR SHORING ALIGNMENT AND EXCAVATION/LAGGING LEVEL FROM DRAWING S198, S198E AND S198W BY READ JONES CHRISTOFFERSEN LTD, DATED 2022 12 02 (REV 4). SHORING IS SET BACK 2.0M FROM FOUNDATION WALL.
- 4. POSITIONS OF UNDERGROUND UTILITIES FROM DRAWING S1 'SERVICING PLAN' BY TMIG DATED 221109 (REV 6) AND CITY AS-BUILT DRAWING PROVIDED TO MARATHON UNDERGROUND.
- 5. GENERAL BOTTOM OF LAGGING LEVEL OF EL. 52.965 DETERMINED FROM STRUCTURAL DRAWINGS.
- 6. DESIGN LOADING:
 - a. SURCHARGE OF 12KPA ABOVE/BEHIND SHORING WALL. NO HEAVY EQUIPMENT TO BE OPERATED WITHIN 2m OF SHORING WITHOUT REVIEW BY SHORING DESIGN ENGINEER.
 - b. DESIGN PARAMETERS

MATERIAL	UNIT WEIGHT (kN/m ³)	FRICTION ANGLE (DEGREES)	ACTIVE EARTH PRESSURE COEFFICIENT
FILL	21	30	0.33
SILTY SAND	21	33	0.29
DENSE GLACIAL TILL	22	37	0.25



PRESSURE DISTRIBUTION DIAGRAM FOR MULTI-LEVELS OF SUPPORTS

- c. NO GROUNDWATER PRESSURE SINCE SHORING WALL IS PERVIOUS.
- 7. MATERIALS
 - a. SOLDIER PILES: H PILES SHALL CONFORM TO CSA-G40.20/G40.21 350W
 - b. PIPE STRUT FOR CORNER BRACE
 - i) 244 mm OD x 12.0 mm (9.625 x 0.472 INCH) WALL PIPE
 - ii) ASTM GRADE 3, Fy = 310 MPa (MIN.)
 - c. ALL OTHER STRUCTURAL STEEL: CSA G40.20/G40.21 350W, OR ASTM A992, OR ASTM A572 GR. 50 (MIN. Fy = 345 MPa).
 - d. TIMBER LAGGING - 4" X 6" ROUGH CUT CONSTRUCTION-GRADE HARDWOOD LUMBER (E.G., POPLAR OR SIMILAR)
 - e. TIE-BACKS AND SOIL ANCHORS: SEE TIE-BACK AND SOIL ANCHOR SCHEDULE. 0.6" 7-WIRE STRAND 270 KSI PER ASTM A-416. MS CABLE GROUT (MIN. 40 MPA)
 - 8. WELDING TO CSA W59-13. E49XX WELDING ELECTRODES
 - 9. PROVIDE RAILING ON TOP OF WALL AS REQUIRED (REF. O/REG. 213/91).
 - 10. ALL EXISTING UTILITIES TO BE LOCATED PRIOR TO SHORING INSTALLATION.
 - a. IF BURIED UTILITIES ARE LOCATED WITHIN 1.5m OF SOLDIER PILE LOCATIONS, EXPOSE UTILITY (HYDROVAC) TO CONFIRM LOCATION.
 - b. POSITIONS AND DEPTHS OF ALL BURIED UTILITIES IN PROXIMITY TO TIE-BACK TRAJECTORIES, AND IN

PARTICULAR OF HPTM WATERMAIN AND HYDRO DUCT ALONG SOUTH PROPERTY LINE, TO BE CONFIRMED PRIOR TO TIE-BACK DRILLING.

- 11. ANY CHANGES TO DESIGN AND CONSTRUCTION METHODOLOGY TO BE APPROVED BY SHORING DESIGNER PRIOR TO IMPLEMENTATION.
- 12. ALL DIMENSIONS SHOWN IN MILLIMETRES UNLESS NOTED. ELEVATIONS SHOWN IN METRES.
- 13. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT.

INSTALLATION PROCEDURE:

- 1. LOCATE ALL BURIED UTILITIES, INCLUDING PROPOSED SERVICE CONNECTIONS. CONFIRM NO CONFLICTS WITH SOLDIER PILE LOCATIONS AND TIE-BACK TRAJECTORIES.
- 2. CONFIRM EXACT SHORING ALIGNMENT WITH OWNER, G.C., AND SURVEYOR. NOTE: ENCROACHMENT AGREEMENT FOR PILE LOCATIONS AND TIE-BACKS ARE THE RESPONSIBILITY OF THE CLIENT.
- 3. CONFIRM REQUIRED BOTTOM-OF-EXCAVATION (B.O.E.) LEVEL WITH G.C.
- 4. PRE-DRILL PILE LOCATIONS TO BEDROCK (16" DIAMETER DTHH). MIN 3.5 m TOE REQUIRED BELOW B.O.E. OR MIN. 0.5m INTO BEDROCK, THEN DRIVE PILES TO BEDROCK.
- 5. INSTALL MONITORING TARGETS ON TOP OF PILES.
- 6. SOIL IN FRONT OF PILES TO BE EXCAVATED IN MAXIMUM 1.2m LIFTS PRIOR TO LAGGING INSTALLATION. USE SHORTER LIFTS IF NEEDED TO AVOID SLOUGHING OF BACKFILL.
- 7. INSTALL LAGGING (NO GAPS). PACK BEHIND LAGGING WITH STONE DUST AS REQUIRED TO ENSURE NO VOIDS ARE CREATED AND BACKFILL IS IN GOOD CONTACT WITH LAGGING.
- 8. EXCAVATE TO MAXIMUM OF 0.8 m BELOW UNDERSIDE OF WALER LEVEL. DRILL, INSTALL, AND GROUT STRAND TIE-BACK AND SOIL ANCHORS WHERE INDICATED. INSTALL BRACKET AND WALER. NOTE: CONFIRM NO CONFLICT WITH EXISTING UTILITIES PRIOR TO TIE-BACK DRILLING.
- 9. POST-GROUT SOIL ANCHORS, AS REQUIRED.
- 10. STRESS, TEST, AND LOCK-OFF TIE-BACKS AND SOIL ANCHORS. SEE TIE-BACK AND SOIL ANCHOR SCHEDULE FOR DETAILS. TEST RESULTS TO BE PROVIDED TO SHORING DESIGN ENGINEER. TESTING TO GENERALLY CONFORM TO OPSS942.07.12.06.03. MEASURE WALL DEFLECTION DURING STRESSING AND TESTING. IF WALL MOVEMENT REACHES 25 mm, LOCK-OFF ANCHOR AND REPORT LOCK-OFF LOAD TO DESIGNER.
- 11. CONTINUE EXCAVATION AND LAGGING SEQUENCE TO BOTTOM-OF-EXCAVATION LEVEL.

REMOVAL PROCEDURE:

- 1. ONCE BUILDING FOUNDATION WALL HAS BEEN CONSTRUCTED, BACKFILL BETWEEN SHORING AS NEEDED. COMPACT BACKFILL TO 95% STD. PROCTOR.
- 2. ONLY CUT TIE-BACKS AND REMOVE WALERS ONCE BACKFILL LEVEL IS WITHIN 0.8 m BELOW WALER LEVEL.
- 3. CUT PILES OFF 1.2m BELOW GRADE OR AS REQUIRED BY AGREEMENT WITH CITY/NEIGHBOURS.

MONITORING AND INSPECTIONS:

- 1. CONTINUOUS INSPECTION BY SHORING DESIGN ENGINEER DURING EXCAVATION AND REMOVAL [PER OBC 4.2.2.2(2)(a)(ii)].
- 2. MONITORING TARGETS TO BE INSTALLED AT TOPS OF PILES AT MAX. 10 m SPACING.
- 3. OBTAIN BASELINE READINGS ONCE TARGETS INSTALLED.
- 4. TARGETS TO BE MONITORED WEEKLY THEREAFTER, UNLESS DIRECTED OTHERWISE BY SHORING DESIGN ENGINEER. MONITORING BY OTHERS.
- 5. SHORING DESIGN ENGINEER TO BE NOTIFIED IMMEDIATELY IF DEFLECTION EXCEEDS 15 mm. IF DEFLECTION EXCEEDS 25 mm, EXCAVATION SHOULD STOP UNTIL CONDITIONS ARE REVIEWED BY SHORING DESIGN ENGINEER.
- 6. ON-SITE STAFF SHOULD CARRY OUT DAILY VISUAL INSPECTION DURING EXCAVATION AND SHORING CONSTRUCTION, INCLUDING OF GROUND SURFACE BEHIND SHORING. IF ANY DEFORMATIONS OR GROUND SURFACE CRACKING OR SETTLEMENT ARE OBSERVED, SHORING DESIGN ENGINEER TO BE IMMEDIATELY NOTIFIED.
- 7. VIBRATION MONITORING AND PRE-CONSTRUCTION SURVEY BY OTHERS, IF REQUIRED.



EllisDon	
LeBreton Library Parcel ("LBLEP")	Project 70652
Spec Section 31.41.00	ED Ref 14100-001-01
Received 02/06/2023	Returned
Review of this submission is for compliance with general intent of the contract. This review does not relieve the Sub-Contractor, Supplier or Manufacturer of responsibility for error or omissions in the submission, or the responsibility of meeting all the requirements in the contract documents. Any deviation from the contract documents initiated by the Sub-Contractor, Supplier or Manufacturer shall be at their sole risk. QUANTITIES AND DETAIL DIMENSIONS ARE THE SUB-CONTRACTOR OR SUPPLIER'S RESPONSIBILITY. VERIFY DATA WITH FIELD DIMENSIONS.	
Reviewed	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Reviewed as Noted	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Revised and Resubmit	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Rejected	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
	Reviewed By AC

2	RESUBMITTED	2023.02.06
1	ISSUED FOR REVIEW/PERMIT	2022.12.16
No.	REVISION	DATE

Marathon Underground Constructors Corporation
 6847 Hiram Drive, Greely, ON K4P 1A2
 Tel: (613) 821-4800
 Fax: (613) 821-3182
www.marathonunderground.com

PROJECT LEBRETON LIBRARY PARCEL EXCAVATION SHORING	
LOCATION 665 ALBERT STREET OTTAWA, ONTARIO	
JOB No.	22409
DESCRIPTION NOTES	
DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MUO
CHECKED BY MIC	

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PROJECT
**LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING**

LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No.
 22409

DESCRIPTION
 NOTES

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU0A
CHECKED BY MIC	



LOCATION WITH RESPECT TO PILES	LENGTH OF BOX WALER (m)	WALER USED	NUMBER OF STRANDS (UPPER LEVEL)	NUMBER OF STRANDS (LOWER LEVEL)	LOCK OFF LOAD (UPPER LEVEL) (KN)	LOCK OFF LOAD (LOWER LEVEL) (KN)	TEST LOAD (UPPER LEVEL) (KN)	TEST LOAD (LOWER LEVEL) (KN)
P2-P3 L	2.4	W410x54	2	1	230	145	300	190
P2-P3 R	2.4	W410x54	2	1	230	145	300	190
P3-P4 L	3	W410x54	1	-	130	-	170	-
P3-P4 R	3	W410x54	1	-	130	-	170	-
P4-P5 L	2.4	W410x54	2	1	230	145	300	190
P4-P5 R	2.4	W410x54	2	1	230	145	300	190
P5-P6 L	3	W410x54	1	-	130	-	170	-
P5-P6 R	3	W410x54	1	-	130	-	170	-
P6-P7 L	2.4	W410x54	2	1	230	145	300	190
P6-P7 R	2.4	W410x54	2	1	230	145	300	190
P7-P8 L	3	W410x54	1	-	130	-	170	-
P9-P10	2.4	W530x109	8	8	1220	1160	1590	1510
P11-P12	2.4	W530x109	8	8	1220	1160	1590	1510
P13-P14	2.4	W530x109	8	8	1220	1160	1590	1510
P15-P16	2.4	W530x109	8	8	1220	1160	1590	1510
P17-P18	2.4	W530x109	8	8	1220	1160	1590	1510
P19-P20	2.4	W530x109	8	8	1220	1160	1590	1510
P21-P22	2.4	W530x109	8	8	1220	1160	1590	1510
P23-P24	2.4	W530x109	8	8	1220	1160	1590	1510
P25-P26	2.4	W530x109	9	9	1370	1270	1780	1650
P28-P29	2.4	W530x109	9	9	1370	1270	1780	1650
P30-P31	2.4	W530x109	9	9	1370	1270	1780	1650
P32-P33	2.4	W530x109	9	9	1370	1270	1780	1650
P34-P35	2.4	W530x109	9	9	1370	1270	1780	1650
P36-P37	2.4	W530x109	9	9	1370	1270	1780	1650
P38-P39	2.4	W530x109	9	9	1370	1270	1780	1650
P40-P41	2.4	W530x109	9	9	1370	1270	1780	1650
P42-P43	2.4	W530x109	9	9	1370	1270	1780	1650

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PROJECT
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 EXCAVATION SHORING**

LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No. **22409**

DESCRIPTION
TIE-BACK SCHEDULE 1

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU0B
CHECKED BY MIC	



LOCATION WITH RESPECT TO PILES	LENGTH OF BOX WALER (m)	WALER USED	NUMBER OF STRANDS (UPPER LEVEL)	NUMBER OF STRANDS (LOWER LEVEL)	LOCK OFF LOAD (UPPER LEVEL)(KN)	LOCK OFF LOAD (LOWER LEVEL) (KN)	TEST LOAD (UPPER LEVEL) (KN)	TEST LOAD (LOWER LEVEL) (KN)
P44-P45	2.4	W530x109	9	9	1370	1270	1780	1650
P46-P47	2.4	W530x109	9	9	1370	1270	1780	1650
P48-P49	2.4	W530x109	9	9	1370	1270	1780	1650
P50-P51	2.4	W530x109	9	9	1370	1270	1780	1650
P52-P53	2.4	W530x109	9	9	1370	1270	1780	1650
P54-P55	2.4	W530x109	9	9	1370	1270	1780	1650
P56-P57	2.4	W530x109	9	9	1370	1270	1780	1650
P58-P59	2.4	W530x109	9	9	1370	1270	1780	1650
P60-P61	2.4	W530x109	9	9	1370	1270	1780	1650
P62-P63	3	W530x109	9	9	1350	1370	1760	1780
P64-P65	2.4	W530x109	8	9	1210	1290	1580	1680
P66-P67	2.4	W530x109	8	9	1210	1290	1580	1680
P68-P69	2.4	W530x109	8	9	1210	1290	1580	1680
P70-P71	2.4	W530x109	8	9	1210	1290	1580	1680
P72-P73	2.4	W530x109	8	9	1210	1290	1580	1680
P74-P75	2.4	W530x109	8	9	1210	1290	1580	1680
P76-P77	3	W530x109	9	9	1350	1370	1760	1780
P79-P80	2.4	W530x109	8	8	1220	1160	1590	1510
P81-P82	2.4	W530x109	8	8	1220	1160	1590	1510
P83-P84	2.4	W530x109	8	8	1220	1160	1590	1510
P85-P86	2.4	W530x109	8	8	1220	1160	1590	1510
P92-P93	2.4	W410x54	5	5	740	740	960	960
P94-P95	2.4	W410x54	5	5	740	740	960	960
P96-P97	2.4	W410x54	5	5	740	740	960	960
P98-P99	2.4	W410x54	5	5	740	740	960	960

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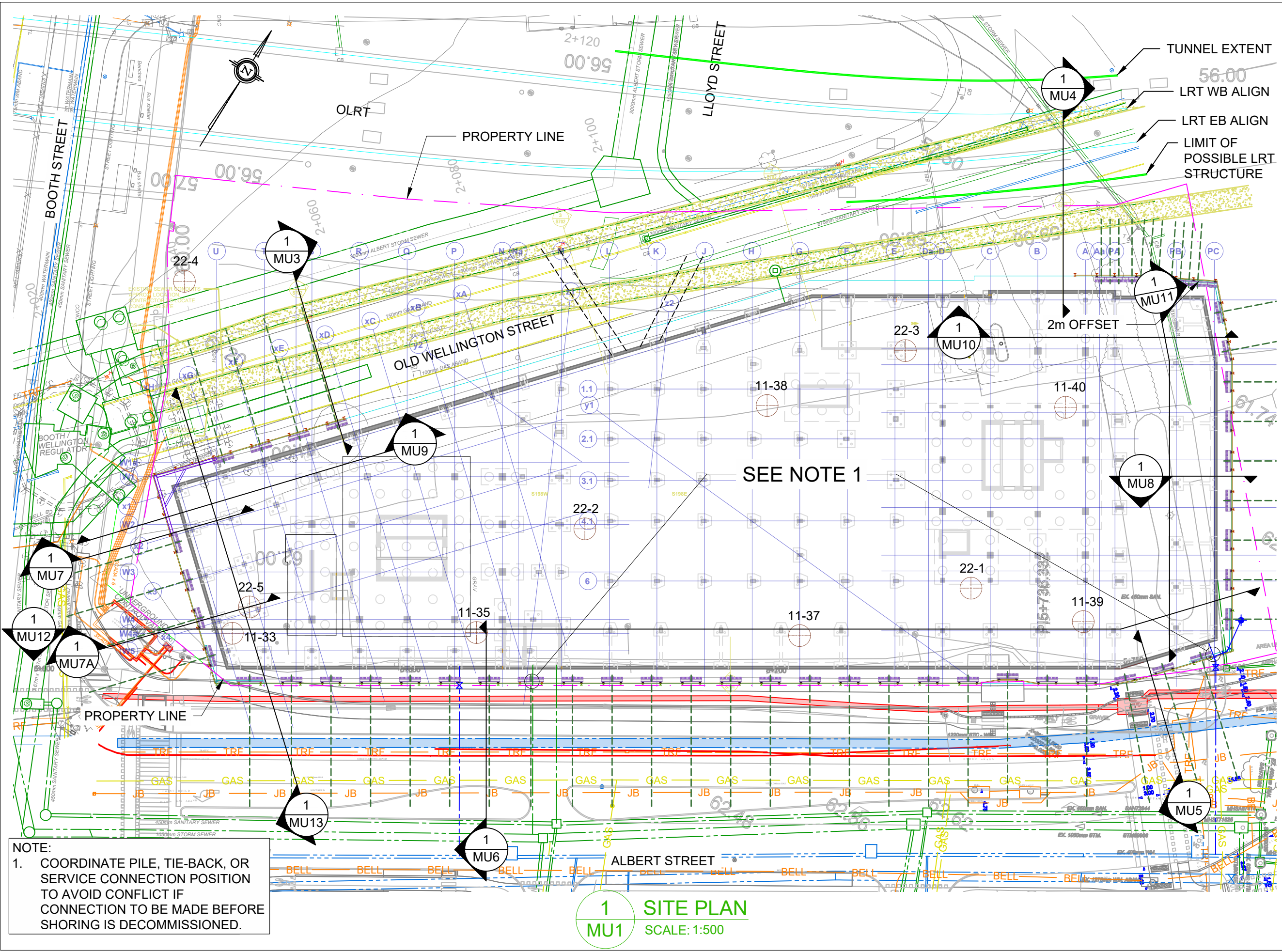
PROJECT
**LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING**

LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No.
 22409

DESCRIPTION
 TIE-BACK SCHEDULE 2

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU0C
CHECKED BY MIC	



NOTE:
 1. COORDINATE PILE, TIE-BACK, OR SERVICE CONNECTION POSITION TO AVOID CONFLICT IF CONNECTION TO BE MADE BEFORE SHORING IS DECOMMISSIONED.

1 SITE PLAN MU1
 SCALE: 1:500



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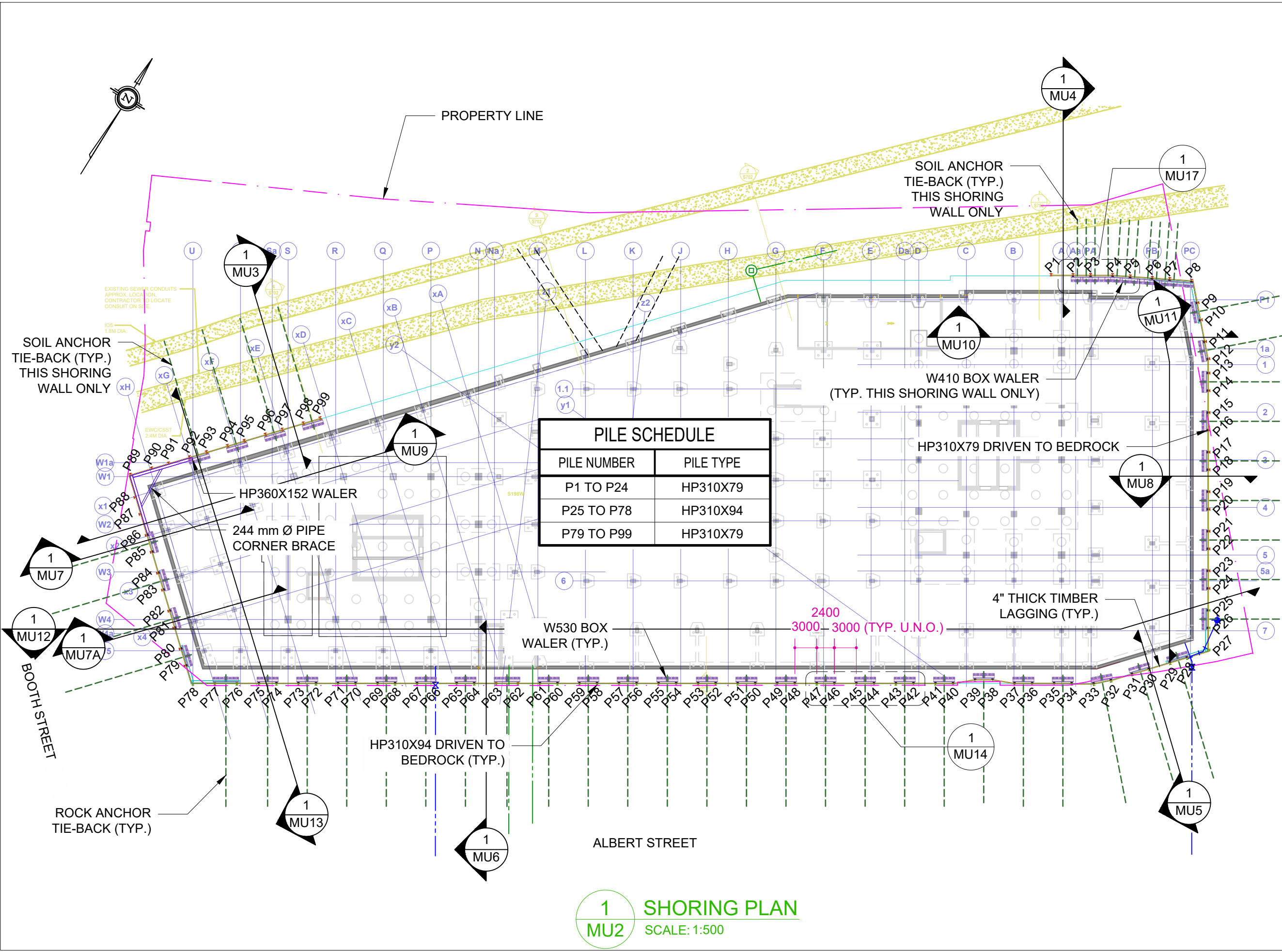
PROJECT
 LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING

LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No.
 22409

DESCRIPTION
 SITE AND UTILITY PLAN

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU1
CHECKED BY MIC	



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PROJECT
**LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING**

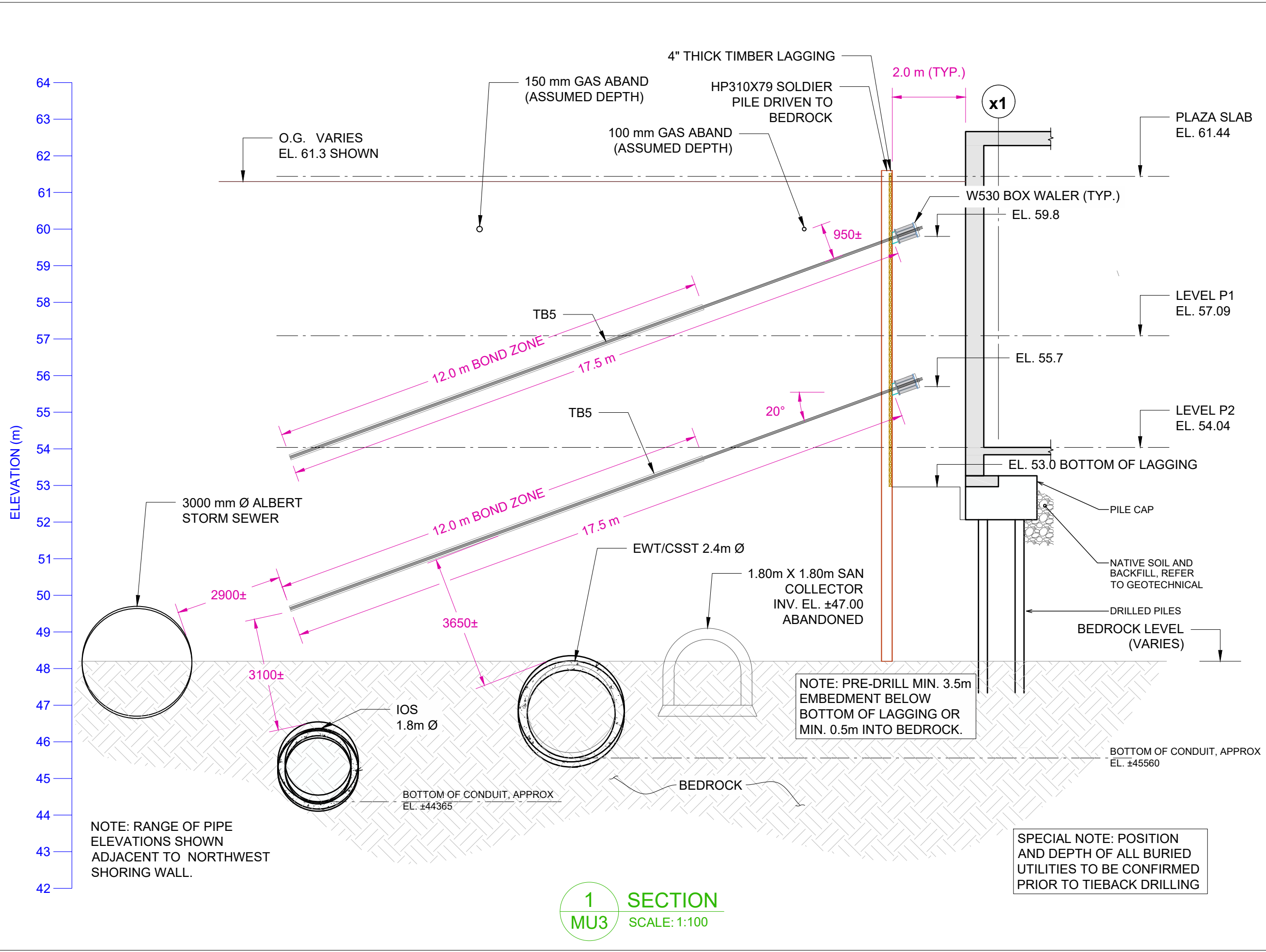
LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No.
 22409

DESCRIPTION
SHORING PLAN

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU2
CHECKED BY MIC	

1 SHORING PLAN
 MU2 SCALE: 1:500



No.	REVISION	DATE
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PROJECT
**LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING**

LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No.
 22409

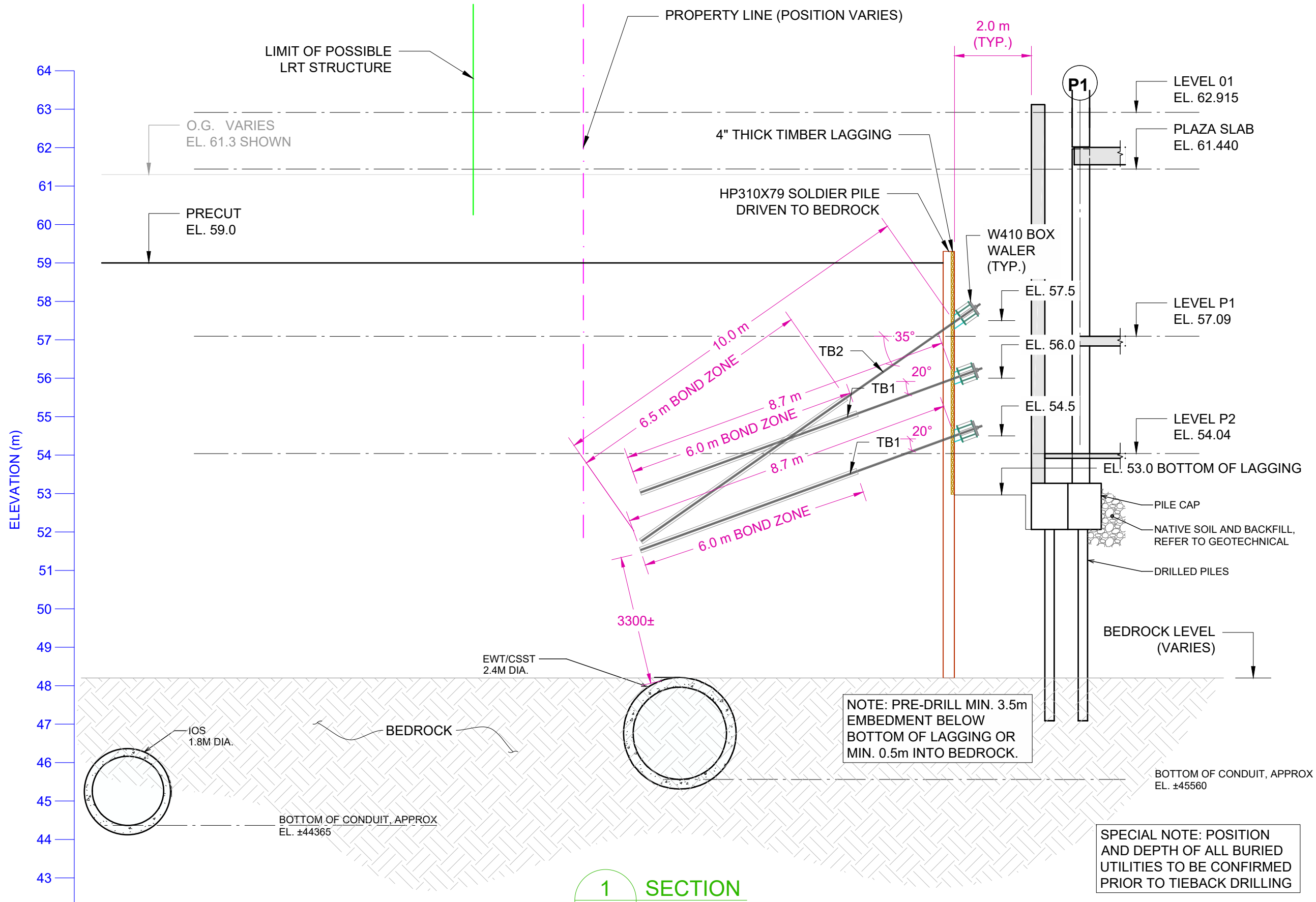
DESCRIPTION SECTION	
DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU3
CHECKED BY MIC	

1 SECTION
MU3
 SCALE: 1:100

**SPECIAL NOTE: POSITION
 AND DEPTH OF ALL BURIED
 UTILITIES TO BE CONFIRMED
 PRIOR TO TIEBACK DRILLING**

**NOTE: PRE-DRILL MIN. 3.5m
 EMBEDMENT BELOW
 BOTTOM OF LAGGING OR
 MIN. 0.5m INTO BEDROCK.**

**NOTE: RANGE OF PIPE
 ELEVATIONS SHOWN
 ADJACENT TO NORTHWEST
 SHORING WALL.**



No.	REVISION	DATE
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PROJECT
**LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING**

LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

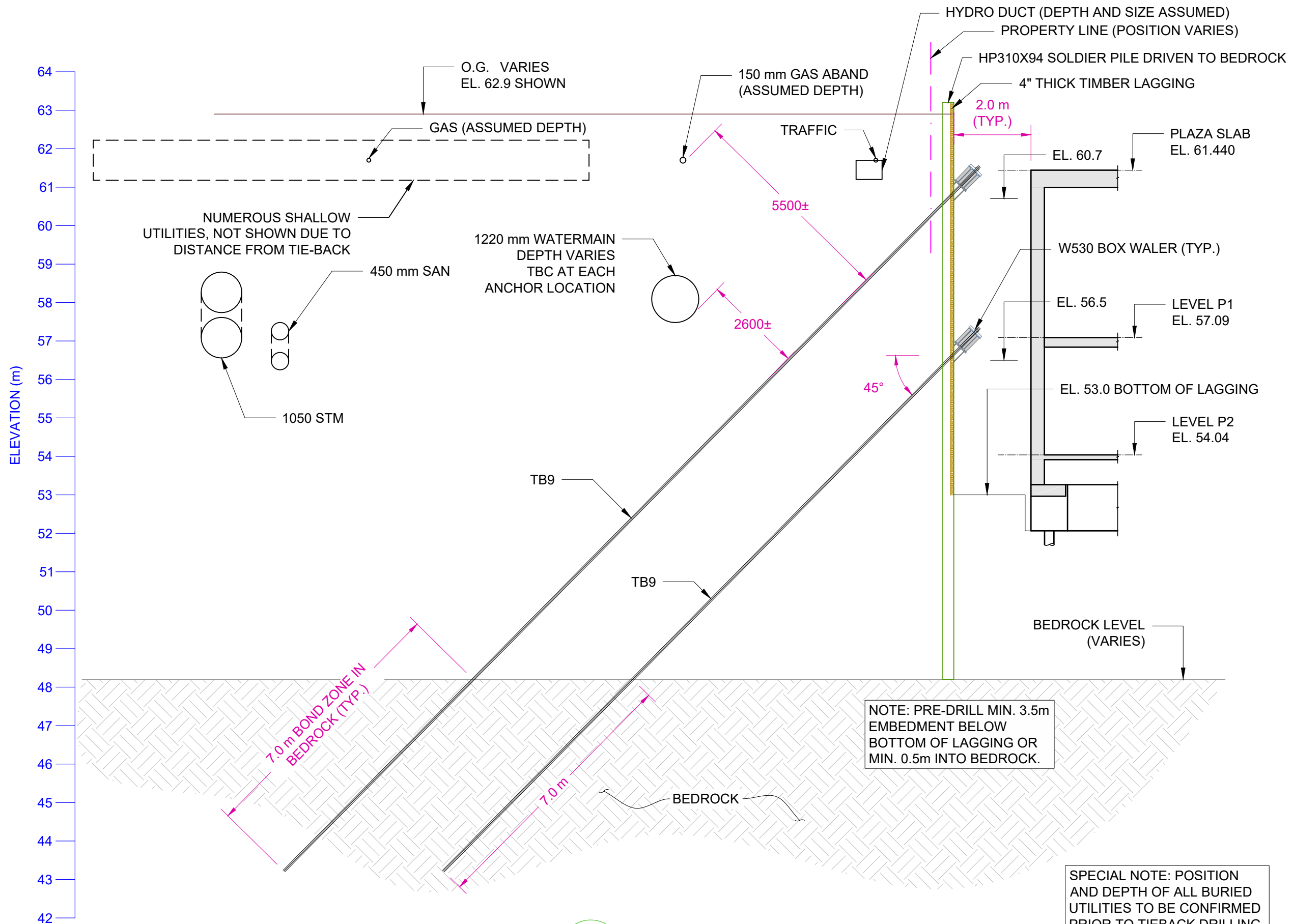
JOB No.
 22409

DESCRIPTION SECTION	
DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU4
CHECKED BY MIC	

NOTE: PRE-DRILL MIN. 3.5m
 EMBEDMENT BELOW
 BOTTOM OF LAGGING OR
 MIN. 0.5m INTO BEDROCK.

SPECIAL NOTE: POSITION
 AND DEPTH OF ALL BURIED
 UTILITIES TO BE CONFIRMED
 PRIOR TO TIEBACK DRILLING

1 SECTION
MU4 SCALE: 1:100



1 SECTION
MU5 SCALE: 1:100

SPECIAL NOTE: POSITION AND DEPTH OF ALL BURIED UTILITIES TO BE CONFIRMED PRIOR TO TIEBACK DRILLING



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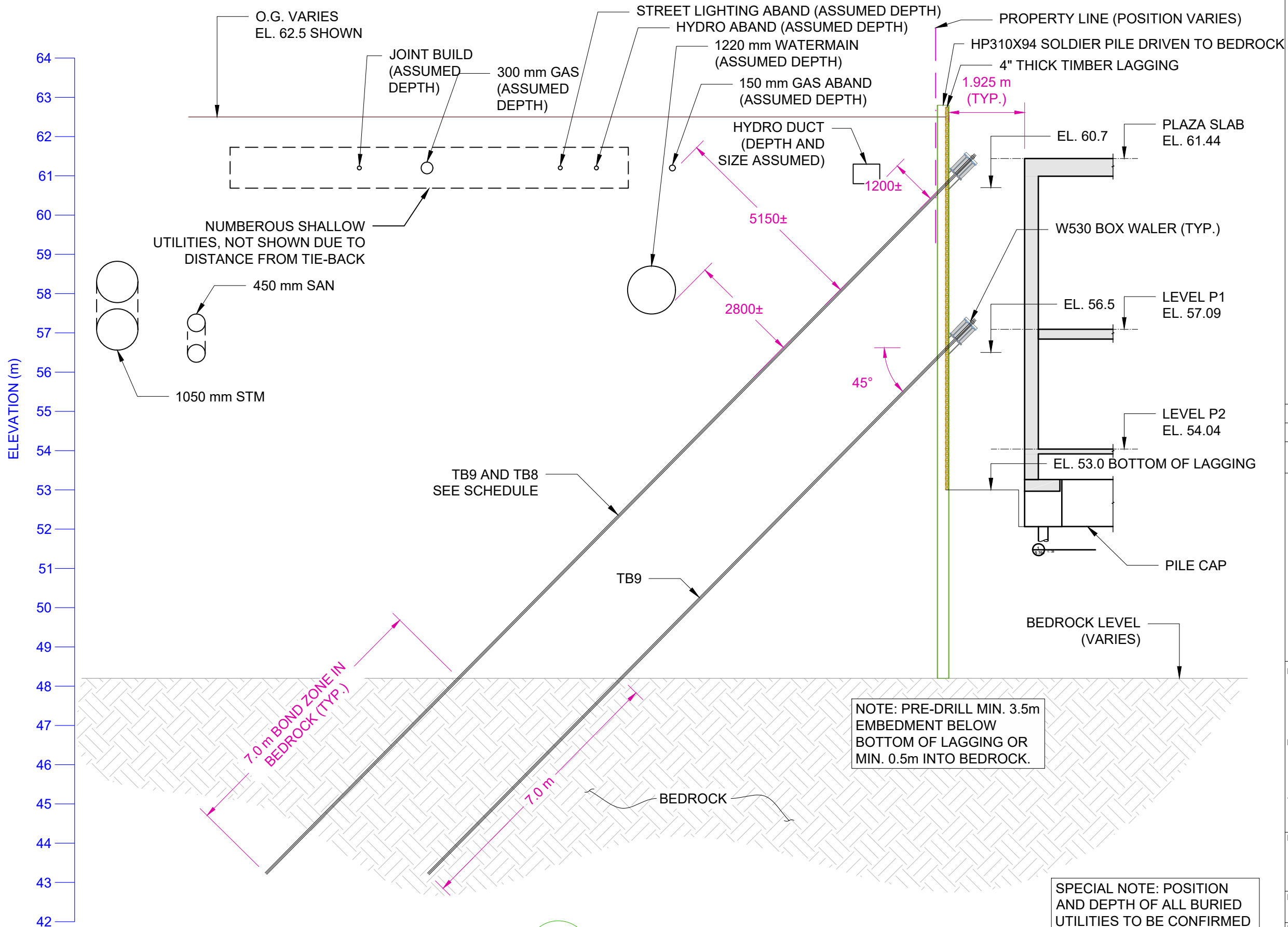
PROJECT
 LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING

LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No.
 22409

DESCRIPTION
 SECTION

DRAWN BY	SCALE
AC	AS NOTED
DESIGNED BY	DRAWING No.
HB	MU5
CHECKED BY	
MIC	



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PROJECT
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 EXCAVATION SHORING**

LOCATION
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JOB No.
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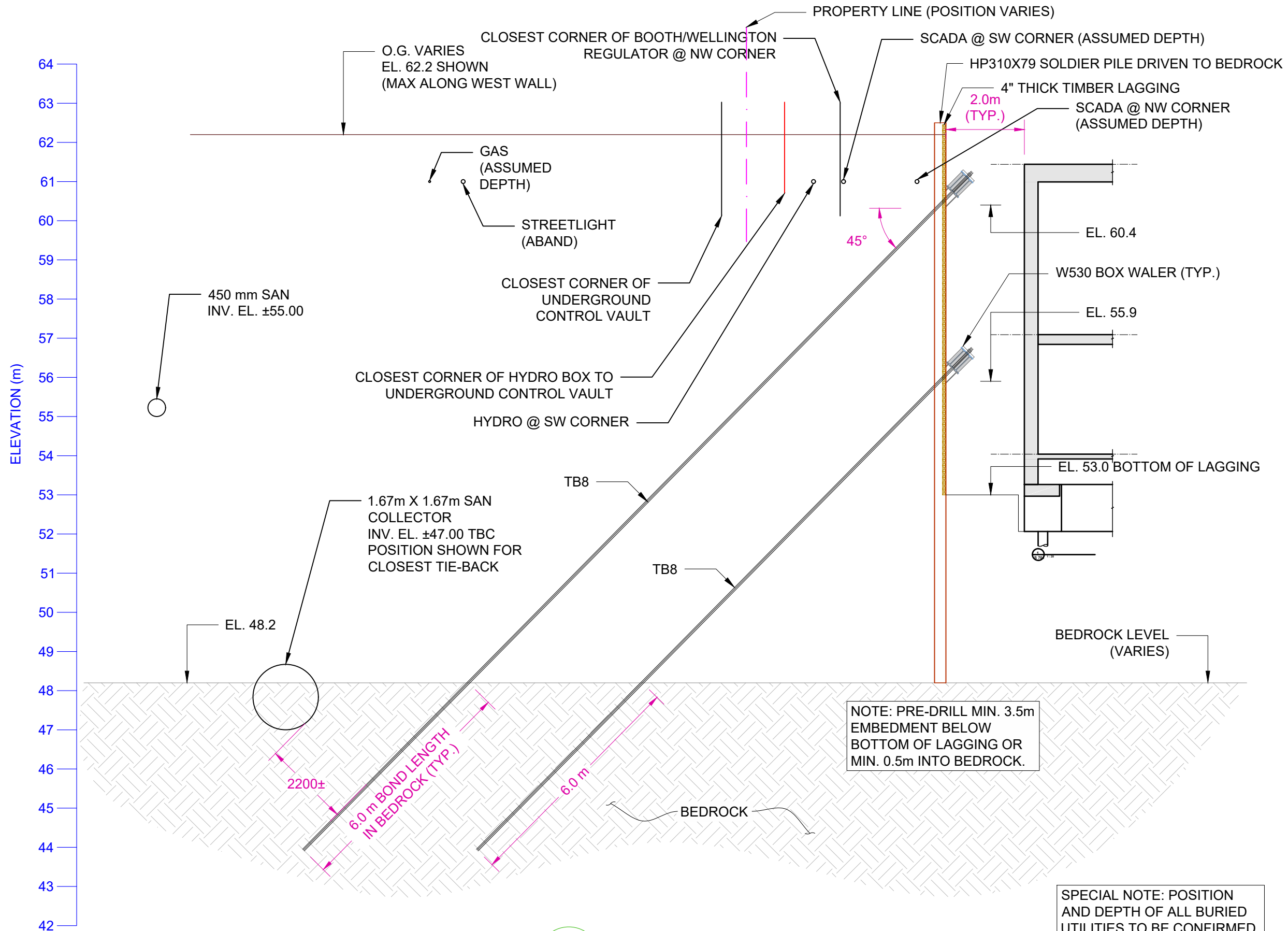
DESCRIPTION
 SECTION

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU6
CHECKED BY MIC	

1 SECTION
MU6 SCALE: 1:100

NOTE: PRE-DRILL MIN. 3.5m
 EMBEDMENT BELOW
 BOTTOM OF LAGGING OR
 MIN. 0.5m INTO BEDROCK.

SPECIAL NOTE: POSITION
 AND DEPTH OF ALL BURIED
 UTILITIES TO BE CONFIRMED
 PRIOR TO TIEBACK DRILLING



1 SECTION
MU7 SCALE: 1:100

SPECIAL NOTE: POSITION AND DEPTH OF ALL BURIED UTILITIES TO BE CONFIRMED PRIOR TO TIEBACK DRILLING



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PROJECT
LEBRETON LIBRARY PARCEL EXCAVATION SHORING

LOCATION
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 OTTAWA, ONTARIO

JOB No.
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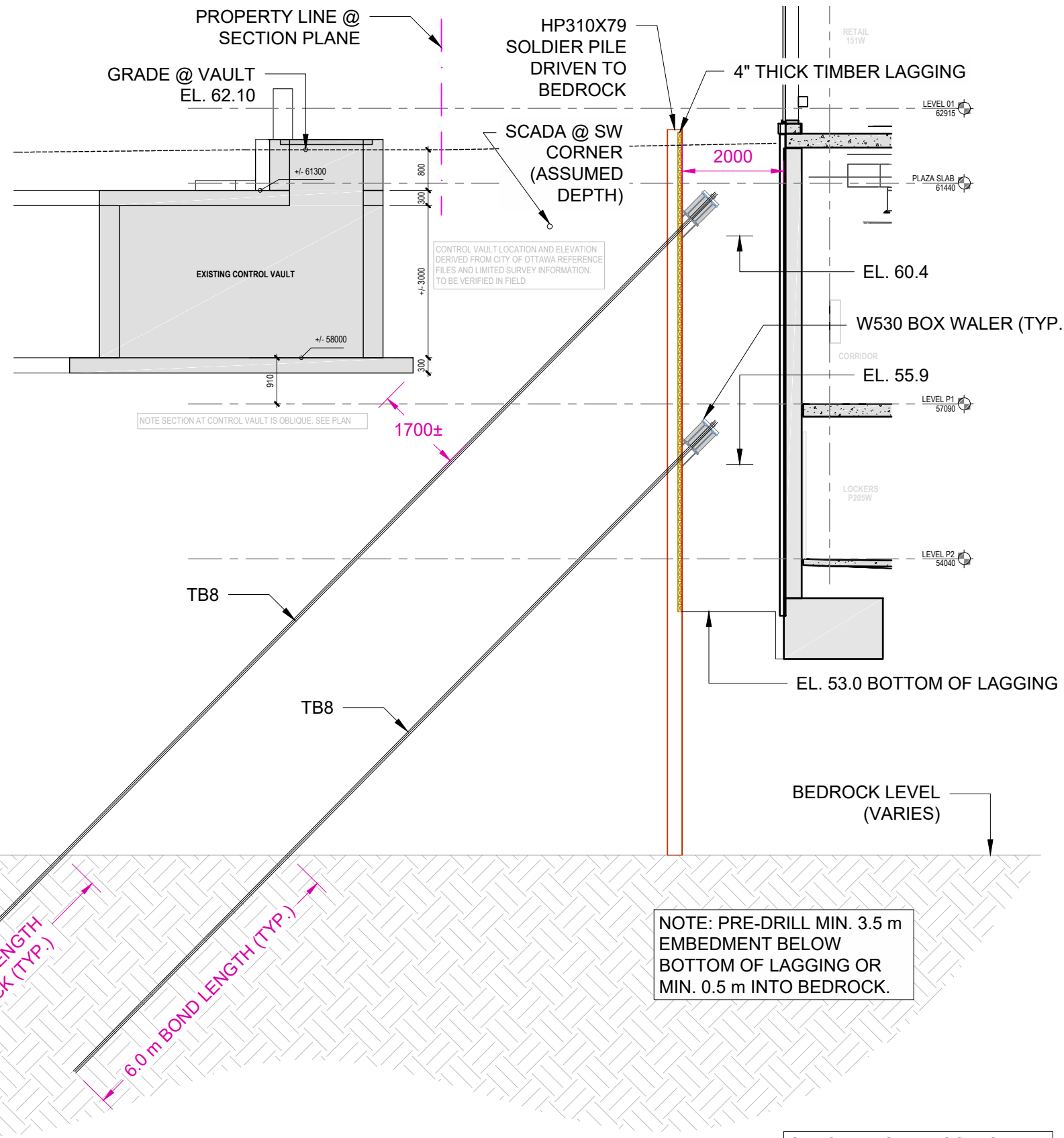
DESCRIPTION
 SECTION

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU7
CHECKED BY MIC	

ELEVATION (m)

64
63
62
61
60
59
58
57
56
55
54
53
52
51
50
49
48
47
46
45
44
43
42

NOTE: POSITION OF CONTROL VAULT DETERMINED FROM DRAWING A40-02 PROVIDED IN APPENDIX D OF CONSTRUCTABILITY REPORT PREPARED BY TYLIN DATED DECEMBER 2022 (REF. 10399).



1 SECTION
MU7A SCALE: 1:100



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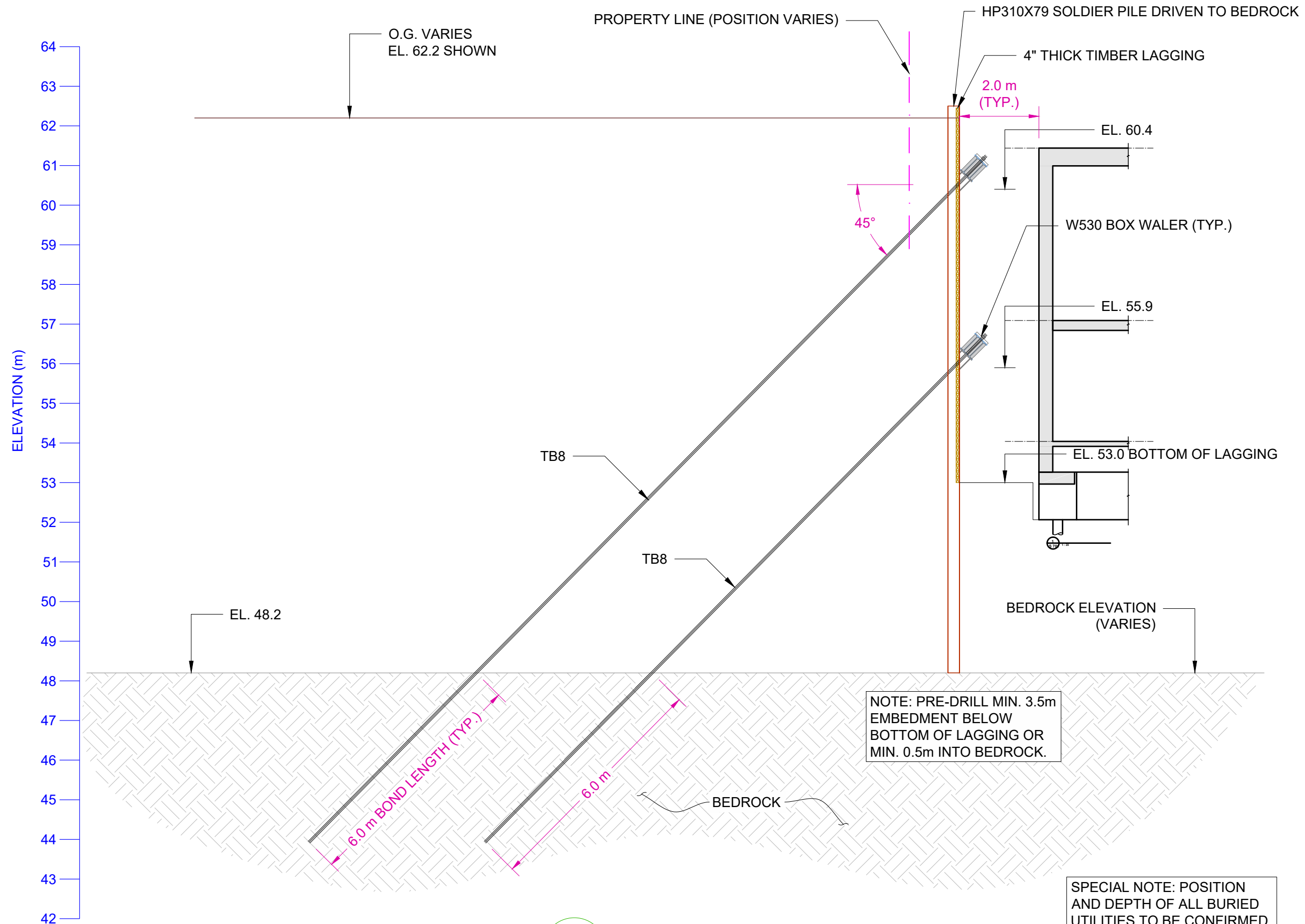
PROJECT
**LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING**

LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No.
 22409

DESCRIPTION
 SECTION

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU7A
CHECKED BY MIC	



1 SECTION
MU8 SCALE: 1:100



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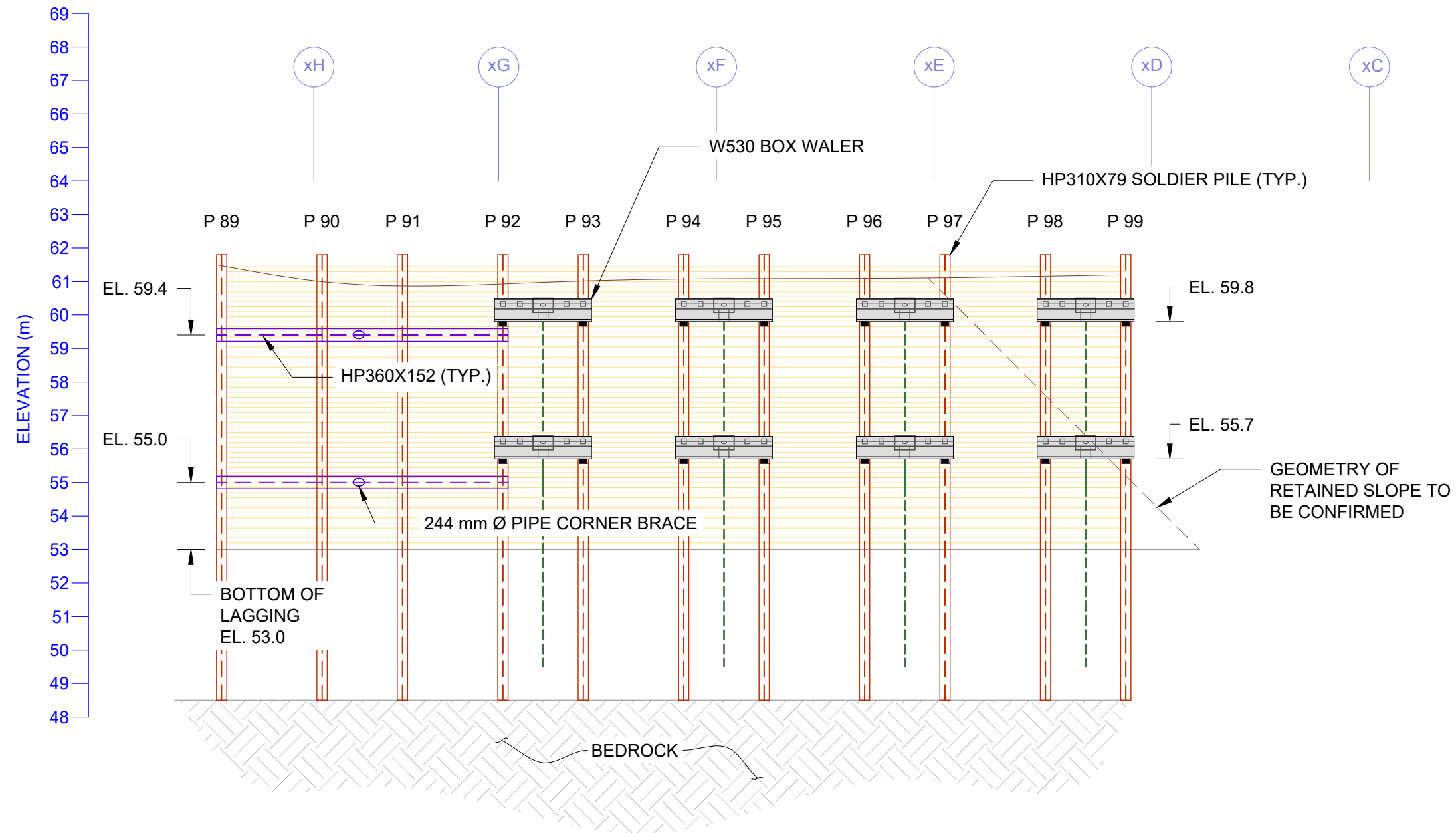
PROJECT
**LEBRETON LIBRARY PARCEL
EXCAVATION SHORING**

LOCATION
665 ALBERT STREET
OTTAWA, ONTARIO

JOB No.
22409

DESCRIPTION
SECTION

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU8
CHECKED BY MIC	



1 ELEVATION
MU9 SCALE: 1:150

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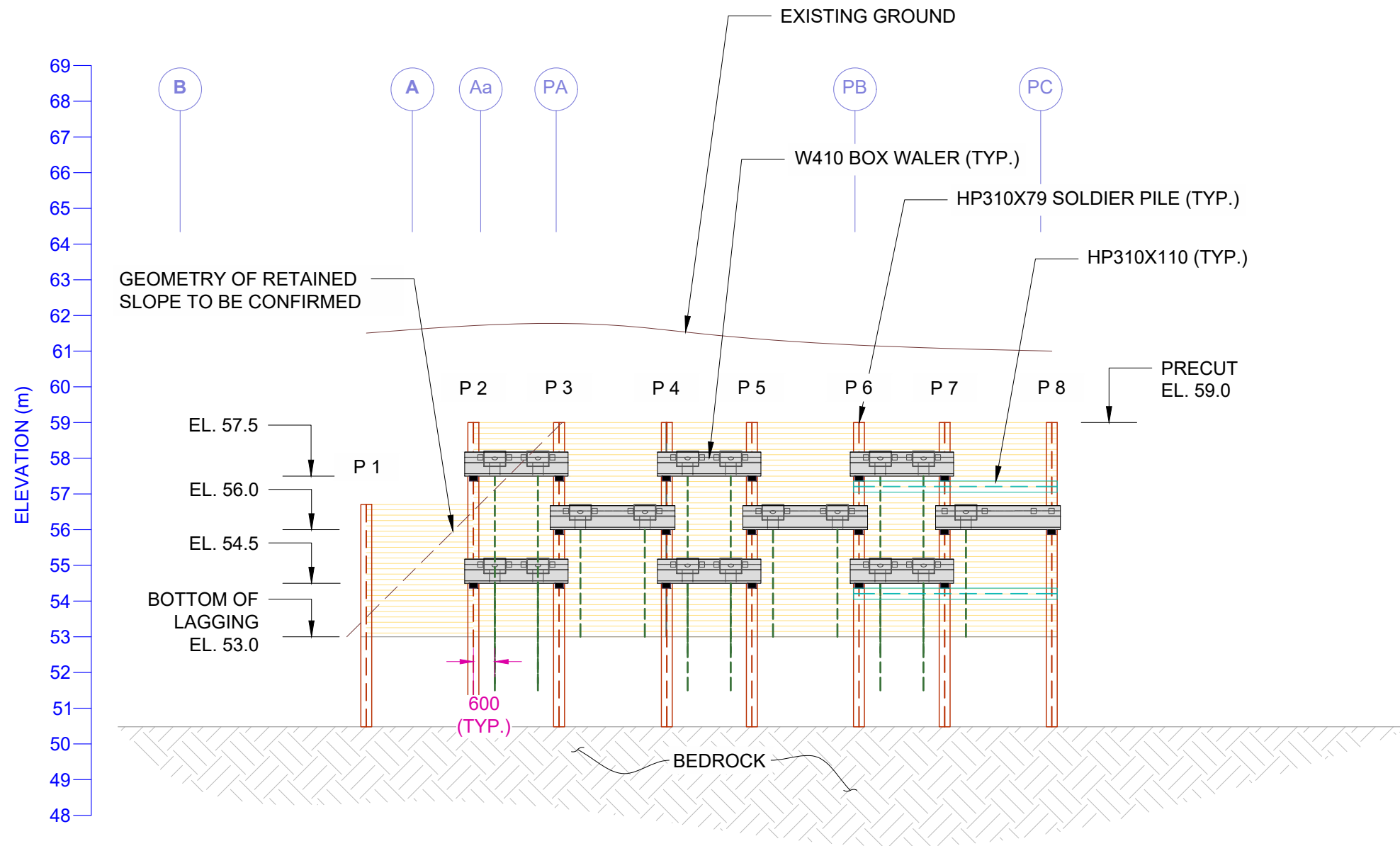
PROJECT
**LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING**

LOCATION
**665 ALBERT STREET
 OTTAWA, ONTARIO**

JOB No.
22409

DESCRIPTION
ELEVATION

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU9
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1 ELEVATION
MU10 SCALE: 1:150

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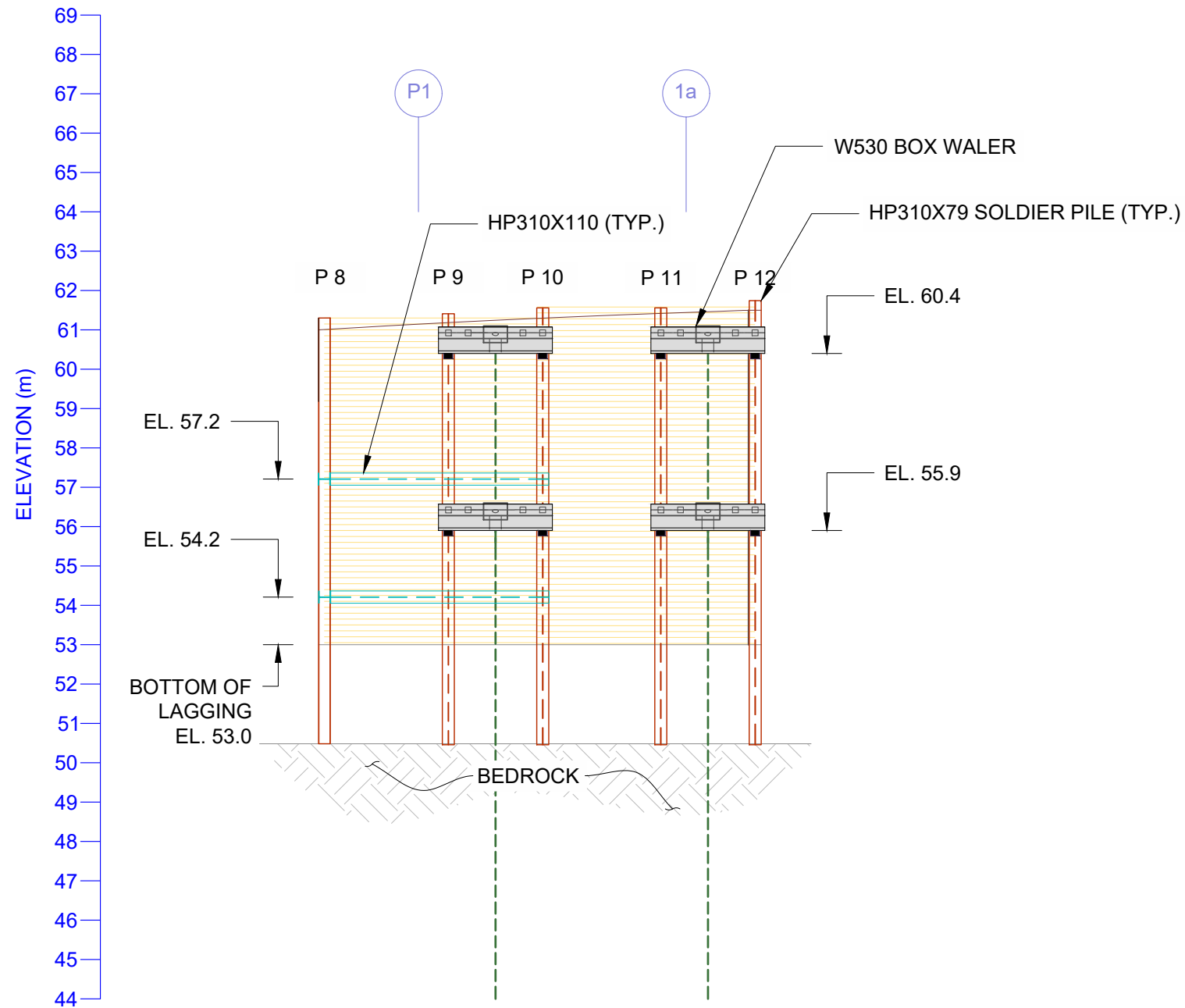
PROJECT
**LEBRETON LIBRARY PARCEL
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**665 ALBERT STREET
 OTTAWA, ONTARIO**

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DESCRIPTION
ELEVATION

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1 ELEVATION
MU11 SCALE: 1:150



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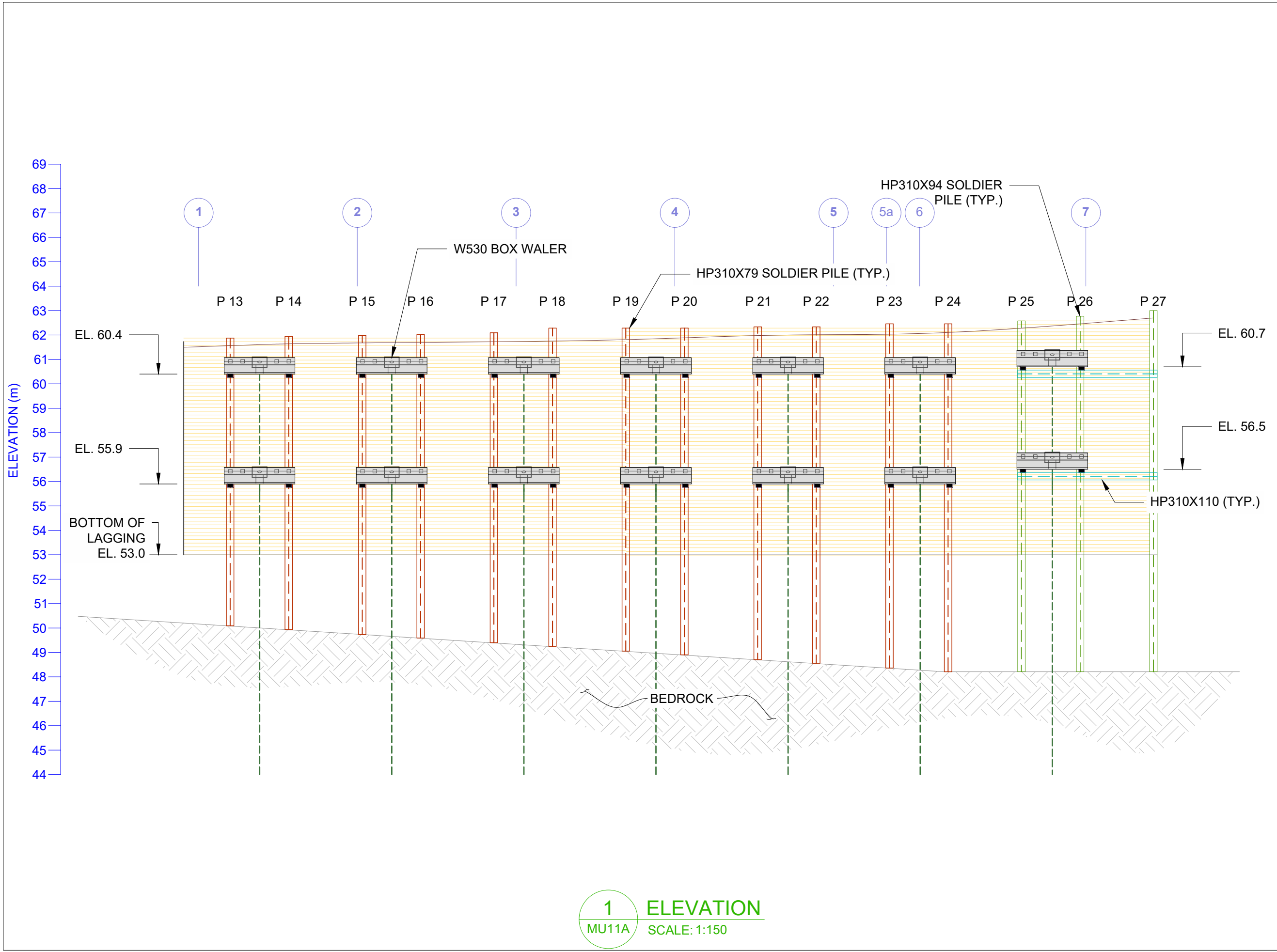
PROJECT
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ELEVATION

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU11
CHECKED BY MIC	



2	RESUBMITTED	2023.02.06
1	ISSUED FOR REVIEW/PERMIT	2022.12.16
No.	REVISION	DATE



Marathon Underground Constructors Corporation
 6847 Hiram Drive, Greely, ON K4P 1A2
 Tel: (613) 821-4800
 Fax: (613) 821-3182
 www.marathonunderground.com

PROJECT
**LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING**

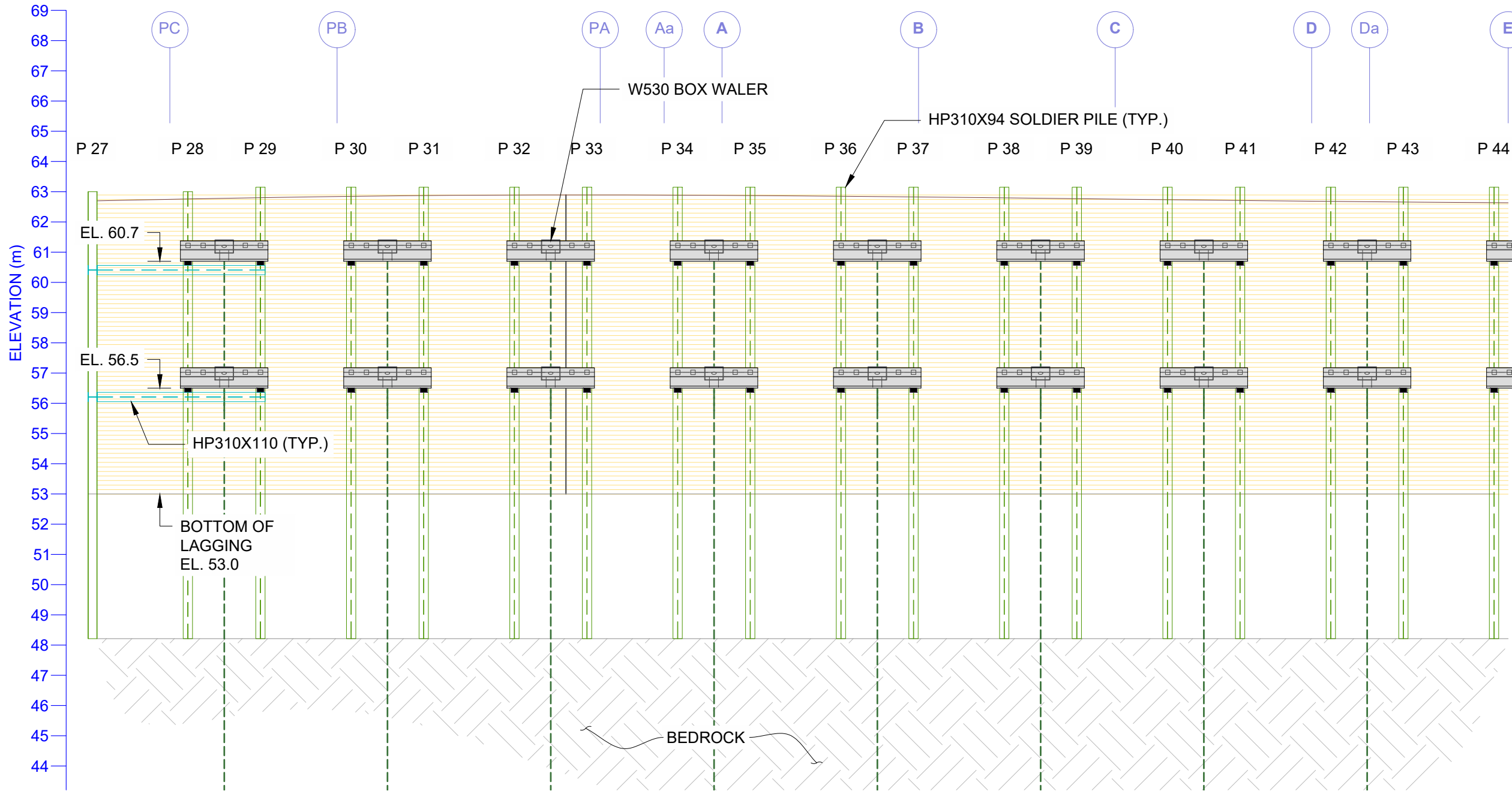
LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No.
 22409

DESCRIPTION
 ELEVATION

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU11A
CHECKED BY MIC	

1 ELEVATION
 MU11A SCALE: 1:150



CONTINUED ON MU12A

2	RESUBMITTED	2023.02.06
1	ISSUED FOR REVIEW/PERMIT	2022.12.16
No.	REVISION	DATE

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 Fax: (613) 821-3182
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PROJECT
**LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING**

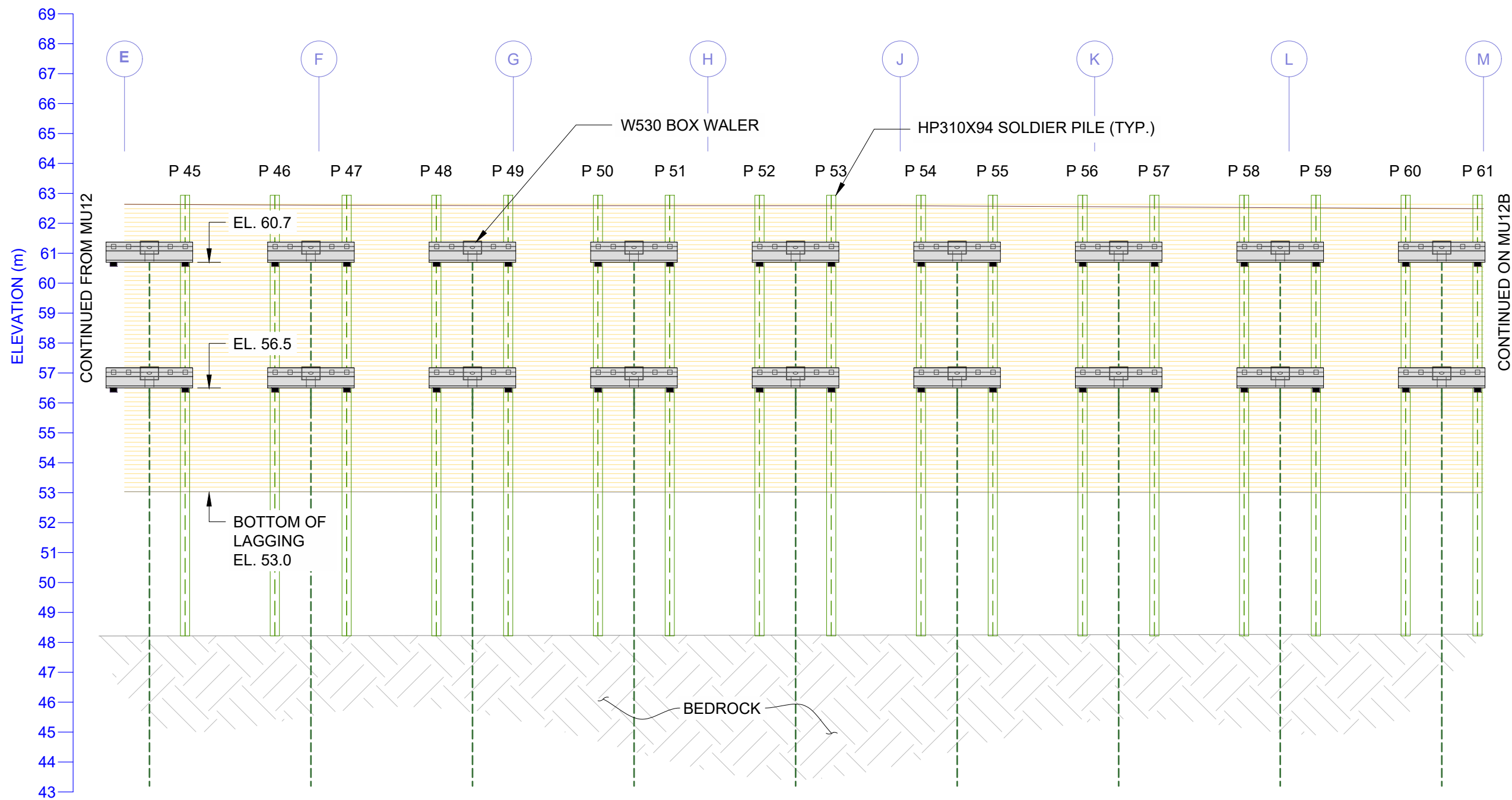
LOCATION
**665 ALBERT STREET
 OTTAWA, ONTARIO**

JOB No.
22409

DESCRIPTION
ELEVATION

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU12
CHECKED BY MIC	

1 ELEVATION
MU12 SCALE: 1:250



2	RESUBMITTED	2023.02.06
1	ISSUED FOR REVIEW/PERMIT	2022.12.16
No.	REVISION	DATE

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 Marathon Underground Constructors Corporation
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 Fax: (613) 821-3182
 www.marathonunderground.com

PROJECT
**LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING**

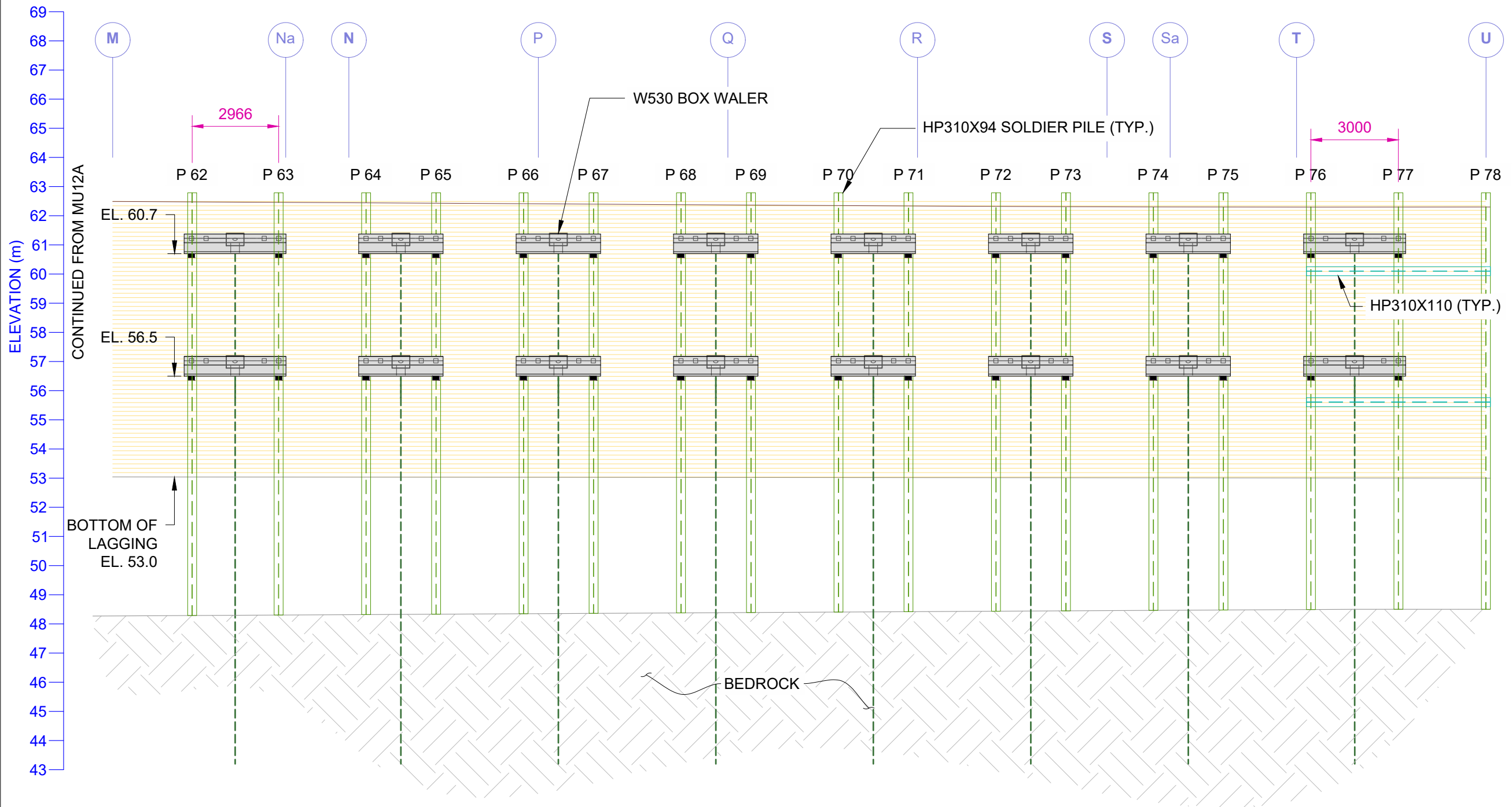
LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No.
 22409

DESCRIPTION
 ELEVATION

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU12A
CHECKED BY MIC	

1 ELEVATION
 MU12A SCALE: 1:250



1 ELEVATION
 MU12B SCALE: 1:250



No.	REVISION	DATE
2	RESUBMITTED	2023.02.06
1	ISSUED FOR REVIEW/PERMIT	2022.12.16



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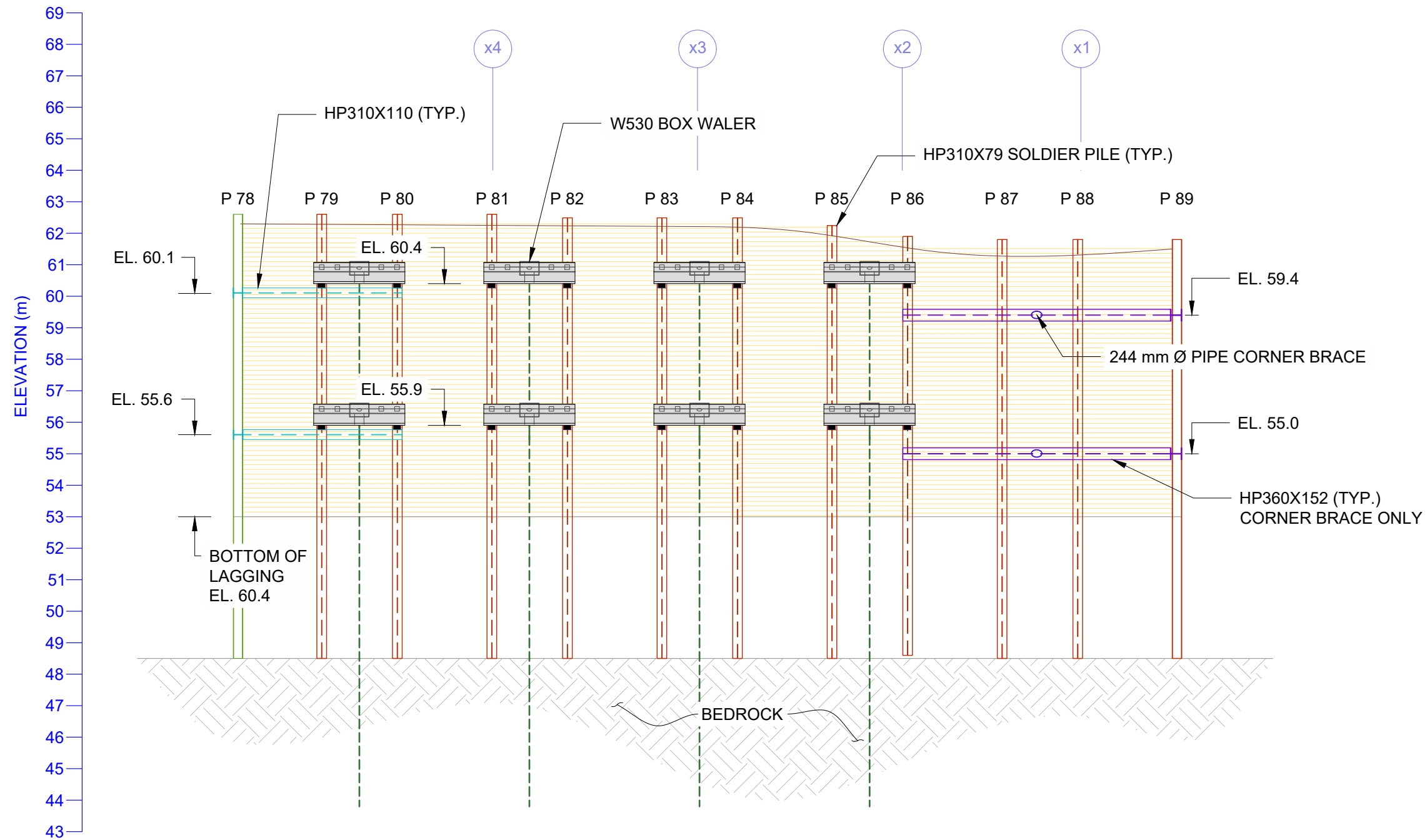
PROJECT
**LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING**

LOCATION
**665 ALBERT STREET
 OTTAWA, ONTARIO**

JOB No.
22409

DESCRIPTION
ELEVATION

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU12B
CHECKED BY MIC	



1 ELEVATION
MU13 SCALE: 1:150

2	RESUBMITTED	2023.02.06
1	ISSUED FOR REVIEW/PERMIT	2022.12.16
No.	REVISION	DATE

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 Tel: (613) 821-4800
 Fax: (613) 821-3182
 www.marathonunderground.com

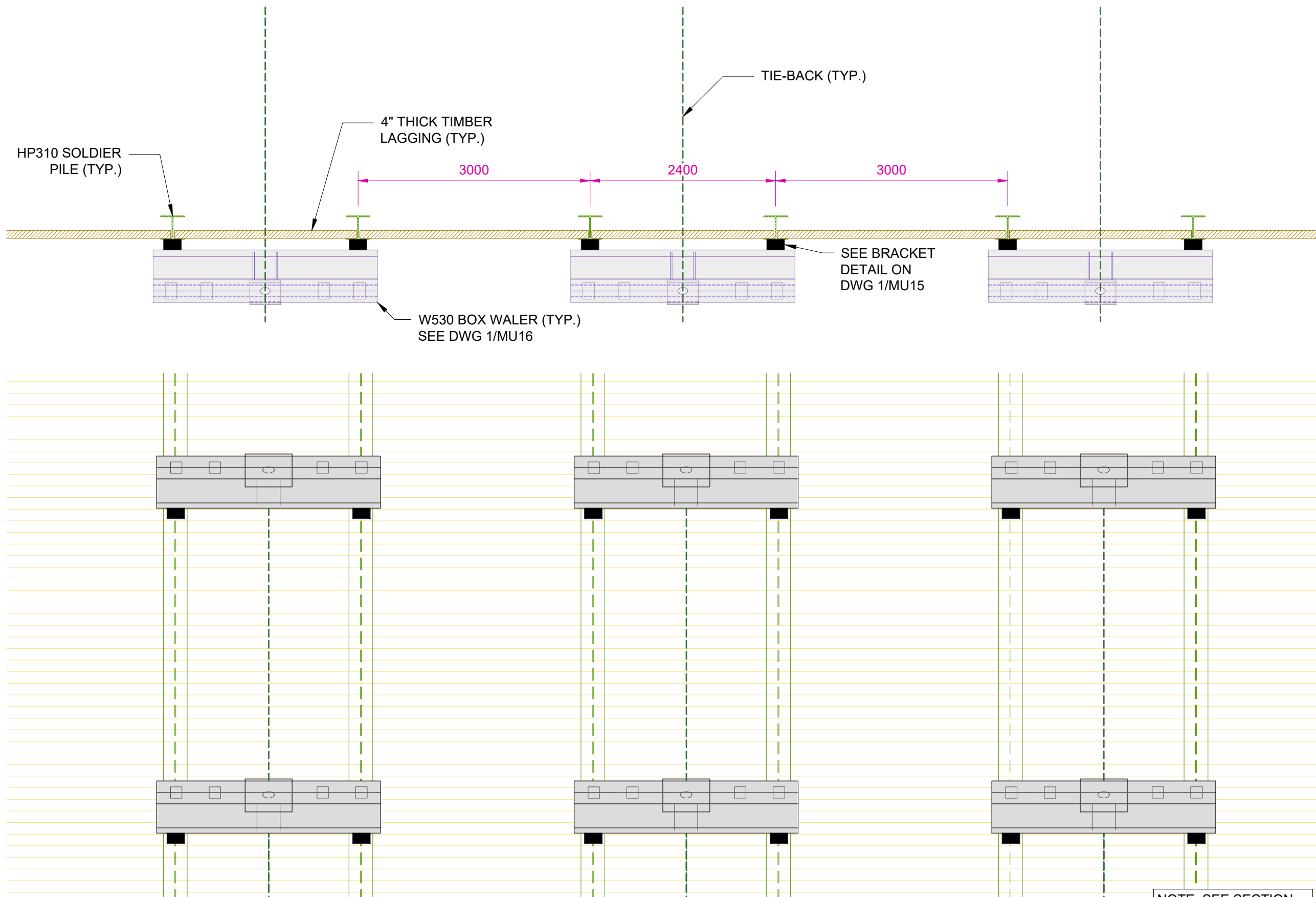
PROJECT
LEBRETON LIBRARY PARCEL EXCAVATION SHORING

LOCATION
**665 ALBERT STREET
 OTTAWA, ONTARIO**

JOB No.
22409

DESCRIPTION
ELEVATION

DRAWN BY	AC	SCALE	AS NOTED
DESIGNED BY	HB	DRAWING No.	MU13
CHECKED BY	MIC		



1 TYPICAL WALER ASSEMBLY
 MU14 SCALE: 1:50

NOTE: SEE SECTION AND ELEVATION VIEWS FOR TIE-BACK LEVELS.



2	RESUBMITTED	2023.02.06
1	ISSUED FOR REVIEW/PERMIT	2022.12.16
No.	REVISION	DATE



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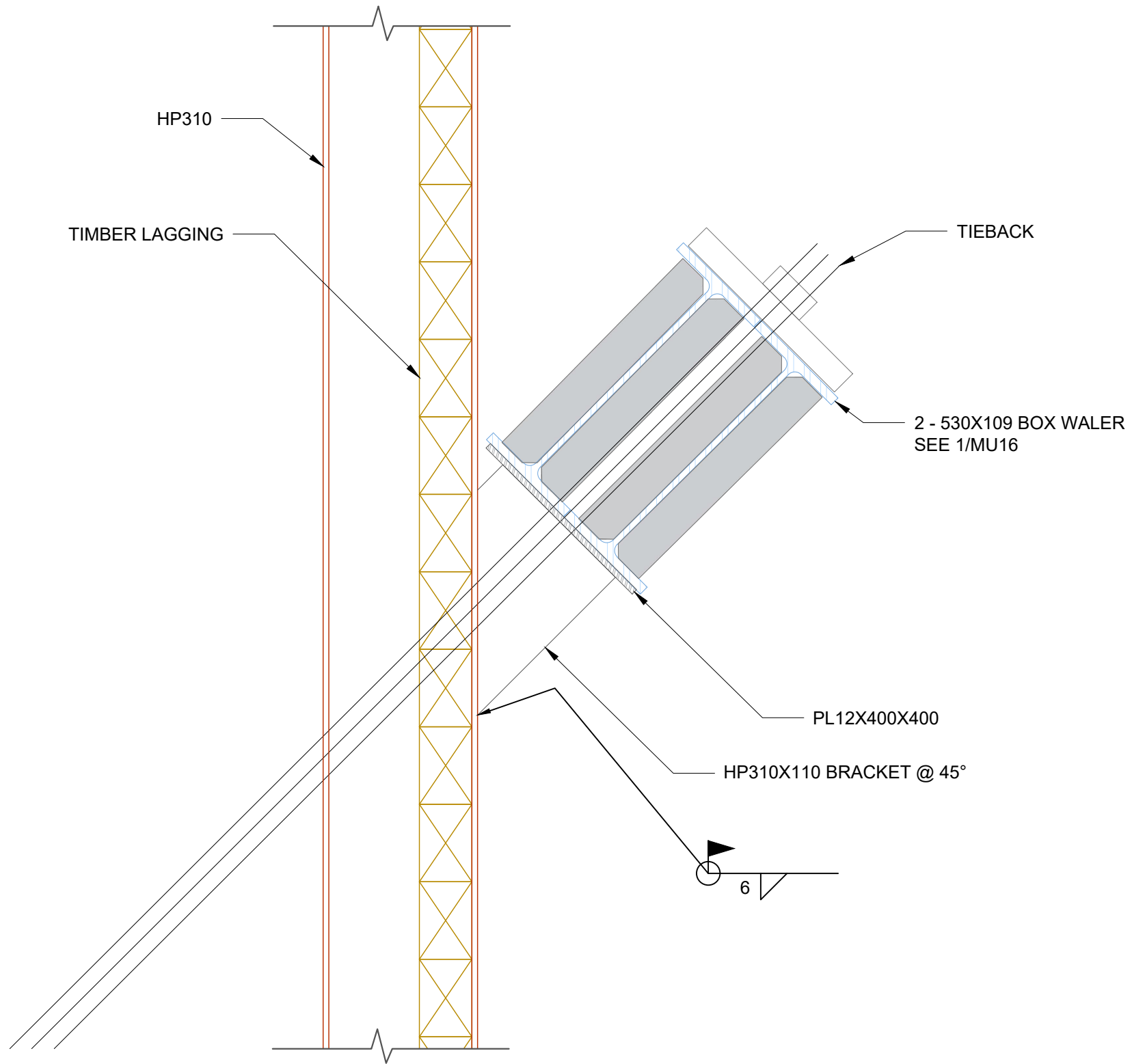
PROJECT
 LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING

LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No.
 22409

DESCRIPTION
 TYPICAL WALER ASSEMBLY

DRAWN BY	AC	SCALE	AS NOTED
DESIGNED BY	HB	DRAWING No.	MU14
CHECKED BY	MIC		



1 BRACKET DETAIL
 MU15 SCALE: 1:10



No.	REVISION	DATE
2	RESUBMITTED	2023.02.06
1	ISSUED FOR REVIEW/PERMIT	2022.12.16



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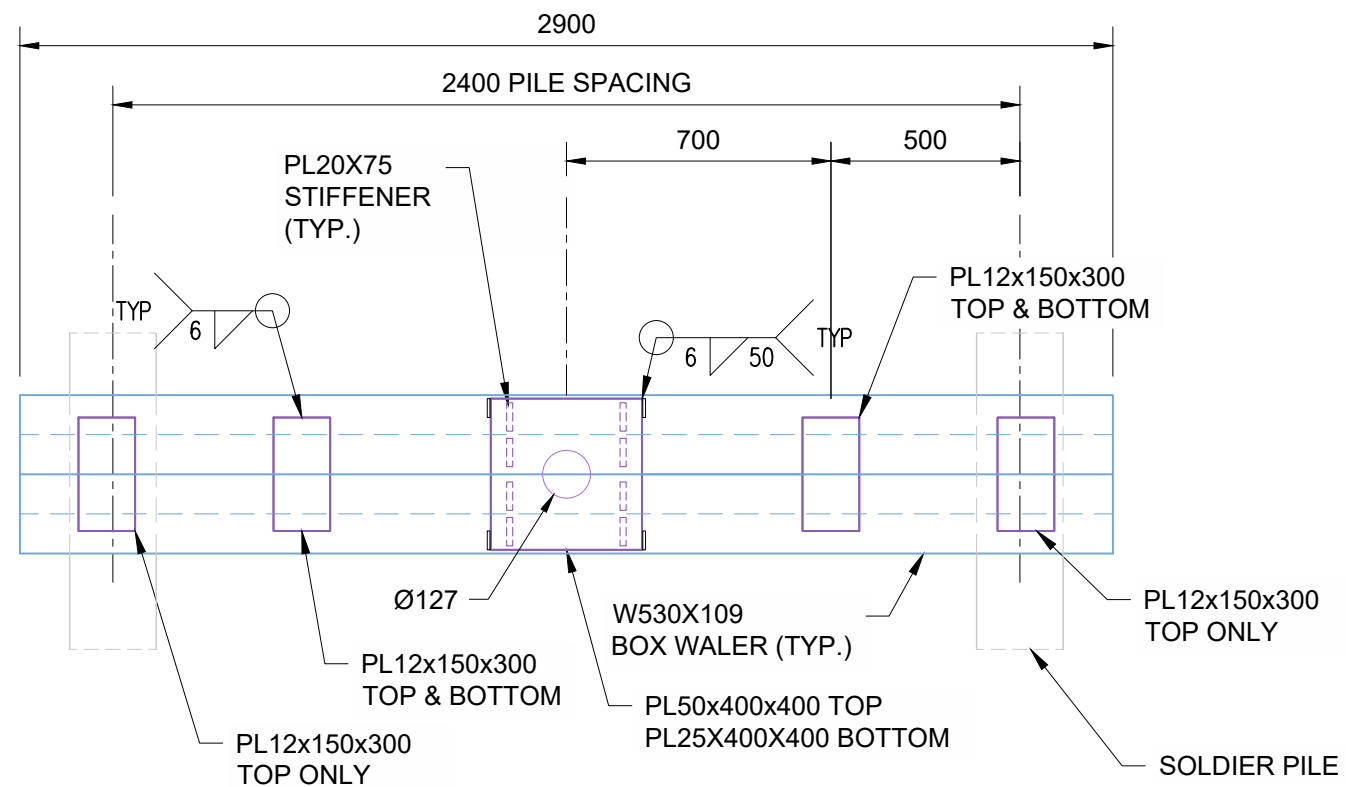
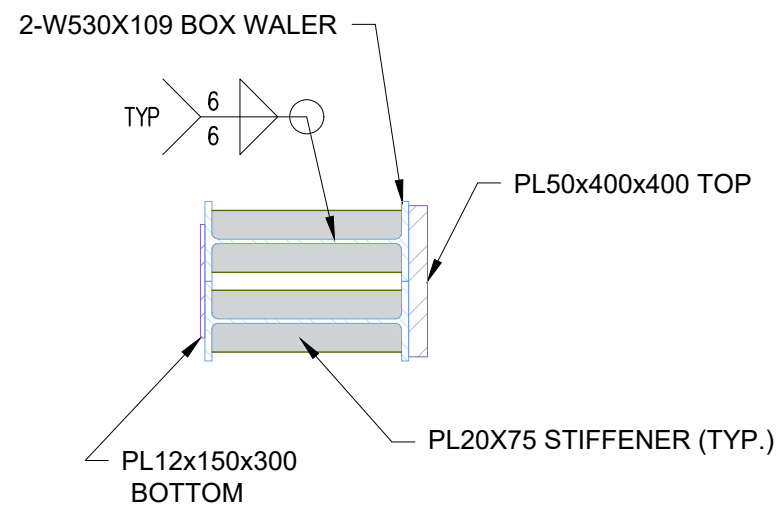
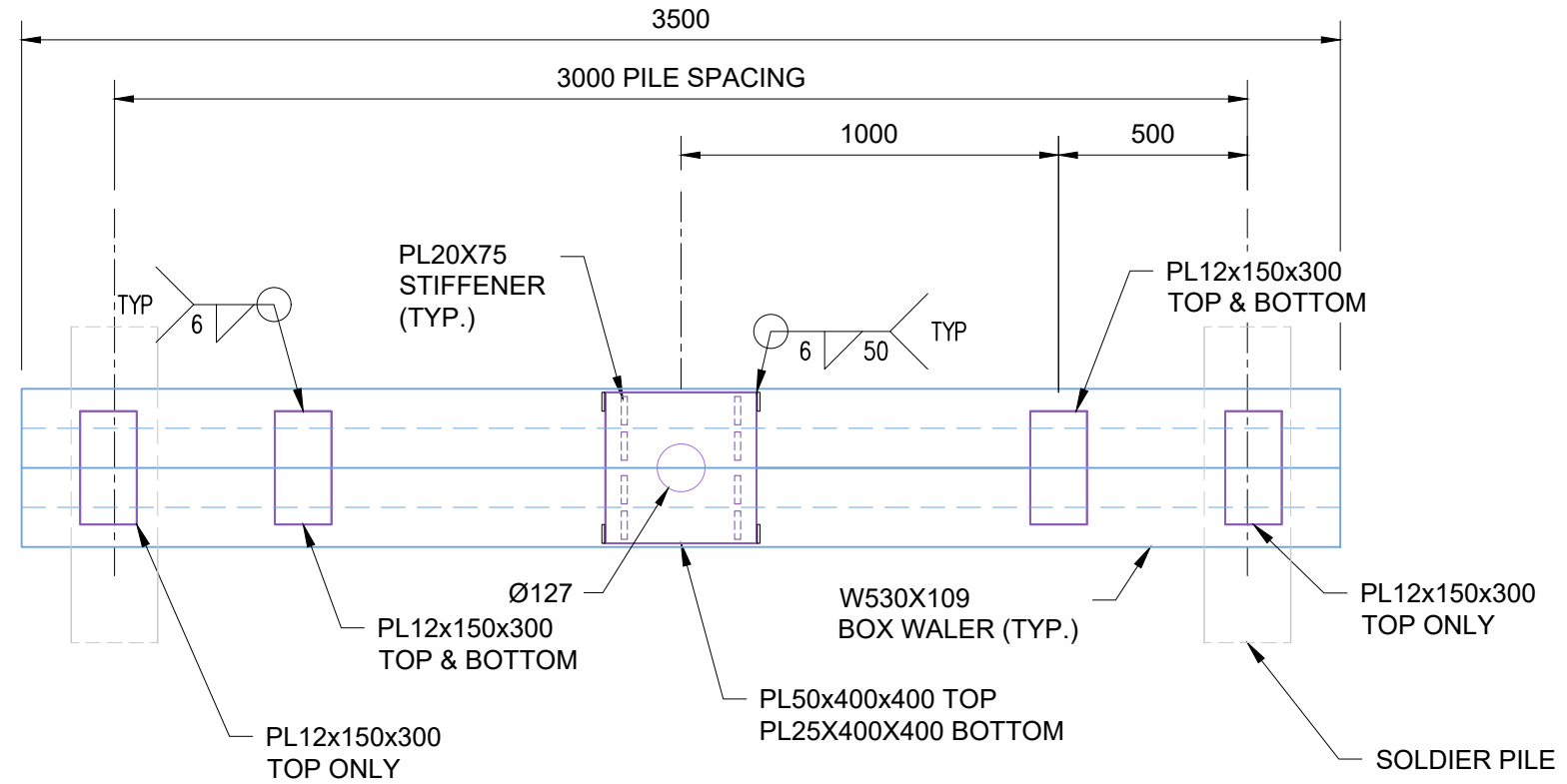
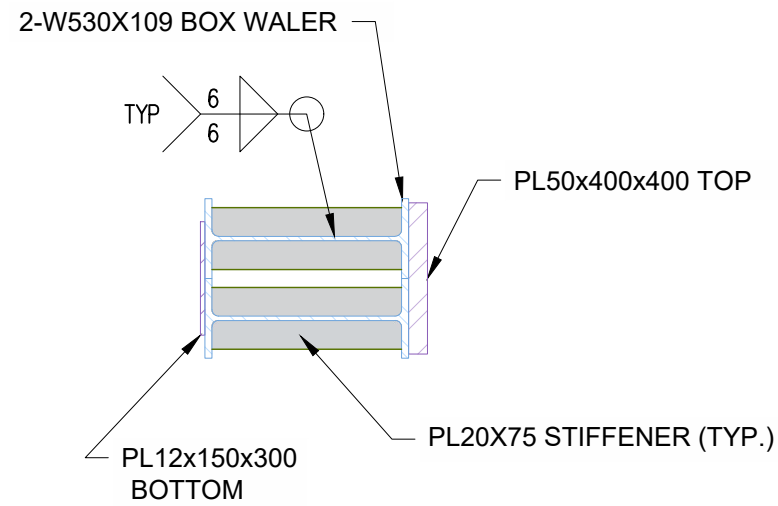
PROJECT
 LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING

LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No.
 22409

DESCRIPTION
 BRACKET DETAIL

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU15
CHECKED BY MIC	



1 W530 BOX WALER DETAIL
MU16 SCALE: 1:20

NOTE: SELECT WALER
BASED ON PILE SPACING
(TYP. 2.4m)



2	RESUBMITTED	2023.02.06
1	ISSUED FOR REVIEW/PERMIT	2022.12.16
No.	REVISION	DATE



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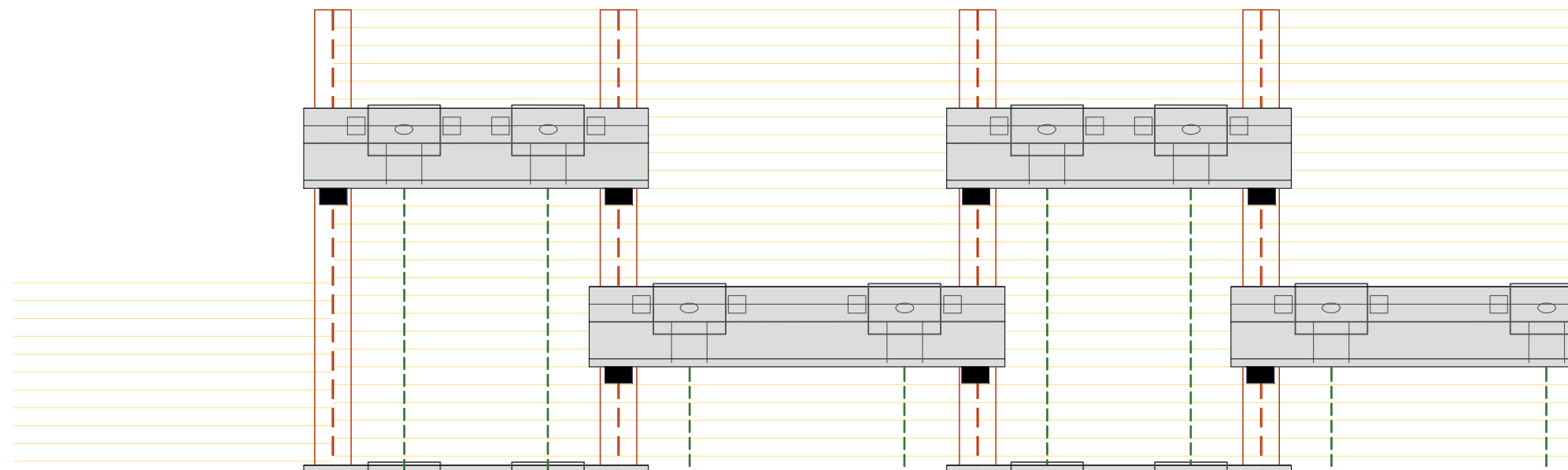
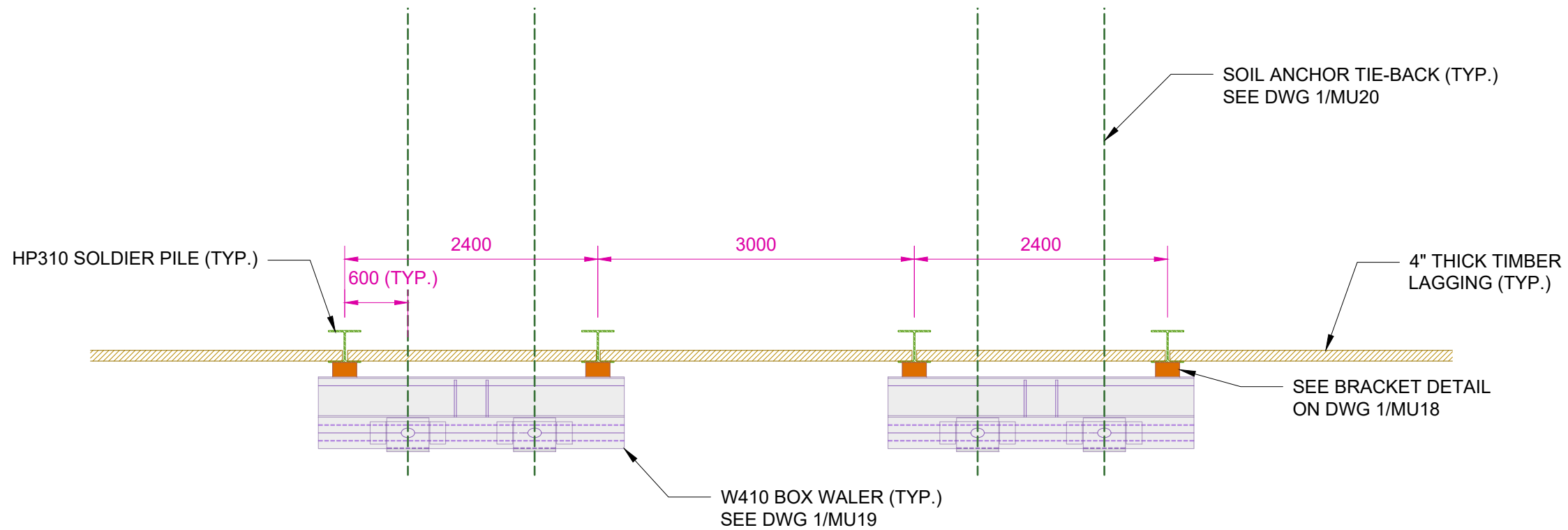
PROJECT
LEBRETON LIBRARY PARCEL
EXCAVATION SHORING

LOCATION
665 ALBERT STREET
OTTAWA, ONTARIO

JOB No.
22409

DESCRIPTION
BOX WALER DETAIL

DRAWN BY	AC	SCALE	AS NOTED
DESIGNED BY	HB	DRAWING No.	MU16
CHECKED BY	MIC		



NOTE: SEE SECTION AND ELEVATION VIEWS FOR TIE-BACK LEVELS.

1 TYPICAL WALER ASSEMBLY - NORTHEAST SHORING WALL ONLY
 MU17 SCALE: 1:50



2	RESUBMITTED	2023.02.06
1	ISSUED FOR REVIEW/PERMIT	2022.12.16
No.	REVISION	DATE



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 Fax: (613) 821-3182
 www.marathonunderground.com

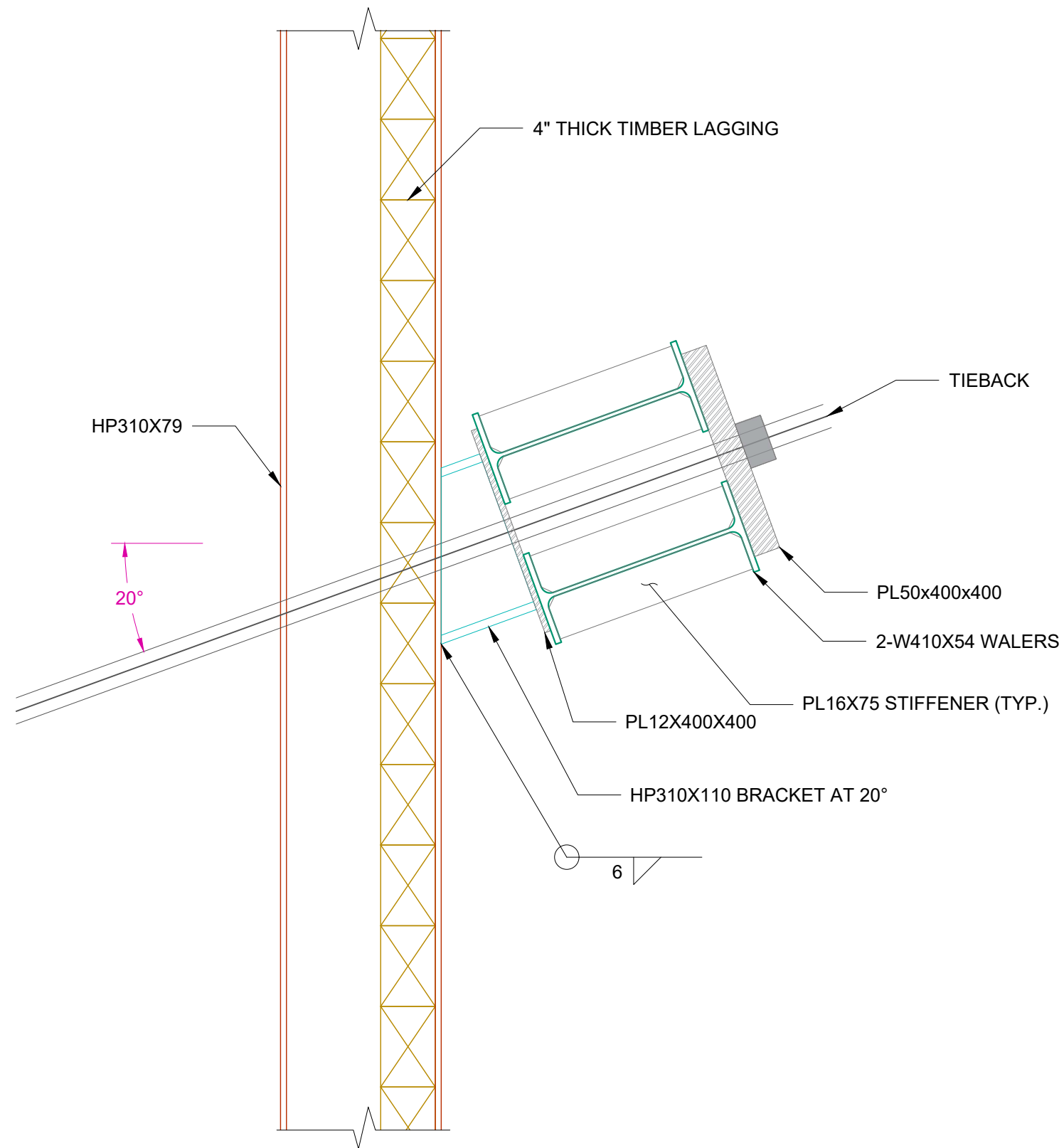
PROJECT
 LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING

LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No.
 22409

DESCRIPTION
 TYPICAL WALER ASSEMBLY

DRAWN BY	AC	SCALE	AS NOTED
DESIGNED BY	HB	DRAWING No.	MU17
CHECKED BY	MIC		



1 BRACKET DETAIL
 MU18 SCALE: 1:10



2	RESUBMITTED	2023.02.06
1	ISSUED FOR REVIEW/PERMIT	2022.12.16
No.	REVISION	DATE

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 6847 Hiram Drive, Greely, ON K4P 1A2
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 www.marathonunderground.com

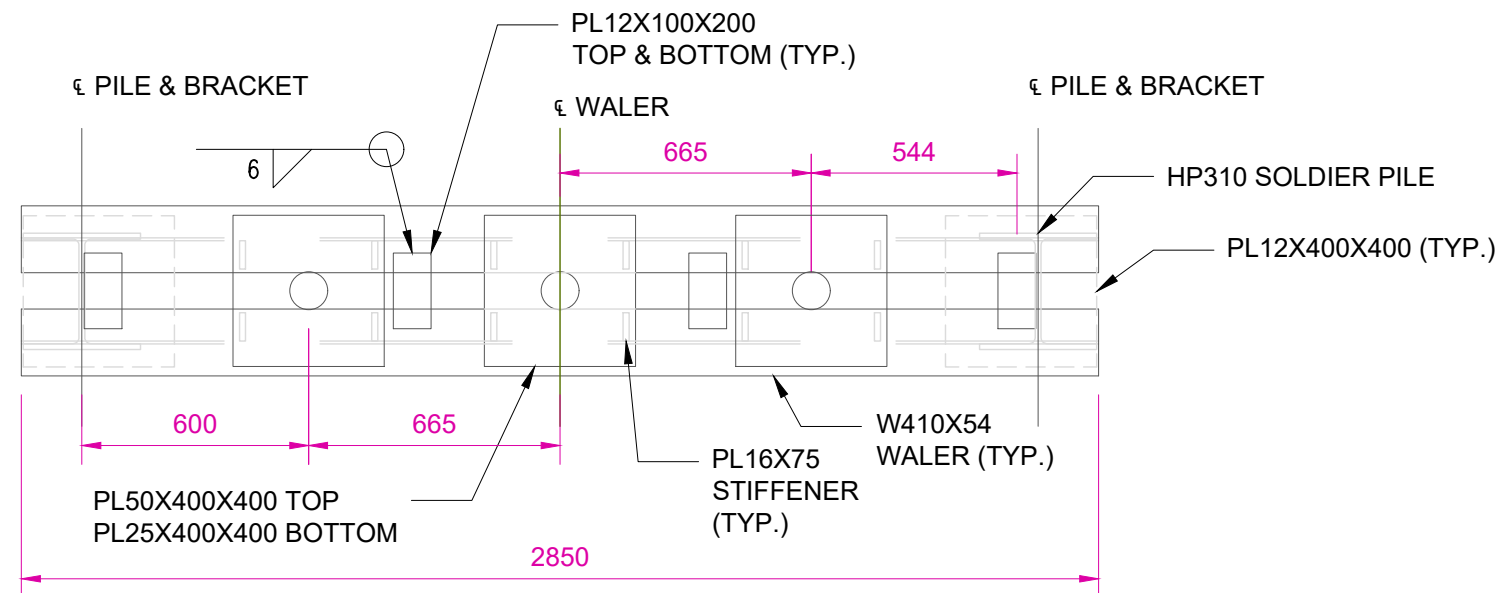
PROJECT
**LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING**

LOCATION
**665 ALBERT STREET
 OTTAWA, ONTARIO**

JOB No.
22409

DESCRIPTION
BRACKET DETAIL

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU18
CHECKED BY MIC	



1 W410 BOX WALER DETAIL
MU19 SCALE: 1:20

No.	REVISION	DATE
2	RESUBMITTED	2023.02.06
1	ISSUED FOR REVIEW/PERMIT	2022.12.16



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www.marathonunderground.com

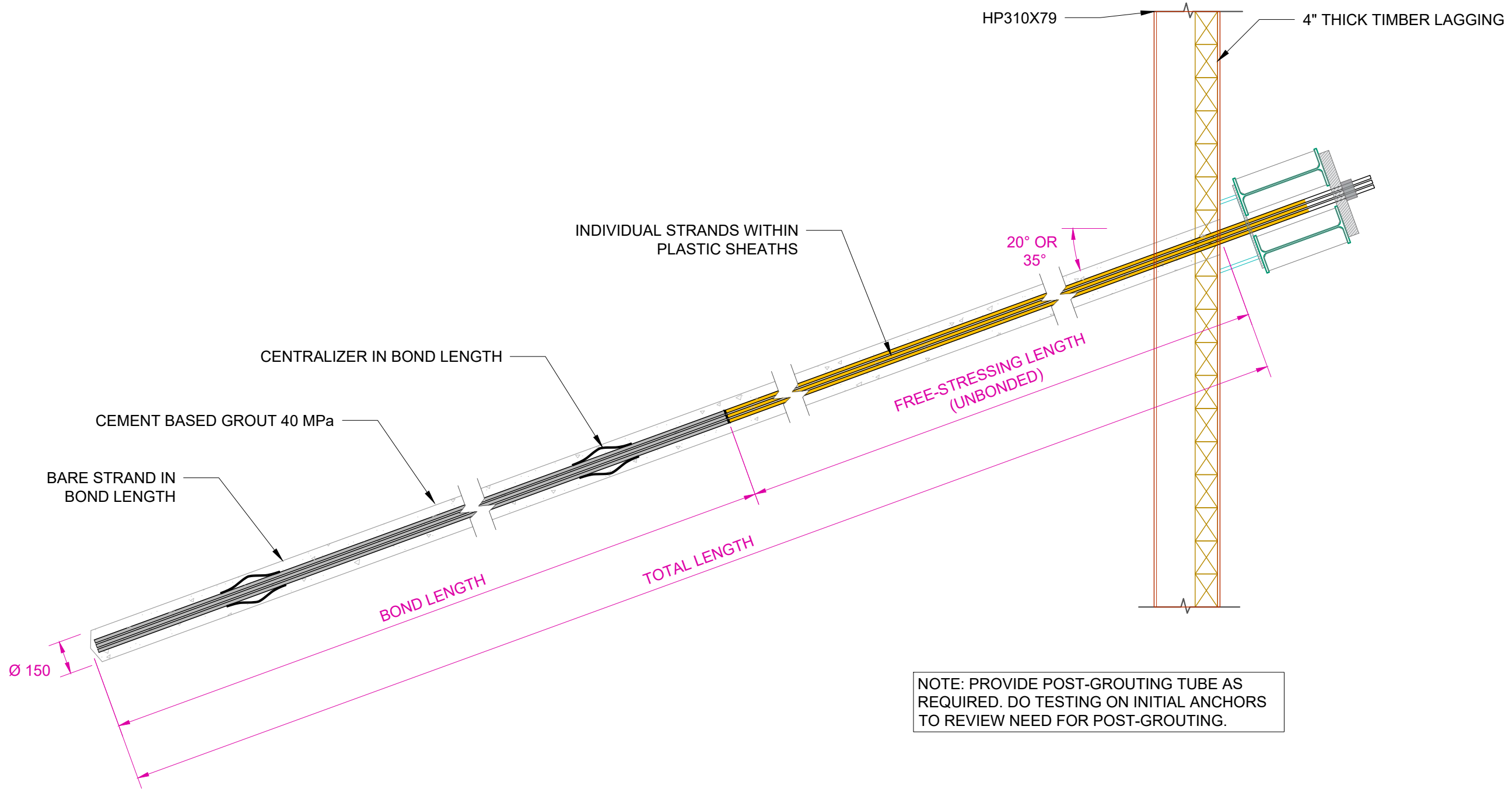
PROJECT
**LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING**

LOCATION
**665 ALBERT STREET
 OTTAWA, ONTARIO**

JOB No.
22409

DESCRIPTION
BOX WALER DETAIL

DRAWN BY AC	SCALE AS NOTED
DESIGNED BY HB	DRAWING No. MU19
CHECKED BY MIC	



NOTE: PROVIDE POST-GROUTING TUBE AS REQUIRED. DO TESTING ON INITIAL ANCHORS TO REVIEW NEED FOR POST-GROUTING.

1 SOIL ANCHOR DETAIL
 MU20 SCALE: 1:20



2	RESUBMITTED	2023.02.06
1	ISSUED FOR REVIEW/PERMIT	2022.12.16
No.	REVISION	DATE



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PROJECT
 LEBRETON LIBRARY PARCEL
 EXCAVATION SHORING

LOCATION
 665 ALBERT STREET
 OTTAWA, ONTARIO

JOB No.
 22409

DESCRIPTION
 SOIL ANCHOR DETAIL

DRAWN BY	AC	SCALE	AS NOTED
DESIGNED BY	HB	DRAWING No.	MU20
CHECKED BY	MIC		



APPENDIX F

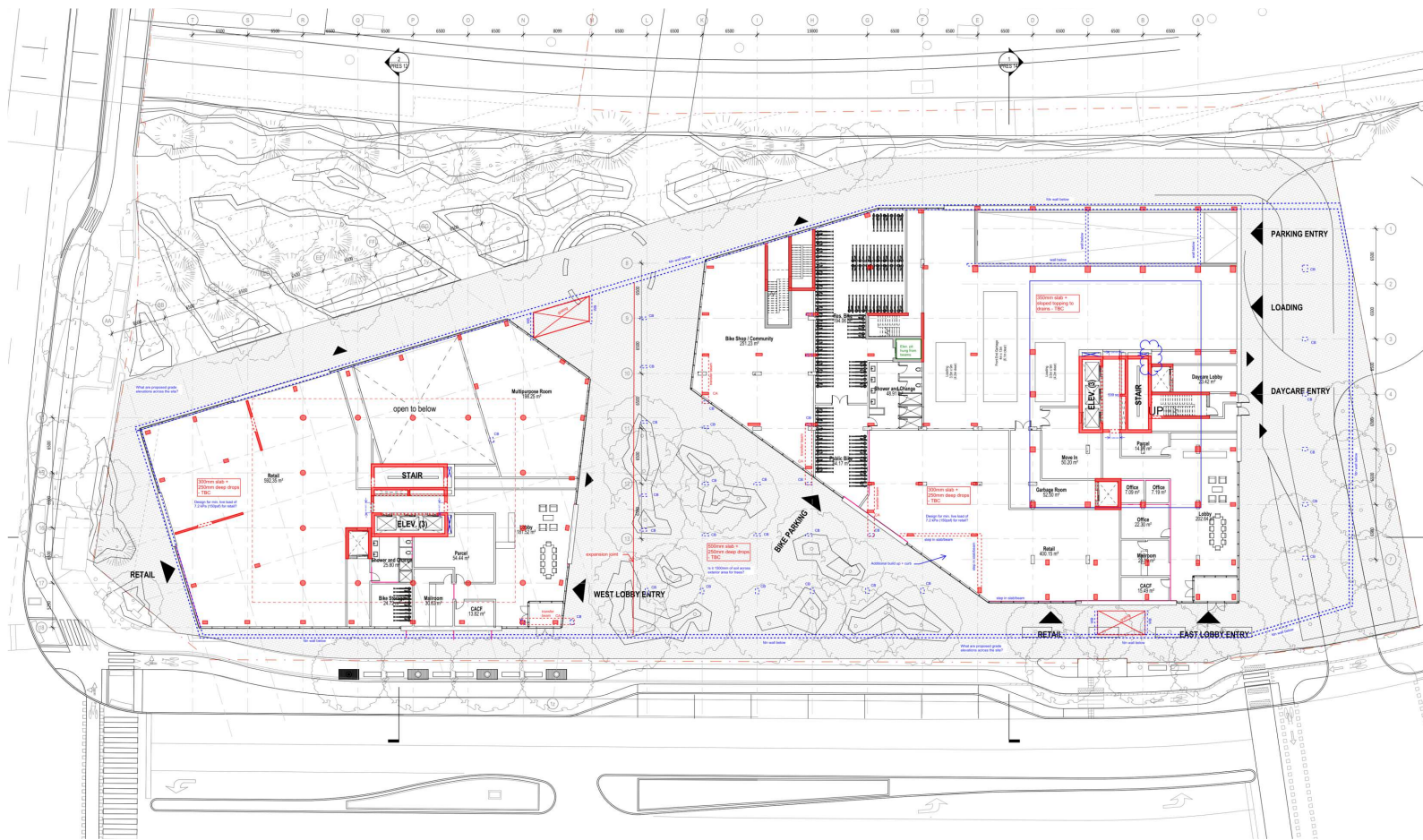
Construction Logistics Plan

LEBRETON LIBRARY PARCEL

655 ALBERT ST. OTTAWA. ONTARIO.

LOGISTICS DRAWINGS

ISSUE DATE: JANUARY 27, 2023




DRAWINGS LIST

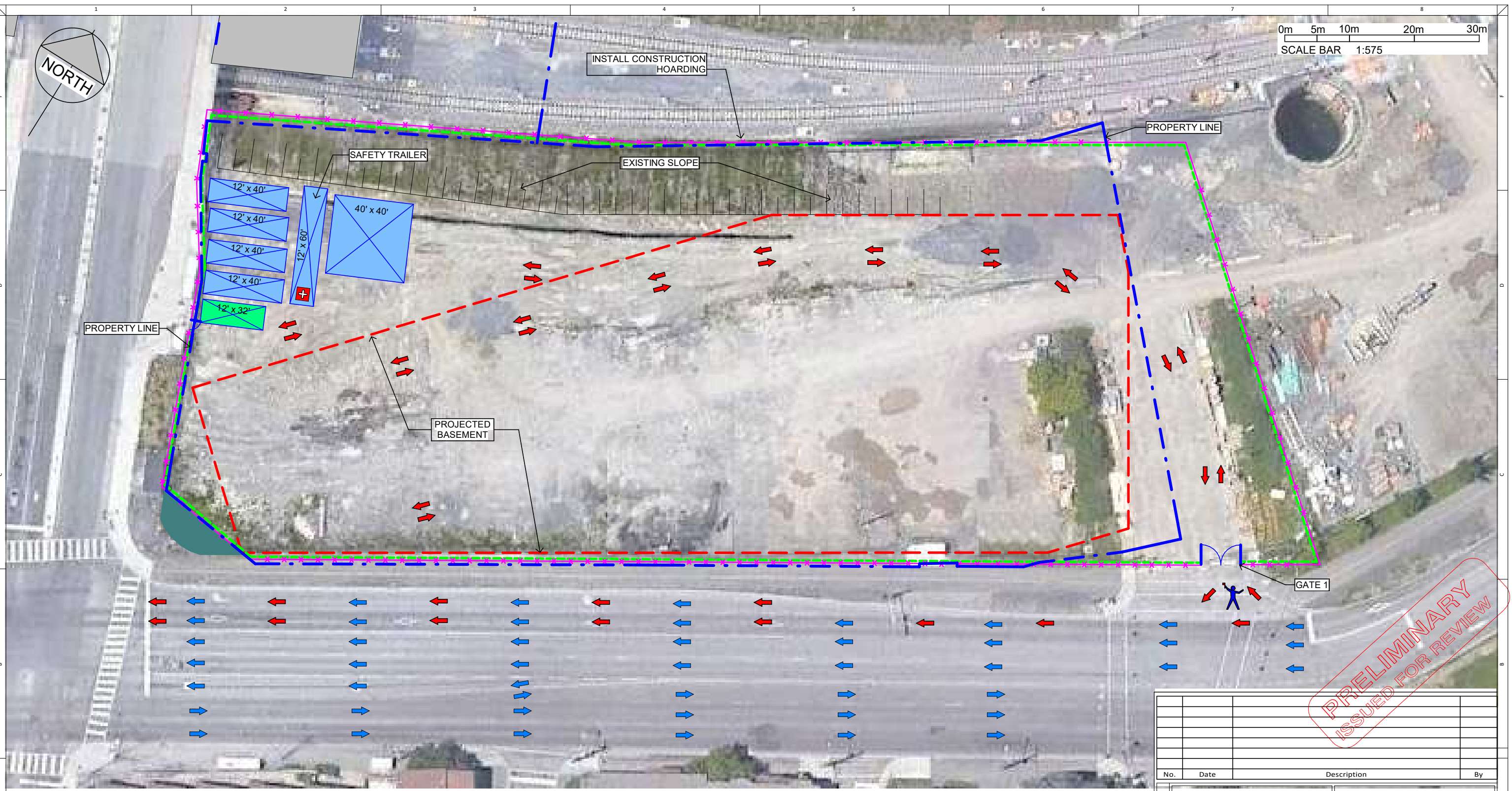
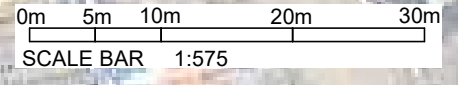
DRAWING #	DRAWING TITLE	ISSUE DATE
LLP-LOG-00	Cover Page	Jan 27, 2023
LLP-LOG-01	Mobilization and Site Offices	Jan 27, 2023
LLP-LOG-02	Excavation Work	Jan 27, 2023
LLP-LOG-03	Substructure - Level P2	Jan 27, 2023
LLP-LOG-04	Superstructure - Level 1	Jan 27, 2023
LLP-LOG-05	Superstructure - Level 3	Jan 27, 2023
LLP-LOG-06	Superstructure - Towers Construction	Jan 27, 2023
LLP-LOG-07	Site Safety Plan COVID-19	Jan 27, 2023
LLP-LOG-08	South Elevation	Jan 27, 2023
LLP-LOG-09	Superstructure - Construction Hoists inside podium - Option B	Jan 27, 2023

PRELIMINARY
ISSUED FOR REVIEW

No.	Date	Description	By

 <p>EllisDon We build on great relationships™</p>	Construction Sciences Engineering Department 1004 Middlegate Road, Main Floor Mississauga, Ontario, L4Y 1M4 Canada Tel: 905-896-8900 www.ellisdon.com		
	Project Name: Lebreton Library Parcel		Drawing Title: Site Logistics Cover Page
Date: Jan 27, 2023		Scale: 1:40	Drawn By: MR
Job Number: LLP-LOG-00		Rev: 0	

Print Date / Time: 1/27/23 7:38:18 PM



PRELIMINARY
ISSUED FOR REVIEW

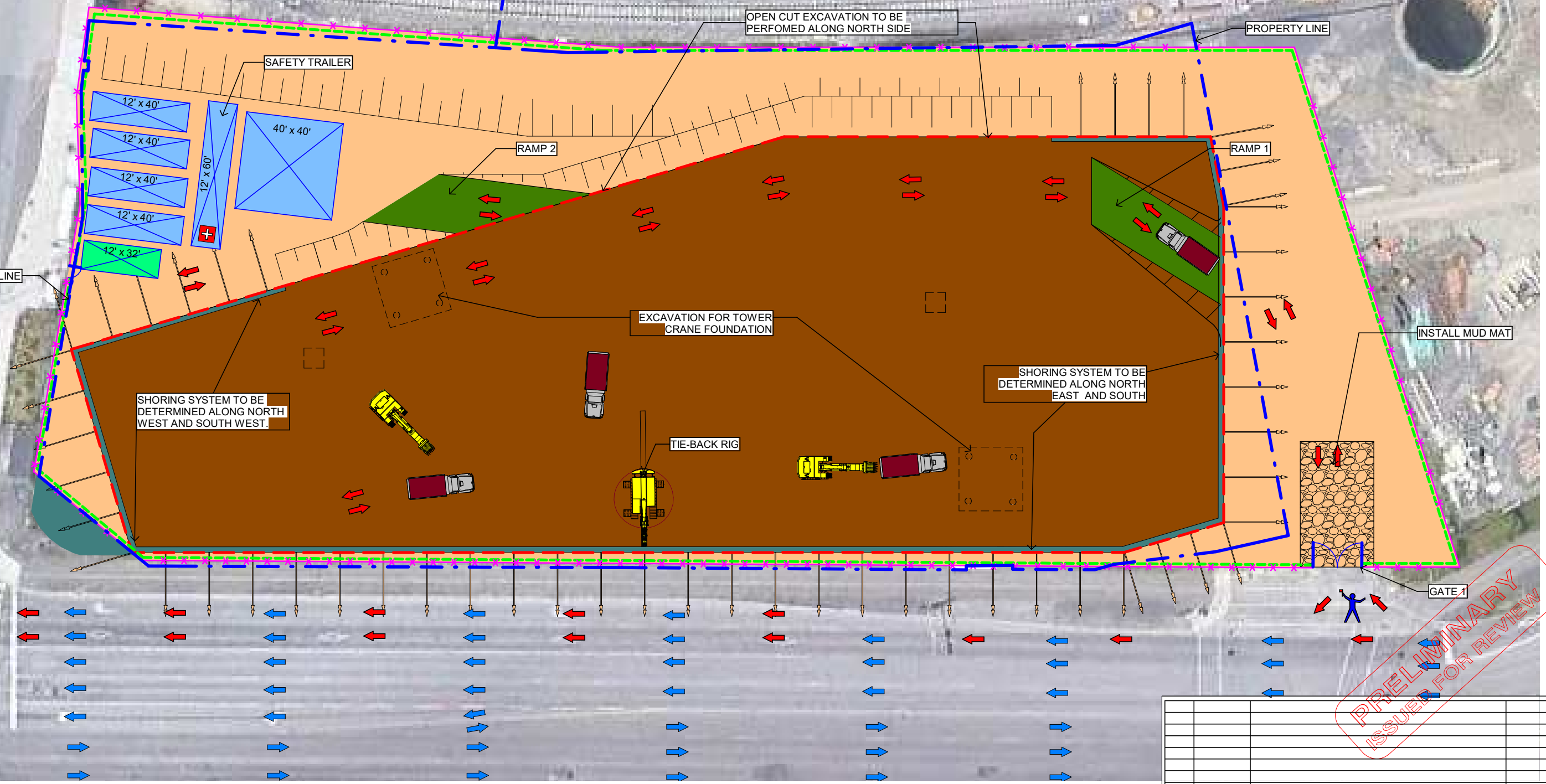
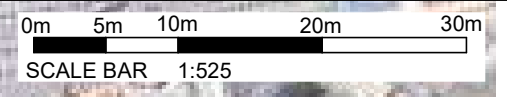
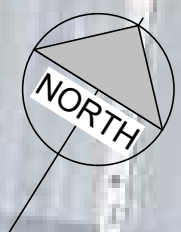
No.	Date	Description	By

LEGEND:

EXISTING BUILDING	PROPERTY LINE	SWING GATE	WASHROOM TRAILER
LAYDOWN AREA	CONSTRUCTION HOARDING	CONSTRUCTION TRAFFIC	TRAILER OFFICES
EXCAVATION WORKS	SILT FENCE	PUBLIC TRAFFIC	
MUD MAT	PROJECTED STRUCTURES	FLAGMAN	
	FOLDING GATE		

Print Date / Time: 1/27/23 7:38:18 PM

<p>EllisDon We build on great relationships™</p>	Construction Sciences Engineering Department 1004 Middlegate Road, Main Floor Mississauga, Ontario, L4Y 1M4 Canada Tel: 905-896-8900 www.ellisdon.com	
	Project Name: Lebreton Library Parcel	
Date: Jan 27, 2023		Scale: As indicated
Job Number: 655 Albert St. Ottawa, Ontario.		Drawn By: MR
		Rev: LLP-LOG-01



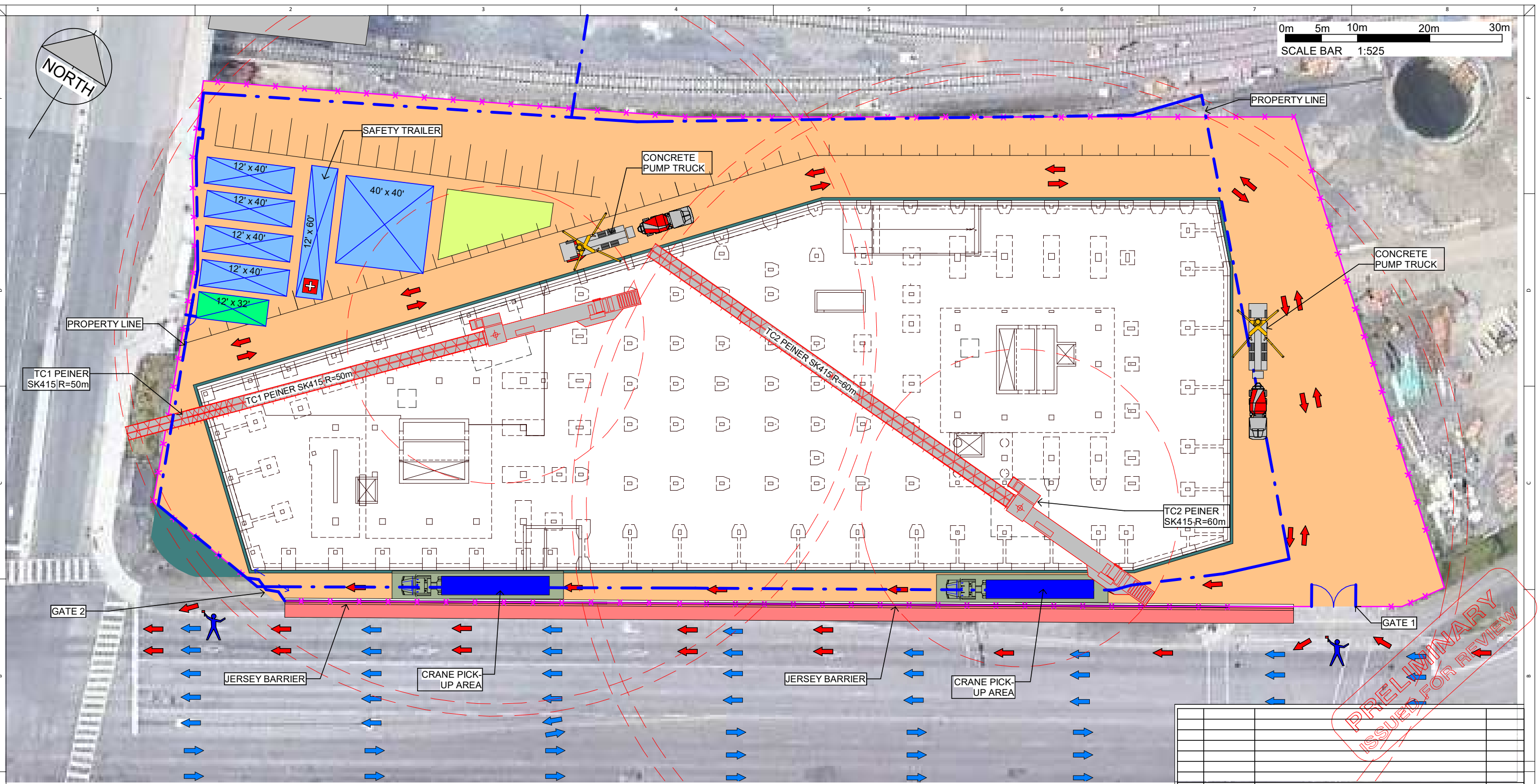
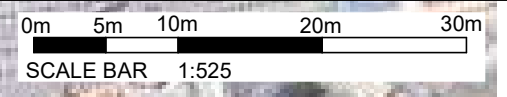
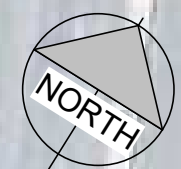
PRELIMINARY
ISSUED FOR REVIEW

LEGEND:

- | | | | |
|-------------------|-----------------------|----------------------|------------------|
| EXISTING BUILDING | PROPERTY LINE | SWING GATE | WASHROOM TRAILER |
| LAYDOWN AREA | CONSTRUCTION HOARDING | CONSTRUCTION TRAFFIC | TRAILER OFFICES |
| EXCAVATION WORKS | SILT FENCE | PUBLIC TRAFFIC | |
| MUD MAT | PROJECTED STRUCTURES | FLAGMAN | |
| | FOLDING GATE | | |

No.	Date	Description	By

Print Date / Time: 1/27/23 7:38:18 PM 	Construction Sciences Engineering Department 1004 Middlegate Road, Main Floor Mississauga, Ontario, L4Y 1M4 Canada Tel: 905-896-8900 www.ellisdon.com	
	Project Name: Lebreton Library Parcel	
Date: Jan 27, 2023		Scale: As indicated
Job Number: 655 Albert St. Ottawa, Ontario.		Drawn By: MR
Drawing Title: Site Logistics Excavation Work		Rev: LLP-LOG-02



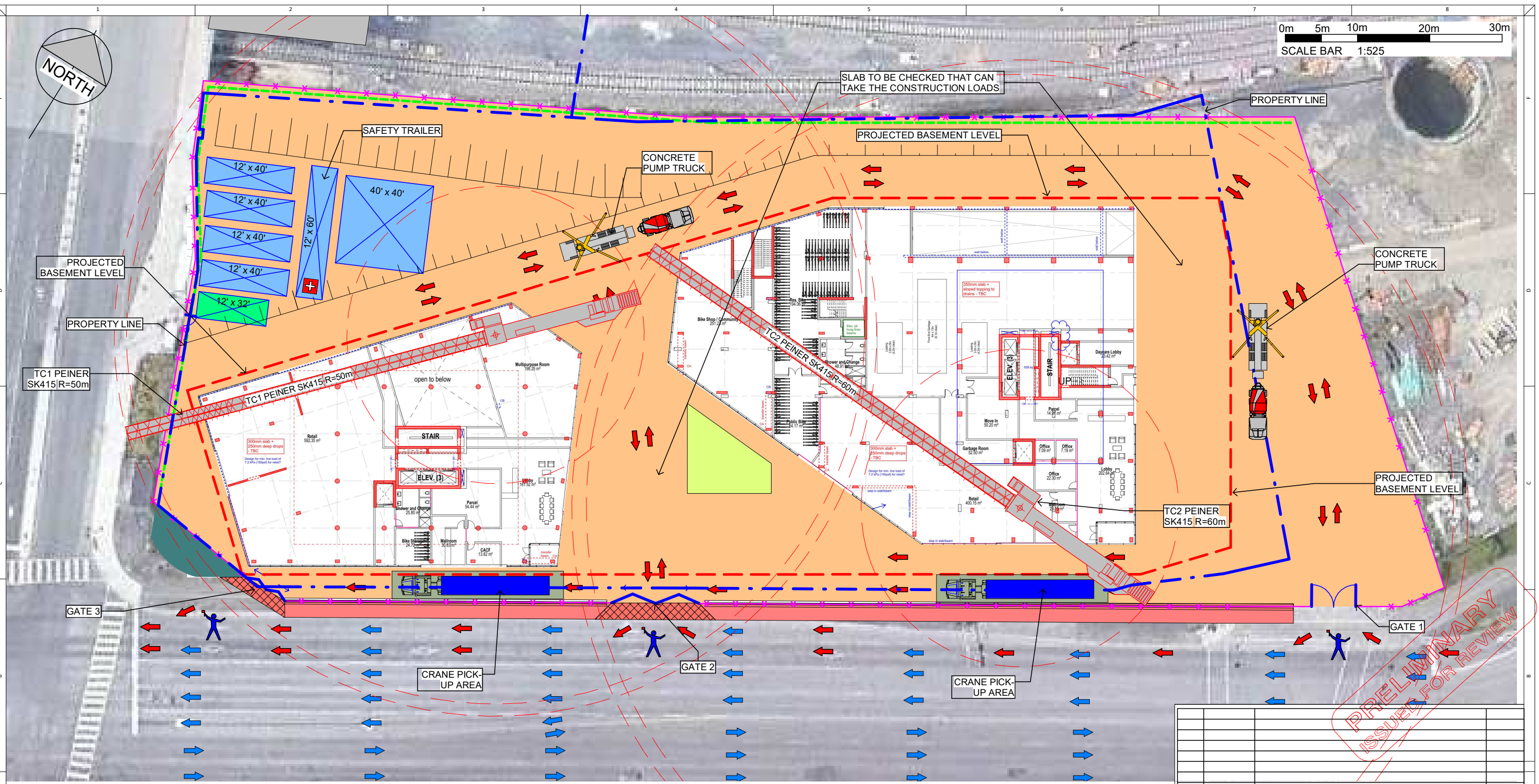
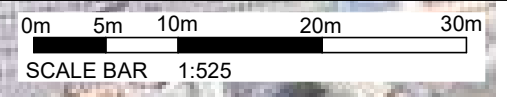
**PRELIMINARY
ISSUED FOR REVIEW**

LEGEND:

	EXISTING BUILDING		PROPERTY LINE		FLAGMAN		JERSEY BARRIER
	LAYDOWN AREA		CONSTRUCTION HOARDING		CONSTRUCTION TRAFFIC		WASHROOM TRAILER
	COVERED HOARDING		SILT FENCE		PUBLIC TRAFFIC		TRAILER OFFICES
	HIGH COVERED HOARDING		PROJECTED STRUCTURES		FLAGMAN		
			FOLDING GATE				

No.	Date	Description	By

 We build on great relationships™	Construction Sciences Engineering Department 1004 Middlegate Road, Main Floor Mississauga, Ontario, L4Y 1M4 Canada Tel: 905-896-8900 www.ellisdon.com		
	Project Name: Lebreton Library Parcel	Drawing Title: Site Logistics Substructure - Level P2	
655 Albert St. Ottawa, Ontario.	Date: Jan 27, 2023	Scale: As indicated	Drawn By: MR
Job Number: LLP-LOG-03	Rev: 0	Print Date / Time: 1/27/23 7:38:19 PM	



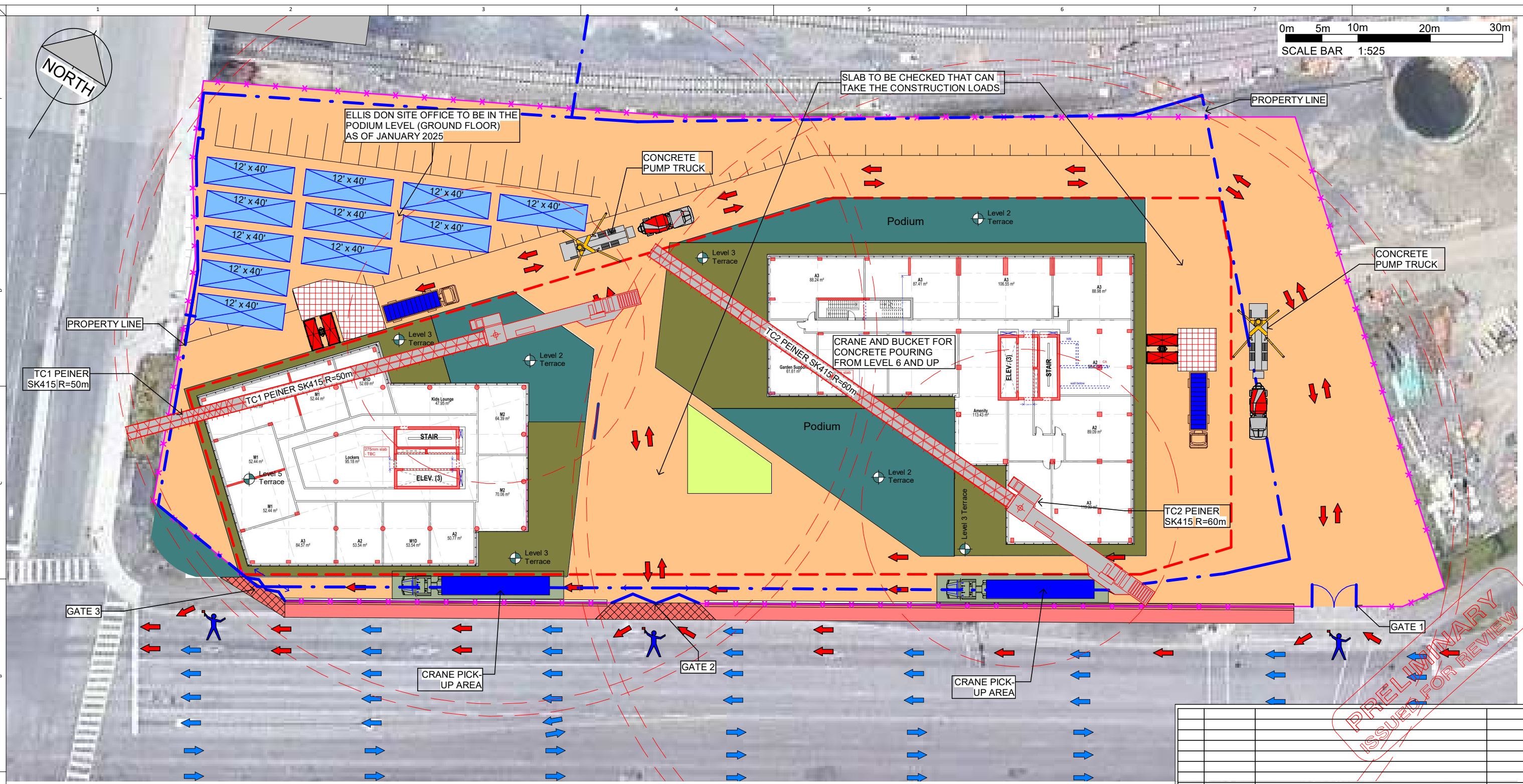
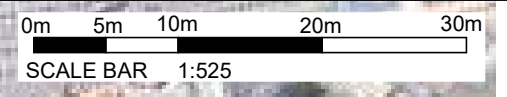
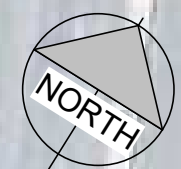
PRELIMINARY
ISSUED FOR REVIEW

LEGEND:

	EXISTING BUILDING		PROPERTY LINE		SWING GATE		JERSEY BARRIER
	LAYDOWN AREA		CONSTRUCTION HOARDING		CONSTRUCTION TRAFFIC		WASHROOM TRAILER
	COVERED HOARDING		SILT FENCE		PUBLIC TRAFFIC		TRAILER OFFICES
	HIGH COVERED HOARDING		PROJECTED STRUCTURES		FLAGMAN		
			FOLDING GATE				

No.	Date	Description	By

 We build on great relationships™	Construction Sciences Engineering Department 1004 Middlegate Road, Main Floor Mississauga, Ontario, L4Y 1M4 Canada Tel: 905-896-8900 www.ellisdon.com		
	Project Name: Lebreton Library Parcel	Drawing Title: Site Logistics Superstructure - Level 1	
655 Albert St. Ottawa, Ontario.	Date: Jan 27, 2023	Scale: As indicated	Drawn By: MR
Job Number: LLP-LOG-04	Rev: (blank)	(blank)	



PRELIMINARY
ISSUED FOR REVIEW

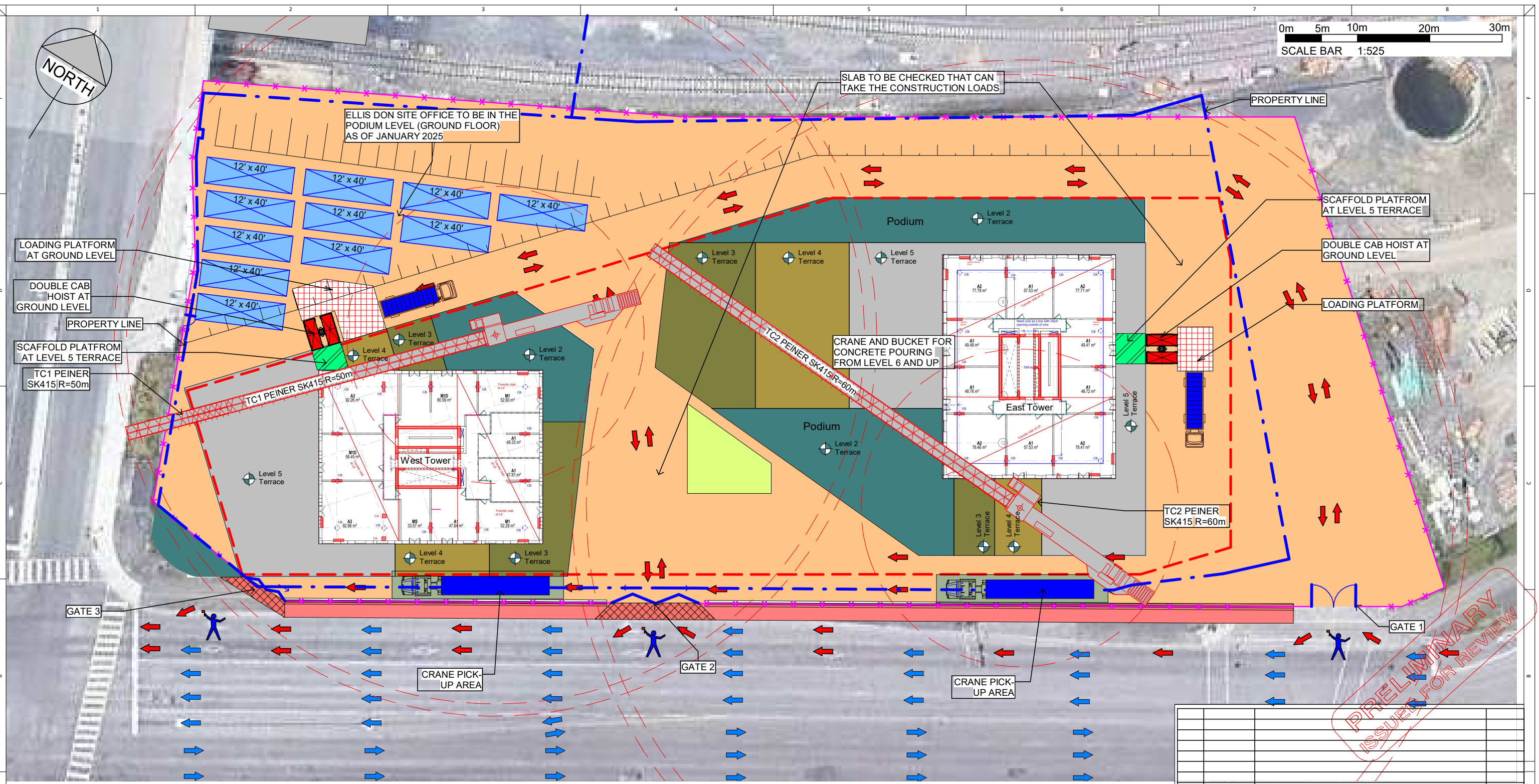
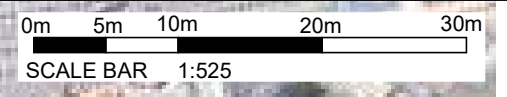
No.	Date	Description	By

LEGEND:

	EXISTING BUILDING		PROPERTY LINE		SWING GATE		JERSEY BARRIER
	LAYDOWN AREA		CONSTRUCTION HOARDING		CONSTRUCTION TRAFFIC		WASHROOM TRAILER
	COVERED HOARDING		SILT FENCE		PUBLIC TRAFFIC		TRAILER OFFICES
	HIGH COVERED HOARDING		PROJECTED STRUCTURES		FLAGMAN		
			FOLDING GATE				

Print Date / Time: 1/27/23 7:38:20 PM

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	Project Name: Lebreton Library Parcel	Drawing Title: Site Logistics Superstructure - Level 3	
655 Albert St. Ottawa, Ontario.	Date: Jan 27, 2023	Scale: As indicated	Drawn By: MR
	Job Number: LLP-LOG-05		Rev:



PRELIMINARY
ISSUED FOR REVIEW

No.	Date	Description	By

LEGEND:	
	EXISTING BUILDING
	LAYDOWN AREA
	COVERED HOARDING
	HIGH COVERED HOARDING
	PROPERTY LINE
	CONSTRUCTION HOARDING
	SILT FENCE
	PROJECTED STRUCTURES
	FOLDING GATE
	SWING GATE
	CONSTRUCTION TRAFFIC
	PUBLIC TRAFFIC
	FLAGMAN
	JERSEY BARRIER
	WASHROOM TRAILER
	TRAILER OFFICES

Print Date / Time: 1/27/23 7:38:21 PM

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Construction Sciences
Engineering Department
1004 Middlegate Road, Main Floor
Mississauga, Ontario, L4Y 1M4
Canada
Tel: 905-896-8900
www.ellisdon.com

Project Name:
Lebreton Library Parcel

655 Albert St. Ottawa,
Ontario.

Drawing Title:
**Site Logistics
Superstructure - Towers Construction**

Date: Jan 27, 2023 Scale: As indicated Drawn By: MR

Job Number: Rev: **LLP-LOG-06**

0m 5m 10m 20m 30m
SCALE BAR 1:525



TC1 PEINER SK415 R=50m

MAXIMUM NUMBER OF PEOPLE ALLOWED ON HOIST CAR AT ONE TIME

5

EllisDon

COVID-19 PRACTICE THE 6'/2 METER SOCIAL DISTANCING

MAXIMUM NUMBER OF PEOPLE ALLOWED ON HOIST CAR AT ONE TIME

5

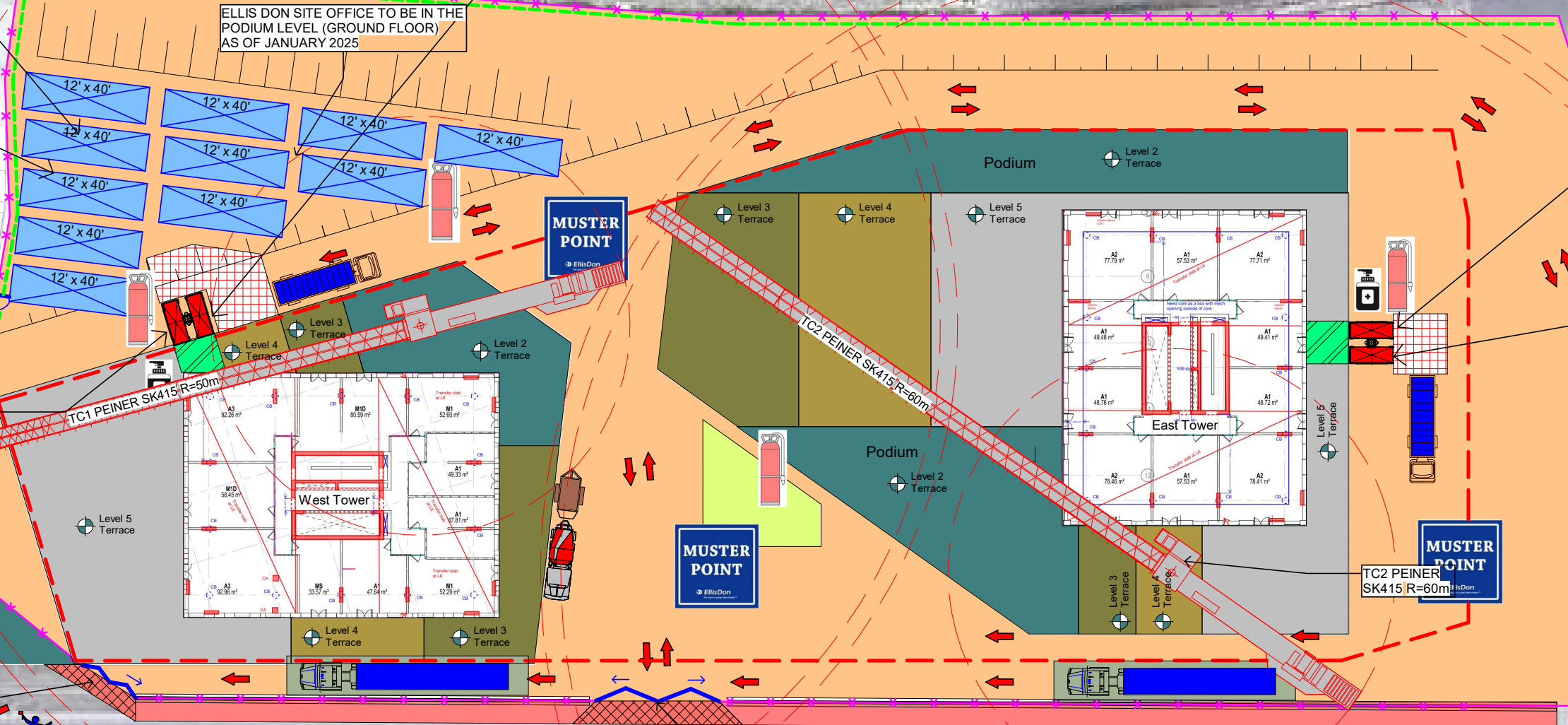
EllisDon

SUBCONTRACTORS STAGGERED START TIME SCHEDULE

No.	Date	Description	By

EllisDon

- HEAD PROTECTION
 - EYE PROTECTION
 - FOOT PROTECTION
 - REFLECTIVE VEST
 - REQUIRED TO ACCESS
- EllisDon



- HEAD PROTECTION
 - EYE PROTECTION
 - FOOT PROTECTION
 - REFLECTIVE VEST
 - REQUIRED TO ACCESS
- EllisDon

- HEAD PROTECTION
 - EYE PROTECTION
 - FOOT PROTECTION
 - REFLECTIVE VEST
 - REQUIRED TO ACCESS
- EllisDon

LEGEND:

- CONSTRUCTION AREA
- LAYDOWN AREA
- COVERED HOARDING
- HIGH COVERED HOARDING
- PROPERTY LINE
- CONSTRUCTION HOARDING
- FOLDING GATE
- SWING GATE
- CONSTRUCTION TRAFFIC
- PUBLIC TRAFFIC
- FLAGMAN

- WASHROOM TRAILER
- TRAILER OFFICES
- FIRE EXTINGUISHER
- SECURITY GUARD
- HAND SANITIZING BOTTLE
- HAND WASH STATION

- HEAD PROTECTION
 - EYE PROTECTION
 - FOOT PROTECTION
 - REFLECTIVE VEST
 - REQUIRED TO ACCESS
- EllisDon

LOW RISK EXPOSURE TO COVID-19 STANDARD PPE REQUIRED

COMMONLY TOUCHED SURFACES OR AREAS THAT REQUIRE MORE FREQUENT CLEANING/SANITIZING (ELEVATOR/ HOIST CONTROLS / BUTTONS, SITE TRAILERS, DOORS HANDLES, EQUIPMENT, ETC.)

No.	Date	Description	By

Print Date / Time: 1/27/23 7:38:21 PM

EllisDon
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Project Name: Lebreton Library Parcel

655 Albert St. Ottawa, Ontario.

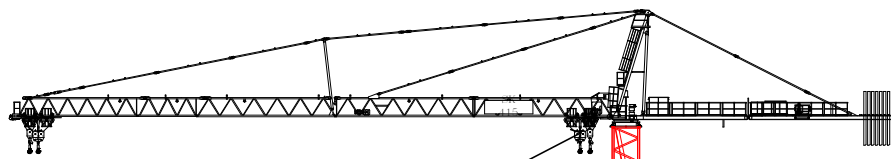
Construction Sciences Engineering Department
1004 Middlegate Road, Main Floor
Mississauga, Ontario, L4Y 1M4
Canada
Tel: 905-896-8900
www.ellisdon.com

Drawing Title: Site Logistics
Site Safety Plan COVID-19

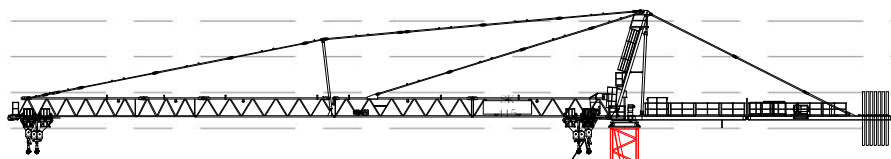
Date: Jan 27, 2023 Scale: As indicated Drawn By: MR

Job Number: LLP-LOG-07 Rev:

PRELIMINARY
ISSUED FOR REVIEW



TC2 PEINER
SK415 50M JIB



TC2 PEINER
SK415 55M JIB

SCAFFOLD PLATFORM AT
LEVEL 5 TERRACE
(NORTH SIDE OF THE
TOWER)

SCAFFOLD
PLATFORM
AT LEVEL 5
TERRACE

DOUBLE CAB HOIST AT
GROUND LEVEL
(NORTH SIDE OF THE
TOWER)

DOUBLE CAB
HOIST AT
GROUND LEVEL

- Level 40 183500
- Level 39 180500
- Level 38 177500
- Level 37 174500
- Level 36 171500
- Level 35 168500
- Level 34 165500
- Level 33 162500
- Level 32 159500
- Level 31 156500
- Level 30 153500
- Level 29 150500
- Level 28 147500
- Level 27 144500
- Level 26 141500
- Level 25 138500
- Level 24 135500
- Level 23 132500
- Level 22 129500
- Level 21 126500
- Level 20 123500
- Level 19 120500
- Level 18 117500
- Level 17 114500
- Level 16 111500
- Level 15 108500
- Level 14 105500
- Level 13 102500
- Level 12 99500
- Level 11 96500
- Level 10 93500
- Level 9 90500
- Level 8 87500
- Level 84500
- Level 6
- Level 5 Terrace
- Level 4 Terrace
- Level 3 Terrace
- Level 2 Terrace
- Level 1.5 - Mezz. 61000
- Plaza Slab 60200
- Level P1 56600
- Level P2

South Elevation

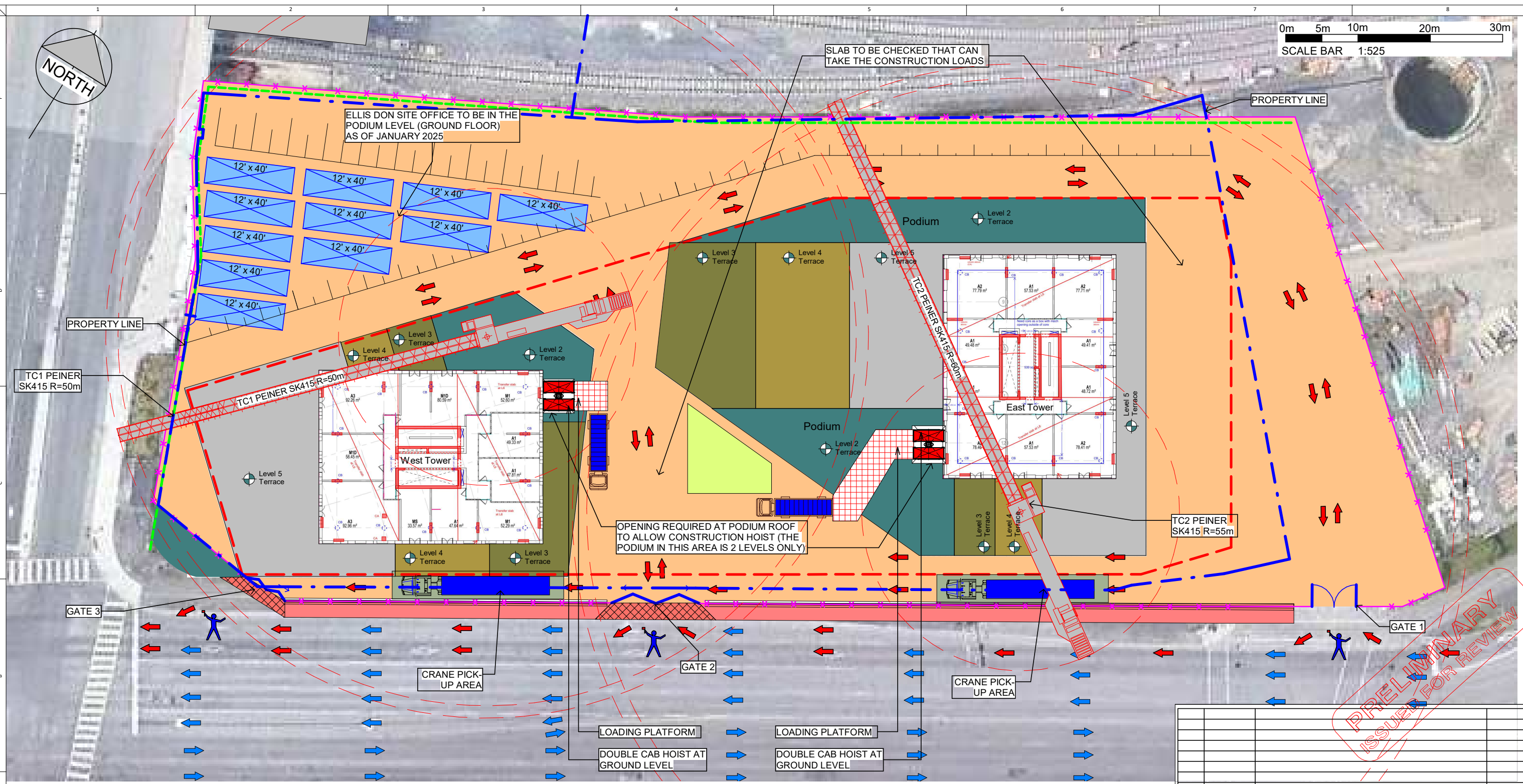
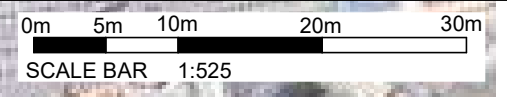
TOWER CRANE FOUNDATION

Parking level

PRELIMINARY
ISSUED FOR REVIEW

No.	Date	Description	By

<p>We build on great relationships™</p>	<p>Construction Sciences Engineering Department 1004 Middlegate Road, Main Floor Mississauga, Ontario, L4Y 1M4 Canada Tel: 905-896-8900 www.ellisdon.com</p>		
	<p>Project Name: Lebreton Library Parcel</p>		<p>Drawing Title: Site Logistics South Elevation</p>
<p>655 Albert St. Ottawa, Ontario.</p>		<p>Date: Jan 27, 2023 Scale: 1:635 Drawn By: MR</p>	<p>Job Number: LLP-LOG-08</p>



**PRELIMINARY
ISSUED FOR REVIEW**

No.	Date	Description	By

LEGEND:

EXISTING BUILDING	PROPERTY LINE	SWING GATE	JERSEY BARRIER
LAYDOWN AREA	CONSTRUCTION HOARDING	CONSTRUCTION TRAFFIC	WASHROOM TRAILER
COVERED HOARDING	SILT FENCE	PUBLIC TRAFFIC	TRAILER OFFICES
HIGH COVERED HOARDING	PROJECTED STRUCTURES	FLAGMAN	
	FOLDING GATE		

Print Date / Time: 1/27/23 7:38:22 PM

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Construction Sciences
Engineering Department
1004 Middlegate Road, Main Floor
Mississauga, Ontario, L4Y 1M4
Canada
Tel: 905-896-8900
www.ellisdon.com

Project Name: Lebreton Library Parcel

Drawing Title: Site Logistics
Superstructure - Construction Hoists inside podium - Option B

655 Albert St. Ottawa, Ontario.

Date: Jan 27, 2023 Scale: As indicated Drawn By: MR

Job Number: LLP-LOG-09 Rev:



APPENDIX G

Structural Engineering Documentation

November 2, 2022



Engineers

Justin Robitaille
Dream
30 Adelaide st. E
Toronto, ON, M5C 3H1
jrobitaille@dream.ca

Dear Justin Robitaille,

RE: LeBreton Library Parcel

RJC No. [OTT.128984.0001]

**Structural approach for construction adjacent to existing City infrastructure
665 Albert St. Ottawa**

The intent of this letter is to describe the approach taken by the design team to mitigate any structural impact of the proposed development to the existing City infrastructure running in the vicinity of the site.

The proposed structure will be supported on reinforced concrete caissons drilled down and socketed into the bedrock for all heavily loaded tower structural elements. For the lightly loaded columns and walls, smaller “pipe piles” drilled and socketed to rock will be provided.

Based on the as-built drawings available to RJC, three key pieces of City infrastructure run along the north foundation wall of the proposed development site. The closest service is the 2400mm EWT concrete sewer pipe running parallel to the north foundation wall with an invert elevation of approximately 45560. The conduit runs at a distance of 3 to 10m from the foundation wall. No existing conduit is to remain within the footprint of the proposed development.

As per Golder’s geotechnical recommendations, the deep foundation system underneath the foundation wall and adjacent columns will be socketed 1m into the bedrock, hence loading the rock in friction approximately between elevation 47000 and 48000. Based on the provided as-built drawings of the existing services, the minimum horizontal distance from the buried pipe to the edge of the caisson is at least 3m (refer to RJC drawings S198-S198E-S198W-S702 attached to this letter). The invert elevation of the pipe is around elev. 45m, providing a minimum 1H:1V slope from the invert to the highest point of application of the deep foundation force in the rock. Based on Golder’s geotechnical recommendations, these conditions should not impose any significant stress increase to the existing services.



Trusting this letter is sufficient to confirm that the proposed structural foundation system is being designed to mitigate any structural impact on the existing city infrastructure running north of the site. RJC remains available to respond to any questions on this matter.

Best regards,

A handwritten signature in blue ink, appearing to read 'Benoit Boulanger'.

Benoit Boulanger, MAsc, P.Eng.
Regional Manager, Associate





APPENDIX H

H1: City Comments (Stantec Memo)

H2: Golder Response (Geotechnical Analysis Memo)

H3: City Comments (Stantec Memo, Rev. 1)

To:	Steven Courtland City of Ottawa	From:	Colin Goodwin, Shawn Ireland Ottawa ON Office
File:	CSST: 665 Albert Development Review Package	Date:	November 2, 2022

Reference: CSST: 665 Albert Development Review Package, Stantec Review of Interfacing with CSST Infrastructure

The City requested Stantec complete a review of the development review package submitted for 665 Albert as it relates to potential impacts to adjacent CSST infrastructure at the site. This memo summarizes Stantec's review. Two documents were provided by the City for the review as follows:

1. *LeBreton Library Parcel, Constructability Report* (TYLin Ref. 10399), dated April 2022, Prepared by TYLin for Dream Asset Management; and
2. *Geotechnical Investigation, LeBreton Library Parcel, 665 Albert Street, Ottawa, Ontario*, dated April 2022, Prepared by Golder Associates Ltd. for Dream Impact Master LP.

SUMMARY OF STANTEC REVIEW

The City asked Stantec to review the developer's constructability report and accompanying geotechnical report, which discusses proximity of the development's shoring, excavation, footings, permanent structures etc. on the adjacent 2400mm East-West-Tunnel. Comments are provided as follows:

1. **Background on the EWT pipe:** The East-West-Tunnel (EWT) section in question was installed in 2015-2016 under the Lebreton Flats Diversion Chamber project. As-built drawings prepared for City Contract No. ISD13-2007 depict the pertinent infrastructure. The EWT pipe is Class 185D precast concrete pipe, the pipe depth is around 15m, and was installed via open cut within a rock trench.
2. **Drawings and Construction Plans:** The developer should provide plans showing details of the proposed shoring system and permanent underground works, showing details on proximity to the EWT at several cross sections along the development. The cross section should also include any required temporary shoring and/tie backs that may be required to perform the work, including limits of excavation.
3. **Confirming no loads are applied to the EWT from the proposed development:**
 - a. The EWT was installed via open cut, where the bottom portion of the pipe was installed within a bedrock trench and the pipe was backfilled in concrete within the bedrock trench. Since the pipe/concrete backfill is essentially in direct contact with the rock, the developer should review and confirm that there are no additional loads which will be applied to the EWT from the proposed permanent and/or temporary works.
 - b. The constructability report states that the caissons will be embedded 1 m into rock and that the caisson will be "*at least 3 m (3 times the diameter of the proposed caisson)*" but the report does not actually state the caissons will have a 1 m diameter.
 - c. In the supplied Golder geotechnical report, we could not locate a statement that corroborates the following statement from the constructability report "*Based on Golder's geotechnical*

Reference: CSST: 665 Albert Development Review Package, Stantec Review of Interfacing with CSST Infrastructure

recommendations, these conditions should not impose any significant stress increase to the existing services”.

- d. Is full fixity of the caissons required? Per 5.2.1.4 of the Golder report, if full fixity is required, the caisson depth may need to be increased.
- e. The report also states *“should not impose any significant stress increase to the existing services.”* The increase stress should be quantified.

4. Miscellaneous comments:

- a. The plans included within the constructability report (Figure 1-1) appears to show the existing Real Time Control (RTC) underground control vault at Booth/Albert and the associated underground ductbanks from this vault to the RTC facilities. It is unclear how/if the infrastructure is affected by the work, but this should be reviewed and addressed by the proponent. Excavations may extend into the footprint of the vault and the ductbanks, potentially requiring temporary support and protection.
- b. The West tower excavation proposes a shoring system with what appears to be tie-backs (see Excavation Works drawings). Some of these tie-backs appear to be in conflict with the existing RTC regulator and CSST chambers under Booth Street. Shoring system design to consider the location of existing City infrastructure, prevent conflicts with the structures, and confirm that no additional loads will be applied to the structures.
- c. Site laydown areas and access roads appear to cross over the existing EWT, IOS and Albert Storm Sewer in various locations. It is unclear from the excavation drawings what the site elevations will be at various stages of excavation and construction. The developer should confirm the minimum amount of cover that will remain above the existing sewers within the site and if any protective measures would be required to protect the sewers from construction activity.
- d. Excavations in proximity to the existing RTC regulator and CSST chambers west of the site should consider the existing CIP retaining wall adjacent to the chambers. The bottom of this wall does not extend very far below existing grade, and may need to be supported if excavation slopes cannot match existing grades at the perimeter of the development site.
- e. Existing temporary shoring systems in proximity to the RTC and CSST chambers could be in conflict with the proposed works, depending on the required depths of excavation in the area. Developer to consider risk of load transfer to nearby existing infrastructure (EWT, IOS, Albert Storm Sewer) during excavation and removal of pre-existing temporary shoring if conflicts are identified. Pertinent as-built drawings are attached to this memo for clarity.
- f. The developer should provide drawings of proposed retaining wall along north side of site, and clarify its position relative to the EWT, IOS and Albert Storm Sewer and demonstrate that no additional loads will be imposed on the existing sewers.

- 5. **Vibration limits and monitoring:** typical OPSS/City of Ottawa limits should apply to the development work. Developer to establish a vibration monitoring plan that considers the EWT, IOS,

November 2, 2022

Steven Courtland

Page 3 of 3

Reference: CSST: 665 Albert Development Review Package, Stantec Review of Interfacing with CSST Infrastructure

Albert Storm Sewer, and associated chambers including response measures and contingency plans in the event of vibration threshold exceedances.

6. **Pre and post condition surveys:** pre-construction CCTV should be completed along with post-construction CCTV.

SUMMARY

Stantec's review was limited in nature to the documents provided and was intended to identify key areas for consideration by the City and the developer in mitigating impacts to existing CSST related infrastructure adjacent to the development at 665 Albert.

Should you have any question or concerns with the comments provide in this memo, please reach out to Colin or Shawn directly.

Stantec Consulting Ltd.

Colin Goodwin P.Eng.
Environmental Engineer

Phone: 613.697.5124

Colin.Goodwin@stantec.com

Attachment: ISD13-2007 As-Built Drawing C-03
ISD13-2007 As-Built Drawing S-401

c. Adrien Comeau



Shawn Ireland P.Eng.
Environmental Engineer

Phone: 613-218-4845

Shawn.Ireland@stantec.com

**LEBRETON FLATS
DIVERSION CHAMBER**



**3000mm CSST
PLAN AND PROFILE
STA.1+000 TO STA.1+240**

Contract No. **ISD13-2007** Dwg. No. **C-03**

Sheet **1** of **1**

Asset No. _____

Asset Group _____

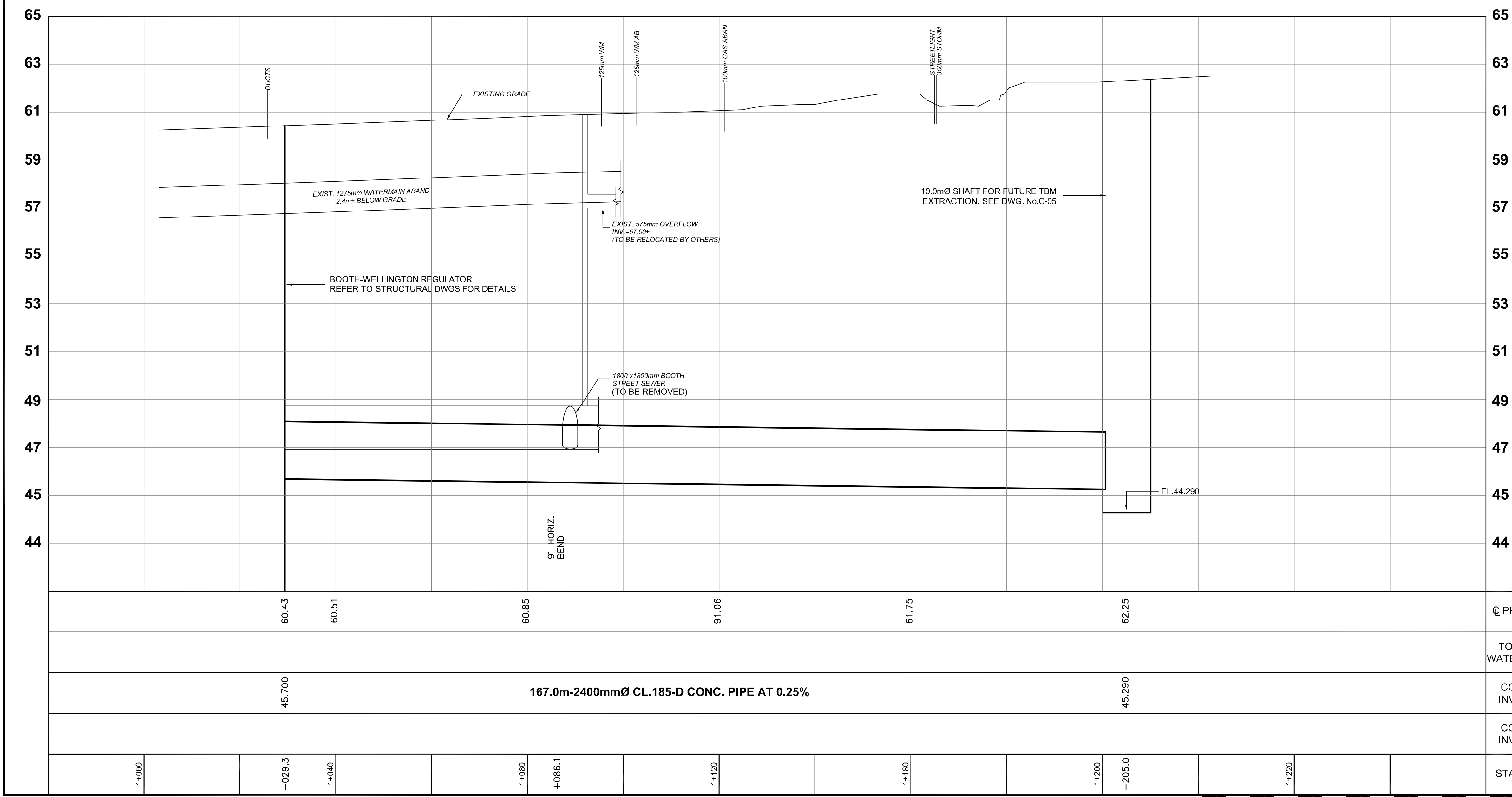
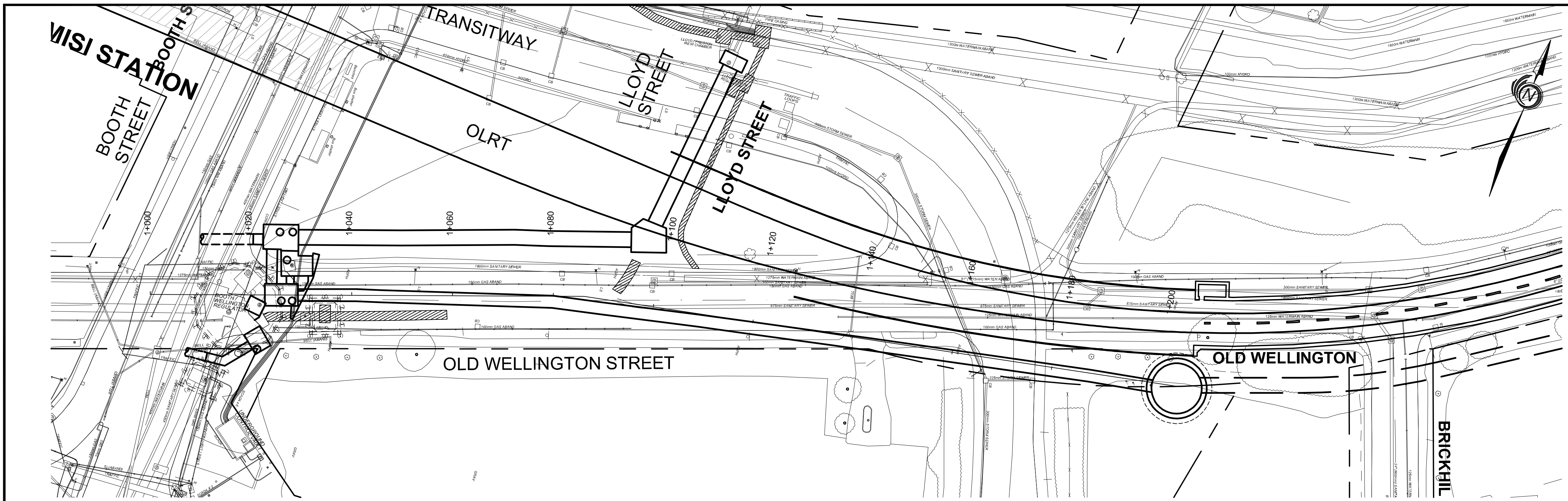
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Dwn.	E.C.	Chk'd.	C.G.
Utility Circ. No.		Index No.	
Const. Inspector			

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VERTICAL 100
0m 2 4

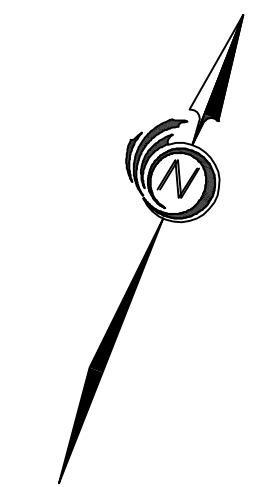
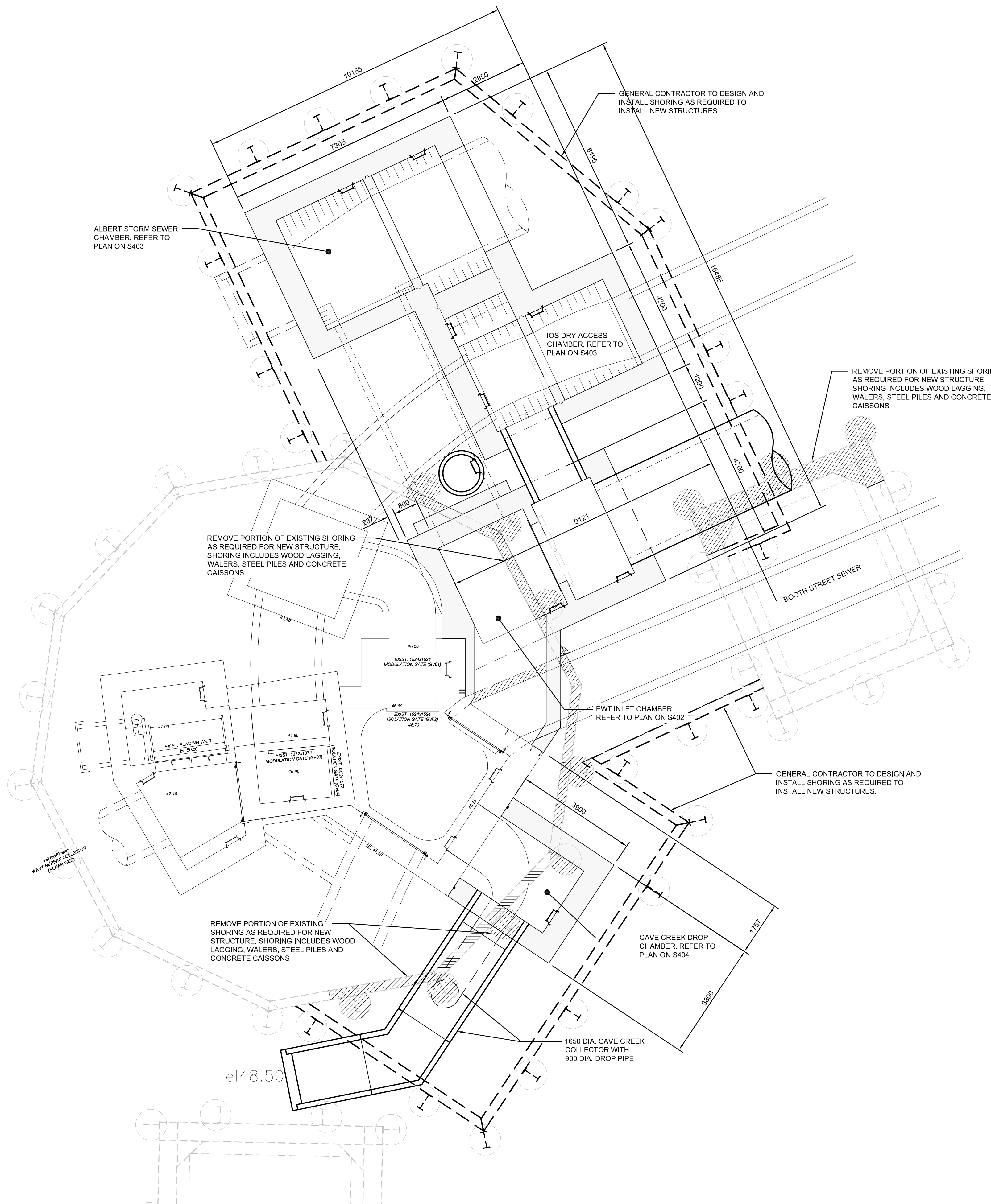
NOTE:
The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.



No.	Description	By	Date (dd/mm/yy)
0	ISSUED FOR PRELIMINARY DESIGN	CG/SD	25/10/13
1	ISSUED FOR 90% DESIGN	CG/SD	22/11/13
2	ISSUED FOR TENDER	CG/SD	20/12/13
3	ISSUED FOR ADDENDUM #3	CG/SD	06/03/14
4	ISSUED FOR CONSTRUCTION	C.G.	23/05/14
5	ISSUED FOR SCM #18	J.R.	09/12/14
6	AS BUILT	J.R.	19/10/18



AS BUILT
THIS DRAWING WAS PREPARED FROM INFORMATION PROVIDED BY THE CONTRACTOR. THE ENGINEER DOES NOT TAKE RESPONSIBILITY FOR INFORMATION ON THIS DRAWING THAT IS IN CONFLICT WITH THE EXISTING CONDITION DUE TO INACCURATE OR MISSING INFORMATION ON SOURCE DOCUMENTS PROVIDED.



LEBRETON FLATS DIVERSION CHAMBERS			
BOOTH-WELLINGTON REGULATOR CHAMBER MODIFICATIONS OVERALL PLAN SHOWING EXCAVATION SHORING		Contract No. ISD13-2007	Dwg. No. S401
		Sheet	of
		Asset No.	00
		Asset Group	00
W. Newell, P. Eng. <i>General Manager, Infrastructure Services</i>	R. Dempsey, P. Eng. <i>Project Manager, Infrastructure Services</i>	Des. S.A.	Chk'd. O.N.
		Dwn. D.M.	Chk'd. O.N.
		Utility Circ. No. 00	Index No. 00
		Const. Inspector	00
		Scale:	AS SHOWN

NOTE:
The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.



No.	Description	By	Date (dd/mm/yy)
0	ISSUED FOR 90% DESIGN	S.A.	22/11/13
1	TENDER	S.A.	20/12/13
2	ISSUED FOR ADDENDUM	S.A.	18/02/14
3	ISSUED FOR CONSTRUCTION	S.A.	23/05/14
4	ISSUED FOR SCM#40	S.A.	04/06/15
5	ISSUED FOR SCM#40R1	S.A.	09/06/15
6	ISSUED FOR AS-BUILT DRAWINGS	S.A.	11/06/18

- GENERAL NOTES FOR ALL CHAMBERS:**
- REFER TO SPECIFICATIONS AND CIVIL DRAWINGS FOR FURTHER SHORING EXCAVATION PROTECTION NOTES.
 - BEFORE COMMENCING WORK, THE CONTRACTOR SHALL RETAIN A PROFESSIONAL ENGINEER OF ONTARIO TO DESIGN AND DETAIL THE EXCAVATION PROTECTION SYSTEMS.
 - CONTRACTOR SHALL MINIMIZE EFFECTS OF VIBRATIONS DUE TO CONSTRUCTION OF SHORING SYSTEM TO THE SATISFACTION OF ENGINEER.
 - SHORING FOR THE NEW WORKS SHOWN FOR ILLUSTRATION PURPOSE ONLY. THE CONTRACTOR IS RESPONSIBLE FOR DESIGN AND INSTALLATION OF EXCAVATION PROTECTION SYSTEM. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS SHOWING DETAILS OF METHOD AND DESIGN CALCULATIONS OF PROPOSED SHORING SYSTEMS TO ENGINEER FOR REVIEW. THESE SUBMISSIONS MUST BE CERTIFIED BY A PROFESSIONAL ENGINEER IN ONTARIO. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
 - REFER TO GEOTECHNICAL INVESTIGATION ENTITLED "GEOTECHNICAL INVESTIGATION ALBERT STREET SEWER - CSST WEST EXTENSION LEBRETON FLATS OTTAWA, ONTARIO" PREPARED BY GOLDBER ASSOCIATES DATED NOVEMBER 2013, FOR SOIL PARAMETERS AND GEOTECHNICAL RECOMMENDATIONS.
 - PROVIDE ADEQUATE DEWATERING SYSTEM TO ENSURE A REASONABLY DRY EXCAVATION AND COMPLY WITH PTTW.
 - PAINT ALL ALUMINUM SURFACES IN CONTACT WITH CONCRETE WITH 2 COATS OF BITUMINOUS PAINT.
 - ALL FASTENERS TO BE 316 STAINLESS STEEL.
 - BEDROCK BEARING SURFACES OF CHAMBERS TO BE INSPECTED AND APPROVED BY GEOTECHNICAL ENGINEER BEFORE POURING CONCRETE.
 - 30MPa CONCRETE MIX. USE TYPE MS CEMENT AND CONCRETE IS TO BE AIR ENTRAINED WITH HIGH RANGE SUPERPLASTICIZER.
 - REFER TO CIVIL DRAWINGS AND GEOTECHNICAL REPORT FOR BACKFILL REQUIREMENTS AND REFER TO TYPICAL BACKFILL NOTES ON CIVIL DRAWINGS, IF NOT INDICATED ON STRUCTURAL DRAWINGS.
 - PROVIDE PVC WATERSTOP AT ALL CONSTRUCTION JOINTS.
 - REFER TO CIVIL DRAWINGS FOR SUGGESTED CONSTRUCTION SEQUENCING AND FLOW MANAGEMENT PLAN.
 - FORM BENCHING IN SHAPES AS DIRECTED BY ENGINEER ON-SITE.
 - ROUGHEN SURFACE OF CONCRETE AND APPLY BONDING AGENT IMMEDIATELY PRIOR TO POURING CONCRETE BENCHING.
 - DESIGN REMOVABLE CONCRETE PANELS TO WITHSTAND OVERBURDEN WEIGHT AND HIGHWAY LOADING. SUBMIT SHOP DRAWINGS CERTIFIED BY A PROFESSIONAL ENGINEER IN ONTARIO.

TECHNICAL MEMORANDUM

DATE December 19, 2022

Project No. 22511882 (20141216)

TO Justin Robataille, Dream Properties

CC Ben Worth, TY Lin

FROM Chris Hendry

EMAIL chris.hendry@wsp.com

REVIEW OF PROPOSED FOUNDATIONS AND CSST INFRASTRUCTURE – DREAM LEBRETON PROJECT

Ben,

As requested, Golder has reviewed the proposed foundations for the Dream LeBreton project and their potential impact on the existing CSST infrastructure.

The following documents have been reviewed:

- A letter prepared by RJC Engineers (RJC) titled “LeBreton Library Parcel, Structural Approach for Construction Adjacent to Existing City Infrastructure”, dated November 2, 2022. This letter contains foundation plans and cross sections for the proposed new development.
- A memo prepared by Stantec Consulting Ltd. (Stantec) titled “CSST: 665 Albert Development Review Package, Stantec Review of Interfacing with CSST Infrastructure”, dated November 2, 2022.

Proposed Foundations

There are two types of foundations proposed for the new development:

- The high-rise towers (which are in the interior of the overall structure) are supported on 1200 mm diameter caissons, socketed 3 m to 4 m into rock.
- The podium and exterior walls are supported on groups of 245 mm diameter pipe piles, also socketed into bedrock. Along the northern perimeter wall (which is the area relevant to a discussion of the CSST Infrastructure) the piles are installed in groups of three. These pipe piles are intended to carry factored ULS loads of 1,668 kN. The piles have also been designed to carry horizontal loads of 75 kN to account for possible eccentricity of loading as well as small lateral loads.

The foundation locations and cross sections are shown on the plans prepared by RJC and attached to their November 2 letter.

Existing CSST Infrastructure

Based on information contained in the Stantec memo as well as the RJC drawings, there is an existing 2.4 m diameter precast concrete sewer which forms part of the CSST infrastructure. This sewer is referred to as the EWT tunnel. The EWT tunnel is located 3.2 m from the exterior wall at its closest point to the new building (see Section 2 on Sheet 702 of the RJC foundation drawings). At all other locations the distance is greater than 3.2 m.

The EWT was installed in a trench within the bedrock at the site, and the sewer obvert is at an elevation roughly coincident with the anticipated bedrock surface (and therefore the sewer is at a similar elevation to the proposed rock sockets).

There is a second, slightly deeper, 1.8 m diameter sewer (identified as the IOS) located some 7 m north (further from the building).

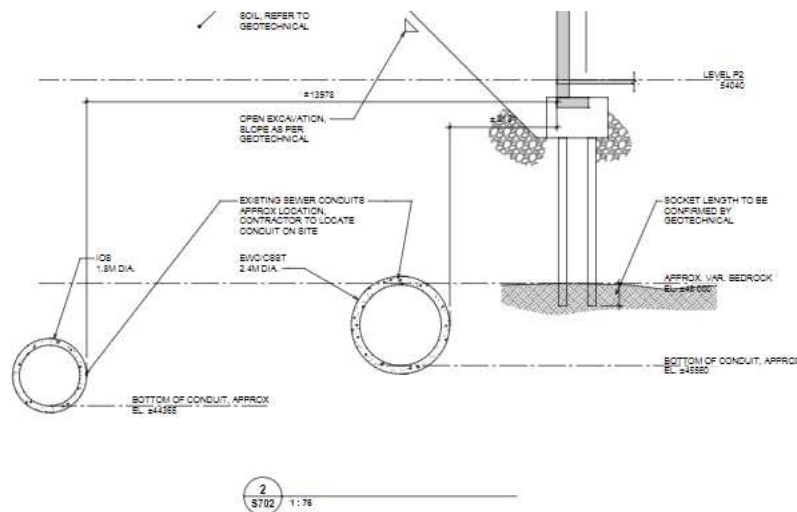


Figure 1 - Example Cross Section Along North Foundation Wall

Impact of the Proposed Foundations on the EWT

As part of this review, Golder has evaluated the potential for the proposed new building foundations to impact the existing EWT.

Large Diameter Interior Caissons

The closest large interior caissons which support the towers are located approximately 12 to 15 m from the EWT. This corresponds to approximately 10 to 12 times the diameter of the piles¹. This distance is beyond the area identified in the CSST guidance as requiring specific consideration. Regardless, at these distances, no meaningful interaction between the EWT and the interior caissons should be expected, even if the caissons are resisting large lateral loads.

¹ The zone of influence of a pile or foundation is proportional to the loaded area; for a given load intensity, larger foundations will cause stress changes in a larger mass of soil/rock. Typically, individual footings will cause stress changes within 2 – 3 times their width, while continuous strip footings may cause stress changes within 4 to 6 times their width.

Small Diameter Pipe Piles

The smaller pipe pile groups supporting the north foundation wall are located approximately 3.2 m from the EWT (at the location of the closest group to the sewer; other pile groups are further away).

A conservative approach commonly adopted to determine the potential for vertical foundation loads to impact the ground below them is to assume that the foundations could impact an area below a 1:1 line extending down and out from the edge of the foundation. A less conservative (but more accurate) approach is presented in the Canadian Foundation Engineering Manual which presents stress contours below a uniformly loaded area obtained from elastic solutions presented in Poulos and Davis (1974). A similar method for calculating stress distributions within the ground due to imposed loading (the Boussinesq stress distribution) is also common.

Both of these methods (a simple assumed 1:1 line and series of stress contours as per the CFEM) are presented on the cross-sections attached. As can be seen from these cross sections, there is no expectation that any meaningful loading would be transferred to the EWT by the foundation piles. It should also be noted that the stress contours presented treat the pile group as a single foundation unit. If consideration was given to the individual 245 mm diameter piles the stressed area would be dramatically smaller. As can be seen in the attached figures, there is no potential for the exterior piles to transfer any significant vertical loading to the EWT.

The exterior piles are designed to accommodate nominal lateral loads due to eccentricities in construction as well as minor lateral loads applied to the pile caps. The majority of the small lateral loads would typically be resisted by the approximately 8 m of soil between the bedrock and the top of pile cap. This soil is above the EWT and lateral stresses in the upper soil have no potential to impact the EWT.

In addition, the 245 mm diameter piles are located approximately 3.2 m from the edge of the EWT. This corresponds to approximately 13 pile diameters at their closest point. Given the distances and the lengths of the piles, there is no significant risk of the small diameter exterior piles transferring any meaningful lateral loads to the EWT.

Additional Comments Related to Stantec Review

The following provides additional discussion related to specific comments contained in the November 2 Stantec Review. Note that not all comments are related to the foundations and so only responses relevant to the geotechnical aspects of the pile foundations are provided.

- Comment 3a: Golder has reviewed the foundation drawings and confirms that there are no additional loads expected to be applied to the EWT by the proposed foundations.
- Comment 3b: The current RJC drawings indicate that the caisson foundations will have a diameter of 1.2 m and will have a rock socket depth of 3 to 4 m.
- Comment 3c: The statement is not included in the geotechnical report because the foundations were not designed at the time of preparing the report. We believe this statement in the constructability report refers to subsequent correspondence and discussion. Regardless, it is Golder's opinion that the currently proposed foundations should not impose any significant stress increase to the existing services in question and, notwithstanding the reference, the statement in the constructability report is generally valid.

- Comment 3d: The caissons are designed to have a rock socket depth of 3 to 4 m which is approximately 3 times the proposed diameter. This would typically be sufficient to be considered fixed (though the quality of the rock sockets does need to be confirmed during construction).
- Comment 3e: Given the discussion above, the increase in stress due to the permanent foundations is expected to be essentially zero.
- Comments 4a to 4e: These comments relate to shoring and temporary works which are designed by others. Golder would be pleased to provide additional review as required as these aspects of the project are designed in further detail.
- Comment 5: Golder agrees that a vibration monitoring plan should be developed for the project. Golder can assist with development of a vibration monitoring plan if required.
- Comment 6: Golder agrees that pre- and post-construction CCTV inspections should be carried out.

Closure

We trust this provides the information you require at this time. Should you require anything further, or have any questions please feel free to contact the undersigned at your convenience.

Golder Associates Ltd.



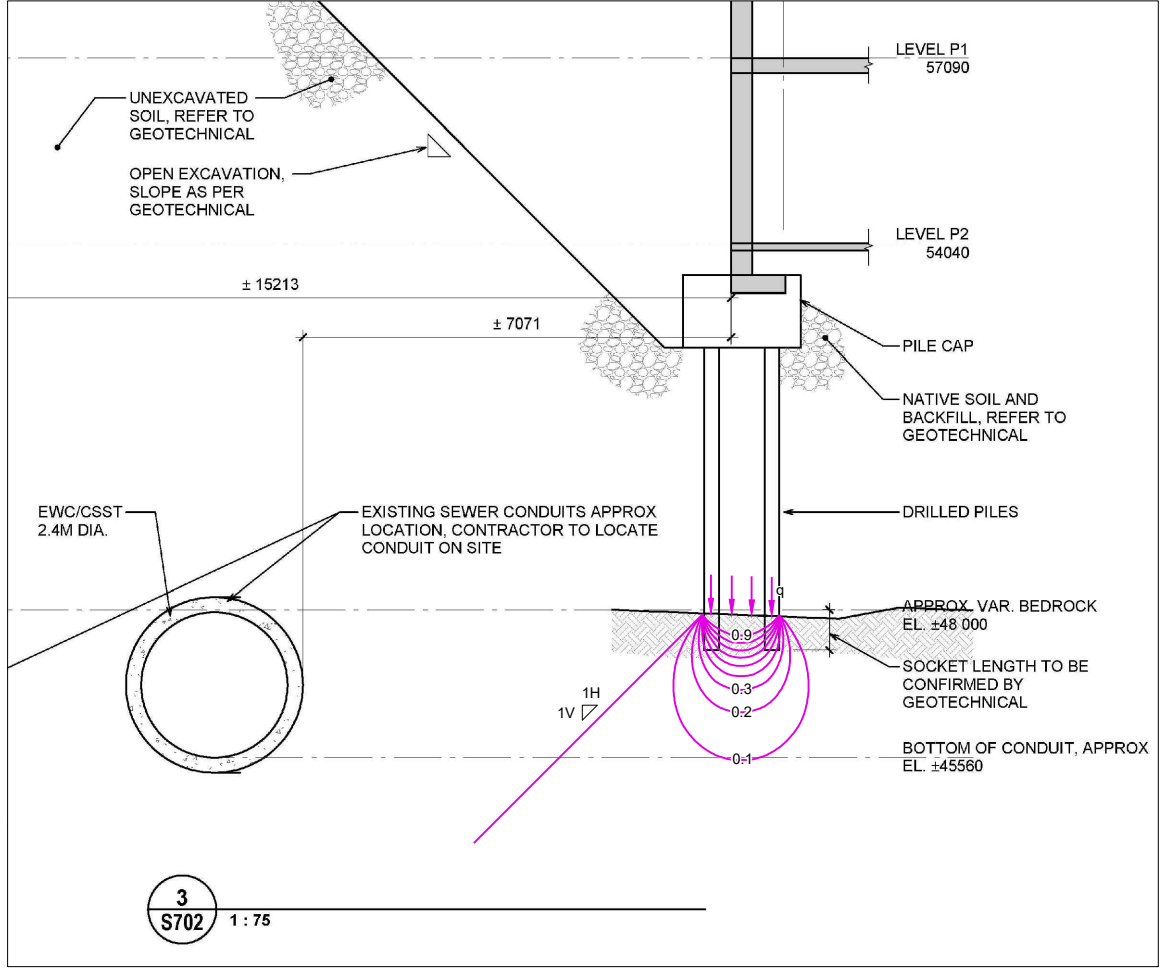
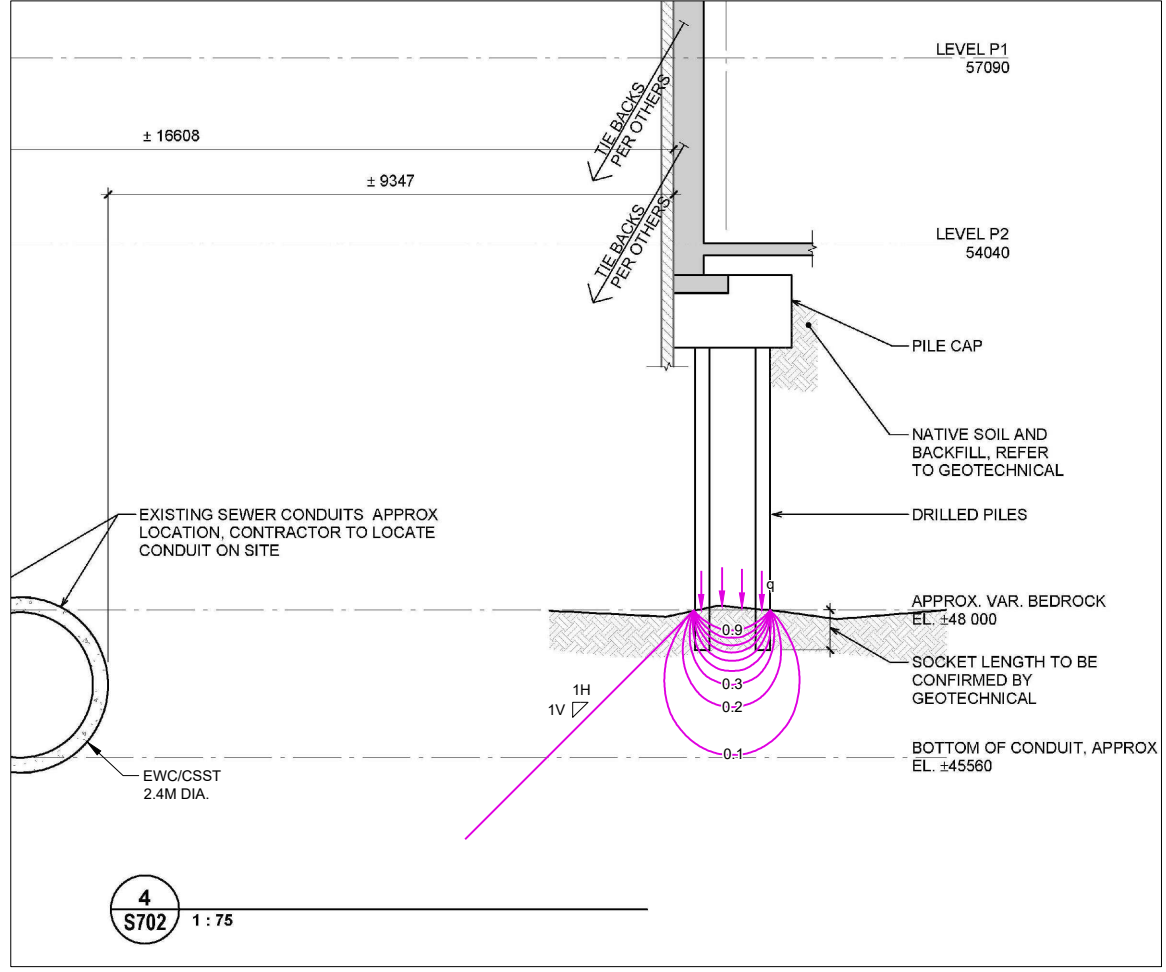
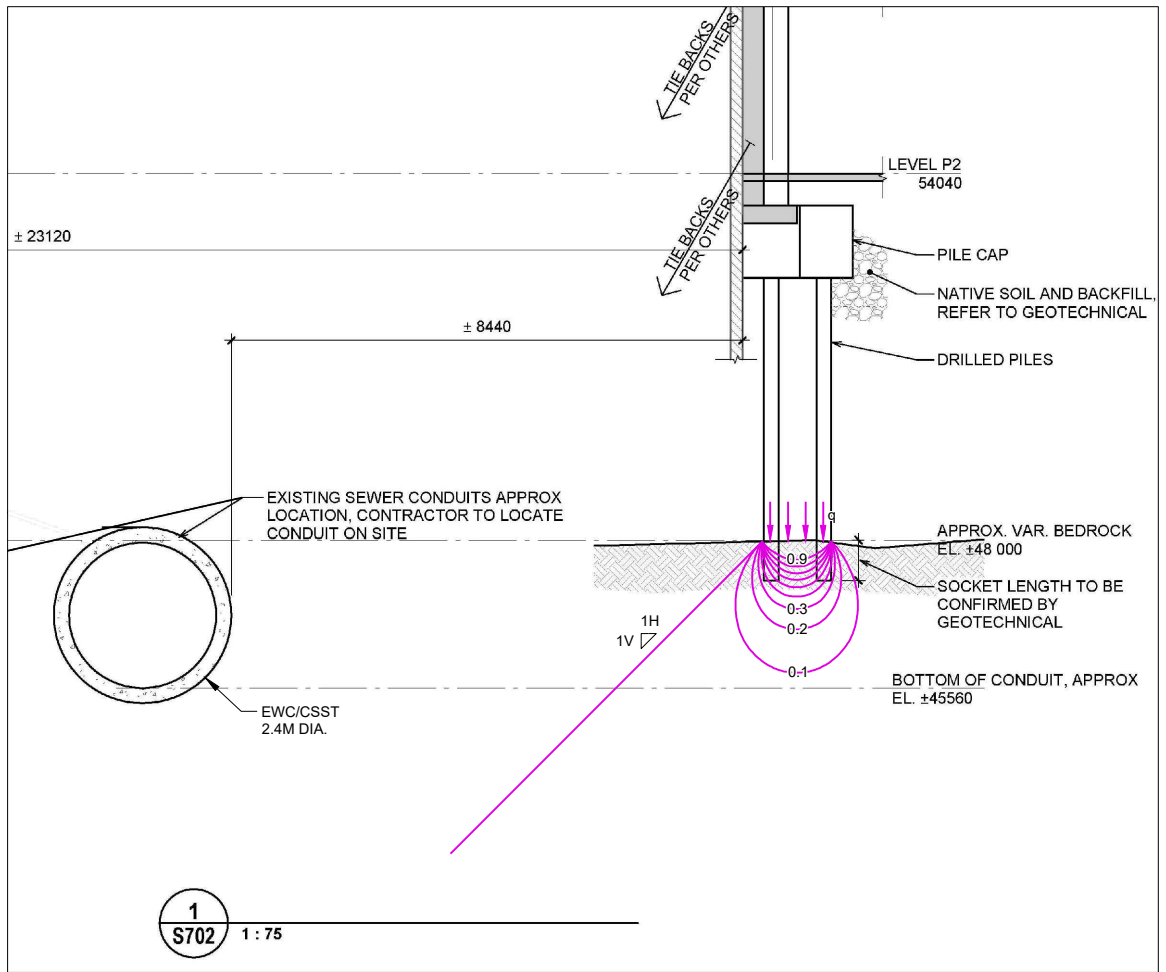
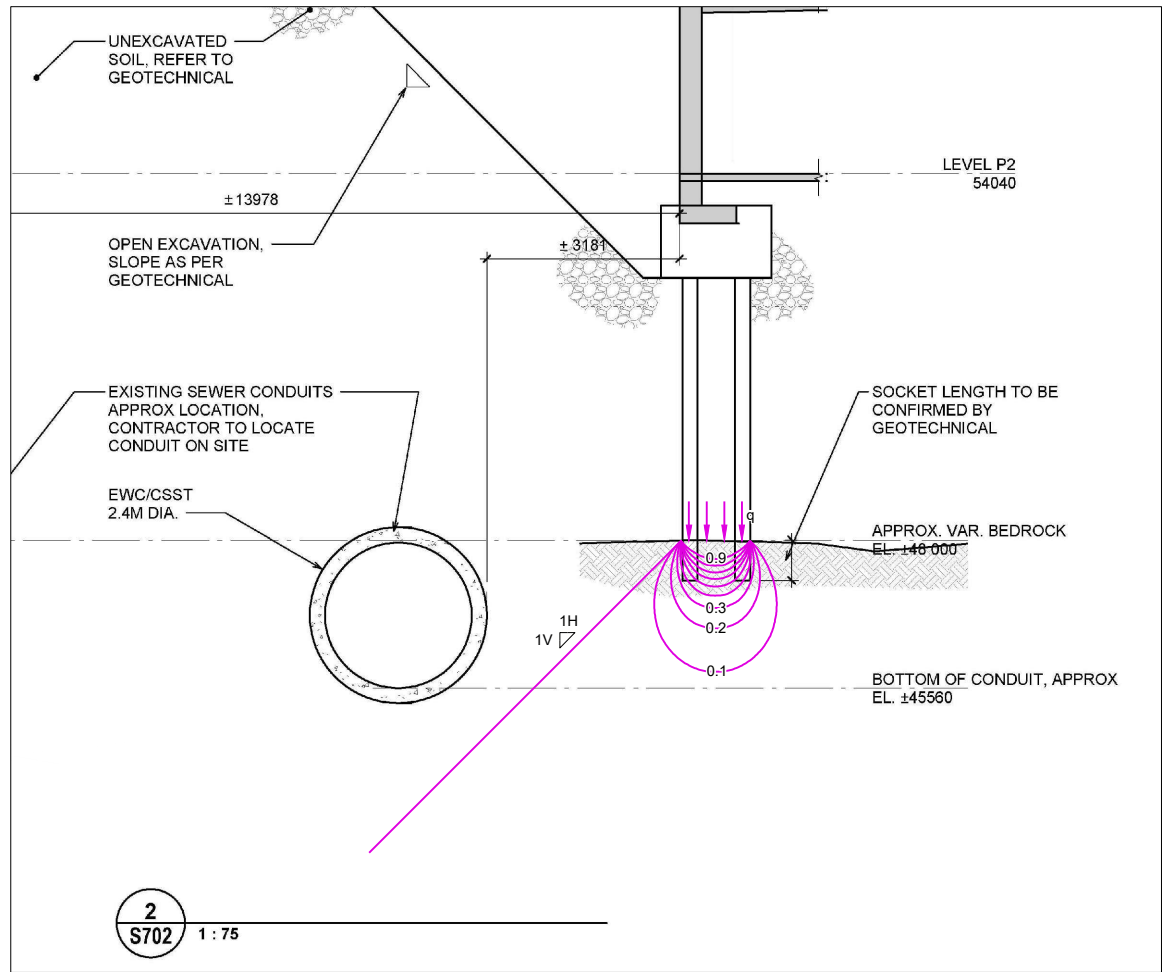
Chris Hendry, M.Eng., P.Eng.
Sr. Principal Geotechnical Engineer

CH/ljv

Attachments: Figure 1 – Cross-Sections

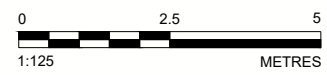
[https://golderassociates.sharepoint.com/sites/158117/project files/7 correspondence/20221214 response to city comments re foundations and csst/22511882 20141216 tm rev0 2022'12'19 lbip foundation review.docx](https://golderassociates.sharepoint.com/sites/158117/project%20files/7%20correspondence/20221214%20response%20to%20city%20comments%20re%20foundations%20and%20csst/22511882%2020141216%20tm%20rev0%202022%2012%2019%20lbip%20foundation%20review.docx)

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REFERENCE(S)
1. SECTION DETAILS OBTAINED FROM READ JONES CHRISTOFFERSEN LTD. LETTER NO. OTT.128984.0001, DATED NOVEMBER 2, 2022.

DRAFT



CLIENT	DREAM	
PROJECT	FOUNDATIONS ANALYSIS LEBRETON LIBRARY PARCEL, OTTAWA, ONTARIO	
TITLE	CROSS-SECTIONS	
CONSULTANT	YYYY-MM-DD	2022-12-15
	DESIGNED	---
	PREPARED	JM
	REVIEWED	---
	APPROVED	---
PROJECT NO.	CONTROL	REV.
22511882	0006	A
		FIGURE
		1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3/B

To: Steven Courtland
City of Ottawa

From: Colin Goodwin, Shawn Ireland
Ottawa ON Office

File: CSST: 665 Albert Development Review Package **Rev.1 Review**

Date: **January 19, 2023**

Reference: CSST: 665 Albert Development Review Package, Stantec Review of Interfacing with CSST Infrastructure Rev.1

The City requested Stantec complete a review of the development review package submitted for 665 Albert as it relates to potential impacts to adjacent CSST infrastructure at the site. This memo summarizes Stantec's review, **with revision 1 comments identified with red text**. Two documents were provided by the City for the review as follows:

1. *LeBreton Library Parcel, Constructability Report* (TYLin Ref. 10399), dated April 2022, Prepared by TYLin for Dream Asset Management; and
2. *Geotechnical Investigation, LeBreton Library Parcel, 665 Albert Street, Ottawa, Ontario*, dated April 2022, Prepared by Golder Associates Ltd. for Dream Impact Master LP.

The latest revision of the submission to the City incorporated comments provided in Stantec's previous November 2, 2022 memo. One document was provided by the City for review (revision 1) as follows:

1. *LeBreton Library Parcel, Constructability Report* (TYLin Ref. 10399), dated December 2022, Prepared by TYLin for Dream Asset Management

SUMMARY OF STANTEC REVIEW

The City asked Stantec to review the developer's constructability report and accompanying geotechnical report, which discusses proximity of the development's shoring, excavation, footings, permanent structures etc. on the adjacent 2400mm East-West-Tunnel. Comments are provided as follows:

1. **Background on the EWT pipe:** The East-West-Tunnel (EWT) section in question was installed in 2015-2016 under the Lebreton Flats Diversion Chamber project. As-built drawings prepared for City Contract No. ISD13-2007 depict the pertinent infrastructure. The EWT pipe is Class 185D precast concrete pipe, the pipe depth is around 15m, and was installed via open cut within a rock trench.

This has been provided to the proponent for its information and consideration in the design of the building foundations and other development features on the site. It appears that the proponent has considered and incorporated this information into its constructability report as necessary. No further comments at this time.

2. **Drawings and Construction Plans:** The developer should provide plans showing details of the proposed shoring system and permanent underground works, showing details on proximity to the EWT at several cross sections along the development. The cross section should also include any required temporary shoring and/tie backs that may be required to perform the work, including limits of excavation.

Preliminary shoring system design drawings and other permanent aboveground and underground works appear to be provided in the revised report appendices. Several cross

Reference: CSST: 665 Albert Development Review Package, Stantec Review of Interfacing with CSST Infrastructure Rev.1

sections illustrating shoring systems in relation to existing City infrastructure are also provided, including separation distances to the EWT, IOS, and Albert Storm Sewer. No further comments at this time.

3. Confirming no loads are applied to the EWT from the proposed development:

- a. The EWT was installed via open cut, where the bottom portion of the pipe was installed within a bedrock trench and the pipe was backfilled in concrete within the bedrock trench. Since the pipe/concrete backfill is essentially in direct contact with the rock, the developer should review and confirm that there are no additional loads which will be applied to the EWT from the proposed permanent and/or temporary works.

Golder acknowledges review of the foundation drawings and confirms that there are no additional loads expected to be applied to the EWT by the proposed foundations. No further comments at this time.

- b. The constructability report states that the caissons will be embedded 1 m into rock and that the caisson will be “at least 3 m (3 times the diameter of the proposed caisson)” but the report does not actually state the caissons will have a 1 m diameter.

Golder clarifies that 1.2m diameter caissons are proposed, with a 3-4m deep socket into bedrock. It is noted that the drawings do not specify this information. No further comments at this time.

- c. In the supplied Golder geotechnical report, we could not locate a statement that corroborates the following statement from the constructability report “Based on Golder’s geotechnical recommendations, these conditions should not impose any significant stress increase to the existing services”.

Golder provides corroboration with the statements made in the constructability report. No further comments at this time.

- d. Is full fixity of the caissons required? Per 5.2.1.4 of the Golder report, if full fixity is required, the caisson depth may need to be increased.

Golder clarifies that depth of socketing into rock (now 3-4m in latest submission) is typically considered full fixity, however, this will be confirmed during construction based on quality of rock. No further comments at this time.

- e. The report also states “should not impose any significant stress increase to the existing services.”. The increase stress should be quantified.

Golder quantifies the increase in stress as essentially zero. Foundation analysis results are provided to support this statement. No further comments at this time.

4. Miscellaneous comments:

- a. The plans included within the constructability report (Figure 1-1) appears to show the existing Real Time Control (RTC) underground control vault at Booth/Albert and the associated underground ductbanks from this vault to the RTC facilities. It is unclear how/if the

Design with community in mind

Reference: CSST: 665 Albert Development Review Package, Stantec Review of Interfacing with CSST Infrastructure Rev.1

infrastructure is affected by the work, but this should be reviewed and addressed by the proponent. Excavations may extend into the footprint of the vault and the ductbanks, potentially requiring temporary support and protection.

Temporary shoring drawings and DWG. A40-02 are provided, including cross-sections, which appear to consider separation distances to existing City infrastructure – RTC Control Vault and associated ductbanks/utilities. Drawings note precise locations to be verified in field and to be coordinate with City wastewater collections operations group. No further comments at this time.

- b. The West tower excavation proposes a shoring system with what appears to be tie-backs (see Excavation Works drawings). Some of these tie-backs appear to be in conflict with the existing RTC regulator and CSST chambers under Booth Street. Shoring system design to consider the location of existing City infrastructure, prevent conflicts with the structures, and confirm that no additional loads will be applied to the structures.

Temporary shoring drawings and DWG. A40-02 are provided, including cross-sections, which appear to consider separation distances to existing City infrastructure. Drawings note precise locations to be verified in field. No further comments at this time.

- c. Site laydown areas and access roads appear to cross over the existing EWT, IOS and Albert Storm Sewer in various locations. It is unclear from the excavation drawings what the site elevations will be at various stages of excavation and construction. The developer should confirm the minimum amount of cover that will remain above the existing sewers within the site and if any protective measures would be required to protect the sewers from construction activity.

Revised report does not address comment fully. However, landscaping cross-sections illustrate that final grades for the MUP (lowest elevation area of site) will be at 56.0m at a minimum, consistent with the grades of the existing LRT tracks that are above-adjacent to the existing sewer infrastructure. It is assumed that the construction site overtop of the EWT and IOS will not be excavated lower than 56.0m outside of the shoring system (essentially existing grades). Provide confirmation whether any protective measures would be required to protect the sewers from construction activity/equipment.

- d. Excavations in proximity to the existing RTC regulator and CSST chambers west of the site should consider the existing CIP retaining wall adjacent to the chambers. The bottom of this wall does not extend very far below existing grade, and may need to be supported if excavation slopes cannot match existing grades at the perimeter of the development site.

Proposed grades and landscaping plan clarify that substantial excavation in this area is not planned, and deep excavation will only be limited to within the shoring system. No further comments at this time.

- e. Existing temporary shoring systems in proximity to the RTC and CSST chambers could be in conflict with the proposed works, depending on the required depths of excavation in the area. Developer to consider risk of load transfer to nearby existing infrastructure (EWT, IOS, Albert

Reference: CSST: 665 Albert Development Review Package, Stantec Review of Interfacing with CSST Infrastructure Rev.1

Storm Sewer) during excavation and removal of pre-existing temporary shoring if conflicts are identified. Pertinent as-built drawings are attached to this memo for clarity.

Temporary shoring drawings illustrate the locations of known existing abandoned shoring. No further comments at this time.

- f. The developer should provide drawings of proposed retaining wall along north side of site, and clarify its position relative to the EWT, IOS and Albert Storm Sewer and demonstrate that no additional loads will be imposed on the existing sewers.

Proposed retaining walls are provided in the landscaping drawings. Lowest elevation of proposed retaining walls appears to be approximately 56.0m. No further comments at this time.

5. **Vibration limits and monitoring:** typical OPSS/City of Ottawa limits should apply to the development work. Developer to establish a vibration monitoring plan that considers the EWT, IOS, Albert Storm Sewer, and associated chambers including response measures and contingency plans in the event of vibration threshold exceedances.

Proponent identifies that a vibration monitoring program will be developed as part of the design. No further comments at this time.

6. **Pre and post condition surveys:** pre-construction CCTV should be completed along with post-construction CCTV.

Proponent identifies that pre and post construction CCTV program will be executed as part of the work. No further comments at this time.

SUMMARY

Stantec's review was limited in nature to the documents provided and was intended to identify key areas for consideration by the City and the developer in mitigating impacts to existing CSST related infrastructure adjacent to the development at 665 Albert.

Should you have any question or concerns with the comments provide in this memo, please reach out to Colin or Shawn directly.

Stantec Consulting Ltd.

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Environmental Engineer

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Colin.Goodwin@stantec.com



Shawn Ireland P.Eng.
Environmental Engineer

Phone: 613-218-4845
Shawn.Ireland@stantec.com

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January 19, 2023

Steven Courtland

Page 5 of 5

Reference: CSST: 665 Albert Development Review Package, Stantec Review of Interfacing with CSST Infrastructure Rev.1

Attachment: ISD13-2007 As-Built Drawing C-03
ISD13-2007 As-Built Drawing S-401

c. Adrien Comeau

**LEBRETON FLATS
DIVERSION CHAMBER**



**3000mm CSST
PLAN AND PROFILE
STA.1+000 TO STA.1+240**

Contract No. **ISD13-2007** Dwg. No. **C-03**

Sheet of

Asset No.
 Asset Group

W. Newell, P. Eng. *General Manager, Infrastructure Services*
 R. Dempsey, P. Eng. *Project Manager, Infrastructure Services*

Des. C.G. Chk'd. S.D.
 Dwn. E.C. Chk'd. C.G.
 Utility Circ. No. Index No.

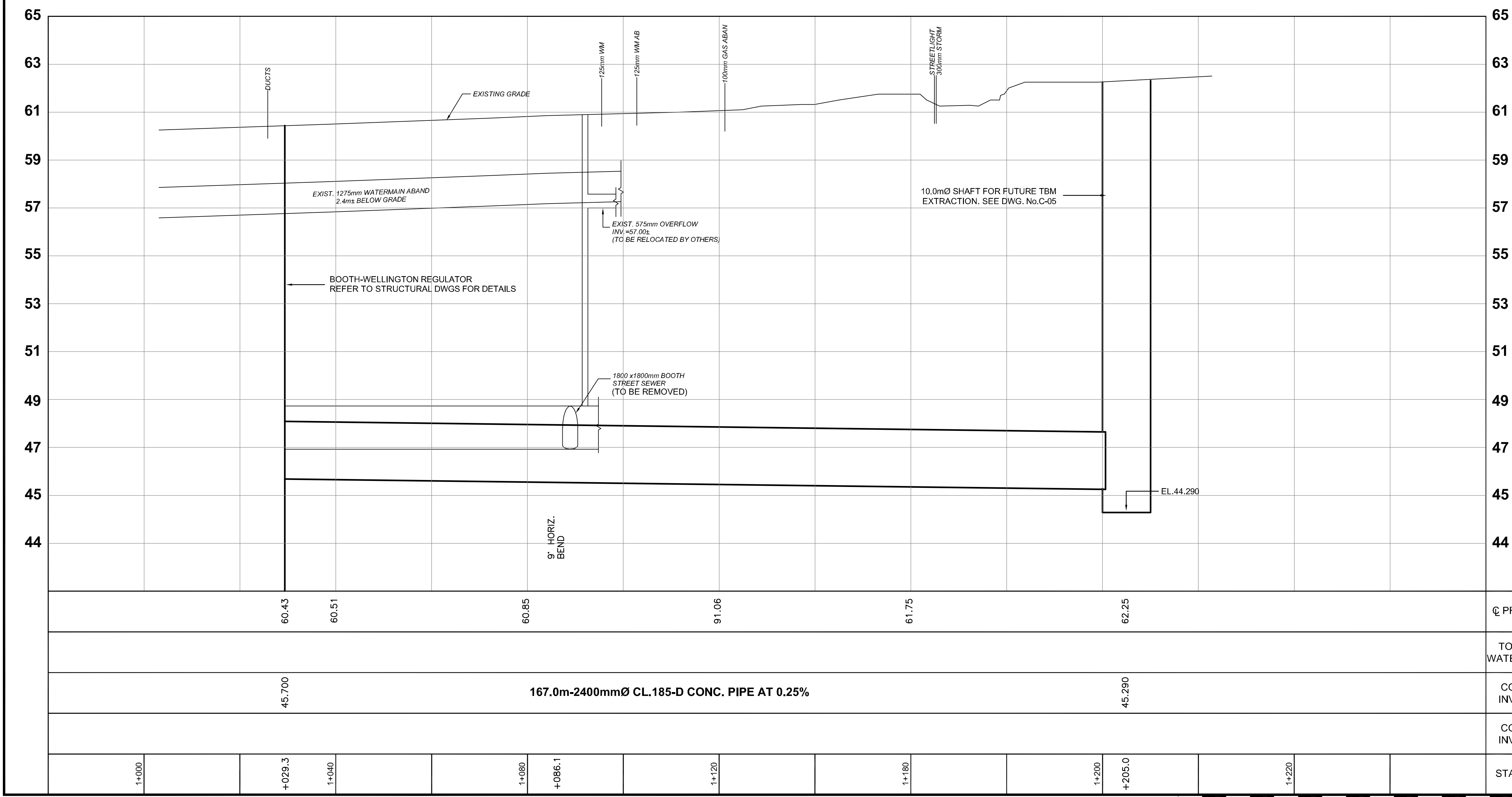
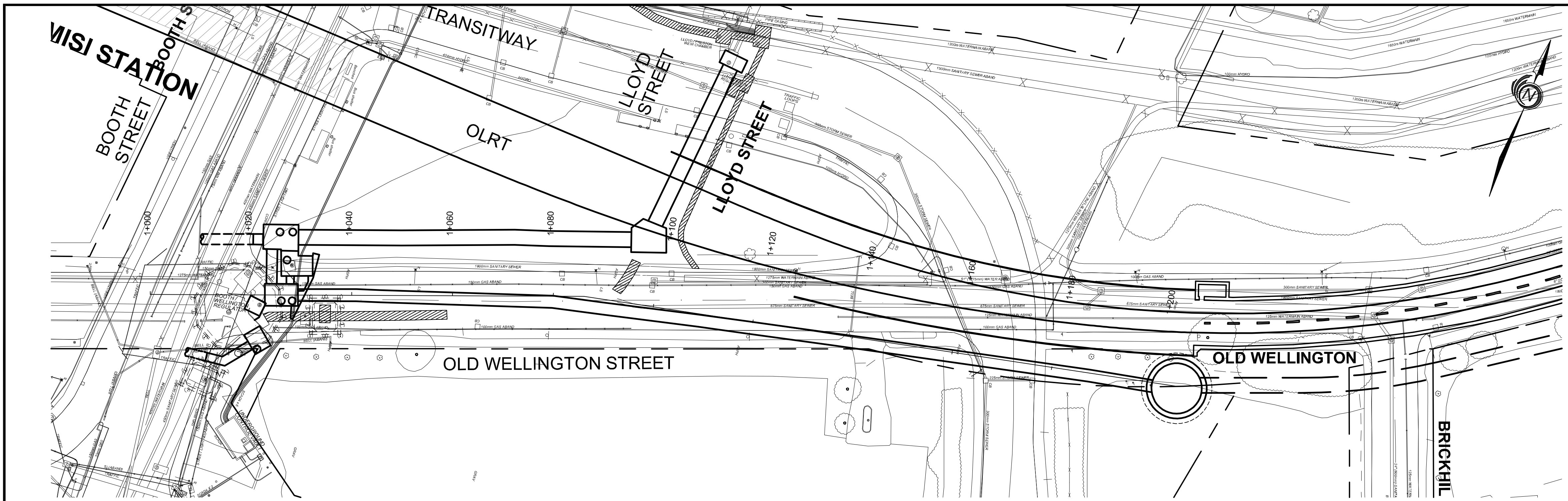
Const. Inspector

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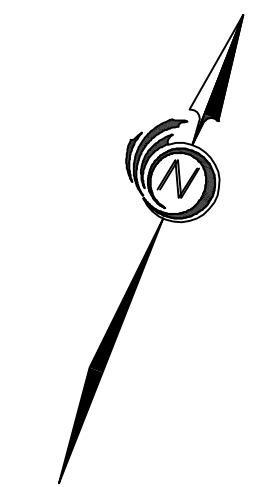
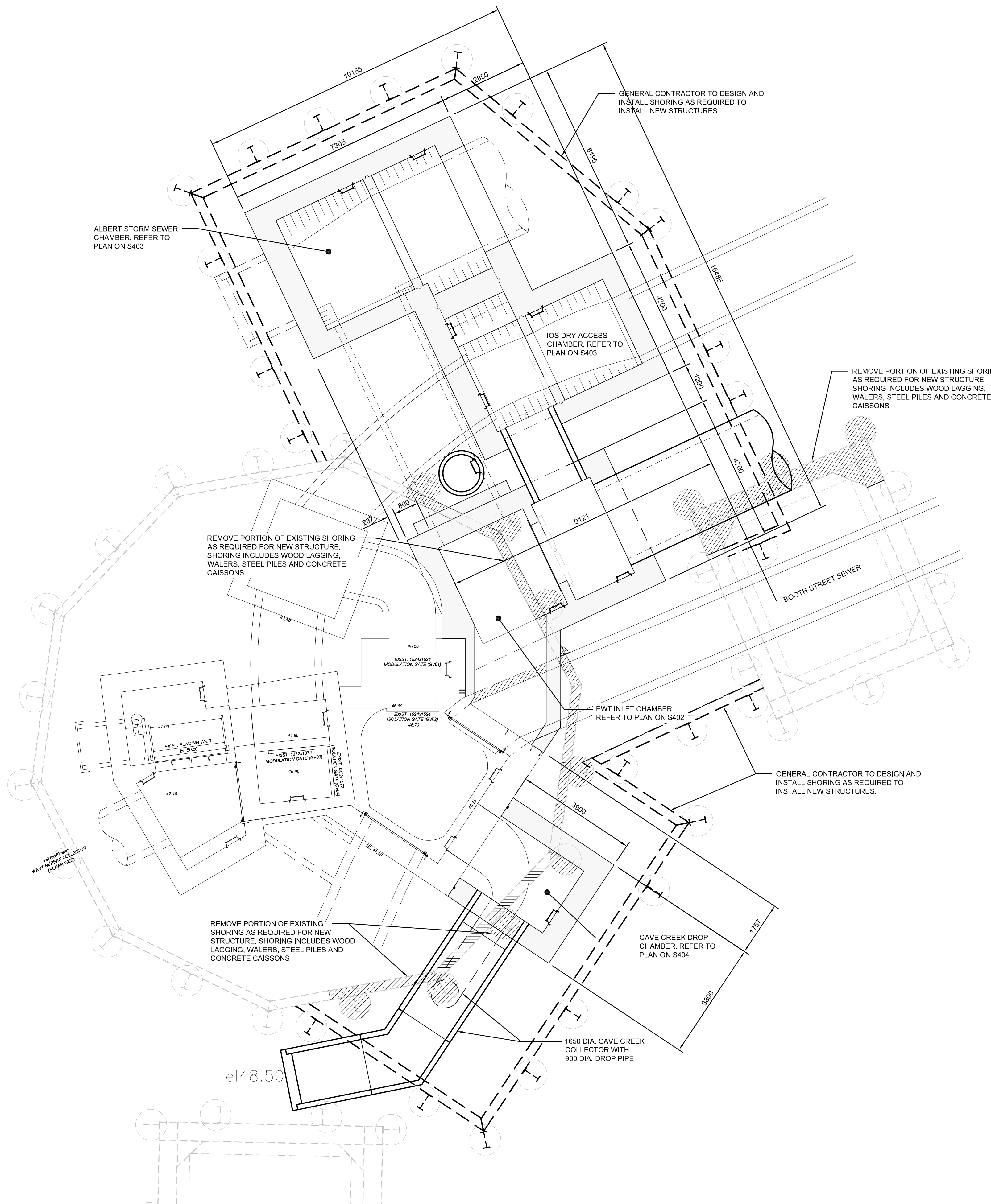
NOTE:
 The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.



No.	Description	By	Date (dd/mm/yy)
0	ISSUED FOR PRELIMINARY DESIGN	CG/SD	25/10/13
1	ISSUED FOR 90% DESIGN	CG/SD	22/11/13
2	ISSUED FOR TENDER	CG/SD	20/12/13
3	ISSUED FOR ADDENDUM #3	CG/SD	06/03/14
4	ISSUED FOR CONSTRUCTION	C.G.	23/05/14
5	ISSUED FOR SCM #18	J.R.	09/12/14
6	AS BUILT	J.R.	19/10/18



AS BUILT
THIS DRAWING WAS PREPARED FROM INFORMATION PROVIDED BY THE CONTRACTOR. THE ENGINEER DOES NOT TAKE RESPONSIBILITY FOR INFORMATION ON THIS DRAWING THAT IS IN CONFLICT WITH THE EXISTING CONDITION DUE TO INACCURATE OR MISSING INFORMATION ON SOURCE DOCUMENTS PROVIDED.



**LEBRETON FLATS
DIVERSION CHAMBERS**

**BOOTH-WELLINGTON REGULATOR
CHAMBER MODIFICATIONS
OVERALL PLAN
SHOWING EXCAVATION SHORING**

Contract No. ISD13-2007		Dwg. No. S401	
Sheet 00 of 00		Asset No. 00	
Asset Group 00		Des. S.A. Chk'd. O.N.	
W. Newell, P. Eng. <i>General Manager, Infrastructure Services</i>		R. Dempsey, P. Eng. <i>Project Manager, Infrastructure Services</i>	
Dwn. D.M. Chk'd. O.N.		Utility Circ. No. 00 Index No. 00	
Const. Inspector 00		Scale: AS SHOWN	

NOTE:
The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.



No.	Description	By	Date (dd/mm/yy)
0	ISSUED FOR 90% DESIGN	S.A.	22/11/13
1	TENDER	S.A.	20/12/13
2	ISSUED FOR ADDENDUM	S.A.	18/02/14
3	ISSUED FOR CONSTRUCTION	S.A.	23/05/14
4	ISSUED FOR SCM#40	S.A.	04/06/15
5	ISSUED FOR SCM#40R1	S.A.	09/06/15
6	ISSUED FOR AS-BUILT DRAWINGS	S.A.	11/06/18

- GENERAL NOTES FOR ALL CHAMBERS:**
- REFER TO SPECIFICATIONS AND CIVIL DRAWINGS FOR FURTHER SHORING EXCAVATION PROTECTION NOTES.
 - BEFORE COMMENCING WORK, THE CONTRACTOR SHALL RETAIN A PROFESSIONAL ENGINEER OF ONTARIO TO DESIGN AND DETAIL THE EXCAVATION PROTECTION SYSTEMS.
 - CONTRACTOR SHALL MINIMIZE EFFECTS OF VIBRATIONS DUE TO CONSTRUCTION OF SHORING SYSTEM TO THE SATISFACTION OF ENGINEER.
 - SHORING FOR THE NEW WORKS SHOWN FOR ILLUSTRATION PURPOSE ONLY. THE CONTRACTOR IS RESPONSIBLE FOR DESIGN AND INSTALLATION OF EXCAVATION PROTECTION SYSTEM. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS SHOWING DETAILS OF METHOD AND DESIGN CALCULATIONS OF PROPOSED SHORING SYSTEMS TO ENGINEER FOR REVIEW. THESE SUBMISSIONS MUST BE CERTIFIED BY A PROFESSIONAL ENGINEER IN ONTARIO. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
 - REFER TO GEOTECHNICAL INVESTIGATION ENTITLED "GEOTECHNICAL INVESTIGATION ALBERT STREET SEWER - CSST WEST EXTENSION LEBRETON FLATS OTTAWA, ONTARIO" PREPARED BY GOLDER ASSOCIATES DATED NOVEMBER 2013, FOR SOIL PARAMETERS AND GEOTECHNICAL RECOMMENDATIONS.
 - PROVIDE ADEQUATE DEWATERING SYSTEM TO ENSURE A REASONABLY DRY EXCAVATION AND COMPLY WITH PTTW.
 - PAINT ALL ALUMINUM SURFACES IN CONTACT WITH CONCRETE WITH 2 COATS OF BITUMINOUS PAINT.
 - ALL FASTENERS TO BE 316 STAINLESS STEEL.
 - BEDROCK BEARING SURFACES OF CHAMBERS TO BE INSPECTED AND APPROVED BY GEOTECHNICAL ENGINEER BEFORE POURING CONCRETE.
 - 30MPa CONCRETE MIX. USE TYPE MS CEMENT AND CONCRETE IS TO BE AIR ENTRAINED WITH HIGH RANGE SUPERPLASTICIZER.
 - REFER TO CIVIL DRAWINGS AND GEOTECHNICAL REPORT FOR BACKFILL REQUIREMENTS AND REFER TO TYPICAL BACKFILL NOTES ON CIVIL DRAWINGS, IF NOT INDICATED ON STRUCTURAL DRAWINGS.
 - PROVIDE PVC WATERSTOP AT ALL CONSTRUCTION JOINTS.
 - REFER TO CIVIL DRAWINGS FOR SUGGESTED CONSTRUCTION SEQUENCING AND FLOW MANAGEMENT PLAN.
 - FORM BENCHING IN SHAPES AS DIRECTED BY ENGINEER ON-SITE.
 - ROUGHEN SURFACE OF CONCRETE AND APPLY BONDING AGENT IMMEDIATELY PRIOR TO POURING CONCRETE BENCHING.
 - DESIGN REMOVABLE CONCRETE PANELS TO WITHSTAND OVERBURDEN WEIGHT AND HIGHWAY LOADING. SUBMIT SHOP DRAWINGS CERTIFIED BY A PROFESSIONAL ENGINEER IN ONTARIO.