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MPE Engineering Ltd.

# Tylehurst Lift Station Wet Well Access
# Geotechnical Report

**Prepared for:**
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**Project Number:** 0512-017-00

**Date:** November 6, 2025

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November 6, 2025 Our File No. 0512-017-00

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**RE: Tylehurst Lift Station Wet Well Access**
**Geotechnical Report - Addendum**

TREK Geotechnical Inc. is pleased to submit our addendum to the final report for the geotechnical investigation for the above noted project.

Please contact the undersigned should you have any questions.

Sincerely,

**TREK Geotechnical Inc.**
**Per:**

Ryan Belbas, M.Sc., P.Eng.
Senior Geotechnical Engineer

Encl.

## Revision History

| Revision No. | Author | Issue Date | Description |
|---|---|---|---|
| 0 | JSS | October 20, 2025 | Final Report |
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## Authorization Signatures

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Senior Geotechnical Engineer

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# 1.0 Introduction

This report provides excavation and shoring recommendations for the construction of a wet well access vault to be undertaken as part of the upgrades to the Tylehurst Lift Station, located at the corner of Tylehurst Street and Wolseley Avenue West in Winnipeg, Manitoba. The recommendations provided in this report are based on the soil and groundwater conditions observed in the test hole that was completed as part of the original geotechnical investigation for the Tylehurst Lift Station project.

# 2.0 Project Understanding

It is understood that the planned depth of the proposed wet well access vault is about 7.5 m below existing grade, with the vault base having a geodetic elevation of about 223.7 meters above sea level (masl). The footprint of the access vault will be 2.4 m square. A plan and section view of the wet well access vault design is included in Appendix A. It is understood that construction of the wet well access vault is planned for February 2026.

# 3.0 Excavation and Shoring

Excavations must be carried out in compliance with the current relevant regulations under the Manitoba Workplace Safety and Health Act to suit the planned and expected construction activities and schedule. Excavations greater than 3 m deep must be designed and sealed by a professional engineer. In this case, it is understood that a shoring system consisting of soldier piles and timber lagging will be utilized for the excavation during construction of the wet well.

Based on the 7.5 m excavation depth and the sensitivity of surrounding structures (e.g. existing lift station, underground utilities, poles supporting nearby overhead power line) to settlement, conventional shoring will need to be braced. Shoring will need to extend through the clay layer and into the silt till layer. Undrained soil conditions may govern design of the shoring in the short term and effective stress conditions should be considered for long-term stability. Both undrained and drained soil conditions should be checked, and the more conservative condition used to design the shoring.

The earth pressure distribution provided in Figure 01 can be used for braced shoring design; however, the shoring designer should refer to the Canadian Foundation Engineering Manual (5th Edition, 2023) and the information provided on the test hole logs for consideration of the layered soil profile in design. The apparent earth pressure distribution shown on Figure 01 can be used for temporary braced shoring design in stiff clay and is not applicable for unsupported shoring. The effect of any surcharge loads must be added to the force on the wall in addition to the calculated earth pressures. The appropriate earth pressure condition should be used to calculate the lateral earth pressure due to surcharge loads. Suggested soil parameters for use in shoring design are provided in Table 1, however it is the Contractor’s responsibility to review the test hole log and confirm the selection of soil parameters for design.

**Table 1. Engineering Properties for Soil**

| Material | Depth Below Site Grade | Undrained Shear Strength | Effective Cohesion | Effective Friction Angle | Saturated Unit Weight | Effective Unit Weight | Earth Pressure Coefficients (Rankine[1]) | | |
|---|---|---|---|---|---|---|---|---|---|
| | (m) | (kPa) | (kPa) | (degrees) | (kN/m$^3$) | (kN/m$^3$) | Ko | Ka | Kp |
| Fill / Silt | 0 – 2 | n/a | 0 | 25 | 17.5 | 7.7 | 0.6 | 0.42 | 2.4 |
| Clay | 2 – 6 | 50 | 4 | 23 | 18 | 9.5 | 0.6 | 0.43 | 2.2 |
| Clay | 6 – 8 | 30 | 5 | 23 | 18 | 9.5 | 0.6 | 0.43 | 2.2 |
| Silt Till | below 8 | n/a | 10 | 30 | 20 | 10.2 | 0.5 | 0.33 | 3.0 |

*Note 1: The effective stress earth pressure coefficients assume the magnitude of wall rotation is sufficient to develop the full earth pressure. The values should be reduced to suit the allowable wall rotation. Refer to Section 20.2.5 of the Canadian Foundation Engineering Manual (5th Edition 2023).*

Considerations for the shoring design include:

- Design should be based on local experience with similar shoring systems as well as theoretical and empirical methods,
- Length of time the excavation shoring system will be in service,
- Excavation staging,
- Excavation base stability,
- Spoil material from the excavation should not be stockpiled behind the shoring,
- Earth and water pressures,
    - Water pressure should be included in the analysis below the water table and/or behind the portion of the shoring that is not drained. The unit weight of water is 9.8 kN/m$^3$. The groundwater or piezometric level in the clay soil can be taken as 226.5 masl as indicated on the groundwater summary graph (Figure 02).
- Surcharge loading (q) from construction equipment should be considered in the design. The surcharge loading should be confirmed based on the equipment proposed for use by the contractor,
- Provide positive surface drainage away from the excavation to minimize water infiltration behind the shoring,
- Frost effects are best mitigated by providing free draining backfill behind the shoring. Insulation could also be used to minimize frost penetration into the retained soil,
- Current Manitoba Building Code (MBC 2024) requirements
- Chapter 20 of the Canadian Foundation Engineering Manual (5th Edition 2023)
- A monitoring program should be established to record the performance of the shoring system from the onset of installation to removal. The monitoring program should include top of pile

surveys as a minimum to measure and track lateral movement of the shoring with time. The vertical profile of soldier piles could be monitored using slope inclinometer casing and measurement of earth pressures acting on the shoring and groundwater pressure measurements could also be considered if deemed important by the shoring designer.

- Given the vicinity of the shoring to an existing buried power cable, Manitoba Hydro requires that vibration monitoring be undertaken during installation of shoring and that vibrations do not exceed 0.5 in/s (12.5 mm/s) along the buried cable. A vibration monitoring unit should be placed about 1 m in front of the buried cable between the line and the source of vibration. If the thresholds are exceeded, methods to reduce the vibration source should be considered or the excavation of a wave break trench between the vibration source and the cable may need to be undertaken. If piling is the vibration source, then reducing vibrations can be done by reducing the energy delivering to the pile.

Ground movements behind the shoring and associated settlement are largely unavoidable. The amount of movement cannot be predicted with a high degree of accuracy as it is as much a function of the excavation procedures and workmanship as it is of theoretical considerations. In this regard, good contact between the retaining wall or timber lagging and retained soil should be maintained throughout the construction process. Free-draining sand fill should be used to fill in any voids behind the wall.

It is anticipated that the design of temporary shoring will be the responsibility of the Contractor. Shoring designs will need to be designed and sealed by a professional engineer, and shop drawings should be reviewed by TREK prior to construction for review and comment. Shoring design should account for potential base heave and the need for dewatering and/or depressurization of the till or bedrock.

## 3.1 Groundwater Considerations

Water levels in the till fluctuate with the level of the Assiniboine River and regional groundwater levels rise during the spring and summer months, however, this will require long-term monitoring to confirm. A standpipe piezometer was installed at site and regular water level readings were recorded between April 1 and October 2, 2025. The results are shown in Figure 02. If this is the case, the groundwater levels in the till may be 3 to 4 m higher during the summer months (non-flood periods). It must also be recognized that groundwater levels are likely to be even higher during spring freshet / flooding before returning to normal summer levels. Construction of the proposed works in the winter months (November to February) will reduce the risk of higher groundwater levels and the need for more extensive dewatering measures. In the event that construction must occur during non-winter months, TREK should be contacted to re-assess conditions, and a groundwater investigation and pump test may be warranted.

The proposed excavation is anticipated to terminate at a depth of 7.5 m depth below ground surface, which is within 0.5 m above the clay-till interface (± 7.9 m depth below ground surface). Groundwater levels in the till during the monitoring period (April to October 2025) were approximately 5 to 9 m below ground surface, within or below the excavation depth. Based on the proposed excavation depth,

measured groundwater levels in the till, the thickness and compactness condition of the till, and the winter construction schedule, seepage into the excavation can be expected and should be manageable using conventional sump pits and submersible pumping systems. Depending on the river and groundwater levels at the time of construction, more robust dewatering measures such as well point systems may be required. Upward seepage may also occur along remnant shoring piles from the original chamber construction, or through granular backfill (if used) surrounding the chamber.

## 4.0 Closure

The geotechnical information provided in this report is in accordance with current engineering principles and practices (Standard of Practice). The findings of this report were based on information provided (field investigation and laboratory testing). Soil conditions are natural deposits that can be highly variable across a site. If subsurface conditions are different than the conditions previously encountered on-site or those presented here, we should be notified to adjust our findings if necessary.

All information provided in this report is subject to our standard terms and conditions for engineering services, a copy of which is provided to each of our clients with the original scope of work or standard engineering services agreement. If these conditions are not attached, and you are not already in possession of such terms and conditions, contact our office and you will be promptly provided with a copy.

This report has been prepared by TREK Geotechnical Inc. (the Consultant) for the exclusive use of the MPE Engineering Ltd. (the Client) and their agents for the work product presented in the report. Any findings or recommendations provided in this report are not to be used or relied upon by any third parties, except as agreed to in writing by the Client and Consultant prior to use.

# Figures

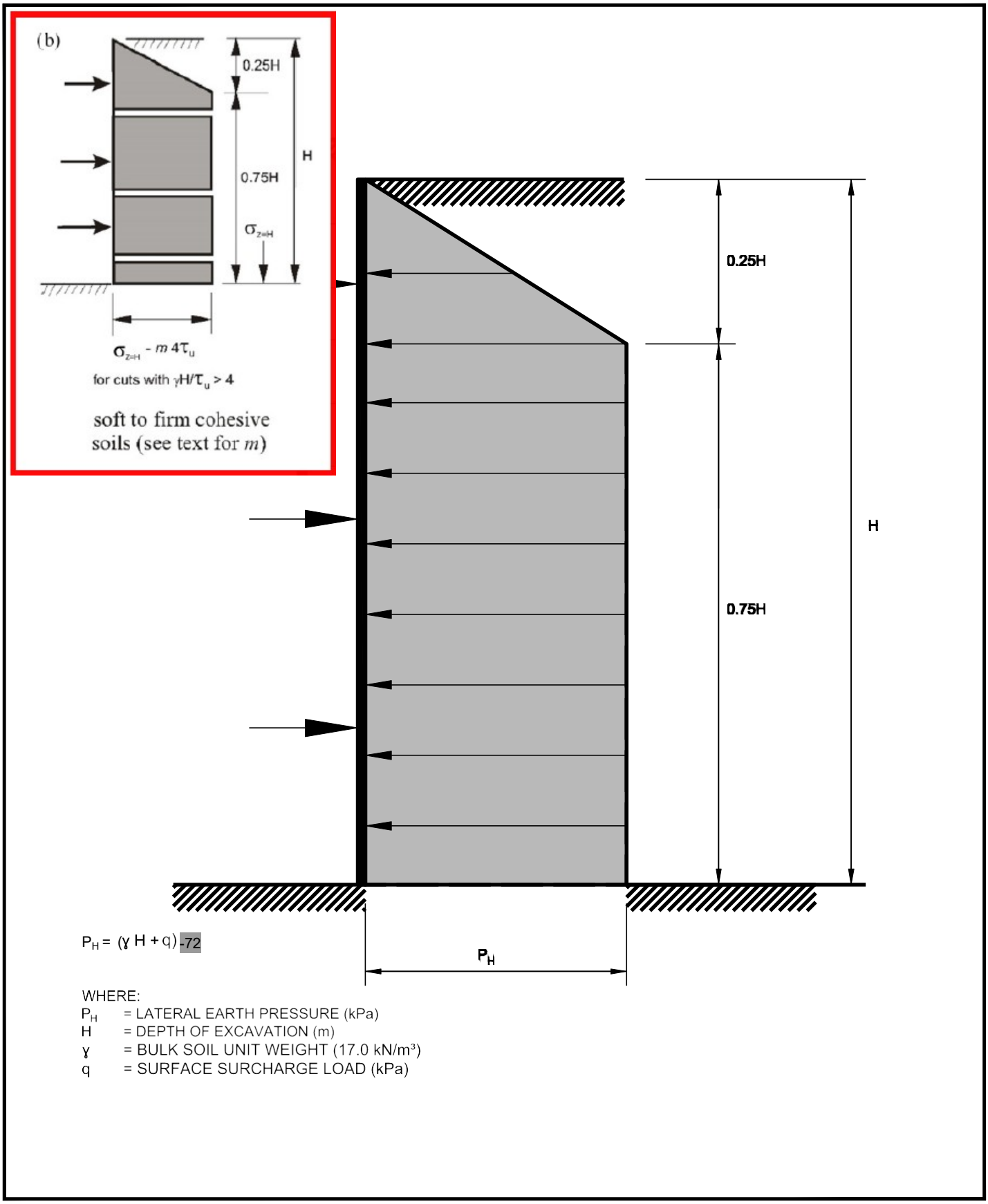



**Figure 01**

Apparent Temporary Lateral Earth Pressure Distribution

Braced Excavation in Firm to Stiff clay

bdfhg

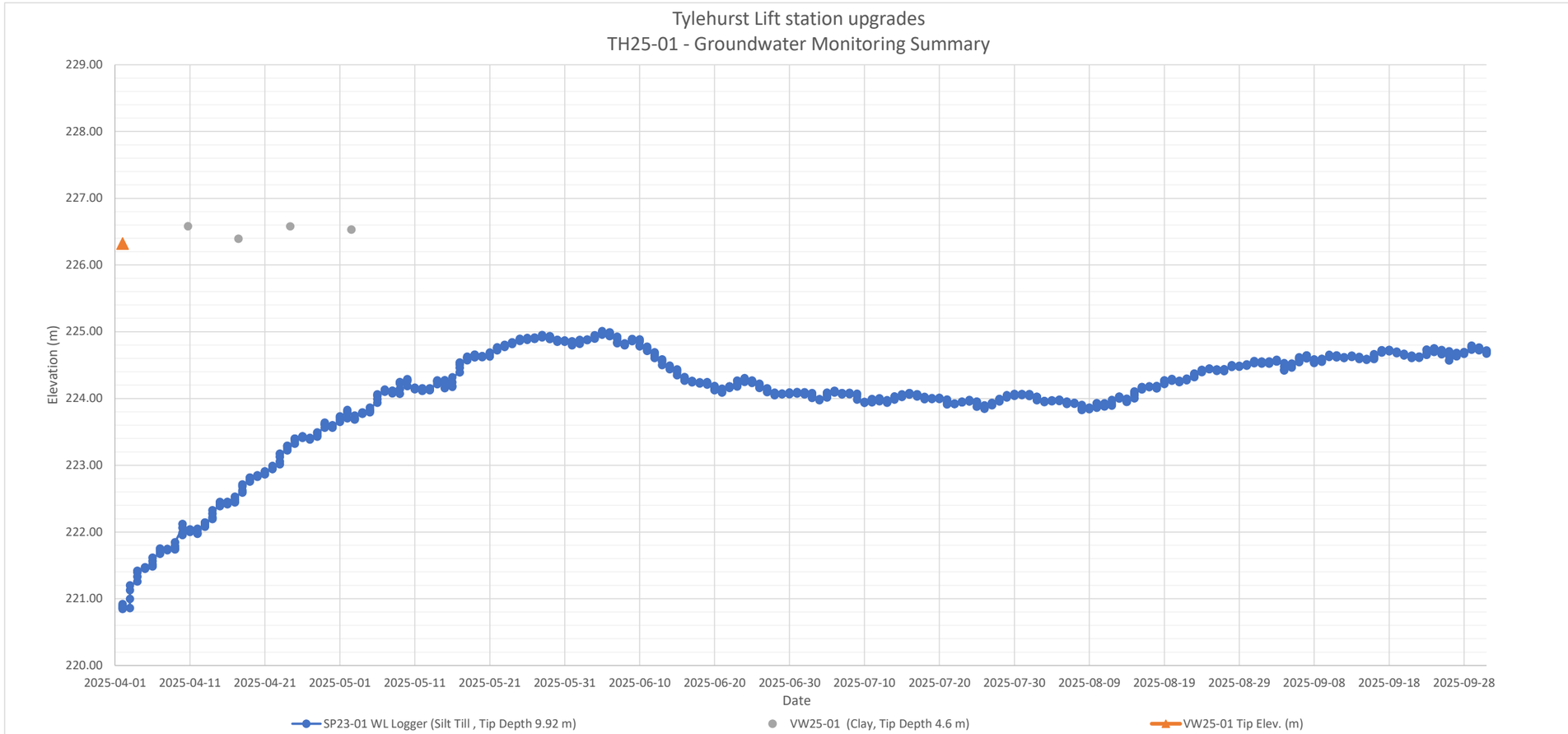
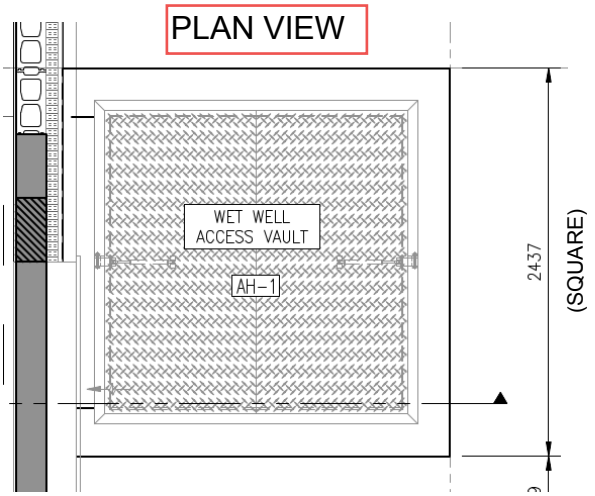



Figure 02
Groundwater Monitoring Summary

# Appendix A

## Plan and Section View of Wet Well Access Vault

PLAN VIEW




SECTION VIEW