THURBER ENGINEERING LTD.

FOUNDATION DESKTOP STUDY REPORT
PRELIMINARY DESIGN AND ENVIRONMENTAL ASSESSMENT
HIGHWAY 6 OVERHEAD AT CPR
STRUCTURE REHABILITATION
HAMILTON, ONTARIO
W.O. #16-20004
SITE 36-156

GEOCRES NO. 30M5-351

Latitude: 43.300288°
Longitude: -79.901046°

Report

to

AECOM

Date: April 24, 2023
File: 25963

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1.0 INTRODUCTION

This report presents the results of a foundation desktop study carried out by Thurber Engineering Ltd. (Thurber) for the preliminary design and environmental assessment of the rehabilitation of the Highway 6 overhead structure at CPR in Hamilton, Ontario.
This Phase 1 study is carried out for planning, structure evaluation and preliminary design purposes only. As part of the Phase 1 scope, a desktop study is to be carried out based on currently available subsurface and foundation information. Where this study determines that the existing foundation information is insufficient to complete the preliminary design, additional foundation investigation and assessment may be recommended for completing Phase 1. It is understood that the budget for this additional investigation is to be drawn from the Phase 2 contingency upon approval by MTO.

Thurber was retained by AECOM to carry out this Phase 1 study under the Ministry of Transportation Ontario (MTO) Assignment Number 2016-E-0027.

This site is a part of the overall Highway 403 and Highway 6 Interchange Improvements project where 14 bridges, 3 structural culverts and 15 retaining walls are planned to be replaced, reconstructed or rehabilitated.

It is a condition of this report that Thurber's performance of its professional services be subject to the attached Statement of Limitations and Conditions.

The following references and drawings are available in the general vicinity of this site.

- Foundation Investigation and Design Report, Highway 6 Overpass at CP Rail, Highway 6 Widening between Highway 403 and 5, W.P. 19-95-04, Report 001-1141F-1, Geocres 30M05-243, prepared by Golder Associates, dated November 2002. (Reference 1).

- Foundation Investigation Report, CPR Overhead, Highway No. 6, 1.2 Mile South of Clappison's Corners, District No. 4, W.P. 287-60, Geocres 30M05-006, prepared by Dominion Soil Investigation Ltd., November 17, 1960. (Reference 2).
- Foundation Investigation and Design Report, Plains Road Overpass at CP Rail, Highway 6 Widening between Highway 403 and 5, W.P. 19-95-00, Report 001-1141F-2, Geocres 30M05-229, prepared by Golder Associates, dated April 2004. (Reference 3).
- Archive drawings, Highway 6 Overhead at CPR, Highway 6, Contract No. 2005-2019, W.P. 19-95-04, prepared by URS, dated July 2005. (Reference 4).
    - General Arrangement, Sheet 257
    - Foundation Layout, Sheet 263
    - South Abutment, Sheet 264
    - North Abutment, Sheet 265
    - Retained Soil System, Sheet 272
- Ontario Bridge Management System (OBMS), Ontario Structure Inspection Manual – Inspection Form, Highway 6 Overhead at CPR, Site number 36-516, Regular OSIM 09-30-2016 dated December 14, 2016. (Reference 5).

2.0 SITE AND PROJECT DESCRIPTION

The existing bridge is located at the crossing of Highway 6 and the CPR tracks, approximately 1.0 km north of Highway 403 and Highway 6 interchange in Hamilton, Ontario. At the site, the overhead structure carries the Highway 6 NBL (northbound lane) and SBL (southbound lane) over the CPR rail tracks.

Based on available information at the site, the natural ground surface varies southerly from about Elevations 145 to 140. The lands on the west side of the structure are typically residential, while the southeast lands are occupied by Wedgewood Golf Centre. Highway 6 in the vicinity of the site runs in a north to south orientation. Plains Road runs parallel to and approximately 15 m east of Highway 6, where a structure carries Plains Road over the CPR tracks.

The subject single span bridge was constructed in 2006 to replace the then existing three-span structure built in the early 1960's. It is understood that the 1960 structure was constructed to also replace a previously built three-span structure at the site.

According to available information (Reference 4), the existing overhead consists of a single-span reinforced cast-in place concrete rigid frame structure supported on two abutments. Archive design drawings indicate that the abutments are supported on spread footings founded on the

native silty clay till to clayey silt till. The bridge is at an approximate 45° skew to the centreline of Highway 6. Archive drawings indicate that the curvilinear width of the bridge is 53.8 m and 51.3m on the north and south sides, respectively. The clear span between abutments is 12 m, measured perpendicular to the centreline of CPR. The existing grade of Highway 6 at the bridge is at approximately Elevations 146.5 to 147.0. The CPR tracks were built in a cut between 2 m and 6 m deep, with the rail grade at approximate Elevations 138.8 to 139.0. The existing north and south approaches are approximately 7.7 m to 9.0 m high. RSS walls are located at each corner of the structure. At the bridge location, a noise barrier wall is located along the west side of Highway 6 southbound lane (SBL).

Selected photographs of the site are included in Appendix C.

There is no record of any rehabilitation program carried out for this structure since its construction in 2006.

The project area is situated within the physiographic region known as the Niagara Escarpment, which forms a north-south trending strip, and is a major topographic break in the bedrock between the carbonate Amabel Formation to the west and the soft sediments of the Queenston Formation to the northeast. At many locations, the Queenston Formation consists of up to 1.2 m of very weathered bedrock (red clay) which grades downward into typical brick-red shale and often with green mottling. Thin to medium beds of grey-green and reddish argillaceous limestone are present in most sections. The Queenston shale is overlain by Halton Till in the area of the site. The Halton Till is a red clay to clayey silt till and is exposed in the form of a till plain extending from Lake Ontario southward to the Niagara escarpment.

3.0 SITE OBSERVATIONS

Site reconnaissance visits were conducted by a Thurber Senior Geotechnical Engineer in July 2021 and on March 27, 2022 to observe conditions related to the foundation performance of the existing bridge and approaches. The following observations have been noted during our site visit:

- There was no visible sign of settlement or distress along the overhead alignment.
- The existing approach embankments are fully covered with vegetation including tall grass and bushes, and appeared to be in good condition. The side slopes did not exhibit obvious sign of instability or bulging.
- The RSS walls on the west side of the bridge appear to be in good condition.
- The concrete structure shows no signs of structural distress.

- Wet stains were noted on the west fascia/side of the bridge deck.
- Few longitudinal and transverse cracks were noted on the Highway 6 pavement at the site.
- Graffiti was observed at the northwest and southwest RSS walls, noise barrier wall and abutment walls.

Selected photographs of the site taken during the site visits are presented in Appendix C.

4.0 SUBSURFACE CONDITIONS

A foundation investigation was conducted to cover the site for the then proposed bridge in 1960 (Reference 2). In this investigation, three (3) boreholes (numbered 1, 2 and 3) were drilled in the vicinity of the CPR tracks and Highway 6. Also, two (2) Dynamic Cone Penetration Tests (DCPT) were carried out. The boreholes were wash bored and lined for the first 1.5 m with BX casing. The actual locations of these boreholes in relation to the existing bridge cannot be confirmed since a co-ordinate system was not used at the time and there was no available record of the as-built locations of the bridge.

A second foundation investigation was carried out in 2001 and 2002 (Reference 1) and consisted of drilling and sampling seven (7) boreholes (numbered H1 to H4, P1, P4 and P5). Boreholes H3, H4, P1, P4 and P5 were drilled through the then-existing fill into the hard silty clay/clayey silt till. The boreholes were advanced by solid stem auger using a bombardier-mounted drill rig. Boreholes H1 and H2 were advanced for the north and south approach embankments using portable hand-held and tripod-mounted equipment.

Record of Borehole Sheets of Boreholes from the previous investigations and borehole location plans are included in Appendix A.

In general, the subsurface stratigraphy encountered at the site, during the field investigation conducted in 1960, consisted of topsoil encountered surficially in Boreholes 1 and 2, and a surficial layer of clay fill (2.6 m thick) contacted in Borehole 3, overlying a native deposit of brown clay till of intermediate plasticity. Mixed broken red and green shale was encountered in Borehole 2 at Elevation 130.5. Groundwater was not observed in the boreholes.

The soil stratigraphy encountered at the site during the investigation conducted in 2001 and 2002, consisted of surficial topsoil and embankment fill overlying very stiff to hard native clayey silt/silty clay till and clayey silt till/residual soils which are underlain by shale bedrock.

A 300 mm thick layer of topsoil was encountered surficially in Boreholes H1 and H2. Embankment fill was encountered below the topsoil in Boreholes H1 and H2, and surficially in Boreholes H3 and H4. The embankment fill consisted of brown clayey silt containing trace sand and gravel and shale fragments. Black cinders or slag were encountered within the fill. The thickness of the embankment fill varied from 1.4 m to 5.2 m. SPT 'N' values measured in the embankment fill varied from 15 to 35 blows per 0.3 m of penetration indicating a very stiff to hard consistency. In Borehole H2, the upper 1.0 m of the embankment fill revealed a stiff consistency. Reported water contents in the soil samples ranged between 12 and 20 percent.

A layer of native red-brown to brown clayey silt containing trace sand and gravel and occasional rootlets was contacted surficially in Boreholes P1 and P2. The thickness of the clayey silt was 1.4 m. SPT 'N' values in the clayey silt were 21 and 11 blows per 0.3 m of penetration, indicating a stiff to very stiff consistency.

Native clayey silt, brown to grey-brown clayey silt till, grading to silty clay till was contacted in Boreholes H1 to H4, P1 and P5 below the fill and, surficially in Borehole P5. The glacial till contained trace to some sand, trace gravel and shale fragments. The thickness of this layer varied from 6.4 m to 11.7 m. SPT 'N' values measured in the clayey silt/silty clay till varied from 37 to greater than 100 blows per 0.3 m of penetration indicating a hard consistency. Moisture content in the cohesive till ranged from 8 to 18 percent. The depth to the base of the silty clay/clayey silt till varied from 7.8 m to 13.1 m (Elevations ranging from 130.2 to 132.7).

Underlying the silty clay/clayey silt till, a deposit of red-brown clayey silt till/residual soil was contacted at elevations ranging from 130.2 to 132.7 in Boreholes H3, H4, P1, P4 and P5. This till/residual soil contains trace to some sand, trace gravel and shale fragments. Thin layers or lenses of weathered shale and limestone were noted within this deposit in the recovered soil samples. The thickness of this deposit was 2.6 m in Borehole H4 where it was fully penetrated. SPT 'N' values measured in the clayey till/residual soil were greater than 100 blows for less than 0.3 m of penetration indicating a hard consistency and the possibility of the presence of cobbles and/or boulders. Moisture content in the clayey silt till/residual soil ranged from 8 to 12 percent.

Shale bedrock of the Queenston Formation was contacted below the clayey silt till/residual soil, at 10.4 m depth (Elevation 129.7) in Borehole H4. The shale was red-brown in colour. An SPT 'N' value measured in the shale was greater than 100 blows for less than 0.3 m of penetration. Bedrock was not proved by coring.

Groundwater levels measured in Borehole H3 on November 11 and 22, 2022 were at approximate Elevation 138. The boreholes were otherwise reportedly dry upon completion.

5.0 EXISTING FOUNDATIONS

Based on archive design drawings (Reference 4) and foundation recommendations (Reference 1), the existing Highway 6 overhead at CPR structure was designed to be supported on two abutments. The abutments are supported on spread footings founded on the native, hard silty clay to clayey silt till at about Elevation 135.9. The spread footings have a design width of 5.3 m.

Reference 1 recommended that spread footings be founded on undisturbed clayey silt to silty clay till at or below Elevation 137, and be designed based on a Factored Geotechnical Resistance at ULS of 700 kPa and a Geotechnical Resistance at SLS (less than 25 mm settlement) of 450 kPa. These geotechnical resistances are based on an assumed footing width of 4.2 m and a length of 45 m.

6.0 PROPOSED REHABILITATION PROGRAM

Based on a preliminary GA drawing dated May 2022, the proposed rehabilitation program of the existing structure involves the following:

1. Removal and repair of deteriorated and delaminated concrete from barrier wall, abutment, deck surface, deck soffit and approach slab.
2. Removal of existing asphalt from approach slab and removal of existing waterproofing system.
3. Placement of new asphalt and waterproofing system on deck.
4. Removal of the existing RSS wall located at the southeast corner of the existing bridge.
5. Construction of retaining soil system on the northwest and northeast sides of the bridge.
6. Placement of new precast deck.

Subsequently, a new GA drawing dated August 2022 was provided to Thurber in which items 1 to 3 presented above remained similar, and items 4 to 6 were modified. The new design items proposed in the August GA drawing are as follows:

- Widening of the existing bridge by a matching rigid frame by 2.305 m to the east and 5.05 m to the west; the footings and abutments for the widening will be extended from the existing ones.
- Removal of the existing four (4) RSS walls at each corner of the bridge to accommodate widening of the structure.
- Placement of new cast-in-place concrete abutment walls at the widened structure.
- Construction of new secant caisson walls at the northeast, northwest and southeast corners of the bridge, and a new RSS wall at the southwest corner.

It is anticipated that temporary protection system (TPS) design will be required in support of the rehabilitation of the Highway 6 Overhead at CPR tracks.

The designer should establish the additional loading on the footings, if any, that may be associated with the proposed structural rehabilitation of the main body of the bridge and widening of the existing bridge. Should the additional foundation loading be less than 10 percent of the existing loading and in accordance with current MTO practice, it is not anticipated that the proposed rehabilitation works for the bridge would have an impact on the existing bridge foundations provided that the footings are structurally sound. Should such rehabilitation and widening works result in foundation loading greater than 10 percent of the existing loading, further foundation evaluation will be required.

7.0 ASSESSMENT OF EXISTING FOUNDATIONS

The rehabilitation and widening of the bridge, and addition of walls, must be carried out in accordance with the CPR design manuals, American Railway Engineering and Maintenance-of-Way Association (AREMA) guidelines, and all other applicable codes and standards having jurisdiction over the project.

Additional boreholes will be required during detail design to address the bridge widening, proposed walls at each corner of the bridge and TPS design. A borehole program for detail design is proposed in Section 13.

It is recommended that all new footings be founded at similar elevations as the existing footings such that the latter will not be undermined. It is critical for the designer to have accurate information on outlines of existing footing footprints to avoid interference between new and existing footings.

A foundation assessment of the existing structure, based on current information, has been carried out to provide some information to the designers regarding the feasibility of the proposed foundations.

Archive drawings show that the founding levels of the existing structure are at approximate Elevation 136. If the base of the proposed widening footings is to be close to these elevations, it is anticipated that the new footings will be founded on the native hard clayey silt to silty clay till.

For the existing footings founded on undisturbed, native clayey silt to silty clay till at approximate Elevation 136, it is assessed that the factored geotechnical resistance at Ultimate Limit States (ULS) is 700 kPa and the geotechnical resistance at Serviceability Limit State (SLS) is 450 kPa (corresponding up to 25 mm settlement). For preliminary planning purposes, these founding level and geotechnical resistances may be used for the proposed bridge widening footings.

8.0 RETAINING WALLS

8.1 Retained Soil Systems (RSS) Wall

An RSS wall is proposed at the southwest corner of the bridge. The GA drawing shows that the base of the RSS wall will be near Elevation 137.5. Further details of the RSS wall were not available at the time of preparation of this report.

There is insufficient information of the existing embankment fill and the underlying native soils to provide foundation recommendations for this wall. A borehole program is presented in Section 13 for obtaining information for detail design.

RSS walls used on this project must be specified to be “High Performance” and “High Appearance”. Construction of the RSS wall will require excavations upslope for reinforcing strip installation and backfill placement. Temporary protection (shoring) will be required to facilitate construction of this type of wall. The RSS mass should be founded on a compacted granular pad as per MTO practices. The pad should be formed on native, undisturbed clayey silt to silty clay till.

During detail design, global stability of the overall embankment slope with an RSS wall and settlement analysis due to additional fill loading should be carried out. The designers should assess the implication and effect of additional loading on the existing bridge.

8.2 Secant Caisson Walls

The GA drawing dated August 2022 indicates that secant caisson walls are proposed at the northeast, northwest and southeast corners of the widened bridge. Details of the proposed caisson walls were not provided at the time of preparation of this report.

There is insufficient information of the existing embankment fill and native soils to provide foundation recommendations for these walls. A borehole program is presented in Section 13 for obtaining information for preliminary design of the proposed caisson walls.

The caisson sizes and wall embedment depth largely depend on the retained height, sloping and surcharge and the founding subsurface conditions. For preliminary assessment, the secant caisson wall may be assumed to be socketted within the hard clayey silt to silty clay till which transitions into a clayey silt till (residual soil). If required, the wall can be extended into the underlying shale bedrock.

During detail design, global stability of the overall embankment slope retained by a secant caisson wall and settlement analysis due to additional fill loading should be carried out. The designers should assess the implication and effect of additional loading on the existing bridge.

9.0 TEMPORARY PROTECTION AND SHORING

Where required during bridge widening and rehabilitation, track/roadway protection should be designed and implemented in accordance with AREMA, Chapter 8, Section 28.1.5. Discussions with the railway authorities should be carried out to determine the required performance level of protection. CPR may require a more stringent performance level for railway protection.

The design of such systems must incorporate rail (where applicable), traffic and surcharge loading due to equipment and operations of the rehabilitation program. It is anticipated that the protection system will need to be extended from highway grade, predominantly through the existing embankment fill, into the underlying native hard silty clay/clayey silt till to develop the required toe resistance. Installation of temporary protection should consider that the existing embankment fill and native till may contain obstructions such as cobbles and boulders, as well as shale fragments.

For conceptual planning and costing purposes, soldier pile and lagging walls and sheetpile walls are possible options for temporary protection at this site. However, there may be difficulties in

installing sheetpile walls below the existing embankment fill into the glacial till, due to the presence of hard soils.

The selection and design of railway and other temporary protection (shoring) is the responsibility of the Contractor. All rail track/roadway protection should be designed by a Professional Engineer experienced in such designs.

10.0 WALL BACKFILL AND LATERAL EARTH PRESSURES

Backfill will be required after removal the existing walls and construction of the new walls, as well as for bridge widening, and should consist of free-draining granular material conforming to OPSS.PROV 1010 Granular A or B Type II specifications. Compaction should be carried out in accordance with OPSS.PROV 206 and OPSS.PROV 501.

Earth pressures acting on a structure may be assumed to impose a triangular distribution governed by the characteristics of the backfill. For a fully drained condition, the pressures should be computed in accordance with the CHBDC 2019 but generally are given by the expression:

$$p = K(\gamma h + q)$$

Where:

- p = horizontal earth pressure on the wall at depth h (kPa)
- K = earth pressure coefficient (see table below)
- γ = unit weight of retained soil (see table below)
- h = depth below top of fill where pressure is computed (m)
- q = value of any surcharge (kPa)

The earth pressure coefficients are dependent on the material used as backfill. Recommended unfactored values are shown in Table 10.1. The at-rest coefficients should be employed for restrained walls. Active pressures should be used for any wingwalls or unrestrained walls.

In conventional design, the use of a material with a high friction angle and low active pressure coefficient (e.g. Granular A, Granular B Type II) is generally preferred as it results in lower earth pressures acting on the wall.

Table 10.1 – Lateral Earth Pressure Coefficients

Loading Condition	Earth Pressure Coefficient (K)			
	OPSS Granular A or Granular B Type II $\phi = 35°, \gamma = 22.8$ kN/m^3		OPSS Granular B Type I $\phi = 32°, \gamma = 21.2$ kN/m^3	
	Horizontal Backfill	Sloping Backfill (2H : 1V)	Horizontal Backfill	Sloping Backfill (2H : 1V)
Active (Unrestrained Wall)	0.27	0.40	0.31	0.48
At-rest (Restrained Wall)	0.43	0.62	0.47	0.70
Passive	3.7	-	3.2	-

11.0 EXCAVATION AND GROUNDWATER CONTROL

According to the preliminary GA drawing dated August 2022, the bridge will be widened and a new foundation system will be designed to accommodate the bridge widening. Moreover, the existing retaining walls at each corner of the bridge will be removed and replaced with new walls. It is anticipated that excavation will be required at this site as a result of the proposed works.

All excavations at this site must be carried out in accordance with OPSS.PROV 902 and the Occupational Health and Safety Act (OHSA). For the purposes of assessing excavation and temporary support requirements in compliance with the OHSA, the embankment fills are classified as Type 3 soils. The underlying native hard silty clay/clayey silt till may be considered as a Type 2 material.

The selection of the method of excavation is the responsibility of the contractor and must be based on his equipment, experience and interpretation of the site conditions. Excavations should be inspected regularly for evidence of instability if they have been left open for extended periods of time and following periods of heavy rain or thawing. If required, remedial actions must be taken to ensure the stability of the excavation and the safety of workers. Any exposed soil slopes should be covered with plastic sheetings to protect against precipitation and surface runoff.

Given the presence of highway drainage and that the excavations are likely going to be within the embankment fill, it is anticipated that any excavation required for rehabilitation of the bridge will

likely not extend below the groundwater level. However, seepage or perched water from the embankment fill is to be expected.

Surface runoff and precipitation should be diverted away from the excavations. The Contractor should be prepared to pump from filtered sumps to remove seepage water or surface water collecting in an excavation. Unwatering must remain operational and effective until all excavations are backfilled.

The design of dewatering and unwatering systems that may be required is the responsibility of the Contractor and the Contract Documents must alert him to this responsibility.

12.0 ADJACENT STRUCTURES AND BURIED UTILITIES

It is recommended that the exact locations of any existing utilities that are present in the vicinity of the work areas be established by the designer and compared with the extent of the potential work zones related to the proposed rehabilitation of existing structure.

The utilities should not be undermined or damaged during rehabilitation of the existing bridge. Relocation of, and/or special protective measures for some or all of these affected utilities may be required.

13.0 INVESTIGATION FOR DETAIL DESIGN

The proposed works include east and west widening of the bridge and replacing existing walls with secant caisson walls or RSS walls at the four corners of the bridge. Temporary protection will likely be required for construction. Available information (References 1 and 2) does not provide sufficient coverage and detail information of the site. Accordingly, it will be necessary to carry out an additional site investigation and field testing to support the preparation of foundation design recommendations for detail design of the bridge widening and retaining walls.

For detail design, it is recommended that MTO Guideline for Foundation Engineering Services (Version 3.0 April 2022) be followed. For this bridge widening and new retaining walls, the minimum requirements are summarized as follows:

Bridge widening

- One (1) borehole at each widened side of foundation element advancing to a minimum of 3m below refusal.
- If bedrock is encountered, borehole shall be cored for a minimum depth of 3 m.

Retaining walls

- One (1) borehole shall be advanced at each end of a retaining wall and at a maximum longitudinal spacing of 50 m. Boreholes shall be advanced to 3 m into a competent stratum or 10 m below the base of the wall, whichever is less. If bedrock is encountered, bedrock shall be cored for a minimum depth of 3 m.
- Additional requirements for RSS wall include boreholes behind and in front of the wall facing, minimum depth of boreholes along wall facing and retained zone area shall be 2H or 10 m below the base of RSS, minimum depth of H for boreholes along the fore-slope area.

  Borehole location for the proposed retaining walls should be established during the final design phase.

The proposed borehole location is schematically shown on a plan in Appendix D for illustrative purposes. For detail design, the full requirements of the MTO (2022) guideline will need to be satisfied.

14.0 CLOSURE

Engineering assessment and preparation of this desktop study report were carried out by Rocio Reyna, P,Eng. The report was reviewed by Sydney Pang, P.Eng. and P.K. Chatterji, P.Eng., a Designated Principal Contact for MTO Foundations Projects.

THURBER ENGINEERING LTD.

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Senior Geotechnical Engineer

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Senior Associate, Senior Foundation Engineer

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Review Principal, Designated MTO Contact

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STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

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The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.

d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

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Appendix A

Record of Borehole Sheets and Borehole Plan (Geocres)

Order No. 0-10-5 Enclosure No. 2

Dominion Soil Investigation Ltd.

Engineering Data Sheet for Borehole # 1.

Date: 13-17 OCT. 1960.

Project: HWY #6 - C.P.R. OVERHEAD
Location: 12 MI. S. OF CLAPPISONS CORNERS
Hole Location: SEE ENCLOSURE NO. 1.
Hole Elevation and Datum: 473.1 FT.
Field Supervisor: J.P. Prep.: J.P.
Driller: R.R. Checked: L.R.S.

LEGEND
Shear Strength (C)
Unconfined compression
Vane test and sensitivity (S) ⊕ $+^S$
Penetration Resistance (P)
2" Split tube
2" Dia. Cone
Casing
Sampling Method
2" Dia. split tube
2" Shelby tube

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	GROUND SURFACE.	473.1	0
~ ~ ~	ORGANIC TOPSOIL.	470	
	BROWN CLAY OF INTERMEDIATE PLASTICITY CONTAINING APPR. 5% SAND AND FINE GRAVEL MAX ¾" Ø (CLAY TILL)	460	10
		450	20
		440	30
	END OF BOREHOLE	436.6	36.5

STRENGTH AND PENETRATION RESISTANCE
C P.S.F.
P BLOWS/FT.
0 20 40 60 80 100
0 5 10 15 20 25 30 35
1. 2. 3. 4. >100 5. 6. 7. 8. 9.

Order No. 0-10-5 Enclosure No. 3.

Dominion Soil Investigation Ltd.

Engineering Data Sheet for Borehole: #2

Date: 18-19. OCT. 1960.

Project: HWY #6 - C.P.R. OVERHEAD
Location: 1/2 MI. S. OF CLAPPISONS CRNS.
Hole Location: SEE ENCLOSURE NO. 1.
Hole Elevation and Datum: 454.5 FT
Field Supervisor: J.P. Prep.: J.P.
Driller: R.R. Checked: L.R.S.

LEGEND
Shear Strength (C)
Unconfined compression ⊕
Vane test and sensitivity (S) +s
Penetration Resistance (P)
2" Split tube
2" Dia. Cone
Casing
Sampling Method
2" Dia. split tube
2" Shelby tube

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	GROUND SURFACE	454.5	0
	GRASS AND ROOTS		
	BROWN CLAY OF INTERMEDIATE PLASTICITY CONTAINING APPR. 5% SAND AND FINE GRAVEL MAX. 3/4"ϕ (CLAY TILL)	450	5
		440	15
	TURNS REDDISH	430	25
	MIXED WITH BROKEN RED & GREEN SHALE.	422.5	30
	END OF BOREHOLE		

STRENGTH AND PENETRATION RESISTANCE
C P.S.F.
P BLOWS/FT.
0 20 40 60 80 100
5 10 15 20 25 30

1.
2.
3.
4. >100
5.
6.
7. >100
8.
9. >100

Order No. O-10-5 Enclosure No. 4.

Dominion Soil Investigation Ltd.

Engineering Data Sheet for Borehole: # 3.

Date: 20-21. OCT. 1960.

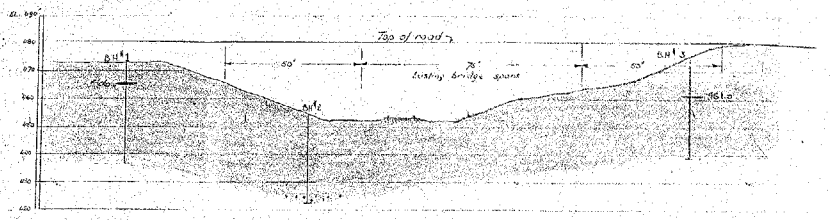
Project: HWY #6 - C.P.R. OVERHEAD
Location: 1.2 MI. S. OF CLAPPISONS CORNERS
Hole Location: SEE ENCLOSURE NO.1.
Hole Elevation and Datum: 475.5 FT.
Field Supervisor: J.P. Prep.: J.P.
Driller: R.R. Checked: L.R.S.

LEGEND
Shear Strength (C)
Unconfined compression ⊕
Vane test and sensitivity (S) +S
Penetration Resistance (P)
2" Split tube
2" Dia. Cone
Casing
Sampling Method
2" Dia. split tube
2" Shelby tube

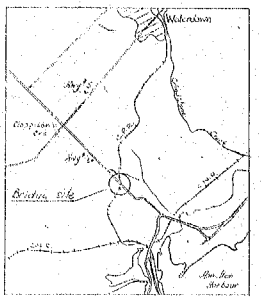
SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	GROUND SURFACE	475.5	0
	FILL (BROWN CLAY TILL)	470	5
		467	
	BROWN CLAY OF INTERMEDIATE PLASTICITY CONTAINING APPR. 5% SAND AND FINE GRAVEL MAX. 3/4" ϕ (CLAY TILL)	460	15
		450	25
		440	35
	END OF BOREHOLE.	439.0	

STRENGTH AND PENETRATION RESISTANCE
C P.S.F.
P BLOWS/FT.
0 20 40 60 80 100
1. 2. 3. 4. 5. 6. 7. 8. 9. 10.

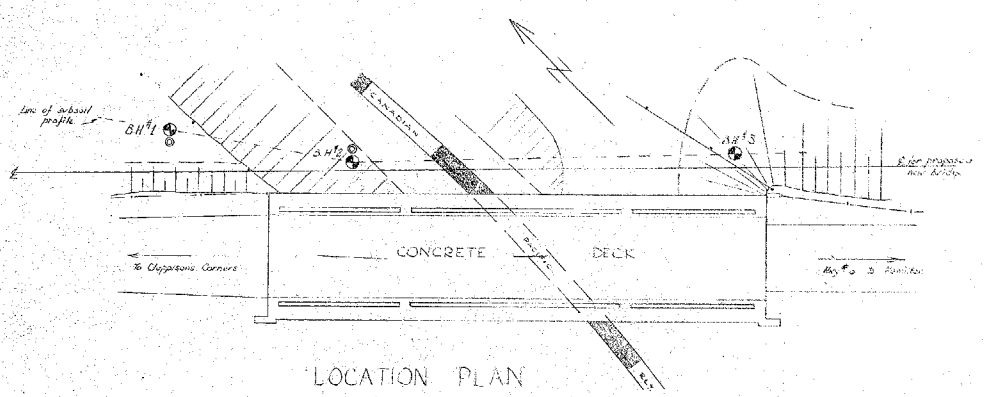
589100 E
4794 500 N 17 30 M S W



SUBSURFACE PROFILE
(ALONG "LINE" OF BOREHOLES)
SCALE : 1 INCH TO 20 FEET



KEY PLAN
SCALE 1:63000



LOCATION PLAN
SCALE : 1 INCH TO 200 FEET

LEGEND

- Borehole
- Dynamic cone
- Fill (chiefly clay fill)
- Brown clay of intermediate plasticity with approx. 5% sand and fine gravel (Weathered clay till).
- As above, but mixed with broken red and grey shale.

OUR REF. No.	DEPARTMENT OF HIGHWAYS MATERIALS AND RESEARCH SECTION DOWNSVIEW, ONTARIO.
G-10-7	
ENCL. No. 1	HWY. #6 - CPR. OVERHEAD
DATE Nov. 1960	P.I. No. 5 OF CLAPPISONS CRNS. WP. 247-60 DISTRICT NO. 4.
DRAWN BY J.B.	DOMINION SOIL INVESTIGATION LIMITED
CHECKED BY J.A.	TORONTO 12 80 EGLINTON AVENUE EAST ONTARIO

LIST OF ABBREVIATIONS

The abbreviations commonly employed on Records of Boreholes, on figures and in the text of the report are as follows:

I. SAMPLE TYPE

AS	Auger sample
BS	Block sample
CS	Chunk sample
SS	Split-spoon
DS	Denison type sample
FS	Foil sample
RC	Rock core
SC	Soil core
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

II. PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg. (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) drive open sampler for a distance of 300 mm (12 in.)

Dynamic Cone Penetration Resistance; N_d:

The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

Piezo-Cone Penetration Test (CPT)

A electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

III. SOIL DESCRIPTION

(a) Cohesionless Soils

Density Index (Relative Density)	N Blows/300 mm or Blows/ft.
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

(b) Cohesive Soils

Consistency	c_u, s_u kPa	c_u, s_u psf
Very soft	0 to 12	0 to 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1,000
Stiff	50 to 100	1,000 to 2,000
Very stiff	100 to 200	2,000 to 4,000
Hard	over 200	over 4,000

IV. SOIL TESTS

w	water content
w_p	plastic limit
w_l	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, G_s)
DS	direct shear test
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V	field vane (LV-laboratory vane test)
γ	unit weight

Note: 1 Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. General

π	3.1416
in x,	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time
F	factor of safety
V	volume
W	weight

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta \sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
ν	poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1+\sigma_2+\sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight*)
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s/\rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

(a) Index Properties (continued)

w	water content
w_l	liquid limit
w_p	plastic limit
I_p	plasticity index = $(w_l - w_p)$
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p)/I_p$
I_C	consistency index = $(w_l - w)/I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_a	coefficient of secondary consolidation
m_v	coefficient of volume change
c_v	coefficient of consolidation
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation pressure
OCR	over-consolidation ratio = σ'_p/σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c'	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p'	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 + \sigma_3)/2$ or $(\sigma'_1 + \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 + \sigma_3)$
S_t	sensitivity

Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

* density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density x acceleration due to gravity)

Golder Associates

RECORD OF BOREHOLE No H1 1 OF 1 METRIC

PROJECT 001-1141F
W.P. 19-95-00
DIST Central HWY 6
DATUM Geodetic

LOCATION N 4,795,469.1 E 272,214.6
BOREHOLE TYPE Continuous Split-Spoon Sampling
DATE Oct.15/02

ORIGINATED BY GM
COMPILED BY LCC
CHECKED BY LCC

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES 'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × REMOULDED) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
145.2	GROUND SURFACE										
0.0 / 144.9	Topsoil		1	SS	4		145				
0.3	Clayey Silt, trace sand, gravel, shale fragments, cinders and rootlets (FILL) Stiff to very stiff Brown Moist		2	SS	8 12						
			3	SS	9		144		○		
			4	SS	15 19				○		
			5	SS	21 23 33		143				
142.6											
142.3 / 2.9	Clayey Silt, trace sand, gravel and shale fragments (TILL) Hard Brown to grey-brown Dry to moist		6	SS	25/.15				○		
	END OF BOREHOLE										

Notes:
1. Borehole dry on completion of drilling operations.

2. Borehole advanced using portable drilling equipment with a half-weight hammer. The SPT "N" values have been adjusted on these logs to reflect the values that would be obtained using a standard-weight hammer.

$+^3, \times^3$ Numbers refer to Sensitivity $\circ^{3\%}$ STRAIN AT FAILURE

Golder Associates

RECORD OF BOREHOLE No H2 1 OF 1 METRIC

PROJECT 001-1141F
W.P. 19-95-00
DIST Central HWY 6
DATUM Geodetic

LOCATION N 4,795,420.9 E 272,258.9
BOREHOLE TYPE Continuous Split-Spoon Sampling
DATE Oct.16/02

ORIGINATED BY GM
COMPILED BY LCC
CHECKED BY LCC

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES 'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (O UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × REMOULDED) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
144.7	GROUND SURFACE										
0.0 / 144.4	Topsoil										
0.3	Clayey Silt, trace sand, gravel and shale fragments (FILL) Stiff to very stiff Brown Moist		1	SS	3 7		145				
			2	SS	~~9~~ 15 16				o		
			3	SS	20 22		140				
					~~21~~						
			4	SS	23 23		135		o		
			5	SS	22 20						
					~~15~~		130				
			6	SS	15 15				o		
			7	SS	15 20		125				
					~~33~~						
139.2			8	SS	23/.15				o		
5.6	Clayey Silt, trace sand, gravel and shale fragments (TILL) Hard Brown to grey-brown Dry to moist END OF BOREHOLE										

Notes:
1. Borehole dry on completion of drilling operations.

2. Borehole advanced using portable drilling equipment with a half-weight hammer. The SPT "N" values have been adjusted on these logs to reflect the values that would be obtained using a standard-weight hammer.

$+^3, \times^3$: Numbers refer to Sensitivity $O^{3\%}$ STRAIN AT FAILURE

Golder Associates

RECORD OF BOREHOLE No H3 1 OF 1 METRIC

PROJECT 001-1141F
W.P. 19-95-00
DIST Central HWY 6
DATUM Geodetic

LOCATION N 4,795,456.6 E 272,230.5
BOREHOLE TYPE 108mm Diameter Solid Stem Augers
DATE Jan.23/01

ORIGINATED BY GM
COMPILED BY LCC
CHECKED BY ASP

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: o UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × REMOULDED (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 10 20 30	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
141.2	GROUND SURFACE						141				
0.0	Clayey Silt, trace sand and gravel (Fill) Very stiff to hard Brown		1	SS	19						
	Contains pieces of black slag between 1.5m and 2.0m depth.		2	SS	35		140				
139.2											
2.0	Clayey Silt to Silty Clay, trace to some sand, trace gravel and shale fragments (Till) Hard Brown to grey-brown Moist		3	SS	37		139		o ⊢		
			4	SS	40/.05		138				
			5	SS	95		137				
			6	SS	85				o ⊢		0 4 59 37
							136				
			7	SS	80		135				
							134				
			8	SS	100/.23		133				
132.7											
8.5	Clayey Silt, trace to some sand, trace gravel and shale fragments (Till/Residual Soil) Hard Red-brown Dry to moist		9	SS	95/.15		132		o ⊢		
							131				
130.4			10	SS	100/.1						
10.8	END OF BOREHOLE										

Notes:
1. Borehole dry on completion of drilling operations.
2. Water level in piezometer measured on November 11, 2002 at 3.2m depth (Elev.138.0m).
3. Water level in piezometer measured on November 22, 2002 at 3.3m depth (Elev.137.9m).

$+^3$, $\times^3$: Numbers refer to Sensitivity $o^{3\%}$ STRAIN AT FAILURE

ON_MOT 0011141F.GPJ ON_MOT.GDT 25/11/02

Golder Associates

RECORD OF BOREHOLE No H4 1 OF 1 METRIC

PROJECT 001-1141F
W.P. 19-95-00
DIST Central HWY 6
DATUM Geodetic

LOCATION N 4,795,464.5 E 272,256.9
BOREHOLE TYPE 108mm Diameter Solid Stem Augers
DATE Jan.23/01

ORIGINATED BY GM
COMPILED BY LCC
CHECKED BY ASP

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES 'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × REMOULDED) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
140.1	GROUND SURFACE						140				
0.0	Clayey Silt, trace sand and gravel (Fill) Very stiff Brown		1	SS	23						
138.7							139				
1.4	Clayey Silt, trace to some sand, trace gravel and shale fragments (Till) Hard Grey-brown Dry to moist		2	SS	54				○		
			3	SS	77		138				
			4	SS	61		137		○ —		
			5	SS	103						
			6	SS	81		136		○		
			7	SS	82		135				
132.3							134				
7.8	Clayey Silt, trace to some sand, trace gravel and shale fragments (Till/Residual Soil) Hard Red-brown Dry to moist		8	SS	100/.23		133		○ —		
			9	SS	100/.08		132				
129.7							131				
	Shale (Bedrock)										
129.3	Red-brown		10	SS	100/.1		130				
10.8	END OF BOREHOLE Note: Borehole dry on completion of drilling operations.										

$+^3, \times^3$: Numbers refer to Sensitivity $\circ^{3\%}$ STRAIN AT FAILURE

Golder Associates

RECORD OF BOREHOLE No P1

1 OF 2

METRIC

PROJECT 001-1141F
W.P. 19-95-00
DIST Central HWY 6
DATUM Geodetic

LOCATION N 4,795,502.9 E 272,225.0
BOREHOLE TYPE 108mm Diameter Solid Stem Augers
DATE Jan.08/01

ORIGINATED BY GM
COMPILED BY LCC
CHECKED BY ASP

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (O UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × REMOULDED) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
145.1	GROUND SURFACE						145				
0.0	Clayey Silt, trace sand and gravel Very stiff Red-brown		1	SS	21						
143.7							144				
1.4	Clayey Silt, trace to some sand, trace gravel (Till) Hard Brown becoming grey-brown below 3m depth Dry to moist		2	SS	69						
			3	SS	86		143		o——		
			4	SS	100		142				
			5	SS	90		141				
			6	SS	80				o		
							140				
			7	SS	75/.15		139				
							138				
			8	SS	50		137				
							136		o——		
			9	SS	66		135				
			10	SS	75		134				
			11	SS	70		133				
132.0							132				
13.1	Clayey Silt, trace to some sand, trace gravel and shale fragments (Till/Residual Soil) Hard Red-brown Dry to moist		12	SS	72/.15		131		o——		

Continued Next Page

+³, ×³: Numbers refer to Sensitivity

O³% STRAIN AT FAILURE

Golder Associates

RECORD OF BOREHOLE No P1 2 OF 2 METRIC

PROJECT 001-1141F
W.P. 19-95-00
DIST Central HWY 6
DATUM Geodetic

LOCATION N 4,795,502.9 E 272,225.0
BOREHOLE TYPE 108mm Diameter Solid Stem Augers
DATE Jan.08/01

ORIGINATED BY GM
COMPILED BY LCC
CHECKED BY ASP

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: 'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: O UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × REMOULDED (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	-- CONTINUED FROM PREVIOUS PAGE --										
	Clayey Silt, trace to some sand, trace gravel and shale fragments (Till/Residual Soil) Hard Red-brown Dry to moist		13	SS	102/.15		130				
							129				
128.1 / 17.0			14	SS	110/.23						
	END OF BOREHOLE Note: Borehole dry on completion of drilling operations.										

+3, ×3: Numbers refer to Sensitivity O3% STRAIN AT FAILURE

Golder Associates

RECORD OF BOREHOLE No P4 1 OF 1 METRIC

PROJECT 001-1141F
W.P. 19-95-00
DIST Central HWY 6
DATUM Geodetic

LOCATION N 4,795,470.0 E 272,252.4
BOREHOLE TYPE 108mm Diameter Solid Stem Augers
DATE Jan.24/01

ORIGINATED BY GM
COMPILED BY LCC
CHECKED BY ASP

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: o UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × REMOULDED 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 10 20 30	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
140.1	GROUND SURFACE						140				
0.0	Clayey Silt, some sand, trace gravel and rootlets Stiff Brown		1	SS	11						
138.7							139				
1.4	Clayey Silt, trace to some sand, trace gravel and shale fragments (Till) Hard Brown to grey-brown Dry to moist		2	SS	110						
			3	SS	70		138		o ⊢—⊣		
			4	SS	90		137				
			5	SS	90		136				
			6	SS	80				o		
							135				
			7	SS	91		134				
							133				
132.2			8	SS	100/.28						
7.9	Clayey Silt, trace to some sand, trace gravel and shale fragments (Till/Residual Soil) Hard Red-brown Dry to moist						132				
			9	SS	105/.15		131		o ⊢—⊣		4 18 60 18
							130				
129.3			10	SS	100/.1						
10.8	END OF BOREHOLE Note: Borehole dry on completion of drilling operations.										

+3, ×3: Numbers refer to Sensitivity o3% STRAIN AT FAILURE

Golder Associates

RECORD OF BOREHOLE No P5 1 OF 1 METRIC

PROJECT 001-1141F
W.P. 19-95-00
DIST Central HWY 6
DATUM Geodetic

LOCATION N 4,795,491.6 E 272,248.5
BOREHOLE TYPE 108mm Diameter Solid Stem Augers
DATE Jan.22/01

ORIGINATED BY GM
COMPILED BY LCC
CHECKED BY ASP

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (O UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × REMOULDED) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
138.7	GROUND SURFACE										
0.0	Clayey Silt, trace to some sand, trace gravel and shale fragments (Till) Hard Brown to grey-brown Dry to moist		1	SS	69		138				
			2	SS	87		137				
			3	SS	72		136				
			4	SS	86		135		o——		
			5	SS	75		134				
			6	SS	90		133		o		
			7	SS	88		132				
			8	SS	100/.15		131		——o		5 13 56 26
130.2											
8.5	Clayey Silt, trace to some sand, trace gravel and shale fragments (Till/Residual Soil) Hard Red-brown Dry to moist		9	SS	100/.08		130				
							129				
127.9			10	SS	102/.14		128		o		
10.8	END OF BOREHOLE Note: Borehole dry on completion of drilling operations.										

$+^{3}, \times^{3}$: Numbers refer to Sensitivity $O^{3\%}$ STRAIN AT FAILURE

ON_MOT 0011141F.GPJ ON_MOT.GDT 22/11/02

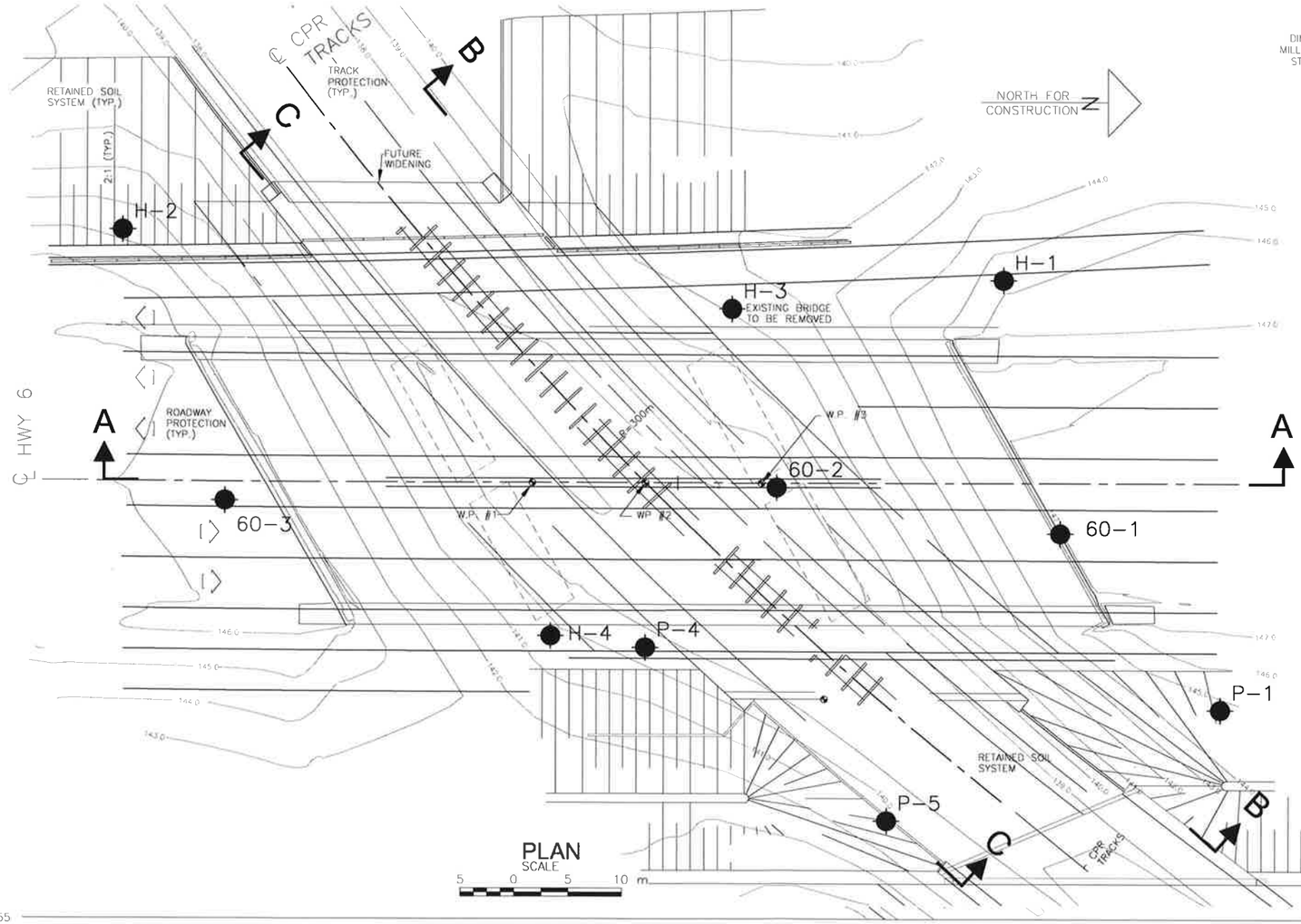
METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS IN KILOMETRES + METRES.

CONT No.
WP No. 19-95-04

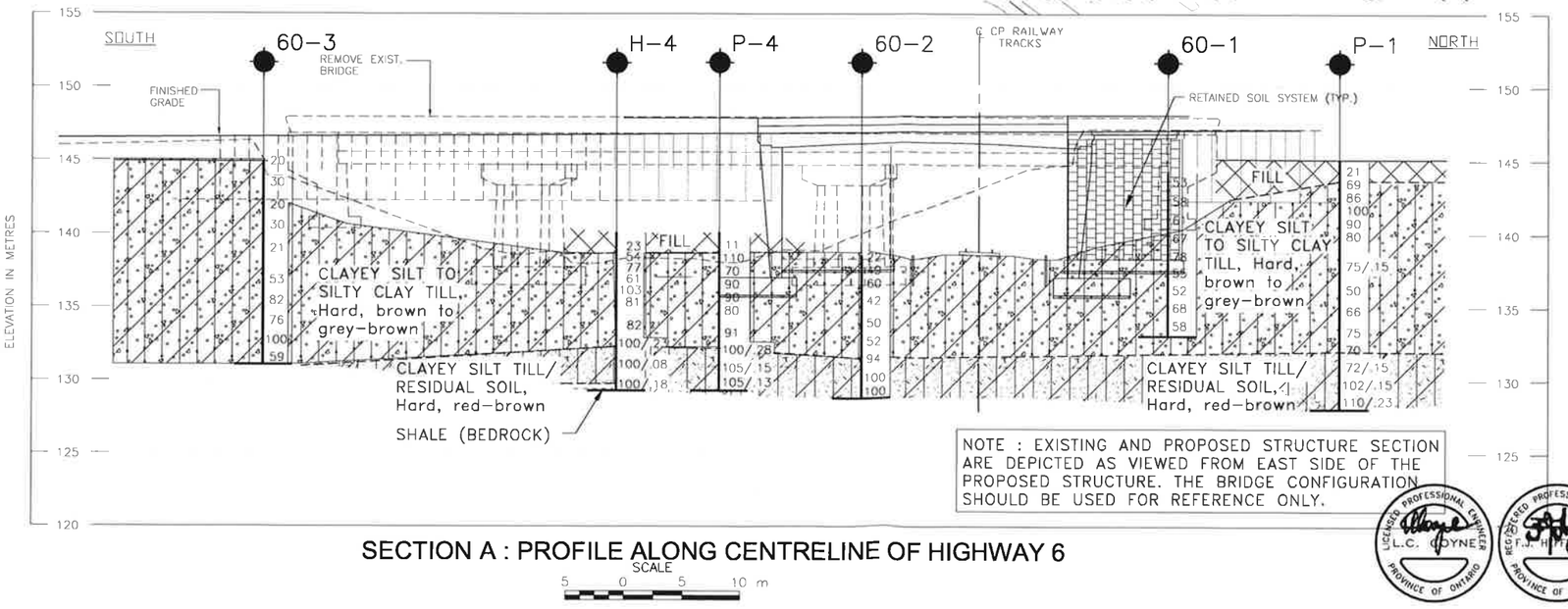
SHEET

HIGHWAY 6 OVERPASS AT CP RAIL
BOREHOLE LOCATIONS & SOIL STRATA

Golder Associates Ltd.
MISSISSAUGA, ONTARIO, CANADA

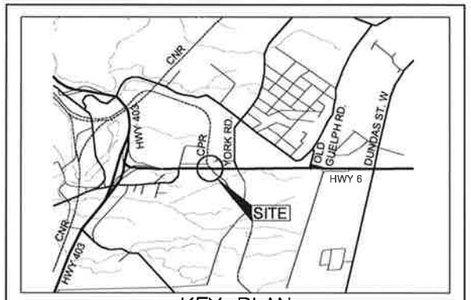


PLAN
SCALE 5 0 5 10 m



NOTE : EXISTING AND PROPOSED STRUCTURE SECTION ARE DEPICTED AS VIEWED FROM EAST SIDE OF THE PROPOSED STRUCTURE. THE BRIDGE CONFIGURATION SHOULD BE USED FOR REFERENCE ONLY.

SECTION A : PROFILE ALONG CENTRELINE OF HIGHWAY 6
SCALE 5 0 5 10 m



KEY PLAN

LEGEND

- Borehole – Current Investigation
- Seal
- Piezometer
- N — Standard Penetration Test Value
- 16 — Blows/0.3m unless otherwise stated (Std. Pen. Test, 475 j/blow)
- 100 — Rock Quality Designation (RQD)
- WL in piezometer
- WL upon completion of drilling

No.	ELEVATION	CO-ORDINATES	
		NORTHING	EASTING
H-1	145.2	4795469.1	272214.6
H-2	144.7	4795420.9	272258.9
H-3	141.2	4795456.6	272230.5
H-4	140.1	4795464.5	272256.9
P-1	145.1	4795502.9	272225.0
P-4	140.1	4795470.0	272252.4
P-5	138.7	4795491.6	272248.5
60-1	144.2	4795485.4	272224.5
60-2	138.5	4795468.3	272237.2
60-3	144.9	4795440.5	272267.3

NOTES

This drawing is for subsurface information only. The proposed structure details are shown for illustration purposes only and may not be consistent with the final design configuration as shown elsewhere in the Contract Documents.

The boundaries between soil strata have been established only at borehole locations. Between Boreholes the boundaries are assumed from geological evidence.

The complete foundation investigation and design report for this project and other related documents may be examined at the Materials Engineering and Research Office, Downsview. Information contained in this report and related documents is specifically excluded in accordance with Section GC 2.01 of OPS General Conditions.

REFERENCE

General Arrangement file was provided in digital format by URS Canada Inc., File name "2002-04/underpass.dwg"

LICENSED PROFESSIONAL ENGINEER L.C. COYNE PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER F.J. HEFFERMAN PROVINCE OF ONTARIO

NO.	DATE	BY	REVISION

Geocres No.

HWY:	PROJECT NO. 001-1141F		DIST.
SUBM'D. LCC	CHKD. LCC	DATE: APRIL 2005	SITE:
DRAWN: PS	CHKD. LCC	APP'D. ASP	DWG. 1

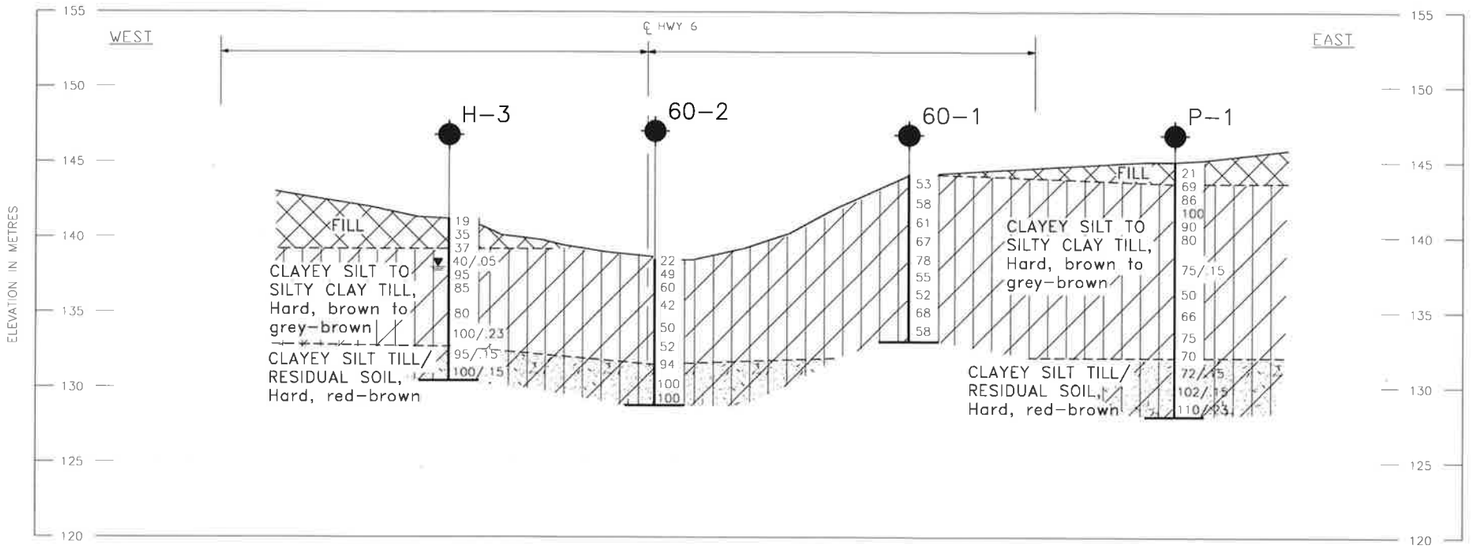
METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS IN KILOMETRES + METRES.

CONT No.
WP No. 19-95-04

HIGHWAY 6 OVERPASS AT CP RAIL
SOIL STRATA

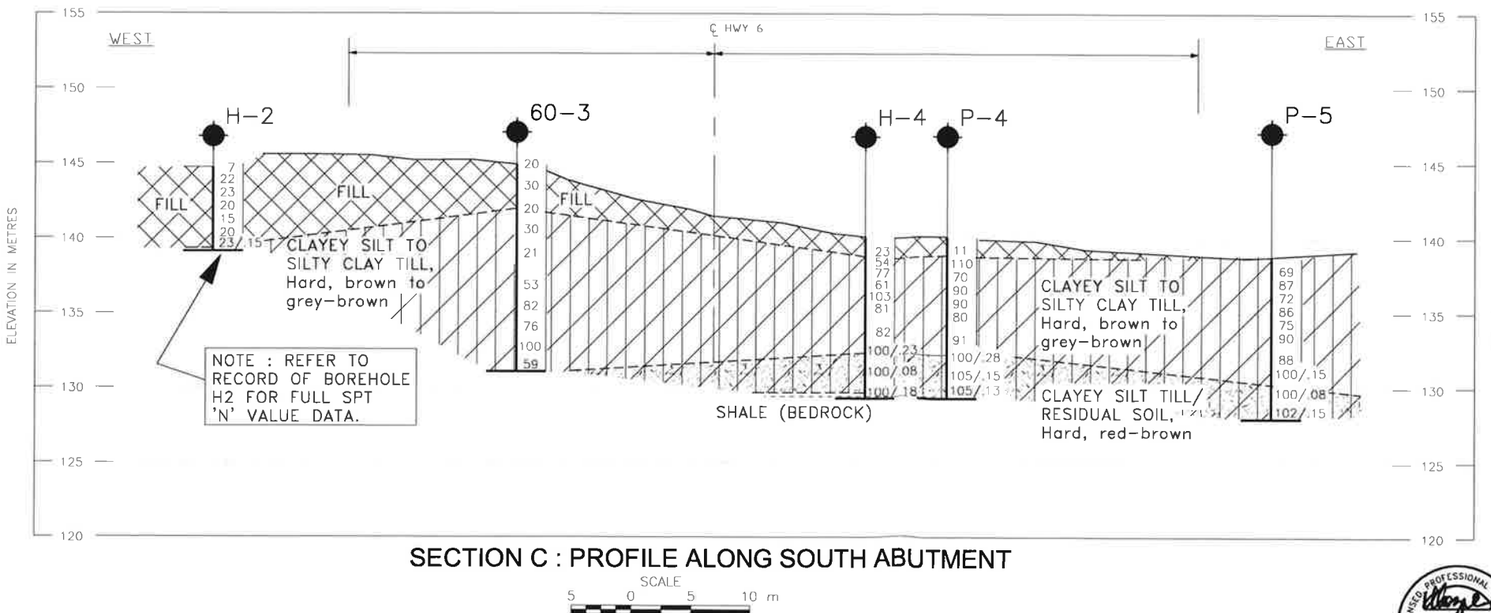
SHEET

Golder Associates
Golder Associates Ltd.
MISSISSAUGA, ONTARIO, CANADA



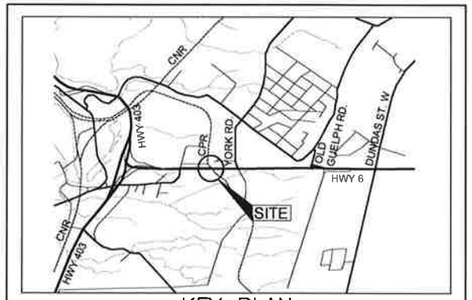
SECTION B : PROFILE ALONG NORTH ABUTMENT

SCALE
5 0 5 10 m



SECTION C : PROFILE ALONG SOUTH ABUTMENT

SCALE
5 0 5 10 m



KEY PLAN

LEGEND

- Borehole – Current Investigation
- Seal
- Piezometer
- N — Standard Penetration Test Value
- 16 — Blows/0.3m unless otherwise stated (Std. Pen. Test, 475 j/blow)
- 100 — Rock Quality Designation (RQD)
- WL in piezometer
- WL upon completion of drilling

No.	ELEVATION	CO-ORDINATES	
		NORTHING	EASTING
H-1	145.2	4795469.1	272214.6
H-2	144.7	4795420.9	272258.9
H-3	141.2	4795456.6	272230.5
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P-4	140.1	4795470.0	272252.4
P-5	138.7	4795491.6	272248.5
60-1	144.2	4795485.4	272224.5
60-2	138.5	4795468.3	272237.2
60-3	144.9	4795440.5	272267.3

NOTES

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LICENSED PROFESSIONAL ENGINEER L.C. JOYNER PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER F.J. HEFFERNAN PROVINCE OF ONTARIO

NO.	DATE	BY	REVISION

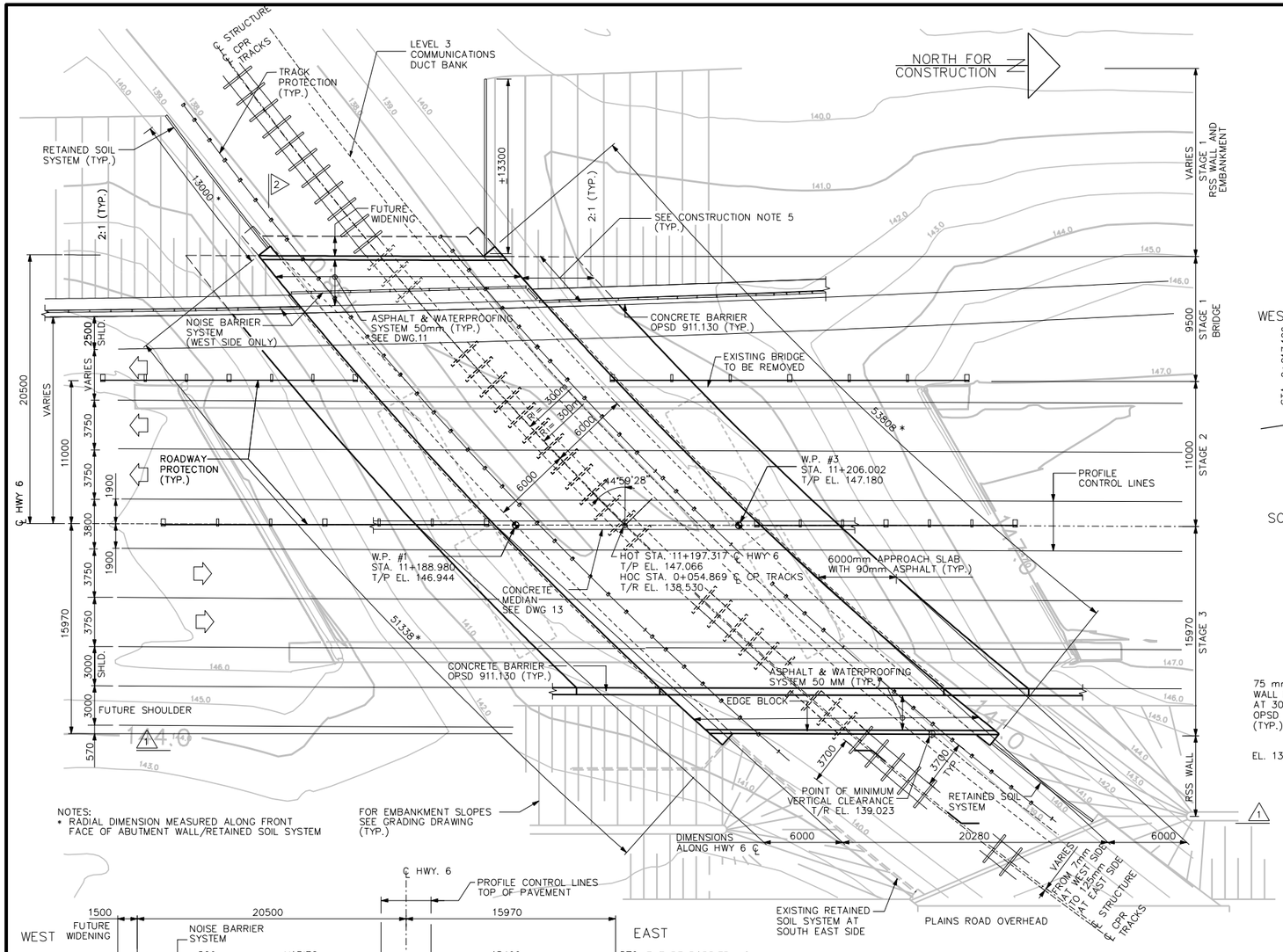
Geocres No.:

HWY.		PROJECT NO. 001-1141F	DIST.
SUBM'D. LCC	CHKD. LCC	DATE: APRIL 2005	SITE:
DRAWN. PS	CHKD. LCC	APP'D. ASP	DWG. 2

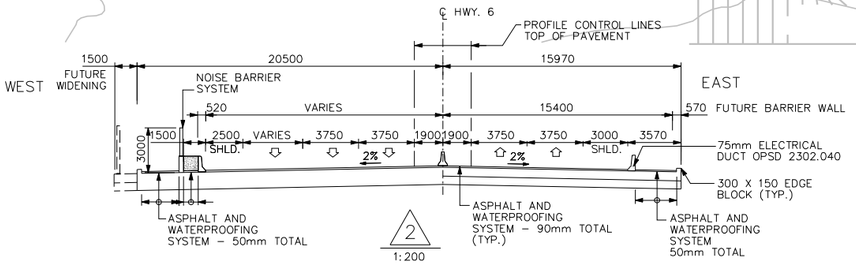
THURBER

Appendix B

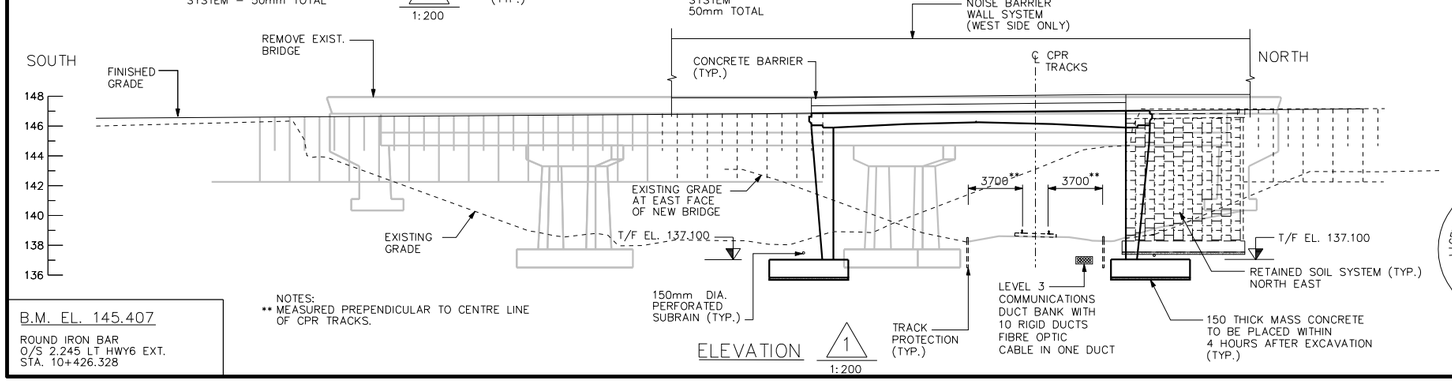
Archive Drawings of Existing Bridge (Construction)



PLAN
1:200



2
1:200



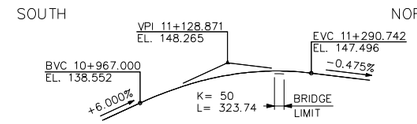
ELEVATION
1
1:200

NOTES:
** MEASURED PREPENDICULAR TO CENTRE LINE OF CPR TRACKS.

B.M. EL. 145.407
ROUND IRON BAR
O/S 2.245 LT HWY6 EXT.
STA. 10+426.328

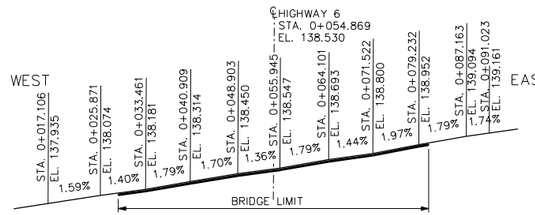
METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN



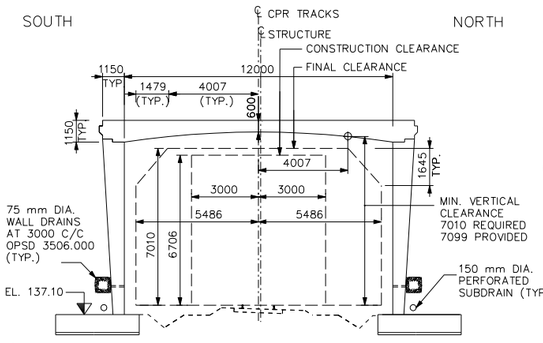
PROFILE CONTROL ALONG HWY 6

N.T.S.



PROFILE ALONG CP RAILWAY

NOTE: TOP OF SOUTH RAIL ELEVATIONS SHOWN



RAILWAY CLEARANCE DIAGRAM

N.T.S.

LIST OF ABBREVIATIONS

W.P.	WORKING POINT
U/S	UNDERSIDE
T/P	TOP OF PAVEMENT
T/FTG.	TOP OF FOOTING
T/R.	TOP OF RAIL
T/BEDROCK	TOP OF BEDROCK
TYP.	TYPICAL

LIST OF DRAWINGS

1. GENERAL ARRANGEMENT
2. BOREHOLE LOCATIONS AND SOIL STRATA
3. SOIL STRATA
4. CONSTRUCTION REMOVALS I
5. CONSTRUCTION REMOVALS II
6. CONSTRUCTION STAGING
7. FOUNDATION LAYOUT
8. SOUTH ABUTMENT
9. NORTH ABUTMENT
10. DECK REINFORCEMENT
11. DECK LAYOUT AND SCREED ELEVATIONS
12. EAST BARRIER WALL W/O RAILING–PL3
13. WEST BARRIER WALL W/O RAILING–PL3
14. REINFORCED CONCRETE MEDIAN BARRIER WALL
15. 6000mm APPROACH SLAB
16. RETAINED SOIL SYSTEM
17. STANDARD DETAILS
18. ELECTRICAL EMBEDDED WORK

GENERAL NOTES

1. CLASS OF CONCRETE: 30 MPa
2. CLEAR COVER TO REINFORCING STEEL:
   –FOOTINGS.....100±25
   –DECK : TOP.....70±20
   BOTTOM.....50±10
   –REMAINDER.....70±20
   UNLESS NOTED OTHERWISE.
3. REINFORCING STEEL
   REINFORCING STEEL SHALL BE GRADE 400 UNLESS OTHERWISE SPECIFIED.
   BAR MARKS WITH PREFIX 'C' DENOTE COATED BARS.
   STAINLESS REINFORCING STEEL SHALL BE TYPE 316LN OR DUPLEX 2205 AND HAVE A MINIMUM YIELD STRENGTH OF 420 MPa.
   BAR MARKS WITH PREFIX 'S' DENOTE STAINLESS STEEL BARS UNLESS SHOWN OTHERWISE.
   TENSION LAP SPLICES SHALL BE CLASS B.
   BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSIONS USING MINIMUM BEND DIAMETERS, WHILE STIRRUPS AND TIES SHALL HAVE MINIMUM HOOK DIMENSIONS.
   ALL HOOKS SHALL BE IN ACCORDANCE WITH THE STRUCTURAL STANDARD DRAWINGS SS12–1 AND SS12–2, UNLESS INDICATED OTHERWISE.
4. RETAINED SOIL SYSTEM
   RETAINED SOIL SYSTEM WALLS SHALL HAVE THE FOLLOWING ATTRIBUTES:
   APPLICATION: HORIZONTAL RETAINMENT–WALL/SLOPES
   PERFORMANCE: HIGH
   APPEARANCE: HIGH
5. NOISE BARRIER ON STRUCTURE.
   REFERENCE WIND PRESSURE 415 Pa MINIMUM.
6. TEMPORARLY ROADWAY PROTECTION SHOWN ON THE DRAWINGS IS SCHEMATIC ONLY.
   THE CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGN, INSTALLATION, MAINTENANCE AND REMOVAL OF THE TEMPORARLY ROADWAY PROTECTION.

CONSTRUCTION NOTES

1. THE CONTRACTOR SHALL ENSURE THE STABILITY OF THE ABUTMENTS DURING CONSTRUCTION.
2. BACKFILL SHALL BE PLACED SIMULTANEOUSLY BEHIND BOTH ABUTMENTS KEEPING THE HEIGHT OF THE BACKFILL APPROXIMATELY THE SAME. AT NO TIME SHALL THE DIFFERENCE IN ELEVATION BE GREATER THAN 500mm.
3. NO BACKFILL SHALL BE PLACED UNTIL THE DECK CONCRETE HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 25 MPa.
4. MASS CONCRETE TO BE PLACED WITHIN 4 HOURS AFTER SUBGRADE PREPARATION AND INSPECTION.
5. APPROACH SLAB SHALL BE REMOVED (WITHIN LIMITS SHOWN) WHEN NO LONGER REQUIRED FOR TRAFFIC STAGING.
6. TRACK PROTECTION SHALL BE DESIGNED BY THE CONTRACTOR AND APPROVED BY CPR. TRACK PROTECTION SHALL BE DESIGNED IN ACCORDANCE WITH AREMA FOR COOPER E90 LIVE LOAD.
7. ROADWAY PROTECTION SHALL MEET REQUIREMENTS FOR PERFORMANCE LEVEL 2 PROTECTION SYSTEM AS SPECIFIED IN CONTRACT DOCUMENTS.
8. DECK FALSEWORK SHALL BE DESIGNED TO FIT WITHIN THE MINIMUM CLEARANCE FOR FALSEWORK.

APPLICABLE STANDARD DRAWINGS

OPSD 3501.00	GRANULAR BACKFILL REQUIREMENTS–ABUTMENTS
OPSD 3506.00	RETAINING WALL AND ABUTMENT WALL DRAIN DETAIL
OPSD 3906.02	BRIDGE DECK WATERPROOFING
OPSD 3906.03	BRIDGE DECK WATERPROOFING DETAILS
OPSD 4010.00	GUIDERAIL AND CHANNEL ANCHORAGE
OPSD 4601.00	LOCATION OF SITE NUMBER AND DATE FIGURES
OPSD 4670.00	TYPICAL JOINT DETAILS
OPSD 918.021	REINFORCED CONCRETE MEDIAN BARRIER

LICENSED PROFESSIONAL ENGINEER — N. WALKER — PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER — R.S. REEL — 20/07/05 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — L. KOZACHUK — 20/7/05 — PROVINCE OF ONTARIO

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS	DATE	BY	DESCRIPTION

DESIGN	N.W.	CHK	S.K.	CODE	CSA–S6–00	LOAD	CL 625–ONT
DRAWN		CHK	S.K.	SITE	36–516	DATE	JULY 2005
						DWG	1

HWY 6
CONT No 2005–2019
WP No 19–95–04

HWY 6 OVERHEAD AT CPR

GENERAL ARRANGEMENT

SHEET 257

URS

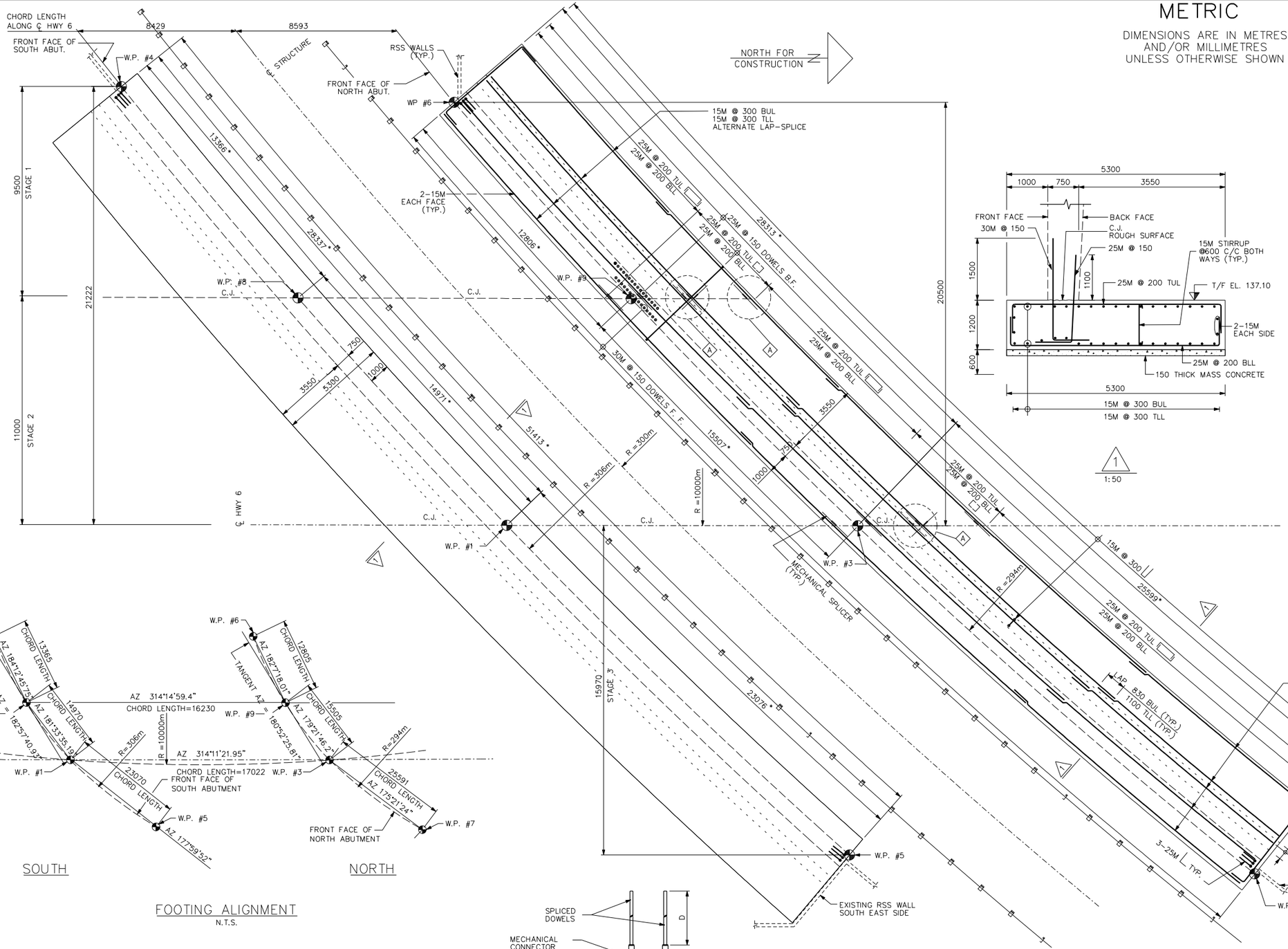
CADD FILE NAME : n:/Str-Trans/CADD/00 Projects/00137/ 6CPR / hwy6_cprGA.dgn

METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

HWY	6	
CONT No	2005-2019	
WP No	19-95-04	
HWY 6 OVERHEAD AT CPR		SHEET 263
FOUNDATION LAYOUT		

URS



1
1:50

NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH DWG. 8 & 9.

COORDINATES OF WORK POINTS

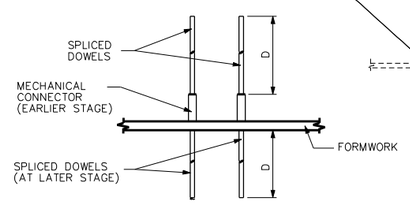
WP	STATION	NORTH COORDINATE	SOUTH COORDINATE
1	11+188.980	4 795 455.445	272 250.014
3	11+206.002	4 795 467.310	272 237.809
4	11+170.192	4 795 427.152	272 248.625
5	11+205.608	4 795 478.501	272 249.208
6	11+186.463	4 795 439.010	272 237.507
7	11+225.239	4 795 492.817	272 235.737
8	11+178.815	4 795 440.481	272 249.607
9	11+195.062	4 795 451.806	272 237.981

LIST OF ABBREVIATIONS

BOT.	DENOTES BOTTOM
E.F.	DENOTES EACH FACE
T/F	DENOTES TOP OF FOOTING
B.F.	DENOTES BACK FACE
F.F.	DENOTES FRONT FACE
DWLS.	DENOTES DOWELS
C.J.	DENOTES CONSTRUCTION JOINT
BUL	DENOTES BOTTOM UPPER LAYER
BLL	DENOTES BOTTOM LOWER LAYER
TUL	DENOTES TOP UPPER LAYER
TLL	DENOTED TOP LOWER LAYER
AZ.	AZIMUTH

SOUTH NORTH

FOOTING ALIGNMENT
N.T.S.



DIMENSION 'D'	
25M SPLICED DOWELS	1070 (TOP) 830 (BOTTOM)
15M SPLICED DOWELS	650 (TOP) 650 (BOTTOM)

A

TYPICAL MECHANICAL SPLICE DETAIL
NOTE: N.T.S.
1. SIZE OF MECHANICAL SPLICE TO MATCH THE REBAR SIZES.
2. DOWELS TO BE HOOKED FOR DEVELOPMENT WHERE REQUIRED.

PLAN
1:100

NOTE:
REINFORCEMENT SHOWN FOR NORTH FOOTING. SOUTH FOOTING SIMILAR UNLESS NOTED.
* - RADIAL DIMENSION MEASURED ALONG FRONT FACE OF ABUTMENT

LICENSED PROFESSIONAL ENGINEER — N. WALKER — PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER — R.S. REEL — 20/07/05 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — L. KOZACHUK — 20/7/05 — PROVINCE OF ONTARIO

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

APPLICABLE STANDARD DRAWINGS

OPSD 4670.00 TYPICAL JOINT DETAILS

REVISIONS		
DATE	BY	DESCRIPTION

DESIGN N.W.	CHK S.K.	CODE CSA-S6-00	LOAD CL 625-ONT	DATE JULY 2005	
DRAWN	CHK S.K.	SITE 36-516		DWG 7	

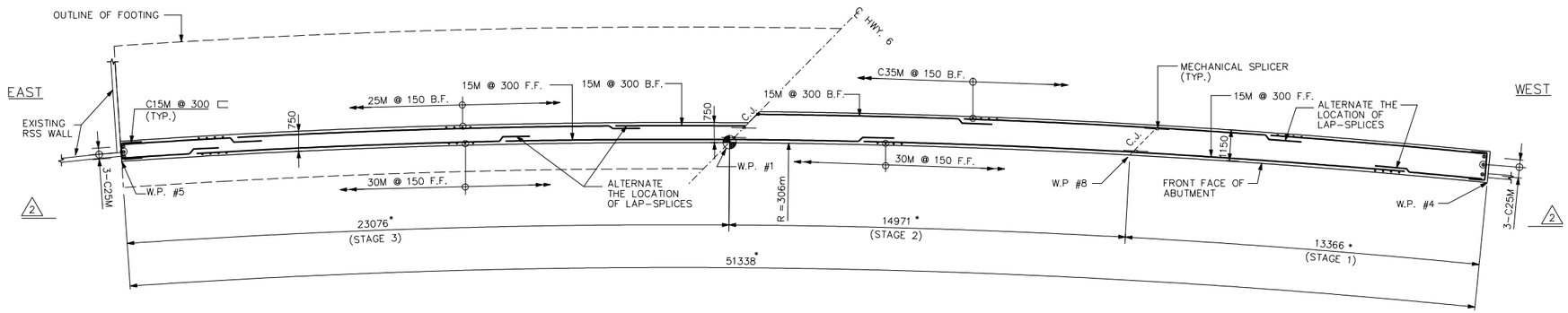
CADD FILE NAME : n:/Str-Trans/CADD/00 Projects/00137/ 6CPR /hwy6_cprFDN.dgn

METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

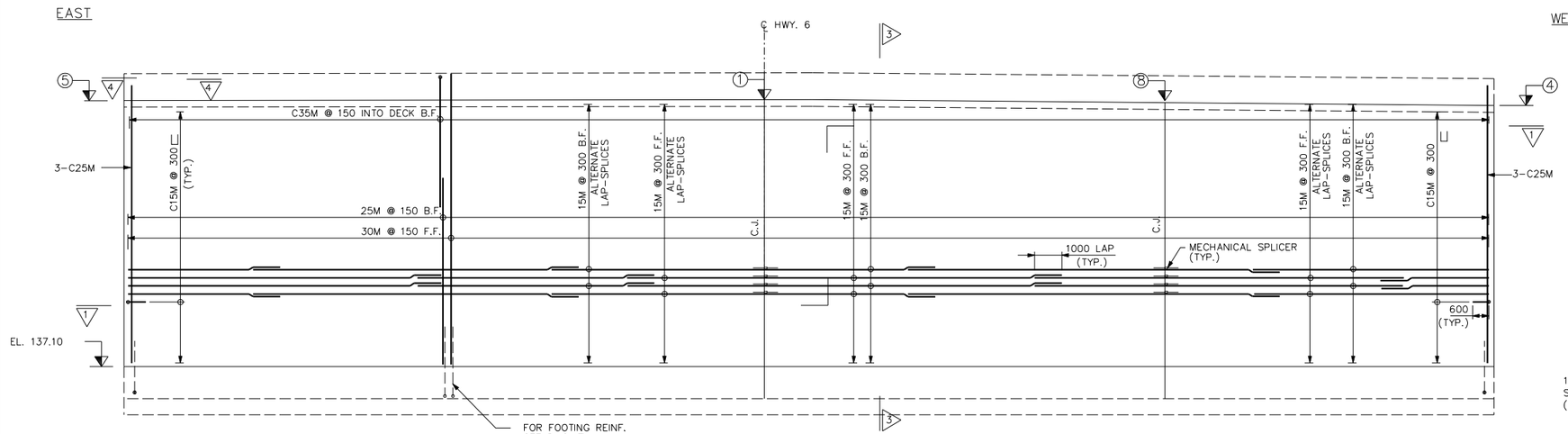
HWY	6	
CONT No	2005-2019	
WP No	19-95-04	
HWY 6 OVERHEAD AT CPR		SHEET 264
SOUTH ABUTMENT		

URS

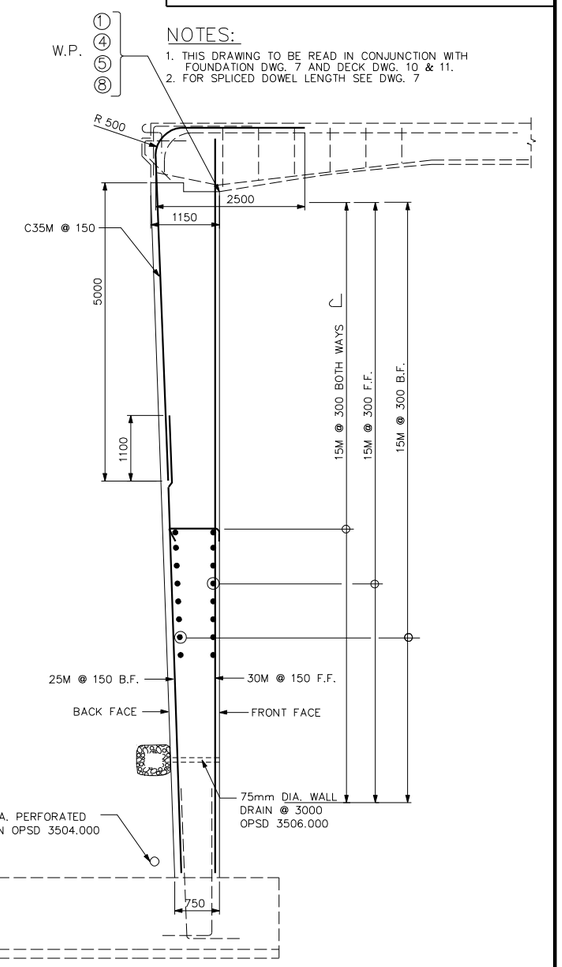


1 PLAN
1:100

NOTE:
* RADIAL DIMENSION ALONG FRONT FACE OF ABUTMENT WALL

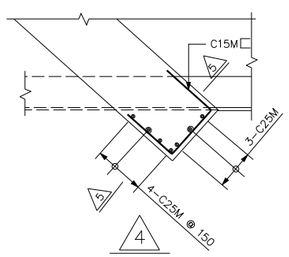


2 ELEVATION
1:100



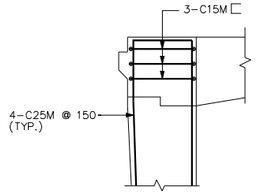
NOTES:
1. THIS DRAWING TO BE READ IN CONJUNCTION WITH FOUNDATION DWG. 7 AND DECK DWG. 10 & 11.
2. FOR SPLICED DOWEL LENGTH SEE DWG. 7

3 1:50



4 1:50

PARTIAL PLAN AT SOUTH EAST CORNER



5 1:50

WORKING POINT	SOUTH ABUT. ELEVATIONS
①	145.704
④	144.951
⑤	145.616
⑧	145.315

LIST OF ABBREVIATIONS

B.F.	DENOTES BACK FACE
F.F.	DENOTES FRONT FACE
C.J.	DENOTES CONSTRUCTION JOINT
TYP.	DENOTES TYPICAL
T/F	DENOTES TOP OF FOOTING
EL.	DENOTES ELEVATION

APPLICABLE STANDARD DRAWINGS

OPSD 4670.00 TYPICAL JOINT DETAILS
OPSD 3506.00 RETAINING WALL AND ABUTMENT WALL DRAIN DETAIL
OPSD 3504.00 MINIMUM GRANULAR BACKFILL REQUIREMENTS

LICENSED PROFESSIONAL ENGINEER — N. WALKER — PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER — R.S. REEL — 20/07/05 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — L. KOZACHUK — 28/7/05 — PROVINCE OF ONTARIO

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS		
DATE	BY	DESCRIPTION

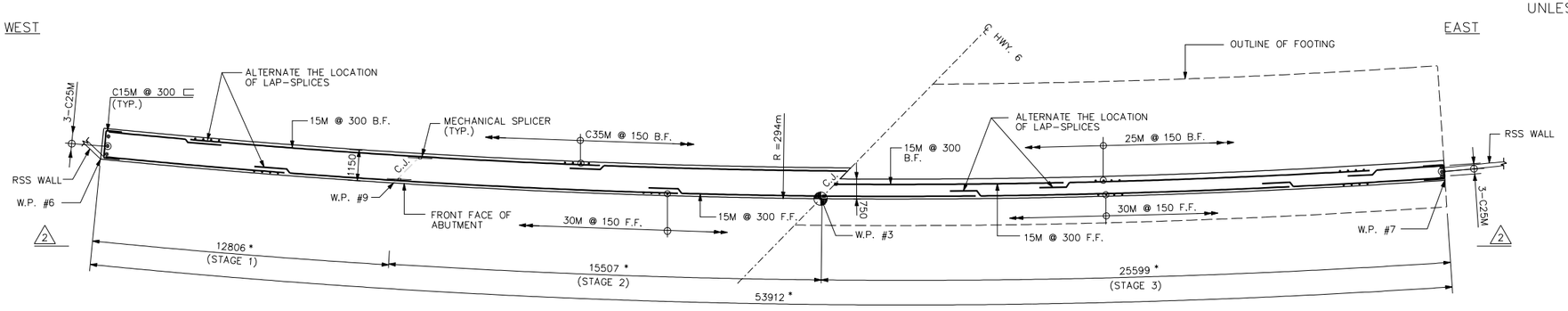
DESIGN	N.W.	CHK	S.K.	CODE	CSA-S6-00	LOAD	CL 625-ONT
DRAWN	B.K./V.A.	CHK	S.K.	SITE	36-516	DATE	JULY 2005
						DWG	8

CADD FILE NAME : n:/Str-Trans/CADD/00 Projects/00137/ 6CPR /hwy6_cprSABUT.dgn

METRIC

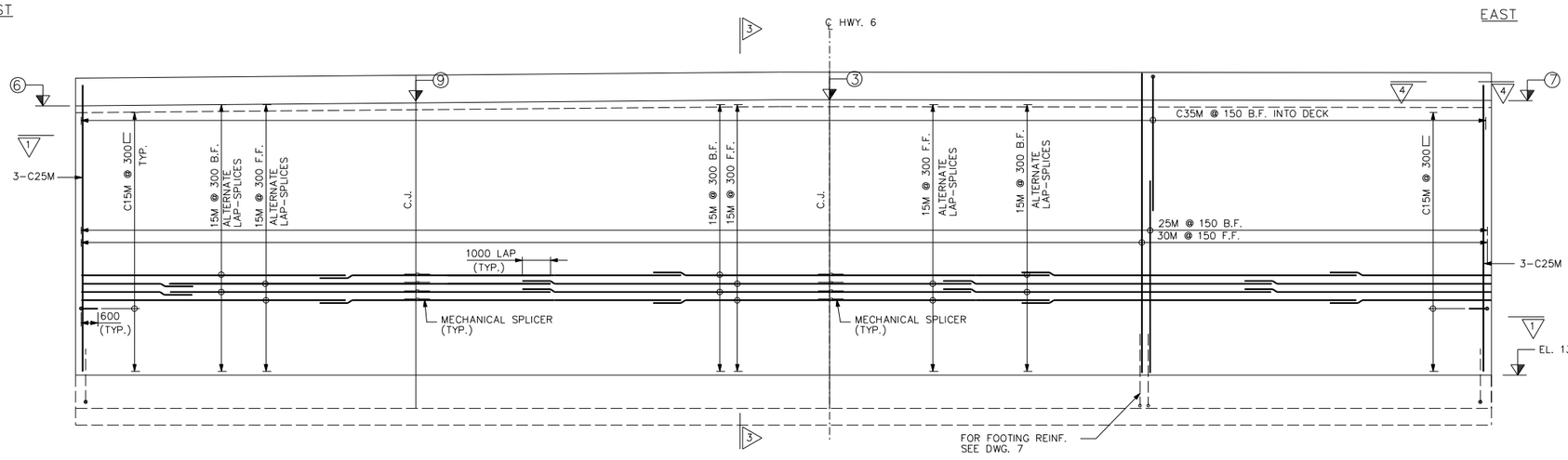
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HWY 6	
CONT No 2005-2019	
WP No 19-95-04	
HWY 6 OVERHEAD AT CPR	SHEET 265
NORTH ABUTMENT	
URS	

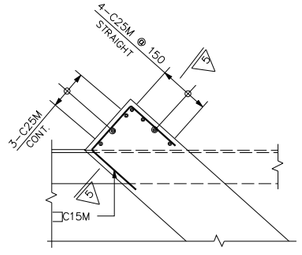


1 PLAN
1:100

NOTE:
* RADIAL DIMENSION ALONG FRONT FACE OF ABUTMENT WALL

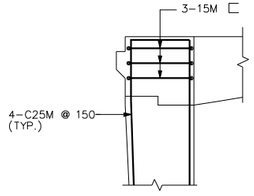


2 ELEVATION
1:100



4
1:50

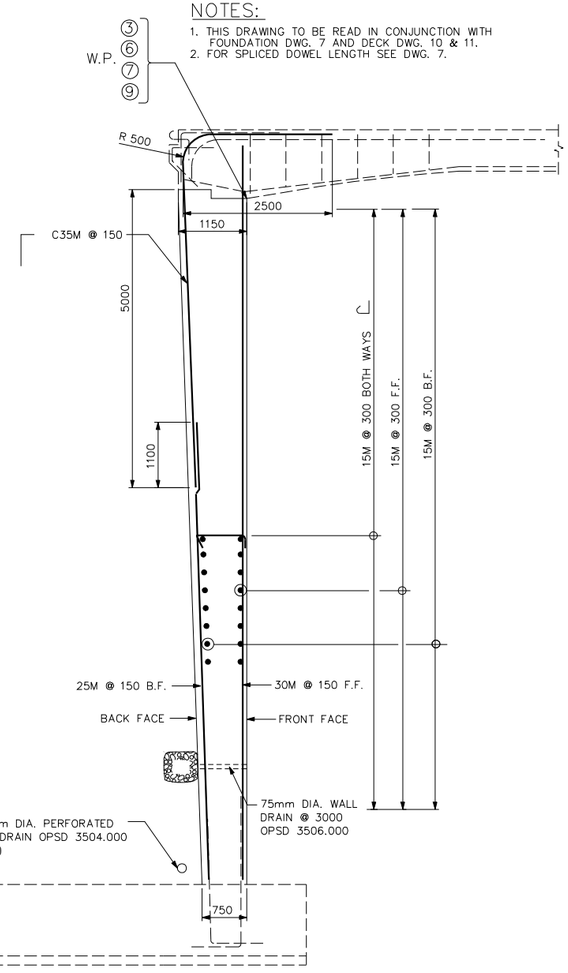
PARTIAL PLAN AT NORTH WEST CORNER



5
1:50

WORKING POINT	NORTH ABUT. ELEVATIONS
③	145.940
⑥	145.254
⑦	145.598
⑨	145.384

NOTES:
1. THIS DRAWING TO BE READ IN CONJUNCTION WITH FOUNDATION DWG. 7 AND DECK DWG. 10 & 11.
2. FOR SPLICED DOWEL LENGTH SEE DWG. 7.



3
1:50

LIST OF ABBREVIATIONS

B.F.	DENOTES BACK FACE
F.F.	DENOTES FRONT FACE
C.J.	DENOTES CONSTRUCTION JOINT
TYP.	DENOTES TYPICAL
T/F	DENOTES TOP OF FOOTING
EL.	DENOTES ELEVATION

APPLICABLE STANDARD DRAWINGS

OPSD 4670.00	TYPICAL JOINT DETAILS
OPSD 3506.00	RETAINING WALL AND ABUTMENT WALL DRAIN DETAIL
OPSD 3504.00	MINIMUM GRANULAR BACKFILL REQUIREMENT

LICENSED PROFESSIONAL ENGINEER — N. WALKER — PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER — R.S. REEL — 20/07/05 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — L. KOZACHUK — 20/7/05 — PROVINCE OF ONTARIO

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS	DATE	BY	DESCRIPTION

DESIGN	N.W.	CHK	S.K.	CODE	CSA-S6-00	LOAD CL 625-ONT	DATE JULY 2005
DRAWN	V.A.	CHK	S.K.	SITE	36-516		DWG 9

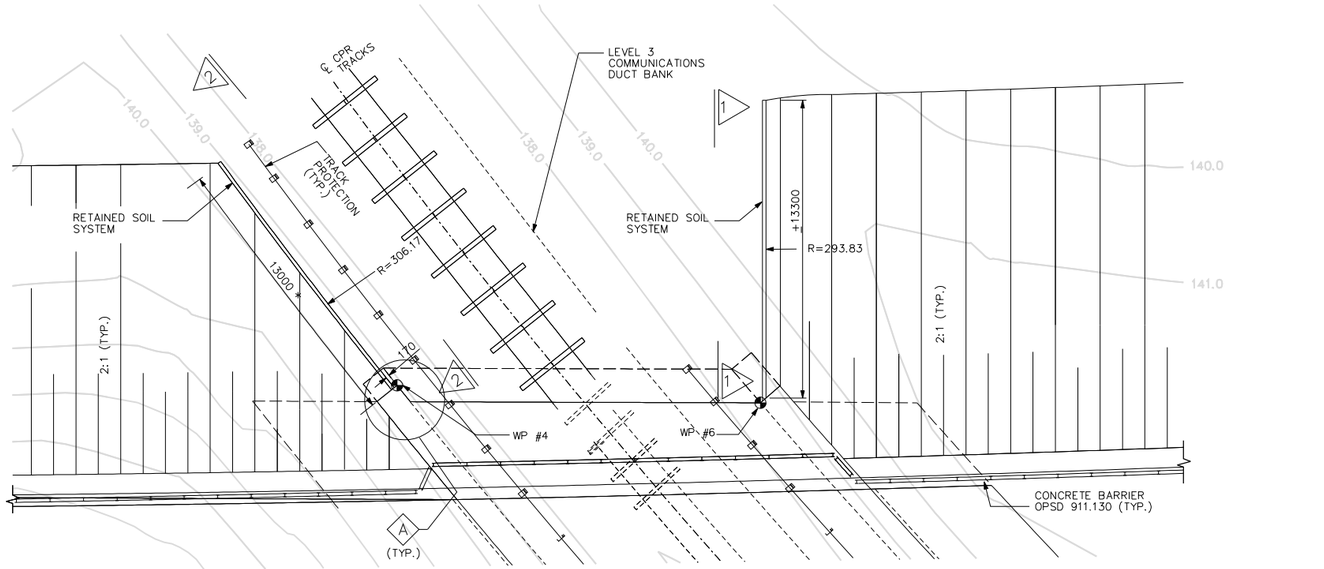
CADD FILE NAME : n:/Str-Trans/CADD/00 Projects/00137/ 6CPR / hwy6_cprNABUT.dgn

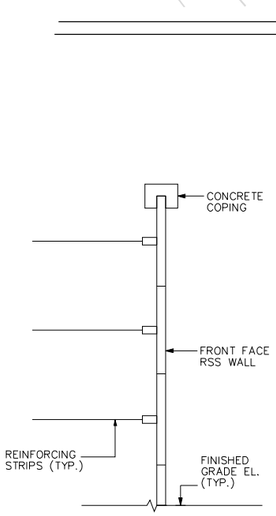
METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HWY	6	
CONT No	2005-2019	
WP No	19-95-04	
HWY 6 OVERHEAD AT CPR		SHEET 272
RETAINED SOIL SYSTEM		

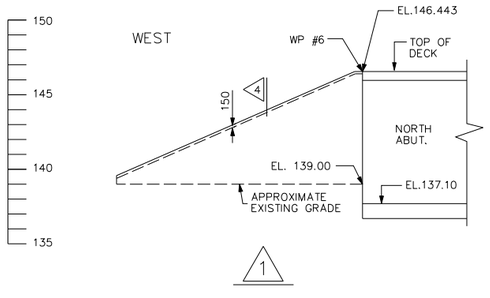
URS

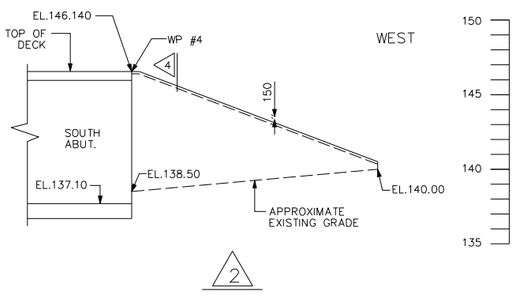


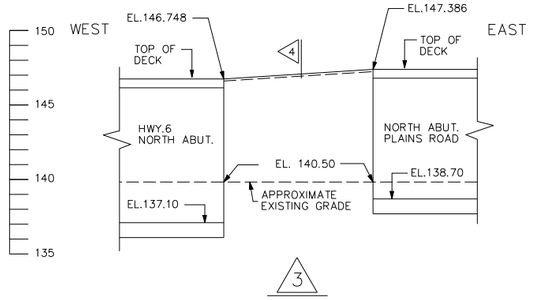


TYPICAL WALL SECTION
N.T.S.

RETAINED SOIL SYSTEM LAYOUT PLAN
N.T.S.





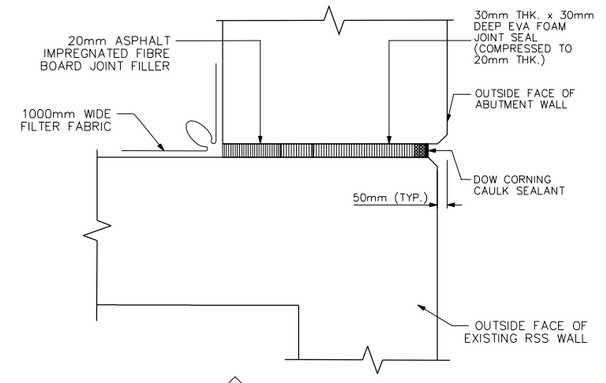


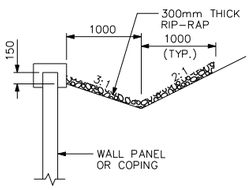
NOTE:

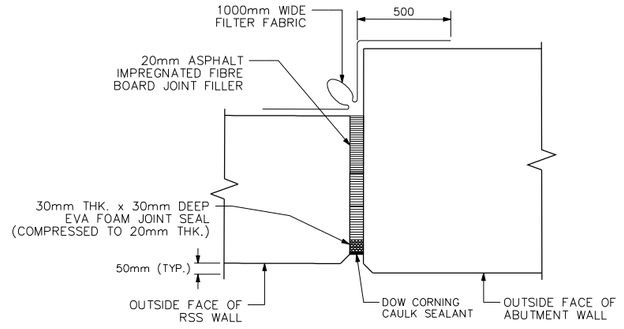
1. CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGN OF RSS WALLS.
2. RETAINING WALL TO BE CONSTRUCTED TO FINAL HEIGHT BACKFILL TO BE PLACED TO THE GRADES SHOWN IN THIS CONTRACT.
3. FOR GRADING SEE GRADING DRAWING.
4. FOR DETAILS OF EXISTING RSS WALLS AT EAST SIDE SEE 'PLAINS ROAD OVER HEAD AT CPR' CONTRACT DRAWING (CONT NO. 2004-2004)

RETAINED SOIL SYSTEM:

1. RETAINED SOIL SYSTEM WALL SHALL HAVE THE FOLLOWING ATTRIBUTES:
   GEOMETRY VERTICAL
   APPLICATION: HORZONTAL RETAINMENT-WALL/SLOPE
   PERFORMANCE: HIGH
   APPEARANCE: HIGH







(TYPICAL JOINT SEAL DETAIL)

LICENSED PROFESSIONAL ENGINEER — N. WALKER — PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER — R.S. REEL — 20/07/05 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — L. KOZACHUK — 20/7/05 — PROVINCE OF ONTARIO

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS	DATE	BY	DESCRIPTION

DESIGN	N.W.	CHK	R.S.R.	CODE	CSA-S6-00	LOAD	CL 625-ONT
DRAWN	V.A.	CHK	S.K.	SITE	36-516	DATE	JULY 2005
						DWG	16

CADD FILE NAME : n:/Str-Trans/CADD/00 Projects/00137/ 6CPR / hwy6_cprRETSOIL.dgn

THURBER

Appendix C

Selected Site Photographs

THURBER

Photo 1- Highway 6 NBL, at CPR Overhead
July 2021

Photo 2- Highway 6 NBL, at CPR Overhead and Plains Rd. Overhead
July 2021

Photo 3- Highway 6 SBL, at CPR Overhead
July 2021

Photo 4- Highway 6 Overhead at CPR, west side
March 27, 2022

Photo 5- Highway 6 Overhead at CPR, west side, North Abutment
March 27, 2022

Photo 6- Highway 6 Overhead at CPR, west side, South Abutment
March 27, 2022

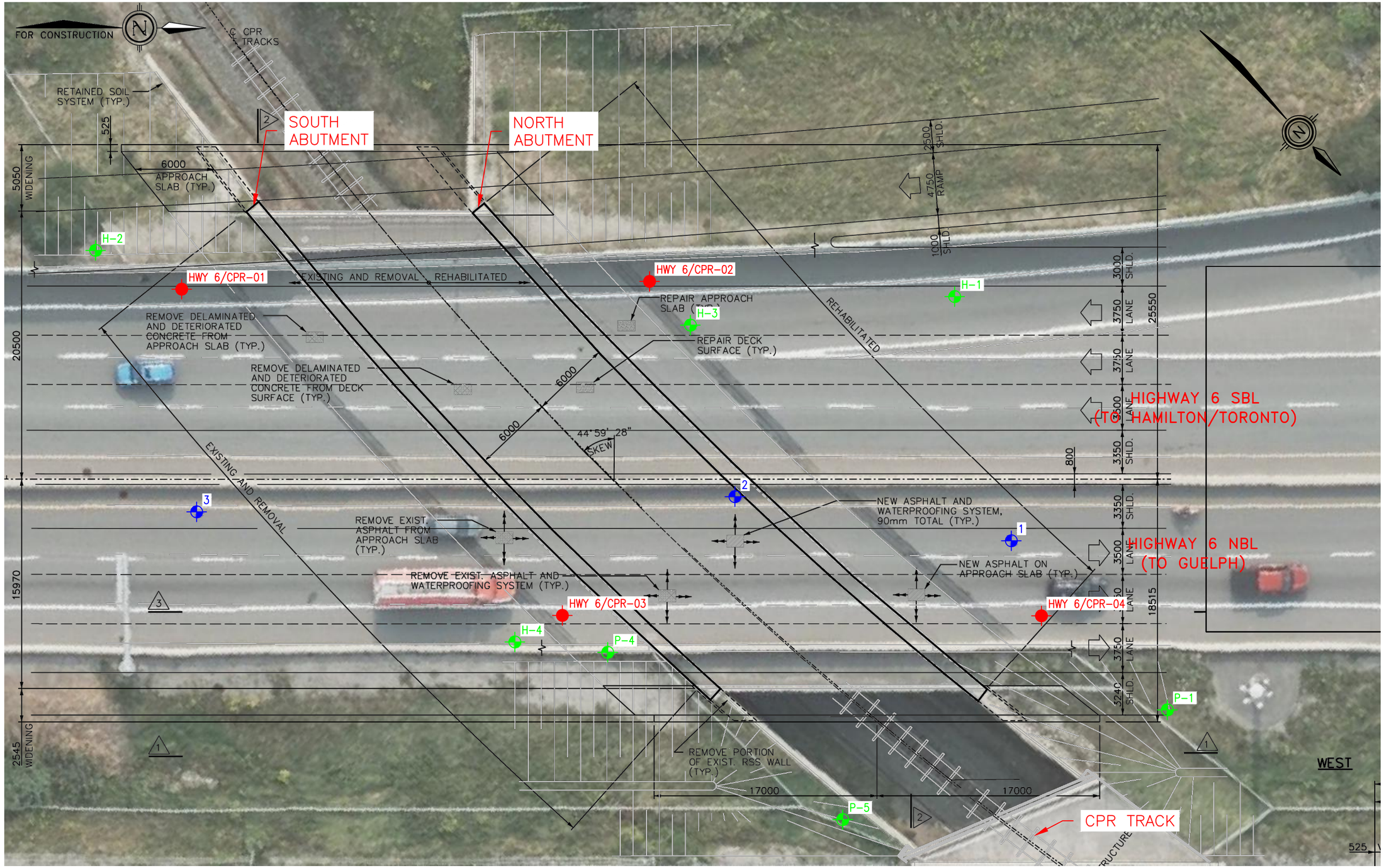
Photo 7- Highway 6 Overhead at CPR, west side, South Abutment
March 27, 2022

Photo 8- Highway 6 Overhead at CPR, west side
March 27, 202

THURBER

Appendix D

Plan of Proposed Borehole



PLAN

PROPOSED BOREHOLE (FROM HWY 6 GRADE)

APPROX. BOREHOLE LOCATIONS (PREVIOUS INVESTIGATION, 2001–02)

APPROX. BOREHOLE LOCATIONS (PREVIOUS INVESTIGATION, 1960)

HWY 6 OVERHEAD AT CPR REHABILITATION
PRELIMINARY DESIGN AND ENVIRONMENTAL ASSESSMENT
PROPOSED BOREHOLE LOCATIONS

(N.T.S. SCHEMATIC ONLY)