Heritage Impact Assessment

East Side Lands Trunk Sewer

Region of Waterloo, Ontario

Interim Draft Report

Prepared for:

Region of Waterloo
150 Frederick Street
Kitchener, ON N2G 4J3

Archaeological Services Inc. File: 24CH-015

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Executive Summary

Archaeological Services Inc. was contracted by the Region of Waterloo to conduct a Heritage Impact Assessment (H.I.A.) as part of the East Side Lands Trunk Sanitary Sewer Detailed Design. The East Side Lands Trunk Sewer H.I.A. addresses the followings cultural heritage landscapes (C.H.L.) and built heritage resources (B.H.R.s):

- The Grand River;
- The Pioneer Tower West Park C.H.L.;
- The Waterloo Pioneer Memorial Tower (300 Lookout Lane);
- The Samuel Betzner Farmstead (300 Joseph Schoerg Crescent), and the municipally-owned Betzner barn ruins adjacent to the property;
- The Joseph Schoerg Farmstead (330 Joseph Schoerg Cresent), and the municipally-owned Schoerg barn and silo ruins adjacent to the property;
- The Pioneer Tower Road and Lookout Lane C.H.L.; and
- The Walter Bean Trail C.H.L..

These C.H.L.s and B.H.R.s require a H.I.A. to provide an assessment of how the proposed sewer and service bridge over the Grand River will impact their cultural heritage value and identified heritage attributes, as recommended in a 2017 Cultural Heritage Resource Assessment that was completed as part of the East Side Lands Sanitary Servicing Class Environmental Assessment (Archaeological Services Inc, 2017).

The assessment of the subject property is being conducted in accordance with the following guiding documents: the *Ontario Heritage Tool Kit* (Ministry of Citizenship and Multiculturalism, 2006a) the *Standards and Guidelines for the Conservation of Historic Places in Canada* (Parks Canada, 2010), and the City of Kitchener's *Heritage Impact Assessment - Terms of Reference* (City of Kitchener, 2024).

Select identified heritage attributes of the Grand River C.H.L., the Pioneer Tower West Park C.H.L., the Waterloo Pioneer Memorial Tower, the Pioneer Tower Road

and Lookout Lane C.H.L., and the Walter Bean Trail C.H.L. are anticipated to be impacted through the construction of a trunk sewer and service bridge to carry the sewer across the Grand River. Overall, the proposed interventions are not anticipated to result in significant adverse impacts if appropriately mitigated.

The following recommendations and mitigation measures have been developed and should be implemented:

1. To ensure the Waterloo Memorial Pioneer Tower and the Doon Pioneer Cemetery are not adversely impacted by vibration during construction, a Vibration Monitoring Plan for each must be prepared by a qualified engineer or vibration consultant who demonstrates a level of professional understanding and competence in the field of heritage conservation. The Vibration Monitoring Plans must respond to the City of Kitchener's Terms of Reference for Cultural Heritage Protection Plans and Terms of Reference for Risk Management Plans. The Plans must be approved by the City prior to construction. The Vibration Monitoring Plans should include a pre-construction condition assessment of the structures. A condition assessment typically includes pre-construction measurements of background vibrations within the zone of influence, and pre-construction property inspection, including documentation of any visible cracks. This is used to identify any damages caused by construction compared with existing, pre-construction damage to the structure. It is also recommended that the vibration consultant review the research provided in Section 4.0 of this report to help inform their assessment of the tower.

2. Should any damages to the Waterloo Memorial Pioneer Tower or the Doon Pioneer Cemetery be caused by vibration, repairs must be conducted by a contractor with knowledge and experience in restoring similar heritage structures and who is a member in good standing of C.A.H.P. Repairs should follow the *Standards and Guidelines for the Conservation of Historic Places in Canada* (Parks Canada, 2010).

3. Post-construction maintenance and restoration to remove any construction-related dirt or dust on the Waterloo Memorial Pioneer Tower or the Doon Pioneer Cemetery should be conducted by a contractor with knowledge and experience in cleaning and restoring heritage structures and who is a member in good standing of C.A.H.P. The use of pressure washing above 300 P.S.I. and harsh cleaners should be avoided. Repairs should follow the *Standards and Guidelines for the Conservation of Historic Places in Canada.*

4. Construction activities and staging should be suitably planned and undertaken to avoid impacts to the C.H.L.s and B.H.R.s. Suitable mitigation including establishing no-go zones with fencing and issuing instructions to construction crews to avoid the heritage attributes should be considered to mitigate any unintended impacts during construction. The installation of a dust barrier system on the tower's exterior should be considered, in consultation with Parks Canada.

5. To mitigate impacts from construction on the landscape of the Pioneer Tower West Park C.H.L., post-construction rehabilitation of the landscape within the C.H.L. should be undertaken to reflect pre-construction conditions to the extent practicable.

6. To mitigate construction impacts to Lookout Lane, the road should be restored to pre-construction conditions. The restoration of Lookout Lane should follow the City of Kitchener's Pioneer Tower Design Guidelines, specifically, that existing informal road edges should be preserved and no sidewalks or curbs and gutters constructed along either side of the road. As the City no longer has the equipment to maintain tar and chip roads, the new road surface should be comprised of the following alternative approved by City Heritage Planning Staff: Slurry seal over asphalt and an HL4 asphalt with a high degree of exposed aggregate.

7. To mitigate the visual impacts of the bridge on the view of the Grand River and the Pioneer Memorial Tower, the bridge should be designed to be well-proportioned, visually light and should be compatible with the surrounding

beautiful natural context of the river corridor and tower.

8. This interim report will be updated following the completion of the 60% Design Report and Tree Management Plan to provide further discussion of proposed tree removal and construction phasing.

9. This interim report should be submitted by the proponent to heritage staff at the City of Kitchener, the Region of Waterloo and Parks Canada for review and comment. Any feedback received will be considered and incorporated into this report as appropriate. The final Heritage Impact Assessment report should be submitted to the above-mentioned agencies for their records.

Report Accessibility Features

This report has been formatted to meet the Information and Communications Standards under the *Accessibility for Ontarians with Disabilities Act*, 2005 (A.O.D.A.). Features of this report which enhance accessibility include: headings, font size and colour, alternative text provided for images, and the use of periods within acronyms. Given this is a technical report, there may be instances where additional accommodation is required in order for readers to access the report's information. If additional accommodation is required, please contact Annie Veilleux, Manager of the Cultural Heritage Division at Archaeological Services Inc., by email at aveilleux@asiheritage.ca or by phone 416-966-1069 ext. 255. Appendices to this report not originating from A.S.I. may not meet A.O.D.A. standards.

Project Personnel

- **Senior Project Manager**: Lindsay Graves, M.A., C.A.H.P., Senior Cultural Heritage Specialist, Assistant Manager - Cultural Heritage Division
- **Project Coordinator:** Jessica Bisson, B.F.A. (Hon.), Cultural Heritage Technician, Division Coordinator – Cultural Heritage Division
- **Project Manager**: Laura Wickett, B.A. (Hon.), Dip. Heritage Conservation, Cultural Heritage Specialist, Project Manager - Cultural Heritage Division
- **Field Review**: Laura Wickett and Becca Clark, B.A. (Hon.), Adv. Dip. Applied Museum Studies, Cultural Heritage Technical Writer & Researcher, Project Administrator – Cultural Heritage Division
- **Report Production**: Laura Wickett, Becca Clark
- **Graphics Production**: Peter Bikoulis, P.h.D., Archaeologist, Geomatics Technician – Operations Division
- **Report Reviewer**: Lindsay Graves

Qualified Persons Involved in the Project

Lindsay Graves, M.A., C.A.H.P.
Senior Cultural Heritage Specialist, Assistant Manager - Cultural Heritage Division

The Senior Project Manager for this Heritage Impact Assessment is **Lindsay Graves** (M.A., Heritage Conservation), Senior Cultural Heritage Specialist and the Assistant Manager for the Cultural Heritage Division. She was responsible for: overall project scoping and approach; development and confirmation of technical findings and study recommendations; application of relevant standards, guidelines and regulations; and implementation of quality control procedures. Lindsay is academically trained in the fields of heritage conservation, cultural anthropology, archaeology, and collections management and has over 15 years of experience in the field of cultural heritage resource management. This work has focused on the assessment, evaluation, and protection of above ground cultural heritage resources. Lindsay has extensive experience undertaking archival research, heritage survey work, heritage evaluation and heritage impact assessment. She has also contributed to cultural heritage landscape studies and heritage conservation plans, led heritage commemoration and interpretive programs, and worked collaboratively with multidisciplinary teams to sensitively plan interventions at historic sites/places. In addition, she is a leader in the completion of heritage studies required to fulfill Class Environmental Assessment processes and has served as Project Manager for over 100 heritage assessments during her time at A.S.I. Lindsay is a member of the Canadian Association of Heritage Professionals.

Laura Wickett, B.A. (Hon.), Dipl. Heritage Conservation
Cultural Heritage Specialist, Project Manager - Cultural Heritage Division

The Project Manager for this Heritage Impact Assessment is **Laura Wickett** (B.A. (Hon.), Diploma Heritage Conservation), who is a Cultural Heritage Analyst and Project Manager within the Cultural Heritage Division. She was responsible for day-to-day management activities, including scoping and conducting research activities and drafting of study findings and recommendations. Trained in the

theoretical and technical aspects of heritage conservation, Laura has over seven years' experience working in the field of cultural heritage resource management. She began working in A.S.I.'s Cultural Heritage Division as a Cultural Heritage Technician in 2017, providing support for a range of cultural heritage assessment reports, including Cultural Heritage Resource Assessments, Cultural Heritage Evaluation Reports, Heritage Impact Assessments, and Secondary Plan assessments. She has also contributed to Heritage Conservation District studies, Cultural Heritage Landscape inventories and Heritage Register reviews.

Becca Clark, B.A. (Hons)
Cultural Heritage Technical Writer and Researcher - Cultural Heritage Division

The Cultural Heritage Technician for this project is Becca Clark (B.A. Hons, Adv. Diploma Applied Museum Studies), who is a Cultural Heritage Technical Writer and Researcher and Project Administrator within the Cultural Heritage Division. She was responsible for preparing research and technical reporting. With her educational and working background, Becca provides an understanding of Ontario history and built heritage as well as skilled research and analysis. Her time as a museum professional focused on local history in Southern Ontario and how it may be represented by objects and built heritage. In 2021, Becca researched, designed, and produced the Guelph Civic Museum's exhibition "The Origin of Fan: Folding Form and Function". She has since translated her knowledge of Southern Ontario's history into built heritage research. In 2023, she joined ASI's Cultural Heritage team as a Cultural Heritage Technician

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1.0 Introduction

Archaeological Services Inc. was contracted by the Region of Waterloo to conduct a Heritage Impact Assessment (H.I.A.) as part of the East Side Lands Trunk Sanitary Sewer Detailed Design. The Regional Municipality of Waterloo is anticipating significant population growth in the eastern part of Waterloo Region known as the East Side Lands (E.S.L.), which includes parts of Cambridge, Woolwich and Kitchener. To respond to this anticipated growth, the Region intends to construct a new trunk sanitary sewer known as the East Side Lands Trunk Sewer (E.S.L.T.S.). The Region completed a Schedule C Class Environmental Assessment (Class E.A.) study to determine the feasibility of sewer infrastructure in the E.S.L. This culminated in November 2018 as a published Environmental Study Report (E.S.R.) which fulfilled the requirements of phases 1 to 4 of the Schedule C Class E.A. process. The conclusion of the E.S.R. proposed the E.S.L.T.S., a Trunk Sewer servicing the E.S.L. through the City of Cambridge, City of Kitchener, Grand River Valley and terminating at the Kitchener Wastewater Treatment Plant (K.W.W.T.P.). The E.S.L.T.S. is proposed to be made up of open cut and micro-tunnelled construction sections as well as a section supported on a new service bridge crossing over the Grand River.

The East Side Lands Trunk Sewer H.I.A. (Figure 1) addresses the followings cultural heritage landscapes (C.H.L.) and built heritage resources (B.H.R.s):

- The Grand River;
- The Pioneer Tower West Park C.H.L.;
- The Waterloo Pioneer Memorial Tower (300 Lookout Lane);
- The Samuel Betzner Farmstead (300 Joseph Schoerg Crescent);
- The Joseph Schoerg Farmstead (330 Joseph Schoerg Cresent);
- The Pioneer Tower Road and Lookout Lane C.H.L.; and
- The Walter Bean Trail C.H.L.

All B.H.R.s and C.H.L.s are located in the City of Kitchener. All of these cultural heritage resources are the subject of this assessment.

A Cultural Heritage Resource Assessment (C.H.R.A.) was completed by A.S.I. in 2017 regarding the East Side Lands Sanitary Servicing Class E.A. (Archaeological Services Inc, 2017). The C.H.R.A. recommended a H.I.A. for the above heritage resources. This report satisfies that recommendation.

The subject heritage resources require a Heritage Impact Assessment to provide an assessment of how the proposed work will impact the heritage resources' cultural heritage value. The assessment of the subject property is being conducted in accordance with the following guiding documents: the *Ontario Heritage Tool Kit* (Ministry of Citizenship and Multiculturalism, 2006a), the *Standards and Guidelines for the Conservation of Historic Places in Canada* (Parks Canada, 2010), the Region of Waterloo's *Regional Implementation Guideline for Cultural heritage Landscape Conservation* (Region of Waterloo, 2013), the City of Kitchener's *Heritage Impact Assessment - Terms of Reference* (City of Kitchener, 2024), the City of Kitchener's *Historic Pioneer Tower West Community Heritage Design Guidelines* (City of Kitchener, 2003a), and the *Layout and Landscape Plan for Huron Road Trail and Lookout Trail* (Hilton Landmarks Inc., 1998).

A number of the subject C.H.L.s and B.H.R.s have the potential to be impacted by the construction activities related to the construction of the trunk sewer and service bridge. The potential impacts are anticipated to relate to the construction of new infrastructure and potential vibration impacts during construction. Mitigation measures outlined in this report have been proposed to minimize these impacts and should be implemented as appropriate to the extent practicable.

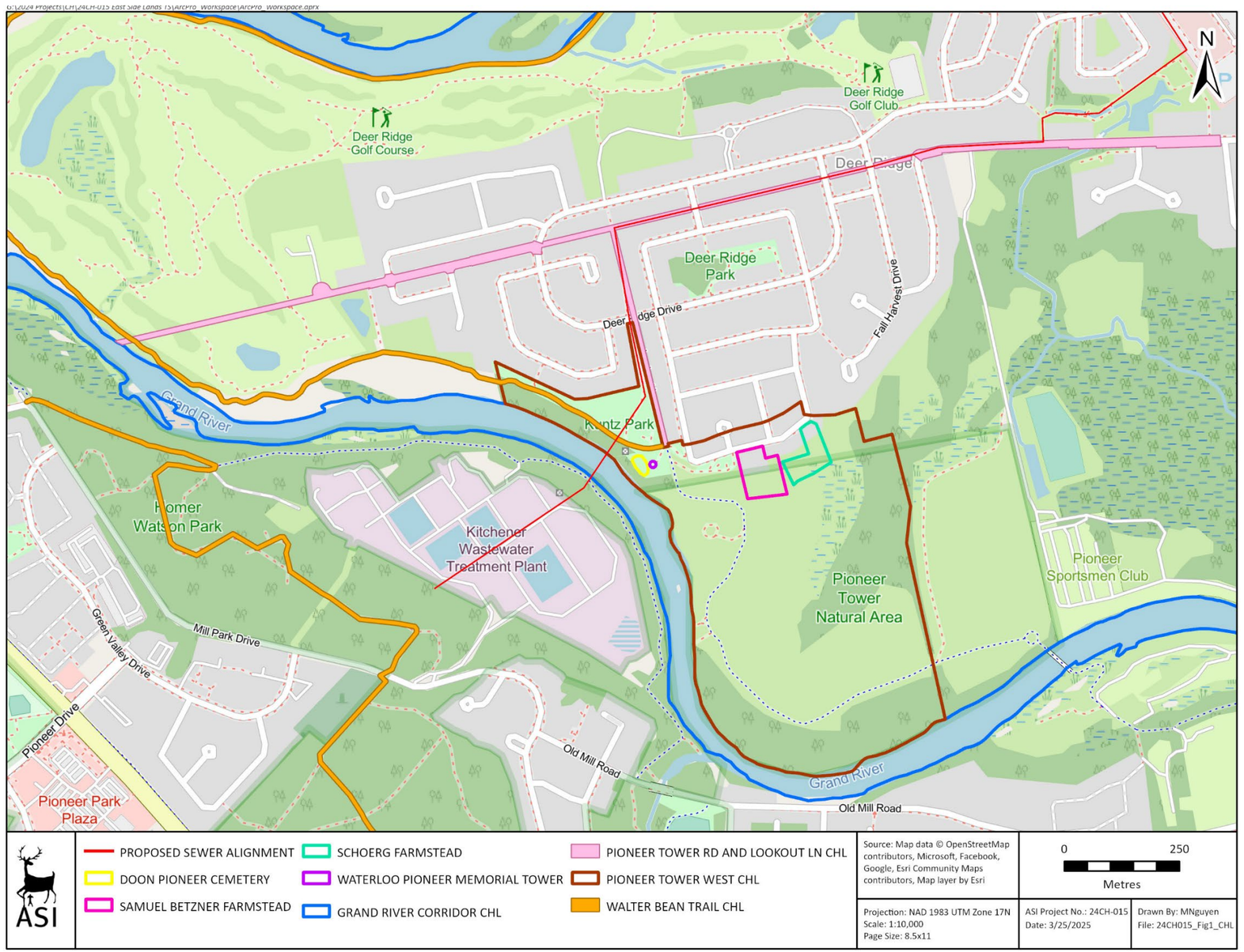

Figure 1: Location of the H.I.A. study area and component cultural heritage landscapes and built heritage resources (Base Map: ©OpenStreetMap and contributors, Creative Commons-Share Alike License (CC-BY-SA)).

1.1 Description of Property

The subject C.H.L.s and B.H.R.s are centred on the Pioneer Tower West Park. The Pioneer Tower West Park C.H.L. is comprised primarily of public parkland and trails on the bank of the Grand River. The C.H.L. contains within it the Waterloo Pioneer Memorial Tower, the Doon Pioneer Cemetery, the Samuel Betzner Farmstead, the Schoerg Farmstead and portions of the Walter Bean Trail C.H.L. Kuntz Park is also located within the Pioneer Tower West Park C.H.L., but is not being assessed as part of this H.I.A. The Pioneer Tower West Park C.H.L. is generally bounded by the Grand River to the west and south, by parkland to the east and by Joseph Schoerg Crescent and Pennsylvania Crescent to the north. The Grand River Corridor C.H.L. and the Pioneer Tower and Lookout Lane C.H.L. are located adjacent to the Pioneer Tower West Park C.H.L.

The former farmland encompassed by the Pioneer Tower West Park C.H.L. was historically owned by Samuel Betzner, a Pennsylvanian-German pioneer in Waterloo Region. The farmstead on which he established his dwelling, known as the Samuel Betzner Farmstead, is located along the northern edge of the C.H.L. The farmstead consists of a farmhouse and driveshed, (on privately owned property) and the ruins of a barn (on City property). The Doon Pioneer Cemetery, which lies along the east bank of the Grand River, hosts the resting places of the Betzner family and other Pennsylvanian-German pioneer families of the nineteenth century. To the east of the Doon Pioneer Cemetery stands the Waterloo Pioneer Memorial Tower, which was built in 1926 to commemorate the arrival of Pennsylvania-German pioneers to the Waterloo area between 1800 and 1803. The Tower has a concrete inner core and is clad in a fieldstone veneer. The tower is maintained by Parks Canada and is open to the public under their supervision at various times throughout the year.

1.2 Heritage Recognition

The Grand River is designated as a Canadian Heritage River and is also identified as a regionally significant C.H.L. in the City of Kitchener's *Cultural Heritage Landscapes* (City of Kitchener, 2014).

The Pioneer Tower West Park C.H.L. is identified as a regionally significant C.H.L. in the City of Kitchener's *Cultural Heritage Landscapes* (City of Kitchener, 2014).

The Waterloo Pioneer Memorial Tower is recognized as a Classified Federal Heritage Building (Parks Canada, 1992).

The Samuel Betzner Farmstead at 300 Joseph Schoerg Crescent is designated under Part IV of the *Ontario Heritage Act* (City of Kitchener, 2003b).

The Joseph Schoerg Farmstead at 330 Joseph Schoerg Crescent is designated under Part IV of the *Ontario Heritage Act* (City of Kitchener, 2003c).

The Pioneer Tower Road and Lookout Lane C.H.L. is identified as a municipally significant C.H.L. in the City of Kitchener's *Cultural Heritage Landscapes* (City of Kitchener, 2014).

The Walter Bean Trail C.H.L. is identified as a municipally significant C.H.L. in the City of Kitchener's *Cultural Heritage Landscapes* (City of Kitchener, 2014).

2.0 Description of Existing Condition

A field review was undertaken by Laura Wickett and Becca Clark of Archaeological Services Inc., on 15 May 2024 to document the existing conditions of the subject C.H.L.s and B.H.R.s. Access to the Waterloo Pioneer Memorial Tower was provided by Parks Canada staff. An additional field review was undertaken by Becca Clark on 27 February 2025 to document additional views. The tower was not accessed at this time.

For organizational purposes, photographs depicting views of the Waterloo Pioneer Memorial Tower from various C.H.L.s and B.H.R.s that have been identified as heritage attributes are consolidated and discussed within the existing conditions description for the tower itself (Section 2.3). However, these views are also associated with the C.H.L. or B.H.R. from which the tower is visible. The same is true for views from the tower looking towards the subject C.H.L.s and B.H.R.s. Views that have been identified as heritage attributes have

been assigned identification numbers. Section 3 includes comprehensive lists of views that have been identified as heritage attributes for each C.H.L. and B.H.R. and the views are mapped in Section 3.88.

2.1 Grand River

The Grand River is a large, meandering river that winds through the southeastern area of Kitchener. In the vicinity of the proposed work, the river has both steep and shallow banks that host a variety of natural vegetation. The river is visible from the lookout platform of the Waterloo Pioneer Memorial Tower and is accessible by foot within the southern part of the Pioneer Tower West C.H.L., where the riverbank is flat (Figure 2 and Figure 3). The Walter Bean Trail runs along the east riverbank within the Pioneer Tower West Park C.H.L. A portion of the Trans-Canada Trail known as the Water Treatment Trail runs along the west riverbank opposite the Pioneer Tower West Park C.H.L. A portion of the Walter Bean Trail also runs along the west riverbank, west of the Kitchener Waste Water Treatment Plant. These trails on both sides of the river are forested and do not offer clear views of the river (Figure 4) except for in select locations (Figure 5).

Figure 2: Looking northwest from the east bank of the Grand River within the Pioneer Tower West Park C.H.L. south of the Pioneer Memorial Tower towards the approximate location of the new service bridge (View 1) (A.S.I., 2024).

Figure 3: Looking south from the east bank of the Grand River, within the Pioneer Tower West Park C.H.L. south of the Pioneer Memorial Tower (View 2) (A.S.I., 2024).

Figure 4: Looking east along the Water Treatment Trail on the west side of the river with obscured view of the river at left (A.S.I. 2025).

Figure 5: Looking northeast across the Grand River from the Water Treatment Trail on the west side of the river (View 3) (A.S.I. 2025).

2.2 Pioneer Tower West Park C.H.L.

The Pioneer Tower West Park C.H.L. is comprised primarily of public parkland located along the east bank of the Grand River that contains multiple large fields, a playground, a parking lot, the Waterloo Pioneer Memorial Tower, portions of the Walter Bean Trail, the Samuel Betzner Farmstead, the Schoerg Farmstead (Figure 6 to Figure 11) and the Doon Pioneer Cemetery (Figure 12 to Figure 14) The landscape within the C.H.L. varies from flat, mowed grass areas in the north end of the park to naturalized green space in the south end that inclines gently towards the river. The river's edge is forested in most places, with a few clearings towards the south end of the C.H.L. The riverbank along the east side of the Grand River is steep in the northern part of the C.H.L. and flattens out in the south end of the C.H.L. as the river curves from north-south to east-west. Due to the steep and forested eastern bank of the river in the northern part of the C.H.L., there are few clear viewing points of the river.

Figure 6: Entrance to the Pioneer Tower West Park C.H.L. from Lookout Lane, facing south (A.S.I., 2024).

Figure 7: Facing west toward the parkland within the Pioneer Tower West Park C.H.L. (A.S.I., 2024).

Figure 8: Looking northwest toward Walter Bean Trail C.H.L. and northwestern portion of Pioneer Tower West Park C.H.L., from the Pioneer Memorial Tower lookout platform (A.S.I. 2024).

Figure 9: Looking southeast toward Walter Bean Trail and southwestern portion of Pioneer Tower West Park C.H.L., from the Pioneer Memorial Tower lookout platform (A.S.I. 2024).

Figure 10: Samuel Betzner Farmstead (Google Streetview).

Figure 11: Schoerg Farmhouse (A.S.I., 2024)

2.2.1 Doon Pioneer Cemetery

The Doon Pioneer Cemetery is a small nineteenth-century cemetery located within the Pioneer Tower West Park C.H.L (Figure 12). The cemetery is situated close to the east bank of the Grand River and lies approximately 20 m west of

the Waterloo Memorial Pioneer Tower. Due to the height of the riverbank at this location, no view of the Grand River is afforded from within the cemetery, though the water treatment plant and trees on the opposite riverbank are partially visible (Figure 13). A fence comprised of concrete stanchions and chain define the perimeter of the cemetery, which is also surrounded by mature trees, including a number of lilac trees. The cemetery contains approximately 20 to 30 grave markers, some sunken into the ground and some remaining upright (Figure 14).

Figure 12: Looking southeast toward the cemetery, with the Waterloo Pioneer Memorial Tower at back left (A.S.I., 2024).

Figure 13: Looking west towards the cemetery, with the opposite riverbank visible in the background (A.S.I., 2024).

Figure 14: View of grave markers within the cemetery (A.S.I., 2024).

2.3 Waterloo Pioneer Memorial Tower

Constructed in 1926, the tower is 18.9 metres tall and constructed of cast-in-place concrete with a random-coursed fieldstone veneer, a classical limestone entrance portico, an open-air viewing platform at the top and a tapered copper roof (Figure 15 to Figure 17). The interior concrete core contains a wooden switchback staircase that leads to the viewing platform. Tall, narrow windows are interspersed throughout the tower. The vestibule at the top of the tower and the ceiling of the viewing platform are clad with painted wood slats. An iron railing lines the viewing platform for viewer safety. A number of cracks were observed in the concrete inner core (Figure 18 and Figure 19). The viewing platform overlooks the Pioneer Tower subdivision to the north, naturalized banks of the Grand River to the west and south, and the Samuel Betzner Farmstead to the east (Figure 20 to Figure 23). The nature of the topography and vegetation within the subject C.H.L.s surrounding the tower means that the tower is sometimes obscured from view depending on the vantage point, however, a number of clear viewing points of the tower were identified during fieldwork conducted in both the spring and winter seasons (Figure 24 to Figure 33). For views of the tower documented in the winter where trees are in front of the tower, only the rooftop of the tower will be visible in warmer months when the trees have full foliage. The tower is not visible from the eastern terminus of Huron Road on the west side of the Grand River (Figure 34).

Figure 15: Waterloo Pioneer Memorial Tower (A.S.I., 2024).

Figure 16: The base of the Waterloo Pioneer Memorial Tower, showing the limestone entrance and fieldstone veneer (A.S.I., 2024).

Figure 17: Looking up at the interior stairs from the base of the tower (A.S.I., 2024).

Figure 18: Example of crack in concrete interior of tower (A.S.I., 2024).

Figure 19: Example of crack in concrete interior of tower (A.S.I., 2024).

Figure 20: Looking west across the Grand River from the Pioneer Memorial Tower lookout platform, towards the water treatment plant (A.S.I., 2024).

Figure 21: Looking north from the Pioneer Memorial Tower lookout platform (A.S.I. 2024).

Figure 22: View looking south along the Grand River from the Pioneer Memorial Tower lookout platform (View 4) (A.S.I. 2024).

Figure 23: View looking east from the Pioneer Memorial Tower, with the Betzner Farmstead visible at right (View 5) (A.S.I. 2024)

Figure 24: View of Pioneer Memorial Tower looking south from within Kuntz Park (View 6)(A.S.I. 2025).

Figure 25: View of Pioneer Memorial Tower looking southeast from Doon Pioneer Cemetery (View 7) (A.S.I., 2024).

Figure 26: View of Pioneer Memorial Tower looking west from the Betzner barn ruins (View 8) (A.S.I. 2024).

Figure 27: View of Pioneer Memorial Tower looking west from top of ridge along sidewalk across from 283 Joseph Schoerg Crescent (View 9) (A.S.I. 2025).

Figure 28: Long-range view of Pioneer Memorial Tower looking south along Pioneer Tower Trail from northern portion of Deer Ridge Drive (View 10) (A.S.I. 2025).

Figure 29: View of Pioneer Memorial Tower looking south along Lookout Lane (View 11) (A.S.I. 2024).

Figure 30: View of Pioneer Memorial Tower looking southeast along northern portion of Walter Bean Trail, with riverbank at right (View 12) (A.S.I., 2024).

Figure 31: Long-range view of Pioneer Memorial Tower and river corridor looking northwest from southern portion of the Walter Bean Trail within the Pioneer Tower West Park C.H.L. on east side of river (View 13) (A.S.I. 2025).

Figure 32: View of Pioneer Memorial Tower looking east from Water Treatment Trail along west side of river (View 14, Figure 32) (A.S.I. 2025).

Figure 33: View of Pioneer Memorial Tower looking north from trail along west side of river (View 15, Figure 33) (A.S.I. 2025).

Figure 34: Obscured view looking east toward the Pioneer Memorial Tower from the eastern terminus of Huron Road on the west side of the Grand River (A.S.I. 2025).

2.4 Samuel Betzner Farmstead

The Samuel Betzner Farmstead consists of a c. 1830 farmhouse, driveshed, and the ruins of a barn (Figure 35, Figure 36 and Figure 37). A drystone wall borders the property around the farmhouse and driving shed on the north side and around the east and west corners. The property contains multiple mature trees and overlooks the Pioneer Tower West Park C.H.L. to the south. The fieldstone foundation of the barn remains, with some alterations made for the safety of the public, as the barn is now a public site of historical interpretation by the City of Kitchener. While the farmstead is at the top of a ridge that provides long-range views across the river to the western side of the Grand River valley, the surrounding topography and vegetation prevent clear views of the river itself from the barn ruins.

Figure 35: View of the farmhouse and drystone wall at the Samuel Betzner Farmstead (A.S.I., 2024).

Figure 36: Driveshed and drystone wall at the Samuel Betzner Farmstead (A.S.I., 2024).

Figure 37: The ruins of the Samuel Betzner Farmstead barn and the parkland beyond (A.S.I., 2024).

2.5 Joseph Schoerg Farmstead

The Joseph Schoerg Farmstead consists of a c. 1830 farmhouse (Figure 38). The property contains a number of mature trees and overlooks the Pioneer Tower Natural Area to the southeast. The rubblestone foundation of a barn and part of a silo are located to the east of the farmhouse (Figure 39). Some alterations to these components have been made for the safety of the public, as the barn and silo are now a public site of historical interpretation by the City of Kitchener. While farmstead is at the top of a ridge that provides long-range views across the river to the western side of the Grand River valley, the surrounding topography and vegetation prevent clear views of the river itself from the barn ruins.

Figure 38: The farmhouse at the Joseph Schoerg Farmstead (A.S.I., 2024).

Figure 39: Barn ruins and silo at the Joseph Schoerg Farmstead (A.S.I., 2024).

2.6 Pioneer Tower Road and Lookout Lane C.H.L.

Pioneer Tower Road is a paved two-lane road that runs west-east from a dead-end east of the Grand River, terminates at the west side of Deer Ridge Road, and restarts after curving eastward from Pioneer Ridge Drive. Between these disconnected sections, following the same west-east alignment, is a paved pedestrian pathway. The section of the alignment that is within the C.H.L. stretches from the west side of the Grand River to Marquette Drive.

Lookout Lane is a paved two-lane road that begins on the southern side of Deer Ridge Drive in the north and extends south toward Pioneer Tower West Park (Figure 40). The Pioneer Tower is visible along the entirety of the Lane (Figure 41). Lookout Lane runs parallel to a paved pedestrian pathway (Pioneer Tower Trail) that runs from the north end of Deer Ridge Drive to the northern edge of Pioneer Tower West Park (Figure 42), where it becomes a dirt pathway through the park. Lookout Lane is surrounded by properties that front on to Pennsylvania Crescent and Joseph Schoerg Crescent to the east and terminates in the south at Walter Bean Trail.

Figure 40: Looking north along Lookout Lane from Pioneer Tower West Park C.H.L.(A.S.I., 2024).

Figure 41: Looking south along Lookout Lane towards the Pioneer Tower West Park C.H.L. (A.S.I., 2025).

Figure 42: looking south along Pioneer Tower Trail from northern portion of Deer Ridge Drive (A.S.I. 2025).

2.7 Walter Bean Trail C.H.L.

The Walter Bean Trail C.H.L. is a recreational trail that runs along the east side of the Grand River through the northwestern portion of Pioneer Tower West Park C.H.L. (Figure 43). The trail runs along the east riverbank in the location of the proposed service bridge (Figure 44). This portion of the trail is gravel and it continues southeast past the Pioneer Memorial Tower, intersecting with Lookout Lane (Figure 45). The trail continues through the southern portion of the Pioneer Tower West Park C.H.L. (Figure 46), however this section of the trail is not identified as part of the Walter Bean Trail C.H.L. (see Figure 1 for the boundaries of the C.H.L.). Another portion of the trail is located on the western bank of the Grand River, accessed from Huron Road and Wilson Avenue (Figure 47). This portion of the trail runs along the riverbank for a short stretch before turning further south behind the water treatment plant and away from the riverbank.

Figure 43: Looking southeast along the Walter Bean Trail C.H.L. within the northwestern portion of the Pioneer Tower West Park C.H.L., with Pioneer Memorial Tower visible in the distance (A.S.I. 2024).

Figure 44: Looking west across the Grand River from the Walter Bean Trail towards approximate location of proposed bridge (A.S.I. 2025).

Figure 45: Intersection of Walter Bean Trail C.H.L. with Lookout Lane, looking south from terminus of Lookout Lane (A.S.I. 2024).

Figure 46: Walter Bean Trail south of the Pioneer Memorial Tower, facing south within the Pioneer West Park C.H.L. The Grand River is to the right of the photo (A.S.I., 2024).

Figure 47: Looking southeast along the Walter Bean Trail C.H.L. on the west riverbank (A.S.I. 2025).

2.8 Photo Location Map

Figure 48 below presents the location and direction of photos taken during field review.

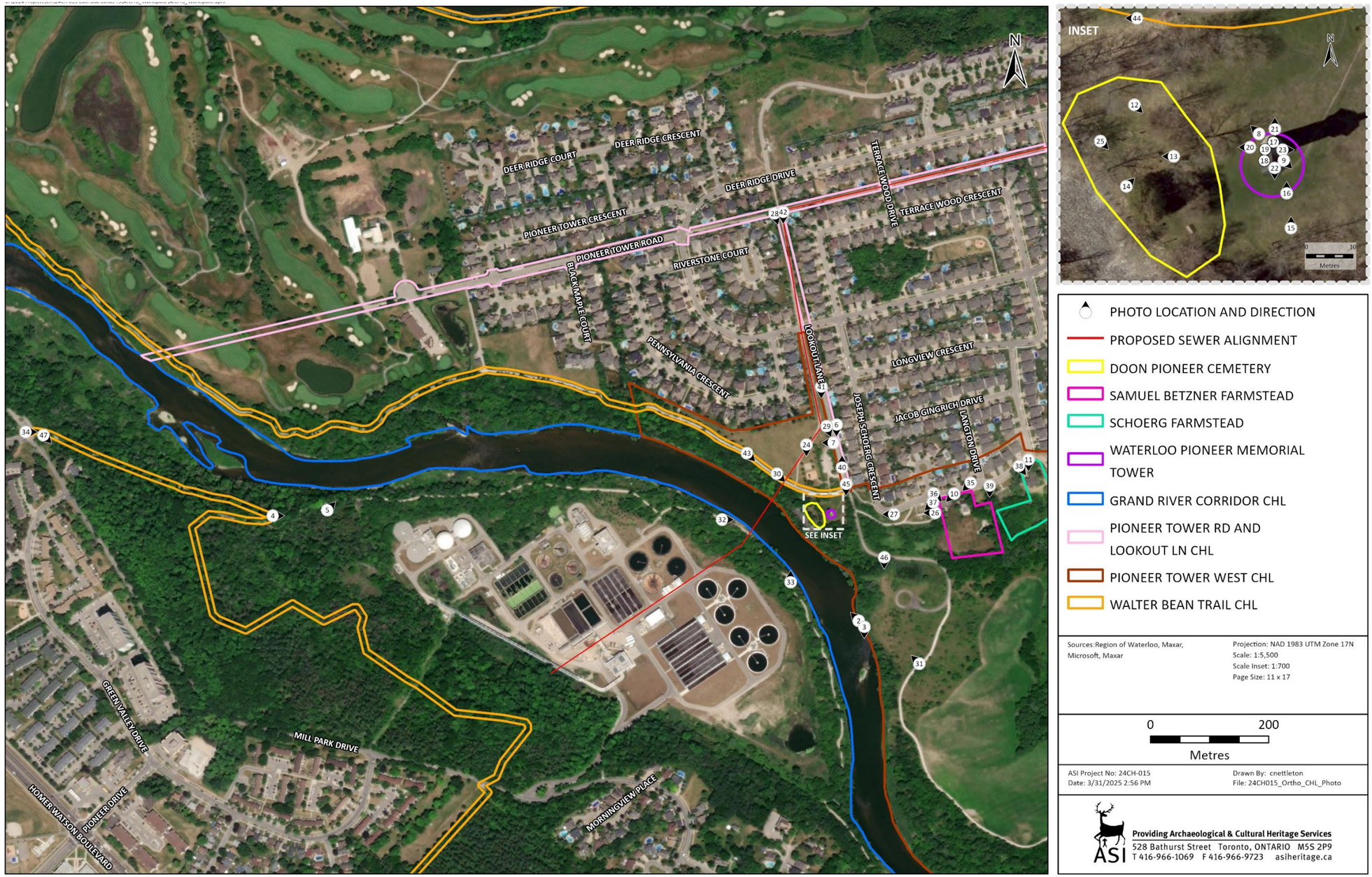

Figure 48: Location and direction of field review photos.

3.0 Statements of Cultural Heritage Value

The following section presents information about the cultural heritage value and heritage attributes of the subject cultural heritage landscapes and built heritage resources, all of which have pre-existing heritage recognition. This information has been excerpted from sources including the City of Kitchener's *Cultural Heritage Landscapes* (City of Kitchener, 2014), heritage river nomination and inventory documents for the Grand River, and individual property designation documents. The heritage attributes identified in the above sources have been supplemented with additional heritage attributes identified by A.S.I during field review[1] and in consultation with City Heritage Planning staff, with a focus on identifying significant views. Figure 49 presents a map showing the location and direction of all views identified as heritage attributes. Due to the diversity of sources, the Statements of Cultural Heritage Value for each heritage resource do not all follow the same format or use identical terminology. However, the information below provides sufficient information about the resources' cultural heritage value and heritage attributes for the purposes of this assessment.

3.1 Grand River

3.1.1 Grand River National Heritage River

The following is reproduced from the *Grand River Canadian Heritage River Nomination Document* (Ministry of Natural Resources, 1990)**:**

[1] The identification of additional heritage attributes by A.S.I. was not conducted for the Schoerg and Betzner Farmsteads, as these properties are municipally designated and their designation by-laws contain their legally recognized heritage attributes.

Human Heritage Values

The settlement of the Grand River Valley is of outstanding Canadian significance and can be described on the basis of four major themes, including: cultural mosaic, native people, industrial history, and human adaptation to the river.

Cultural Mosaic

In human terms, the Grand River Valley is outstanding for its ethnic or cultural mosaic, which encompasses, in an unusually comprehensive way, native people as well as most of the ethnic groups and peoples who have settled and lived in Canada as a whole, including more recent post-World War II migrants. The valley contains features and landscapes that reflect the attitudes, values, and effects of a wide variety of people, some of whom are still distinctive in the valley today. In the north are descendants of Scots, Irish, and English immigrants. This includes many Scots, in towns such as Guelph, whose presence represents some of the major means of European settlement in Canada, i.e. the land company, in this case, the Canada Land Company, and the entrepreneurs who purchased land blocks from it for sale to immigrants. In the central basin are Mennonites as well as descendants of German immigrants of various religious backgrounds. In the lower basin below Paris are descendants of United Empire Loyalists, including the native people who came from New York in the 1780s after the American Revolutionary War. Given the importance of the river's influence on the development of Canada and its strong association with events and movements, the first and second human heritage value guidelines appear to be met.

Native People

The native people reflect thousands of years of history that far surpass the roughly three centuries of European settlement in the area. The Grand River Valley is the site of Paleo-Indian tools and other artifacts from the big game hunting days, some 7,000 to 11,000 years ago. The archaeology of the valley also yields evidence of later Archaic hunting peoples (5000 B.C. to 1000 B.C.),

and finally the Woodland peoples who were originally hunters. The later Woodland people developed crops, initially corn (circa 900 A.D.) and later also beans and squash. The Grand River Valley has been the home of the Six Nations and other native people and of the important native leader Joseph Brant and the famous Canadian poetess E. Pauline Johnson. The native people and the artifacts that remain of their ancient culture represent a significant historical theme in Canadian history and contribute towards the river's fulfillment of the second and fourth human heritage value guidelines.

Industrial History

The industrial heritage of the Grand River is apparent in almost every town along its banks, especially in places such as Elora, Fergus, Cambridge, Paris, and Brantford. Here can be seen outstanding concentrations of historical structures related to past and present industries, including early nineteenth-century grist mills and factories which are often used today for markets or for restaurants, as well as rare architecture, notably the cobblestone buildings of Paris. In the lower river valley from Brantford through York, Caledonia, Cayuga, and Dunnville, there remain old locks, canals, and other signs of the Grand River Navigation Company system, which linked the communities along the river with the Welland Canal, other Great Lakes ports, and the rest of North America and the world. William Hamilton Merritt, builder of the first Welland Canal, was one of the early entrepreneurs associated with these canals and commercial ventures. This diverse concentration of industrial heritage clearly meets the fourth human heritage value guideline.

Human Adaptation to the River

Another outstanding aspect of human heritage in the Grand River Valley is the story of human adaptation to floods, summer low flows, and other fluctuations of the river. Levees, breakwalls, gabions, and other engineering responses are apparent, as well as zoning, flood-proofing, and other behavioral responses. Examples of the problems with and enhancement of wildlife, sediment, and other natural features and processes as a result of human adaptations are to be

seen in the valley. Of interest also are attempts to marry flood and other adaptations with heritage conservation and recreation, as for example with the "Living Levee" in Cambridge. This unique assemblage of structural and non-structural adjustments to river fluctuations fulfills the requirements of the fourth human heritage value guideline.

Associated with each of the above themes are many unique historical sites which fulfill the third human heritage value guideline. These include Pioneer Memorial Tower, West Montrose Covered Bridge, Alexander Graham Bell Homestead, Her Majesty's Chapel of the Mohawks, and the Shand Dam.

Integrity of Human Heritage

The Grand River Valley also meets all of the following historical integrity guidelines: (1) "most of its regime should have the same visual appearance as it had during the period of the river's historical importance"; (2) "most of the artifacts comprising the values for which the river is nominated must be unimpaired by impoundments and human land uses"; (3) "neighboring land use must not seriously affect the historical experience offered by the river environment"; and (4) "the biophysical quality of the water must be suitable for non-contact recreation."

Outstanding Human Heritage Features Associated with the River Identified for Kitchener-Waterloo

- Centre of Pennsylvania-German and European
- German settlement
- Pioneer Memorial Tower
- Homer Watson
- West Montrose Covered Bridge

Natural Heritage Values

The Grand is not being nominated for natural reasons because it is a river that has been changed by weirs, dams, and other human constructs, so it does not

appear to conform with the Canadian Heritage Rivers System integrity guidelines for natural heritage. However, the Grand does have a rich diversity of birds and other animals, as well as valued Carolinian forests, wetlands, glacial, and other geological features, which are the basis for many of the excellent recreation opportunities along the river.

3.1.2 Grand River Corridor Cultural Heritage Landscape

The following is reproduced from the City's *Cultural Heritage Landscapes* (City of Kitchener, 2014). See Appendix A for the full data sheet from that report.

Description

Few rivers in Canada have seen as much of the flow of history as the Grand River. First Nations have flourished in the watershed for more than 10,000 years. The last three centuries have brought an influx of European, American and other settlers, initially seeking agricultural land, but eventually diversifying into centres of industry with the arrival of the railway. Although the River provided sustenance to the early pioneers of the Kitchener area, it did not play the same role it did in other watershed communities where waterpower was the genesis of founding industries. Instead the River was probably perceived as more of an obstacle, restricting the flow of goods and services eastward and requiring substantial investment to connect Kitchener to its eastern and southern markets.

The Grand and its tributaries drain approximately 6735 square kilometres (2600 square miles) and the combined watershed is the largest catchment basin in Southwestern Ontario. The Kitchener reaches of the Grand create the eastern boundary of the City. Along the eastern edge of Kitchener, the Grand cuts its way through an ancient glacial spillway and has alternating banks that range in height from a few metres to over 30 metres. The alluvial plains in which the River runs vary in width, from less than a kilometre to more than 2 kilometres and have been a source of an abundant supply of sands and gravels for many decades. The Grand River Forest, with its rare Carolinian species south of Kitchener, lines much of the shore in the southernmost reaches. This Forest changes to a mixed deciduous hardwood forest with black willow communities

lining the banks through the Kitchener reaches. The River is subject to occasional extreme flows and flooding. In 1954, Hurricane Hazel caused flows of more than 10 times normal levels. This resulted in significant changes to the landscape in the Bridgeport reach due to the construction of dikes and other flood control measures.

The Kitchener reaches have been the location of a variety of settlements and other historical activities since the arrival of pioneer settlers beginning around 1800. The highlights of these activities include the following. In 1829, Jacob Shoemaker established Glasgow Mills at the mouth of Laurel Creek on the west bank of the River. At about the same time John Tyson settled on the east bank and called the settlement Bridgeport. The Bridgeport Bridge was built on Bridge Street in 1934, eight years after its sister bridge was constructed at Freeport. The bridge is a five-span reinforced concrete bowstring and is 126 metres long. Shoemaker's Ford & Wooden Bridge is located south of the current Bridgeport Bridge. It was used to connect the two sides of the early settlement of Bridgeport. The first wooden bridge at Shoemaker's Ford was constructed in 1847. The Grand Trunk Railway Bridge (at Breslau) embankments were started in 1854 and constructed over a period of 2 years. The abutments are made of limestone block. Two concrete piers in the river complete the span. The original bridge spans were constructed of wrought iron imported from England. The iron tube structure was replaced by steel girders in 1905. Other early fords along the Kitchener reaches included the Breslau Ford, the Zeller's Ford, and the Sam Bricker's Ford. Livergood's Ford was first called Reichert's Ford and later the Livergood's Ford, after Christian Reichert and George Livergood early local settlers. After the first permanent major bridge in Waterloo Township was erected here in 1820, the area became known as Toll Bridge (and later Bridgeville). Tolls came to an end in 1857 and the area was renamed Freeport in 1865. In 1880, the first iron bridge in Waterloo County was erected here. The existing Freeport Bridge is a seven span, six-pier, concrete bowstring arch. There was a lane or road from the Dundas Road in Preston to Freeport and beyond. This road was extended to the Grand River in the vicinity of the Pioneer Memorial Tower. Soon after 1800, Bechtel's Ford and later a wooden bridge were established from this road westward across the Grand River. On the western side, the bank was quite steep (over 30 metres in height), but the pioneers built the incline of the road from south to north up the steep bank and

gradually emerged on the Huron Road. About 1836, a wooden bridge was built across the Grand River at the Bechtel's Ford location and lasted until about 1857, when it was removed by an early spring flood.

In 1994, the Grand River and its major tributaries, the Nith, Conestogo, Speed and Eramosa rivers, were designated as Canadian Heritage Rivers. It was the 15th Canadian Heritage River to be designated in Canada. Although the river has been much altered by its people, it still provides large natural areas and scenic views and is of outstanding recreational and educational value. Many decades of careful management have maintained these values even as the urban nature of the watershed grew. While use of the river has changed, the major recreational role it plays, and the well-preserved evidence of the cultures that were drawn to its banks, makes it worthy of its status as a Canadian Heritage River.

Character Defining Features

Well-defined river valley with alternating steep and shallow banks. Wonderful meandering river with significant vegetation communities and associated wildlife habitat.

In addition to the *Grand River Canadian Heritage River Nomination Document* and the City's *Cultural Heritage Landscapes* document, the *Heritage River Inventory - Grand River Watershed* document (Grand River Conservation Authority, 2013) was reviewed to identify any additional heritage attributes of the River within the vicinity of the proposed work. The following additional heritage attributes were identified:

- Schoerg Farmstead
- Betzner Farmstead
- Waterloo Pioneer Memorial Tower

Additional Heritage Attributes Identified by A.S.I. During Fieldwork

- Forested riverbanks
- View along the Grand River looking northwest from the east bank of the river, south of the Pioneer Memorial Tower (View 1, Figure 2)

- View along the Grand River looking south from the east bank of the river, south of the Pioneer Memorial Tower (View 2, Figure 3)
- View across the river from the Water Treatment Trail on the west side of the river (View 3, Figure 5)
- Views to the south from the Waterloo Pioneer Tower lookout platform of the Grand River flood plain, the river corridor and Pinnacle Hill in the background. (View 4, Figure 22)
- Long-range view of Pioneer Memorial Tower and Grand River corridor looking northwest from southern portion of Walter Bean Trail on east side of river (View 13, Figure 31)
- Close-range view of the tower and Grand River looking from a select location along the Water Treatment Trail on the west side of the river (View 14, Figure 32)
- Close-range view of the tower and Grand River looking north from a select location along the Water Treatment Trail on the west side of the river(View 15, Figure 33)

3.2 Pioneer Tower West Park C.H.L.

The following is reproduced from the City's *Cultural Heritage Landscapes* (City of Kitchener, 2014). See Appendix A for the full data sheet for this C.H.L. from that report.

Description of Property

Built in 1926, Waterloo Pioneer Memorial Tower commemorates the arrival of the Pennsylvania-German pioneers to the Waterloo region between 1800 and 1803. The 18.9 metre high tower is located along the east bank of the Grand River within the City of Kitchener's boundary. It is accessed from Lookout Lane which originated at the Huron Road but which is now partially blocked although continuous in the alignment as a public walk. The tower's random-coursed fieldstone, tapered "Swiss" copper roof, and the Conestoga wagon weather vane reflect the German speaking European origin and farming lifestyle of these

early settlers. It has a simple well-proportioned profile, a tapered cylindrical shaft of random coursed fieldstone supporting a molded concrete cornice under a hexagonal gallery platform. Today, the Tower has much the same view to the south as it had when it was constructed and what could be seen from the early pioneer farmhouses to the east. The view includes the Grand River flood plain in the foreground, the river in the middle ground and Pinnacle Hill in the background. Protection of this view is critical to the purpose of the Tower and the heritage value of the area. Included as part of this cultural heritage landscape are the houses of the first settlers to the area. The Betzner and Schoerg farmhouses are located at the top of the same ridge line as the Pioneer Tower and feature largely unobstructed views to the Grand River Valley.

The location continues to feature characteristics which originally influenced its settlement by Mennonite pioneers. These features include rich fertile soils, a mixture of dense forest, open meadows and proximity to water. In 1800, 66 hectares on the East bank of the Grand River within Block 2 of the former Six Nations Reserve were purchased by Samuel Betzner Sr. The Betzner Farmstead lands were adjacent to 105 hectares purchased by Joseph Schoerg, Samuel Betzner's son in law. Samuel Betzner Jr. would purchase 160 hectares on the west side of the Grand River in the same year. Together the Betzner and Schoerg families are believed to have established the first permanent settlements in inland Upper Canada, and are considered to be founding families of Waterloo County. Their contribution to the region is commemorated with the memorial tower. The Betzner Farmstead is an early example of the Mennonite Georgian style. Built circa 1830 by John Betzner, Samuel Betzner's son, the symmetrical proportions and basic architectural features in the home are clear examples of the Mennonite Georgian style. The drive shed, also built circa 1830, is an early example of utilitarian construction on a pioneer farmstead. The City has invested considerable resources in the interpretive programme of the area with the retention of the pioneer barn footprints and creating appropriate settings for the Betzner and Schoerg family homesteads. The Waterloo Pioneer Memorial Tower is a Classified Federal Heritage Building. The designation is confined to the footprint of the structure. The tower represents the theme of

the commemoration of ethnic German pioneer settlers in Ontario and is also a very good early example of a regional commemorative structure. This structure is a visible symbol of the rise of German-Canadian nationalism during the 1920s, which resulted from anti-German sentiment, and cultural sanctions imposed on the community during the First World War. The Pioneer Memorial Tower site also features a small cemetery where several founding Mennonite pioneer family members are buried. The Waterloo Pioneer Memorial Tower is a very good example of a well-scaled design of simply detailed construction with a picturesque aesthetic. The tower shows excellent quality of craftsmanship and materials as evidenced by the cut fieldstone, and by the work on the tower's entrance and observation deck. The tower is a landmark to both residents and tourists by virtue of its prominent site in the Grand River Valley and its visibility from several viewing points on both sides of the river.

Character Defining Features

The Tower and the two farmsteads[2]; the location on the east bank of the Grand River; its access via Lookout Lane which is associated with the original Huron Road; random coursed fieldstone; tapered "Swiss" copper roof the Conestoga wagon weather vane; the Tower's simple well-proportioned profile consisting of a tapered cylindrical shaft supporting a molded concrete cornice under a hexagonal gallery platform; views to the south from the tower including the Grand River flood plain, the river corridor and Pinnacle Hill in the background.

Additional Heritage Attributes Identified by A.S.I. During Fieldworkth

Doon Pioneer Cemetery, including:

- Cemetery size and shape
- Grave markers and plots
- Concrete post fence around perimeter of cemetery

[2] It is presumed that the two farmsteads are the Betzner farmstead and the Schoerg farmstead, including the barn and silo ruins.

- Plantings around perimeter of cemetery
- Location along the east bank of Grand River in proximity to Waterloo Pioneer Memorial Tower

Views of the Waterloo Memorial Pioneer Tower from the following locations:

- Looking west toward the tower from the Betzner barn ruins at 300 Joseph Schoerg Crescent (View 7, Figure 26)
- Looking west toward the tower from atop the ridge along the sidewalk across from 283 Joseph Schoerg Crescent (View 8, Figure 27)
- Clear views of the tower from anywhere within the Pioneer Tower West Park C.H.L. (for example, View 6, Figure 24 looking south from within Kuntz Park)
- Looking southeast from Doon Pioneer Cemetery (View 7, Figure 25)
- Long-range view of tower looking northwest from southern portion of Walter Bean Trail on east side of river (View 13, Figure 31)

3.3 Waterloo Pioneer Memorial Tower

The following is reproduced from Park's Canada's Directory of Federal Heritage Designations (Parks Canada, 1992).

Description of Historic Place

Built in 1926, Waterloo Pioneer Memorial Tower commemorates the arrival of the Pennsylvania-German pioneers to the Waterloo region between 1800 and 1803. The 18.9 metre-high tower is located along the banks of the Grand River in Waterloo Regional Municipality, Ontario. The tower's random-coursed fieldstone, tapered "Swiss" copper roof, and the Conestoga wagon weather vane reflect the German speaking European origin and farming lifestyle of these early settlers. It has a simple well-proportioned profile, a tapered cylindrical shaft of random coursed fieldstone supporting a moulded concrete cornice under a hexagonal gallery platform. The designation is confined to the footprint of the building.

Heritage Value

The Waterloo Pioneer Memorial Tower is a Classified Federal Heritage Building because of its historical associations, and its architectural and environmental values.

Historical Value:

The tower represents the theme of the commemoration of ethnic German pioneer settlers in Ontario and is also a very good early example of a regional commemorative structure. This building is visible symbol of the rise of German-Canadian nationalism during the 1920s, which resulted from anti-German sentiment, and cultural sanctions imposed on the community during the First World War. The tower was an opportunity for German-Canadians to express their historical contribution and loyalty to Canada in the form of German-Canadian nationalism as well as a method for the community to re-establish its self worth. The Pioneer Memorial Tower is also associated with W.H. Breithaupt,

a prominent engineering consultant in Kitchener (previously named Berlin), who has been recognized as the initiator of the scheme.

Architectural Value:

The Waterloo Pioneer Memorial Tower is a very good example of a well-scaled design of simply detailed construction with a picturesque aesthetic. The tower shows excellent quality of craftsmanship and materials as evidenced by the cut fieldstone, and by the work on the tower's entrance and observation deck.

Environmental Value:

The Pioneer Memorial Tower was erected near the earliest focus of Pennsylvanian-German settlement. The tower stands in a grassed area enclosed by a locked fence. The property also contains a small pioneer cemetery. The area surrounding the tower is mixed agricultural and urban development with wooded areas on the west shore of the river. The tower is a landmark to both residents and tourists by virtue of its prominence and significance.

Character-Defining Elements

The character-defining elements of the Waterloo Pioneer Memorial Tower should be respected.

Its very good aesthetic and functional designs, and excellent quality of craftsmanship and materials, such as: the building's form and massing which consists of a tall slightly tapered cylindrical tower clad in multi-coloured and textured local fieldstone; the building's sturdy construction of self-standing exterior wall with concrete inner core; the building's clean lines and subtle ornamentation and picturesque silhouette; the steeply pitched "Swiss-style" roof sheathed in copper; the decorative ironwork placed around the exterior of the platform; the six stone corbels decorating the moulded concrete cornice; the original glazed windows of the tower, with limestone lintels and plain lug sills; the front portico and entrance, framed by a cut limestone lintel of classical design; the Conestoga wagon weather vane.

The manner in which the Waterloo Pioneer Memorial Tower is compatible with the picturesque setting of Waterloo Regional Municipality and is a symbol of the region, as evidenced by: its overall scale, design and materials that harmonize with its mixed agricultural and urban setting. its role as a memorial to the early German settlers of Ontario, which makes it a symbol of the region and well-known to residents and visitors.

Additional Heritage Attributes Identified by A.S.I. During Fieldwork

Views from the Lookout Platform of the Waterloo Memorial Pioneer Tower:

- Views to the south from the Waterloo Pioneer Tower lookout platform of the Grand River flood plain, the river corridor and Pinnacle Hill in the background. (View 4, Figure 22)
- Looking east towards the Betzner Farmstead (View 5, Figure 23)

Views of the Waterloo Memorial Pioneer Tower from the following locations:[3]

- Clear views of the tower from anywhere within the Pioneer Tower West Park C.H.L. (for example, View 6, Figure 24, looking south from within Kuntz Park)
- Looking southeast toward the tower from Doon Pioneer Cemetery (View 7, Figure 25)
- Looking west toward the tower from the Betzner barn ruins at 300 Joseph Schoerg Crescent (View 8, Figure 26)
- Looking west toward the tower from atop the ridge along the sidewalk across from 283 Joseph Schoerg Crescent (View 9, Figure 27)

Long-range view of tower looking south along Pioneer Tower Trail from as far north as the northern portion of Deer Ridge Drive (View 10,

[3] Views looking west and north from the tower's viewing platform were not identified as heritage attributes as these views have been substantially altered by the construction of a water treatment plant and housing subdivisions.

- Figure 28)
- Looking south toward the tower along Lookout Lane from Deer Ridge Drive to Lookout Lane's southern terminus (View 11, Figure 29)
- Looking southeast toward the tower along northern portion of Walter Bean Trail, along east riverbank (View 12, Figure 30)
- Long-range view of tower and Grand River corridor looking northwest from southern portion of Walter Bean Trail on east side of river (View 13, Figure 31)
- Close-range view of the tower and Grand River looking east from a select location along the Water Treatment Trail on the west side of the river (View 14, Figure 32)
- Close-range view of the tower and Grand River looking north from a select location along the Water Treatment Trail on the west side of the river (View 15, Figure 33)

3.4 Samuel Betzner Farmstead

The following is reproduced from *Reasons for Designation - 437 Pioneer Tower Road*[4] (City of Kitchener, 2003b).

Historically, the property is part of the earliest (Spring 1800) inland non-native settlement of what would become Waterloo County. Samuel Betzner Sr. purchased 150 acres of Lot 12 from Richard Beasley to be close to his family. Betzner Sr. was 62 years of age when he and his wife (Maria Detweiler) migrated from Pennsylvania and settled on the land. In 1806, the year his wife Maria died, Samuel Betzner Sr. sold the farm to his youngest son John. The existing farmhouse and driveshed buildings are attributed to having been built by John Betzner, c. 1830.

Heritage Attributes

The built resources and land on which 437 Pioneer Tower Road is located and its

[4] The address has since been changed to 300 Joseph Schoerg Crescent.

historic association with the founding families of Waterloo County are also of cultural heritage significance. The landscape, which includes unobstructed views to the Grand River (designated a Canadian Heritage River) still boasts many features which originally influenced its settlement including rich fertile soils, a mixture of dense forest and open meadows and proximity to water. Architecturally, the Betzner farmhouse serves as an example of a Mennonite Georgian residence. Of significance are the symmetrical proportions and base architectural features that identify the farmhouse as a Mennonite Georgian structure. Specific features of significance on the driveshed include all building elevations; the fieldstone foundation; roof and roofline; window and door openings; door hardware on north and west elevations; and the 6/6 windows.

3.5 Joseph Schoerg Farmstead

The following is reproduced from *Reasons for Designation – 381 Pioneer Tower Road*[5] (City of Kitchener, 2003c).

Historically, the property is part of the earliest (Spring 1800) inland non-native settlement of what would become Waterloo County. The existing farmhouse was built c. 1830 by David Sherk who was born September 7, 1801 and who was reportedly the first non-native child born in Waterloo County. David Sherk would become a deacon and in 1838 ordained to the ministry. He was the son of Joseph Schoerg, who together with Samuel Betzner were the first Pennsylvania Mennonite pioneers to settle in Waterloo County.

Architecturally, the farmhouse serves as an excellent example of a Mennonite Georgian residence. Specific features to be designated include: all exterior elevations including the rear summer kitchen annex with two storey verandah and square posts and ballusters, but excluding the west gable end chimney; single bay pedimented stoop entrance with turned posts and side benches; all window openings, windows and sills including 6/6 double hung sash and storm, and 6 pane end lights and twin light cellar sashes; door and door openings including front entrance paneled door with 5 pane transom and 3 pane sidelights, kitchen annex entrance paneled door with twin gothic windows, but

[5] The address has since been changed to 330 Joseph Schoerg Crescent.

excluding the door opening on the south (rear) elevation; roof and roofline including wooden moulded frieze and return eaves.

3.6 Pioneer Tower Road and Lookout Lane C.H.L.

Description of Property

The following is reproduced from the City's *Cultural Heritage Landscapes* (City of Kitchener, 2014). See Appendix A for the full data sheet for this C.H.L. from that report.

Pioneer Tower Road and Trail extends from Baxter Drive near King Street East (Highway 8) to the top of the Grand River Valley bank, terminating in the Deer Ridge Golf Course. Historically, the Right of Way was used by the earliest non-native settlers to establish the first farm settlements in inland Upper Canada (1800), in the low lying lands along the east side of the Grand River. Pioneer Tower Road and Trail Right of Way then became part of the Huron Road (1828), linking the Canada Company headquarters in Guelph with the Huron Tract and the Town of Goderich. The road travelled down to the river's edge through the existing golf course, where Bechtel's Ford was used to access the west side of the river. A wooden bridge was constructed in 1836 to facilitate access across the river for the flow of immigrants to the Huron Tract. The bridge was washed out in the spring of 1857 and never rebuilt. Today, the road and trail provides continuous pedestrian access over its length but is discontinuous for vehicular access between Pioneer Ridge Drive and Fall Harvest Drive. A portion of the road and trail, between Marquette Drive and the Grand River is designated a Scenic Heritage Road in the Official Plan, in recognition of its historic alignment. Pioneer Tower Road is flanked by residential development; Pioneer Sportsman Club; Pioneer Camping Club; Deer Ridge Golf Course Maintenance Yard; an equestrian farm; Settlers Grove park; and service and retail developments. Lookout Lane T's into Pioneer Tower Road and was the original access to the Pioneer Memorial Tower and Cemetery Site (a National Historic Site) and remnants of the original Schoerg Family Homestead (now 330 Joseph Schoerg Crescent) and Betzner Family Homestead (now 300 Joseph Schoerg Crescent), both designated under Part IV of the Ontario Heritage Act.

Character Defining Features

Character defining features include: the alignment of the road; the association of the road with the former fords across the Grand River; and the adjacent heritage sites including the Pioneer Tower, the Schoerg Family Homestead and the Betzner Family Homestead.

Additional Heritage Attributes Identified by A.S.I. During Fieldwork and in Consultation with the City of Kitchener

- Rural cross-section
- Tar and chip road surface

Views of the Waterloo Pioneer Memorial Tower from the following locations:

- Long-range view of tower looking south along Pioneer Tower Trail from as far north as the northern portion of Deer Ridge Drive (View 10, Figure 28)
- Long-range view of tower looking south along Lookout Lane from Deer Ridge Drive to Lookout Lane's southern terminus (View 11, Figure 29)

3.7 Walter Bean Trail C.H.L.

Description of Property

The following is reproduced from the City's *Cultural Heritage Landscapes* (City of Kitchener, 2014). See Appendix A for the full data sheet from that report.

When complete, the Walter Bean Trail will link West Montrose in the north to the Town of Blair, just south of Highway 401. It will extend along 78 km of the 290-km length of the Grand River basin. The trail alignment parallels the Grand River on its west bank, and rises and falls with the variable height of valley walls. Its position in the valley provides spectacular panoramic views along and across the river valley. The trail is generally paved with limestone screenings with strategic asphalted sections where slopes are steep or where there is high traffic. The trail is serviced by trail heads where there is parking, seating areas, and way-finding and interpretive signage. To fully appreciate the significance of

the trail it is important to understand something of the person after which the trail has been named. Walter Bean was a business and community leader who believed in contributing to the welfare of area residents. He championed the vision of a public hiking trail along the Grand River. As Honourary Chair of The Kitchener and Waterloo Community Foundation, Walter challenged the Foundation to increase public accessibility to the river by building a trail along its length within the Regional Municipality of Waterloo. Following Walter's death, his many friends took up his challenge and in 1998 formed The Walter Bean Grand River Community Trails Foundation. To make his vision a reality, this non-profit fundraising corporation has partnered with the cities of Cambridge, Kitchener, Waterloo and the Township of Woolwich to build and maintain a recreational trail. Along its way, it will connect with many local municipal trails and the Trans Canada Trail. Philanthropist, military hero and prominent Canadian business leader, Walter Bean was one of this area's most distinguished citizens. Born in Berlin (now Kitchener), he graduated from Kitchener-Waterloo Collegiate & Vocational School and the University of Toronto, where he played junior hockey and in 1929 was selected for the Canadian All-Star Football Team. In 1930 Walter Bean joined the Waterloo Trust and Savings Company, advancing to treasurer in 1934, general manager in 1957, and president in 1964. After the merger of Waterloo Trust with Canada Trust, he became Deputy Chair of Canada Trust until his retirement in 1978. Walter Bean served with distinction in the Second World War, in North Africa, Europe and the Pacific. Retiring from active service with the rank of Brigadier-General, he was named a Commander of the British Empire. From 1966 to 1972 he was Honourary Colonel of the Highland Fusiliers of Canada. Walter's numerous public positions included membership on the University of Waterloo Board of Governors, President of the Kitchener United Way, and Governor and Honourary Treasurer of the Stratford Festival. Perhaps his most significant role was that of creator and founding Chair of The Kitchener and Waterloo Community Foundation in 1984. Walter's modest and unassuming manner motivated others to continue his good public works, especially his challenge to create a river trail. It is fitting that the Trail bears the name of this remarkably accomplished, generous, community minded person. It would please Walter to see the co-operative spirit of community in building this legacy.

Character Defining Features

The features of the trail include: a link from West Montrose in the north to the Town of Blair; an alignment which parallels the Grand River on its west bank, and rises and falls with the variable height of valley walls; a position in the valley that will provide spectacular panoramic views along and across the river valley; its pavement with limestone screenings; and, service sites including trail heads, parking, seating areas, and way-finding and interpretive signage.

Additional Heritage Attributes Identified by A.S.I. During Fieldwork

- Vegetation lining the trail

Views of the Waterloo Pioneer Memorial Tower from the following locations:[6]

- Looking southeast toward the tower along northern portion of Walter Bean Trail (View 12, Figure 30)

3.8 Location of Views Identified as Heritage Attributes

Figure 49 below presents the approximate location and direction of views identified as heritage attributes in Section 3.0, relative to the proposed sewer alignment.

[6] View 13, the long-range view of Pioneer Memorial Tower and river corridor looking northwest from southern portion of the Walter Bean Trail within the Pioneer Tower West Park C.H.L. on east side of river, has not been included as a heritage attribute of the Walter Bean Trail C.H.L. because this portion of the trail is not included within the City's boundaries for the C.H.L. However this view is included as a heritage attribute of the Waterloo Pioneer Memorial Tower, the Grand River Corridor C.H.L. and the Pioneer Tower West Park C.H.L.

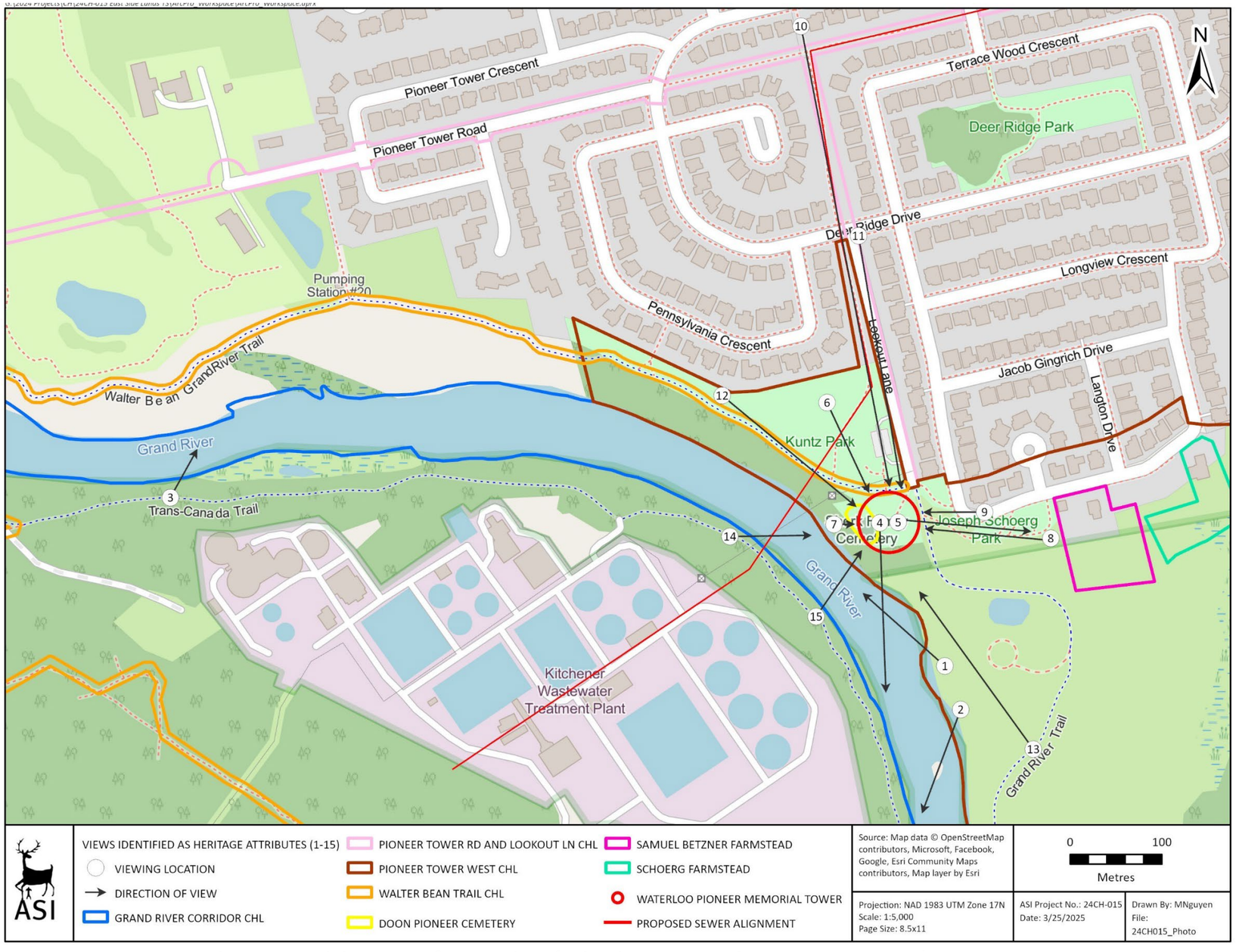

Figure 49: Approximate location and direction of views identified as heritage attributes in Section 3.0 (A.S.I. 2025

4.0 Waterloo Pioneer Memorial Tower Construction Methods, Materials and Condition

This section presents a description of the methods and materials used to construct the Waterloo Pioneer Memorial Tower and the condition of the structure and materials. This research is intended to inform any necessary conditions assessments and/or vibration studies to be completed by other technical disciplines. The information below is based on the following:

- Archival research conducted at the Kitchener Public Library, specifically:
  - Fond MC.113: Waterloo Pioneers Memorial Tower Collection: documents include correspondence, bills, tablet information, sketches and blueprints, and other miscellaneous items
  - Fond MC.55: Pioneer Memorial Tower (Doon, Ont.) Collection: documents include newspapers, correspondence, plans, and drawings
- *Design Brief for the Recapitalization of Pioneer Tower* (Public Works and Government Services Canada, 2000)
- Pioneer Tower Investigation (UMA Engineering Ltd. & Martin Weaver Conservation Consultant Inc., 1996)
- Email communication with John MacLeod, Acting Superintendent, National Historic Sites, Southwestern Ontario Field Unit, Parks Canada

Appendix B contains the *Design Brief* and *Pioneer Tower Investigation*. Appendix C contains technical drawings of the tower completed in 1995 and 1997.

The tower was built between 1925-26 and designed by Toronto-based architect William Alexander Langton (1854-1933) (Armstrong-Reynolds, 1989; Hayes, 1997). The foundation, stonework, and open-air gallery (viewing platform) were constructed by John Fox of Galt (1878-1967). Galt city directories identify Fox as a stonemason, machinist, bricklayer, and core maker for Babcock and Wilcox

Company. The copper roof was installed by the William Knell Company of Kitchener (Armstrong-Reynolds, 1989).

From its foundation to its roof peak, the tower measures 20.7 metres. The tower is built on an octagonal cement foundation measuring 4.57 metres in diameter and 1.52 metres deep (Armstrong-Reynolds, 1989; Public Works and Government Services Canada, 2000).

The tower has an un-reinforced concrete inner core (except for some rebar around the windows) and an exterior fieldstone veneer. The fieldstone veneer rises 11.27 metres from the cement foundation to the base of the observation deck (Armstrong-Reynolds, 1989). The tower tapers from 4.27 metres at the base to 3.66 metres at the gallery platform. The walls are 0.76 metres thick at the base and 0.48 metres thick at the top (Armstrong-Reynolds, 1989; Public Works and Government Services Canada, 2000). The inner diameter of the tower is 2.74 metres throughout. The entrance portico has a classical design and is framed by Indiana limestone. (Public Works and Government Services Canada, 2000). Four glazed divided-light windows are asymmetrically placed within the tower to provide light into the interior, and each window "has a shaped limestone lintel with a plain lug sill" (Armstrong-Reynolds, 1989). As of the May 2024 site visit, what appear to be the original glazed windowpanes were still in place. The shank top is decorated by a moulded concrete cornice interspersed by six stone corbels. The hexagonal gallery deck is constructed of reinforced concrete and was originally covered with oak flooring (since replaced with concrete). A narrow wooden staircase inside the tower leads up to the deck. Decorative iron work had been placed around the exterior of the gallery platform for visitor safety. The tower features a Swiss style steeply-pitched copper roof and has a decorative weathervane on top.

Condition of Concrete Core and Fieldstone Veneer (as of 2000 *Design Brief*)

The *Design Brief* notes that the tower's field stone exterior and concrete interior was "sufficient to stand by itself and retain form." However, this style and form is "an unusual construction method" by late-twentieth century standards "and

must be kept in mind when evaluating the technical issues involved with the core". Concrete in the tower is believed to have a compressive strength of at least 2,000 P.S.I. (16.7 MPa) (UMA Engineering Ltd. & Martin Weaver Conservation Consultant Inc., 1996).

The following excerpts from the *Design Brief* discuss the condition of the concrete core and fieldstone veneer:

> "The structural analysis completed by U.M.A. Engineering Ltd. in 1996 indicated that the Tower was not highly stressed in its current configuration. They state that existing cracks as of 2000 are probably caused by initial shrinkage and/or by thermal expansion and contraction movements over long periods of time.
>
> U.M.A.'s hypothesis is that a high incidence of soluble salts in the concrete is responsible for the deterioration of the core's surface. These salts fill the air voids where there is evaporation at the interior surface of the concrete and eliminate any freeze-thaw protection the air voids provide.
>
> They also suggest that the salts may be attacking the hydrated cement in the concrete mix. U.M.A. also commissioned an Impact-Echo test which allows for the non-destructive analysis of the inner core conditions. This test indicated ''that there is considerable fracturing within the concrete shell, particularly in its lower section where there is a substantial reduction in the thickness of sound concrete." The Impact-Echo test was unfortunately only conducted on the interior of the Tower.
>
> The bulge on the north east face mentioned by U.M.A. is difficult to discern and does not seem to have had any negative structural consequences.
>
> There are a variety of issues involved with respect to the delamination of the inside concrete core of the Tower. These include: high incidence of soluble salts, the water or moisture infiltration and ultimately the mortar

condition on the exterior and the stone veneer separation from the concrete core.

The mortar on the tower is generally sound, but with hairline to 1 mm wide separations around each field stone unit. A mortar analysis conducted by Cornerstone indicates the mortar has a high compressive strength and absorption rate" (Public Works and Government Services Canada, 2000).

The 2000 Design Brief recommended the following investigations and repair for the concrete inner core and fieldstone veneer:

1. Impact-echo testing be performed on the interior and exterior surfaces of the tower to identify the existence, location and magnitude of any voids within the wall. This would allow comparison with the test done in 1996 and determine if fracturing is increasing. It will also assist in determining if any separation has taken place between the field stone veneer and the concrete core and to plan a grouting program, if required.

2. Temperature, humidity and electrical resistance monitoring devices be installed within the concrete core of the Tower along with the recording and analysis of results for a 24 month period. To install these monitoring devices twelve holes will have to be drilled at a diameter of 0.63". This investigation will assist in determining: a) existing conditions to serve as a basis for comparison; b) the 'direction' that the moisture within the concrete core is 'travelling;' c) following the repointing proposed at the beginning of the second year, the data will establish the extent to which the repointing was effective in reducing the moisture content in the concrete core.

3. The entire surface of the field stone veneer be repointed with a compatible heritage mortar that has a non-shrinkage additive. The

results of the Impact-echo test will help determine if a grouting program and/or installation of Helifix anchors is necessary

4. A thorough analysis of the composition of the concrete be performed to verify UMA findings. If the concrete does prove to have excessive amounts of sulfides, then proceed with poulticing to desalinate the concrete core, should it be found necessary or advantageous at the end of the investigation stage

5. Hydro electric service and exhaust fans be installed in the Tower in order to eliminate, or significantly reduce, the extremely high moisture and humidity levels within the tower and especially within the concrete core of the tower. It has not been determined that this work shall, in fact be required. However, there is a strong likelihood that it would assist greatly.

As of June 2024, no investigations or repairs as recommended in the *Design Brief* have yet been undertaken (email communication with John MacLeod of Parks Canada on 13 June 2024).

Timeline of Repairs as Described in the *Design Brief*:

1990

- Minor pointing done to bottom two-thirds of tower where required using sand, cement and latex bonding agent.
- Reset some stones that had previously fallen out.
- Five telltales were installed on Nov. 6, 1990 on two lateral cracks and 8 more were installed on Nov. 8, 1990.
- Epoxy injection of two opened up cracks using a pliable material.
- Air blasted entire inner wall surface in preparation for sealant.
- Sealed inside of tower with two applications of Hydroxo Double 7 (Design Brief notes that this product has since failed).

- A few large openings around the new door frame were mortared prior to spraying the sealant.
- A thin coat of cement was applied over the cracks in the exterior door threshold to prevent water from freezing in them during the winter.

1992

- Further re-pointing of the outer stonework.
- Drainhole installed at the bottom of the Tower.

1998

- Metal windows repaired
- Concrete observation deck surface and edge repaired and sealed
- Sandstone corbel stabilization with 'Cintec Anchor System'
- Roof joist ends capped to prevent further deterioration
- Metal support straps installed between each post and bracket

5.0 Description and Purpose of Proposed Activity

The Region of Waterloo is anticipating significant population growth in the eastern part of Waterloo Region known as the East Side Lands (E.S.L.), which includes parts of Cambridge, Woolwich and Kitchener. To respond to this anticipated growth, the Region intends to construct a new trunk sanitary sewer known as the East Side Lands Trunk Sewer (E.S.L.T.S.).

Figure 50 below shows the proposed sewer alignment in relation to the surrounding cultural heritage landscapes (C.H.L.s) and built heritage resources (B.H.R.s).

Archaeological Services Inc. (A.S.I.) has reviewed the *East Side Gravity Trunk Sewer (Kitchener): Detailed Design and Services During Construction—30% Design Report* dated November 13, 2024 (R.V. Anderson Associates Ltd., 2024).

30% drawings are presented in Appendix D. The proposed sewer has the following main sections:

- An approximately 3.3 kilometer-long underground section that begins at Intermarket Road in the City of Cambridge near an existing sewage pumping station, runs through the Pioneer Tower Road and Lookout Lane C.H.L. and terminates in an underground section in Kuntz Park in the City of Kitchener, within the Pioneer Tower West C.H.L. The section of the underground sewer within the Pioneer Tower Road and Lookout Lane C.H.L. will be constructed using the open-cut method, with the exception of micro-tunnelling construction starting where Pioneer Tower Trail turns 90 degrees from north to east and running along the eastern portion of Pioneer Tower Trail and Pioneer Tower Road. The methodology of pipe construction will be reviewed by R.V.A. and may be revised during detailed design.
- An approximately 500 metre-long aboveground section on a new service bridge to be constructed crossing the Grand River southwest of the Waterloo Pioneer Memorial Tower within the Pioneer Tower West Park C.H.L., the Grand River Corridor C.H.L. and the Walter Bean Trail C.H.L. The eastern end of the bridge will terminate adjacent to the west side of the Walter Bean Trail. The construction of the bridge will require cutting into the east riverbank. **Note to Draft: This H.I.A. will be updated with a discussion of the cut required in the east riverbank following the completion of the 60% Design Report.**
- An approximately 75 metre-long section that connects to the existing wastewater treatment plant influent channel (referred to as the influent flume), located on the west side of the Grand River, adjacent to the Grand River C.H.L.

Note to Draft: This H.I.A. will be updated with a discussion of tree removal and construction phasing following the completion of the 60% Design Report.
Figure 51 shows the proposed limits of construction for the bridge supporting structures. Figure 52 shows an aerial image of the proposed bridge alignment.

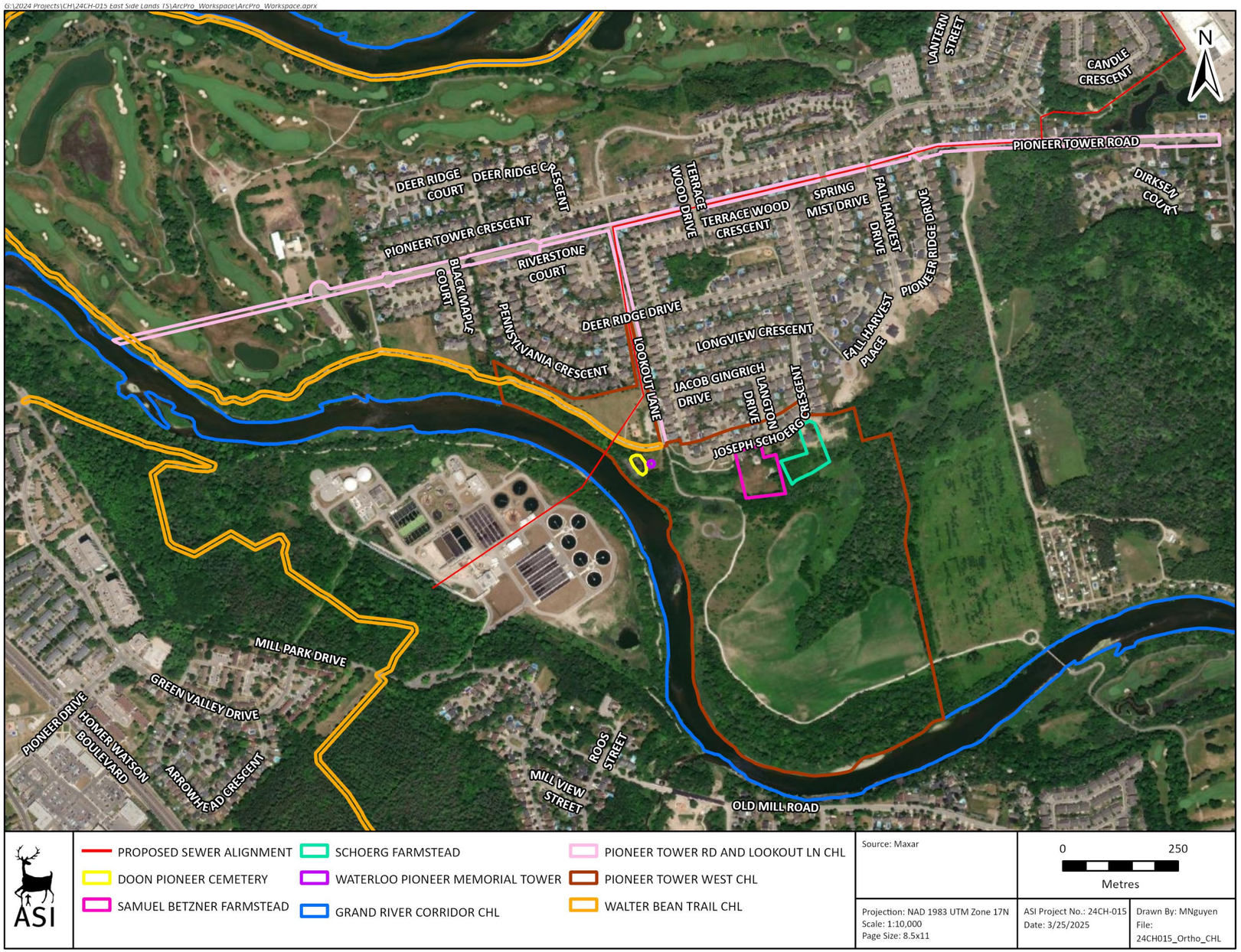

Figure 50: Alignment of proposed sewer in relation to the surrounding C.H.L.s and B.H.R.s (A.S.I. 2025).

Figure 51: Alignment of proposed bridge showing limits of construction for bridge supporting structures (R.V.A.). Additional bridge piers will be located within the Kitchener W.W.T.P. site, but those are not within the scope of this H.I.A.

Figure 52: Drone image showing proposed bridge alignment, with Pioneer Memorial Tower at left (R.V.A. 2024).

A steel truss bridge structure is proposed to carry the sewer over the Grand River, through the water treatment facility and then connects to a drop structure which is connected to the existing influent channel. The sewer will be supported on a 12-span truss bridge. The bridge will be 5 metres lower than the plateau on the east side of the riverbank. As the bridge services a gravity sewer, the height of the bridge cannot shift up or down. The spans of the bridge are 75 metres long for the span over the river and 15 to 50 metres long for the remaining spans. The substructure for the bridge will be cast-in-place concrete. The superstructure of the bridge will be made of prefabricated steel trusses. Four truss configuration options for the three spans of the bridge crossing the Grand River were developed for the 30% Design Report (Figure 53 to Figure 56). Option 4 has been selected by the project team as the preferred option for the trunk sewer bridge. The preferred option has V-shaped supports and was inspired by some of the previous truss bridges over the Grand River. The V-shaped supports allow for lower piers than the other three options, which

reduces the perceived scale of the bridge from the vantage point of a pedestrian along the river. The bridge will not provide pedestrian or vehicular access; however, it will have a maintenance walkway on either side of the sewer pipe.

Figure 53: Truss configuration Option 1, looking southeast from the west bank of the Grand River, along the Water Treatment Trail beside the Kitchener Waste Water Treatment Plant (R.V.A. 2024).

Figure 54: Truss configuration Option 2, looking southeast from the west bank of the Grand River, along the Water Treatment Trail beside the Kitchener Waste Water Treatment Plant (R.V.A. 2024).

Figure 55: Truss configuration Option 3, looking southeast from the west bank of the Grand River, along the Water Treatment Trail beside the Kitchener Waste Water Treatment Plant (R.V.A. 2024)

Figure 56: Truss configuration Option 4, looking southeast from the west bank of the Grand River, along the Water Treatment Trail beside the Kitchener Waste Water Treatment Plant (R.V.A. 2024)

Bridge Design Considerations

The bridge is being designed by D.T.A.H., an Architecture, Landscape Architecture and Urban Design firm with experience designing bridges in heritage contexts. The bridge architect reviewed historical bridges crossing the Grand River to inform the design (see Appendix E). There are numerous historical industrial bridges over the Grand and many are truss bridges. The proposed truss bridge has an elegant, minimal design with clean, continuous lines, and slender members to emphasize visual lightness. The space between the members provides a visual permeability through the structure, lending it a lightness in the landscape. The design also references the tradition of truss bridges over the Grand River, while being distinguishable as a contemporary bridge.

The 30% bridge design has been designed to suit its context on the Grand River, with a beautiful natural setting (sky, trees and water with reflections), the riverside trail system and surrounding area, including the Waterloo Pioneer Memorial Tower. Given this particular context, the three spans of the bridge

over the Grand River and its supporting piers have been aesthetically enhanced beyond what would be designed for a typical utility bridge.

A.S.I. has worked with R.V.A., D.T.A.H. and the Region to develop two finish options for the three spans of the bridge's superstructure over the Grand River. For both options, the finish for the maintenance walkway and railings will be plain galvanized steel and the sewer pipe itself will be plain galvanized steel or a neutral colour finish. Finish Option 1 has been selected as the preferred option by the project team.

Finish Option 1 – Pale blue paint (Figure 57 and Figure 58)

This option features galvanized steel primary truss members with a premium paint finish in a light sky blue colour and secondary truss members in a galvanized steel or white paint finish.

The pale blue paint finish option with steel or white accents enhances the visual lightness of the bridge by blending into the sky. The coloured finish also provides a contemporary character to the bridge.

Finish Option 2 – Corten steel (Figure 59 and Figure 60)

This option features Corten steel primary truss members (a rust colour) and secondary truss members in a galvanized steel or white paint finish.

The Corten steel finish option with its variegated rust colour on the primary truss members echoes the natural tones of the Grand River setting and references the colour of some historical bridge crossings over the Grand River as well as the nearby existing pedestrian bridge to the south.

Figure 57: Rendering of bridge Option 4 with sky blue paint finish, looking southeast from the west bank of the Grand River, along the Water Treatment Trail beside the Kitchener Waste Water Treatment Plant (DTAH 2025).

Figure 58: Rendering of bridge Option 4 with sky blue paint finish, looking east from the west bank of the Grand River, along the Water Treatment Trail beside the Kitchener Waste Water Treatment Plant (DTAH 2025).

Image Placeholder

This H.I.A. will be updated with an additional image showing the bridge with the pale blue finish option from a longer-range viewpoint.

Figure 59: Rendering of bridge Option 4 with Corten finish, looking southeast from the west bank of the Grand River, along the Water Treatment Trail beside the Kitchener Waste Water Treatment Plant (DTAH 2025)

Figure 60: Rendering of bridge Option 4 with Corten finish, looking east from the west bank of the Grand River, along the Water Treatment Trail beside the Kitchener Waste Water Treatment Plant (DTAH 2025).

Image Placeholder

This H.I.A. will be updated with an additional image showing the bridge with the Corten finish option from a longer-range viewpoint.

Bridge Piers

A.S.I. has discussed design options for the bridge piers with R.V.A., D.T.A.H. and the Region. The design for the cast-in-place concrete piers on either side of the river has not yet been finalized, however these piers will be aesthetically enhanced beyond what is typical for a utility bridge due to their size and their public visibility along the riverside trails and from the Waterloo Pioneer Memorial Tower. Figure 57 to Figure 60 depict piers with a ribbed profile intended to provide visual lightness to the concrete. There is the potential to refine the shape of the piers, for example, T-shaped or slender single piers. There is also the potential to explore the addition of benches and interpretive panels or features at grade to further respond to the bridge's context along the riverside trails and enhance the pedestrian experience of the bridge. A.S.I. will continue to work with the project team to ensure the refinement of the piers is appropriate to the setting and surrounding C.H.L.s and B.H.R.s.

6.0 Impact Assessment and Mitigation Measures

To assess the potential impacts of the proposed works on the cultural heritage value of the subject cultural heritage landscapes and built heritage resource, the identified heritage attributes outlined in Section 3.0 were considered against a range of possible impacts based on the *Ontario Heritage Tool Kit InfoSheet #5: Heritage Impact Assessments and Conservation Plans* (Ministry of Citizenship and Multiculturalism, 2006b). These include:

Direct impacts:

- Destruction of any, or part of any, significant heritage attributes or features; and
- Alteration that is not sympathetic, or is incompatible, with the historic fabric and appearance.

Indirect impacts:

- Shadows created that alter the appearance of a heritage attribute or change the viability of a natural feature or plantings, such as a garden;
- Isolation of a heritage attribute from its surrounding environment, context or a significant relationship;
- Direct or indirect obstruction of significant views or vistas within, from, or of built and natural features;
- A change in land use such as rezoning a battlefield from open space to residential use, allowing new development or site alteration to fill in the formerly open spaces; and
- Land disturbances such as a change in grade that alters soils, and drainage patterns that adversely affect an archaeological resource.

Indirect impacts from construction-related vibration have the potential to negatively affect built heritage resources and cultural heritage landscapes

depending on the type of construction methods and machinery selected for the project and proximity and composition of the identified resources.

The results of the impact assessment presented in the tables below are based on a review of the *East Side Gravity Trunk Sewer (Kitchener): Detailed Design and Services During Construction—30% Design Report* (R.V. Anderson Associates Ltd., 2024). The impact assessment considers possible direct adverse impacts, indirect adverse impacts, and positive impacts to the cultural heritage attributes of the subject cultural heritage landscapes and built heritage resources. See Section 3.0 for a description of these cultural heritage attributes. Table 1 presents impact assessment and mitigation measures for the subject C.H.L.s and B.H.R.s. Impact assessment and mitigation measures for views that have been identified as heritage attributes of the C.H.L.s and B.H.R.s are presented in a separate table (Table 2).

The proposed interventions will involve construction of a sewer and service bridge within the Pioneer Tower West Park C.H.L., the Grand River C.H.L, the Pioneer Tower Road and Lookout Lane C.H.L., and the Walter Bean Trail C.H.L.

Table 1: Impact Assessment and Mitigation Recommendations (Not including impacts to views)

Cultural Heritage Resource and Heritage Attributes (not including views)	Impact Assessment	Mitigation Recommendations
Waterloo Memorial Pioneer Tower Heritage Attributes: Its very good aesthetic and functional designs, and excellent quality of craftsmanship and materials, such as: the building's form and massing which consists of a tall slightly tapered cylindrical tower clad in multi-coloured and textured local fieldstone; the building's sturdy construction of self-standing exterior wall with concrete inner core; the building's clean lines and subtle ornamentation and picturesque silhouette; the steeply pitched "Swiss-style" roof sheathed in copper; the decorative ironwork	Indirect adverse impacts to the Tower from construction-related vibration are possible. These are anticipated to be limited and temporary. **Note to Draft: This section may be updated following completion of the 60% Design Report if new information about vibration impacts is available.** Temporary indirect impacts are also possible during construction activities due to the accumulation of dust and/or dirt on the tower. No additional direct or indirect adverse impacts to cultural heritage attributes (excluding views) are anticipated.	To ensure the tower is not adversely impacted by vibration during construction, a Vibration Monitoring Plan must be prepared by a qualified engineer or vibration consultant who demonstrates a level of professional understanding and competence in the field of heritage conservation.). The Vibration Monitoring Plan must respond to the City of Kitchener's Terms of Reference for Cultural Heritage Protection Plans and Terms of Reference for Risk Management Plans. The Plan must be approved by the City prior to construction. The Vibration Monitoring Plan should include a pre-construction condition assessment of the structure. A condition assessment typically includes pre-construction measurements of background vibrations within the zone of influence, and pre-construction property inspection, including documentation of any visible cracks. This is used to identify any damages caused by construction compared with existing, pre-construction damage to the structure. It is also recommended that the vibration consultant review the research provided in Section 4.0 of this report to help inform their assessment.

Cultural Heritage Resource and Heritage Attributes (not including views)	Impact Assessment	Mitigation Recommendations
placed around the exterior of the platform; the six stone corbels decorating the moulded concrete cornice; the original glazed windows of the tower, with limestone lintels and plain lug sills; the front portico and entrance, framed by a cut limestone lintel of classical design; the Conestoga wagon weather vane. The manner in which the Waterloo Pioneer Memorial Tower is compatible with the picturesque setting of Waterloo Regional Municipality and is a symbol of the region, as evidenced by: its overall scale, design and materials that harmonize with its mixed agricultural and urban setting. Its role as a memorial to the early		Further, should any damages be caused by vibration, repairs must be conducted by a contractor with knowledge and experience in restoring heritage structures and who is a member in good standing of C.A.H.P. Repairs should be completed in consultation with Parks Canada and follow the *Standards and Guidelines for the Conservation of Historic Places in Canada* (Parks Canada, 2010). Post-construction maintenance and restoration to remove any construction-related dirt or dust on the tower should be conducted by a contractor with knowledge and experience in cleaning and restoring heritage structures and who is a member in good standing of C.A.H.P. Cleaning should be done using the gentlest means possible and the use of pressure washing above 300 pounds per square inch (P.S.I.) should be avoided. Repairs should be completed in consultation with Parks Canada and follow the *Standards and Guidelines for the Conservation of Historic Places in Canada.*

Cultural Heritage Resource and Heritage Attributes (not including views)	Impact Assessment	Mitigation Recommendations
German settlers of Ontario, which makes it a symbol of the region and well-known to residents and visitors.		Construction activities and staging should be suitably planned and undertaken to avoid impacts to the tower. Suitable mitigation including establishing no-go zones with fencing and issuing instructions to construction crews to avoid the tower should be considered to mitigate any unintended impacts during construction. The installation of a dust barrier system on the tower's exterior should be considered, in consultation with Parks Canada.
Grand River C.H.L. Heritage Attributes: • Well-defined river valley with alternating steep and shallow banks. • Wonderful meandering river with significant vegetation communities and associated wildlife habitat. • Forested riverbanks • Schoerg Farmstead	Direct adverse impacts to the vegetation communities and associated wildlife habitat on the eastern bank of the Grand River are anticipated due to the construction of the trunk sewer and service bridge within the river valley. **<u>Note to Draft:</u> This H.I.A. will be updated with additional information about vegetation removal following the completion of a Tree Management Plan**.	**Note to Draft: Mitigation measures related to vegetation removal will be updated following completion of Tree Management Plan.** Documentation and replanting are typical mitigation measures.

Cultural Heritage Resource and Heritage Attributes (not including views)	Impact Assessment	Mitigation Recommendations
• Betzner Farmstead • Waterloo Pioneer Memorial Tower	See discussion of impacts to the Schoerg Farmstead and Betzner Farmstead in subsequent rows in this table. See discussion of impacts specific to the Waterloo Pioneer Memorial Tower in the first row of this table. No additional direct or indirect adverse impacts to cultural heritage attributes are anticipated.	
Pioneer Tower West Park C.H.L. Heritage Attributes: The Tower and the two farmsteads; the location on the east bank of the Grand River; its access via Lookout Lane which is associated with the original Huron Road; random coursed fieldstone;	Temporary direct impacts to the C.H.L.'s landscape are anticipated due to construction, but these will not result in adverse impacts to identified heritage attributes so long as the recommended mitigation measures are completed.	Post-construction rehabilitation of the landscape within the Pioneer Tower West Park C.H.L. should be undertaken to reflect pre-construction conditions to the extent practicable. To ensure the cemetery is not adversely impacted during construction, a Vibration Monitoring Plan must be prepared by a qualified engineer or vibration consultant who demonstrates a level of professional understanding and competence in the

Cultural Heritage Resource and Heritage Attributes (not including views)	Impact Assessment	Mitigation Recommendations
tapered "Swiss" copper roof the Conestoga wagon weather vane; the Tower's simple well-proportioned profile consisting of a tapered cylindrical shaft supporting a molded concrete cornice under a hexagonal gallery platform. The Doon Pioneer Cemetery, including: • Cemetery size and shape • Grave markers and plots • Concrete post fence around perimeter of cemetery • Plantings around perimeter of cemetery • Location along east bank of the Grand River in proximity	Indirect adverse impacts to the cemetery grave markers and concrete post fence from construction-related vibration are possible. These are anticipated to be limited and temporary adverse vibration impacts. Temporary indirect adverse impacts to the Doon Pioneer Cemetery are also possible during construction activities due to the accumulation of dust and/or dirt on the cemetery grave markers and concrete post fence. See discussion of impacts specific to the Waterloo Pioneer Memorial Tower in the first row of this table.	field of heritage conservation. The Vibration Monitoring Plan must respond to the City of Kitchener's Terms of Reference for Cultural Heritage Protection Plans and Terms of Reference for Risk Management Plans. The Plan must be approved by the City prior to construction. The Vibration Monitoring Plan should include a pre-construction condition assessment of the grave markers and concrete post fence. A condition assessment typically includes pre-construction measurements of background vibrations within the zone of influence, and pre-construction property inspection, including documentation of any visible cracks. This is used to identify any damages caused by construction compared with existing, pre-construction damage to the grave markers and fence. Further, should any damages be caused by vibration, repairs must be conducted by a contractor with knowledge and experience in restoring heritage cemeteries and who is a member in good standing of C.A.H.P. Repairs should follow the *Standards and Guidelines for the Conservation of Historic Places in Canada*

Cultural Heritage Resource and Heritage Attributes (not including views)	Impact Assessment	Mitigation Recommendations
to Waterloo Pioneer Memorial Tower	See discussion of impacts to the Schoerg Farmstead and Betzner Farmstead in subsequent rows in this table. No additional direct or indirect adverse impacts to cultural heritage attributes are anticipated.	Post-construction maintenance and restoration to remove any construction-related dirt or dust on the grave markers and fence should be conducted by a contractor with knowledge and experience in cleaning and restoring heritage cemeteries and who is a member in good standing of C.A.H.P. Cleaning should be done using the gentlest means possible and the use of pressure washing above 300 pounds per square inch (P.S.I.) should be avoided. Repairs should follow the *Standards and Guidelines for the Conservation of Historic Places in Canada.* Construction activities and staging should be suitably planned and undertaken to avoid impacts to identified B.H.R.s and C.H.L.s. Suitable mitigation including establishing no-go zones with fencing and issuing instructions to construction crews to avoid the tower should be considered to mitigate any unintended impacts during construction. Suitable mitigation measures including post-construction rehabilitation should also be implemented.

Cultural Heritage Resource and Heritage Attributes (not including views)	Impact Assessment	Mitigation Recommendations
Samuel Betzner Farmstead (300 Joseph Schoerg Crescent) Heritage Attributes: The built resources and land on which 437 Pioneer Tower Road [now 300 Joseph Schoerg Crescent] is located and its historic association with the founding families of Waterloo County are also of cultural heritage significance. The landscape, which includes unobstructed views to the Grand River (designated a Canadian Heritage River) still boasts many features which originally influenced its settlement including rich fertile soils, a	No direct or indirect adverse impacts are anticipated. Heritage attributes on the property are all located a minimum of 150 metres away from the construction area, and as such are not anticipated to be impacted by construction-related vibration or damage from construction-related dust, debris or machinery.	Continue to avoid direct and indirect adverse impacts to this property and its identified heritage attributes. No further work required.

Cultural Heritage Resource and Heritage Attributes (not including views)	Impact Assessment	Mitigation Recommendations
mixture of dense forest and open meadows and proximity to water. Architecturally, the Betzner farmhouse serves as an example of a Mennonite Georgian residence. Of significance are the symmetrical proportions and base architectural features that identify the farmhouse as a Mennonite Georgian structure. Specific features of significance on the driveshed include all building elevations; the fieldstone foundation; roof and roofline; window and door openings; door hardware on north and west elevations; and the 6/6 windows.		
Schoerg Farmstead (330 Joseph Schoerg Crescent)	No direct or indirect adverse impacts are anticipated. Heritage attributes on the property are all located a minimum of 150	Continue to avoid direct and indirect adverse impacts to this property and its identified heritage attributes.

Cultural Heritage Resource and Heritage Attributes (not including views)	Impact Assessment	Mitigation Recommendations
Heritage Attributes: All exterior elevations of the farmhouse including the rear summer kitchen annex with two storey verandah and square posts and ballusters, but excluding the west gable end chimney; single bay pedimented stoop entrance with turned posts and side benches; all window openings, windows and sills including 6/6 double hung sash and storm, and 6 pane end lights and twin light cellar sashes; door and door openings including front entrance paneled door with 5 pane transom and 3 pane sidelights, kitchen annex entrance paneled door with twin gothic windows, but excluding the door opening on the south (rear) elevation; roof and	metres away from the construction area, and as such are not anticipated to be impacted by construction-related vibration or damage from construction-related dust, debris or machinery.	No further work required.

Cultural Heritage Resource and Heritage Attributes (not including views)	Impact Assessment	Mitigation Recommendations
roofline including wooden moulded frieze and return eaves.		
Pioneer Tower Road and Lookout Lane C.H.L. Heritage Attributes: The alignment of the road; the association of the road with the former fords across the Grand River; and the adjacent heritage sites including the Pioneer Tower, the Schoerg Family Homestead and the Betzner Family Homestead; Lookout Lane's rural cross-section and tar and chip road surface	Direct adverse impacts to Lookout Lane's tar and chip road surface are anticipated due to the open-cut construction of the sewer along Lookout Lane. Construction will result in the removal of the tar and chip surface. There is also the potential for the alteration of Lookout Lane's rural cross-section during reconstruction. The alignment of Lookout Lane, Pioneer Tower Trail and Pioneer Tower Road are not anticipated to be altered. No additional direct or indirect adverse impacts to cultural heritage attributes are anticipated.	To mitigate impacts to Lookout Lane, the road should be restored to pre-construction conditions. The restoration of Lookout Lane should follow the City of Kitchener's Pioneer Tower Design Guidelines, specifically, that existing informal road edges should be preserved and no sidewalks or curbs and gutters constructed along either side of the road. As the City no longer has the equipment to maintain tar and chip roads, the new road surface should be comprised of the following alternative approved by City Heritage Planning Staff: Slurry seal over asphalt and an HL4 asphalt with a high degree of exposed aggregate. Road restoration work should be completed in consultation with City Heritage Planning Staff.
Walter Bean Trail C.H.L.	Direct adverse impacts are anticipated due to the removal of vegetation along the trail	To be updated following completion of Tree Management Plan.

Cultural Heritage Resource and Heritage Attributes (not including views)	Impact Assessment	Mitigation Recommendations
A link from West Montrose in the north to the Town of Blair; an alignment which parallels the Grand River on its west bank, and rises and falls with the variable height of valley walls; a position in the valley that will provide spectacular panoramic views along and across the river valley; its pavement with limestone screenings; and, service sites including trail heads, parking, seating areas, and way-finding and interpretive signage; vegetation along trail; vegetation lining the trail	in the vicinity of the proposed sewer and bridge. **Note to Draft: This H.I.A. will be updated with additional information about vegetation removal following the completion of a Tree Management Plan.**	

Table 2: View Impact Assessment and Mitigation Recommendations

View Description and I.D.	**Impact Assessment**	**Mitigation Recommendations**
View along the Grand River looking northwest from the east bank of the river, south of the Pioneer Memorial Tower (View 1, Figure 2) (Heritage Attribute of Grand River Corridor C.H.L.)	Visual impacts are anticipated as the proposed bridge will introduce a new element spanning the river visible from this location, which will alter this view. However, this is not anticipated to result in adverse impacts to the cultural heritage value or interest of the C.H.L. so long as the recommended mitigation measures are employed. The view of the tower will not be obstructed.	To mitigate the visual impacts of the bridge on the view of the Grand River and the Pioneer Memorial Tower, the bridge should be designed to be well-proportioned, visually light and compatible with the surrounding beautiful natural context of the river corridor and tower. These mitigation measures have been integrated into the bridge design process in the following ways: • Bridge has been designed to respond to its setting on the Grand River and has been aesthetically enhanced to suit its setting beyond what is typical for a service bridge. • Truss bridge design selected for its visual permeability and lightness in the landscape and to reference existing truss bridges across the Grand River, while being distinguishable as a contemporary bridge. • The preferred truss configuration option (Option 4) was selected to reduce the height of the bridge piers.

View Description and I.D.	Impact Assessment	Mitigation Recommendations
		• The preferred finish option (Option 1) has been selected to enhance compatibility with the Grand River setting. Refinement of the bridge and pier design should continue to integrate these mitigation measures.
View along the Grand River looking south from the east bank of the river, south of the Pioneer Memorial Tower (View 2, Figure 3) (Heritage Attribute of Grand River Corridor C.H.L.)	No visual impacts are anticipated as the view is looking in the opposite direction of the proposed bridge.	No further work required.
View northeast across the river from the Water Treatment Trail on the west side of the river (View 3, Figure 5)	No impacts are anticipated, as the proposed bridge will be located too far east to be visible from this location.	No further work required.

View Description and I.D.	Impact Assessment	Mitigation Recommendations
(Heritage Attribute of Grand River Corridor C.H.L.)		
Views to the south from the lookout platform of the Pioneer Memorial Tower lookout platform of the Grand River flood plain, the river corridor and Pinnacle Hill in the background. (View 4, Figure 22) (Heritage attribute of Grand River Corridor C.H.L. and the Waterloo Pioneer Memorial Tower)	No visual impacts are anticipated, as the proposed bridge will be located to the west of the tower and will not be visible from this location	No further work required.
View looking east from the lookout platform of the Pioneer Memorial Tower towards the Betzner Farmstead (View 5, Figure 23) (Heritage attribute of the Waterloo Pioneer Memorial Tower)	No visual impacts are anticipated, as the proposed bridge will be located to the west of the tower and will not be visible from this location.	No further work required.

View Description and I.D.	Impact Assessment	Mitigation Recommendations
Clear views of the tower from anywhere within the Pioneer Tower West Park C.H.L. (for example, View 6, Figure 24, looking south from within Kuntz Park) (Heritage attribute of the Waterloo Pioneer Memorial Tower and the Pioneer Tower West Park C.H.L.)	No visual impacts are anticipated, as the height of the proposed bridge will be 5 metres lower than the plateau on the east side of the river where the Pioneer Tower West Park C.H.L. is located. Therefore, the bridge will not be visible from most locations within the park and no clear view of both the tower and the river has been identified near the location of the proposed bridge.	No further work required.
Looking southeast toward the tower from Doon Pioneer Cemetery (View 7, Figure 25) (Heritage attribute of the Waterloo Pioneer Memorial Tower and the Pioneer Tower West Park C.H.L.)	No visual impacts are anticipated, as the proposed bridge will be located to the southwest of the cemetery and will not be visible from this location.	No further work required.
Looking west toward the tower from the Betzner barn ruins (View 8, Figure 26)	No visual impacts are anticipated, as the proposed bridge will not be visible from this location because the riverbank and river are not visible from this viewpoint due to	No further work required.

View Description and I.D.	Impact Assessment	Mitigation Recommendations
(Heritage attribute of the Waterloo Pioneer Memorial Tower and the Pioneer Tower West Park C.H.L.)	topography, and the height of the proposed bridge will be 5 metres below the plateau on the east side of the river.	
Looking west toward the tower from atop the ridge along the sidewalk across from 283 Joseph Schoerg Crescent (View 9, Figure 27) (Heritage attribute of the Waterloo Pioneer Memorial Tower and the Pioneer Tower West Park C.H.L.)	No visual impacts are anticipated, as the proposed bridge will not be visible from this location because the riverbank and river are not visible from this viewpoint due to topography, and the height of the proposed bridge will be 5 metres below the plateau on the east side of the river.	No further work required.
Long-range view of tower looking south along Pioneer Tower Trail from as far north as the northern portion of Deer Ridge Drive (View 10, Figure 28) (Heritage attribute of the Waterloo Pioneer Memorial Tower and the Pioneer Tower Road and Lookout Lane C.H.L.)	No visual impacts are anticipated, as the proposed bridge will not be visible from this location because the riverbank and river are not visible from this viewpoint due to topography, and the height of the proposed bridge will be 5 metres below the plateau on the east side of the river.	No further work required.

View Description and I.D.	Impact Assessment	Mitigation Recommendations
Long-range view of tower looking south along Lookout Lane from Deer Ridge Drive to Lookout Lane's southern terminus (View 11, Figure 29) (Heritage attribute of the Waterloo Pioneer Memorial Tower and the Pioneer Tower Road and Lookout Lane C.H.L.)	No visual impacts are anticipated, as the proposed bridge will not be visible from this location because the riverbank and river are not visible from this viewpoint due to topography, and the height of the proposed bridge will be 5 metres below the plateau on the east side of the river.	No further work required.
Looking southeast toward the tower along northern portion of Walter Bean Trail, along east riverbank (View 12, Figure 30) (Heritage attribute of the Waterloo Pioneer Memorial Tower and the Walter Bean Trail C.H.L.)	No visual impacts are anticipated, as the edge of the riverbank is largely obscured by trees even in winter and the height of the proposed bridge will be 5 metres below the plateau on the east side of the river.	No further work required.
Long-range view of tower and Grand River corridor looking northwest from southern	Visual impacts are anticipated as the proposed bridge will introduce a new element spanning	To mitigate the visual impacts of the bridge on the view of Grand River Corridor C.H.L., Pioneer Tower

View Description and I.D.	Impact Assessment	Mitigation Recommendations
portion of Walter Bean Trail within the Pioneer Tower West Park C.H.L. on east side of river (View 13, Figure 31) (Heritage attribute of the Waterloo Pioneer Memorial Tower, the Pioneer Tower West Park C.H.L. and the Grand River Corridor C.H.L.)	the river visible from this location, which will alter this view. However, this is not anticipated to result in adverse impacts to the cultural heritage value or interest of the Waterloo Pioneer Memorial Tower, the Pioneer Tower West Park C.H.L. and the Grand River Corridor C.H.L. so long as the recommended mitigation measures are employed. The view of the tower will not be obstructed.	West Park C.H.L. and the Pioneer Memorial Tower, the bridge should be designed to be well-proportioned, visually light and compatible with the surrounding beautiful natural context of the river corridor and tower. These mitigation measures have been integrated into the bridge design process in the following ways: • Bridge has been designed to respond to its setting on the Grand River and has been aesthetically enhanced to suit its setting beyond what is typical for a service bridge. • Truss bridge design selected for its visual permeability and lightness in the landscape and to reference existing truss bridges across the Grand River, while being distinguishable as a contemporary bridge. • The preferred truss configuration option (Option 4) was selected to reduce the height of the bridge piers.

View Description and I.D.	Impact Assessment	Mitigation Recommendations
		• The preferred finish option (Option 1) has been selected to enhance compatibility with the Grand River setting. Refinement of the bridge and pier design should continue to integrate these mitigation measures.
Close-range view of the tower and Grand River looking east from a select location along the Water Treatment Trail on the west side of the river (View 14, Figure 32) (Heritage attribute of the Waterloo Pioneer Memorial Tower and the Grand River Corridor C.H.L.)	Visual impacts are anticipated as the proposed bridge will introduce a new element spanning the river visible from this location, which will alter this view. The view of the tower may be partially obstructed. However, this is not anticipated to result in adverse impacts to the cultural heritage value or interest of the Waterloo Pioneer Memorial Tower and the Grand River Corridor C.H.L. so long as the recommended mitigation measures are employed.	To mitigate the partial obstruction of the view of the tower, this view should be documented for archival purposes. To mitigate the visual impacts of the bridge on the view of the Grand River Corridor C.H.L. and the Pioneer Memorial Tower, the bridge should be designed to be well-proportioned, visually light and compatible with the surrounding beautiful natural context of the river corridor and tower. These mitigation measures have been integrated into the bridge design process in the following ways: • Bridge has been designed to respond to its setting on the Grand River and has been

View Description and I.D.	Impact Assessment	Mitigation Recommendations
		aesthetically enhanced to suit its setting beyond what is typical for a service bridge. • Truss bridge design selected for its visual permeability and lightness in the landscape and to reference existing truss bridges across the Grand River, while being distinguishable as a contemporary bridge. • The preferred truss configuration option (Option 4) was selected to reduce the height of the bridge piers. • The preferred finish option (Option 1) has been selected to enhance compatibility with the Grand River setting. Refinement of the bridge and pier design should continue to integrate these mitigation measures.
Close-range view of the tower and Grand River looking north from a select location along the Water Treatment Trail on the west side of the river (View 15, Figure 33)	Visual impacts are anticipated as the proposed bridge will introduce a new element spanning the river visible from this location, which will alter this view. However, this is not anticipated to result in adverse impacts to the cultural	To mitigate the visual impacts of the bridge on the view of the Grand River Corridor C.H.L. and the Pioneer Memorial Tower, the bridge should be designed to be well-proportioned, visually light and compatible with the surrounding beautiful natural

View Description and I.D.	Impact Assessment	Mitigation Recommendations
(Heritage attribute of the Waterloo Pioneer Memorial Tower and the Grand River Corridor C.H.L.)	heritage value or interest of the Waterloo Pioneer Memorial Tower and the Grand River Corridor C.H.L. so long as the recommended mitigation measures are employed. The view of the tower will not be obstructed.	context of the river corridor and tower. These mitigation measures have been integrated into the bridge design process in the following ways: • Bridge has been designed to respond to its setting on the Grand River and has been aesthetically enhanced to suit its setting beyond what is typical for a service bridge. • Truss bridge design selected for its visual permeability and lightness in the landscape and to reference existing truss bridges across the Grand River, while being distinguishable as a contemporary bridge. • The preferred truss configuration option (Option 4) was selected to reduce the height of the bridge piers. • The preferred finish option (Option 1) has been selected to enhance compatibility with the Grand River setting. Refinement of the bridge and pier design should continue to integrate these mitigation measures.

7.0 Considered Alternatives

The East Side Lands Sanitary Servicing Class Environmental Assessment (E.A.) was completed to establish the preferred solution for conveying wastewater from the broader East Side Lands area (+/- 4,000 hectares) to the Kitchener Wastewater Treatment Plant (W.W.T.P.). To establish the preferred solution which is discussed in this H.I.A., the E.A. contemplated various alternative solutions that include two main components:

- Part 1 of the E.A. considered the alignment of a new wastewater pipeline from the East Side Lands area to the Kitchener W.W.T.P.; and

- Part 2 considered the conveyance methodology to be utilised along the preferred pipeline alignment, namely either a mechanical pumping station and forcemain system or a gravity sewer system.

Five distinct pipeline alignments (Routes A, B, C, D, and E) were identified and evaluated as part of the broader E.A. study considering impacts to the Natural, Social, and Economic environments, as well as technical considerations for each. Of these five alignments, Route B was determined to have the lowest overall impact. Route B avoids important natural features, has the shortest overall length (and therefore lowest cost), and is mostly located within existing public utility corridors and roads to minimize impacts to the community. All of the alignments considered two options for crossing the Grand River: one at the existing Pioneer Tower Pumping Station (where there is an existing forcemain crossing under the river), and the second within the Pioneer Tower West Park C.H.L., west of the Pioneer Memorial Tower (the alignment option that is discussed in this H.I.A.).

After the initial existing conditions survey in 2015, in November 2016, the evaluation process for the E.A. identified the preferred solution for transferring wastewater. The preferred conveyance method is a gravity sewer option (Alternative Solution #3) which results in significantly lower overall impacts to the environment, lower energy requirements, lower operating costs, and lower noises and odours. The preferred solution eliminates the need for construction

and long-term operations and maintenance of a large, complex pumping station. However, the gravity solution is only viable for the Route B alignment that uses River Crossing Location #2 (near Pioneer Tower), and it requires the construction of a service bridge to carry the sewer pipe over the Grand River to the Kitchener W.W.T.P. Site.

In order to prevent or minimize impacts of the undertaking, the mitigation measures proposed in Section 6.0 should be implemented. With suitable mitigation, the proposed interventions will allow for construction of the trunk sewer and bridge across the Grand River in a manner that is not anticipated to result in significant adverse impacts.

8.0 Summary of Community Engagement

The following individuals, groups, and/or organizations were contacted with inquiries regarding the heritage status and for information concerning the subject property and any additional adjacent built heritage resources or cultural heritage landscapes:

- Deeksha Choudhry, Heritage Planner, Development and Housing Approvals Division, City of Kitchener (email communication 9 and 10 May 2024). Deeksha was contacted to request additional information about the subject cultural heritage resources. Deeksha provided the designation by-law for the Samuel Betzner farmstead and confirmed the name of the Doon Pioneer Cemetery and that it is not listed or designated.
- Michelle Drake, Senior Heritage Planner, Development and Housing Approvals Division, City of Kitchener (email communication 5 November 2024, meetings on 15 January and 26 February 2025). Michelle provided comments on the August 2024 draft of this report. Subsequent meetings were held to confirm approach to revising the report to respond to the comments. The current draft of the report has been extensively revised to address these comments.

- Parks Canada. A meeting was held between staff from Parks Canada, the Region of Waterloo, the consulting engineer (R.V.A.) and A.S.I. on 7 May 2024 to discuss the scope of the subject E.A. and H.I.A. and potential impacts to the Waterloo Pioneer Memorial Tower. Follow up emails were exchanged with John MacLeod, Acting Superintendent, National Historic Sites, Southwestern Ontario Field Unit, Parks Canada, who supplied background technical reports and drawings of the Tower. The August 2024 draft of the report was shared with Parks Canada in October 2024. No comments were provided.
- Region of Waterloo (email communication 27 June and 4 and 25 July 2024). An email was sent on behalf of A.S.I. by Sirin Galaria, Senior Engineer at the Region, to Roxanna Nazarowicz, Senior Planner (Cultural Heritage, Archaeology, and Indigenous Engagement) at the Region to request guidance on the completion of this H.I.A. The email included the attachment of the 2017 Cultural Heritage Resource Assessment completed by A.S.I. for the East Side Lands Sanitary Servicing Class Environmental Assessment. Roxanna replied to indicate that there is Regional support for the recommendations A.S.I. had provided in 2017 for the cultural heritage resources within the area of the East Side Lands Trunk Sewer, and Staff supports the mitigation measures to prevent impacts to those resources.
- The Ministry of Citizenship and Multiculturalism (email communication 1 and 12 August 2024). A response confirmed there are no properties designated by the Minister or any provincial heritage properties within or adjacent to the study area.
- The Ontario Heritage Trust (email communication 1 and 9 August 2024). A request confirmed the Trust doe not own any property or have any conservation easements on any property within the study area.

This report should be submitted by the proponent to heritage staff at the City of Kitchener, the Region of Waterloo, and Parks Canada for review and comment. Following review, staff should determine if they are aware of additional information that should be taken into account in the assessment of impacts, identification of mitigation measures, or implementation. Any feedback will be

considered and incorporated into the report, where appropriate. The final report should be submitted to the above-mentioned agencies.

9.0 Recommendations

Select identified heritage attributes of the Grand River C.H.L., the Pioneer Tower West Park C.H.L., the Waterloo Pioneer Memorial Tower, the Pioneer Tower Road and Lookout Lane C.H.L., and the Walter Bean Trail C.H.L. are anticipated to be impacted through the construction of a trunk sewer and service bridge to carry the sewer across the Grand River. These impacts generally relate to required construction activities and the introduction of a new service bridge across the river. Overall, the proposed interventions are not anticipated to result in significant adverse impacts if appropriately mitigated.

The following recommendations and mitigation measures have been developed and should be implemented:

1. To ensure the Waterloo Memorial Pioneer Tower and the Doon Pioneer Cemetery are not adversely impacted by vibration during construction, a Vibration Monitoring Plan for each must be prepared by a qualified engineer or vibration consultant who demonstrates a level of professional understanding and competence in the field of heritage conservation. The Vibration Monitoring Plans must respond to the City of Kitchener's Terms of Reference for Cultural Heritage Protection Plans and Terms of Reference for Risk Management Plans. The Plans must be approved by the City prior to construction. The Vibration Monitoring Plans should include a pre-construction condition assessment of the structures. A condition assessment typically includes pre-construction measurements of background vibrations within the zone of influence, and pre-construction property inspection, including documentation of any visible cracks. This is used to identify any damages caused by construction compared with existing, pre-construction damage to the structure. It is also recommended that the vibration consultant review the research provided in Section 4.0 of this report to help inform their assessment of the tower.

2. Should any damages to the Waterloo Memorial Pioneer Tower or the Doon Pioneer Cemetery be caused by vibration, repairs must be conducted by a contractor with knowledge and experience in restoring similar heritage structures and who is a member in good standing of C.A.H.P. Repairs should follow the *Standards and Guidelines for the Conservation of Historic Places in Canada* (Parks Canada, 2010).

3. Post-construction maintenance and restoration to remove any construction-related dirt or dust on the Waterloo Memorial Pioneer Tower or the Doon Pioneer Cemetery should be conducted by a contractor with knowledge and experience in cleaning and restoring heritage structures and who is a member in good standing of C.A.H.P. The use of pressure washing above 300 P.S.I. and harsh cleaners should be avoided. Repairs should follow the *Standards and Guidelines for the Conservation of Historic Places in Canada.*

4. Construction activities and staging should be suitably planned and undertaken to avoid impacts to the C.H.L.s and B.H.R.s. Suitable mitigation including establishing no-go zones with fencing and issuing instructions to construction crews to avoid the heritage attributes should be considered to mitigate any unintended impacts during construction. The installation of a dust barrier system on the tower's exterior should be considered, in consultation with Parks Canada.

5. To mitigate impacts from construction on the landscape of the Pioneer Tower West Park C.H.L., post-construction rehabilitation of the landscape within the C.H.L. should be undertaken to reflect pre-construction conditions to the extent practicable.

6. To mitigate construction impacts to Lookout Lane, the road should be restored to pre-construction conditions. The restoration of Lookout Lane should follow the City of Kitchener's Pioneer Tower Design Guidelines, specifically, that existing informal road edges should be preserved and no sidewalks or curbs and gutters constructed along either side of the road. As

the City no longer has the equipment to maintain tar and chip roads, the new road surface should be comprised of the following alternative approved by City Heritage Planning Staff: Slurry seal over asphalt and an HL4 asphalt with a high degree of exposed aggregate.

7. To mitigate the visual impacts of the bridge on the view of the Grand River and the Pioneer Memorial Tower, the bridge should be designed to be well-proportioned, visually light and should be compatible with the surrounding beautiful natural context of the river corridor and tower.

8. This interim report will be updated following the completion of the 60% Design Report and Tree Management Plan to provide further discussion of proposed tree removal and construction phasing.

9. This interim report should be submitted by the proponent to heritage staff at the City of Kitchener, the Region of Waterloo and Parks Canada for review and comment. Any feedback received will be considered and incorporated into this report as appropriate. The final Heritage Impact Assessment report should be submitted to the above-mentioned agencies for their records.

10.0 References

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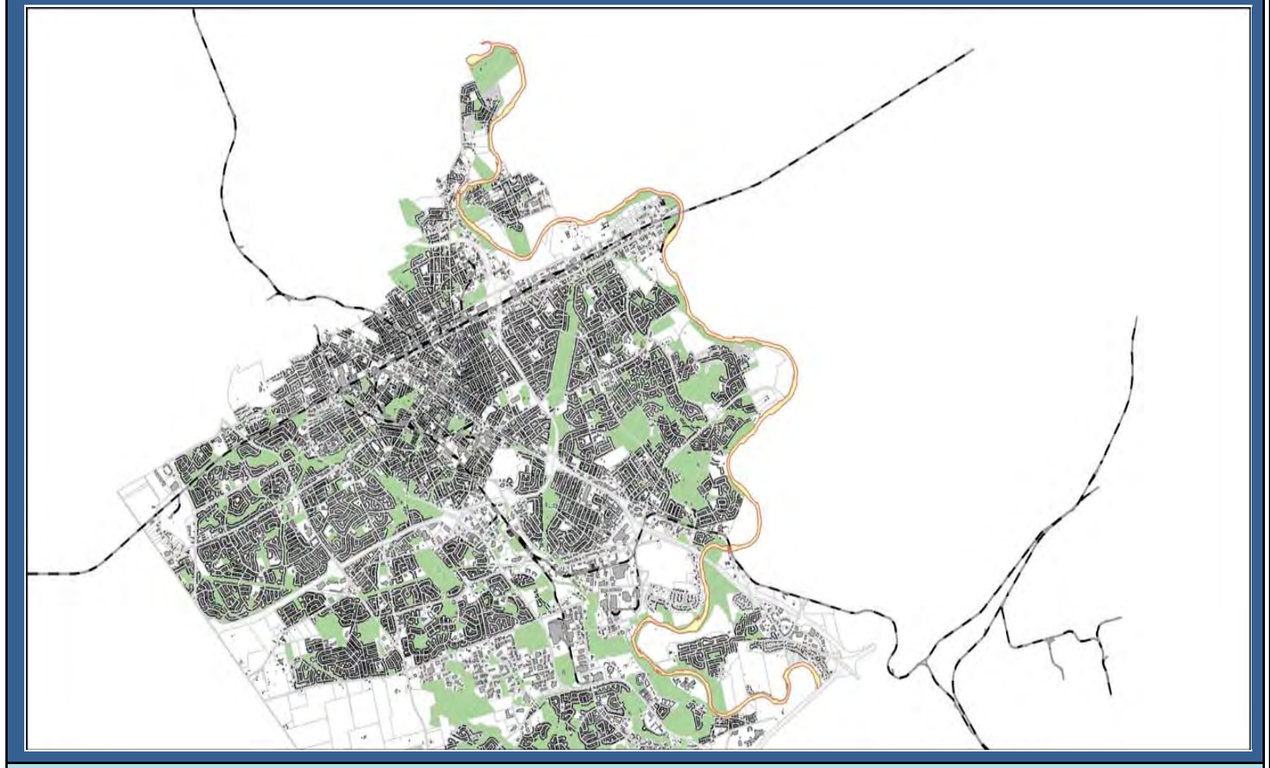
Appendix A: C.H.L. Data Sheets from City of Kitchener C.H.L. Study

L-GRC-1 Grand River Corridor



LOCATION:

The Grand River Corridor, in large part, defines the east limit of the City. It is continuous from the northern limit where Kitchener meets Waterloo at Kiwanis Park south to the meander bend just north of Bloomingdale Road.

Within the Described boundary, there are:

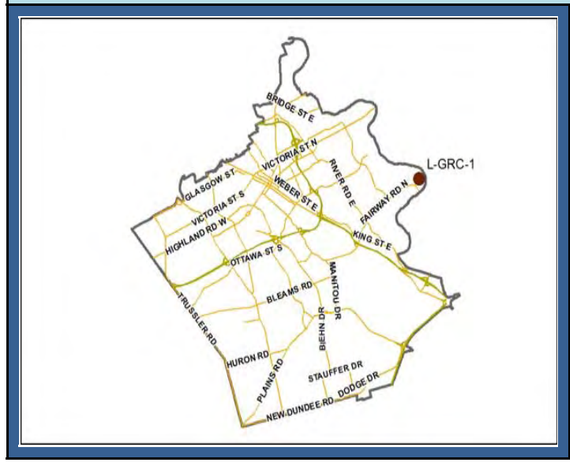
Designated HCDs:	0
Designated Properties:	0
Listed Properties:	0

HISTORIC THEMES:

Prehistoric Habitation, Grand River, First Exploration, Pioneer Settlement, Mennonite

LANDSCAPE TYPE: Open Space

ARCHAEOLOGICAL POTENTIAL: YES



DESCRIPTION:

Few rivers in Canada have seen as much of the flow of history as the Grand River. First Nations have flourished in the watershed for more than 10,000 years. The last three centuries have brought an influx of European, American and other settlers, initially seeking agricultural land, but eventually diversifying into centres of industry with the arrival of the railway. Although the River provided sustenance to the early pioneers of the Kitchener area, it did not play the same role it did in other watershed communities where waterpower was the genesis of founding industries. Instead the River was probably perceived as more of an obstacle, restricting the flow of goods and services eastward and requiring substantial investment to connect Kitchener to its eastern and southern markets. The Grand and its tributaries drain approximately 6735 square kilometres (2600 square miles) and the combined watershed is the largest catchment basin in Southwestern Ontario. The Kitchener reaches of the Grand create the eastern boundary of the City. Along the eastern edge of Kitchener, the Grand cuts its way through an ancient glacial spillway and has alternating banks that range in height from a few metres to over 30 metres. The alluvial plains in which the River runs vary in width, from less than a kilometre to more than 2 kilometres and have been a source of an abundant supply of sands and gravels for many decades. The Grand River Forest, with its rare Carolinian species south of Kitchener, lines much of the shore in the southernmost reaches. This Forest changes to a mixed deciduous hardwood forest with black willow communities lining the banks through the Kitchener reaches. The River is subject to occasional extreme flows and flooding. In 1954, Hurricane Hazel caused flows of more than 10 times normal levels. This resulted in significant changes to the landscape in the Bridgeport reach due to the construction of dikes and other flood control measures. The Kitchener reaches have been the location of a variety of settlements and other historical activities since the arrival of pioneer settlers beginning around 1800. The highlights of these activities include the following. In 1829, Jacob Shoemaker established Glasgow Mills at the mouth of Laurel Creek on the west bank of the River. At about the same time John Tyson settled on the east bank and called the settlement Bridgeport. The Bridgeport Bridge was built on Bridge Street in 1934, eight years after its sister bridge was constructed at Freeport. The bridge is a five-span reinforced concrete bowstring and is 126 metres long. Shoemaker's Ford & Wooden Bridge is located south of the current Bridgeport Bridge. It was used to connect the two sides of the early settlement of Bridgeport. The first wooden bridge at Shoemaker's Ford was constructed in 1847. The Grand Trunk Railway Bridge (at Breslau) embankments were started in 1854 and constructed over a period of 2 years. The abutments are made of limestone block. Two concrete piers in the river complete the span. The original bridge spans were constructed of wrought iron imported from England. The iron tube structure was replaced by steel girders in 1905. Other early fords along the Kitchener reaches included the Breslau Ford, the Zeller's Ford, and the Sam Bricker's Ford. Livergood's Ford was first called Reichert's Ford and later the Livergood's Ford, after Christian Reichert and George Livergood early local settlers. After the first permanent major bridge in Waterloo Township was erected here in 1820, the area became known as Toll Bridge (and later Bridgeville). Tolls came to an end in 1857 and the area was renamed Freeport in 1865. In 1880, the first iron bridge in Waterloo County was erected here. The existing Freeport Bridge is a seven span, six-pier, concrete bowstring arch. There was a lane or road from the Dundas Road in Preston to Freeport and beyond. This road was extended to the Grand River in the vicinity of the Pioneer Memorial Tower. Soon after 1800, Bechtel's Ford and later a wooden bridge were established from this road westward across the Grand River. On the western side, the bank was quite steep (over 30 metres in height), but the pioneers built the incline of the road from south to north up the steep bank and gradually emerged on the Huron Road. About 1836, a wooden bridge was built across the Grand River at the Bechtel's Ford location and lasted until about 1857, when it was removed by an early spring flood. In 1994, the Grand River and its major tributaries, the Nith, Conestogo, Speed and Eramosa rivers, were designated as Canadian Heritage Rivers. It was the 15th Canadian Heritage River to be designated in Canada. Although the river has been much altered by its people, it still provides large natural areas and scenic views and is of outstanding recreational and educational value. Many decades of careful management have maintained these values even as the urban nature of the watershed grew. While use of the river has changed, the major recreational role it plays, and the well-preserved evidence of the cultures that were drawn to its banks, makes it worthy of its status as a Canadian Heritage River.

HISTORICAL INTEGRITY

- [x] LAND USE - CONTINUITY OF USE
- [ ] OWNERSHIP - CONTINUITY OF OWNERSHIP
- [x] BUILT ELEMENTS - ORIGINAL GROUPINGS AND ASSOCIATED SITES
- [x] VEGETATION - ORIGINAL PATTERNS
- [x] CULTURAL RELATIONSHIPS - SUPPORTING DESIGNED ELEMENTS
- [x] NATURAL FEATURES - PROMINENT NATURAL FEATURES
- [x] NATURAL RELATIONSHIPS - FEATURES THAT DETERMINE USE
- [x] VIEW THAT REFLECTS LANDSCAPE CHARACTER FROM HISTORIC PHOTOS
- [x] RUIN - HUMAN MADE REMNANTS
- [ ] DESIGNED LANDSCAPES THAT HAVE RESTORATION POTENTIAL

Was the main feature that attracted the first pioneer Mennonite settlers from Pennsylvania to the Kitchener area. Has been the ancestral home of First Nations peoples for 10,000 years.

CULTURAL VALUE

- [ ] DESIGN VALUE - RARENESS OR UNIQUENESS
- [ ] DESIGN VALUE - AESTHETIC/SCENIC REASONS
- [x] DESIGN VALUE - HIGH DEGREE TECHNICAL / SCIENTIFIC INTEREST
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- [ ] HISTORIC VALUE - WORK OF LANDSCAPE ARCHITECT, ARCHITECT OR OTHER DESIGNER
- [x] CONTEXTUAL VALUE - LANDMARK VALUE
- [x] CONTEXTUAL VALUE - IMPORTANT IN DEFINING CHARACTER OF AREA
- [x] CONTEXTUAL VALUE - HISTORICALLY, PHYSICALLY, FUNCTIONALLY OR VISUALLY LINKED TO SURROUNDINGS

Is one of the best known watersheds in southwestern Ontario and is nationally designated as a Canadian Heritage River.

COMMUNITY VALUE

- [x] COMMUNITY IDENTITY - TELLS STORY OF AREA
- [x] PUBLIC STEWARDSHIP - SUPPORTED BY VOLUNTEERISM
- [x] COMMUNITY IMAGE - IDENTIFIED WITH KITCHENER'S PROVINCIAL/NATIONAL REPUTATION
- [x] TOURISM - PROMOTED AS TOURIST DESTINATION
- [x] LANDMARK - RECOGNIZED BY COMMUNITY
- [ ] COMMEMORATION - SITE USED FOR CELEBRATIONS
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- [x] LOCAL HISTORY - CONTRIBUTING TO LOCAL LORE
- [x] VISUALLY SIGNIFICANT PHOTOGRAPHED OFTEN
- [x] GENUS LOCI - SENSE OF PLACE
- [x] PLANNING - IDENTIFIED THROUGH OTHER PLANNING INITIATIVES

Provides large natural areas and scenic views and is of outstanding recreational and educational value.


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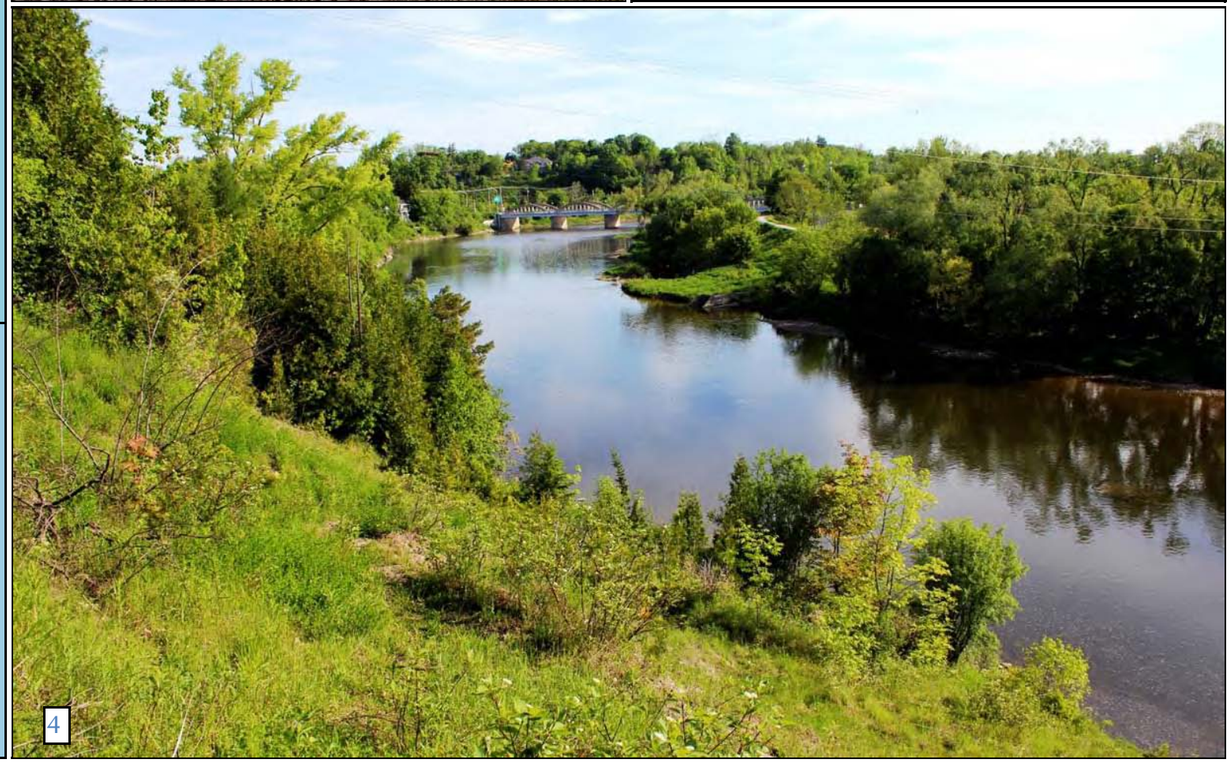
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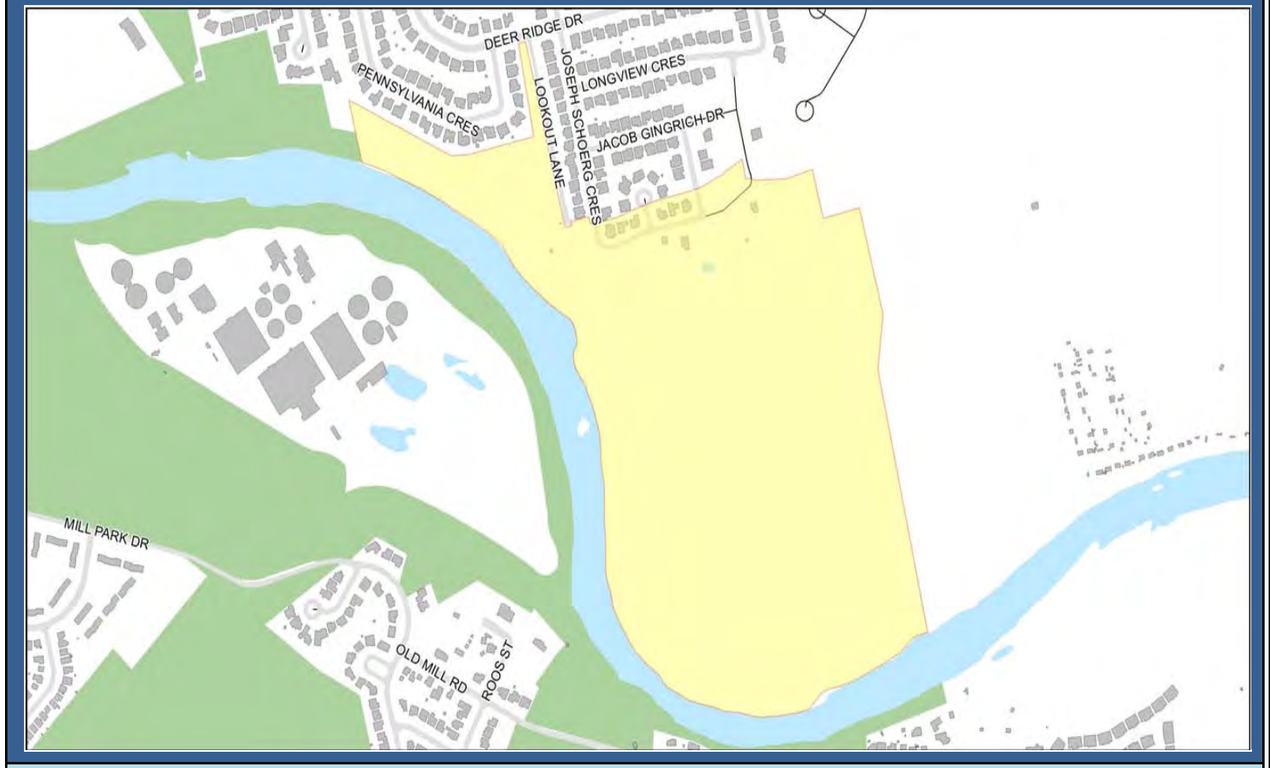
CHARACTER DEFINING FEATURES:

Well-defined river valley with alternating steep and shallow banks. Wonderful meandering river with significant vegetation communities and associated wildlife habitat.

LIST OF FIGURES:

1. Bowstring bridge at Bridgeport c.1934
2. Remnant bridge pier in middle of river south of Bridgeport.
3. View along river through forested area.
4. View along valley towards Bridgeport crossing.

L-OPS-1 Pioneer Tower West



LOCATION:

Located at top of bank on the east of the Grand River south of Pioneer Tower Road.

HISTORIC THEMES:

Pioneer Settlement, Agriculture, Grand River, Mennonite Community

LANDSCAPE TYPE: Open Space

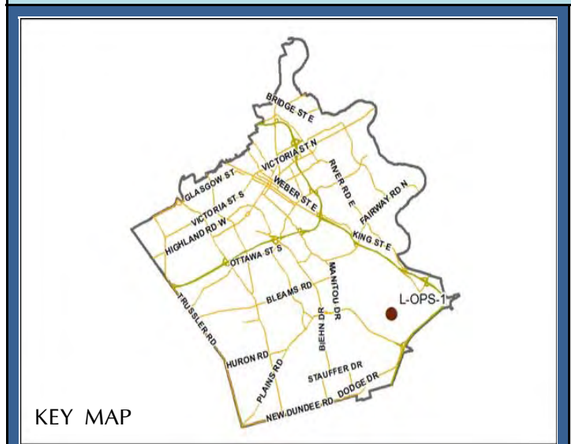
ARCHAEOLOGICAL POTENTIAL: YES

Within the Described boundary, there are:

Designated HCDs:	0
Designated Properties:	3
Listed Properties:	0

DESCRIPTION:

Built in 1926, Waterloo Pioneer Memorial Tower commemorates the arrival of the Pennsylvania-German pioneers to the Waterloo region between 1800 and 1803. The 18.9 metre high tower is located along the east bank of the Grand River within the City of Kitchener's boundary. It is accessed from Lookout Lane which originated at the Huron Road but which is now partially blocked although continuous in the alignment as a public walk. The tower's random-coursed fieldstone, tapered "Swiss" copper roof, and the Conestoga wagon weather vane reflect the German speaking European origin and farming lifestyle of these early settlers. It has a simple well-proportioned profile, a tapered cylindrical shaft of random coursed fieldstone supporting a molded concrete cornice under a hexagonal gallery platform. Today, the Tower has much the same view to the south as it had when it was constructed and what could be seen from the early pioneer farmhouses to the east. The view includes the Grand River flood plain in the foreground, the river in the middle ground and Pinnacle Hill in the background. Protection of this view is critical to the purpose of the Tower and the heritage value of the area. Included as part of this cultural heritage landscape are the houses of the first settlers to the area. The Betzner and Schoerg farmhouses are located at the top of the same ridge line as the Pioneer Tower and feature largely unobstructed views to the Grand River Valley. The location continues to feature characteristics which originally influenced its settlement by Mennonite pioneers. These features include rich fertile soils, a mixture of dense forest, open meadows and proximity to water. In 1800, 66 hectares on the East bank of the Grand River within Block 2 of the former Six Nations Reserve were purchased by Samuel Betzner Sr. The Betzner Farmstead lands were adjacent to 105 hectares purchased by Joseph Schoerg, Samuel Betzner's son-in-law. Samuel Betzner Jr. would purchase 160 hectares on the west side of the Grand River in the same year. Together the Betzner and Schoerg families are believed to have established the first permanent settlements in inland Upper Canada, and are considered to be founding families of Waterloo County. Their contribution to the region is commemorated with the memorial tower. The Betzner Farmstead is an early example of the Mennonite Georgian style. Built circa 1830 by John Betzner, Samuel Betzner's son, the symmetrical proportions and basic architectural features in the home are clear examples of the Mennonite Georgian style. The drive shed, also built circa 1830, is an early example of utilitarian construction on a pioneer farmstead. The City has invested considerable resources in the interpretive programme of the area with the retention of the pioneer barn footprints and creating appropriate settings for the Betzner and Schoerg family homesteads. The Waterloo Pioneer Memorial Tower is a Classified Federal Heritage Building. The designation is confined to the footprint of the structure. The tower represents the theme of the commemoration of ethnic German pioneer settlers in Ontario and is also a very good early example of a regional commemorative structure. This structure is a visible symbol of the rise of German-Canadian nationalism during the 1920s, which resulted from anti-German sentiment, and cultural sanctions imposed on the community during the First World War. The Pioneer Memorial Tower site also features a small cemetery where several founding Mennonite pioneer family members are buried. The Waterloo Pioneer Memorial Tower is a very good example of a well-scaled design of simply detailed construction with a picturesque aesthetic. The tower shows excellent quality of craftsmanship and materials as evidenced by the cut fieldstone, and by the work on the tower's entrance and observation deck. The tower is a landmark to both residents and tourists by virtue of its prominent site in the Grand River Valley and its visibility from several viewing points on both sides of the river.



KEY MAP

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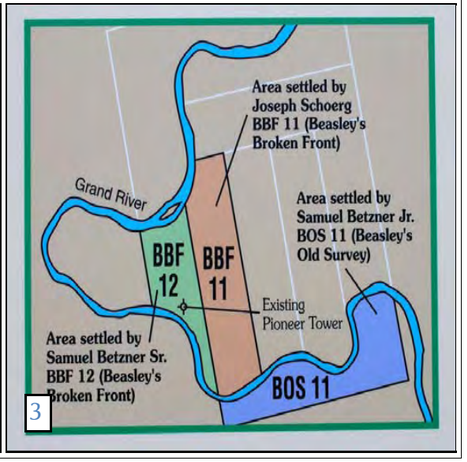

3

HISTORICAL INTEGRITY

- [x] LAND USE - CONTINUITY OF USE
- [x] OWNERSHIP - CONTINUITY OF OWNERSHIP
- [x] BUILT ELEMENTS - ORIGINAL GROUPINGS AND ASSOCIATED SITES
- [x] VEGETATION - ORIGINAL PATTERNS
- [x] CULTURAL RELATIONSHIPS - SUPPORTING DESIGNED ELEMENTS
- [ ] NATURAL FEATURES - PROMINENT NATURAL FEATURES
- [ ] NATURAL RELATIONSHIPS - FEATURES THAT DETERMINE USE
- [x] VIEW THAT REFLECTS LANDSCAPE CHARACTER FROM HISTORIC PHOTOS
- [x] RUIN - HUMAN MADE REMNANTS
- [ ] DESIGNED LANDSCAPES THAT HAVE RESTORATION POTENTIAL

CULTURAL VALUE

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- [x] LANDMARK - RECOGNIZED BY COMMUNITY
- [ ] COMMEMORATION - SITE USED FOR CELEBRATIONS
- [ ] PUBLIC SPACE - USED FOR FREQUENT PUBLIC EVENTS
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Constructed in the then popular Arts and Crafts style (reflecting a German/Swiss aesthetic) in 1926 to commemorate the arrival of the Pennsylvania-German pioneers, this site is a federally Classified (the highest level) historic building and represents the rise of German-Canadian nationalism in the 1920s.

The site has significant cultural value in the theme of the commemoration of ethnic German pioneer settlers in Ontario and is also a very good early example of a regional commemorative structure. The two farmsteads were constructed by the first permanent settlers to the area and represent very good examples of pre-Confederation rural architecture in the Mennonite Georgian style.

The tower was an opportunity for German-Canadians to express their historical contribution and loyalty to Canada in the form of German-Canadian nationalism as well as a method for the community to re-establish its self worth and is also associated with W.H. Breithaupt, a prominent engineering consultant in Kitchener, who has been recognized as the initiator of the scheme.


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CHARACTER DEFINING FEATURES:

Features of the site include: the Tower and the two farmsteads; the location on the east bank of the Grand River; its access via Lookout Lane which is associated with the original Huron Road; random-coursed fieldstone; tapered "Swiss" copper roof the Conestoga wagon weather vane; the Tower's simple well-proportioned profile consisting of a tapered cylindrical shaft supporting a molded concrete cornice under a hexagonal gallery platform; views to the south from the tower including the Grand River flood plain, the river corridor and Pinnacle Hill in the background.

LIST OF FIGURES:

1. View of tower from parking lot.
2. Spectacular view across Grand River valley with Pinnacle Hill in background.
3. Interpretive signage.
4. Original barn and farmstead.
5. Remnant barn and interpretive site.
6. Restored Betzner farmhouse.

L-TRL-17 Walter Bean Trail

LOCATION:

Follows the west bank of the Grand River from the northern municipal boundary to the southern municipal boundary at the 401.

Within the Described boundary, there are:

Designated HCDs:	0
Designated Properties:	0
Listed Properties:	0

HISTORIC THEMES:

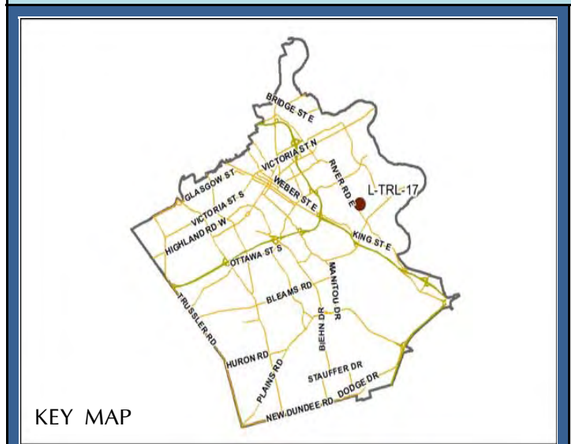
Transportation, Urban Development, Governance and Education

LANDSCAPE TYPE: Transportation Corridor

ARCHAEOLOGICAL POTENTIAL: YES

DESCRIPTION:

When complete, the Walter Bean Trail will link West Montrose in the north to the Town of Blair, just south of Highway 401. It will extend along 78 km of the 290-km length of the Grand River basin. The trail alignment parallels the Grand River on its west bank, and rises and falls with the variable height of valley walls. Its position in the valley provides spectacular panoramic views along and across the river valley. The trail is generally paved with limestone screenings with strategic asphalted sections where slopes are steep or where there is high traffic. The trail is serviced by trail heads where there is parking, seating areas, and way-finding and interpretive signage. To fully appreciate the significance of the trail it is important to understand something of the person after which the trail has been named. Walter Bean was a business and community leader who believed in contributing to the welfare of area residents. He championed the vision of a public hiking trail along the Grand River. As Honourary Chair of The Kitchener and Waterloo Community Foundation, Walter challenged the Foundation to increase public accessibility to the river by building a trail along its length within the Regional Municipality of Waterloo. Following Walter's death, his many friends took up his challenge and in 1998 formed The Walter Bean Grand River Community Trails Foundation. To make his vision a reality, this non-profit fundraising corporation has partnered with the cities of Cambridge, Kitchener, Waterloo and the Township of Woolwich to build and maintain a recreational trail. Along its way, it will connect with many local municipal trails and the Trans Canada Trail. Philanthropist, military hero and prominent Canadian business leader, Walter Bean was one of this area's most distinguished citizens. Born in Berlin (now Kitchener), he graduated from Kitchener-Waterloo Collegiate & Vocational School and the University of Toronto, where he played junior hockey and in 1929 was selected for the Canadian All-Star Football Team. In 1930 Walter Bean joined the Waterloo Trust and Savings Company, advancing to treasurer in 1934, general manager in 1957, and president in 1964. After the merger of Waterloo Trust with Canada Trust, he became Deputy Chair of Canada Trust until his retirement in 1978. Walter Bean served with distinction in the Second World War, in North Africa, Europe and the Pacific. Retiring from active service with the rank of Brigadier-General, he was named a Commander of the British Empire. From 1966 to 1972 he was Honourary Colonel of the Highland Fusiliers of Canada. Walter's numerous public positions included membership on the University of Waterloo Board of Governors, President of the Kitchener United Way, and Governor and Honourary Treasurer of the Stratford Festival. Perhaps his most significant role was that of creator and founding Chair of The Kitchener and Waterloo Community Foundation in 1984. Walter's modest and unassuming manner motivated others to continue his good public works, especially his challenge to create a river trail. It is fitting that the Trail bears the name of this remarkably accomplished, generous, community-minded person. It would please Walter to see the co-operative spirit of community in building this legacy.



KEY MAP


1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HISTORICAL INTEGRITY

- [ ] LAND USE - CONTINUITY OF USE
- [ ] OWNERSHIP - CONTINUITY OF OWNERSHIP
- [ ] BUILT ELEMENTS - ORIGINAL GROUPINGS AND ASSOCIATED SITES
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This trail, still in its infancy, has connections with Walter Bean who has championed its creation.

The trail will connect several communities along the Grand River and will also connect with the Trans Canada Trail. It is associated with Walter Bean, a community activist, philanthropist, military hero, prominent business leader and sportsman, Commander of the British Empire, and Honourary Colonel of the Highland Fusiliers of Canada and was active in many important community organizations.

This trail maintains an important recreational and conservation link through the City.


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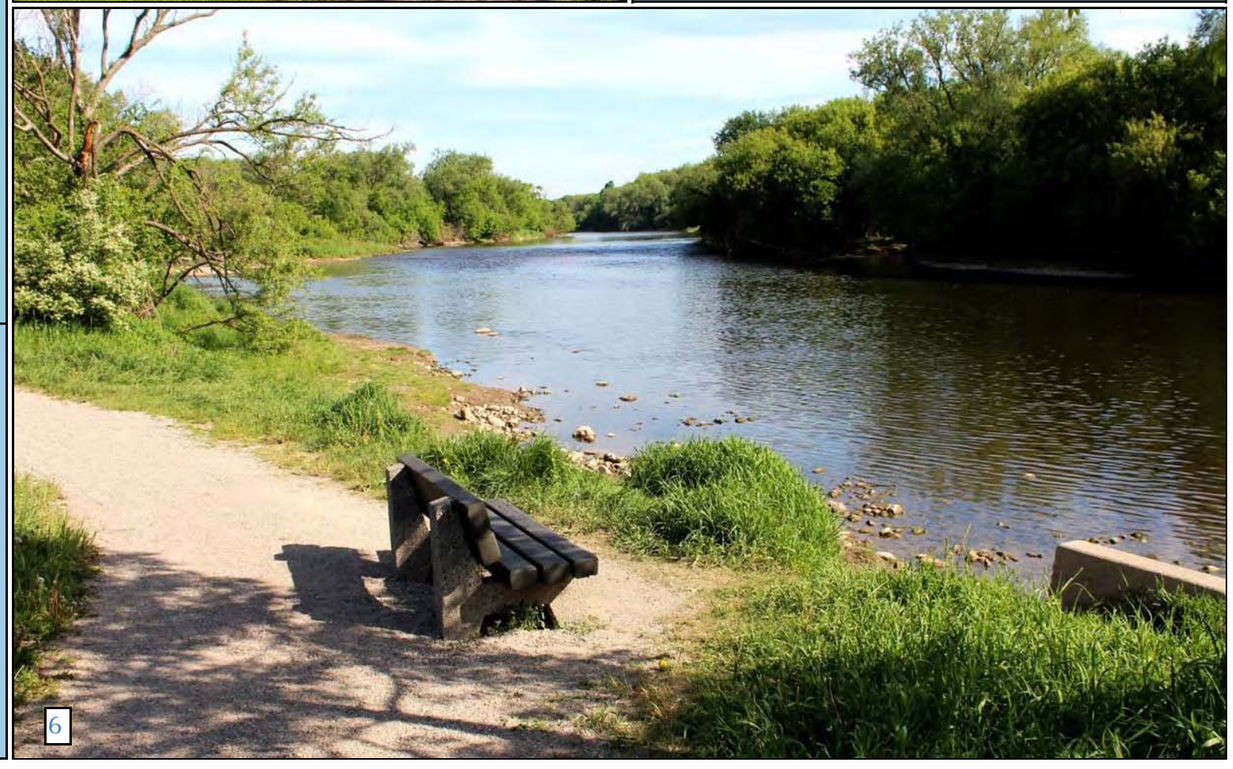
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CHARACTER DEFINING FEATURES:

The features of the trail include: a link from West Montrose in the north to the Town of Blair; an alignment which parallels the Grand River on its west bank, and rises and falls with the variable height of valley walls; a position in the valley that will provide spectacular panoramic views along and across the river valley; its pavement with limestone screenings; and, service sites including trail heads, parking, seating areas, and way-finding and interpretive signage.

LIST OF FIGURES:

1. Trail alignment under Bridgeport bowstring bridge.
2. Walter Bean Trail on dike at Bridgeport.
3. Wooded right of way along Grand River floodplain.
4. Modern pedestrian bridge along trail to provide access across small tributaries.
5. Access adjacent private properties.
6. View to Grand River.

L-RD-8 Pioneer Tower Road & Lookout Lane

LOCATION:

Previously extended from King Street to the top of bank at the Grand River valley. Currently the road itself begins at Baxter Drive near King Street and is discontinuous and closed to vehicular traffic where it has been converted into public walkway.

Within the Described boundary, there are:

Designated HCDs:	0
Designated Properties:	0
Listed Properties:	0

HISTORIC THEMES:

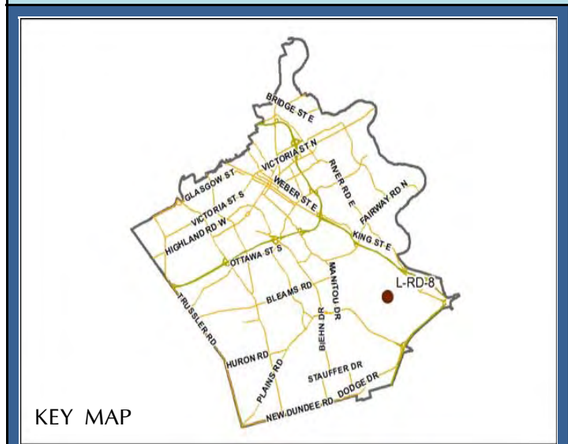
Grand River, Pioneer Settlement, Mennonite Settlement, Agriculture, Transportation,

LANDSCAPE TYPE: Transportation Corridor

ARCHAEOLOGICAL POTENTIAL: YES

DESCRIPTION:

Pioneer Tower Road and Trail extends from Baxter Drive near King Street East (Highway 8) to the top of the Grand River Valley bank, terminating in the Deer Ridge Golf Course. Historically, the Right of Way was used by the earliest non-native settlers to establish the first farm settlements in inland Upper Canada (1800), in the low lying lands along the east side of the Grand River. Pioneer Tower Road and Trail Right of Way then became part of the Huron Road (1828), linking the Canada Company headquarters in Guelph with the Huron Tract and the Town of Goderich. The road travelled down to the river's edge through the existing golf course, where Bechtel's Ford was used to access the west side of the river. A wooden bridge was constructed in 1836 to facilitate access across the river for the flow of immigrants to the Huron Tract. The bridge was washed out in the spring of 1857 and never rebuilt. Today, the road and trail provides continuous pedestrian access over its length but is discontinuous for vehicular access between Pioneer Ridge Drive and Fall Harvest Drive. A portion of the road and trail, between Marquette Drive and the Grand River is designated a Scenic-Heritage Road in the Official Plan, in recognition of its historic alignment. Pioneer Tower Road is flanked by residential development; Pioneer Sportsman Club; Pioneer Camping Club; Deer Ridge Golf Course Maintenance Yard; an equestrian farm; Settlers Grove park; and service and retail developments. Lookout Lane T's into Pioneer Tower Road and was the original access to the Pioneer Memorial Tower and Cemetery Site (a National Historic Site) and remnants of the original Schoerg Family Homestead (now 330 Joseph Schoerg Crescent) and Betzner Family Homestead (now 300 Joseph Schoerg Crescent), both designated under Part IV of the Ontario Heritage Act.



KEY MAP

HISTORICAL INTEGRITY

- [x] LAND USE - CONTINUITY OF USE
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- [ ] VEGETATION - ORIGINAL PATTERNS
- [x] CULTURAL RELATIONSHIPS - SUPPORTING DESIGNED ELEMENTS
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- [ ] DESIGN VALUE - RARENESS OR UNIQUENESS
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The historical right of way was used by the earliest non-native settlers to establish farm settlements and subsequently the alignment became a part of the Huron Road in 1828. While the road and trail provide continuous pedestrian access over its length, it is discontinuous for vehicular access. Only the original alignment of the road remains, although the road provides access to the Pioneer Memorial Tower and remnants of early homestead sites.

Historic route to the Schoerg homestead and Betzner farmstead - the first permanent settlements in inland Upper Canada (1800); Limited views into Grand River Valley; Incorporated into the Huron Road by John Galt & Dr Wm "Tiger" Dunlop 1828.

Shows alignment of historic transportation route that was used by original non-native settlers. The road and its alignment are of high value to the community as a result of its recreational uses and historical associations.


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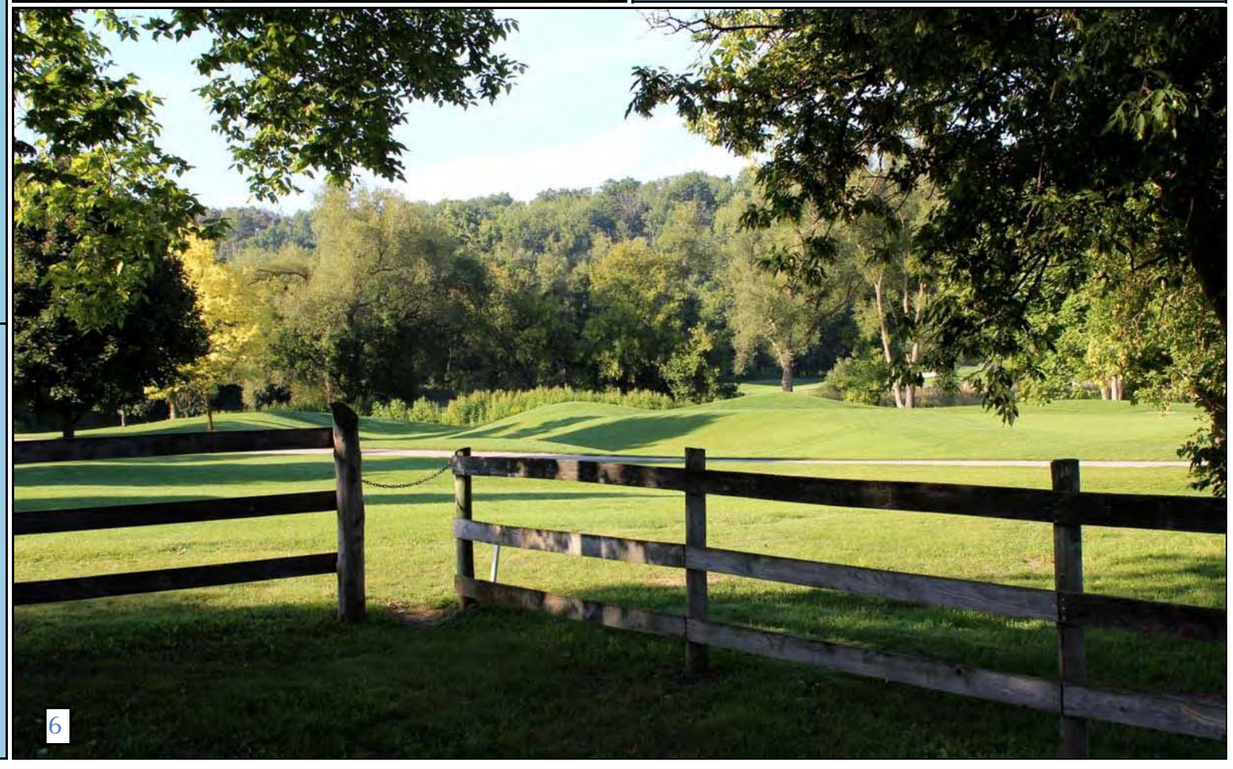
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CHARACTER DEFINING FEATURES:

Character defining features include: the alignment of the road; the association of the road with the former fords across the Grand River; and the adjacent heritage sites including the Pioneer Tower, the Schoerg Family Homestead and the Betzner Family Homestead.

LIST OF FIGURES:

1. High point off of King Street.
2. Alignment converted to pedestrian trail.
3. View west towards Grand River.
4. Former bridge location at Grand River on Huron Road.
5. Agricultural land use.
6. Golf course at terminus of road.

Appendix B: Waterloo Pioneer Memorial Tower Technical Studies

Maria Terrence

PIONEER TOWER
INVESTIGATION

Woodside National Historic Park
Kitchener, Ontario

Prepared by
UMA Engineering Ltd. / Martin Weaver Conservation Consultant Inc.
Ottawa, Mississauga and New York
January 1996

uma

TABLE OF CONTENTS

TERMS OF REFERENCE

UMA Engineering Ltd./Martin Weaver Conservation Consultant Inc. were retained by Parks Canada/Ontario Region, to carry out an investigation of the Pioneer Tower, Woodside National Historic Park, in Kitchener, Ontario.

This study is to assess the condition of the tower, recommend appropriate action and provide a Class C cost estimate for proposed repairs.

HISTORIC BACKGROUND AND DESCRIPTION

Pioneer Tower (formally known as Doon Tower) was constructed as a monument and observation tower, commemorating the early settlement of Waterloo County by Pennsylvania Germans. It symbolizes the German-Canadian community's attempt to re-establish their self-worth and loyalty to Canada following the events of World War I.

W. H. Breithaupt, a prominent consulting engineer in Kitchener, was credited with initiating and completing the Tower project and is recognized as the founder and honorary president of the Waterloo County Pioneers' Memorial Association.

The Association purchased property along the bank of the Grand River - formally the homestead of Samuel Bricker Sr. (one of the area's first settlers) - to build the monument. Construction of the tower began in May 1925 and was completed in August 1926.

The circular tower measures 68 feet high, rising from an octagonal shaped concrete foundation and base. The concrete structure is faced with local fieldstone and is topped by a copper roof. A hexagonal reinforced concrete deck serves as an observation platform. A narrow wooden staircase leads up to the deck.

At the official opening in 1926, an Historic Sites and Monuments Board plaque was unveiled.

In 1991 the Federal Heritage Building Review Office designated the building as a *Classified historic asset*, the highest heritage designation.

INVESTIGATION

A) METHODOLOGY

The site was visited on several occasions by our team in February and March 1995, to carry out a condition survey. This was achieved by using four methods of investigation:

i) Visual Inspection

The interior face of the wall was inspected from the staircase and the exterior face and the underside of the observation deck with the aid of binoculars. Locations of cracks in the walls were noted, areas of deteriorated concrete, locations of demeq points and tell-tales installed and monitored by PW & GSC, and areas of cracking around the edge of the observation deck. Analysis of wood elements and the roof structure were not included in this contract.

ii) Coring

Three dry drilled cores were taken from the interior face of the concrete wall for evaluation:

1) a 50 mm dia., 300 mm long core at approximately 1200 mm up from the ground level slab;

2) a 40 mm dia., 75 mm long core near mid-height of the tower;

3) a 40 mm dia., 75 mm long core approximately 650 mm down from the underside of the observation deck.

iii) Instrument Testing

Several tests were carried out on March 12, 1995, to help assess the condition of the structure. The interior face of the concrete was not 'sounded' with a rubber mallet due to the poor condition of the surface which crumbles at a touch.

Both concrete slabs were chain-dragged to determine if there was evidence of delamination.

A metal detector was employed to establish the location of metal reinforcement in the walls and observation deck.

A variety of electronic instruments were employed to take readings at the three core locations:

a) Protimeter Mini - to read moisture levels, on the surface and inside the core holes;

b) Salts Detector - to determine the presence of salts in the concrete;

c) Surface temperature;

d) Diagnostic Mk. IV - to read temperature and humidity levels within the tower.

iv) Impact-Echo Testing

Impact-echo instrumentation allows for non-destructive analysis of inner core conditions. Tekron Services Inc. was engaged by Public Works to study the structure and detect the presence of inner wall deterioration, i.e.: cracks; debonding; and disintegration of the core.

The tests were carried on March 16 and 19. A grid was established using string around the interior circumference of the concrete wall. The strings were spaced 1.5 meters apart and marked off vertically at 1.0 meter intervals. Findings are summarized under 'Analysis & Recommendations', and Tekron's report is found in Appendix III.

v) Laboratory Testing

Cores were sectioned and polished in the laboratory. These sections were photographed under a powerful microscope at a scale of 100X. The resulting photos were examined in an attempt to measure the air void content of the concrete.

vi) Structural Analysis

Because of the difficulties in obtaining the compressive strength of the concrete, it was decided to carry out a stress analysis to determine the actual stresses in the concrete. This would then allow an engineering assessment of the integrity of the structure using an assumed compressive strength for the concrete.

B) OBSERVATIONS

The interior surface of the concrete structure of the tower has a number of structural cracks. These are being monitored by Historic Sites Service (HSS) by means of glass tell-tales and Demeq points. HSS staff advise that no movement has been detected in the latest readings.

We have marked with a pencil the ends of the cracks. This will allow us to determine in the future if the cracks are lengthening.

The interior surface of the concrete is deteriorating and in places this deterioration has reached a depth of 30 mm. Debris is falling regularly from this surface as evidenced by the large amount of material that is collected by maintenance personnel each spring.

The exterior stonework is generally in good condition. A bulge is evident on the north east face of the tower 3/4 of the way to the deck.

The top deck was surveyed for delamination and none was found. There is some cracking in the edge of the top deck which is allowing water to penetrate as evidenced by the efflorescence at the underside of the deck edge.

There is some deterioration of the concrete edge details on the top deck, particularly in one corbel which is cracked.

The survey with a metal detector revealed that the tower is basically un-reinforced with some indication of rebar around windows and at the exterior and interior edge of the top deck.

Small pieces of metal were detected at various locations in the structure. These are believed to be pieces of wire from the formwork, nails, and pieces of mica in the aggregate.

ANALYSIS OF TEST RESULTS

Impact Echo Tests

The impact echo testing is qualitative rather than quantitative for this type of application. There were strong indications that the concrete structure of the tower is suffering internal as well as the very visible surface deterioration.

Specific problems noted in the impact-echo testing are:

1. There appears to be a large delamination or void at the upper left corner of the door (looking from the inside). This was most likely due to a leakage in the formwork in the original construction which allowed the cement paste to leak out.

2. The red dots are indicative of shallow delaminations. Five (5) locations were noted. These are representative of the surface deterioration which is very apparent in this structure by visual inspection. The recommended remedial action would involve scaling off the loose concrete. At that time these specific locations can be inspected further to determine if there are any other defects.

   As with all conservation projects, it will be important to observe and record the as-found condition of the structure during the conservation work to gain insight into the correlation between the test results and the as-found condition.

   This is particularly important in the case of impact echo testing because it is a new process and we must obtain as much data as possible if this is to develop further as an investigation tool.

3. Tekron observed that the defects seemed more prevalent in the lower part of the tower. This coincides with our own observations.

   We believe that this is so because of construction methods. Concrete construction was not widely used at that time in this area. There was probably a learning process with the crews on this site. As the structure progressed, so then did their knowledge and skill in mixing and placing the concrete.

Structural Analysis

The tower structure was analysed for gravity, wind and earthquake loads using the standards of the National Building Code of Canada 1990 version.

Both Working Stress and Limit States design methods were used.

Based on our past experience with historic concretes, and contemporary concretes with poor aggregates and curing and mix design problems, we believe that the concrete in the Pioneer Tower has a compressive strength of at least 2,000 PSI (16.7 MPa).

In the absence of more precise information, we recommend that this value be used for all detailed design on this project.

When compared to the calculated stresses under code load, one sees that expected stresses are very low in relation to the assumed strength. Thus any inaccuracy in estimating the compressive strength will have little consequence for the purposes of this report.

Laboratory Testing

Laboratory testing for air void content was an experimental process in the early stages of development by our team. We have still not worked out all the problems of photographing the polished samples with a scaling device visible in the photos. This scaling device is essential for determining air void content as only the voids in a certain size range are effective in providing freeze-thaw protection to concrete. Timing and resources for this project do not currently allow further pursuit of this program at this time.

The size of core sample was minimized in order to reduce the degree of intervention in the structure in accordance with good conservation practice. The cores were taken principally to provide a visual record of the interior of the structure and to provide samples for the air-void determination experiment. Unfortunately this size of core is too small for standard compressive strength testing.

Results from other testing (soluble salts) have indicated the freeze-thaw protection of the structure is compromised and thus the air void content determination is not critical to this process. Similarly the determination of the concrete strength is not essential to this process since the structural analysis has determined that the tower is not highly stressed in its current configuration.

Field Testing

Field tests on the cores with the Protimeter instrument indicated that the concrete contains "substantial deposits" of soluble salts and that the interior of the cores have a high moisture content. Tabular values are included in Appendix II

DIAGNOSIS

The exterior of the stonework is generally in good condition. The bulge in the north east face should be investigated further with the assistance of a heritage mason when the tower is scaffolded for the conservation work. If there is a void behind the stone, the bulge should be dismantled and rebuilt or the stones pinned back with an anchoring system suitable for conservation work such as the Cintec System..

All loose mortar should be removed and replaced with a compatible heritage mortar.

The concrete work at the top should be restored using a concrete patching system which will be compatible with the original material, such as the Dr. Crete system.

Consideration should be given to providing a waterproof traffic coating to the observation deck. This is an intervention to the original fabric and was not part of the original design. However, the exclusion of water from the structure is one of the key therapy procedures which should be implemented to save this structure. The conservation process does allow the addition of new building components where the intervention is warranted to save the structure. We believe this is warranted in this case.

The deterioration of the inside face of the structure appears to be due to the high incidence of soluble salts in the concrete. These salts fill the available air voids in the concrete matrix and eliminate any freeze-thaw protection the air voids provided. These salts may also be attacking the hydrated cement in the concrete mix.

The soluble salts fill the air voids where there is evaporation (i.e. at the interior surface) that allows the salts to be deposited in crystalline form. This explains why deterioration is progressing from the interior. This also indicates that the deterioration will take place progressively until nothing remains of the wall.

The removal of the salts through a poulticing and protection process, and the reduction in moisture in the walls through effective waterproofing is essential to the longevity of this structure.

The salt removal can be done using an alkali silicate sequestering agent applied by injection and poulticing. Once the removal is complete the concrete should be consolidated using a micro silicate application. DO NOT consolidate before salt removal.

Another level of protection would be the elimination of freezing of the concrete. This could only be done by heating the tower on a continuous basis. This solution would carry a high operating cost and would not necessarily eliminate a deterioration mechanism caused by interaction of the soluble salts and the cement or aggregate in the concrete matrix.

THERAPY

The following scope of work outlines the conservation work recommended to stabilize this structure:

1. Repointing of exterior stone.
2. Investigate and stabilize the exterior bulge.
3. Restore exterior stone and concrete details.
4. Traffic coating to top deck.
5. Scale loose material from interior.
6. Remove salt from the interior face.
7. Consolidate the interior surface.

CLASS "C" COST ESTIMATE

We estimate the cost of the above scope of work to be: $48,000.00 in current dollars. This estimate includes a contingency, inspection and testing, contractor's overheads and mark-up and GST. It does not include design fees, engineering consultants, field review and Parks Canada project management, financing and administration fees.

CONCLUSION

The Pioneer Tower is suffering deterioration of the interior concrete core. The stability and safety of the tower is not threatened at this time. However, the deterioration mechanism is ongoing and will eventually lead to destruction and collapse of the tower if left unattended.

Report prepared by:

Eric P. Jokinen, P. Eng.

APPENDIX I - Photographs

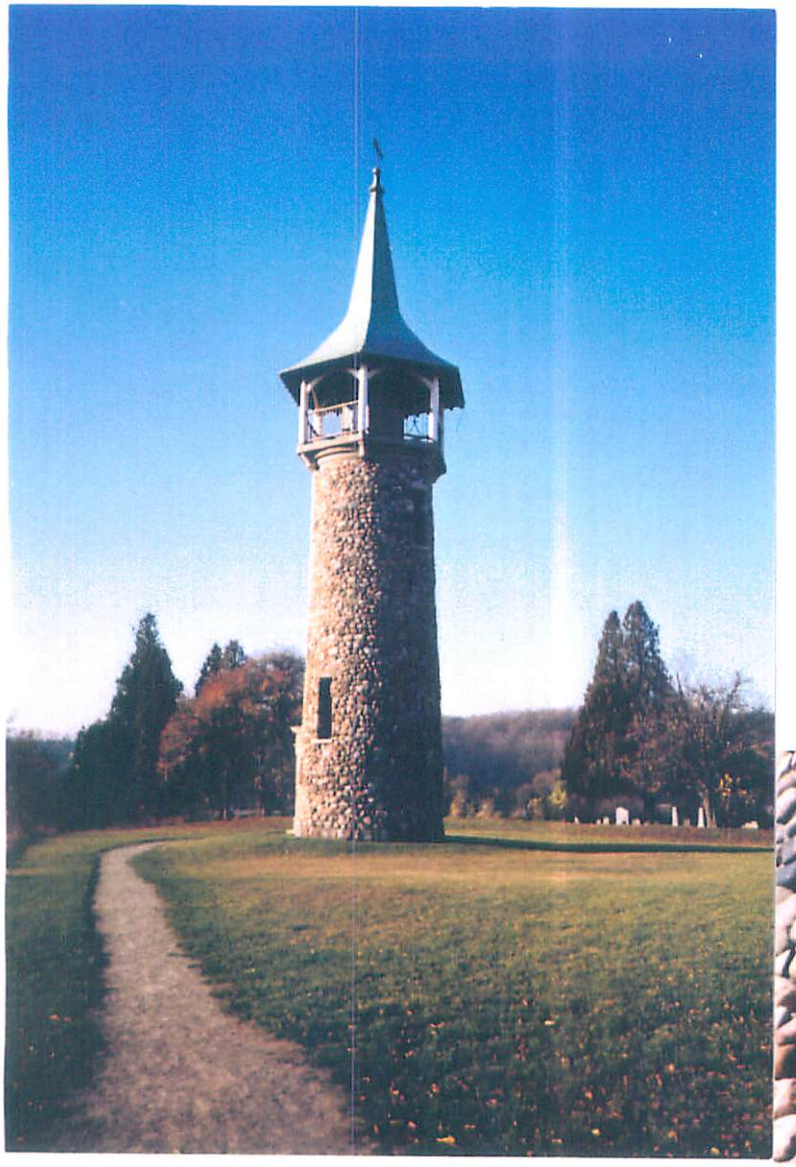


Photo 1: General Overview

Photo 2: Window & exterior stonework

Photo 3: Interior crack in concrete - epoxy repair

Photo 4:
Stone bulge

Photo 5: Interior concrete deterioration

Photo 6: Top deck deterioration

Photo 7: Top deck deterioration

Photo 8: Corbel deterioration

Photo 9: Stone joint deterioration

APPENDIX II - Table of Instrument Measurements

PIONEER TOWER INVESTIGATION
WOODSIDE NATIONAL HISTORIC PARK
KITCHENER, ONTARIO

Martin Weaver Conservation Consultant Inc.
UMA Engineering Ltd.
March 9, 1995

TESTS	READING	CORE 1 (BASE)	READING	CORE 2 (MIDDLE)	READING	CORE 3 (TOP)
SALT DETECTOR	2. 1.	44 (w/ salts) - 28 (water) 16 (substantial deposits)	2. 1.	44 (w/ salts) - 18 (water) 26 (substantial deposits)	2. 1.	n/a n/a n/a
PROTIMETER MINI (moisture reading %)	1. 2.	- outside hole 12 to 18% - 1 1/2" inside hole 95%	1. 2.	- outside hole 14 to 15% - 3/4" inside hole +23%	1. 2.	outside hole 0% 3/4" inside hole 15%
DIAGNOSTIC Mk. IV (rel. humidity)	1.	temp. - 2.3 C rh% 47.5	1.	temp. - 2.3 C rh% 46.6	1.	temp. - 3.6 C rh% 52
SURFACE TEMPERATURE	1.	temp. - 5 C	1.	temp. - 2.3 C	1.	temp. - 3.5 C

Conditions:
Sunny, windy, temp. - 10 C
Time of readings: 3:00 to 4:00 p.m.

APPENDIX III - Tekron Services Inc. report

Tekron Services *Inc.*
Construction Materials Consultants

March 24, 1995 Our Ref:95014

UMA Engineering Ltd.
5080 Commerce Blvd.
Mississauga, Ontario
L4W 4P2

ATTENTION Mr. Eric Jokinen, Ing., P.Eng.

RE: **Impact-Echo Testing, Pioneer Tower, Kitchener, Ontario**

Dear Sirs,

This letter presents our report of impact-echo testing of the interior concrete at the Pioneer Tower, Kitchener, Ontario.

Procedure

Impact-echo tests were carried out during March 16 and 19, 1995. A grid was set up around the inside circumference of the tower using a total of 6 string lines, each approximately 1.5 meters apart and marked at 1 meter intervals. An impact-echo test was carried out at each marker. In addition several tests were made to determine the p-wave speed by measuring the speed of travel of surface R-waves between two impact-echo heads. By its sensitive nature, the impact-echo equipment cannot define the thickness of the shallow delamination, but produces a characteristic signal response. These locations were nominally defined as having a thickness of 75 mm and where possible, another impact-echo test was done outside this zone to define shell thickness.

Tel. (905) 279-8072 2543 Palisander Avenue, Mississauga, Ontario, Canada, L5B 2L1 Fax. (905) 566-9891

Impact-Echo Instrument

The impact-echo instrument is constructed in two parts which are electrically connected by 8m of coaxial cable and is illustrated in figure 1. The first part, known as the Mark II test head, is a hand held unit which houses a surface movement transducer . This design has a single point footprint which enables impact-echo testing on rough surfaces. It is constructed using a stainless steel cylinder with a conical tip. A surface movement transducer with a projecting, shielded sensitive point, is positioned in the cone. The stainless steel casing is sufficiently waterproof to allow the Mark II head to be used in wet and relatively hostile environments. The second part of the impact-echo instrument is a rugged, portable computer of military quality, capable of rapidly reading the electrical impulses sent by the transducer.

With the computer program active, the hand held unit is pressed down on the surface of the masonry which is given a light tap using one of the spherical steel balls supplied with the instrument. This produces elastic waves in the body of the material. The transducer measures the surface movement caused by these oscillating waves. Since the computer samples the resulting electrical impulses at known rates, the duration of oscillation is known and can be calculated by Fast Fourier transformation into frequencies.

The computer screen displays 3 graphs approximately 2 seconds after tapping the surface of the material. Figure 2 illustrates a typical impact-echo screen display. The top graph is a display of the surface movement captured by the transducer. The bottom graph is the frequency spectrum as calculated by the Fast Fourier transformation. The middle graph is the normalised version of the frequency spectrum in terms of the depth of the structural element under examination, where the total thickness represents 100 percent. From these three displays, the wave form can be checked for proper signal acquisition and by manipulation of a cursor, the peak frequency can be obtained. If required, this data an be saved on the hard drive of the computer for future analysis.

Principals of Impact-Echo Technique

A tap on the surface of materials such as stone, concrete or asphalt will generate transient elastic waves. A Rayleigh wave (R-wave) is initiated which travels across the surface in a similar manner to a ripple travelling across a pond. A shear wave (S-wave) is also generated together with a compression wave (P-wave). The major significance of these elastic waves is that they will travel through heterogeneous materials such as concrete without any significant distortion or reflection by inclusions or aggregates, but they are reflected by any sudden change in acoustic impedance such as occurs at the back face of the material under test or the presence of a crack. Unlike ultrasonic testing where the transmitting and receiving transducers have to be separated (usually on opposite sides of the material under test), research revealed that measurement of the P-waves produced the most meaningful signal response. This is achieved by maintaining the transducer and impactor on one side of the material under test as close to one another as possible. This factor alone has opened a wide range of construction problems which can be addressed by this technology.

When the surface of a brittle material is given a sharp tap, a one time pass of the R-wave is first recorded by the transducer. At the same time, a P-wave propagates downwards and is reflected from the bottom surface of the material back to the top surface where it is again reflected back into the material. This process repeats itself several times, with gradually diminishing energy. An illustration of the surface displacement caused by this effect on a concrete wall is given in figure 1. The impact-echo computer is set to sample the surface movement transducer at a known rate and consequently the time taken for the P-wave to oscillate between the top and bottom surfaces can readily be computed. For accurate measurement of the depth, several oscillations of the P-wave must occur during a test, enabling the period or frequency of the wave to be computed by Fast Fourier transformation. In solid materials this produces a single frequency peak, known as the dominant peak frequency, also illustrated in figure 1. There is a simple mathematical relationship between the dominant peak frequency obtained by this calculation and the

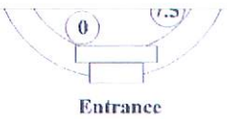
depth of travel of the P-wave. To relate this frequency to the actual thickness of the material being tested, the speed of travel of the P-wave material must be known. This is readily measured by testing a known thickness of the material, either in-situ or in cores. Recent research has produced an additional technique to measure the p-wave speed. In this technique, the time of travel of the surface Rayleigh wave between two impact-echo heads is measured. Research has established a consistent relationship between the speed of travel of the R-wave and the speed of travel of the P-wave. This method has now been simplified by the development of computer software, to be used in conjunction with the impact-echo instrument and has been found extremely useful in the evaluation of historical masonry where core samples or known thicknesses are not readily available.

Results of Tests

Measurements taken around the window areas of the tower indicated that the shell thickness was approximately 350 mm. Using in-situ tests with two impact-echo test heads, a P-wave speed of 3000 m/s was selected as the factor to be used in determining the depth of penetration of the P-waves.

In most cases, the impact-echo responses did not produce a simple dominant peak characteristic of sound concrete or concrete fractured at a single plane, but included several minor peaks. This is characteristic of concrete containing numerous defects causing the impact-echo signal to be reflected at several of the internal boundaries. These types of signals were more prevalent in the lower half of the tower and becoming less predominant towards the top of the tower. It was noted that this pattern was consistent with the internal surface which was almost completely degraded in the lower half of the tower and intact near the top. In some cases penetration depths in excess of 440 mm were recorded. In these cases there may be sufficient bond between concrete shell and the outer stone finish to enable the p-waves to penetrate to the front face of the tower.

Impact-Echo test result



Tekron Services

The results of the impact-echo tests are given in Table 1 where the depth of penetration of the impact-echo signals are given in millimetres. The results show that there are considerable regions of the concrete walls where fracturing has been detected. These regions are illustrated in the contour map of the results revealing that the lower section of the tower has the most extensive internal deterioration. At a few locations shallow delaminations were noted. These locations are marked by a red circle on the contour plan.

Conclusions

The rough concrete surface observed inside the tower is not the cause of the multiple p-wave signals but is symptomatic of the degradation within the concrete shell. The results of the impact-echo tests have confirmed that there is considerable fracturing within the concrete shell, particularly in its the lower section where there is a substantial reduction in the thickness of sound concrete. Damage to the concrete has likely been caused by freezing and thawing producing many internal fracture planes.

We trust that this summary of our work on your behalf is adequate for your present purposes. Should you have any questions related to this work please call us.

Yours Truly
TEKRON SERVICES

R. Grieve

Table 1

Impact-Echo Test Results

P-wave Penetration (mm)

Height (metres)	Circumference (metres)					
	0	1.5	3	4.5	6	7.5
10	444	383	444	444	380	380
9	383	309	236	258	236	340
8	309	236	337	383	256	309
7	75	383	278	278	278	307
6	444	309	236	383	139	309
5	258	309	444	309	309	279
4	307	258	278	220	337	337
3	337	383	309	171	161	128
2	75	337	309	337	383	100
1	75	75	278	205	154	161
0	340	206	192	279	310	340

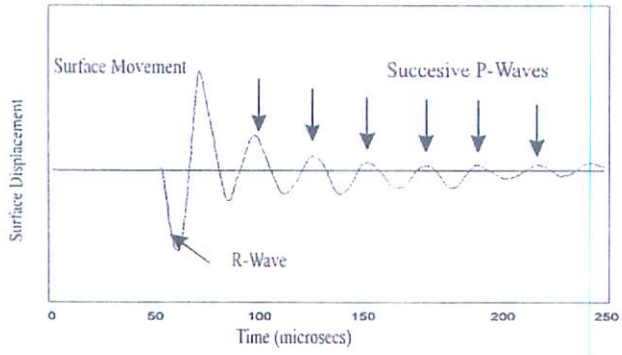
Impact-Echo Principles

Figure 1

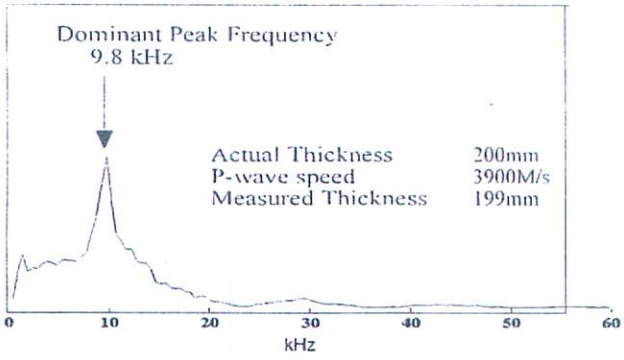
Impact-Echo equipment with Mark II head attached

A tap on the surface of concrete will generate transient stress waves including P-waves, which oscillate between the top and bottom faces of the concrete under test. Close to the point of impact, P-waves produce surface movements which can be measured by the impact-echo equipment. The rate that P-waves arrive at the surface depends on the distance travelled and the speed of the P-waves.

Surface Displacement



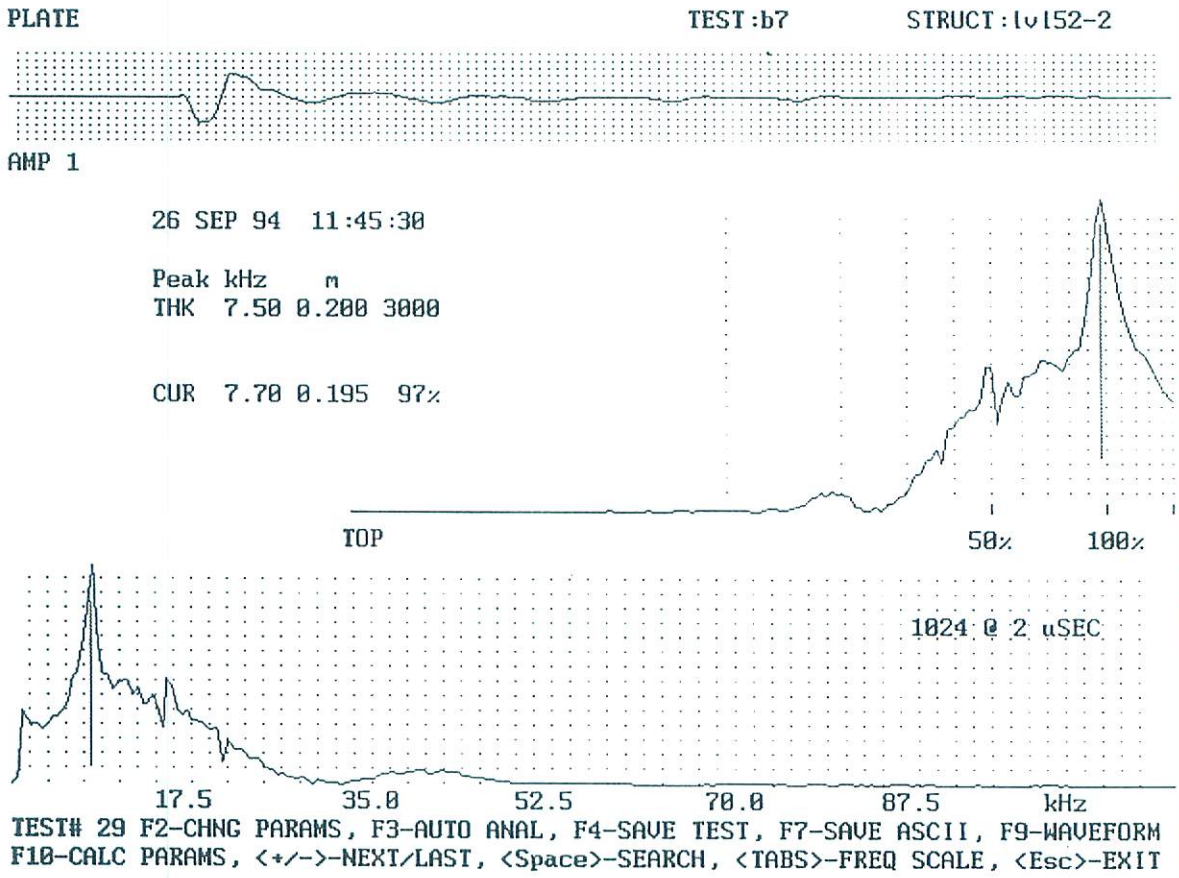
Frequency Spectrum



The impact-echo equipment computes the surface displacement into the frequency domain. When the travel speed of the P-wave through concrete is known, characteristics of the frequency spectrum enable trained operators to determine properties of the concrete under test such as thickness, depth of delamination and presence of defects including honeycombing and quality of bond.

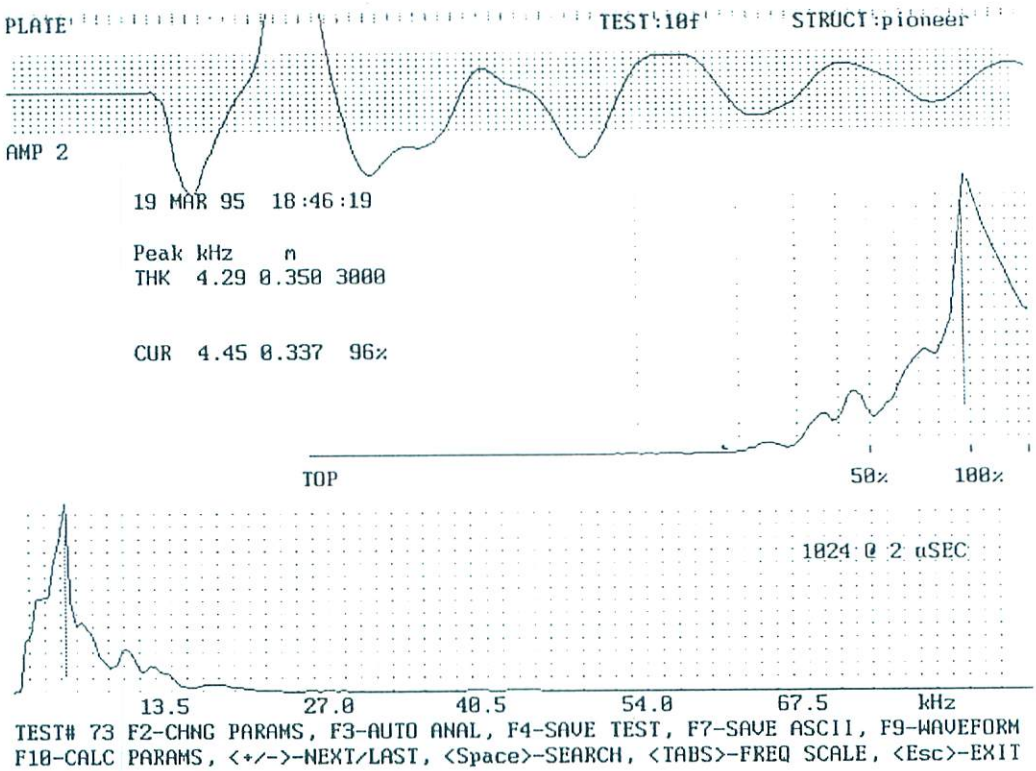
Impact-Echo Screen Display

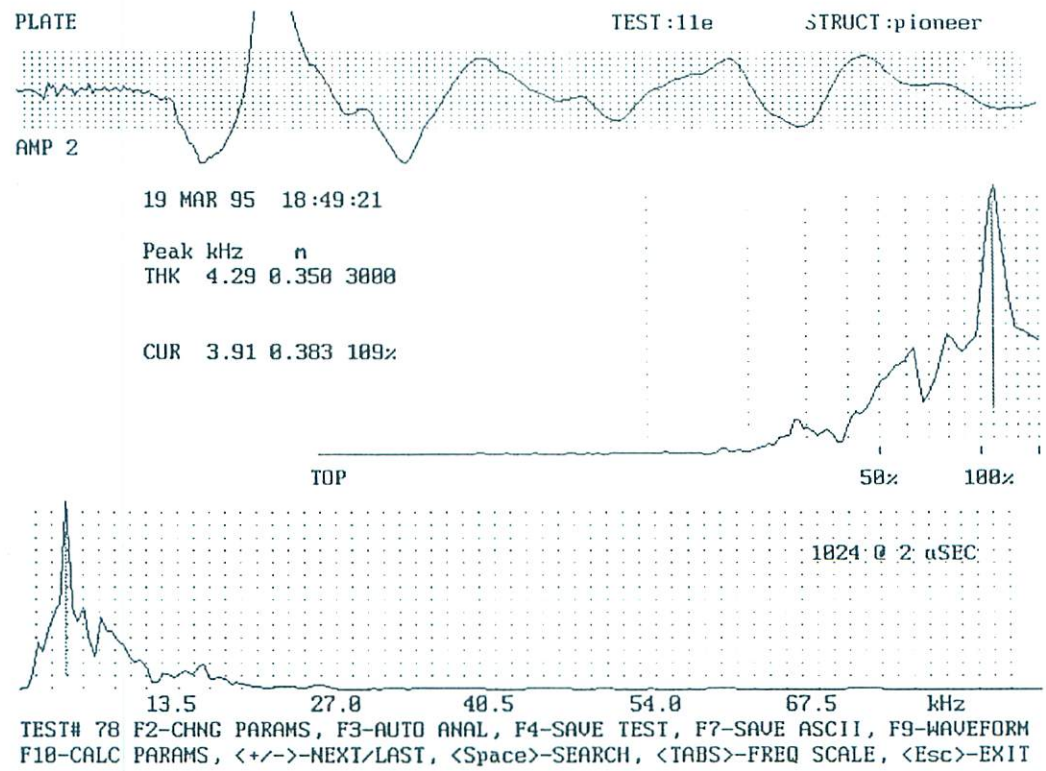
Figure 2



Typical Signal Responses

Figure 3.

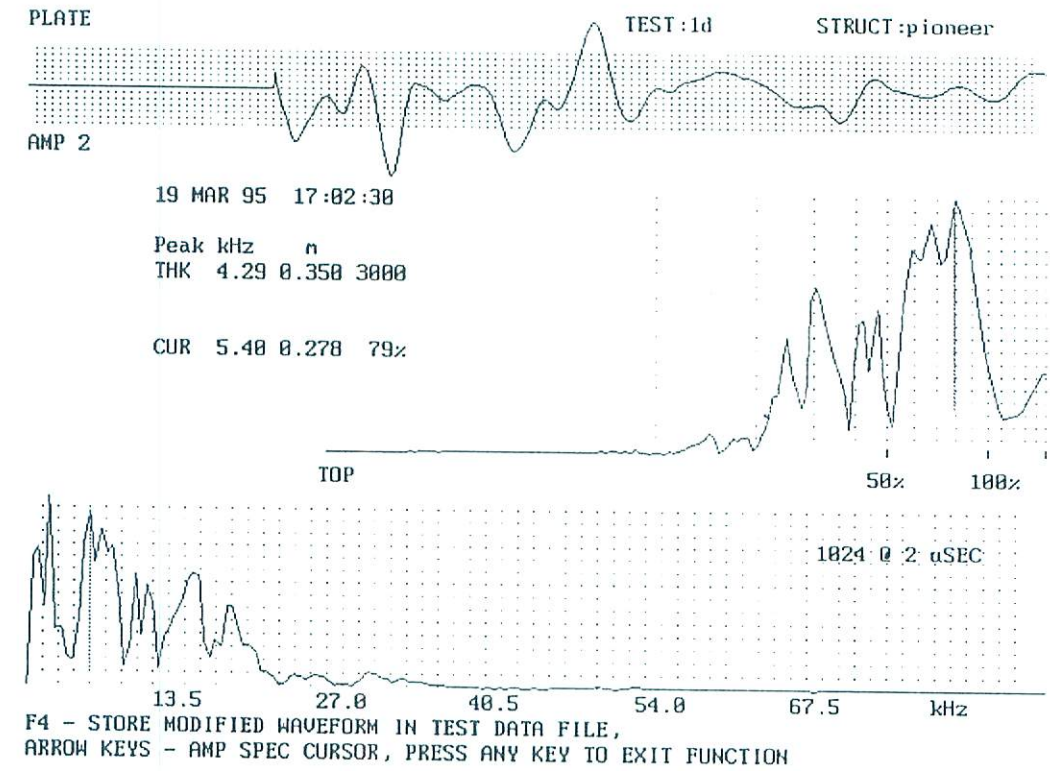


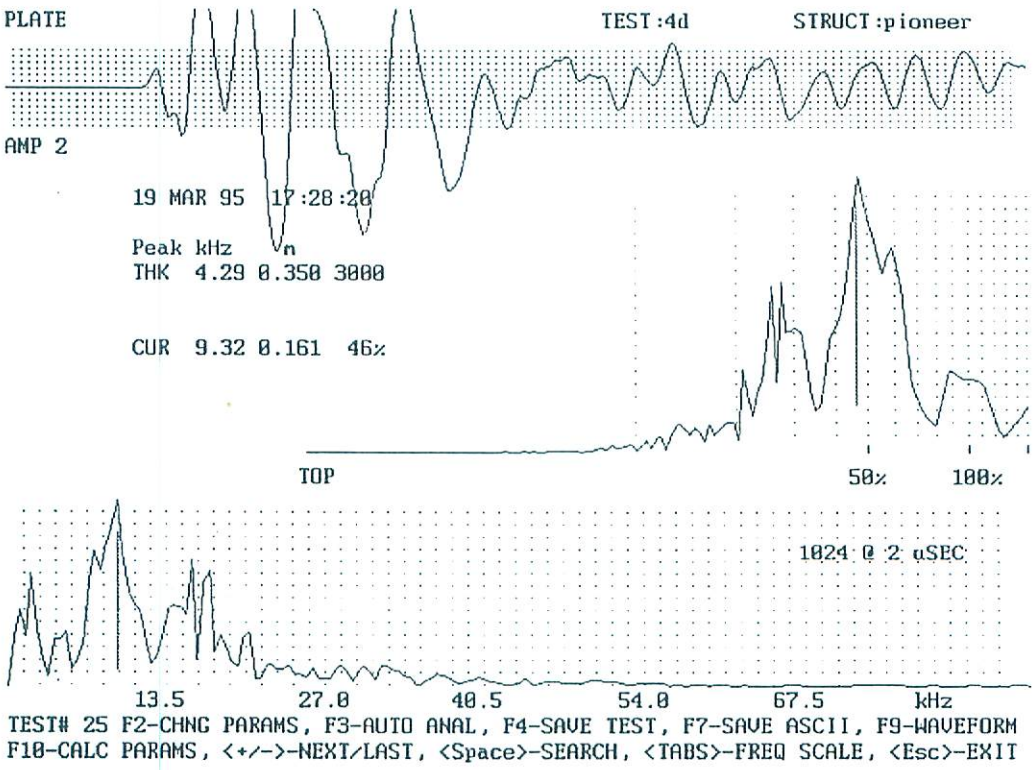


Examples of signal response from solid section of concrete shell

Typical Signal Responses

Figure 4.

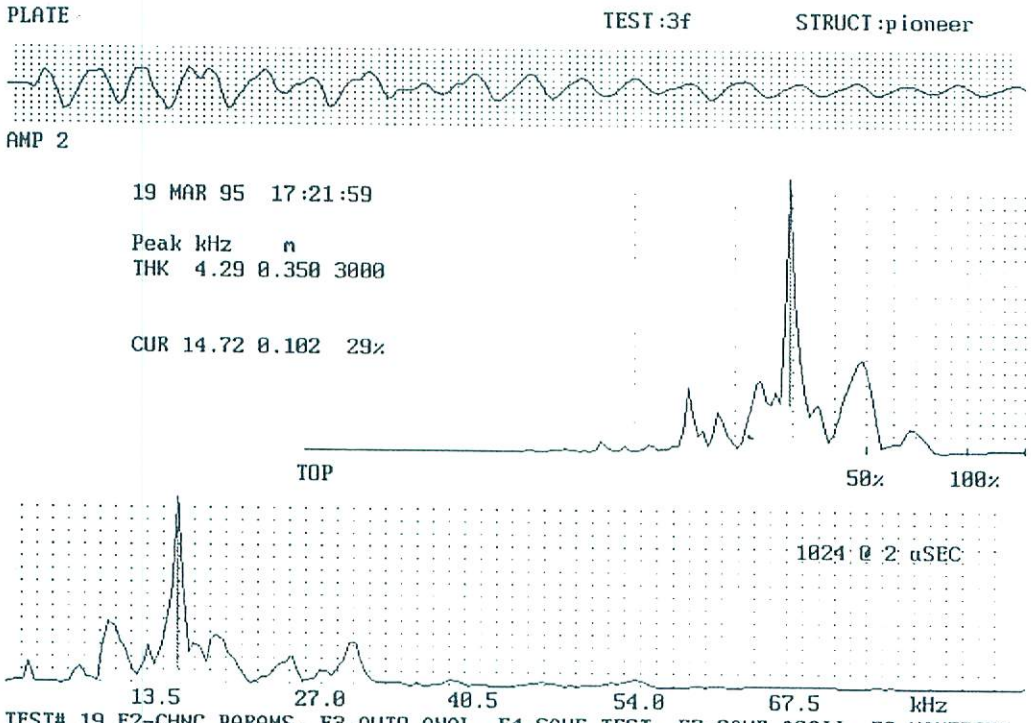


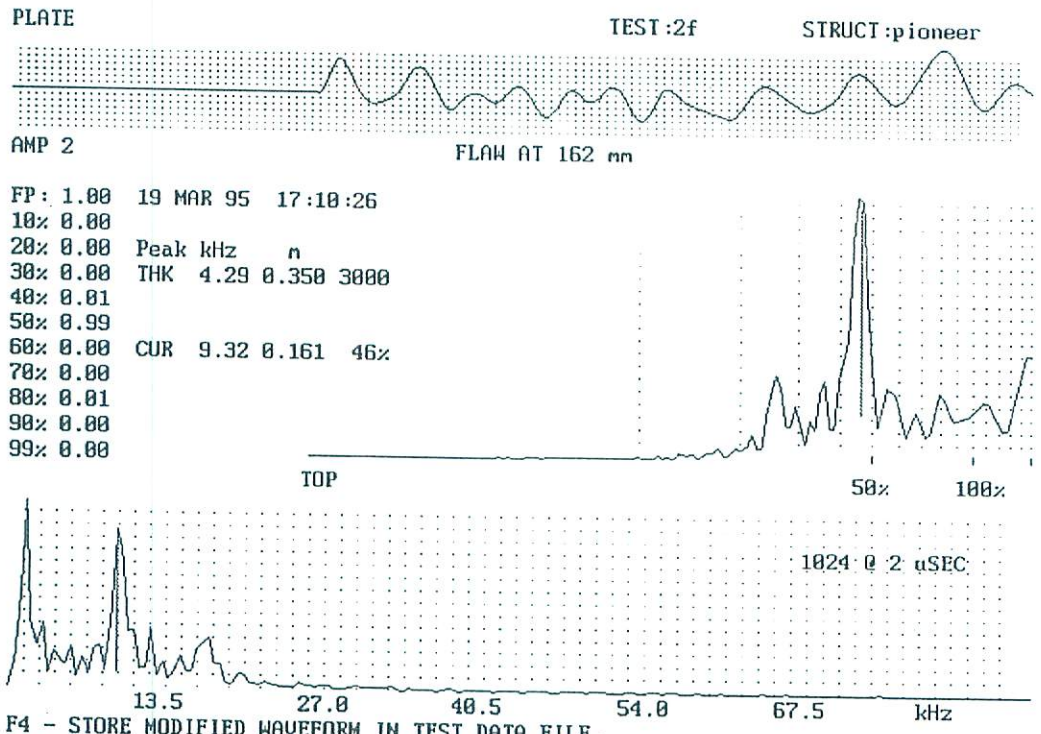


Examples of signal response where multiple fractures of concrete shell are indicated

Typical Signal Responses

Figure 5.





Examples of signal response showing major fracture within concrete shell

Pioneer Tower

Figure 6.

Impact-echo testing the inside walls

Evaluating the P-wave speed using two impact-echo heads

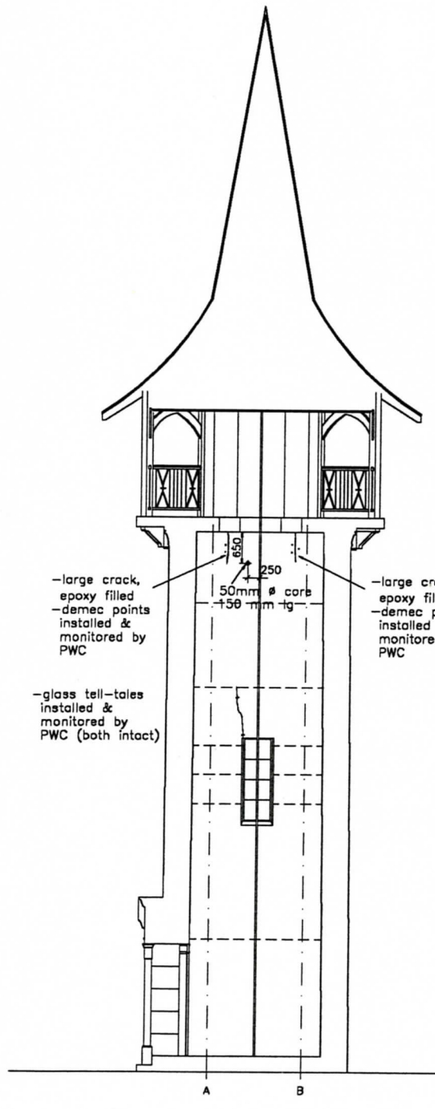
Pioneer Tower

Figure 7.

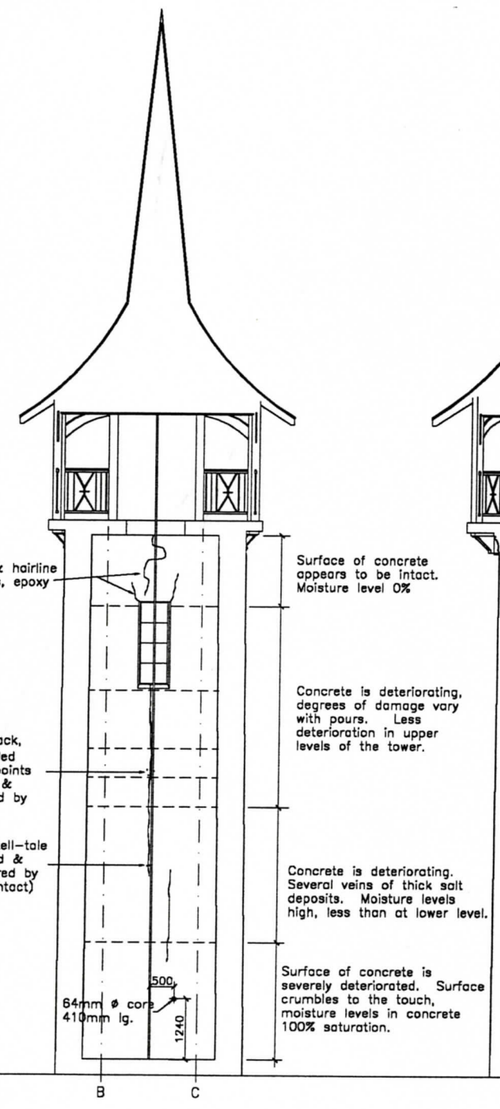
View of inside concrete surface from top of staircase (facing entrance)
Note: grid string lines

View of inside concrete surface from top of staircase (opposite entrance)
Note: grid string lines

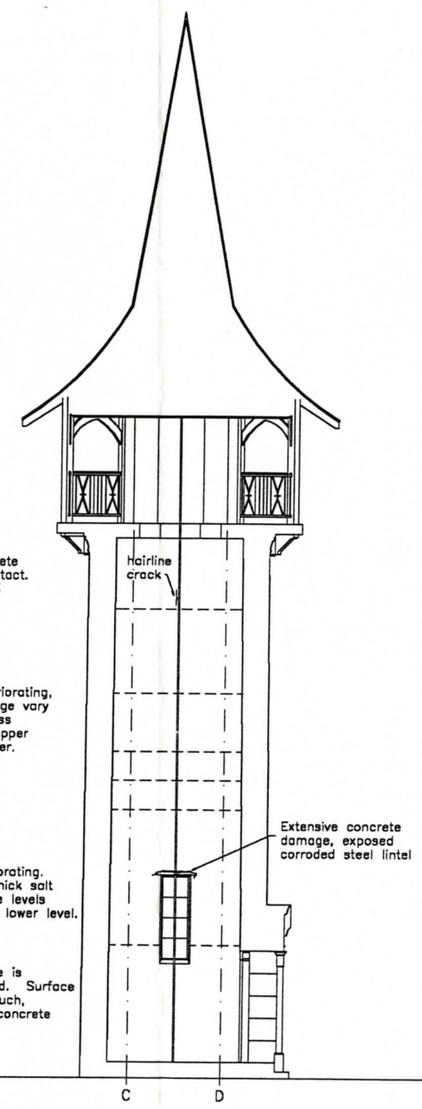
APPENDIX IV - Drawings



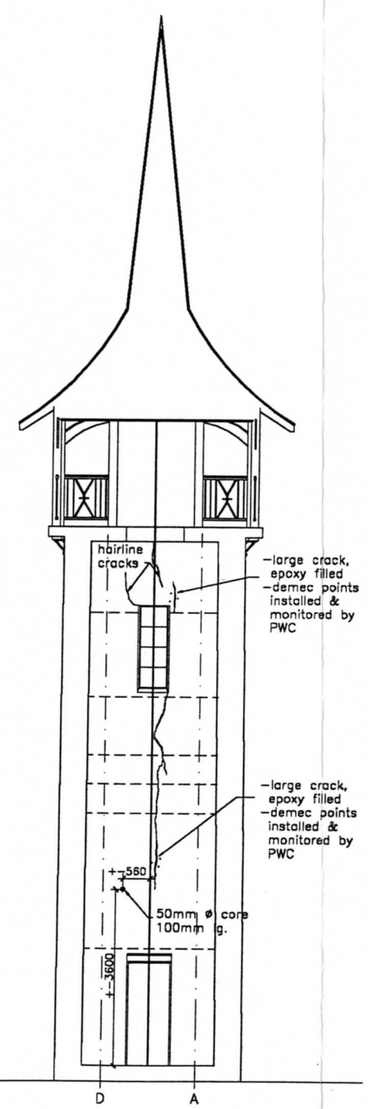
EAST ELEVATION



SOUTH ELEVATION



WEST ELEVATION



NORTH ELEVATION

Public Works and Government Services Canada
Architecture and Engineering Services for Parks Canada

Travaux publics et Services gouvernementaux Canada
Services d'architecture et de génie pour Parcs Canada

Canada

REF. DATE DESCRIPTION

CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH THE WORK DO NOT SCALE DRAWINGS

UMA Engineering Ltd.
Engineers & Planners
5080 Commerce Blvd.
Mississauga
Ontario, L4W 4P2
Tel. (905) 238-0007
Fax (905) 238-0038

PROJECT NAME:

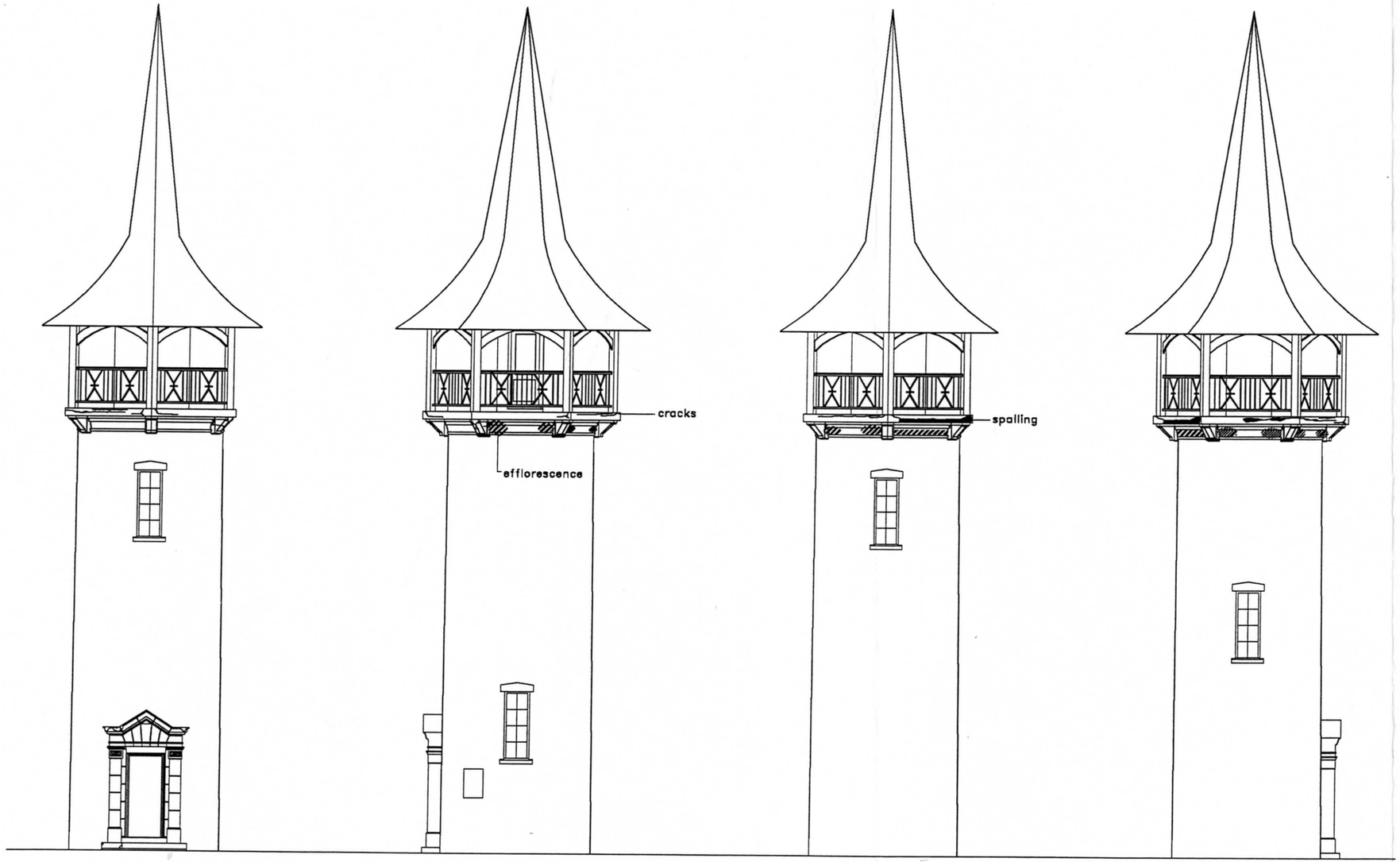
WOODSIDE N.H.S.
PIONEER TOWER
INVESTIGATION

KITCHENER ONTARIO

DRAWING TITLE:

INTERIOR ELEVATIONS

SCALE: NTS	PROJECT NUMBER: 9725-001-00
DATE: MAY-95	
DRAWN BY: C.G.	DRAWING NUMBER: SK.01
CHECKED BY: E.J.	



SOUTH ELEVATION

EAST ELEVATION

NORTH ELEVATION

WEST ELEVATION

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Architecture and Engineering Services for Parks Canada
Services d'architecture et de génie pour Parcs Canada

Canadä

REF.	DATE	DESCRIPTION

CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH THE WORK — DO NOT SCALE DRAWINGS

UMA Engineering Ltd.
Engineers & Planners
5060 Commerce Blvd.
Mississauga
Ontario, L4W 4P6
Tel. (905) 238-0007
Fax (905) 238-0038

PROJECT NAME:

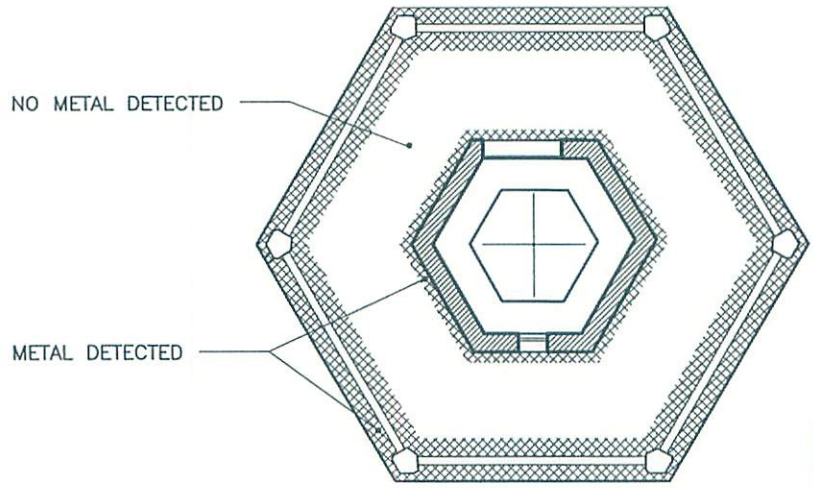
WOODSIDE N.H.S.
PIONEER TOWER
INVESTIGATION

KITCHENER — ONTARIO

DRAWING TITLE:

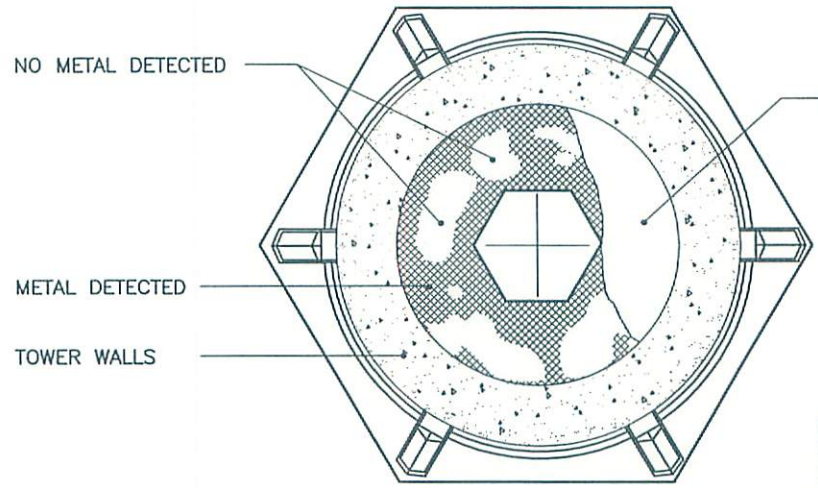
EXTERIOR ELEVATIONS

SCALE: NTS	PROJECT NUMBER: 9725-001-00
DATE: MAY-95	
DRAWN BY: C.G.	DRAWING NUMBER: SK.02
CHECKED BY: E.J.	



DECK PLAN

AREA TESTED WITH METAL DETECTOR ON TOP OF DECK, BOTH INSIDE & OUTSIDE OF TOWER WALLS.



REFLECTED DECK PLAN

AREA TESTED WITH METAL DETECTOR ON U/S OF DECK WITHIN TOWER WALLS ONLY.

UMA Engineering Ltd.
Engineers & Planners
5080 Commerce Blvd.
Mississauga
Ontario, L4W 4P2
Tel. (905) 238-0007
Fax (905) 238-0038

Client

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada
Architecture and Engineering Services for Parks Canada / Services d'architecture et de génie pour Parcs Canada
Canada

Project Title

WOODSIDE N.H.S.
PIONEER TOWER
INVESTIGATION

Drawing Title

METAL DETECTOR SURVEY
CONCRETE DECK

UMA Job No.	9725-001
Date	01/96
Drawn by	CG
Design by	
Checked by	EJ
Scale	NTS
Revision	
Drawing No.	SK.03

ACAD FILE: C:\JOBFILE\PIONEER\METALDWG PLOT DATE: JAN. 31, 1996

APPENDIX V - Table of Calculated Stresses

PIONEER TOWER STRESS ANALYSIS RESULTS

WORKING STRESS DESIGN

LOADS	STRESS TYPE	WORKING STRESS (kPa)	WORKING STRESS (psi)	ALLOWABLE STRESS (kPa)	ALLOWABLE STRESS (psi)
GRAVITY	Bearing	300	43.5	4000	580
WIND & GRAVITY	Compressive leeward side windward side	 490 110	 71 15.9	7200	1044
	Tensile	none		6400	928
	Shear	13.3	1.9	4400	638
EARTHQUAKE & GRAVITY	Compressive max. min.	 536 64	 77.7 9.3	7200	1044
	Tensile	none		6400	928
	Shear	24.7	3.6	4400	638

Note: - assumed compressive strength, f'c = 16 MPa (2000 psi)
- loading calculated according to NBCC 1990
- material is unreinforced

LIMIT STATES DESIGN

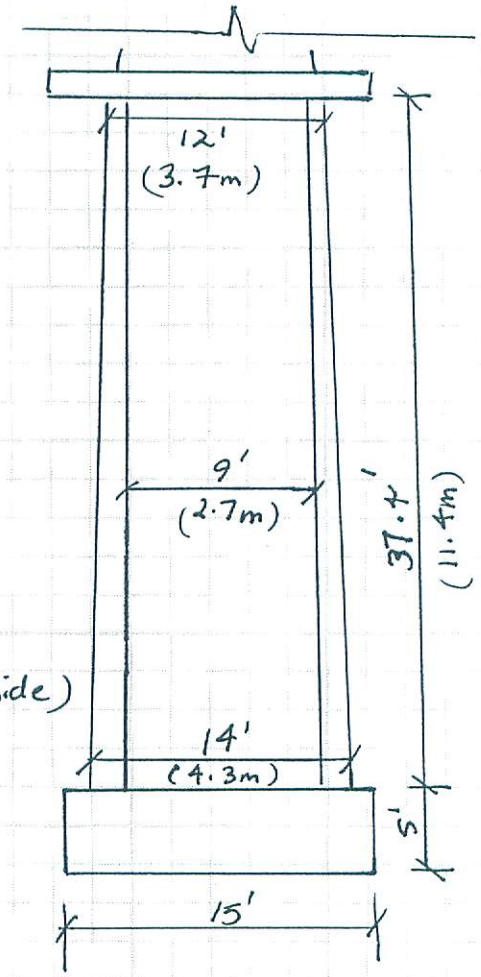
LOADS	STRESS TYPE	FACTORED STRESS (kPa)	FACTORED STRESS (psi)	STRENGTH (kPa)	STRENGTH (psi)
GRAVITY	Bearing	377	54.7	8200	1189
WIND & GRAVITY	Compressive leeward side windward side	 661 89.4	 95.9 13	9600	1392
	Tensile	none		720	104
	Shear	20	2.9	180	26.1
EARTHQUAKE & GRAVITY	Compressive max. min.	 729 21.5	 106 3.1	9600	1392
	Tensile	none		720	104
	Shear	24.7	3.6	180	26.1

Note: - assumed compressive strength, f'c = 16 MPa (2000 psi)
- loading calculated according to NBCC 1990
- material is unreinforced

PIONEER TOWER - STRESS ANALYSIS

DIMENSIONS

FROM FHBRO REPT. 88-78:
total height = 68'
base diameter = 14'
diameter under platform = 12'
inside diameter = 9'



PLATFORM SLAB: (hexagonal)

diam. across corners = 5.1 m
across flats = 4.4 m
avg. diam. = 4.8 m (outside)

opening in slab:

diam. across corners = 1.9m
across flats = 1.6 m
avg. diam = 1.8 m

slab thickness
@ inside edge = 300 mm
@ outside edge = 200 mm
avg. = 250 mm

WALL THICKNESS

@ top window = 0.46 m
@ bottom window = 0.59 m

∴ avg. wall thickness = 0.52 m

ASSUMPTIONS USED IN ANALYSIS

- average dimensions were used
- assume portion of tower above observation deck has a weight = 5% of tower weight
- concrete strength = 16MPa (2000 psi); density = 2400 kg/m³

UMA Engineering Ltd.
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5080 Commerce Blvd., Mississauga, Ontario, Canada L4W 4P2

Design Calculations

Client PARKS CANADA

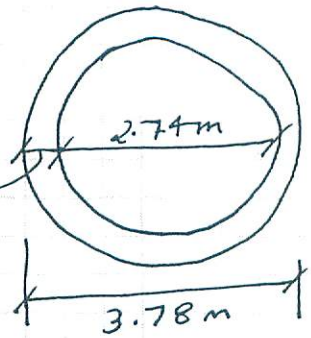
Project PIONEER TOWER

DATE JAN. 96 DESIGNED BY H.H.

DATE _____ CHECKED BY _____ JOB No. 9725-001 SHEET 1 OF 10

LOADS

· concrete 23.5 kN/m³



DEAD LOADS

TOWER

$$23.5 \frac{\pi}{4} (3.78^2 - 2.74^2) 11.4 = 1430 \text{ kN}$$

SLAB

$$23.5 \frac{\pi}{4} (4.8^2 - 1.8^2) 0.25 = 91 \text{ kN}$$

TOP PORTION OF TOWER (5% of tower weight)

$$0.05 (1430 + 91) = 76 \text{ kN}$$

∴ TOTAL WEIGHT OF TOWER = 1597 kN

LIVE LOADS

WIND

NBCC 1990 Cl 4.1.8.1

$p = q C_e C_g C_p$

hourly wind pressure : q for 1/30 = 0.34 kPa App. C

$C_e = 1.1$

$C_g = 2.0$

C_p from App. B Fig B-15

$\frac{h}{d} = 5$ (tables : use 7)

@ 0° $C_p = +1.0$

@ 90° $C_p = -2.2$

∴ $p = 0.34 (1.1)(2.0)(1.0) = 0.75$ kPa

(external wind pressure on windward side)

- LIVE LOADS - cont.

on leeward side

$C_p = -0.5$

$\therefore p = 0.34(1.1)(2.0)(-0.5)$
$= -0.37 \text{ kPa}$

$\therefore$ TOTAL WIND LOAD ON THE TOWER $\therefore$

$P_T = p - p_i$
$= 0.748 - (-0.374)$
$= \boxed{1.12 \text{ kPa}}$

WIND

EARTHQUAKE

$V = (Ve/R)U$ where $U = 0.6$ cl 4.1.9.1(4

$Ve = v \cdot S \cdot I \cdot F \cdot W$

$v = 0.05$

$Z_a = 1$, $Z_v = 0$ $\therefore$ use $Z_v = 1$ (5)

S from table 4.1.9 A

where $T = 0.09 h_n / \sqrt{D_s}$

$h_n = 11.4$ m (to underside of slab)
$D_s = D = 3.78$m (Ø of tower)

$T = 0.5$

$S = 1.5/\sqrt{T} = 2.1$

$I = 1.0$

F (assuming category 2) = 1.3

→

- LIVE LOADS - cont.

EARTHQUAKE - cont.

W = 1597 kN + 25 % of snow load

SNOW LOAD CALCULATIONS :

$$S = S_s(C_b C_w C_s C_a) + S_r$$

$$= 1.8(0.8)(0.75)\, C_s(1.0) + 0.4$$

$$C_s = \frac{60° - 40°}{45°} = 0.44$$

* assume lower section of roof has a slope of 40°

$$S = 0.48 + 0.4 = 0.88 \text{ kPa}$$

Area of roof (avg.) $= \frac{\pi}{4}(3.10)^2 = 7.55 m^2$

Snow load $= 7.55\,(0.88) = 6.6$ kN

$\therefore$ $W = 1597 + 0.25(6.6) = 1599$ kN

$Ve = 0.05\,(2.1)(1.0)(1.3)(1599) = 218$ kN

$V = \left(\frac{Ve}{R}\right) U = \left(\frac{218}{1.0}\right) 0.6 =$ **131 kN**

EARTHQUAKE

WORKING STRESS ANALYSIS.

GRAVITY STRESSES:

total weight of tower = 1597 kN

area at base of tower = $5.3\ m^2$ (assuming avg. wall thickness)

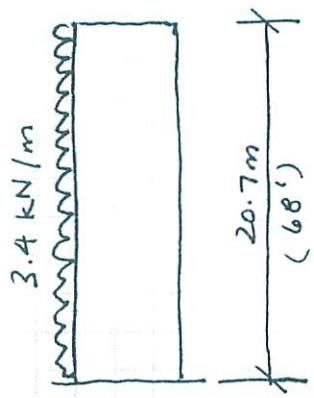
$$\text{bearing stress} = \frac{P}{A}$$

$$= \frac{1597}{5.3}$$

$$= 300\ kPa$$

WIND + GRAVITY:

load = D + W



Coefficient for surface roughness = 0.8

$\therefore p_T = 0.8\,(1.122)$

$= 0.9\ kPa$

$\therefore$ wind load on tower $= 0.9(3.78)$

$= 3.4\ kN/m$

$$\sigma = \frac{Mc}{I}$$

$$M_{max} = \frac{3.4\,(20.7)^2}{2}$$

$$= 730.3\ kNm$$

$c = \frac{1}{2}d = 3.78/2 = 1.89\ m$

→

WIND & GRAVITY – cont.

$$I = \frac{\pi (3.78^4 - 2.74^4)}{64} = 7.25\ m^4$$

$$\sigma = \frac{730.3\ (1.89)}{7.25} = 190.4\ kPa$$

∴ max. stress on tower due to wind is 190.4 kPa. (in bending)

∴ STRESS @ BASE OF TOWER DUE TO GRAVITY & WIND :

@ LEEWARD SIDE $\sigma_c = 300 + 190.4 =$ **490.4 kPa (C)**

@ WINDWARD SIDE $\sigma = 300 - 190.4 =$ **109.6 kPa (C)**

TOTAL WIND FORCE (SHEAR)

$V = 0.9\ d \cdot h$
$= 0.9\ (3.78)(20.7)$
$= 70.4\ kN$

STRESS

$$\tau = \frac{V}{A} = \frac{70.4}{5.3}$$

$$= \boxed{13.3\ kPa}$$

→

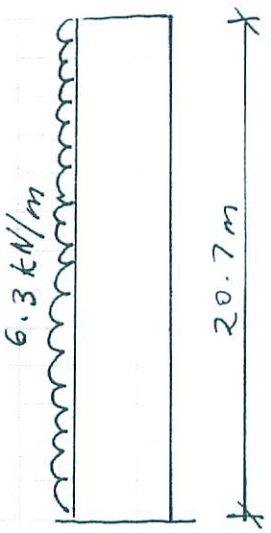
WORKING STRESS ANALYSIS - cont.

EARTHQUAKE LOADING :

$V = 131$ kN

* assume seismic force is distributed over the height of the tower

$$w = \frac{131}{20.7} = 6.3 \text{ kN/m}$$



∴ SHEAR FORCE = 131 kN

$$\text{shear stress} = \frac{V}{A}$$

$$= \frac{131}{5.3}$$

$$\tau = \boxed{24.7 \text{ kPa}}$$

STRESS IN WALLS (due to bending) :

$$M = \frac{wl^2}{2} = \frac{6.3\,(20.7)^2}{2}$$

$$= 1356 \text{ kNm}$$

$$\sigma_c = \frac{1356\,(1.89)}{7.25} = 353.5 \text{ kPa (C)}$$

$$\sigma_T = \sigma_c = 353.5 \text{ kPa (T)}$$

* WHEN COMBINED WITH GRAVITY USE 2/3 EARTHQUAKE

STRESS IN TOWER WALLS :

$$\sigma_c = 300 + \frac{2}{3}(353.5) = \boxed{536 \text{ kPa (C)}} \quad \text{max.}$$

$$\sigma_c = 300 - \frac{2}{3}(353.5) = \boxed{64 \text{ kPa (C)}} \quad \text{min.}$$

LIMIT STATES DESIGN

GRAVITY:

LOAD : $1.25\,D$

$= 1.25\,(1597)$

$= 1996\ kN$

$\sigma = \frac{P}{A} = \frac{1996}{5.3}$

$= 377\ kPa$

WIND LOAD & GRAVITY.

LOAD : $1.25\,D + 1.5\,W$

STRESS DUE TO BENDING:

@ LEEWARD SIDE: $\sigma = 1.25\,(300) + 1.5\,(190.4) =$ **660.6 kPa (C)**

@ WINDWARD SIDE: $\sigma = 1.25\,(300) - 1.5\,(190.4) =$ **89.4 kPa (C)**

SHEAR FORCE DUE TO WIND

$V = 1.5\,(70.4)$

$= 105.6\ kN$

$\tau = \frac{105.6}{5.3}$

$=$ **19.9 kPa**

→

LIMIT STATES DESIGN – cont'd.

EARTHQUAKE LOADING:

COMBINED LOAD = 1.25 D + 1.0 Q

STRESS DUE TO BENDING:
(AS BEFORE ∵ $\alpha_Q = 1.0$)

$\sigma_C = \sigma_T =$ 353.5 kPa

STRESS DUE TO GRAVITY & EARTHQUAKE

$\sigma_C =$ 1.25(300) + 1.0(353.5) = **729 kPa (C)** max

$\sigma =$ 1.25(300) − 1.0(353.5) = **21.5 kPa (C)** min

SHEAR STRESS DUE TO EARTHQUAKE:

V = 131 kN

$\tau = \frac{131}{5.3}$ = **24.7 kPa**

WORKING STRESS DESIGN:

ALLOWABLE STRESSES:

$f'_c = 16$ MPa.

$\sigma_{compression\ (in\ bearing)} = 0.25 f'_c =$ **4 MPa**

σ_c (in bending) $= 0.45 f'_c =$ **7.2 MPa**

σ_T (in bending) $= 1.6\sqrt{f'_c} =$ **6.4 MPa**

$\tau = 1.1\sqrt{f'_c} =$ **4.4 MPa**

LIMIT STATES DESIGN:

STRENGTH:

$\sigma_b = 0.85 \phi_c f'_c = 0.85(0.6)(16) =$ **8.2 MPa** cl 10.15

σ_c (in bending) $= \phi_c f'_c = 0.6(16) =$ **9.6 MPa**

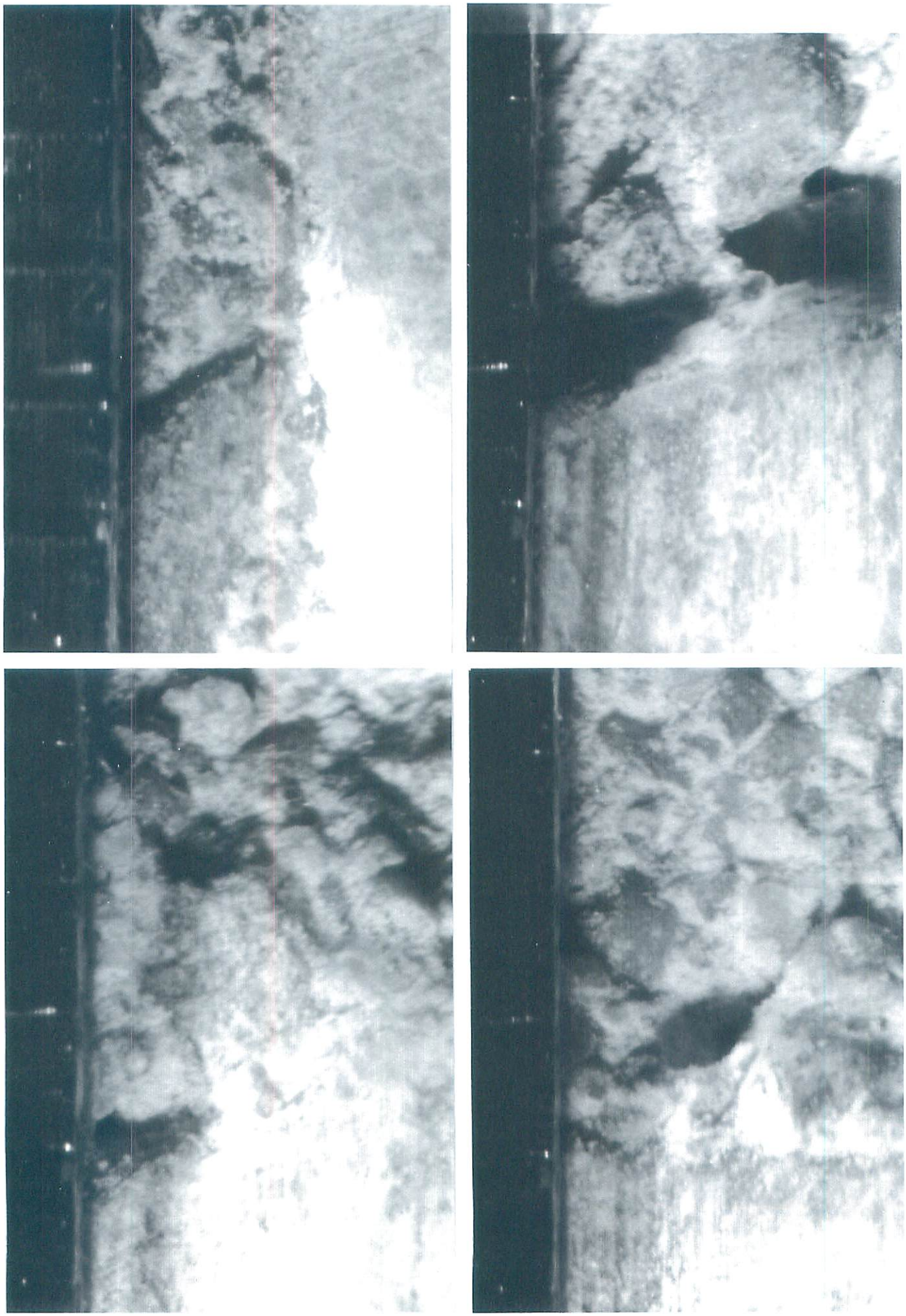
σ_T (in bending) $= 0.4 \lambda \phi_c \sqrt{f'_c} =$ **0.72 MPa**

$\tau = 0.1 \lambda \phi_c \sqrt{f'_c} =$ **0.18 MPa**

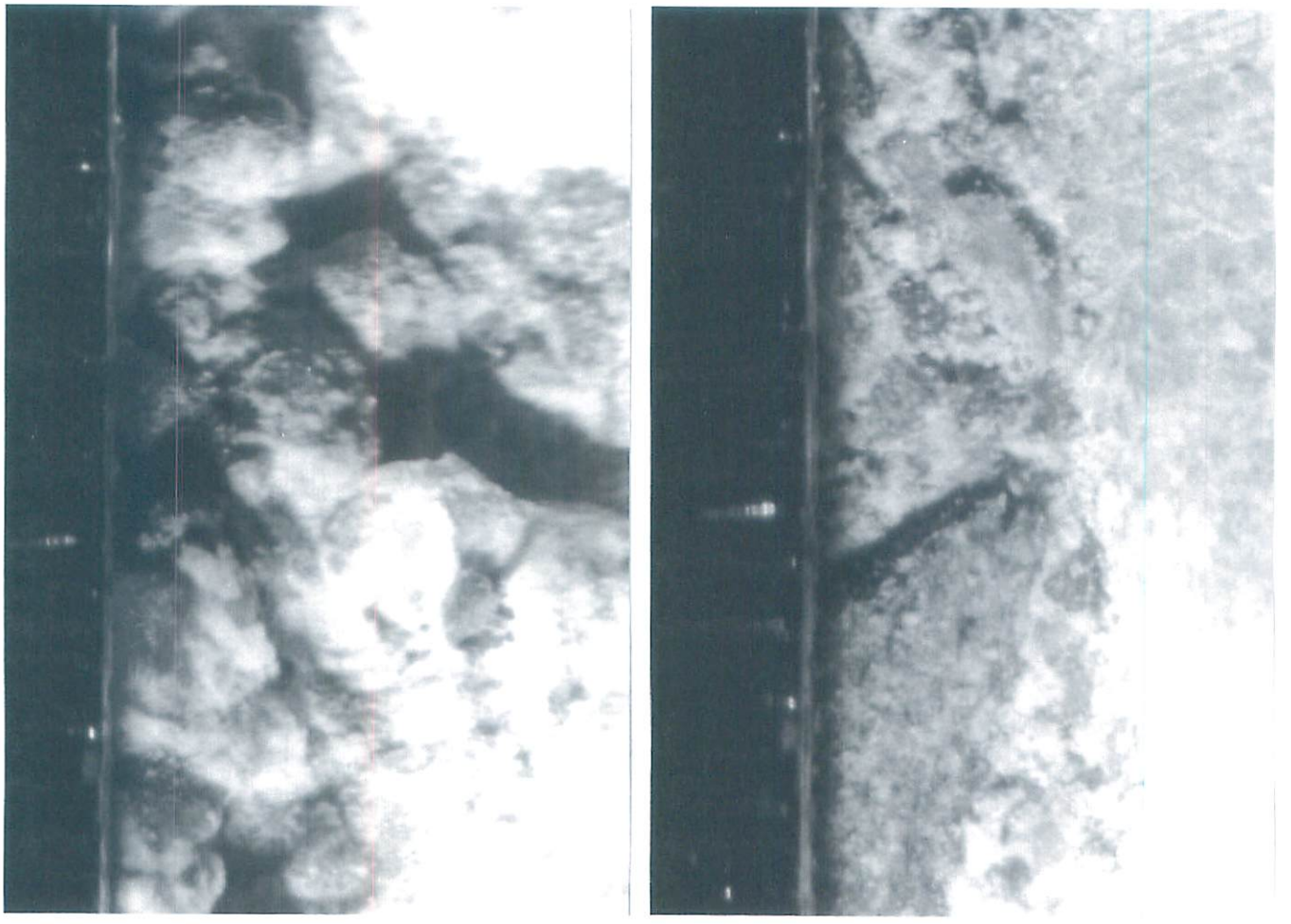
* used $\lambda = 0.75$ for low density concrete

APPENDIX VI - Photographs of Concrete Core Sections

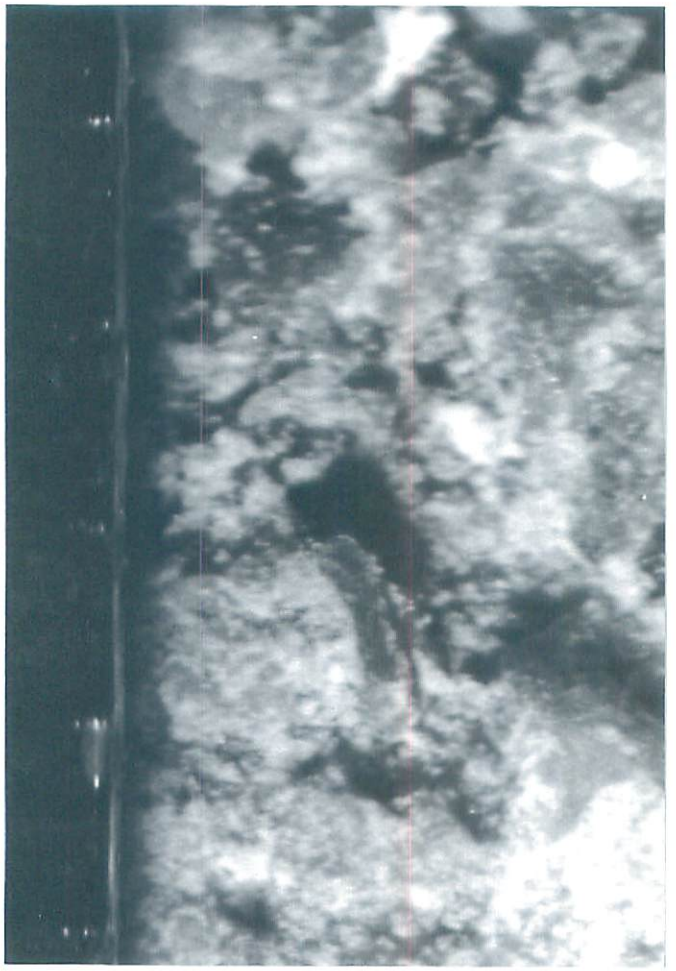
Core #1

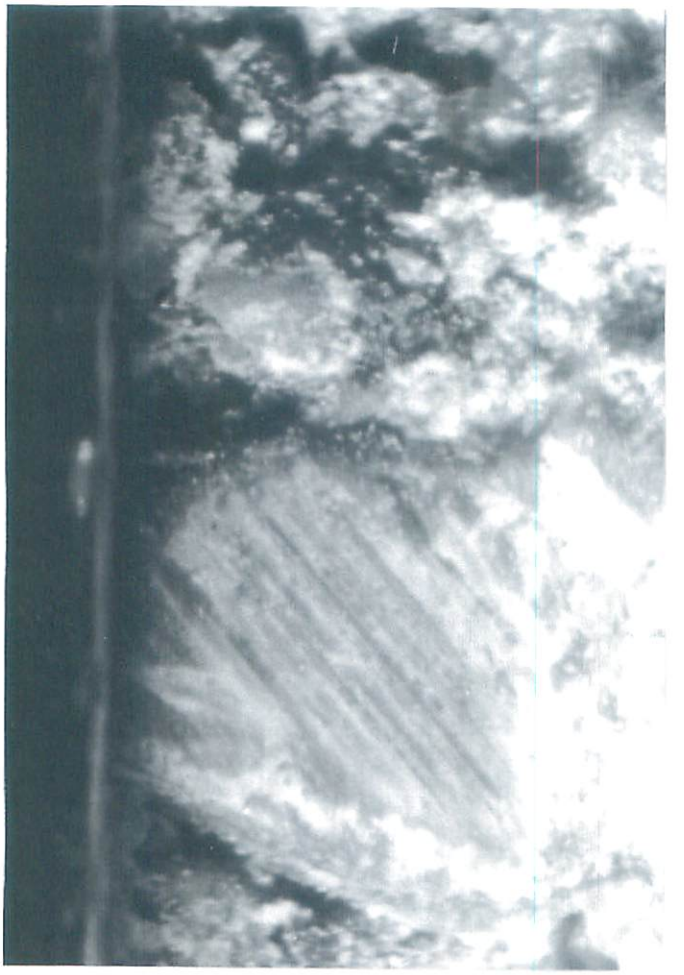


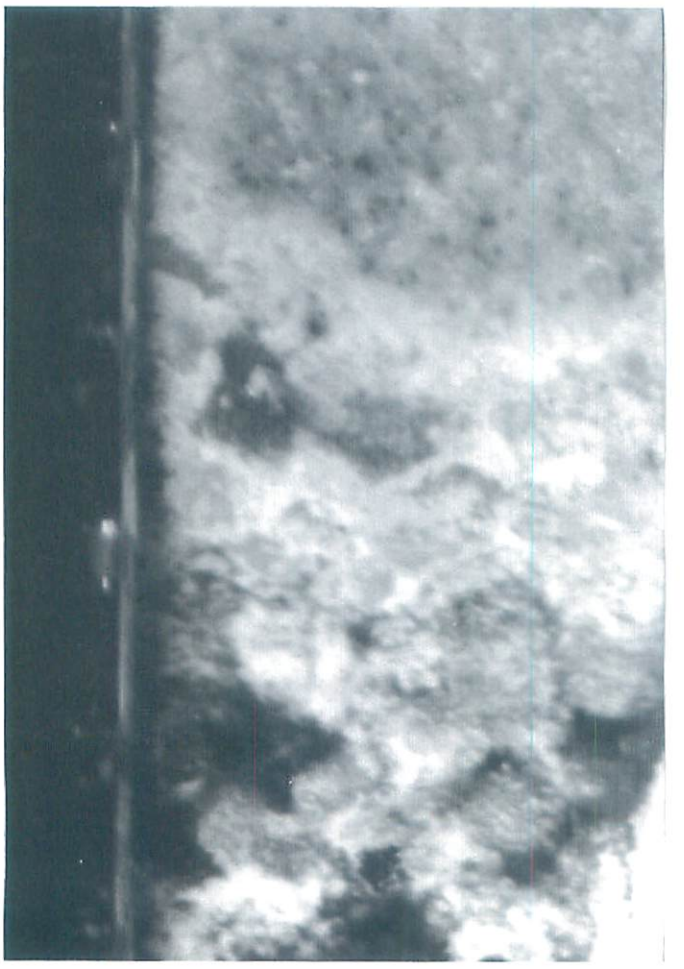
Core #1



Core #2







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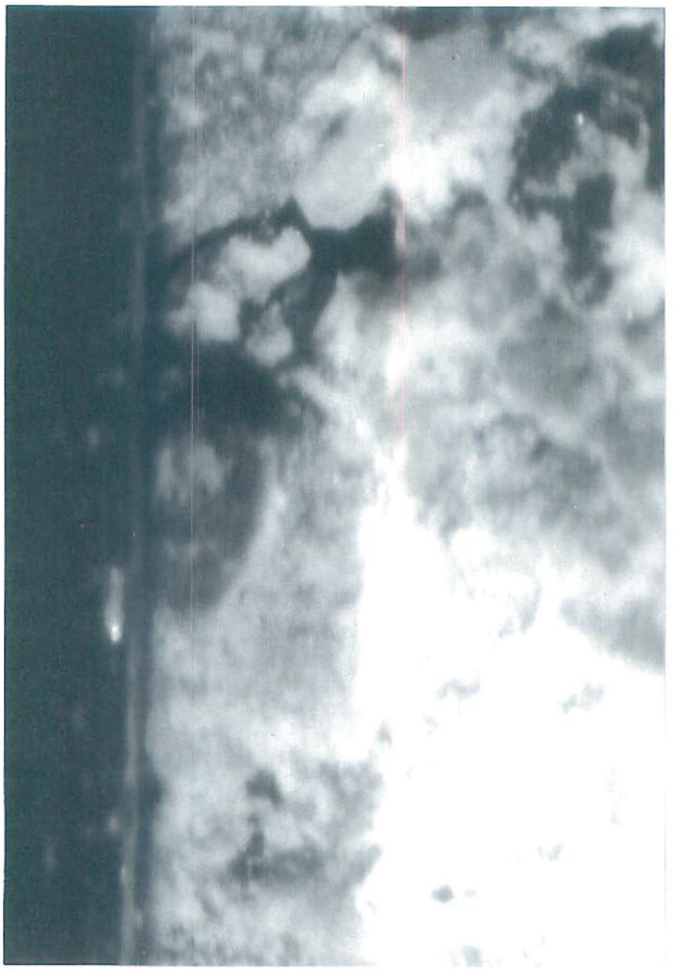

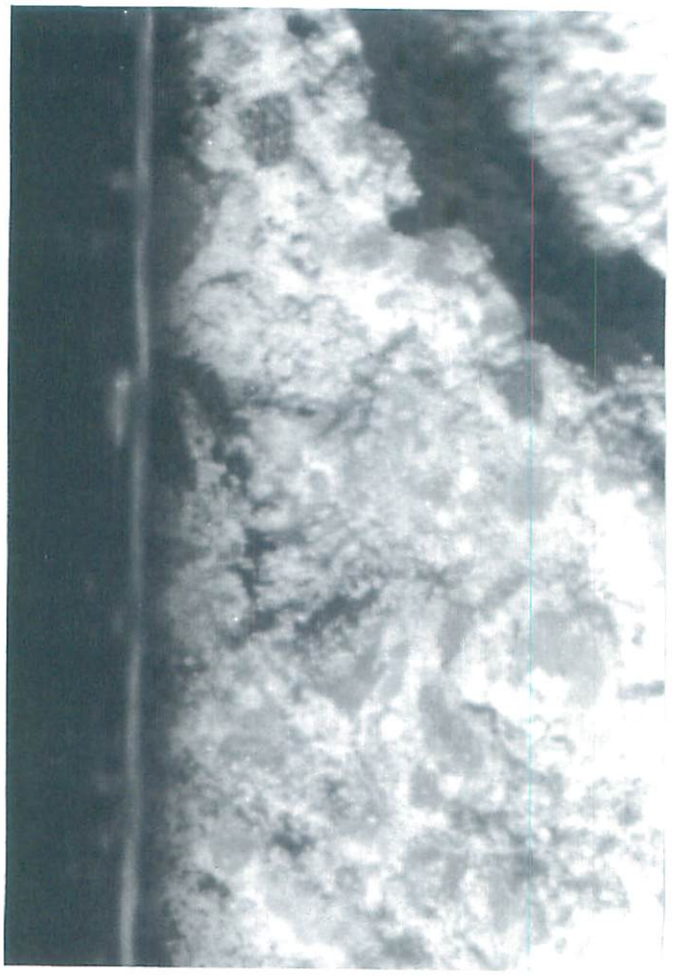

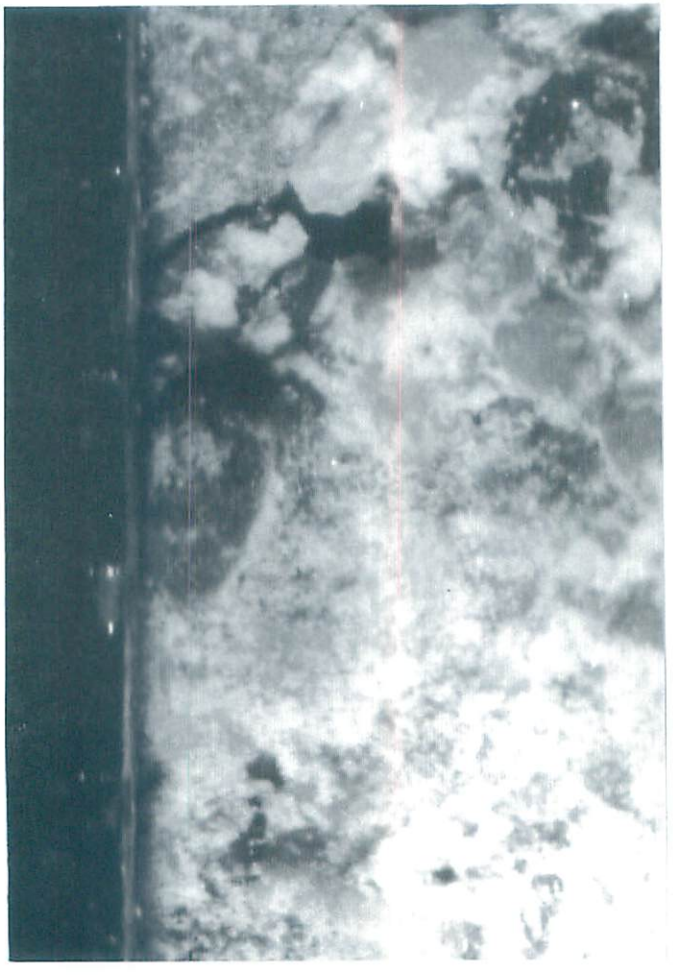

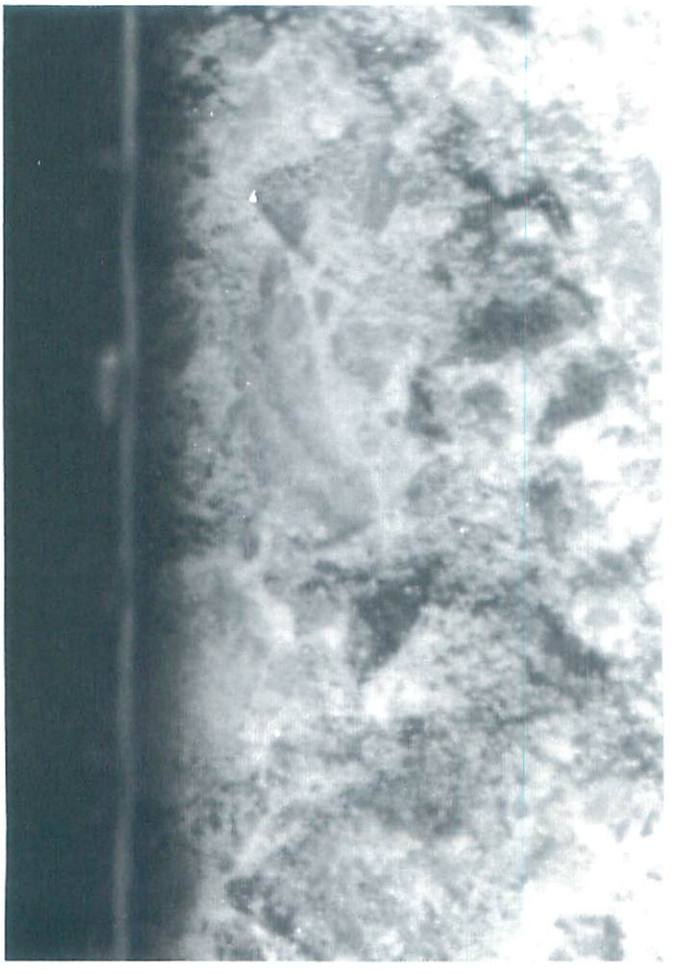

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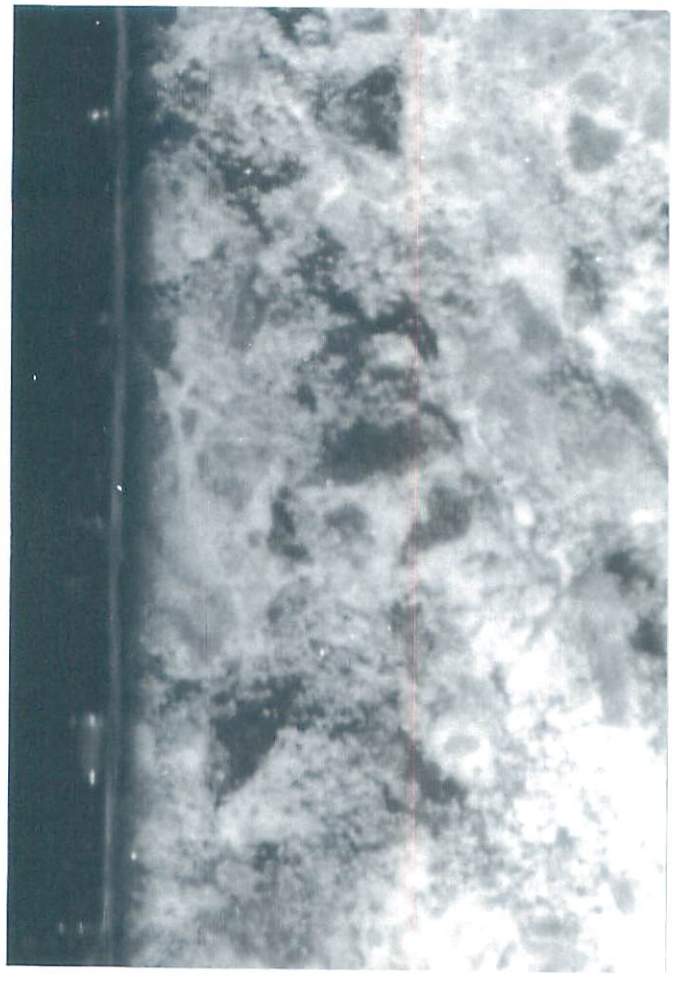

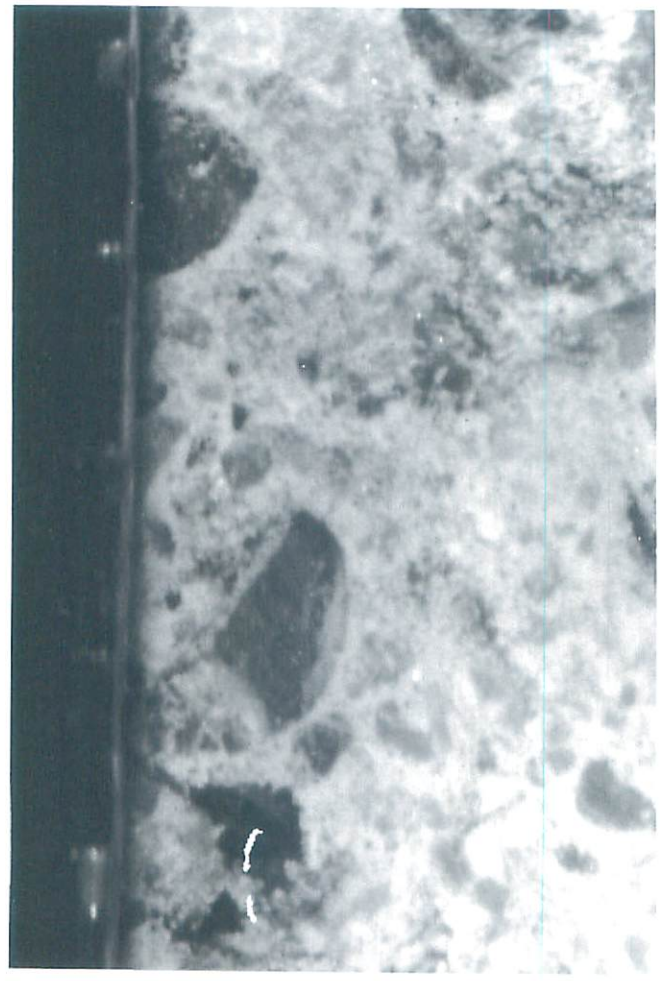

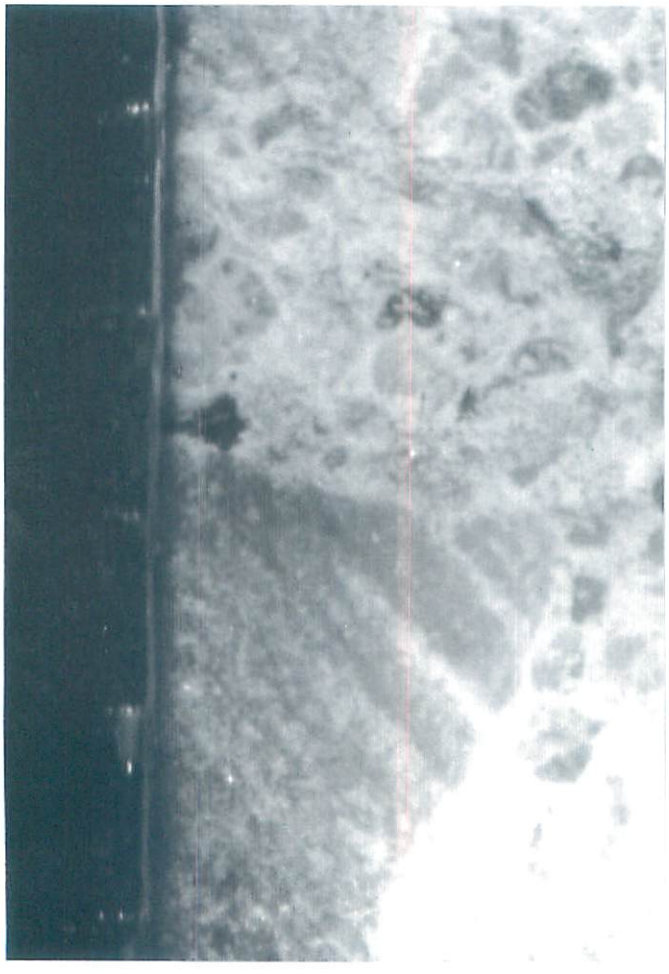

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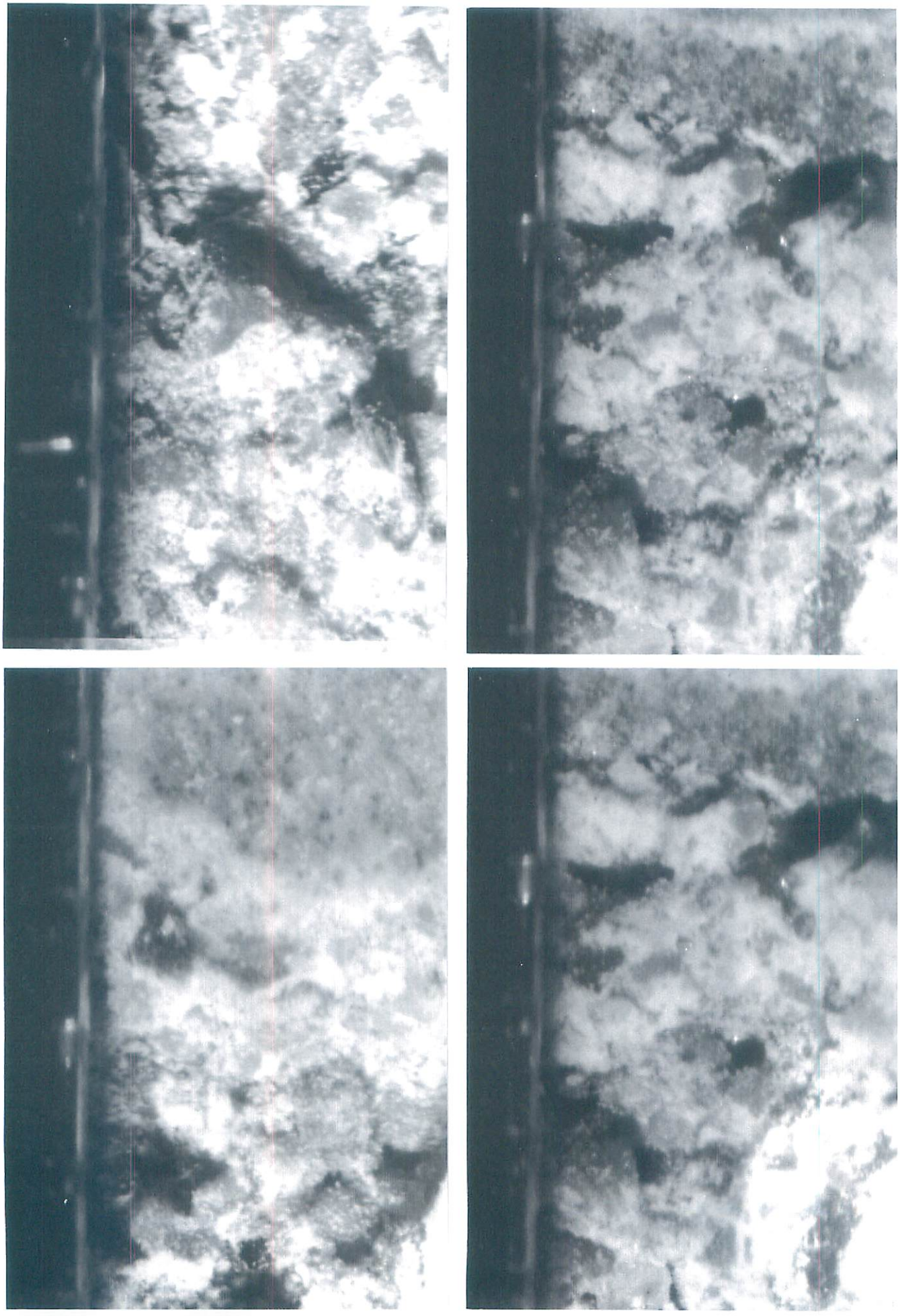

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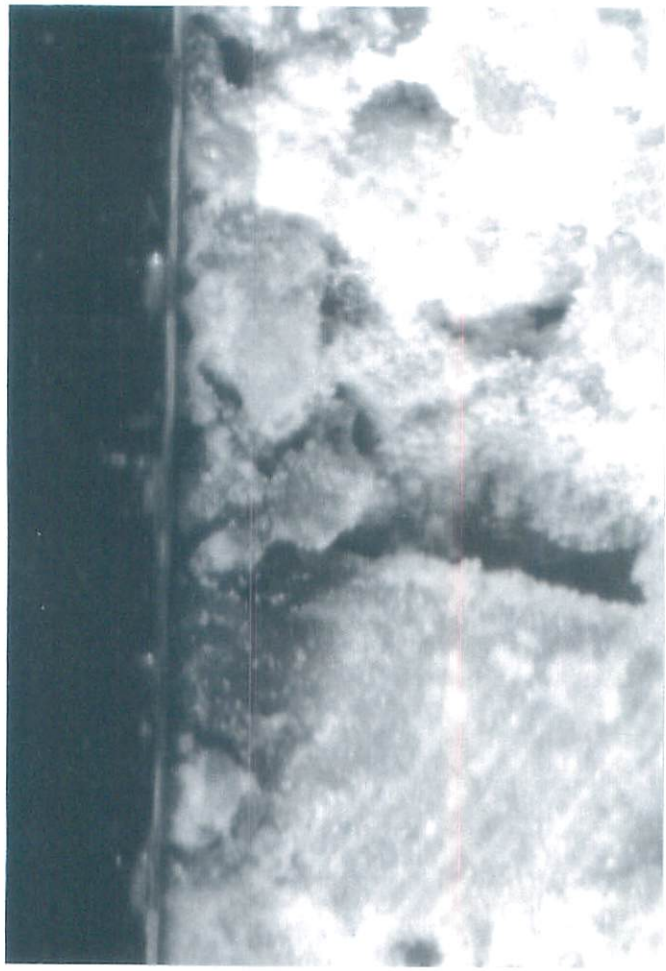

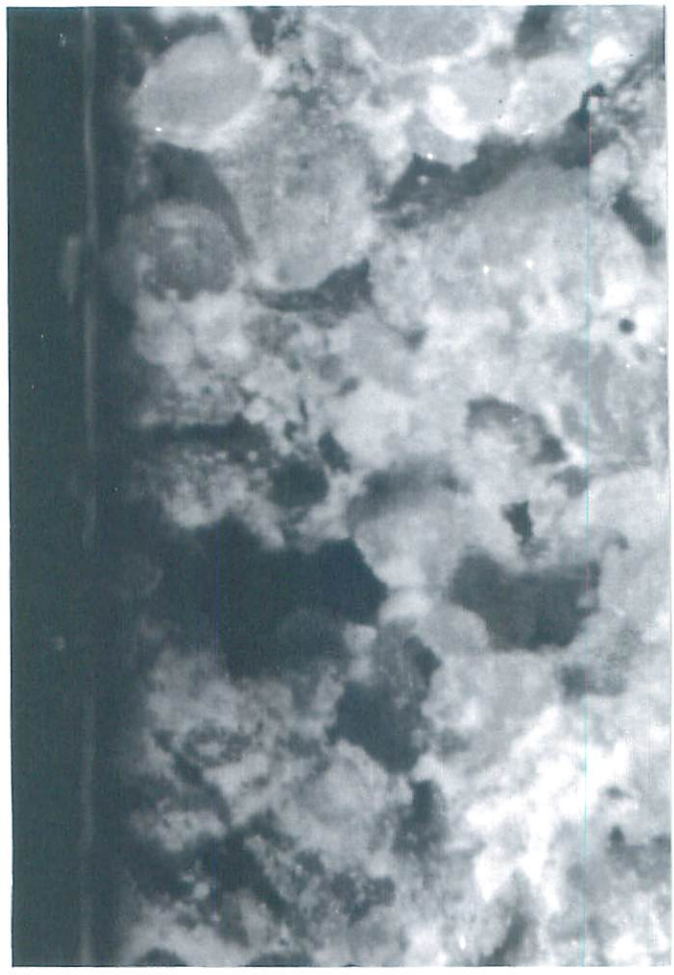

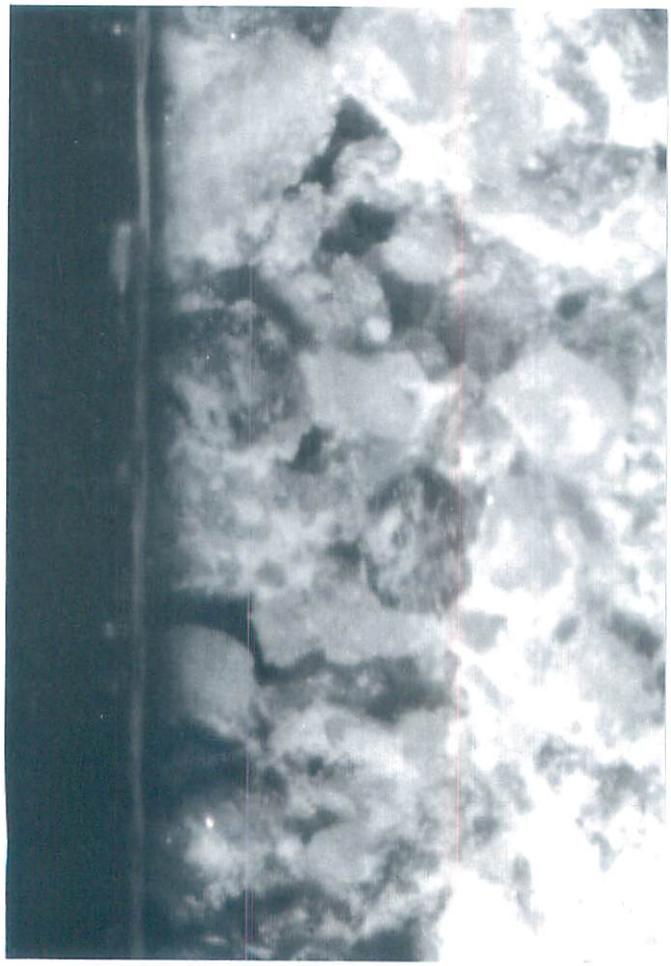

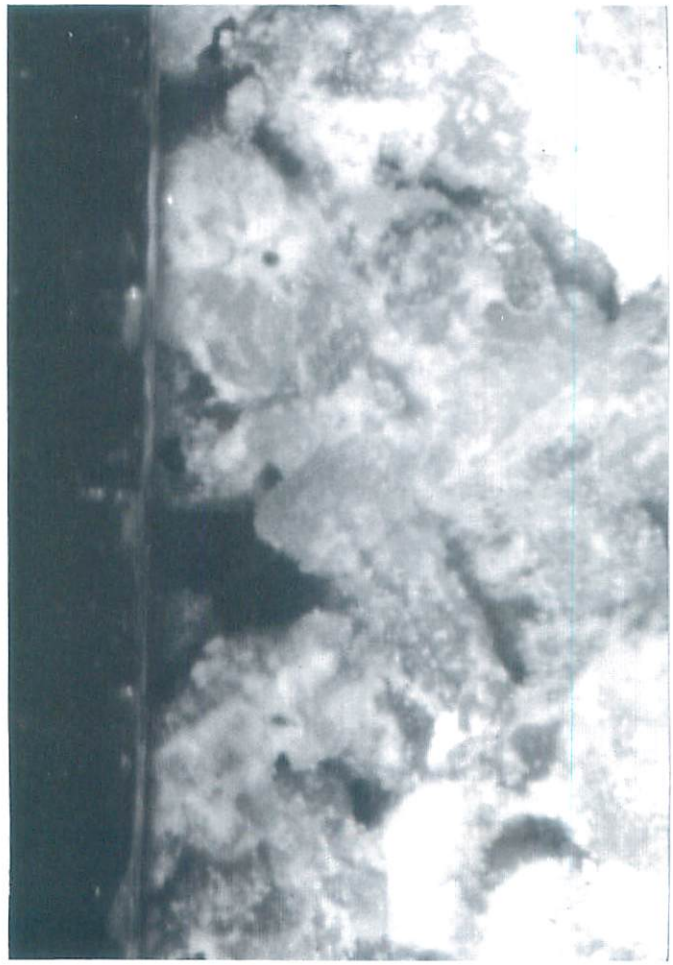

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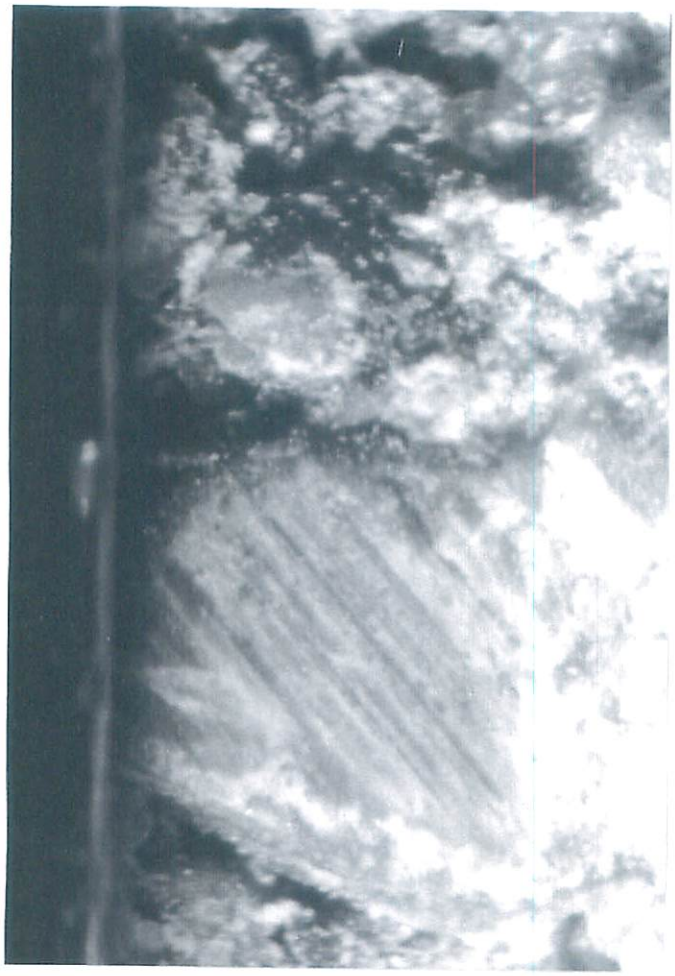

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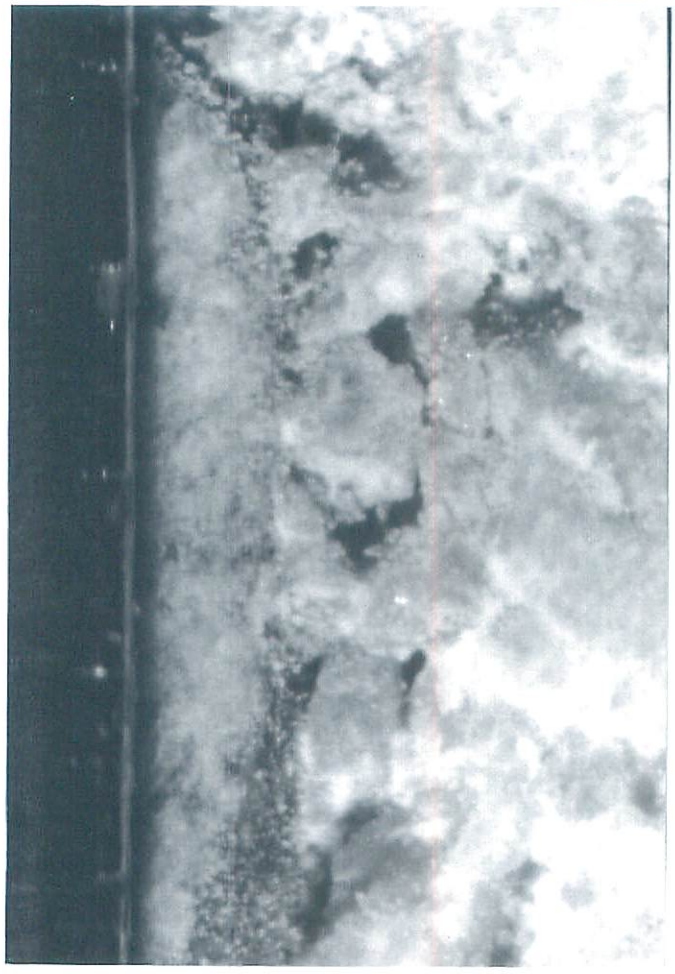
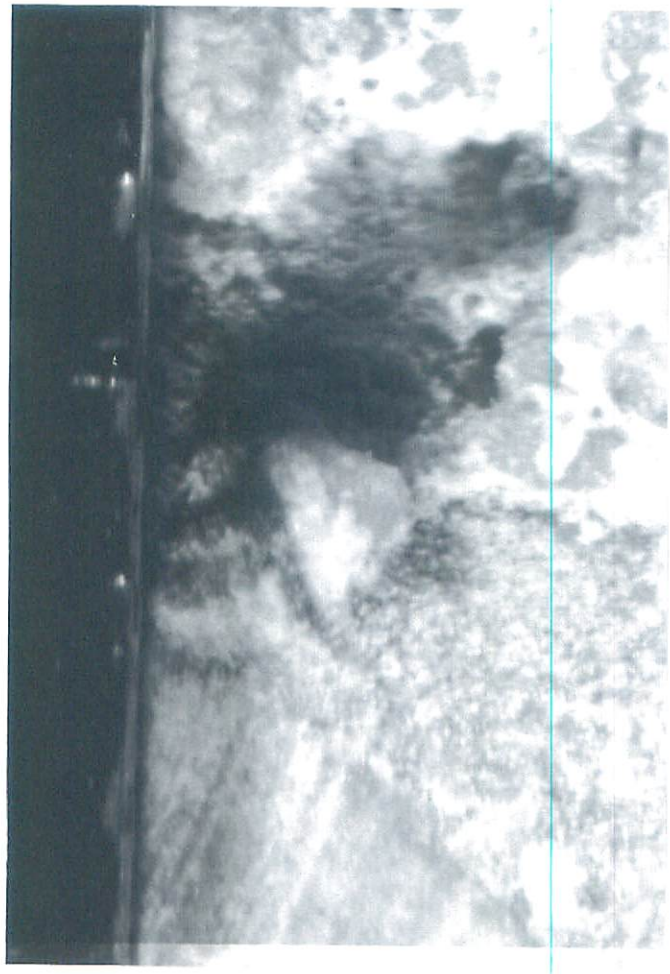
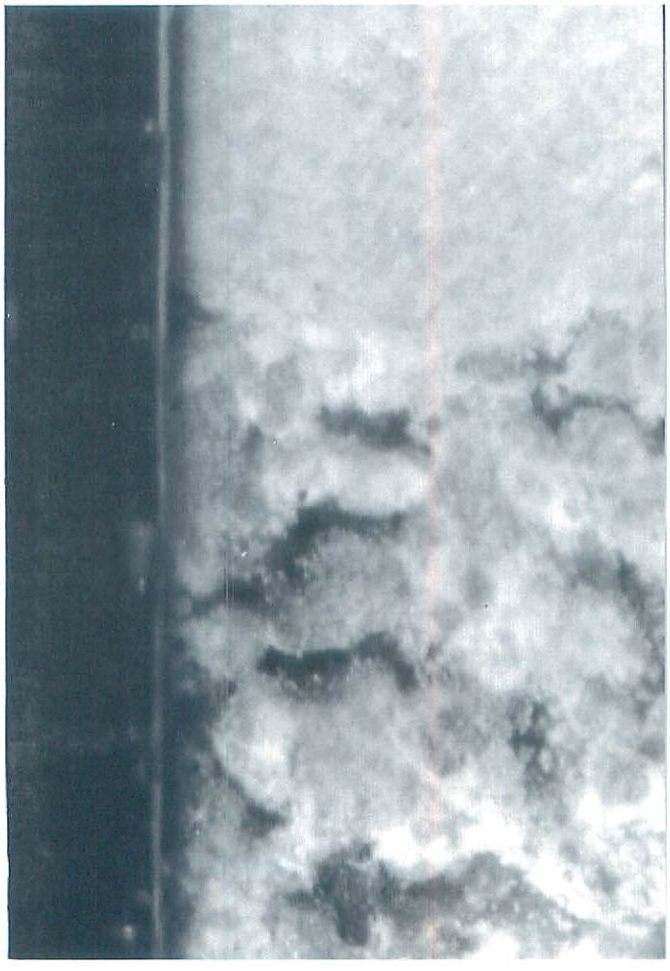
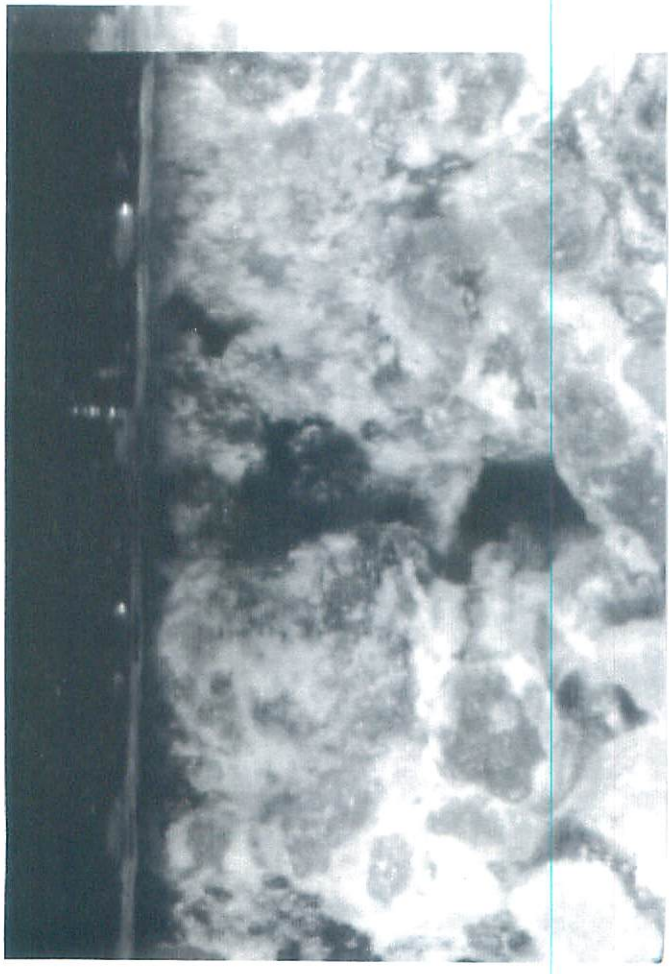
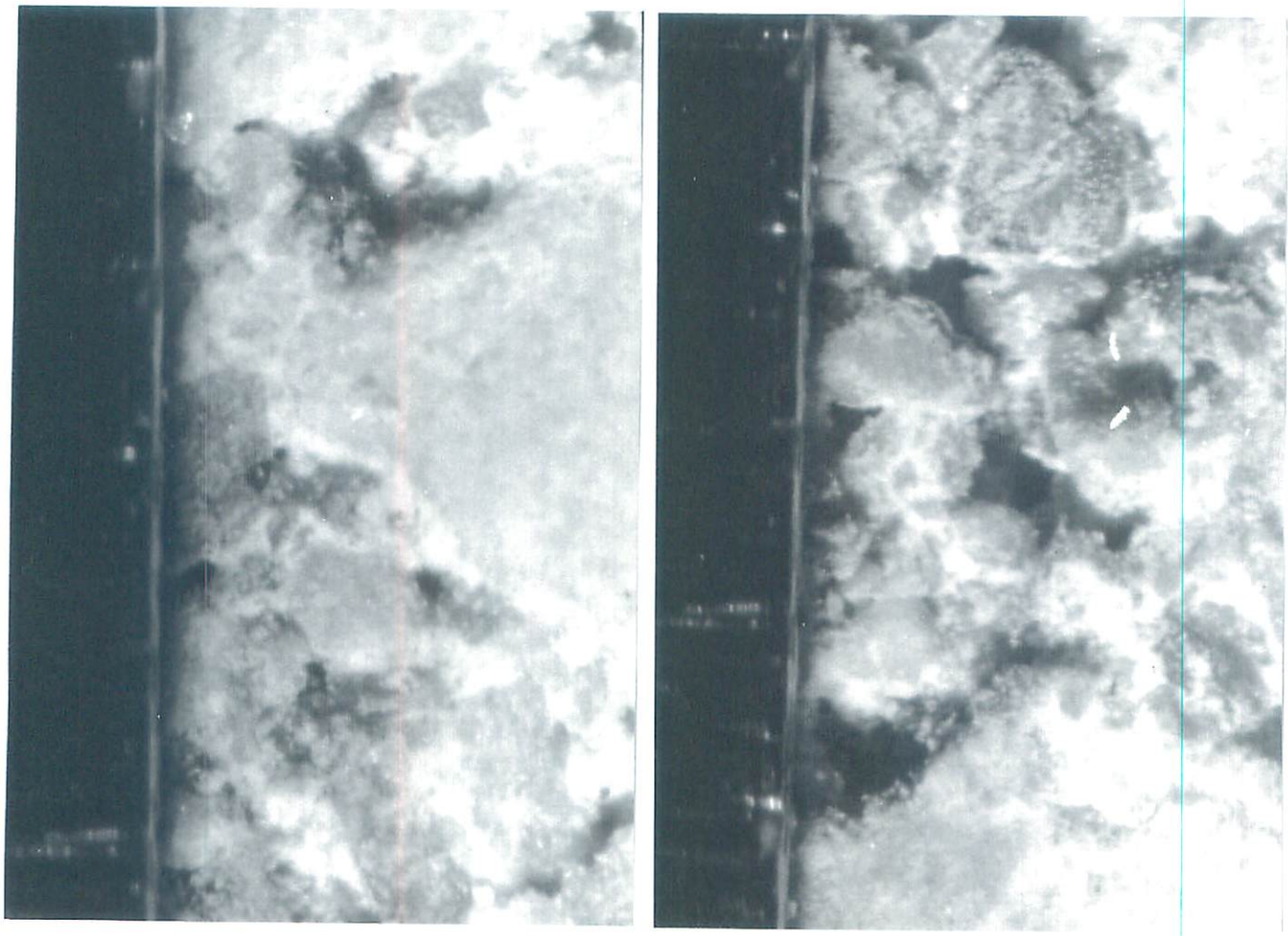








Core #3



APPENDIX VII - Class "C" Cost Estimate

PIONEER TOWER

CLASS 'C' COST ESTIMATE

	Unit Cost	Cost
Repoint exterior 50%	$4/sf	$3,200
Scaffold interior & exterior	$3/sf	$9,000
Fix bulge		$3,600
Crack rout and fill		$1,000
Concrete and stone repair		$3,000
Scale interior		$2,000
Poultice interior		$8,000
Consolidate interior		$4,000
Deck waterproofing		$800
Reset and calibrate monitoring points		$2,000
Testing allowance		$2,000
Direct costs:		$38,600
Indirect cost (overhead, profit, contingencies):		$9,400
TOTAL ESTIMATED COST:		$48,000

The above figure does not include financing, Parks Canada administration and project management, design costs.

DESIGN BRIEF

FOR THE

RECAPITALIZATION OF PIONEER TOWER

WOODSIDE NATIONAL HISTORIC SITE KITCHENER, ONTARIO

Client Project Number: 51301-1767-30000584
RPS CH/EC, Ontario Project Number: 742691

Prepared for:

Parks Canada
Woodside National Historic Site
Kitchener, Ontario

Prepared by:

Public Works and Government Services Canada
Real Property Services for
Canadian Heritage / Environment Canada
111 Water Street East
Cornwall, Ontario
K6H 6S3

March, 2000

Table of Contents

DRAFT

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

PROJECT	WP: Recapitalization of Pioneer Tower
PROJECT #	754691
Date Received	24 Mar 00
Date Returned	24 Mar 00
	DJM

AS SUBMITTED ☐
AS MODIFIED ☐
NOTE COMMENTS AND RESUBMIT ☑

REFER TO ARCHITECTURAL DRAWINGS FOR GENERAL ARRANGEMENT. CONTRACTOR TO VERIFY ALL DIMENSIONS ON THE SITE.

Excellent job!
DJM

Changes made March 24/00

1. Introduction

RPS CH/EC, Ontario was requested by Woodside National Historic Site, Kitchener, Ontario to inspect five specific technical issues relating to Pioneer Tower with the intent of identifying causes and solutions, make recommendations regarding repairs if needed and to prepare tender-ready drawings and specifications designed to implement the work recommended. This inspection is part of the ongoing process established by Woodside National Historic Site to facilitate an overall rehabilitation program for the entire Pioneer Tower site.

The issues investigated at Pioneer Tower are:

.1 Copper roofing & substrate
.2 Entrance portico
.3 Concrete core
.4 Field stone veneer
.5 Interior stairs

Marc Glassford of the Heritage Conservation Program was requested by RPS CH/EC Ontario, Cornwall Office on behalf of the Superintendent for Woodside NHS to accompany David McDonald and Sherry Macdonell to review the Tower. Marc was asked to provide opinions and advice guided by conservation practice, Parks Canada's Cultural Resource Management Policy and the sites' Heritage Character Statement.

2. HISTORIC BACKGROUND AND DESCRIPTION

Pioneer Tower (formerly known as Doon Tower) was constructed in 1925 - 1926 as a monument and observation tower commemorating the early settlement of Waterloo County by Pennsylvania Germans. It symbolizes the German-Canadian community's attempt to re-establish their self-worth and to demonstrate their loyalty to Canada following the events of World War I.

The tower rises 68' (20.7 M) from the foundation to the roof peak and was designed to reflect the Swiss origin and agrarian background of the early Pennsylvania German settlers to Waterloo County. It was built as a stand-alone fieldstone exterior wall with a concrete inner core capped by a Swiss style copper roof. The structure combines an unusual combination of architectural and symbolic features. The shank is a cross between the roundness of the martello tower with the stone appearance of a monumental cairn. However, the shape of the building with its projecting hexagonal deck resembles the design of a lighthouse. The observation deck was designed to incorporate astronomical and directional elements. No comparative examples were located in the Canadian Inventory of Historic Buildings.

The monument is built on an octagonal cement foundation measuring 15' (4.57M) in diameter and

5' (1.52M) in depth. The tower tapers slightly from 14' (4.27M) at the base to 12' (3.66M) under the gallery platform, with an inner diameter of 9' (2.74M) throughout. The shank top is decorated by a moulded concrete cornice interspersed by six stone corbels. The hexagonal gallery deck is constructed of reinforced concrete and was originally covered with oak flooring. A narrow wooden staircase inside the tower leads up to the deck. Decorative iron work had been placed around the exterior of the platform for visitor safety. The steep-pitched roof with flared bell is capped by a decorative weathervane that depicts the arrival of the Pennsylvania settlers by Conestoga wagon.

At the official opening in 1926, an Historic Sites and Monuments Board plaque was unveiled. In 1991 the Federal Heritage Building Review Office designated the building as a *Classified historic asset,* the highest heritage designation.

3. PREVIOUS INSPECTIONS, REPORTS AND REMEDIAL WORK PERFORMED

1988 - Federal Heritage Buildings Review Office
Building Report 88-78
Source: Marilyn E. Armstrong-Reynolds
Architectural History Branch

October 31, 1990 - Site meeting attended by: Ghassan Attar
Kim Seward-Hannam
Robert Girardin
Dave Sanderson

- Minor pointing done to bottom 2/3 of Tower where required using sand, cement and latex bonding agent and reset some stone that had previously fallen out
- 5 telltales were installed on Nov.6 1990 on two lateral cracks and 8 more were installed on Nov. 8, 1990.
- Epoxy injection of two opened up cracks using a pliable material.
- Air blast entire inner wall surface in preparation for sealant.
- Sealed inside of tower with two application of Hydroxo Double 7.
- A few large openings around the new door frame were mortared prior to spraying the sealant.
- A thin coat of cement was applied over the cracks in the exterior door threshold to prevent water from freezing in them during the winter.

October 22, 1992 - INVESTIGATION OF PIONEER MEMORIAL TOWER

Prepared by: Cornerstone Engineering and Restoration Inc.
260 Courtland Ave E
Kitchener, Ontario N2G 2V7
(519) 745-8121

- Since the Tower was scaffolded all around up to the underside of the deck during this investigation it was decided that some pointing be done to the outer stonework and a drainhole be installed round the bottom of the Tower.

June 9, 1994 - The Structural Condition of Pioneer Tower

Prepared by: HQ/PW&GSC
Summary of structural investigations by Ghassan Attar and Jeff McCurdy

- Demec structural monitoring system and telltales installed March 1994. Readings were taken on the 8 stations of the monitoring system and no significant movements or trends in movement can be determined at this time. The readings have been recorded and at a time when more data has been collected an analysis of the results will be reported.
- The concrete structure shows no sign of change from March 23, 1994 to June 9, 1994 and is in good condition.

April 1995 - HERITAGE RECORDING REPORT

Recorded April 1995 by:
Heritage Recording and Technical Data Services (HQ)
Heritage Conservation Program
Architectural and Engineering Services
For Parks Canada / Environment Canada
Public Works and Government Services Canada

May 1995 - Heritage Recording Detailed Record, Drawings H1 to H7

Prepared by: Bernie Prins
Public Works and Government Services Canada
Real Property Services for
Canadian Heritage / Environment Canada
Cornwall Office

January 1996 - Pioneer Tower Investigation

Prepared by: UMA Engineering Ltd./ Martin Conservation Consultant Inc.
Condition survey of concrete tower & observation deck only.

- No movement detected in glass tell-tales and Demec points.
- Impact Echo Tests performed.

December 1996 - Design and drawings for five technical issues: metal windows, concrete observation deck, sandstone corbels, roof joists ends, wood posts and columns.
Prepared by: Sherry Macdonell
Public Works and Government Services Canada
Real Property Services for
Canadian Heritage / Environment Canada
Cornwall Office

Fall 1998 - Work carried out for above technical issues by:
Canadian Construction Controls
Kitchener, Ontario
- Metal windows repaired.
- Concrete observation deck surface and edge repaired and sealed.
- Sandstone corbel stabilization with 'Cintec Anchor System.'
- Roof joist ends capped to prevent further deterioration.
- Metal support straps installed between each post and bracket.

September 9, 1999 - PIONEER TOWER ROOF INSPECTION DRAFT REPORT
Prepared by: Mike Fidler
Rob Girardin
Bernie Prins

4. OBSERVATIONS AND ANALYSIS

4.1 Copper Roof

The existing steep-pitched Swiss style copper roof and the decorative weathervane are part of the original fabric of the Tower and therefore installed in 1926. The flat seamed copper sheets are fastened directly to the substrate. At the exposed eaves the substrate consists of 19x50mm tongue and groove (T&G) painted boards. The balance of the substrate is comprised of 25x175mm± wood planking. At the top of the steep-pitched roof is a decorative cap and spun ball from which extends a Conestoga wagon and horses weathervane.

In general the copper elements of the Tower are in poor condition. The copper sheets on the main part of the roof are in generally fair condition but with a large quantity of small areas that show evidence of deterioration. This deterioration has been caused by the age of the copper roof in conjunction with the inappropriate method of the original installation, 75 years of exposure to the elements, subsequent unsuitable repairs and vandalism. The original copper sheets were installed directly onto the wood substrate. In ideal situations a copper sheet roof should be layed on a stable substrate which is dry and smooth.

4.2 Entrance Portico

The entrance portico is framed by cut limestone in a classical design. The stonework is in reasonable condition, while the mortar joints are in fair to poor condition. While there are some stretches of mortar that are intact, all joints have lengths of missing or loosened mortar.

The entablature has been damaged by acts of vandalism, chips of stone are missing from the outside edges. This is a result of rocks being dropped from the tower's viewing platform onto the entablature. There is evidence that previous damage was repaired doubtlessly caused in the same fashion. This appears to be an ongoing problem with the entablature as FHBRO's 1988 Building Report makes reference to this type of damage.

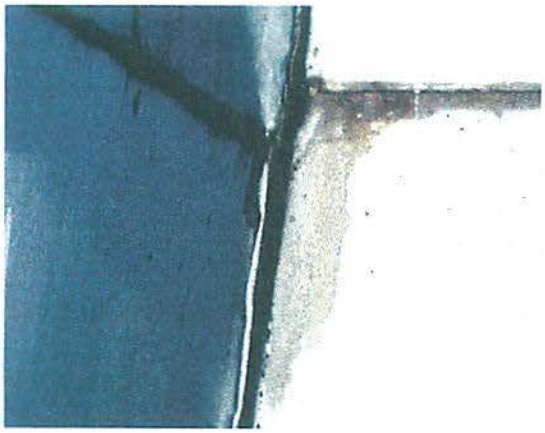
Previous patches to the entablature.

Gypsum crust on top of the entablature and chips of stone missing as a result of vandalism.

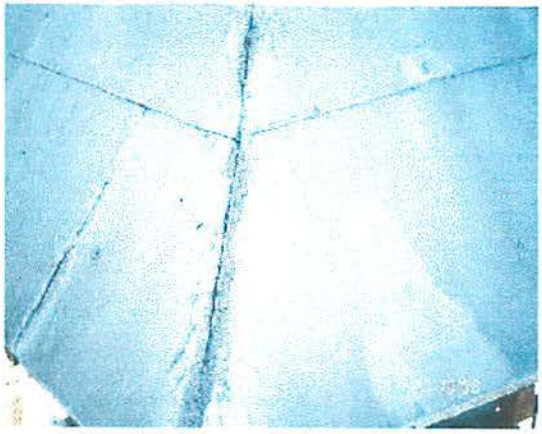
The limestone entrance step is cracked. This might be the result of simple frost heave and/or frost heave in conjunction with the concrete patch or in-fill areas located near the stone veneer wall. These in-fill areas do not appear to be part of the original fabric of the tower and have been patched several times over the years.

The limestone portico is stained with pollutants, grime and copper oxide from the roof above. There is also a layer of gypsum crust on top of the entablature.

As observed from the attic the roof planking is not unduly rough but does show evidence of cupping, water stains and daylight is visible. From the outside the visual evidence indicates that these wooden boards have cupped at the ridges, expanding these seams thereby reducing the weather tightness and accelerating corrosion. This corrosion condition is predominant at the ridges and at some of the horizontal seams. Some of these seams have been ineffectively patched using a sealant which appears to be 'tar'.



Ridge seams separating.



Tar patches.

The lower two sheets on the west elevation have been replaced in an inappropriate seaming pattern. There are several 'bullet holes' in the roof cladding and in one instance a small square of copper was nailed to the roof in a failed attempt at patching. The overall surface of the roof shows evidence of 'pitting' and corrosion. In some cases this is a result of contact between substrate nails and the copper cladding. Most other fasteners added over the years in conjunction with 'band-aid' patches have come loose and corroded.

The decorative cap and spun ball are in poor condition. This is primarily the result of 75 years of exposure to the elements, galvanic corrosion from the severely corroded metal (steel or iron) weathervane support rod and vandalism. There is severe corrosion at all six ridges of the cap and at the base of the flair. The rest of the surfaces of the cap appears 'pitted'. There are a number of 'bullet-holes' in both the cap and spun ball.

The weathervane operating mechanism is severely corroded and has not operated for some years. The original design does not appear very weather tight. The weathervane base is also severely corroded and is splitting at the ends. The Conestoga wagon and horse weathervane shows signs of corrosion, 'pitting' and has a number of 'bullet holes'.

Decorative cap and weathervane.

4.3 Concrete Core
and
4.4 Field Stone Veneer

For the purpose of describing the technical issues involved with these two components they will be combined in this report.

Since 1990 and possibly before there has been a concern about structural stability of the concrete core. The interior concrete surface is delaminating and there are a number of cracks. Maintenance personnel sweep up approximately one pail of debris a year.

According to the original specifications and as noted in FHBRO's 1988 Report, Pioneer Tower was built as a stand-alone fieldstone exterior wall with a concrete inner core. The original specification states exactly "wall, field stone outside, sufficient to stand by itself and retain form; concrete inside." This is, by today's standards, an unusual construction method and must be kept in mind when evaluating the technical issues involved with the core. The Tower tapers slightly from 14' (4.27M) at the base to 12' (3.66M) under the gallery platform, with an inner diameter of 9' (2.74M) throughout and rises 35.5' (10.8M). This means that the walls are 2.5' (.76M) thick at the base and 1.5' (.48M) thick at the top of the wall. The Tower is un-reinforced with some evidence of rebar around the windows.

In 1990 the interior surface of the Tower was sandblasted in preparation for the application of 2 coats of a product called *Hydrozo*, in an attempt to seal the inner surface of the Tower. It is noted in later reports that this product has failed. At this time two of the longer cracks were injected with a pliable epoxy and 13 tell-tales were installed. No results of the monitoring of these devices has been reported. In June of 1994, readings were taken on 8 Demec and a Tell-tale structural monitoring system that was installed in March of that year. No significant movements or any trend in the movement of the masonry wall was determined at that time.

Core interior cracks and delamination.

The structural analysis completed by UMA Engineering Ltd. in 1996 indicates that the Tower is not highly stressed in its current configuration. They state that the existing cracks are probably caused by initial shrinkage and/or by thermal expansion and contraction movements over long

periods of time.

Cornerstone Engineering and Restoration Inc. 1992 report recommended treating the inner core surface with a proprietary catalyst and silicate consolidant to strengthen the concrete and stop the scaling. They also suggested adding an additional 3/4" of mortar on top of the existing mortar, presumably in an attempt to reduce water infiltration. Neither approach was pursued.

The UMA Engineering 1996 study proposed a conservation strategy including: repointing the exterior, investigate and stabilize the exterior bulge, restore exterior stone and concrete details below observation deck, add a traffic coating to the top deck, scale lose material from the interior face, remove salt from the interior face and consolidate the interior surface. The only work completed was the repair of the top deck.

UMA's hypothesis is that a high incidence of soluble salts in the concrete is responsible for the deterioration of the cores' surface. These salts fill the air voids where there is evaporation at the interior surface of the concrete and eliminate any freeze-thaw protection the air voids provide. They also suggest that the salts may be attacking the hydrated cement in the concrete mix.

UMA also commissioned an Impact-Echo test which allows for the non-destructive analysis of the inner core conditions. This test indicated "that there is considerable fracturing within the concrete shell, particularly in its lower section where there is a substantial reduction in the thickness of sound concrete." The Impact-Echo test was unfortunately only conducted on the interior of the Tower. Tekron Services Inc., the company engaged to perform the Impact-Echo test, recommended that the test should be done on the outside as well to provide a clearer picture of the cores' condition.

Field stone veneer.

The UMA report noted "the exclusion of water from the structure is one of the key therapy procedures which should be implemented..." Presumably they recommended repointing the stone veneer of the tower as a method of reducing water infiltration. In 1990, the bottom 2/3 of the tower was repointed. At that time the contractor was to chip away any loose mortar and reset any loose stones. At the recent site investigation it was observed that the mortar on the tower is generally sound, but with hairline to 1mm wide separations around each field stone unit. A mortar analysis conducted by Cornerstone indicates the mortar has a high compressive strength and absorption rate. The bulge on the north east face mentioned by UMA is difficult to discern and does not seem to have had any negative structural consequences.

4.5 Interior Stairs

There has been some concern over the safety of the stairs at Pioneer Tower since access is unsupervised. As the tower was constructed in 1925-26 and is a National Historic Site the stairs do not need to comply with the National Building Code (NBC). Strict legalities aside it is of corporate interest to Parks Canada to attempt to achieve compliance with the intent of the code in the interest of providing their clients, the public, with the safest access possible.

Base of Tower stairs.

The stairs at Pioneer Tower are below the standards as they are set out in the NBC. The treads and risers are not of uniform size throughout any of the five flights and they are smaller than the suggested minimum. The width of the stairs is approximately 465mm as opposed to the minimum suggested of 900mm. The handrails are very close to the suggested 'graspable' size and section intended to provide ease of guidance and support.

Guards at the landings are to open.

The height of the handrails from each step or landing is low. The space between the top and intermediate handrails and the stringers is a little larger than the suggested minimum. The suggested minimum is 100mm, a small enough size that a child could not put their head through the space. The handrails or guards at the landings are to open to be considered safe. The other concern with children is the ease with which they could climb the guardrails as they are designed at the Tower.

In general the stair at Pioneer Tower are well constructed and structurally sound, they give the impression of being safe. During the site visit it was noted that five of the eight bolts that anchor the landings to the concrete core should be re-grouted. All of the wood components are in good condition and only require touch up painting in high traffic areas.

5. RECOMMENDATIONS

5.1 Copper Roof

Copper cladding is generally considered to have a 100 year life span. Despite the fact that the exiting roof is only 75 years old the observations and analysis indicate that it is at the end of its life. The original roof on Pioneer Tower might have achieved its life expectancy had it been properly installed at the onset. The deterioration of the copper cladding is so extensive that very little original material could be salvaged if a repair was undertaken. Therefore it is recommended that the copper roofing be replaced. Similarly it is recommended that the decorative cap and spun ball be replace *in-kind*. The deterioration is too extensive to make repairs a viable option. Conservation practices consider the copper roofing as sacrificial when taking into account the overall maintenance of the Tower. A number of reports over the years have recommended replacing the copper roof before any serious damage is made to the roofs' wooden superstructure.

The weathervane operating mechanism is no longer a functional element. The replacement system shall match the existing profile while improving the operating mechanism with a ball pivot point and enhanced weather tight design.

The Conestoga wagon and horses weathervane is an integral part of the symbolism of the Tower. It contributes to the heritage character of the Tower and is an important element reflecting the craftsmanship of the local community at the time of construction and as such, every attempt must be made to restore this element. Parks Canada's Ontario Service Centre will perform a condition assessment to determine its suitability for restoration. If restoration is recommended, it is hoped that the OSC will be able to schedule the work during the construction phase of the roof repairs. If possible the weathervane shall be reinstalled while access is still available during the roofing project. Otherwise the site shall have to make arrangements for its reinstallation. In the event that the condition assessment is not favourable the original will be used as a template for a reproduction *in-kind*.

5.2 Entrance Portico

It is recommended that the portico be completely repointed with an appropriate matching mortar and that it receive a gentle water cleaning to remove the pollutants and the gypsum crust on top of the entablature. This will improve the aesthetic appearance of the tower and remove any damaging pollutants.

The concrete in-fill adjacent to the stone step will be remove and not replaced. The cracked door sill will be removed, the bedding cleaned up and the stone appropriately pinned, epoxied together and reset.

There are two options for addressing the damage to the entablature. One would be to remove the outer two sections of limestone and have new stones cut to match the existing profiles. This option would unnecessarily replace much of the original fabric since only small patch areas are required. The other option would be to use an epoxy in-fill system such as Jahn mortar for the damaged areas only. This approach maintains all of the remaining original limestone fabric. The copper staining on the portico would have to be addressed to facilitate matching the in-fill system with the existing limestone.

However at this time neither approach will be recommended because of the ongoing vandalism problem and lack of an appropriate means of protecting the top of the portico. All design proposals that have been considered to date to address the vandalism would detract from the heritage character of the tower. Also the land around the tower is currently being development into a subdivision. Which will, with an increase in the surrounding population, probably increase the incidence of vandalism at the tower.

5.3 Concrete Core and 5.4 Field Stone Veneer

There are a variety of issues involved with respect to the delamination of the inside concrete core of the Tower. The high incident of soluable salts, the water or moisture infiltration and ultimately the mortar condition on the exterior and the stone veneer separation from the concrete core. The studies conducted to date give very plausible causes for the condition of the Tower but are not conclusive or detailed enough when thought is given to implementing their recommendations. With the intent of acquiring more detailed and conclusive evidence the following is recommended:

.1 Impact-echo testing be performed on the interior and exterior surfaces of the tower to identify the existence, location and magnitude of any voids within the wall. This would allow comparison with the test done in 1996 and determine if fracturing is increasing. It will also assist in determining if any separation has taken place between the field stone veneer and the concrete core and to plan a grouting program, if required. This field work should be performed any time between April and the end of November 2000. The earlier the better with respect to planning any grout program that may be required. If a grouting program does prove necessary, it would take place with the proposed repointing of the field stone veneer during the summer of 2001.

.2 Temperature, humidity and electrical resistance monitoring devices be installed within the concrete core of the Tower along with the recording and analysis of results for a 24 month period. To install these monitoring devices twelve holes will have to be drilled at a diameter of 0.63". This investigation will assist in determining: a) existing conditions to serve as a basis for comparison; b) the 'direction' that the moisture within the concrete core is 'travelling;' c)

c) following the repointing proposed at the beginning of the second year, the data will establish the extent to which the repointing was effective in reducing the moisture content in the concrete core.

.3 The entire surface of the field stone veneer be repointed with a compatible heritage mortar that has a non-shrinkage additive. The results of the Impact-echo test will help determine if a grouting program and/or installation of Helifix anchors is necessary.

4. A thorough analysis of the composition of the concrete be performed to verify UMA findings. If the concrete does prove to have excessive amounts of sulfides, then proceed with poulticing to desalinate the concrete core, should it be found necessary or advantageous at the end of the investigation stage.

5. Hydro electric service and exhaust fans be installed in the Tower in order to eliminate, or significantly reduce, the extremely high moisture and humidity levels within the tower and especially within the concrete core of the tower . It has not been determined that this work shall, in fact be required. However, there is a strong likelihood that it would assist greatly.
It should be noted that should this work proceed, there will be an increase in O & M costs to the site for subsequent years.

5.5 Interior Stairs

All of the anchor bolts that secure the landings to the concrete core should be examined and re-grouted as required.

They are a few improvements that could be made to the stairs at Pioneer Tower without making severe alterations. As a general maintenance exercise each tread should be inspected and replaced if the top front outside edge is worn or rounded. A rounded edge would increase the potential for slipping especially since the tread depth is shallow.

Another improvement would be to add another 2x4 to the top of the existing handrails at the stairs and a 2x6 to the handrails at the landings. This extra height would bring these components closer to the heights recommended in the NBC.

With respect to the space between the top and intermediate handrails and the stringers, replacing the middle rail with a 2x6 would just reduce the spaces left in between to an acceptable size. At the landings horizontal and vertical rails should be added spaced not more than 100mm apart. Vertical rails would be preferable.

As to climbing children, the only way to alleviate this situation would be to remove the intermediate railing at the stairs and replace them with vertical balusters spaced not more than

100mm apart.

6. COSTS

6.1 Copper Roof

Replace the copper roofing, decorative cap and spun ball following the original materials, profiles and seaming pattern.

Replace the weathervane operating and mounting mechanism to match existing profiles while adding to the design to make it weather tight.

Spring 2000 Class 'B+' Estimate 56 K

Restore the Conestoga wagon and horses weathervane if possible. The suitability of this approach will be determined by Parks Canada's Ontario Service Centre.

Spring 2000

6.2 Main Entrance Portico

Repoint and clean the portico. Reset the cracked step and remove the concrete returns.

Spring 2000 Class 'B+' Estimate 2.5 K

6.3 Concrete Core

Perform impact echo test of the interior and exterior surfaces of the Tower walls.

Spring 2000 Class 'A' Estimate 5.0 K

Install temperature, humidity and electrical resistance monitoring devices within the concrete core of the Tower, as well as, the monitoring, recording and analysis of results for a 24 month period.

Class 'A' Estimate, includes costs up to Mar 31/2001 4.0 K
Class 'A' Estimate, includes costs up to Mar 31/2002 3.0 K

The necessity for the following expenditures can only be determined after the temperature and humidity monitoring phase has been completed.

Poulticing the interior of the core to remove excessive salt within the concrete. Quote includes concrete composition analysis.

Summer 2001 Class 'C' Estimate 30.0 K

Installation of hydro electric service to the tower and exhaust fans in order to significantly reduce the extremely high moisture and humidity levels within the tower.

Summer 2001 Class 'D' Estimate 5.0 K
There will be an increase in O & M in subsequent years.

6.4 Field Stone Veneer

Repointing the exterior fieldstone veneer, installation of Helifix anchors and grouting.

Summer 2001 Class 'B' Estimate 50.0 K

6.5 Interior Stairs

The alterations suggested can be completed by the general works staff at Woodside NHS and as such are considered part of their O & M costs.

7. REFERENCES

Original Drawings and Specifications for *WATERLOO PIONEERS' MEMORIAL TOWER*, circa 1925

Federal Heritage Buildings Review Office. *Waterloo Pioneer Tower*. Building Report 88-78.

Site meeting attended by: Ghassan Attar, Kim Seward-Hannam, Robert Girardin, Dave Sanderson, October 31, 1990.

Federal Heritage Buildings Review Office. *Heritage Character Statement for Waterloo Pioneer Tower*. Revised April 22, 1992.

Report: *Pioneer Memorial Tower*, Cornerstone Engineering and Restoration Inc., Oct. 22, 1992.

Report: *Structural Condition of the Pioneer Tower*, Headquarters PWGSC, A&E Services for Parks Canada, June 9, 1994.

Report: *Heritage Recording Report*, Heritage Recording and Technical Data Services (HQ), HCP, PWGSC, A&E Services for Parks Canada, April 1995.

Drawings: *Heritage Recording Detailed Record*, Drawings H1 to H7, May 1995.

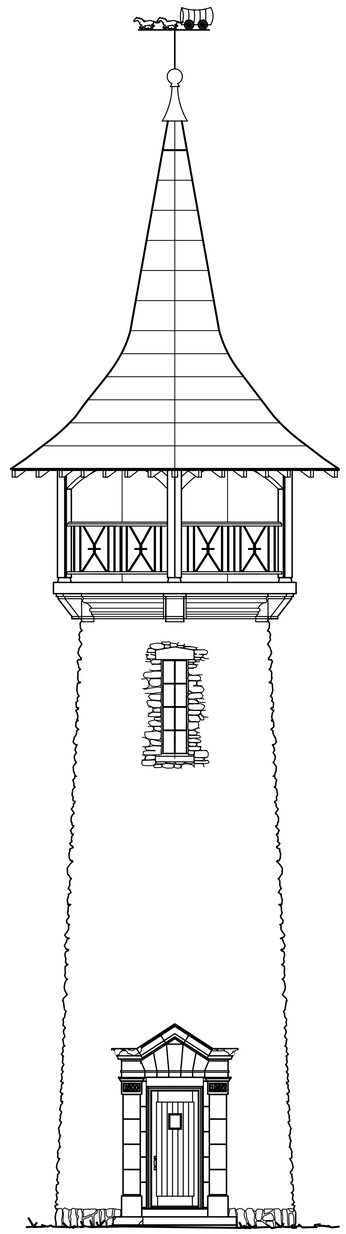
Report: *Pioneer Tower Investigation*, UMA Engineering Ltd. Martin Weaver Conservation Consultant Inc., Jan. 1996.

Drawings: *Design and drawings for five technical issues*: Metal windows, Concrete observation deck, Sandstone corbels, Roof joists ends, Wood posts and columns, December 1996.

Report: *Pioneer Tower Roof Inspection Draft Report*, PWGSC and RPS, April, 1999.

Report: *Pioneer Memorial Tower Field Report*, Heritage Conservation Program, RPS, February 13, 2000.

Appendix C: Drawings of Waterloo Pioneer Memorial Tower



HERITAGE RECORDING
DETAILED RECORD

DOON PIONEER TOWER

WOODSIDE NATIONAL HISTORIC SITE
KITCHENER, ONTARIO

HOPM 94/HR48

DRAWING INDEX

DPT-H2

A Detail number / A Numero de detail
B Sheet number / B Sur feuille numero

Linear dimensions in millimeters / Dimensions lineaires en millimetres

Client Acceptance / Acceptation du client
Signature _____ Date _____
File No. / No. de dossier _____

Public Works Canada / Travaux publics Canada
Architecture and Engineering Services for Environment Canada / Services d'architecture et de génie pour Environnement Canada
Canada

Heritage Recording For Parks Canada Ontario Region / Enrégistrement des Richesses du Patrimoine Pour Parcs Canada Région de l'Ontario

Type of Record / Type d'enregistrement
DETAILED

Project title / Titre du projet
DOON PIONEER TOWER
WOODSIDE N.H.S.
KITCHENER, ONT.

Drawing title / Titre du dessin
DRAWING INDEX

Scale / Echelle
NOT TO SCALE

Drawn by/ Dessine par: B. PRINS — Date: JUNE, 1995

Field Recording by / Releve-Temoin par: B. PRINS; J. MCKAY; D. LEEST — Date

Approved by / Approuve par — Date

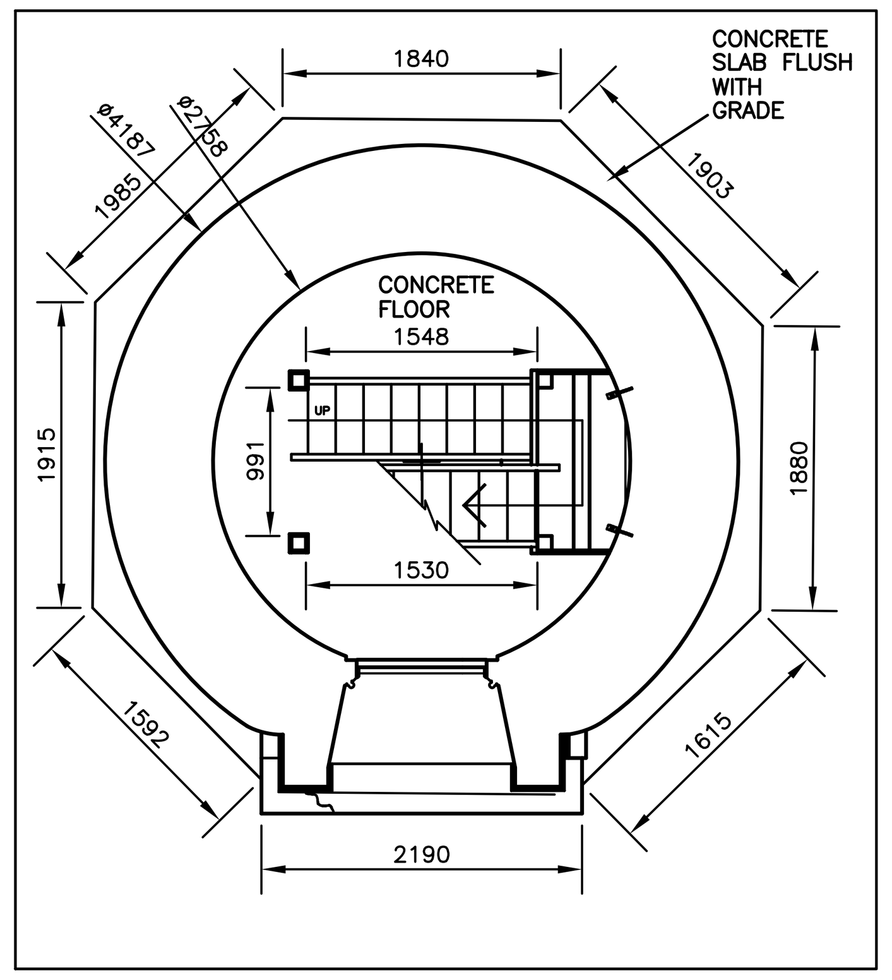
Checked by/ Verifie par

Project No./ No. du projet | Asset No. | Sheet No./ Feuille No.: H2

Drawing Reference No./No. du Dessin: HOPM 94/HR48

HOPM 94/HR48

DPT-H3



GROUND FLOOR PLAN
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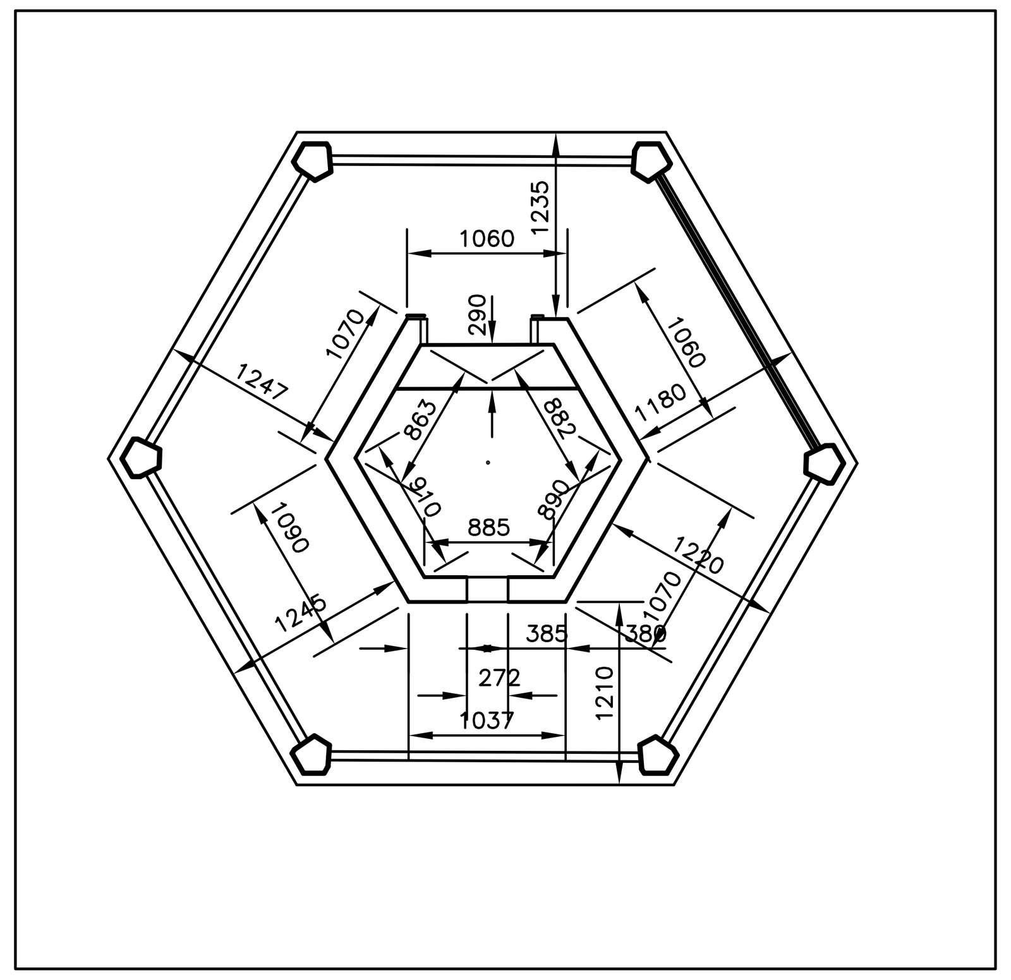

OBSERVATION DECK FLOOR PLAN
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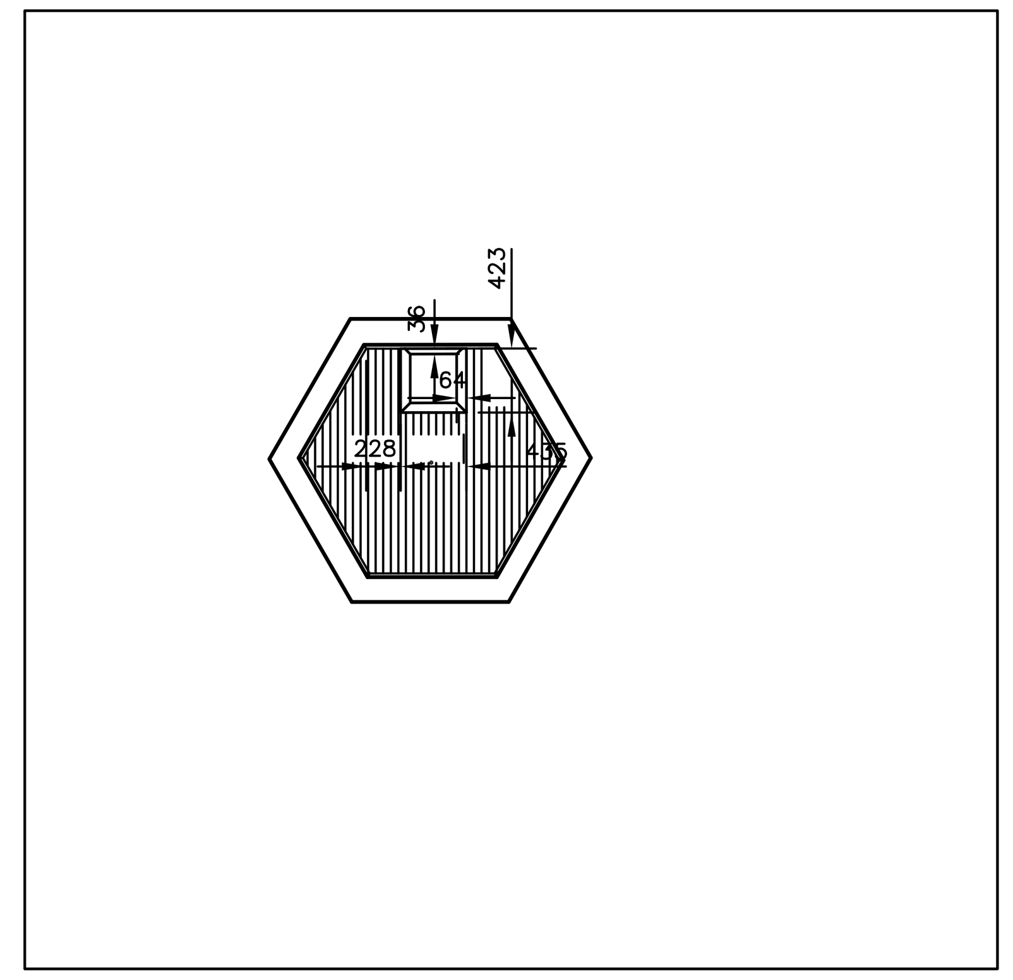

REFLECTED CEILING PLAN INSIDE OBSERVATION DECK
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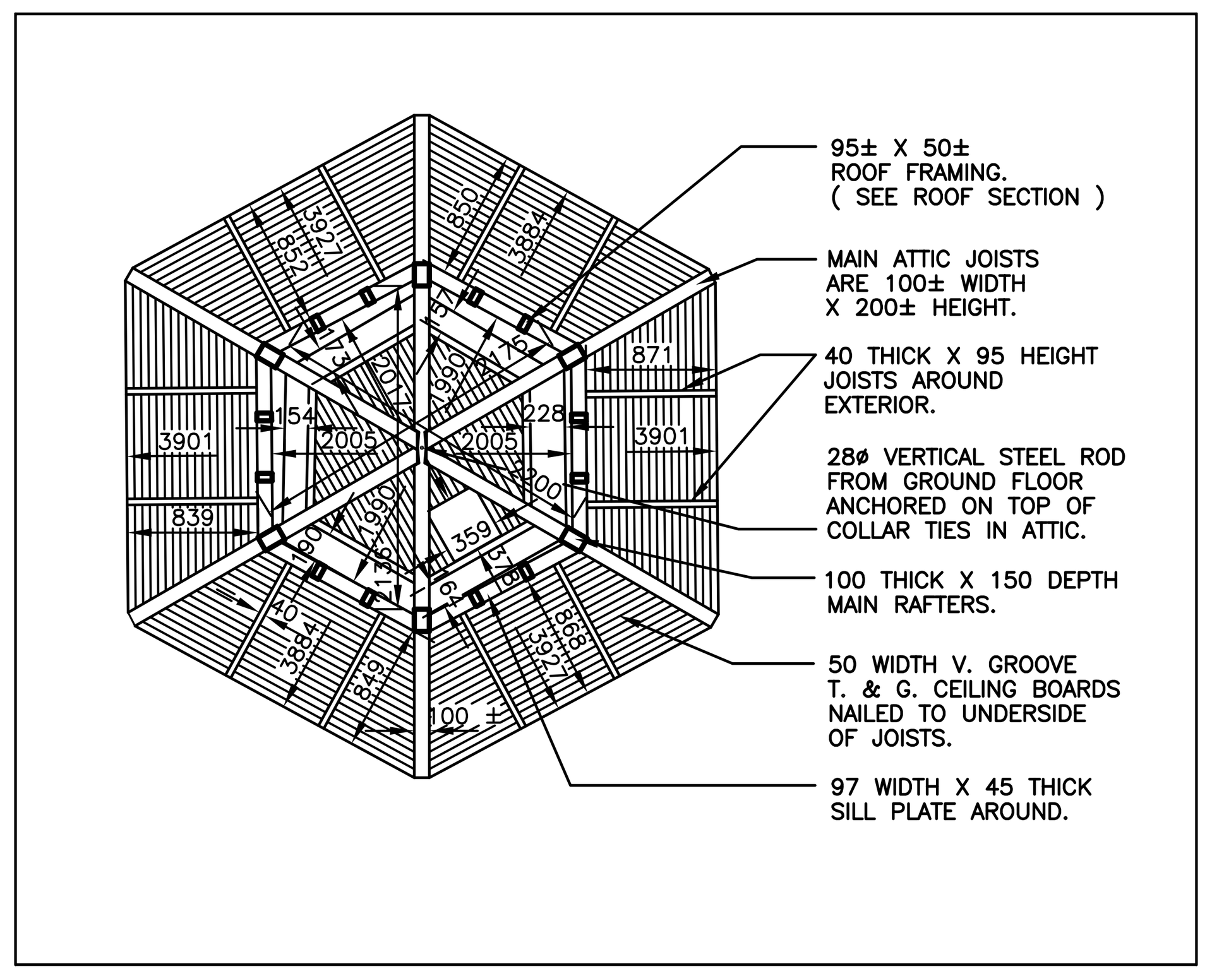

ATTIC JOIST PLAN
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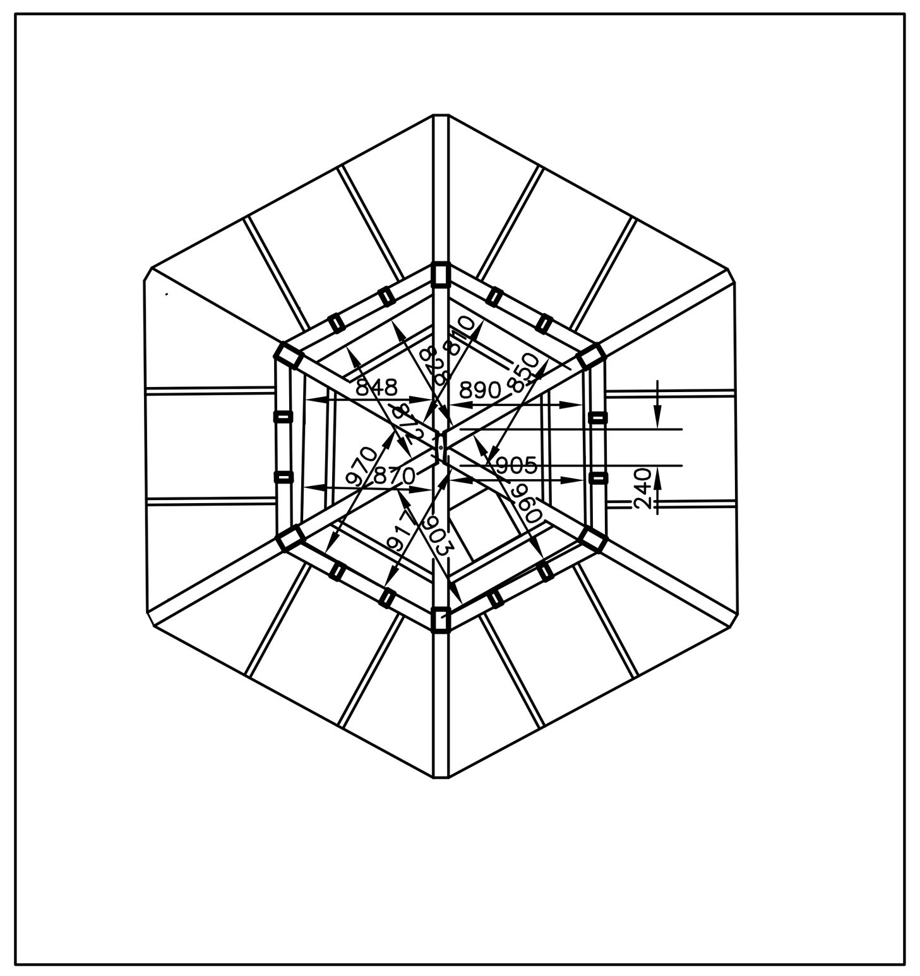

ATTIC JOIST PLAN
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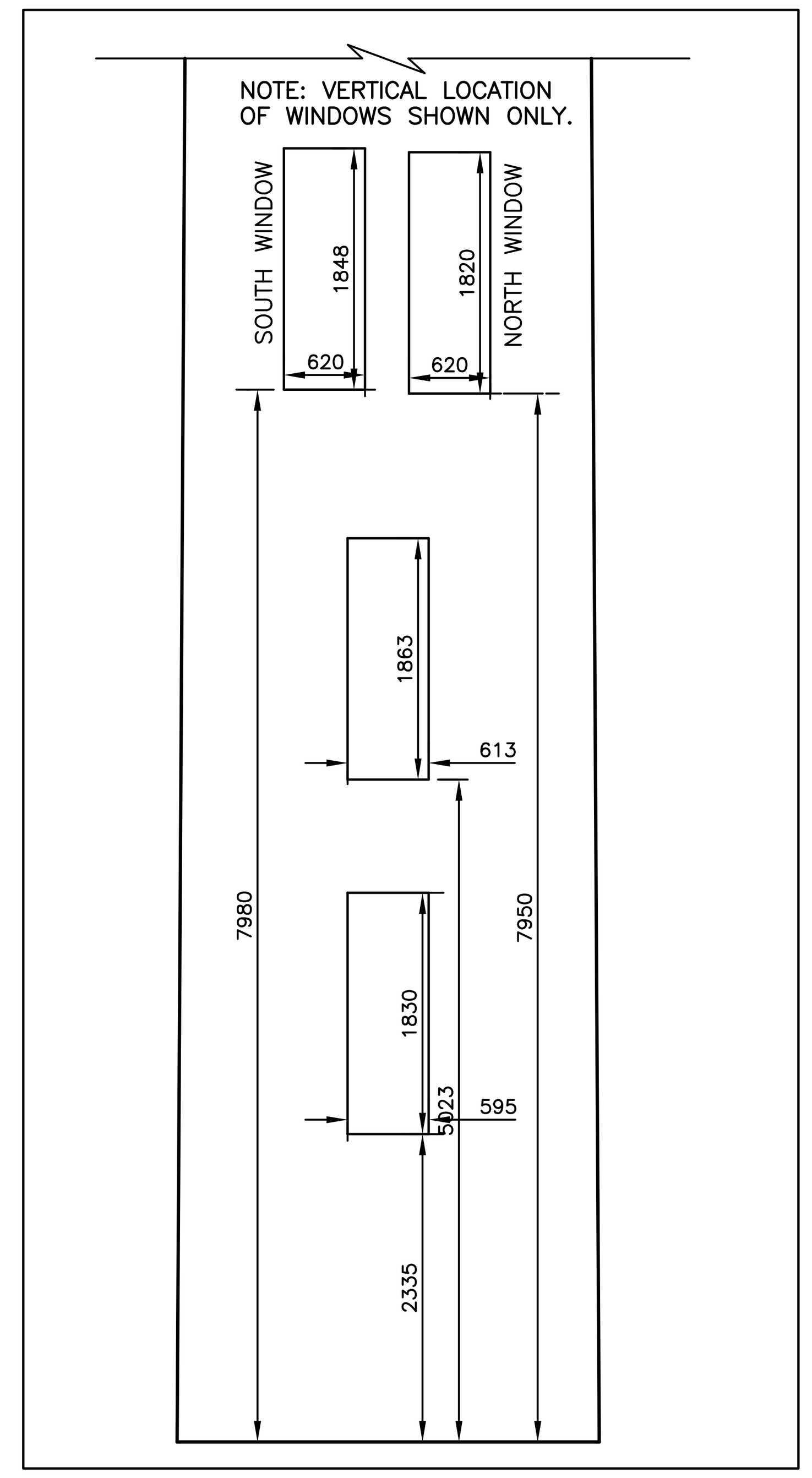
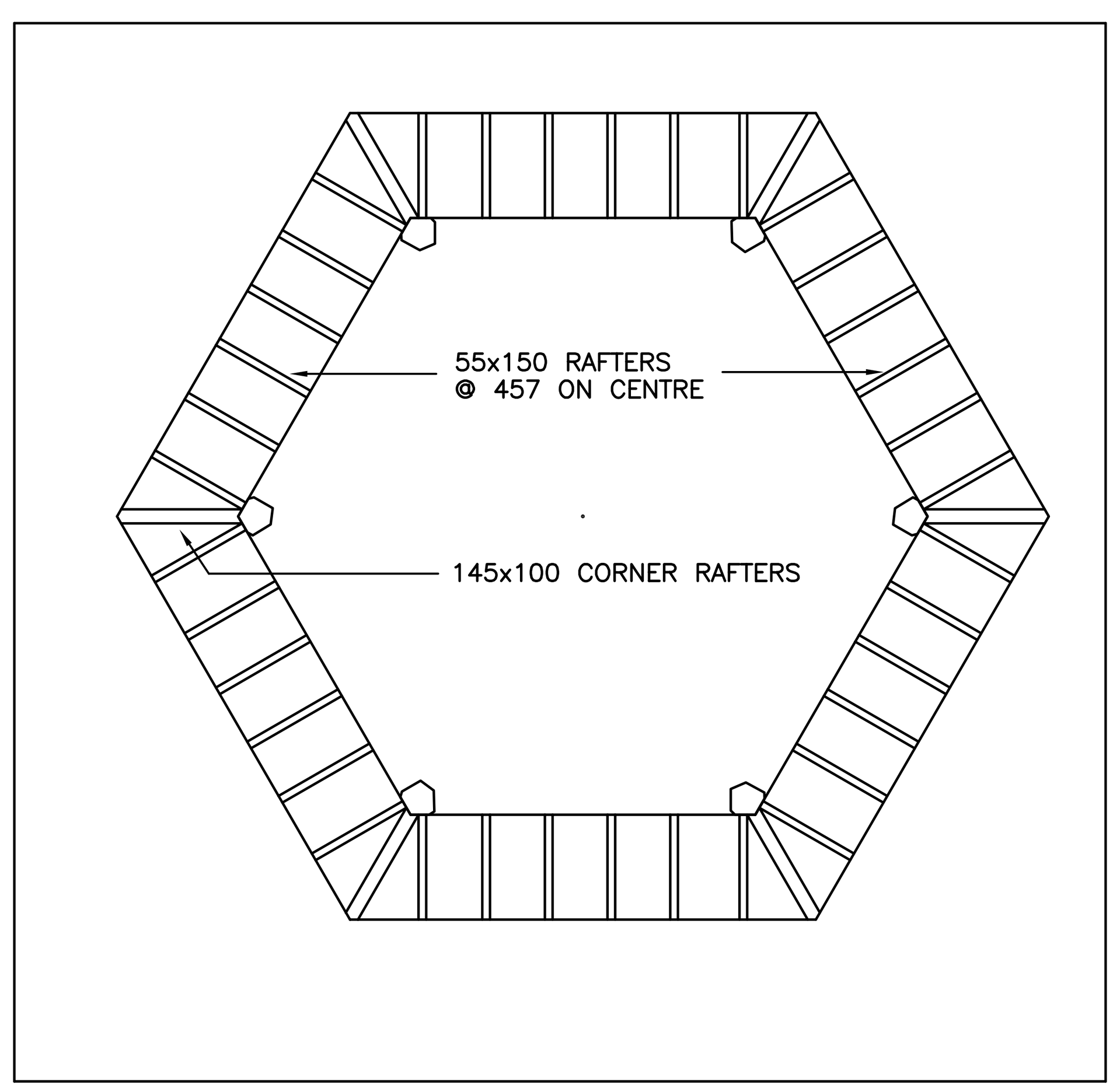
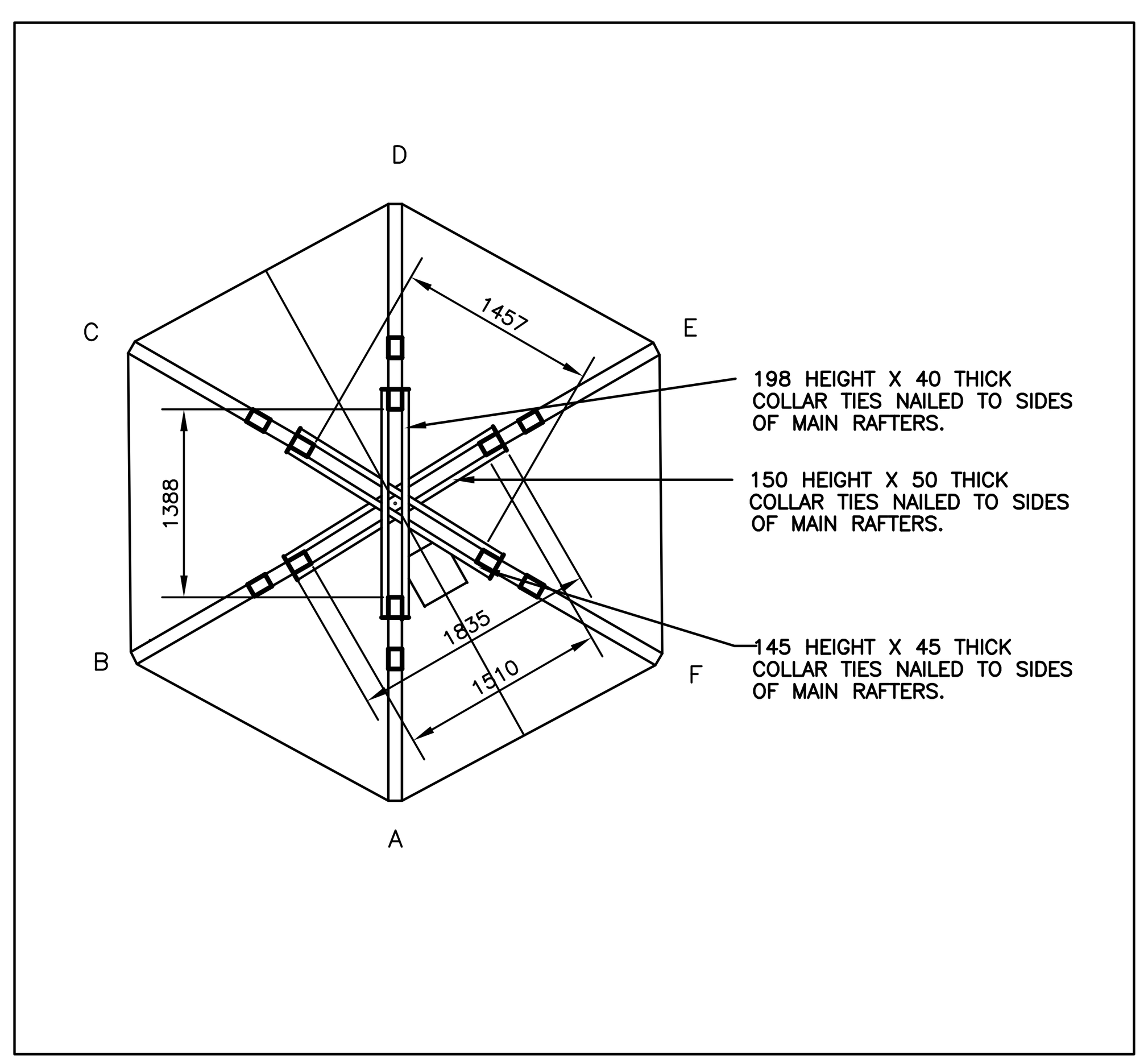


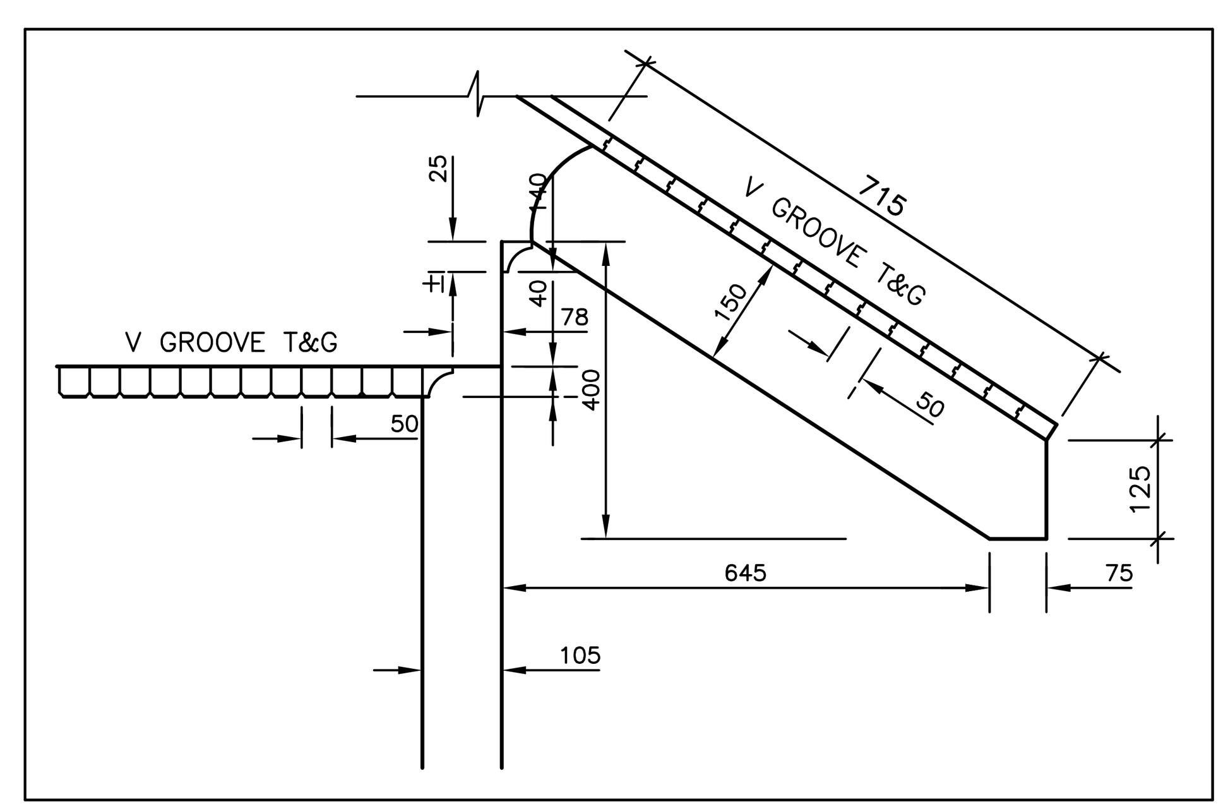
TOWER WINDOW LEVELS & MASONRY OPENING SIZES
SCALE 1 : 50



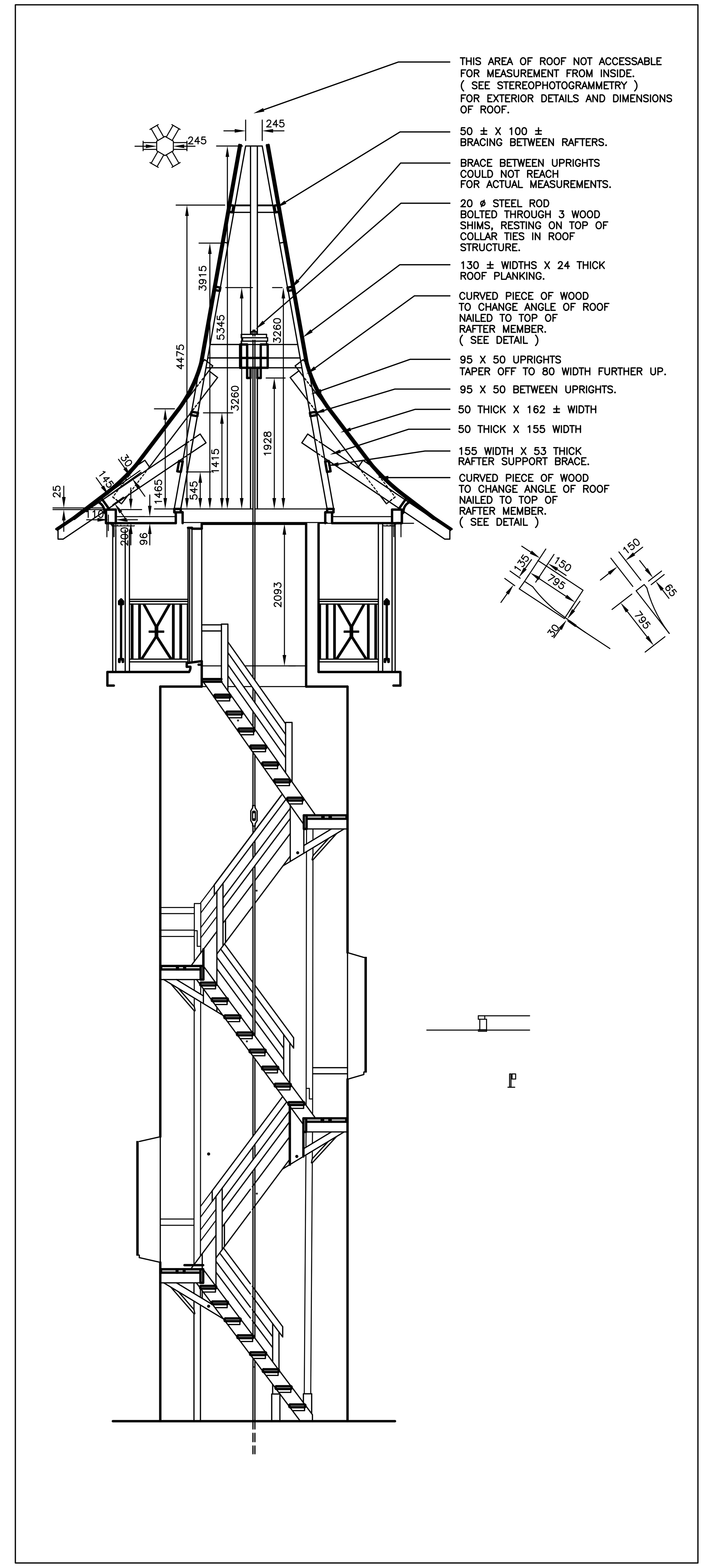
REFLECTED ROOF RAFTER PLAN (EXTERIOR)
SCALE 1 : 50



ATTIC COLLAR TIE PLAN
SCALE 1 : 50



TYPICAL TOWER EAVE SECTION
SCALE 1 : 10



VERTICAL SECTION THRU TOWER
SCALE 1 : 50

A Detail number / A Numero de detail
B Sheet number / B Sur feuille numero

Linear dimensions in millimeters / Dimensions lineaires en millimetres

Client Acceptance / Acceptation du client
Signature ____________ Date ______
File No. / No. de dossier ____________

Public Works Canada / Travaux publics Canada
Architecture and Engineering Services for Environment Canada / Services d'architecture et de génie pour Environnement Canada

Canada

Heritage Recording For Parks Canada Ontario Region / Enrégistrement des Richesses du Patrimoine Pour Parcs Canada Région de l'Ontario

Type of Record / Type d'enregistrement: SUMMARY

Project title / Titre du projet:
DOON PIONEER TOWER WOODSIDE N.H.S. KITCHENER

Drawing title / Titre du dessin:
DETAILS

Scale / Echelle: AS SHOWN

Drawn by/ Dessine par: B. PRINS — Date: MAY, 1995

Field Recording by / Releve-Temoin par: B. PRINS — Date:

Approved by / Approuve par — Date

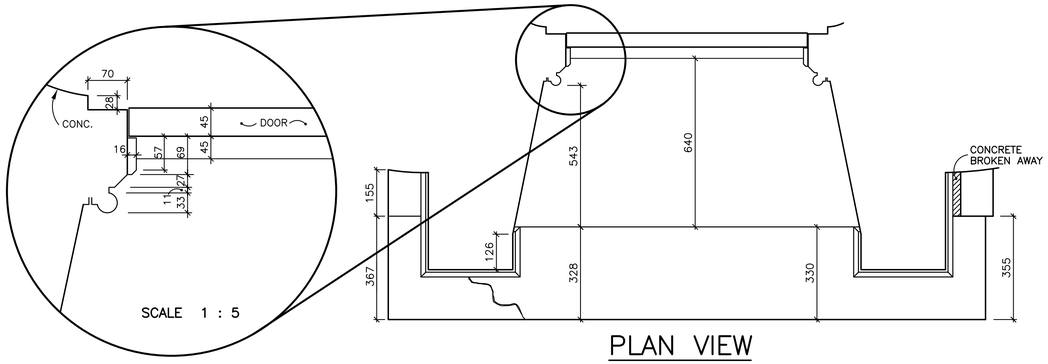
Checked by/ Verifie par

Project No./ No. du projet | Asset No. | Sheet No./ Feuille No.

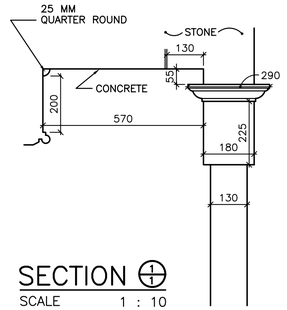
Drawing Reference No./No. du Dessin: HOPM 94/HR48 — H3

HOPM 94/HR48

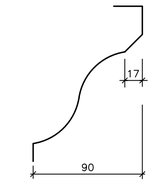
DPT–H4



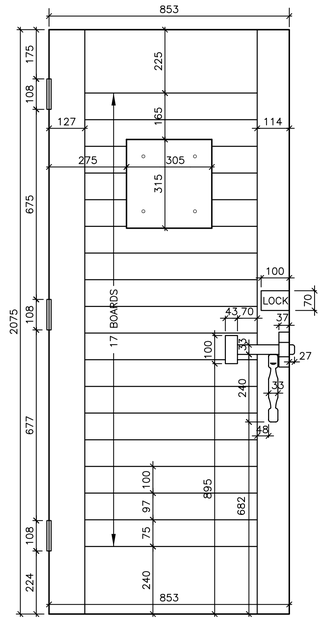
PLAN VIEW
SCALE 1 : 10



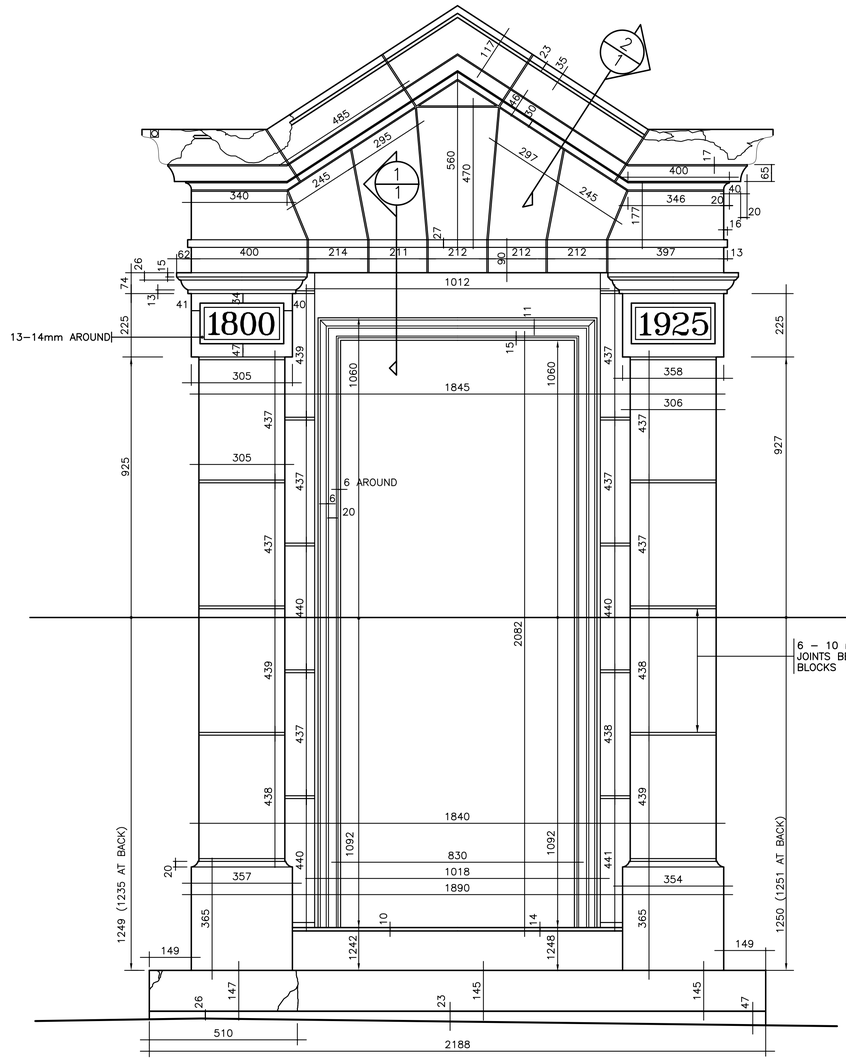
SECTION 1/1
SCALE 1 : 10



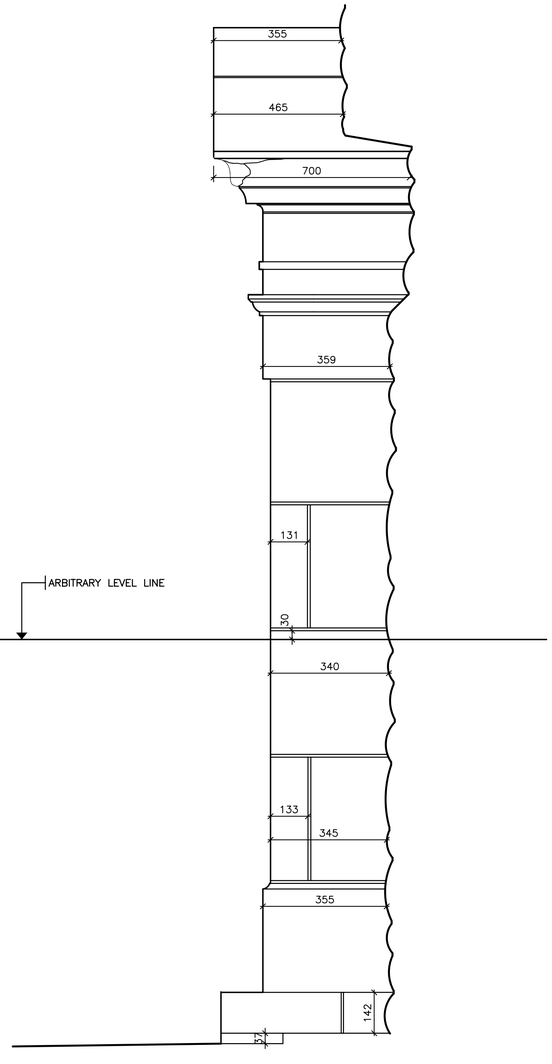
SECTION 2/1
SCALE N.T.S.



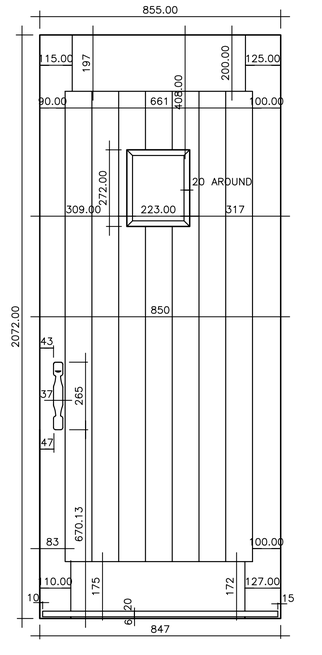
INTERIOR DOOR ELEV.
SCALE 1 : 10



EXTERIOR ELEVATION
SCALE 1 : 10



SIDE ELEVATION
SCALE 1 : 10



EXTERIOR DOOR ELEV.
SCALE 1 : 10

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Public Works Canada / Travaux publics Canada
Architecture and Engineering Services for Environment Canada / Services d'architecture et de génie pour Environnement Canada
Canada

Heritage Recording For Parks Canada Ontario Region / Enrégistrement des Richesses du Patrimoine Pour Parcs Canada Région de l'Ontario

Type of Record / Type d'enregistrement
SUMMARY

Project title / Titre du projet
DOON PIONEER TOWER
WOODSIDE N.H.S.
KITCHENER, ONT.

Drawing title / Titre du dessin
DOOR DETAILS
AND
ELEVATIONS

Scale / Echelle
AS SHOWN

Drawn by/ Dessine par: D. LEEST — Date: FEB. 1992

Field Recording by / Releve–Temoin par: B. PRINS, D. LEEST — Date

Approved by / Approuve par — Date

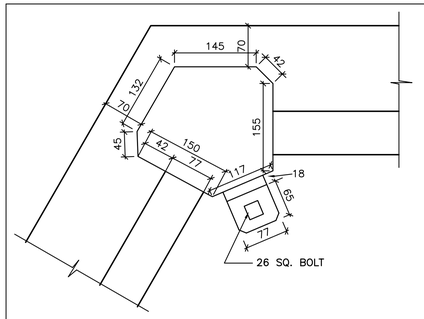
Checked by/ Verifie par

Project No./ No. du projet | Asset No. | Sheet No./ Feuille No.: H4

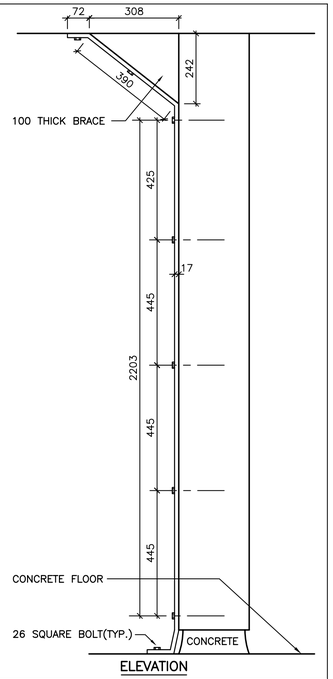
Drawing Reference No./No. du Dessin: HOPM 94/HR48

HOPM 94/HR48

DPT-H5



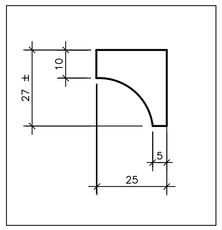
PLAN SECTION



ELEVATION

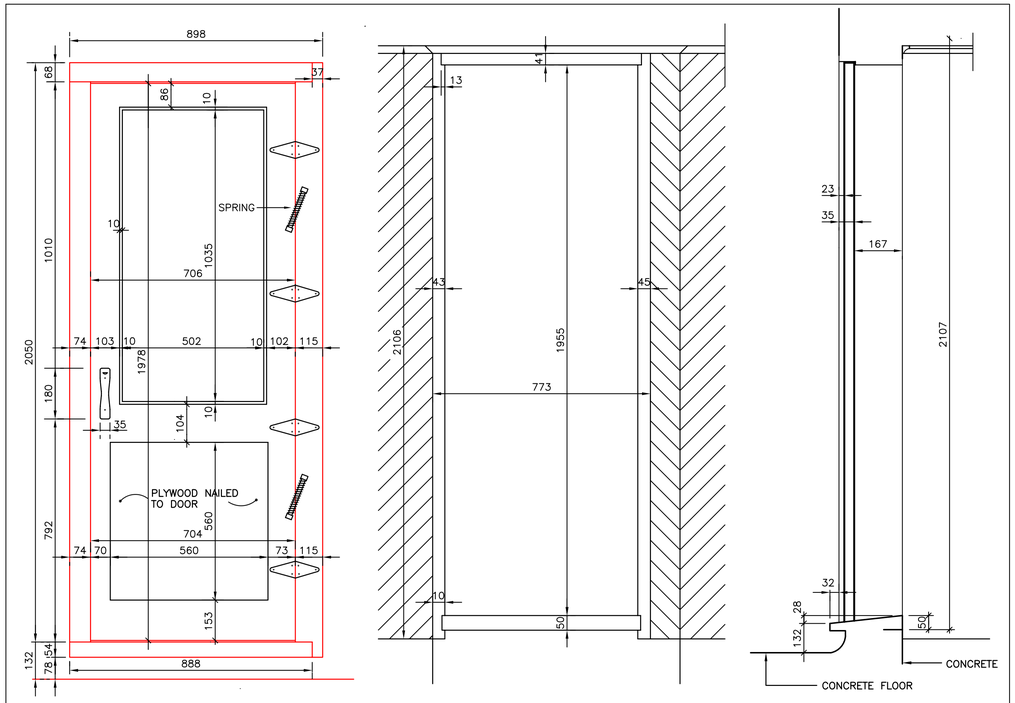
TYPICAL COLUMN DETAIL

SCALE 1 : 10



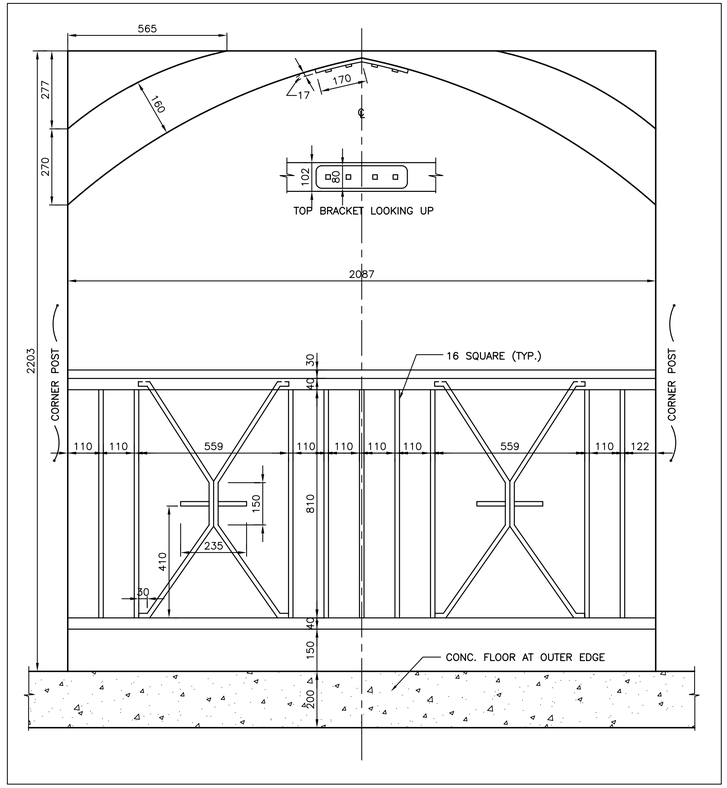
WOOD CORNER MOULDING DETAIL

SCALE F.S.



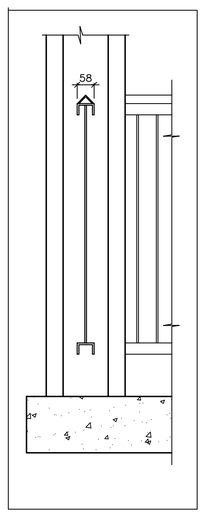
DOOR AT OBSERVATION LEVEL

SCALE 1 : 10



RAILING & BRACKET DETAILS

SCALE 1 : 10



RAILING SECTION

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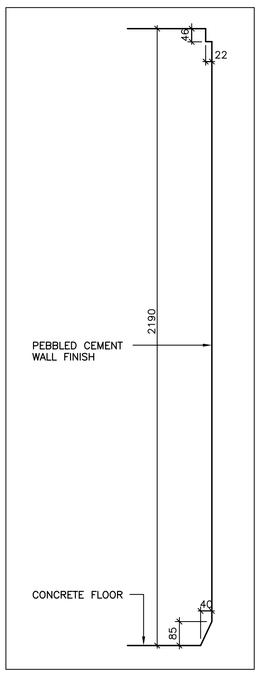
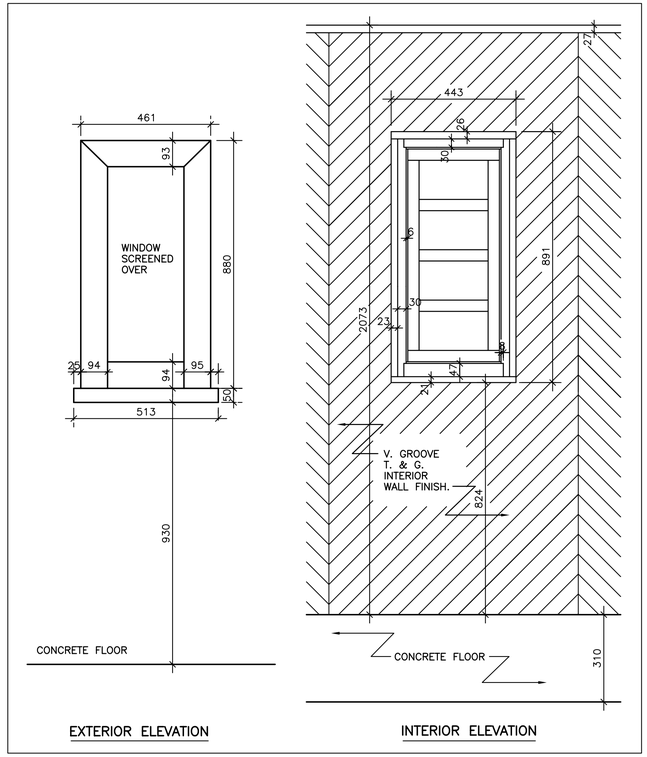


WALL SECTION

SCALE 1 : 10



WINDOW AT OBSERVATION LEVEL

SCALE 1 : 10

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Architecture and Engineering Services for Environment Canada / Services d'architecture et de génie pour Environnement Canada

Canada

Heritage Recording For Parks Canada Ontario Region / Enrégistrement des Richesses du Patrimoine Pour Parcs Canada Région de l'Ontario

Type of Record / Type d'enregistrement

SUMMARY

Project title / Titre du projet

DOON PIONEER TOWER
WOODSIDE N.H.S.
KITCHENER

Drawing title / Titre du dessin

ELEVATIONS & DETAILS

Scale / Echelle

AS SHOWN

Drawn by/ Dessine par — Date

D.C. LEEST — FEB. 1992

Field Recording by / Releve-Temoin par — Date

B. PRINS
D. LEEST

Approved by / Approuve par — Date

Checked by/ Verifie par

Project No./ No. du projet | Asset No. | Sheet No./ Feuille No.

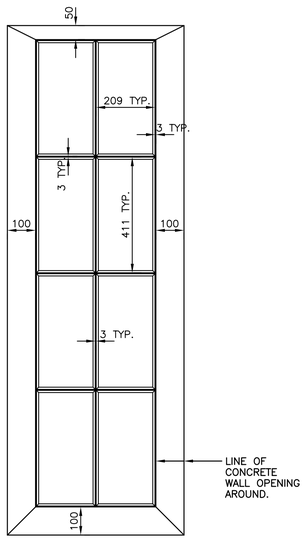
Drawing Reference No./No. du Dessin

HOPM 94/HR48

H5

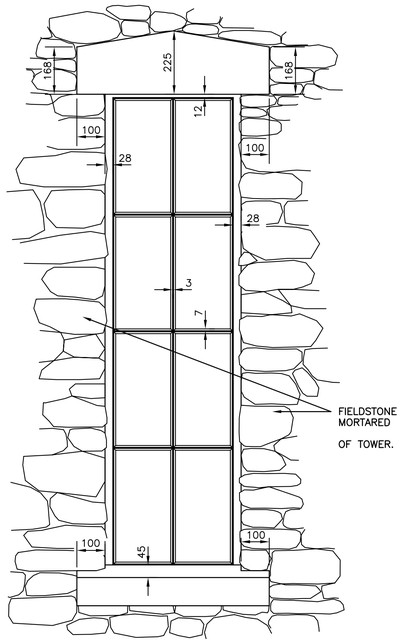
HOPM 94/HR48

DPT-H6



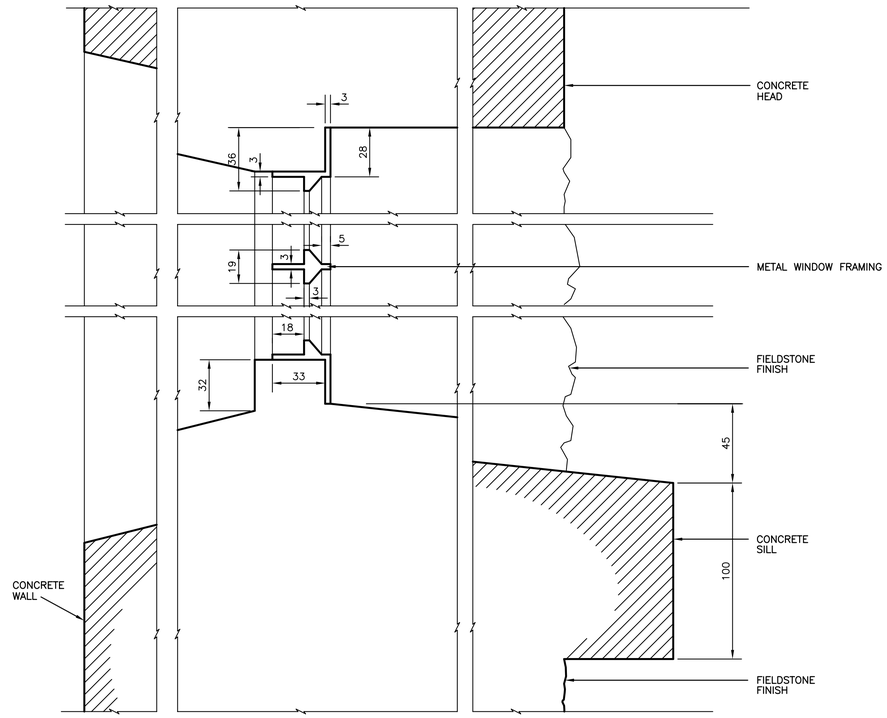
INTERIOR WINDOW ELEVATION

SCALE 1 : 10



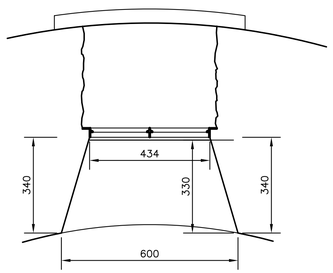
EXTERIOR WINDOW ELEVATION

SCALE 1 : 10



VERTICAL SECTION THRU WINDOW

SCALE 1 : 10



PLAN THRU WINDOW

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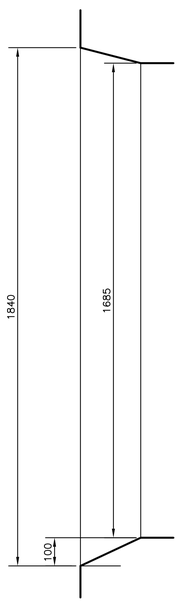
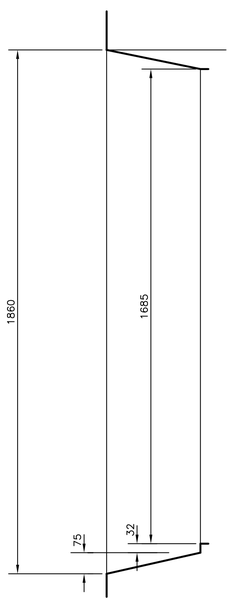


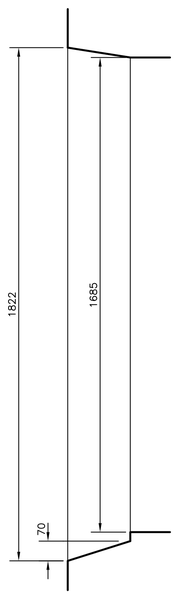
NORTH WINDOW

SCALE 1 : 10



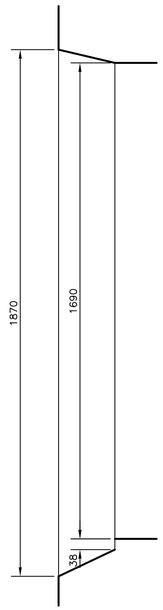
EAST WINDOW

SCALE 1 : 10



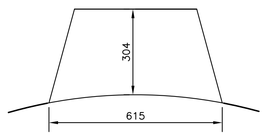
SOUTH WINDOW

SCALE 1 : 10



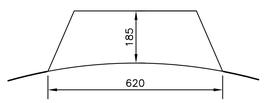
WEST WINDOW

SCALE 1 : 10



EAST WINDOW

SCALE 1 : 10



NORTH WINDOW

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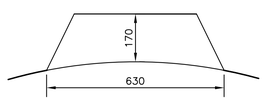
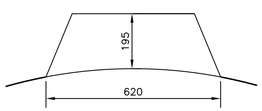


WEST WINDOW

SCALE 1 : 10



SOUTH WINDOW

SCALE 1 : 10

A Detail number / A Numero de detail
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Canada

Heritage Recording For Parks Canada Ontario Region / Enrégistrement des Richesses du Patrimoine Pour Parcs Canada Région de l'Ontario

Type of Record / Type d'enregistrement

SUMMARY

Project title / Titre du projet

DOON PIONEER TOWER
WOODSIDE N.H.S.
KITCHENER

Drawing title / Titre du dessin

TYPICAL TOWER
WINDOW DETAIL

Scale / Echelle

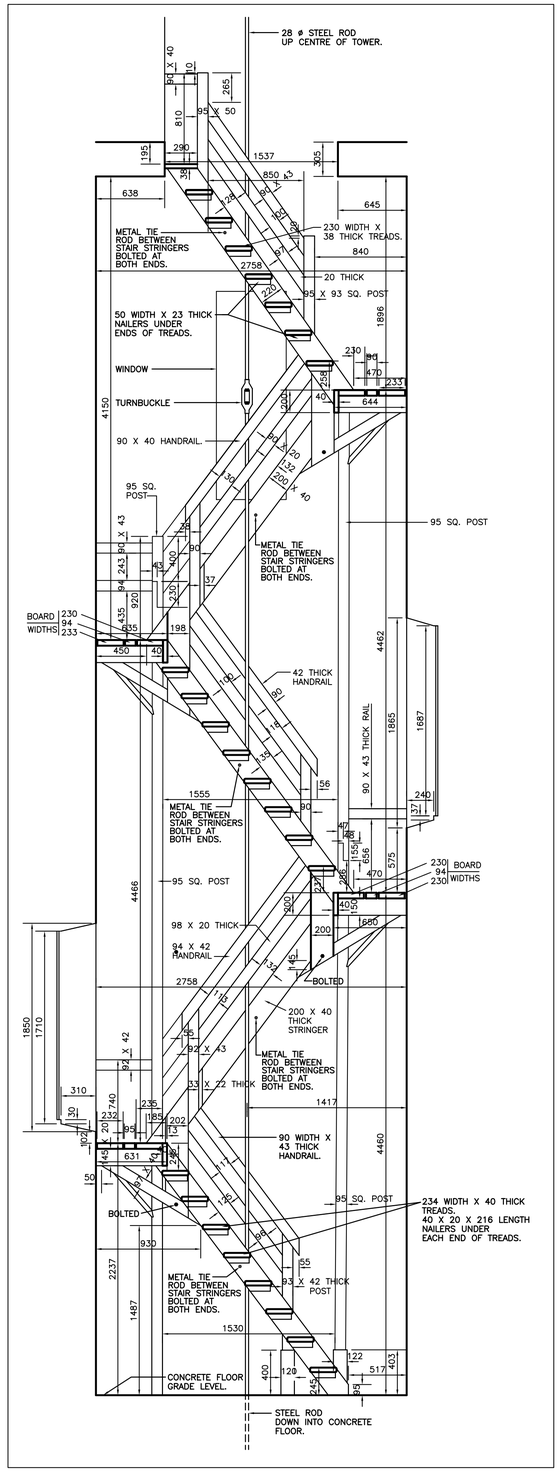
AS SHOWN

Drawn by/ Dessine par	Date
B. PRINS	JUNE 1995
Field Recording by / Releve-Temoin par	Date
B.PRINS	APRIL 1995
Approved by / Approuve par	Date
Checked by/ Verifie par	

Project No./ No. du projet	Asset No.	Sheet No./ Feuille No.
Drawing Reference No./No. du Dessin: HOPM 94/HR48		H6

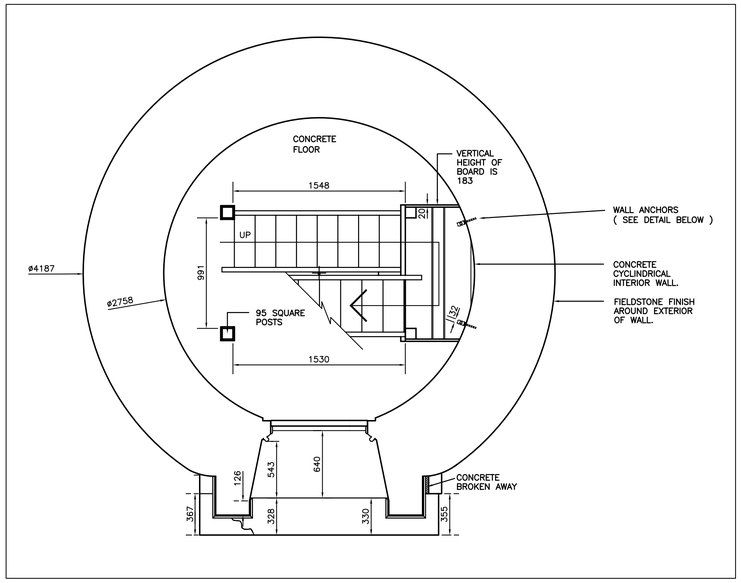
HOPM 94/HR48

DPT–H7



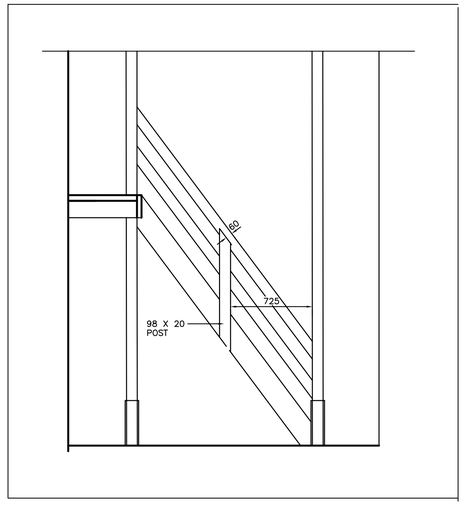
VERTICAL SECTION THRU TOWER STAIR

SCALE : 1 : 25



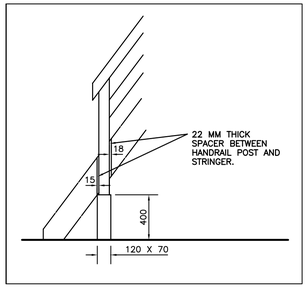
PLAN OF STAIR AT GROUND FLOOR

SCALE : 1 : 25



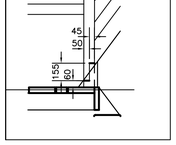
TYPICAL OUTSIDE RAIL DETAIL

SCALE : 1 : 25



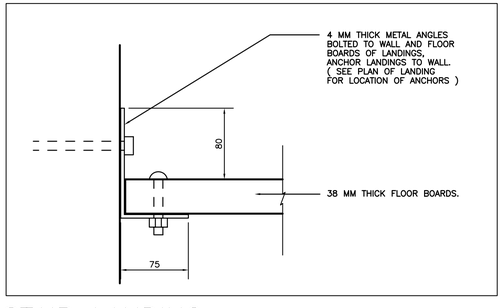
POST DETAIL INSIDE RAIL GROUND FLOOR LEVEL

SCALE : 1 : 25



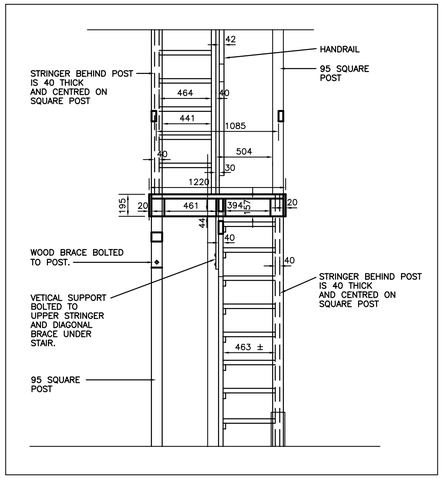
TYPICAL COLUMN LAP JOINT DETAIL

SCALE : 1 : 25



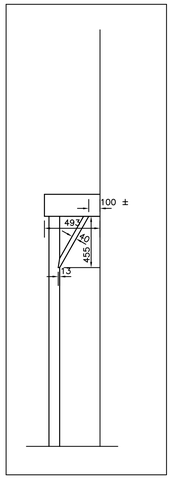
STAIR LANDING WALL ANCHOR DETAIL

SCALE : 1 : 25



SECTION THRU STAIR LANDING

SCALE : 1 : 25



DIAGONAL BRACING CORNER POSTS

SCALE : 1 : 25

A Detail number / A Numero de detail
B Sheet number / B Sur feuille numero

Linear dimensions in millimeters / Dimensions lineaires en millimetres

Client Acceptance / Acceptation du client
Signature _____ Date _____
File No. / No. de dossier _____

Public Works Canada / Travaux publics Canada
Architecture and Engineering Services for Environment Canada / Services d'architecture et de génie pour Environnement Canada
Canada

Heritage Recording For Parks Canada Ontario Region / Enrégistrement des Richesses du Patrimoine Pour Parcs Canada Région de l'Ontario

Type of Record / Type d'enregistrement
SUMMARY

Project title / Titre du projet
DOON PIONEER TOWER
WOODSIDE N.H.S.
KITCHENER, ONT.

Drawing title / Titre du dessin
SECTION

Scale / Echelle
AS SHOWN

Drawn by/ Dessine par: B. PRINS — Date: JUNE, 1995

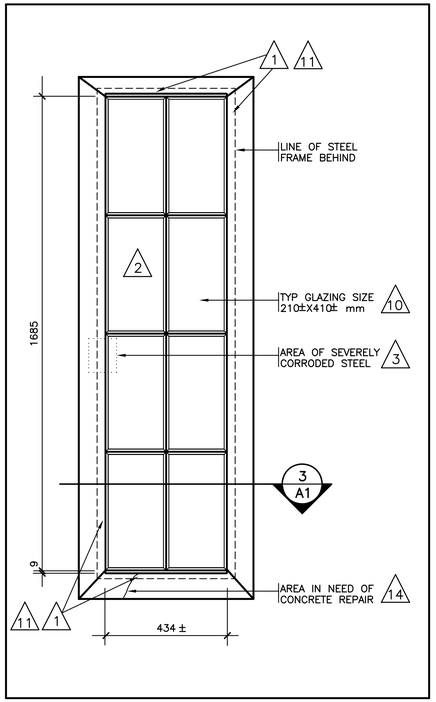
Field Recording by / Releve–Temoin par: B. PRINS — Date: MAY, 1995

Approved by / Approuve par — Date

Checked by/ Verifie par

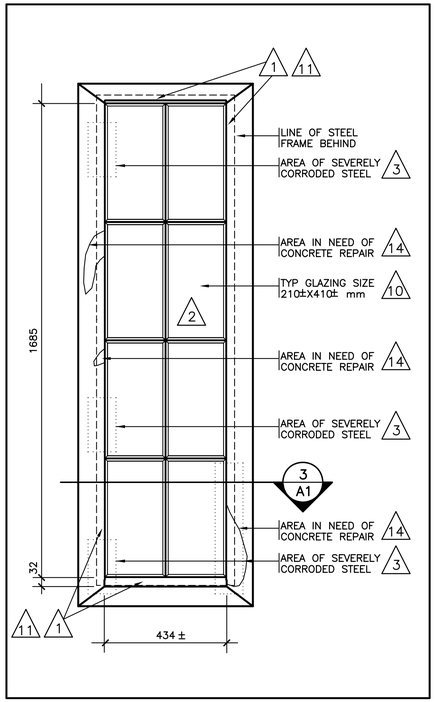
Project No./ No. du projet | Asset No. | Sheet No./ Feuille No.: H7

Drawing Reference No./No. du Dessin: HOPM 94/HR48



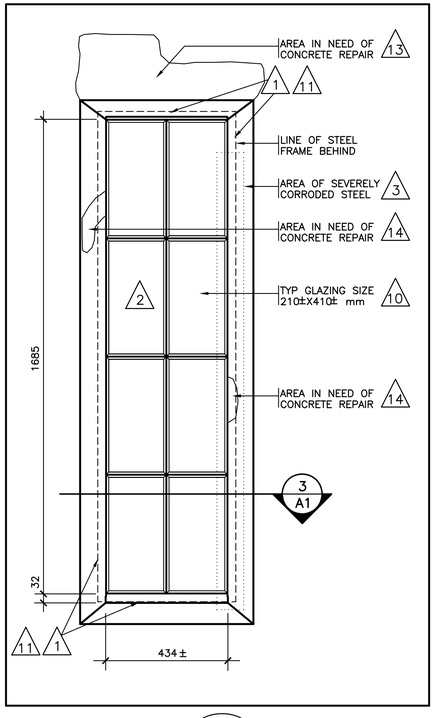
NORTH WINDOW (W3)

1 : 10



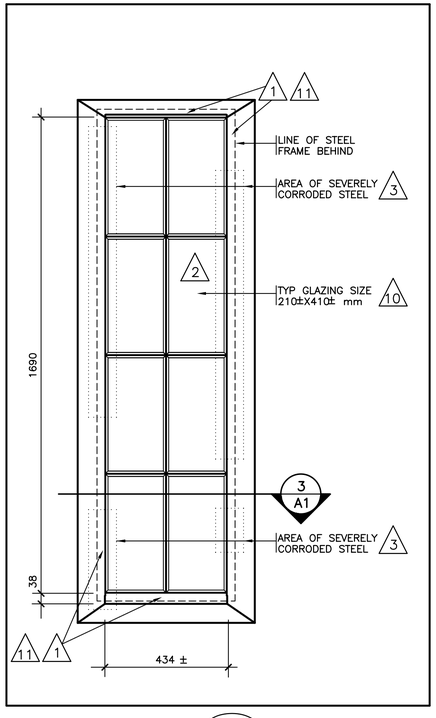
SOUTH WINDOW (W4)

1 : 10



EAST WINDOW (W1) (LANDING ACCESSIBLE)

1 : 10



WEST WINDOW (W2) (LANDING ACCESSIBLE)

1 : 10

CONSTRUCTION NOTES

WINDOW REPAIRS

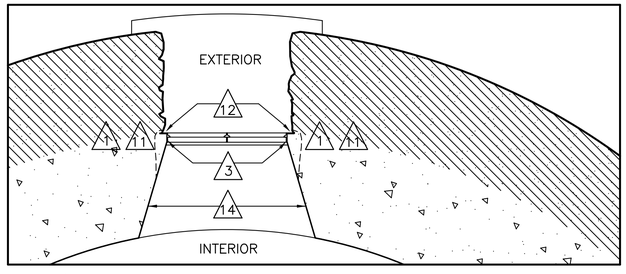
1. REMOVE ENOUGH MATERIAL AT ENTIRE PERIMETER OF WINDOW FRAME TO ACCESS AND REMOVE THE ENTIRE WINDOW UNIT FROM THE INTERIOR. CONTRACTOR TO TAKE SAMPLES OF EXISTING CONCRETE AND MORTAR FOR ANALYSIS TO ENSURE NEW PATCH MATERIALS MATCH EXISTING. PROVIDE A TEMPORARY PLYWOOD CLOSURE AT ALL WINDOW OPENINGS TO ENSURE TOWER REMAINS SECURE.
2. REMOVE ALL EXISTING GLAZING FROM WINDOWS ALONG WITH ALL TRACES OF PUTTY. SALVAGE AND RE–USE ALL GLAZING STOPS, FABRICATE ANY REPLACEMENT STOPS REQUIRED TO MATCH EXISTING. ALL EXISTING PLEXI–GLASS TO BE DISCARDED.
3. CUT OUT ALL SEVERELY CORRODED FRAME SECTIONS IN WINDOW UNIT AS IDENTIFIED ON DRAWINGS. REPLACE WITH NEW SECTIONS FABRICATED TO MATCH EXISTING IN MATERIAL TYPE, SIZE, SHAPE AND PROFILE. REPLACE ENTIRE LENGTH IF REQUIRED. GRIND ALL WELDS SMOOTH. ADD 3 METEL STRAP ANCHORS (3x13x38mm) TO EACH WINDOW UNIT.
4. REMOVE ALL RUST FROM ALL WINDOW FRAME COMPONENTS WITH PENCIL POINT BLASTER. USE LOW PRESSURE 80–100 PSI, GRIT SIZE #10–#40. SHOULD WET BLASTING BE USED, METAL TO BE BLOW DRIED IMMEDIATELY.
5. PATCH UNEVEN AREAS RESULTING FROM RUST REMOVAL WITH MIXTURE OF STEEL FIBERS AND EPOXY BINDER. SAND SMOOTH TO ELIMINATE ANY POCKETS.
6. WIPE BARE METAL CLEAN WITH DENATURED ALCOHOL AND DRY IMMEDIATELY FOR APPLICATION OF ANTI–CORROSIVE PRIMER.
7. APPLY TWO COATS OF OIL–ALKYD BASED ANTI–CORROSIVE PRIMER CONTAINING ZINC OR ZINC CHROMATE.
8. ALL BARE STEEL TO BE PRIMED IMMEDIATELY AFTER CLEANING TO PREVENT FURTHER CORROSION.
9. APPLY 1 COAT PRIMER AND 2 COATS PAINT TO ENTIRE WINDOW UNIT PRIOR TO INSTALLATION OF NEW PLEXI–GLASS. COLOUR AS SELECTED BY OWNER. CONTRACTOR TO PROVIDE COLOUR SAMPLES.
10. TO WINDOW UNITS: INSTALL NEW 5mm LEXAN PLEXI–GLASS IN ALL OPENINGS. EACH LITE APPROXIMATELY 210x410mm. EACH LITE TO BE CUT A MINIMUM OF 3mm LESS THAN OPENING. SET ALL LEXAN IN LINSEED OIL PUTTY. APPLY 1 COAT OF PAINT TO ALL CURED PUTTY SURFACES AT INTERIOR AND EXTERIOR. EXTEND PAINT FINISH 2mm ONTO PLEXI–GLASS AS SEALER AT BOTH SIDES OF GLAZING.

NOTE: NOTES 3 THROUGH 10 REFER TO ALL WINDOW COMPONENTS.

11. RE–INSTALLATION OF REPAIRED WINDOWS: PATCH AND MAKE GOOD THE ENTIRE PERIMETER OF WINDOW OPENINGS AT INTERIOR AND EXTERIOR. ALL NEW PATCH MATERIALS ARE TO MATCH EXISTING IN STRENGTH, COLOUR AND TEXTURE. ENSURE WINDOWS ARE SQUARE AND PLUMB.
12. APPLY NEW FLEXIBLE ELASTOMERIC CAULKING TO ENTIRE PERIMETER OF WINDOW FRAME AT EXTERIOR SIDE. NEW CAULKING COMPOUND TO ADHERE TO BOTH METAL AND MASONRY. COLOUR TO BE SELECTED BY OWNER. CONTRACTOR TO PROVIDE COLOUR SAMPLES.

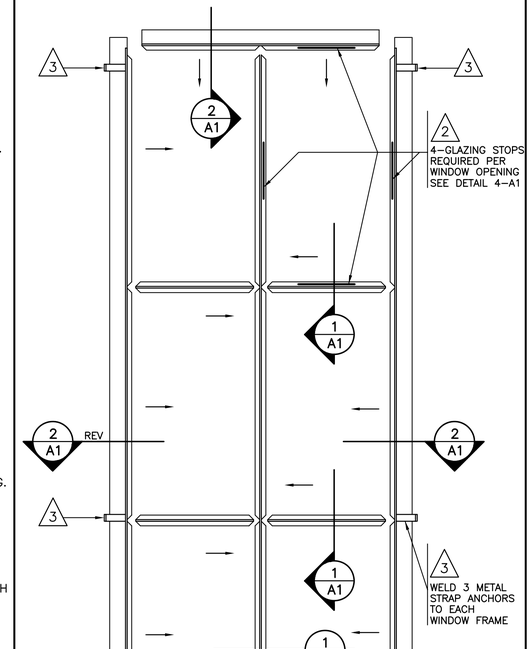
CONCRETE REPAIRS

13. EAST WINDOW (W1): REMOVE ALL LOOSE CONCRETE AROUND LINTEL AND REBAR. REMOVE RUST FROM REBAR AND TREAT WITH ANTI–CORROSIVE PRIMER. PATCH LINTEL AREA WITH NEW CONCRETE TO MATCH EXISTING IN STRENGTH, COLOUR AND TEXTURE.
14. PATCH AS REQUIRED THE INTERIOR HEAD, SILL AND JAMBS OF ALL WINDOWS TO THE SILO EDGE WITH PATCH MATERIAL TO MATCH EXISTING IN STRENGTH, COLOUR AND TEXTURE. EXTENT OF PATCH AREA TO BE DETERMINED ON SITE.



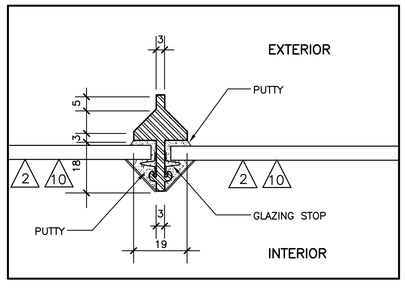
3 A1 TYPICAL WINDOW PLAN

1 : 10



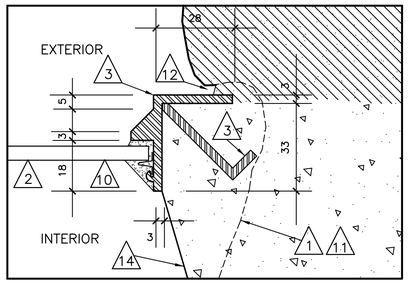
STEEL WINDOW ASSEMBLY (INTERIOR VIEW)

1 : 5



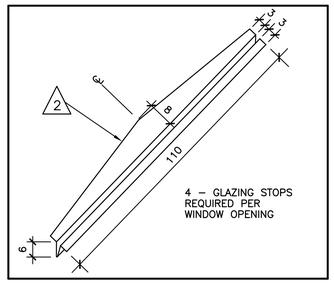
1 A1 SECTION THRU MULLION

FULL SIZE



2 A1 SECTION THRU FRAME

FULL SIZE



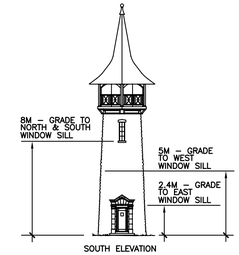
4 A1 GLAZING STOP

FULL SIZE

GENERAL NOTES

ALL DIMENSIONS AND CONDITIONS MUST BE VERIFIED ON SITE BY CONTRACTOR

ALL WINDOW ELEVATIONS ARE DRAWN FROM THE INTERIOR.



SOUTH ELEVATION

LIST OF DRAWINGS

No.	Date	Description	Drawn by / Dessine par	Approved / Approuvé
		Revision / Revision		

A / B — A Detail number / A Numero de detail; B Sheet number / B Sur feuille numero

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Architecture and Engineering Services for Parks Canada / Services d'architecture et de génie pour Parcs Canada

Canada

Project title / Titre du projet

PIONEER TOWER WOODSIDE NATIONAL HISTORIC SITE

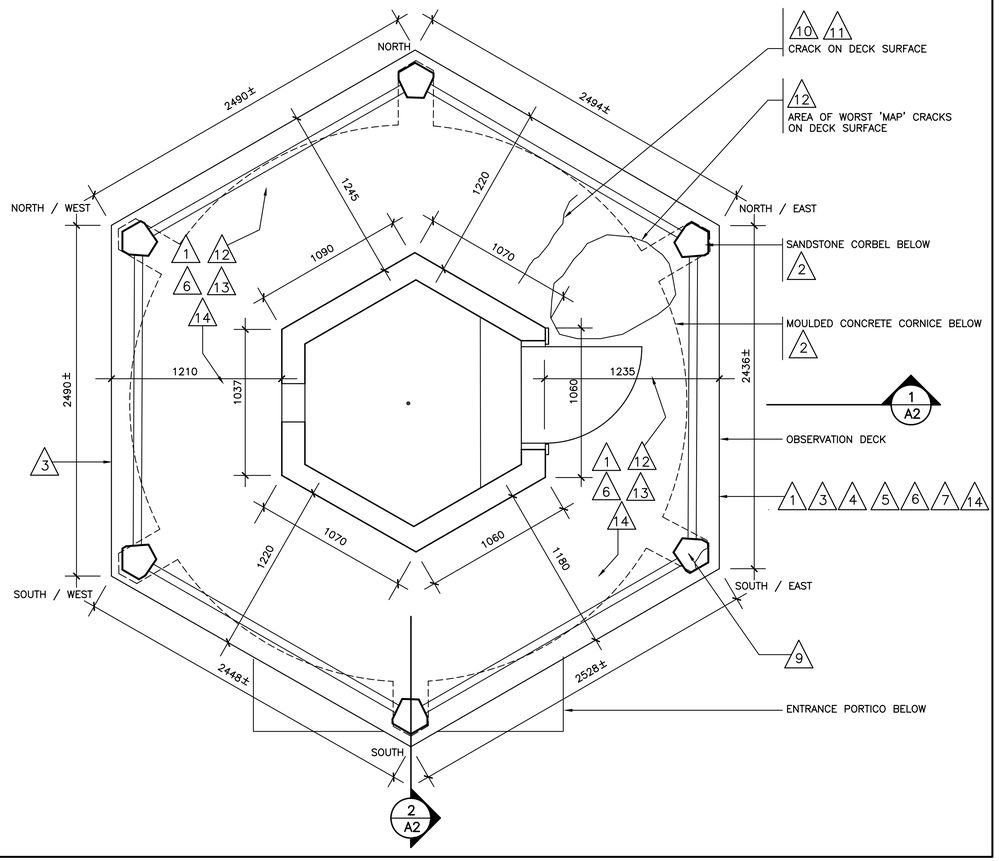
KITCHENER, ONTARIO

Drawing title / Titre du dessin

METAL WINDOW REPAIRS

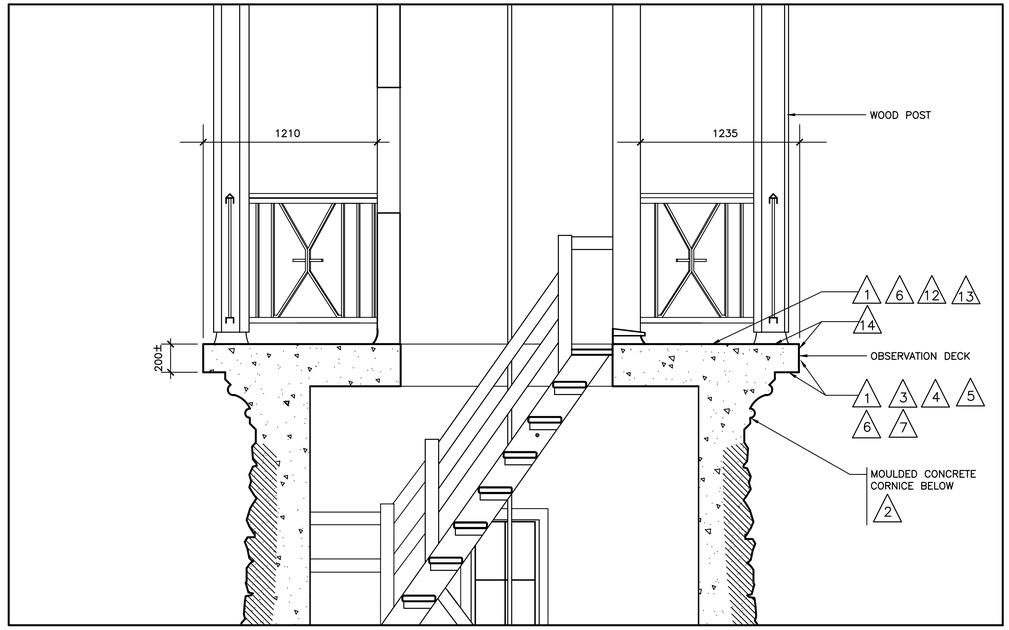
Scale / Echelle	AS SHOWN
Drawn by/ Dessine par	S. MACDONELL
Date	AUGUST 1997
Designed by/ Concu par	R. CAMPBELL
Date	AUGUST 1997
Approved by / Approuve par	
Date	
Checked by/ Verifie par	

Project No./ No. du projet	Asset No.	Sheet No./ Feuille No.
54691		A1
Drawing Reference No./No. du Dessin	HOPM 96/R50	



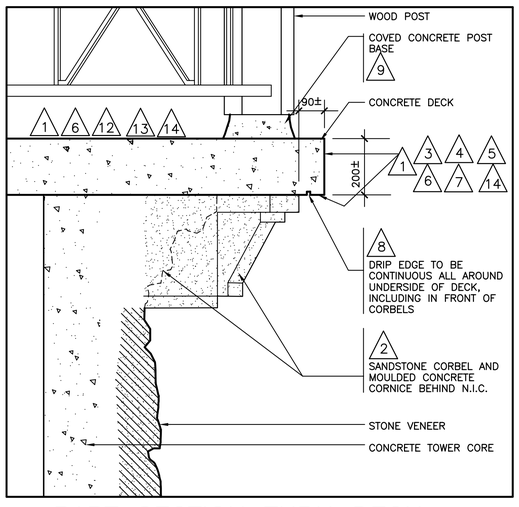
OBSERVATION DECK PLAN

1 : 20



1 / A2 SECTION THRU OBSERVATION DECK

1 : 20



PART SECTION THRU DECK

2 / A2

1 : 10

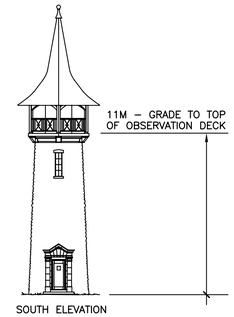
CONSTRUCTION NOTES

1. TO OBSERVATION DECK SURFACES: REMOVE ALL DIRT, RUST OR OTHER BOND INHIBITING MATERIALS PRIOR TO ANY APPLICATION OF NEW MATERIALS. ALL PREPARATION WORK TO BE DONE BY APPROPRIATE MECHANICAL MEANS AS PREAPPROVED BY ENGINEER. SANDBLASTING WILL NOT BE PERMITED.
2. CONTRACTOR TO ENSURE PROTECTION OF CONCRETE CORNICE AND SANDSTONE CORBEL DURING CONSTRUCTION.
3. REMOVE ALL DELAMINATED AND DETERIORATED CONCRETE FROM UNDERSIDE AND EDGE OF OBSERVATION DECK. REMAINING CONCRETE SUBSTRATE TO BE SOUND AND HAVE MINIMUM SURFACE PROFILE OF 2mm.
4. METAL HAS BEEN DETECTED AROUND THE PERIMETER OF THE OBSERVATION DECK. EXACT LOCATION TO BE VERIFIED ON SITE. ALL EXPOSED STEEL SURFACES TO BE CLEANED AND FREE FROM ALL DIRT, RUST AND MILL SCALE.
5. TO EXPOSED STEEL SURFACES: APPLY 2 COATS OF 'SIKATOP, ARMATEC 110 EPOCEM' OR APPROVED EQUAL. FOLLOW ALL MANUFACTURERS INSTRUCTIONS AND RECOMMENDATIONS.
6. OBSERVATION DECK SURFACE PREPERATION: APPLY 1 COAT 'SIKATOP, ARMATEC 110 EPOCEM' OR APPROVED EQUAL TO ALL SURFACES AT TOP OF DECK. FOLLOW ALL MANUFACT. INSTRUCTIONS AND RECOMMENDATIONS.
7. TO UNDERSIDE AND EDGE OF DECK: APPLY 'SIKATOP, 123 POLYMER-MODIFIED GEL MORTAR' OR APPROVED EQUAL. RE-FORM DECK EDGES TO ORIGINAL SIZE AND PROFILE. FOLLOW ALL MANUFACTURERS INSTRUCTIONS & RECOMMEND.
8. ENSURE DRIP EDGE AT UNDERSIDE OF DECK IS PROPERLY FORMED AND CONTINUOUS AROUND ENTIRE PERIMETER OF DECK.
9. INSPECT, EVALUATE AND REPAIR AS REQUIRED ALL 6 CONCRETE COVE BASES AT WOOD POSTS. USE 'SIKATOP 123' TO RE-FORM ALL CONCRETE COVE BASES.
10. ENSURE IDENTIFIED CRACK ON DECK SURFACE IS CHIPPED BACK TO SOLID, SOUND MATERIAL AND CLEANED OF ALL DIRT AND DEBRIS.
11. INJECT OBSERVATION DECK CRACK WITH 'SIKADUR 52, INJECTION RESIN' OR APPROVED EQUAL. FOLLOW ALL MANUFACTURERS INSTRUCTIONS AND RECOMMENDATIONS.
12. . UBSTRATE.
13. TO OBSERVATION DECK SURFACE: APPLY 'SIKATOP 122, POLYMER-MODIFIED REPAIR MORTAR' OR APPROVED EQUAL TO ENTIRE SURFACE. FOLLOW ALL MANUFACTURER'S INSTRUCTIONS & RECOMMENDATIONS. PROVIDE SMOOTH TROWEL FINISH.
14. WATERPROOFING SLURRY SEAL˙

    INHIBITING MATERIALS SUCH AS RUST, DIRT AND DEBRIS. FOLLOW ALL MANUFACTURERS INSTRUCTIONS AND RECOMMENDATIONS.

GENERAL NOTES

ALL DIMENSIONS AND CONDITIONS MUST BE VERIFIED ON SITE BY CONTRACTOR.



SOUTH ELEVATION

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		Revision / Revision		

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Architecture and Engineering Services for Parks Canada / Services d'architecture et de génie pour Parcs Canada

Canada

Project title / Titre du projet

PIONEER TOWER WOODSIDE NATIONAL HISTORIC SITE

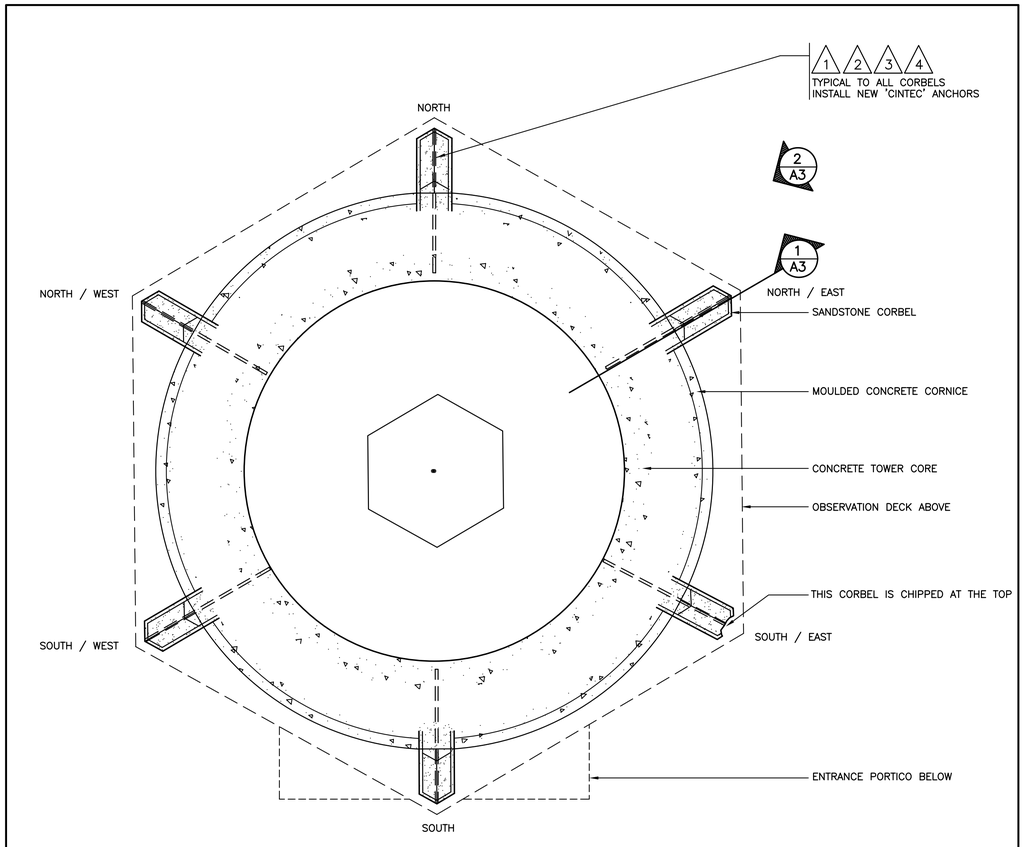
KITCHENER, ONTARIO

Drawing title / Titre du dessin

CONCRETE OBSERVATION DECK REPAIRS

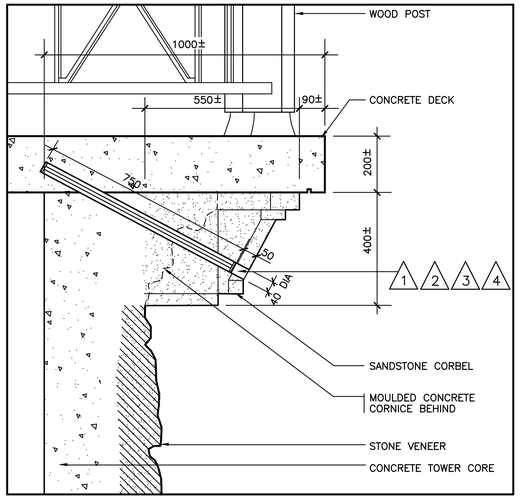
Scale / Echelle	AS SHOWN
Drawn by/ Dessine par	S. MACDONELL
Date	AUGUST 1997
Designed by/ Concu par	R. CAMPBELL
Date	AUGUST 1997
Approved by / Approuve par	
Date	
Checked by/ Verifie par	

Project No./ No. du projet	Asset No.	Sheet No./ Feuille No.
54691		A2
Drawing Reference No./No. du Dessin: HOPM 96/R50		



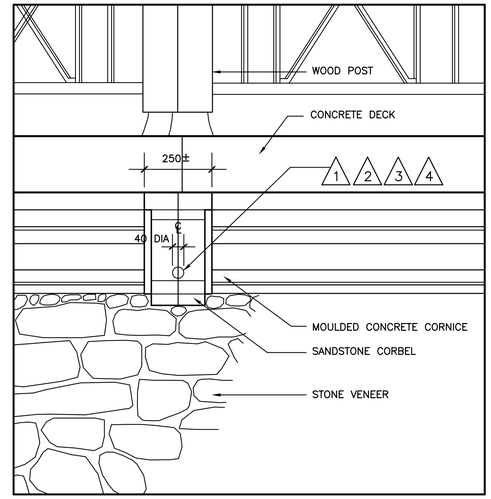
REFLECTED OBSERVATION DECK PLAN

1 : 20



1 / A3 SECTION THRU CORBEL

1 : 10



2 / A3 CORBEL ELEVATION

1 : 10

CONSTRUCTION NOTES

1. TO ALL CORBELS: DRILL A 40mm X 800mm LONG HOLE CENTERED IN THE WIDTH OF CORBEL. DRILLING TO BE DONE WITH CARE TO ENSURE SANDSTONE CORBEL DOES NOT SUSTAIN ANY DAMAGE FROM WORK OF THIS CONTRACT. CONSULT WITH ENGINEER.

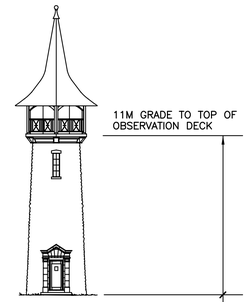
2. INSERT 'CINTEC ANCHOR SYSTEM' COMPRISED OF 750mm LONG X M20 DIA STAINLESS STEEL PIN WITH END PLATES AND MESH SOCK. THE BOTTOM END PLATE TO BE RECESSED 50mm FROM FRONT OF CORBEL TO ACCOMMODATE FINAL EXTERIOR FINISHING.

3. INJECT THE 'PRESSTEC GROUT' PROVIDED WITH 'CINTEC ANCHOR SYSTEM'. INJECT UNDER LOW PRESSURE.

4. FILL AND PATCH THE END OF THE DRILL HOLE. USE A MIXTURE OF STONE DUST ACCUMULATED DURING DRILLING AND WHITE CEMENT. MAKE SMOOTH AND FINISH PATCH TO MATCH EXISTING CORBEL IN PROFILE, SHAPE AND SIZE.

GENERAL NOTES

ALL DIMENSIONS AND CONDITIONS MUST BE VERIFIED ON SITE BY CONTRACTOR.



SOUTH ELEVATION

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Architecture and Engineering Services for Parks Canada / Services d'architecture et de génie pour Parcs Canada

Canada

Project title / Titre du projet

PIONEER TOWER
WOODSIDE NATIONAL HISTORIC SITE

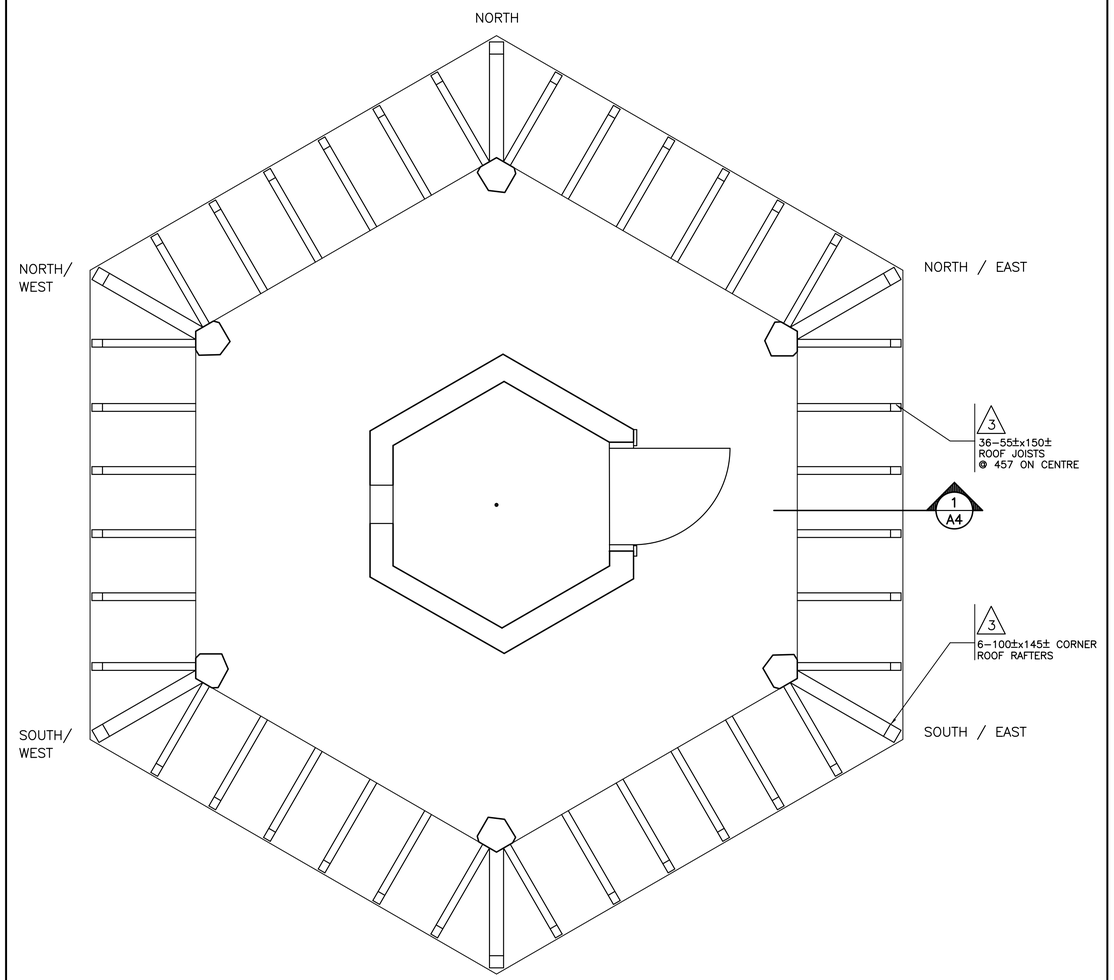
KITCHENER, ONTARIO

Drawing title / Titre du dessin

CORBEL STABILIZATION

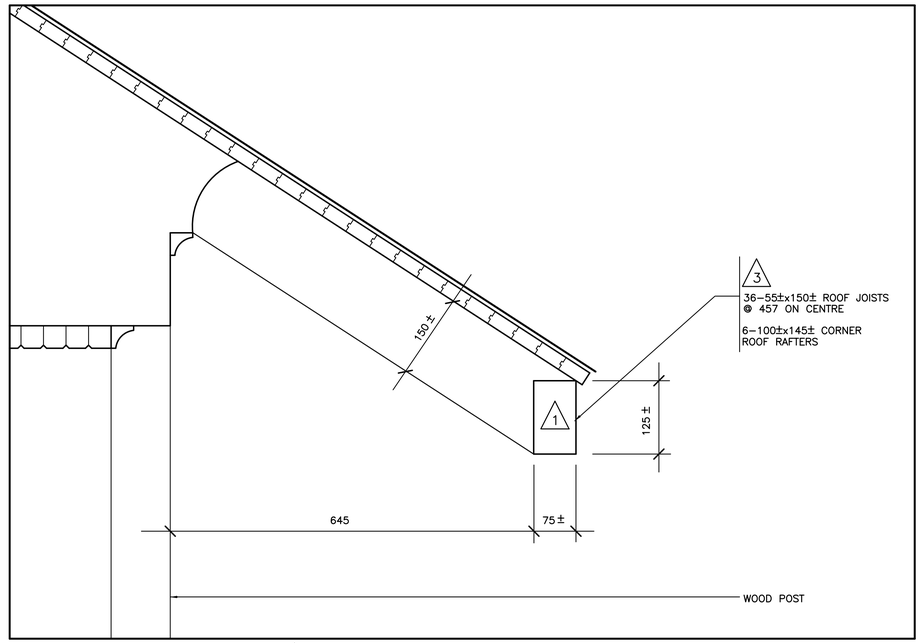
Scale / Echelle: AS SHOWN	
Drawn by/ Dessine par: S. MACDONELL	Date: AUGUST 1997
Designed by/ Concu par: R. CAMPBELL	Date: AUGUST 1997
Approved by / Approuve par	Date
Checked by/ Verifie par	

Project No./ No. du projet	Asset No.	Sheet No./ Feuille No.
54691		A3
Drawing Reference No./No. du Dessin: HOPM 96/R50		



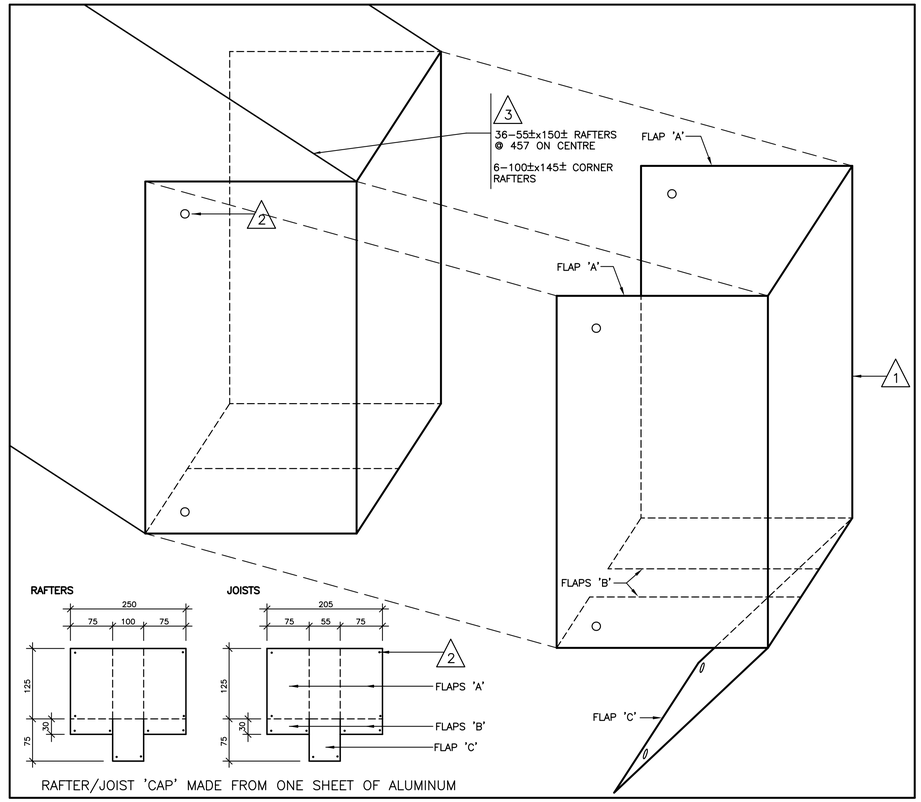
REFLECTED RAFTER AND JOISTS PLAN

1 : 20



1/A4 TYPICAL RAFTER/JOIST ELEVATION

1 : 5



2/A4 TYPICAL RAFTER 'CAP' PERSPECTIVE

FULL SIZE

CONSTRUCTION NOTES

1. ALL ROOF RAFTER & JOIST ENDS TO BE COVERED WITH LIGHT WEIGHT PRE–FINISHED ALUMINUM 'CAP'. PAINT COLOUR TO BE SELECTED BY OWNER, CONTRACTOR TO PROVIDE PAINT SAMPLES.
2. USE ONLY GALVANIZED NAILS WITH PRE–COATED HEADS.
3. VERIFY EXACT SIZES AND PROFILES ON SITE.

FOLDING SEQUENCE

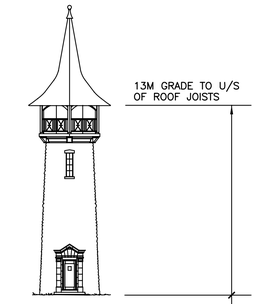
FOLD FLAPS 'A' TO EACH SIDE OF RAFTER.

FOLD FLAPS 'B' TO UNDERSIDE OF RAFTER.

FOLD FLAP 'C' TO UNDERSIDE OF RAFTER, OVER FLAPS 'B'.

GENERAL NOTES

ALL DIMENSIONS AND CONDITIONS MUST BE VERIFIED ON SITE BY CONTRACTOR.



SOUTH ELEVATION

No.	Date	Description	Drawn by Dessine par	Approved Approuve
		Revision / Revision		

A/B A Detail number / A Numero de detail; B Sheet number / B Sur feuille numero

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Canada

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PIONEER TOWER
WOODSIDE NATIONAL HISTORIC SITE

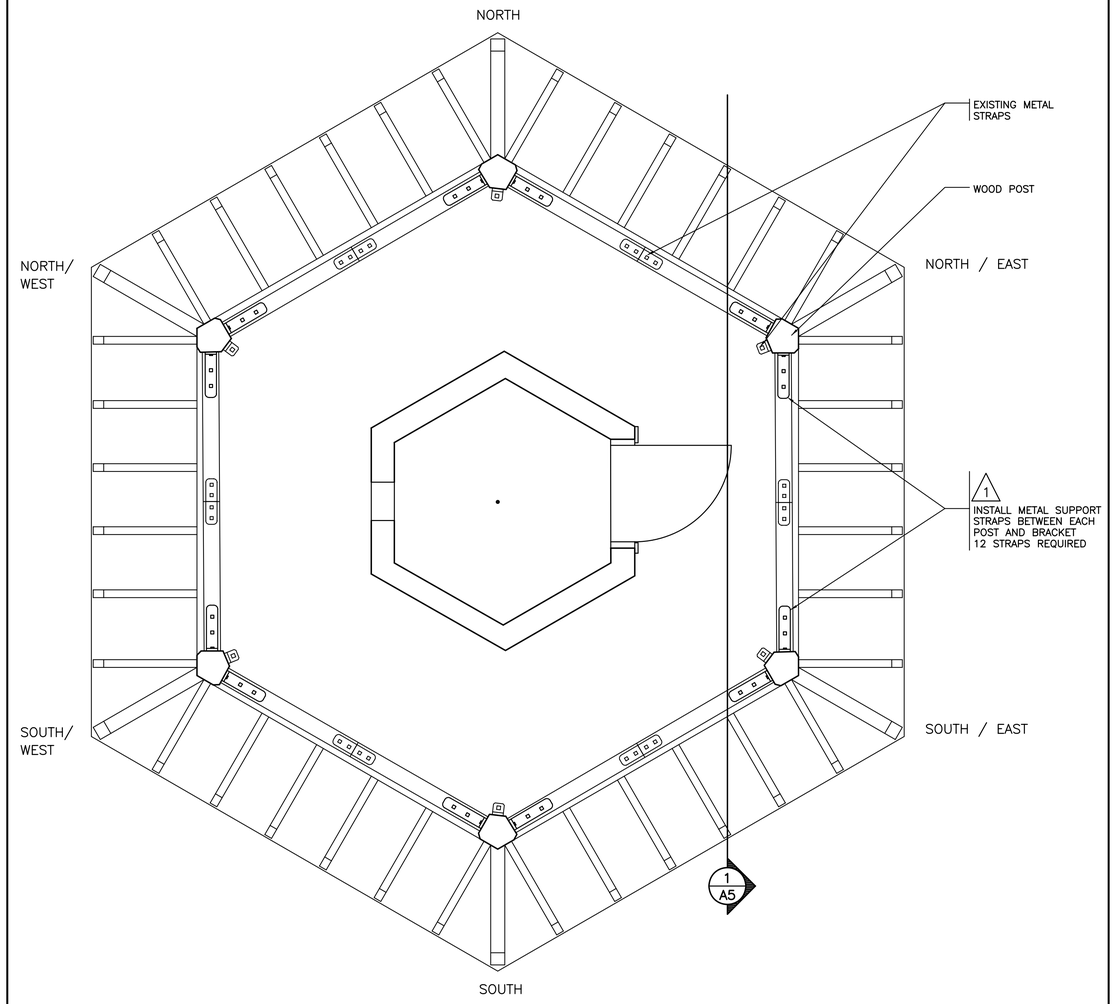
KITCHENER, ONTARIO

Drawing title / Titre du dessin

RAFTER AND JOIST PROTECTION

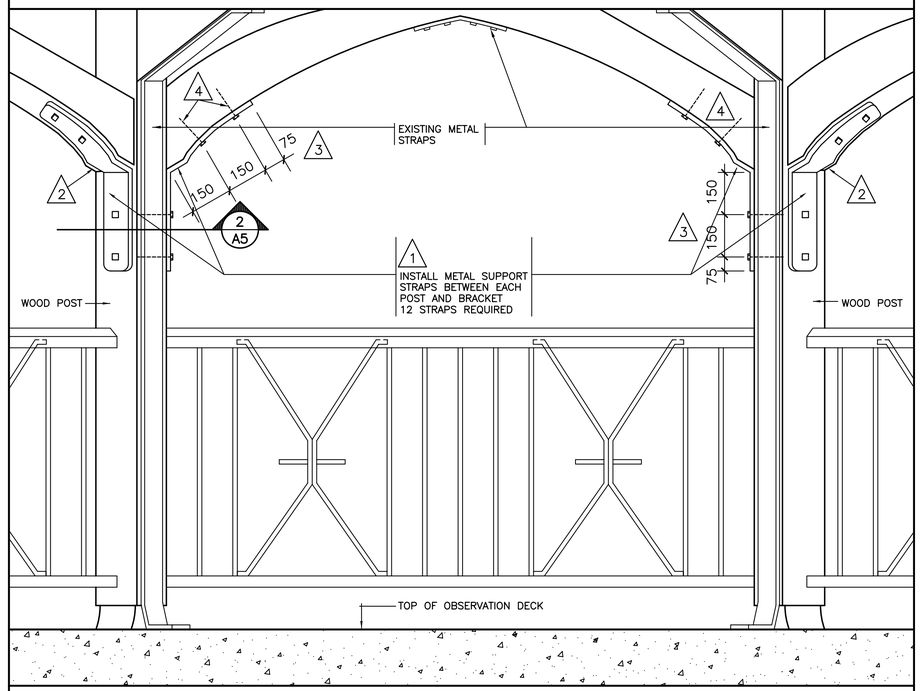
Scale / Echelle	AS SHOWN
Drawn by/ Dessine par	S. MACDONELL
Date	AUGUST 1997
Designed by/ Concu par	R. CAMPBELL
Date	AUGUST 1997
Approved by / Approuve par	
Date	
Checked by/ Verifie par	

Project No./ No. du projet	Asset No.	Sheet No./ Feuille No.
54691		A4
Drawing Reference No./No. du Dessin: HOPM 96/R50		



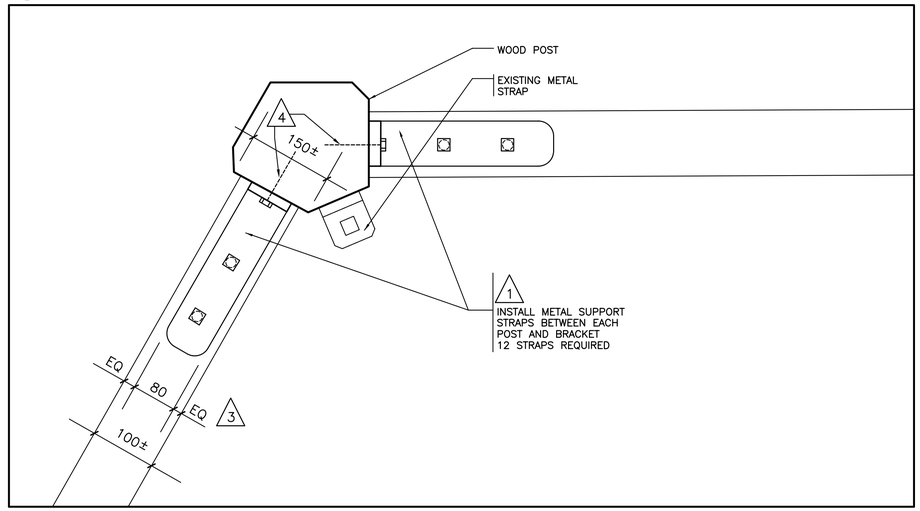
REFLECTED POST AND BRACKET PLAN

1 : 20



1 A5 ELEVATION OF STRAPS FOR POSTS AND BRACKETS

1 : 10



2 A5 STRAP CONNECTION PLAN

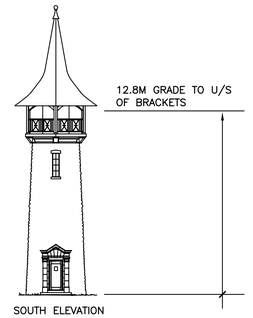
1 : 5

CONSTRUCTION NOTES

1. INSTALL NEW METAL SUPPORT STRAPS BETWEEN EACH WOOD POST AND BRACKET AS INDICATED.
2. NEW METAL STRAPS TO CONFORM TO WOOD BRACKET SHAPE.
3. METAL STRAPS 16mm THICK X 80mm WIDE X APPROX. 750mm LONG, WITH ROUNDED ENDS AS INDICATED. PROVIDE ROUND HOLES IN BRACKETS TO SUIT DIA. OF LAG SCREWS.
4. PROVIDE 4–9mm DIA X100mm LONG STEEL SQUARE HEAD LAG SCREWS PER EACH METAL STRAP TO SECURE TO BRACKET AND POST. PRE–DRILL PILOT HOLES IN WOOD MEMBERS.
5. METAL STRAPS TO BE PRIMED AND PAINTED. APPLY 1 COAT PRIMER TO ALL SURFACES. APPLY 2 COATS FINISH PAINT AFTER INSTALLATION. USE ALKYD BASED PRIMER AND PAINT. COLOUR TO MATCH EXISTING POST COLOUR. CONTRACTOR TO SUBMIT COLOUR SAMPLES.

GENERAL NOTES

ALL DIMENSIONS AND CONDITIONS MUST BE VERIFIED ON SITE BY CONTRACTOR.



SOUTH ELEVATION

No.	Date	Description	Drawn by Dessine par	Approved Approuve
		Revision / Revision		

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PIONEER TOWER WOODSIDE NATIONAL HISTORIC SITE

KITCHENER, ONTARIO

Drawing title / Titre du dessin

WOOD POST AND BRACKET STABILIZATION

Scale / Echelle: AS SHOWN	
Drawn by/ Dessine par: S. MACDONELL	Date: AUGUST 1997
Designed by/ Concu par: R. CAMPBELL	Date: AUGUST 1997
Approved by / Approuve par	Date
Checked by/ Verifie par	

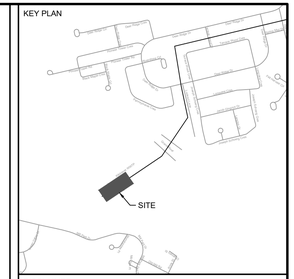
Project No./ No. du projet	Asset No.	Sheet No./ Feuille No.
54691		A5
Drawing Reference No./No. du Dessin: HOPM 96/R50		

Appendix D: 30% Design Drawings

SHEET No.	DRAWING No.	DESCRIPTION
		TITLE SHEET
		LIST OF DRAWINGS
1	C01	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 1+010 TO STA. 1+180)
2	C02	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 1+180 TO STA. 1+340)
3	C03	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 1+340 TO STA. 1+510)
4	C04	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 1+510 TO STA. 1+670)
5	C05	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 1+670 TO STA. 1+840)
6	C06	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 1+840 TO STA. 2+010)
7	C07	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 2+010 TO STA. 2+170)
8	C08	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 2+170 TO STA. 2+340)
9	C09	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 2+340 TO STA. 2+510)
10	C10	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 2+510 TO STA. 2+680)
11	C11	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 2+680 TO STA. 2+850)
12	C12	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 2+850 TO STA. 2+990)
13	C13	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 2+990 TO STA. 3+110)
14	C14	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 3+110 TO STA. 3+230)
15	C15	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 3+230 TO STA. 3+230)
16	C16	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 3+230 TO STA. 3+330)
17	C17	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 3+330 TO STA. 3+510)
18	C18	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 3+510 TO STA. 3+640)
19	C19	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 3+640 TO STA. 3+770)
20	C20	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 3+770 TO STA. 3+890)
21	C21	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 3+890 TO STA. 4+060)
22	C22	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 4+060 TO STA. 4+230)
23	C23	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 4+230 TO STA. 4+400)
24	C24	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 4+400 TO STA. 4+560)
25	C25	TRUNK SANITARY SEWER PLAN AND PROFILE (STA. 4+560 TO STA. 4+710)
26	S01	TRUNK SEWER BRIDGE – GENERAL ARRANGEMENT 1
27	S02	TRUNK SEWER BRIDGE – GENERAL ARRANGEMENT 2
28	S03	TRUNK SEWER BRIDGE – GENERAL ARRANGEMENT 3
29	S04	TRUNK SEWER BRIDGE – GENERAL ARRANGEMENT 4
30	C25	WASTEWATER TREATMENT PLANT – GENERAL ARRANGEMENT
31	S101	WASTEWATER TREATMENT PLANT – PLAN AND SECTIONS 1
32	S102	WASTEWATER TREATMENT PLANT – PLAN AND SECTIONS 2
33	S103	WASTEWATER TREATMENT PLANT – PLAN AND SECTIONS 3
34	S104	WASTEWATER TREATMENT PLANT – CROSSOVER AT INFLUENT CHANNEL

SHEET No.	DRAWING No.	DESCRIPTION

KEY PLAN



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FIELD BOOK No.

No.	ISSUE/REVISION	BY	DATE
1.	30% DESIGN SUBMISSION	E.A.P.	2024.06.17

WATERLOO - EAST SIDE TRUNK SEWER

LIST OF DRAWINGS

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: May 31, 2023	DRAWING No. G01
SCALE HOR. 1:250 VERT. 1:50	SHEET No.
LAYOUT NAME:	

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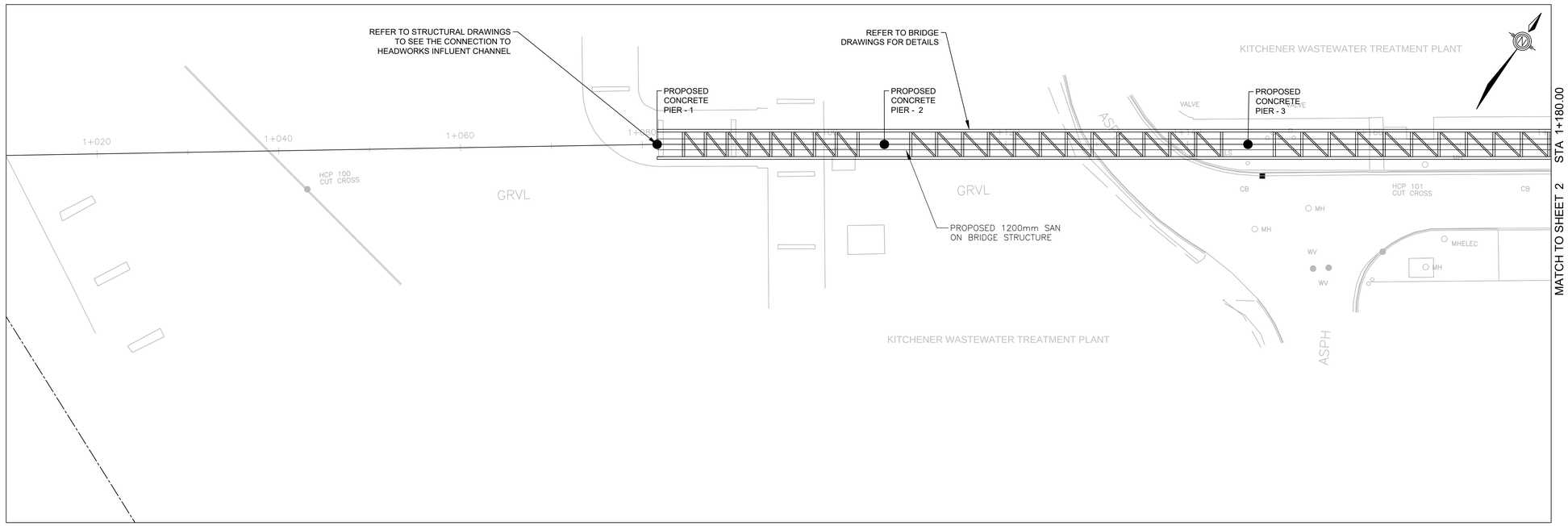
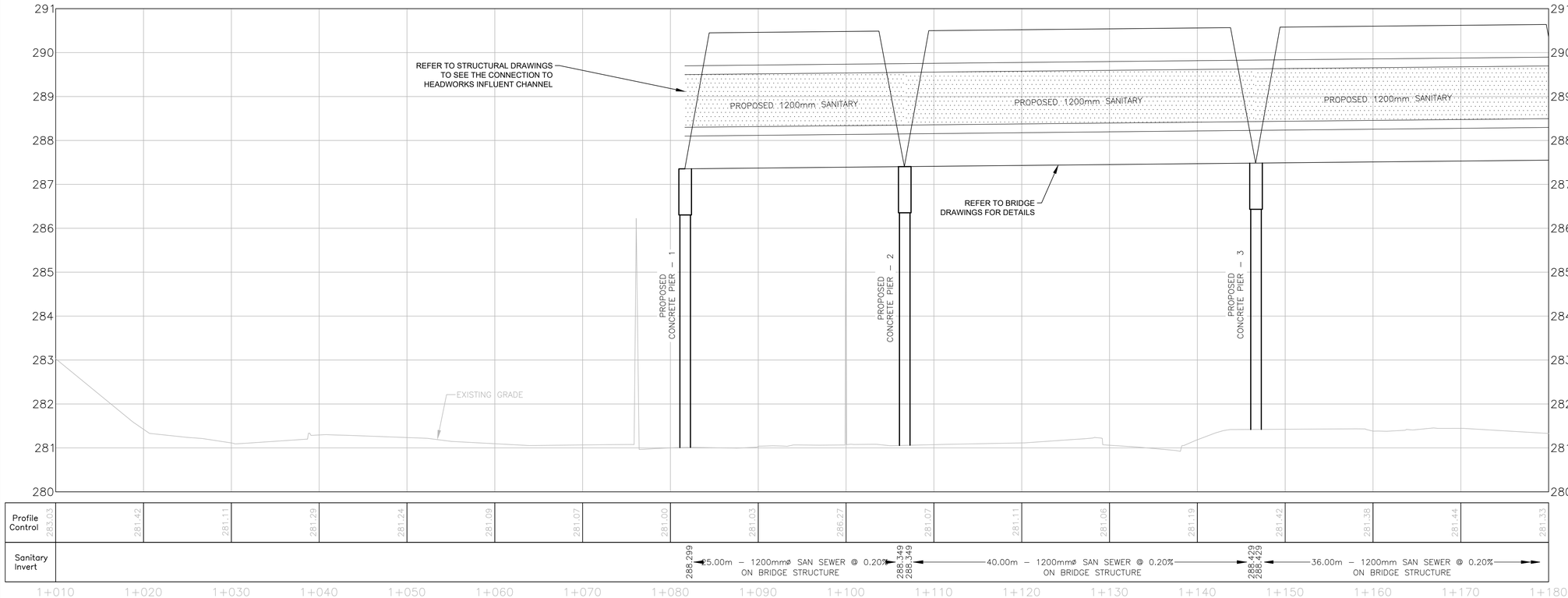
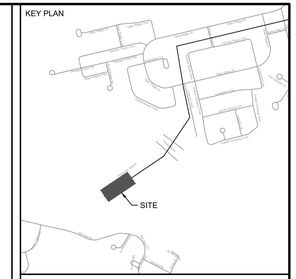




Profile Control	283.03	281.42	281.11	281.29	281.24	281.09	281.07	281.00	281.03	286.27	281.07	281.11	281.06	281.19	281.42	281.38	281.44	281.33	
Sanitary Invert									288.299	25.00m – 1200mmø SAN SEWER @ 0.20% ON BRIDGE STRUCTURE	288.349 288.349	40.00m – 1200mmø SAN SEWER @ 0.20% ON BRIDGE STRUCTURE			288.429 288.429	36.00m – 1200mm SAN SEWER @ 0.20% ON BRIDGE STRUCTURE			

1+010 1+020 1+030 1+040 1+050 1+060 1+070 1+080 1+090 1+100 1+110 1+120 1+130 1+140 1+150 1+160 1+170 1+180

KEY PLAN



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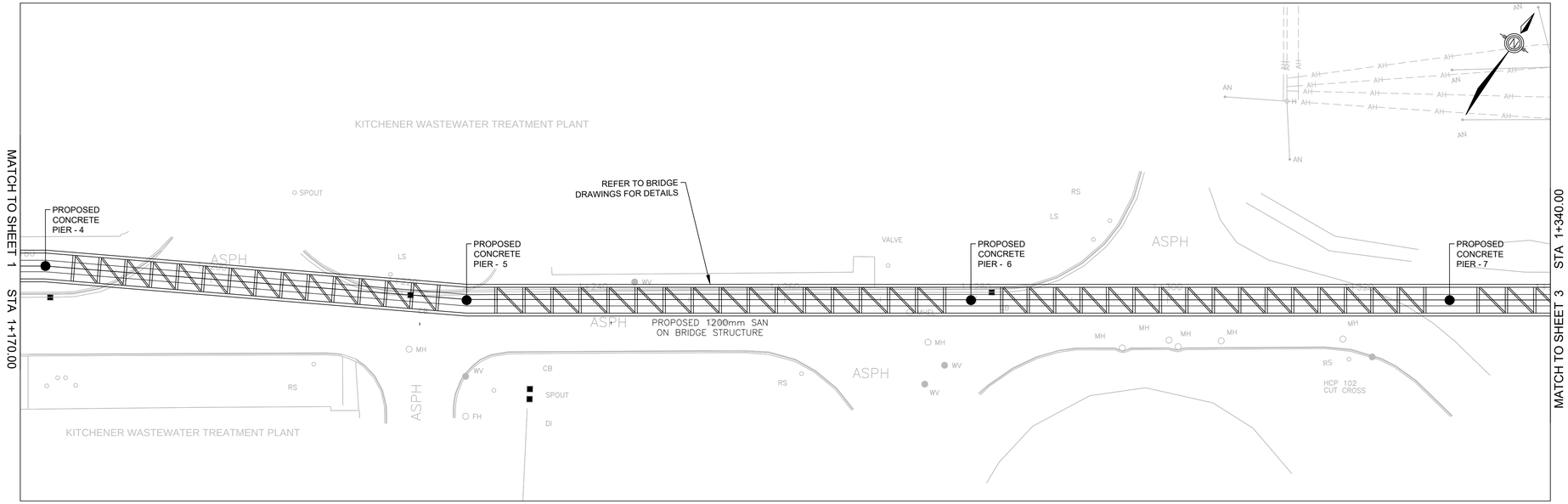
No.	ISSUE/REVISION	BY	DATE
1.	30% DESIGN SUBMISSION	E.A.P.	2024.06.17

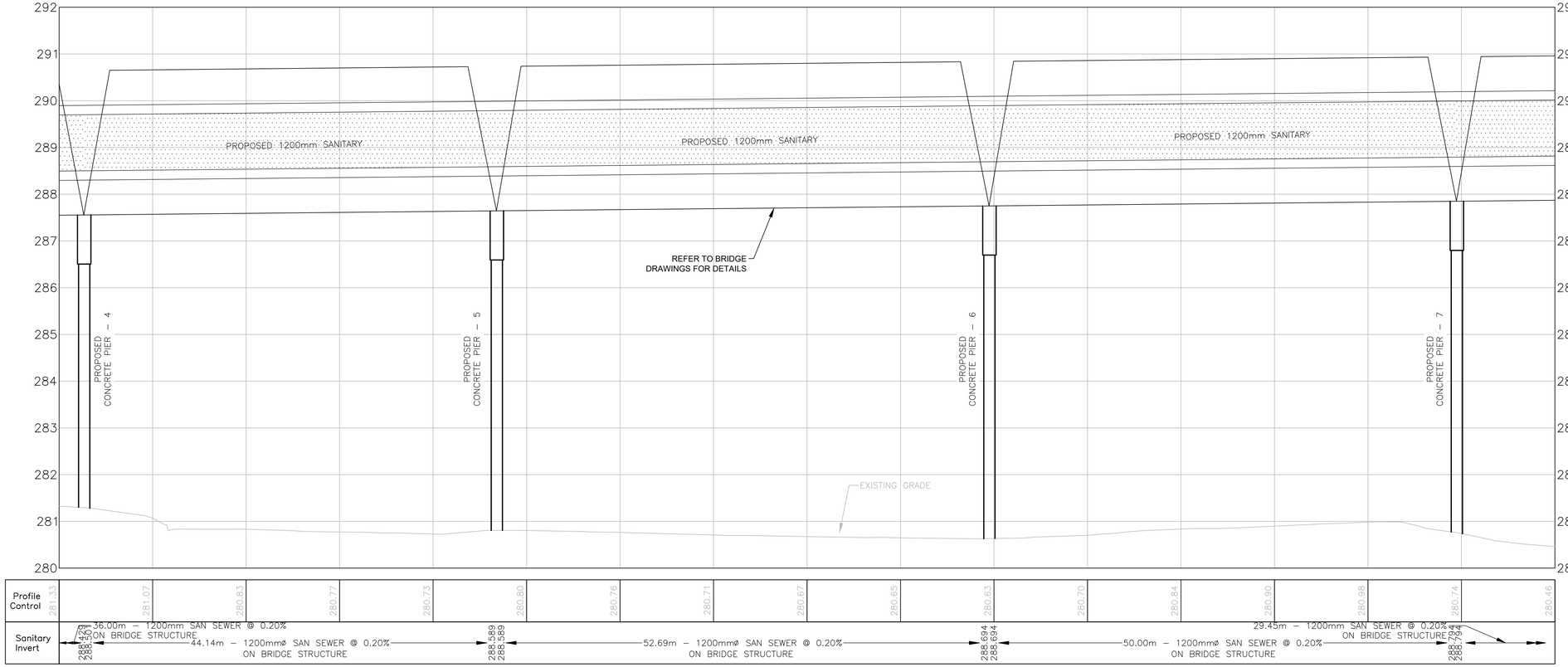
WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB
CONTRACT No. -
CHECKED BY: EAP
FILE No. -
DATE: May 31, 2023
DRAWING No. C01
SCALE HOR. 1:250 VERT. 1:50
SHEET No. 01 OF 34
LAYOUT NAME:

R:\2023\236924 - WATERLOO-EAST SIDE TRUNK SEWER\10 CADDWG\01 LINEAR\04 SHEETS\236924_C01-C05.DWG





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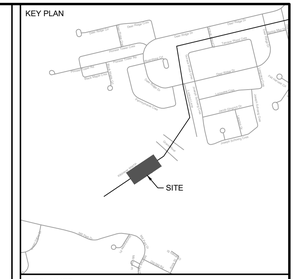

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WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. 236924
CHECKED BY: ANDM	FILE No. -
DATE: December 15, 2023	DRAWING No. C02
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 02 OF 24
LAYOUT NAME:	

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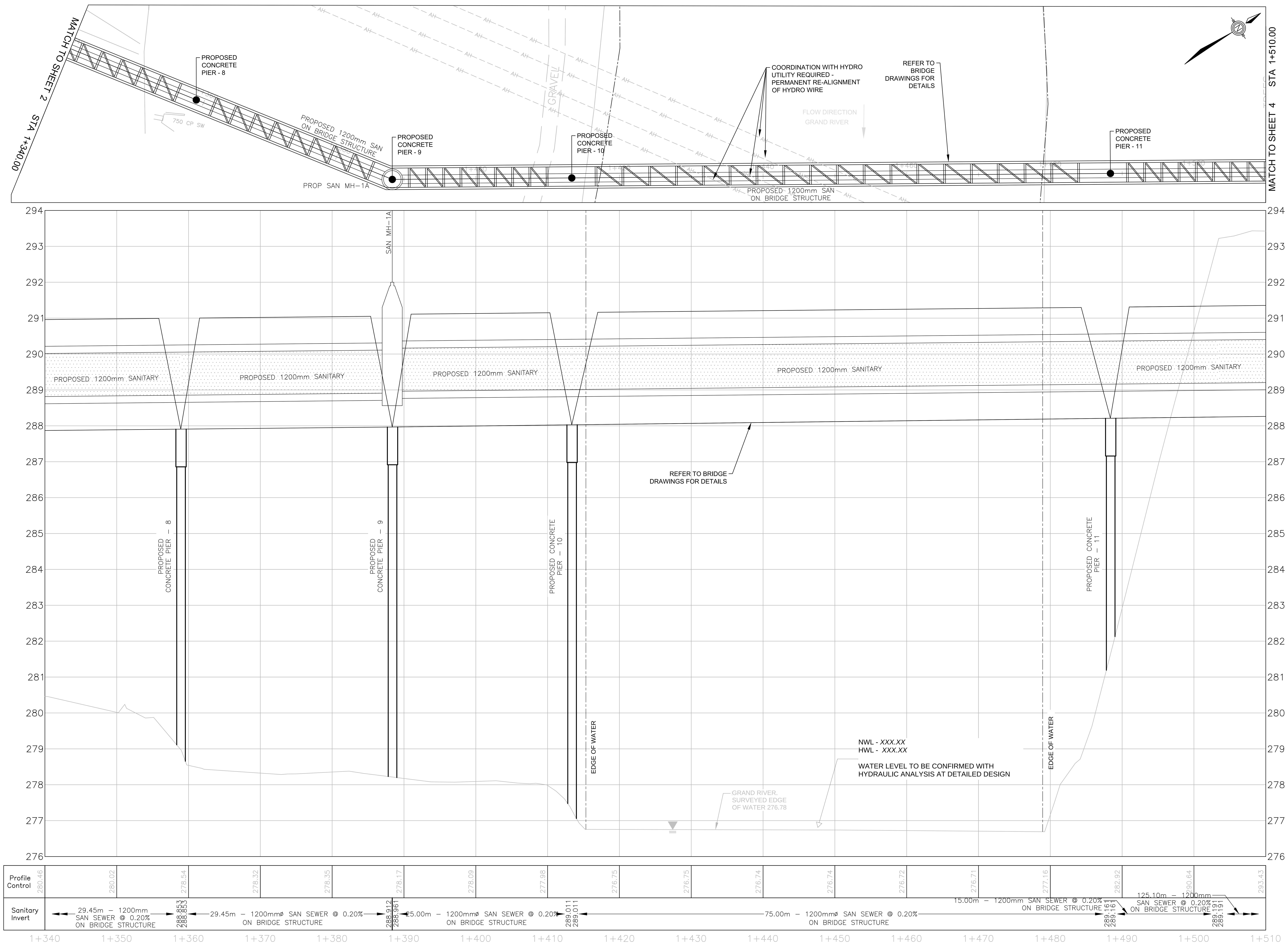

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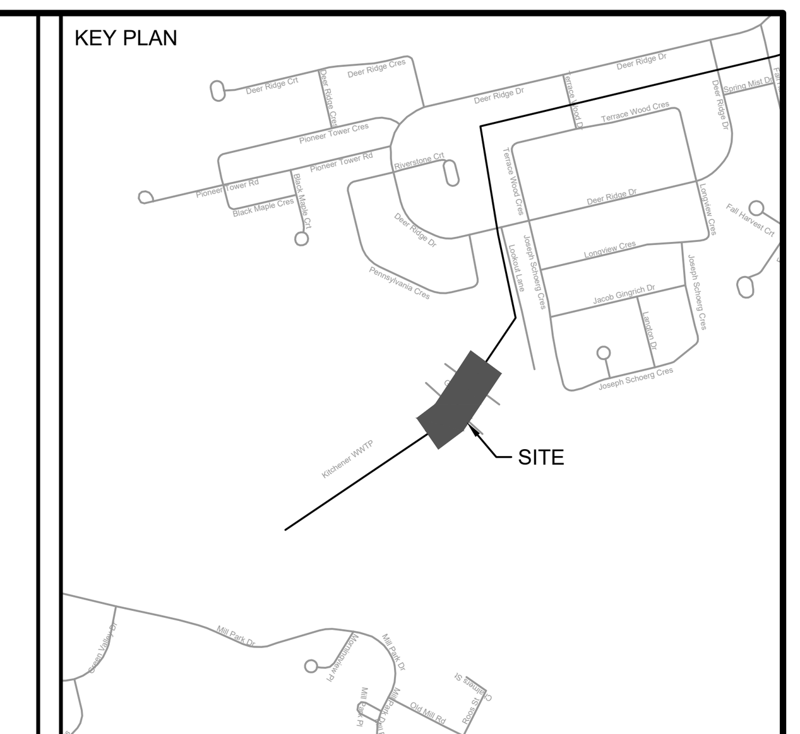

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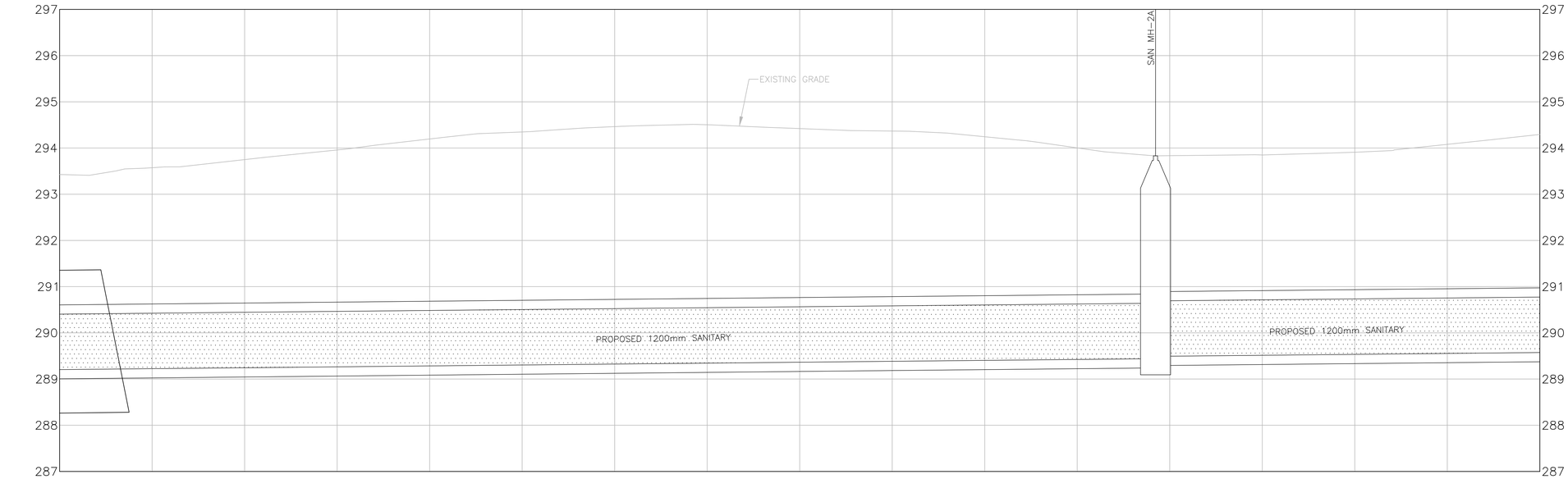
WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: May 31, 2023	DRAWING No. C03
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 03 OF 34
LAYOUT NAME:	

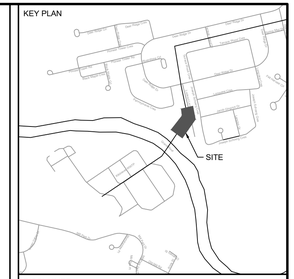
R:\2023\236924 - WATERLOO-EAST SIDE TRUNK SEWER\10 CADDWG\01 LINEAR\04 SHEETS\236924_C01-C05.DWG



Profile Control	293.45	293.57	293.75	293.86	294.20	294.35	294.46	294.50	294.42	294.37	294.24	294.00	293.83	293.85	293.91	294.08	294.29
Sanitary Invert	289.191	125.10m – 1200mmø SAN SEWER @ 0.20% IN VERTICAL TRENCH											289.441 / 289.491	161.61m – 1200mmø SAN SEWER @ 0.20% IN VERTICAL TRENCH			289.814

1+510 1+520 1+530 1+540 1+550 1+560 1+570 1+580 1+590 1+600 1+610 1+620 1+630 1+640 1+650 1+660 1+670

KEY PLAN



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No.	ISSUE/REVISION	BY	DATE
1.	30% INTERIM DESIGN SUBMISSION	E.A.P.	2024.11.08

WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB
CONTRACT No. -
CHECKED BY: EAP
FILE No. -
DATE: NOV 19, 2024
DRAWING No. C04
SCALE HOR. 1:250 VERT. 1:50
SHEET No. 04 OF 34
LAYOUT NAME:

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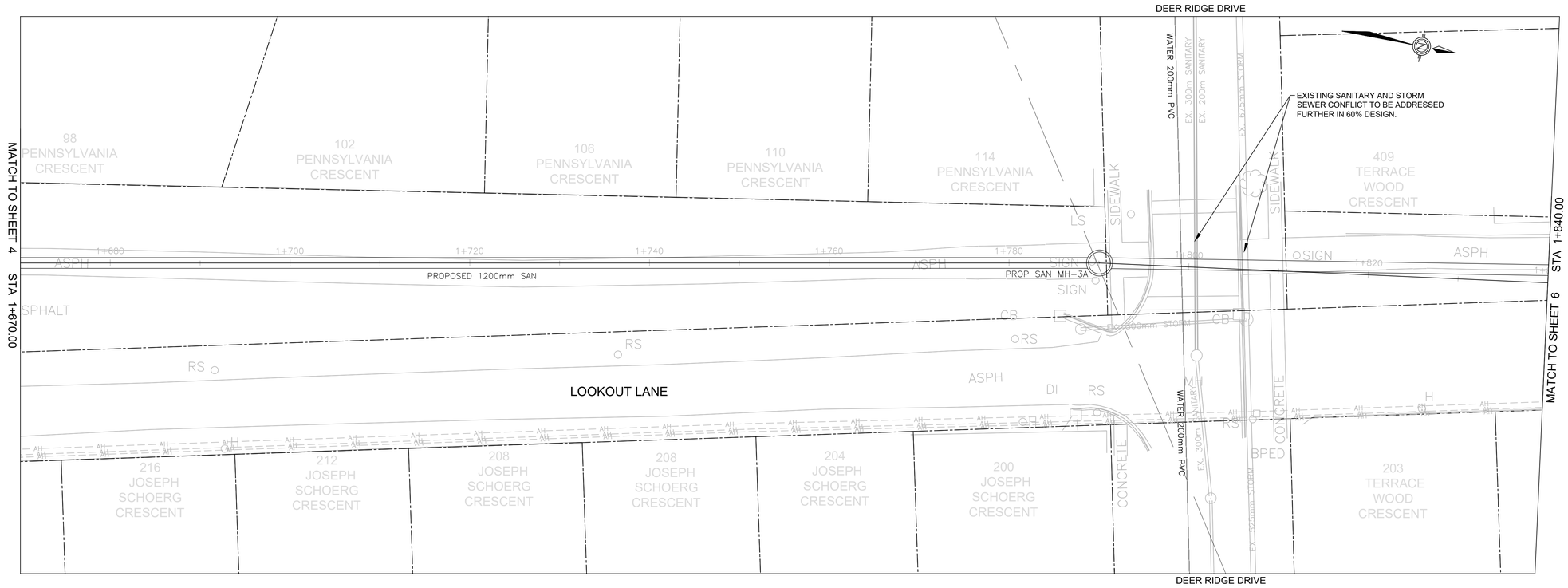
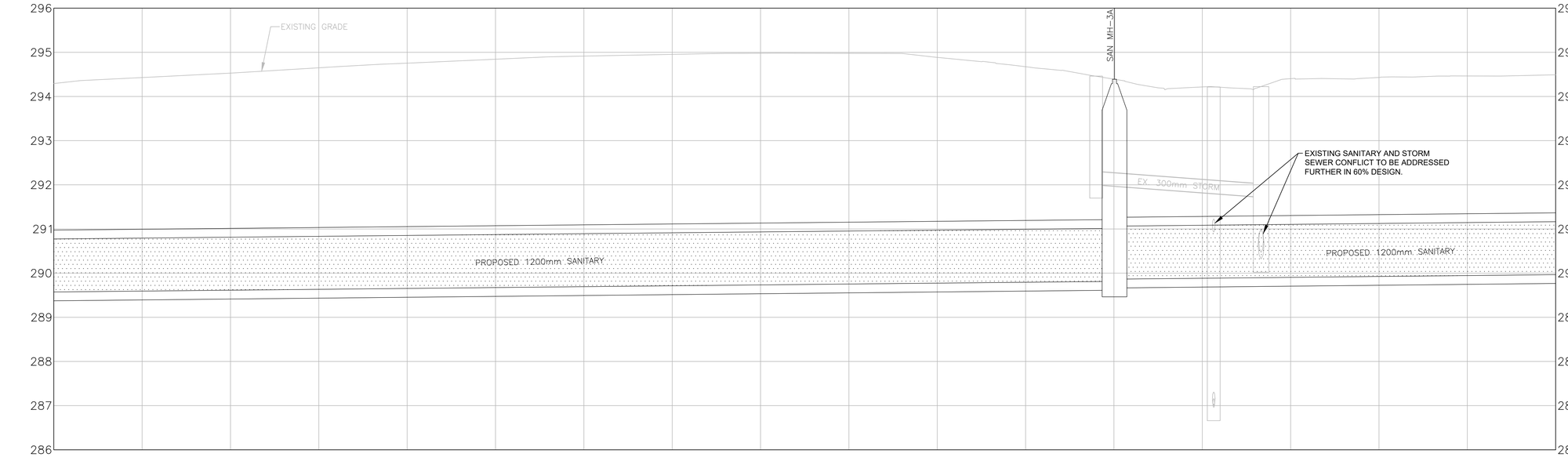
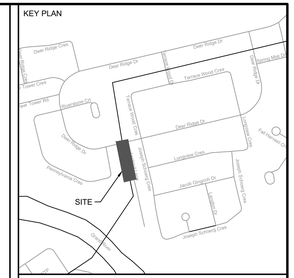




Profile Control	294.29	294.43	294.53	294.65	294.75	294.84	294.91	294.95	294.98	294.98	294.89	294.67	294.39	294.22	294.40	294.43	294.47	294.48	
Sanitary Invert	289.491	161.61m – 1200mmø SAN SEWER @ 0.20% IN VERTICAL TRENCH											289.814	289.864	206.04m – 1200mmø SAN SEWER @ 0.20% IN VERTICAL TRENCH				290.284
	1+670	1+680	1+690	1+700	1+710	1+720	1+730	1+740	1+750	1+760	1+770	1+780	1+790	1+800	1+810	1+820	1+830	1+840	

KEY PLAN



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No.	ISSUE/REVISION	BY	DATE
1.	30% INTERIM DESIGN SUBMISSION	E.A.P.	2024.11.08

WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C05
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 05 OF 34
LAYOUT NAME:	

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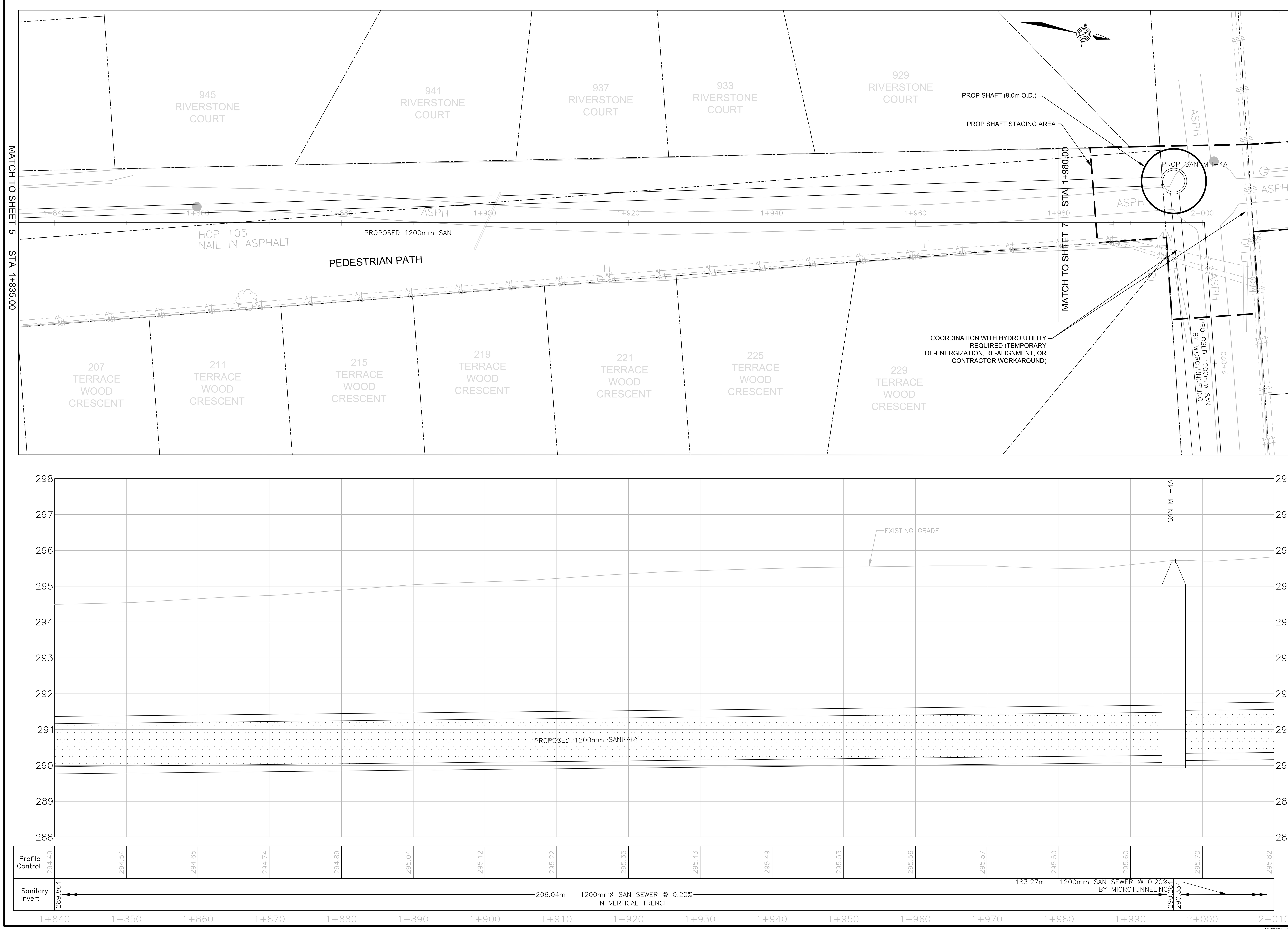

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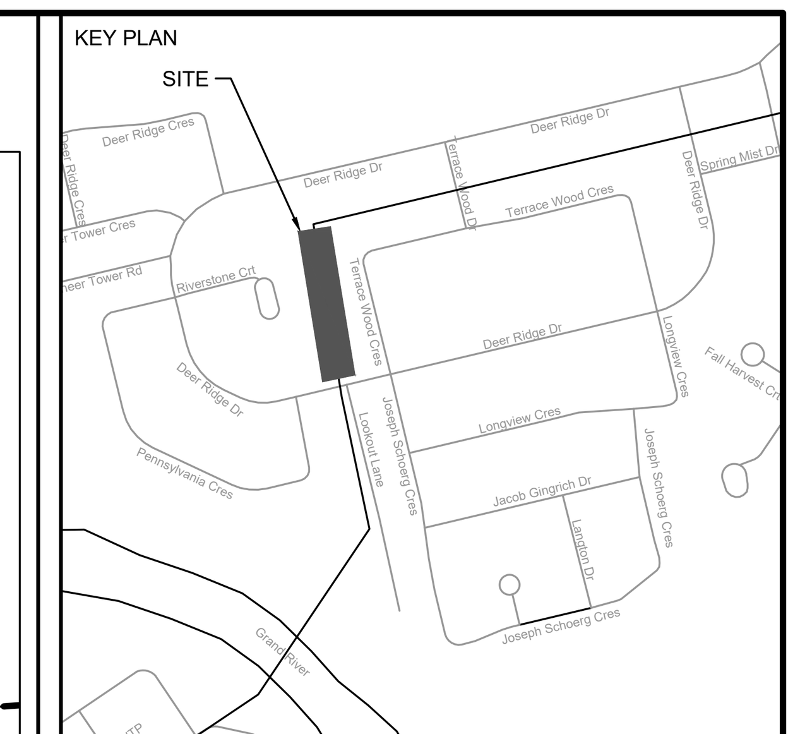

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No.	ISSUE/REVISION	BY	DATE
1.	30% INTERIM DESIGN SUBMISSION	E.A.P.	2024.11.08

WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C06
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 06 OF 34
LAYOUT NAME:	

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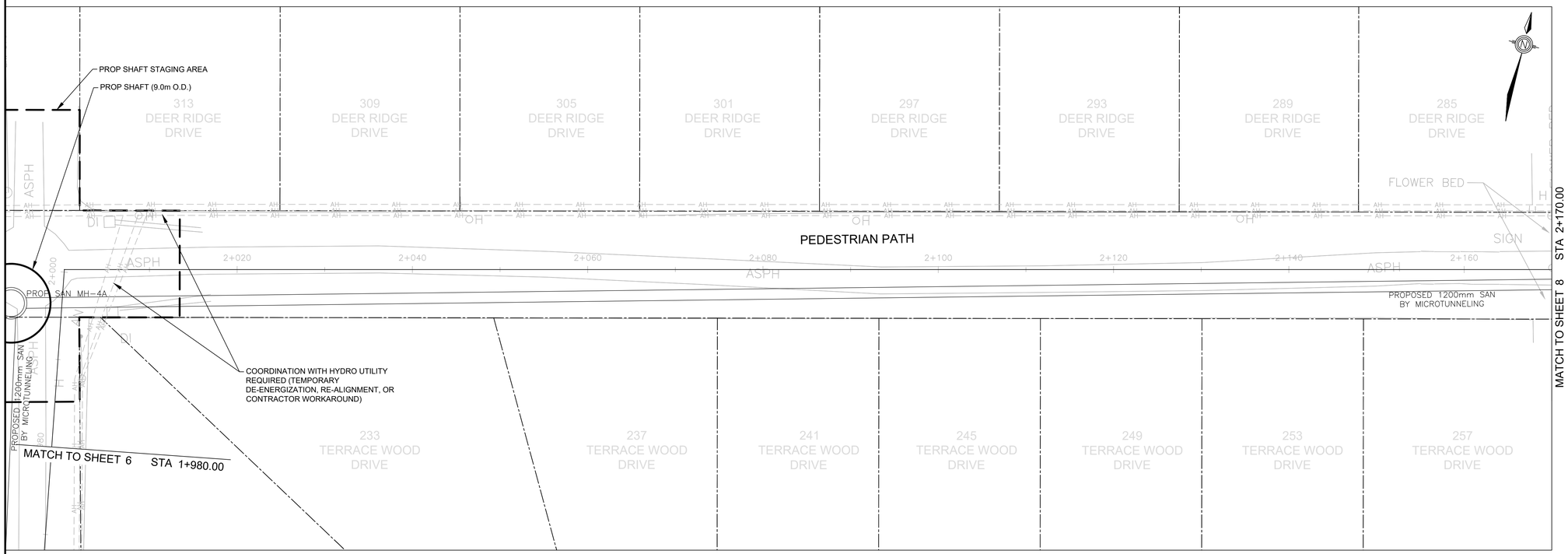

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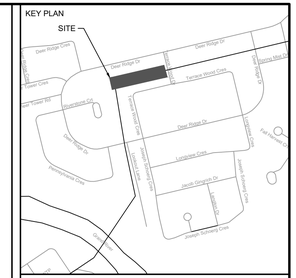

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1.	30% INTERIM DESIGN SUBMISSION	E.A.P.	2024.11.08

WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C07
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 07 OF 34
LAYOUT NAME:	

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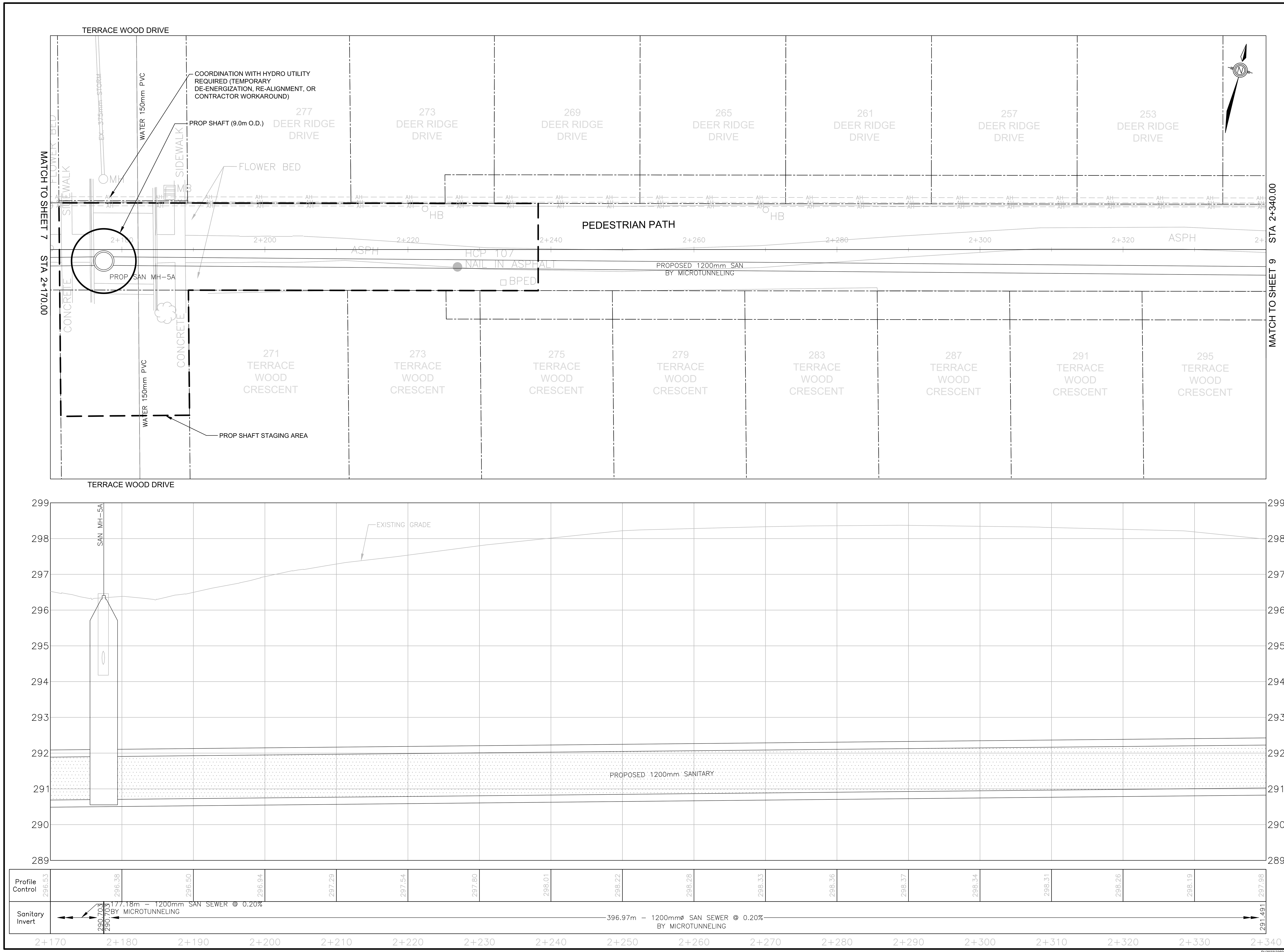

KEY PLAN

SITE

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FIELD BOOK No.

No.	ISSUE/REVISION	BY	DATE
1.	30% INTERIM DESIGN SUBMISSION	E.A.P.	2024.11.08

WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C08
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 08 OF 34
LAYOUT NAME:	

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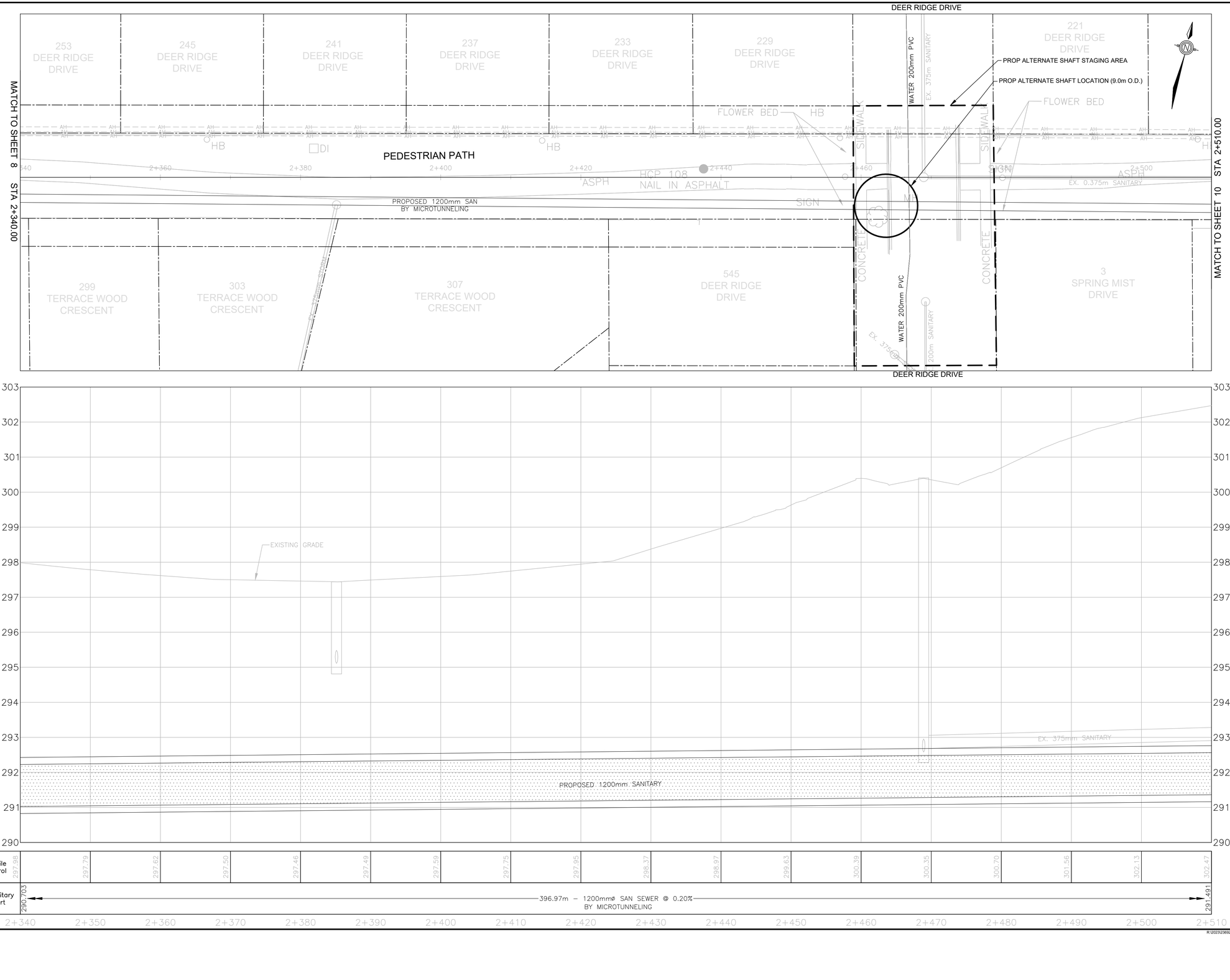
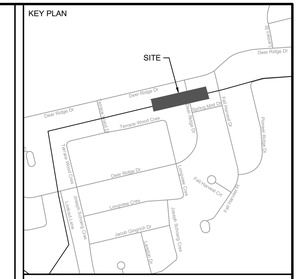


KEY PLAN



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WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C09
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 09 OF 34

LAYOUT NAME:

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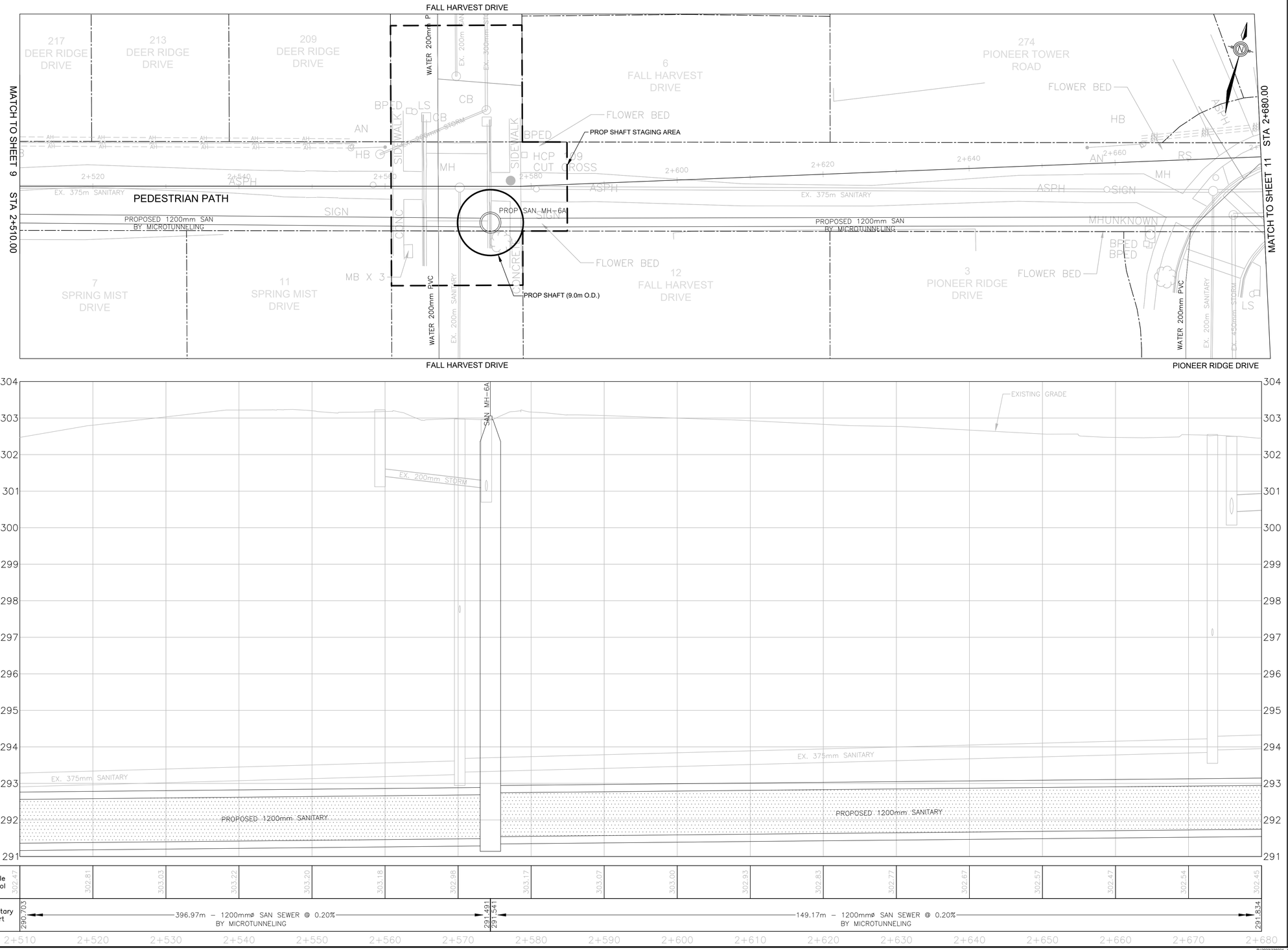

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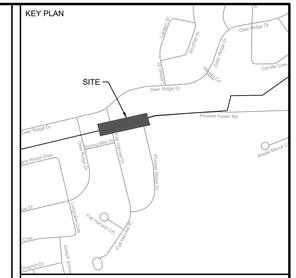

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R.V. ANDERSON ASSOCIATES LIMITED
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Region of Waterloo

CONTROLLING B.M.

FIELD BOOK No.

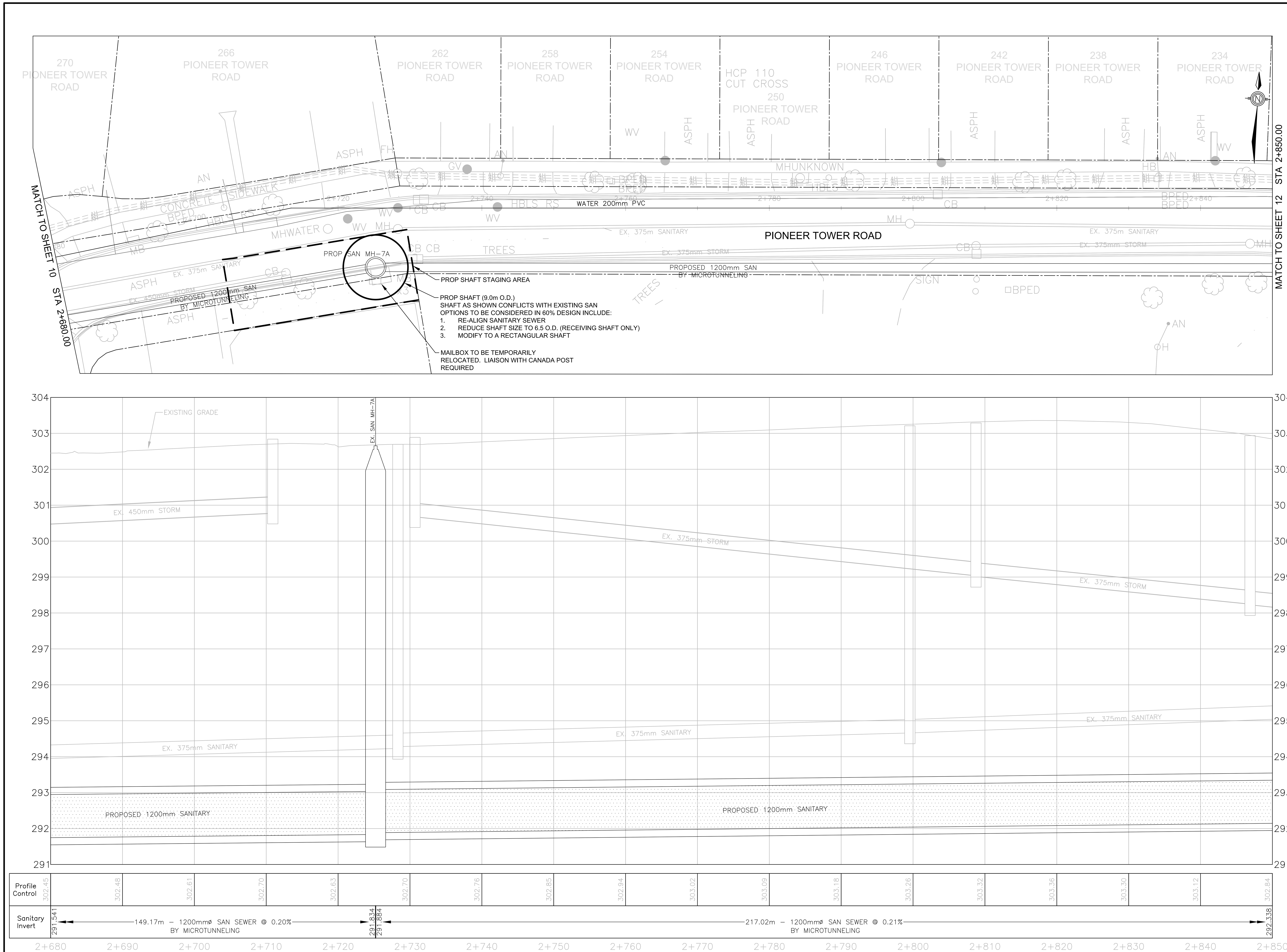
No.	ISSUE/REVISION	BY	DATE
1.	30% INTERIM DESIGN SUBMISSION	E.A.P.	2024.11.08

WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C10
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 10 OF 34
LAYOUT NAME:	

R:\2023\236924 - WATERLOO-EAST SIDE TRUNK SEWER\10 CADDWG\01 LINEAR\04 SHEETS\236924_C06-C10.DWG



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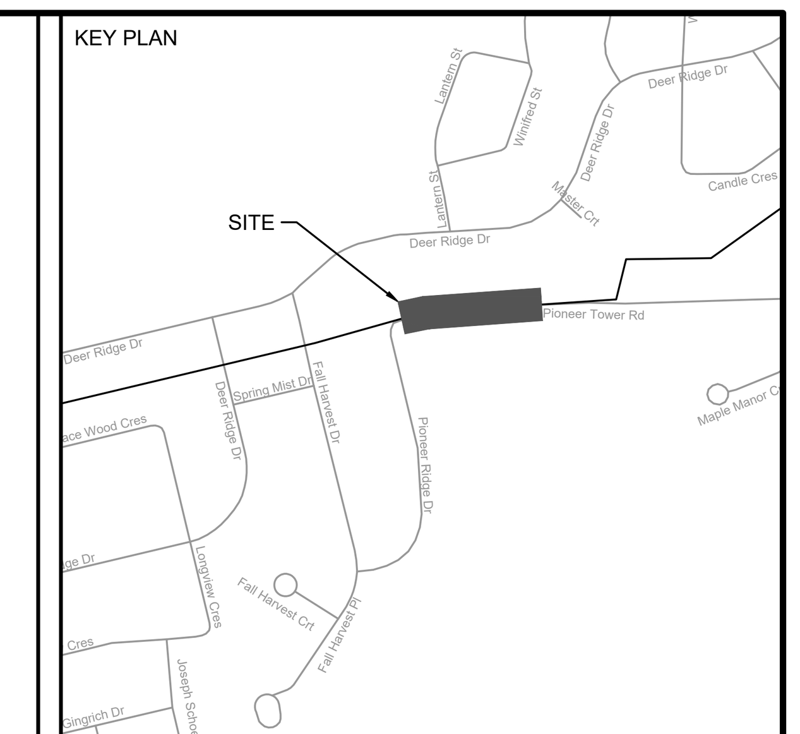

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WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C11
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 11 OF 34
LAYOUT NAME:	

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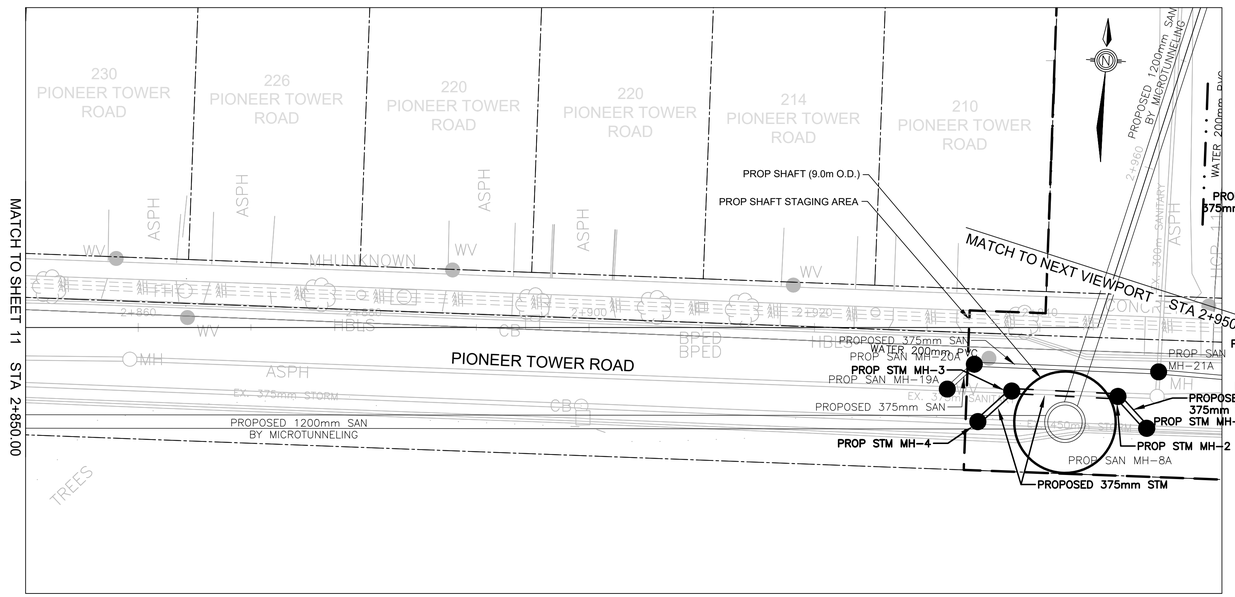

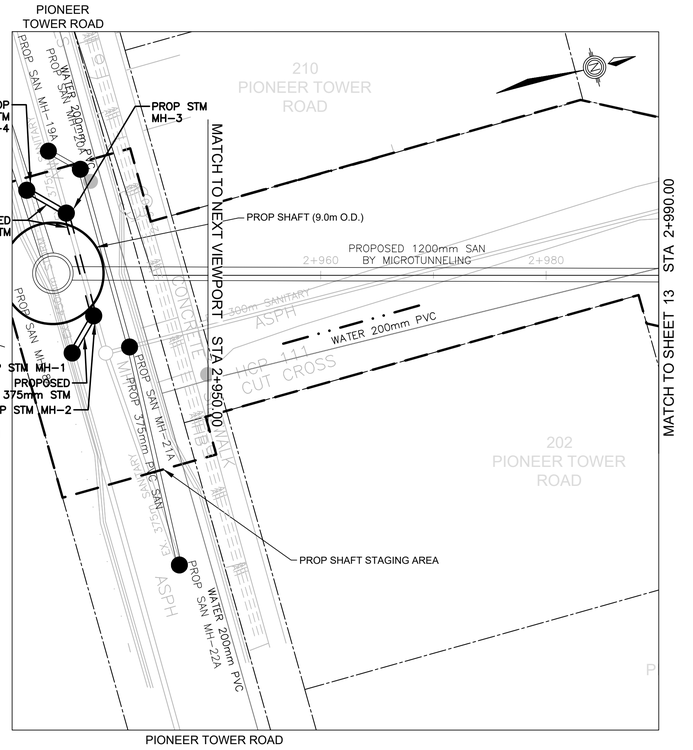

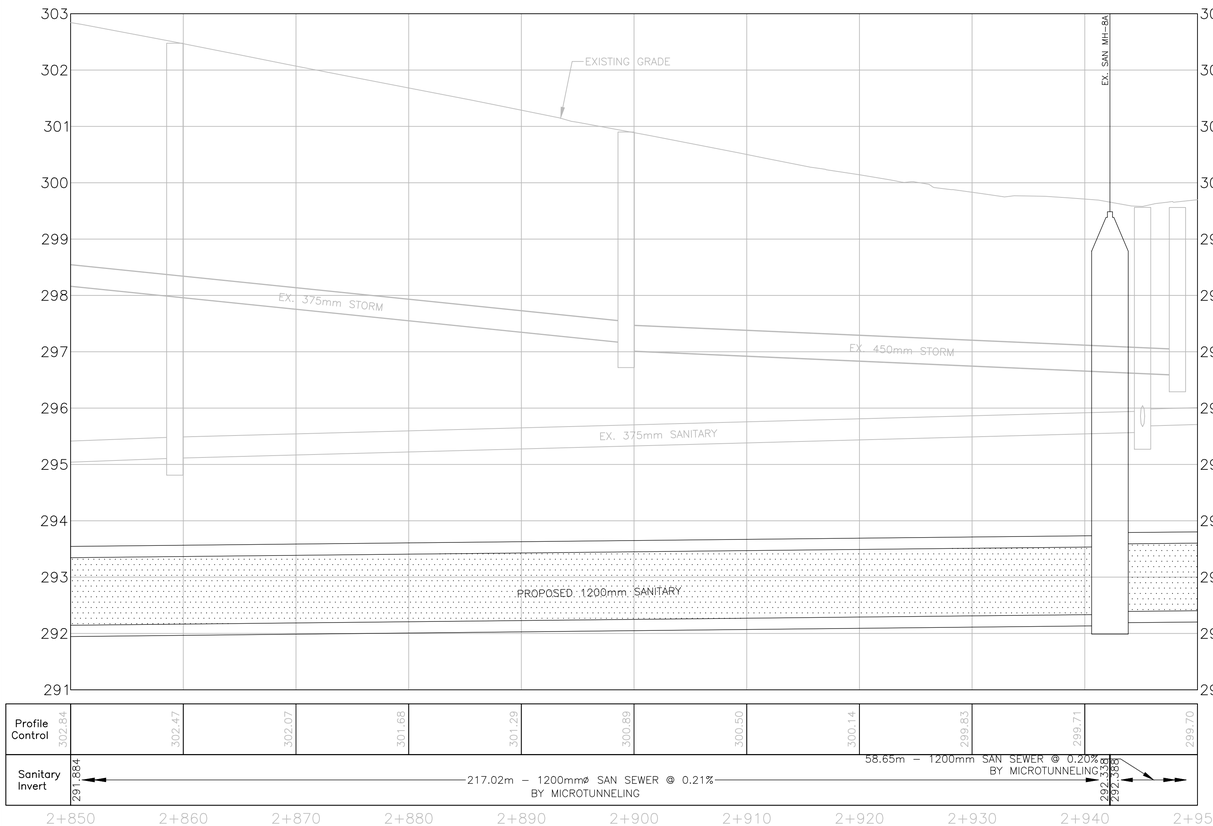

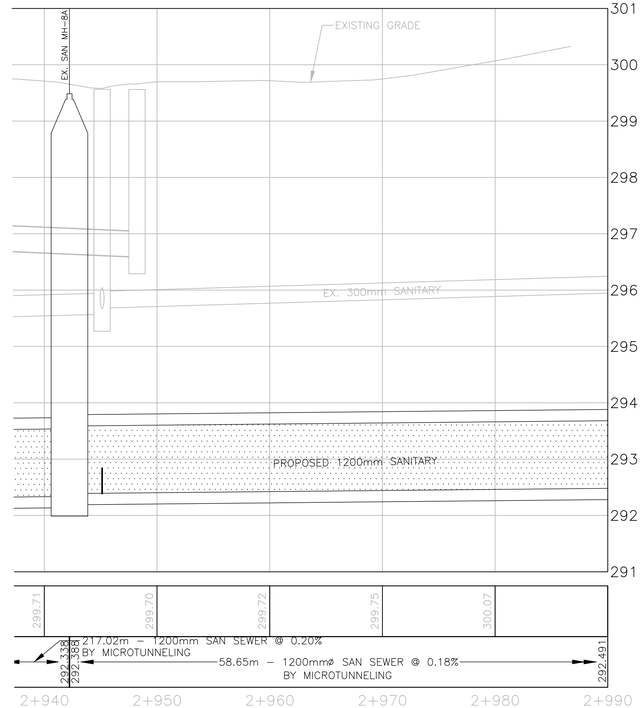

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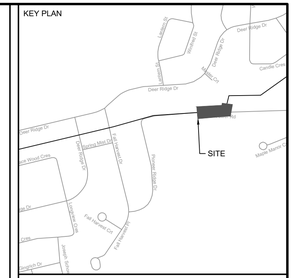

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No.	ISSUE/REVISION	BY	DATE
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WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C12
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 12 OF 34
LAYOUT NAME:	

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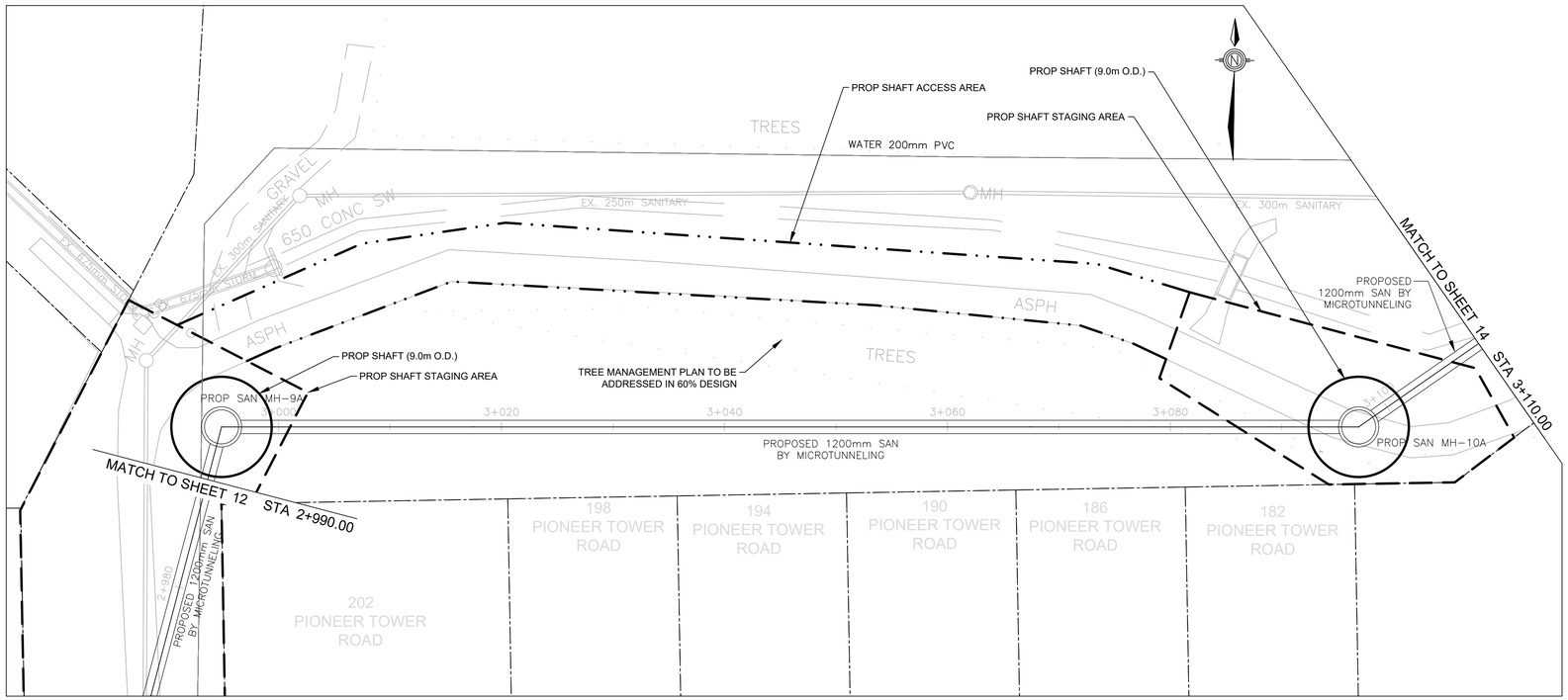

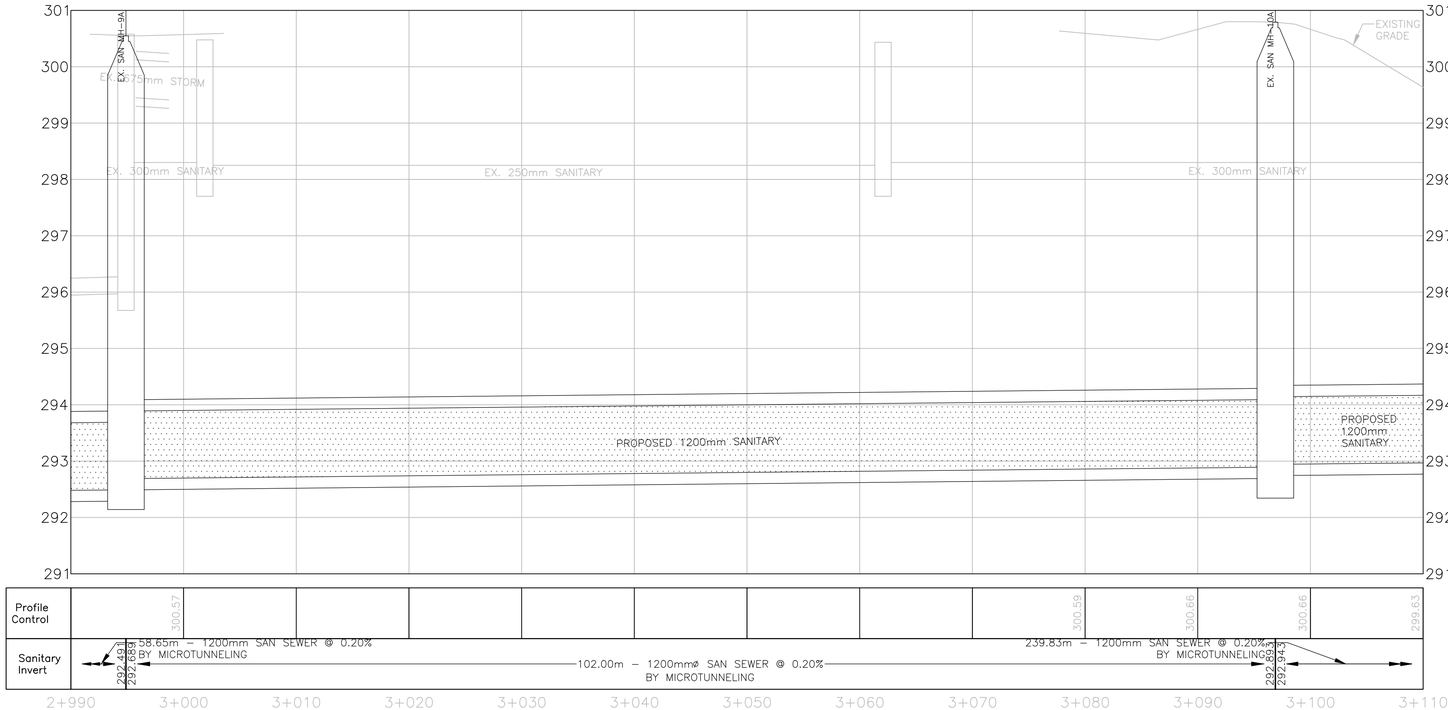

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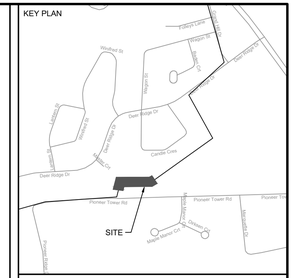

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WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C13
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 13 OF 34
LAYOUT NAME:	

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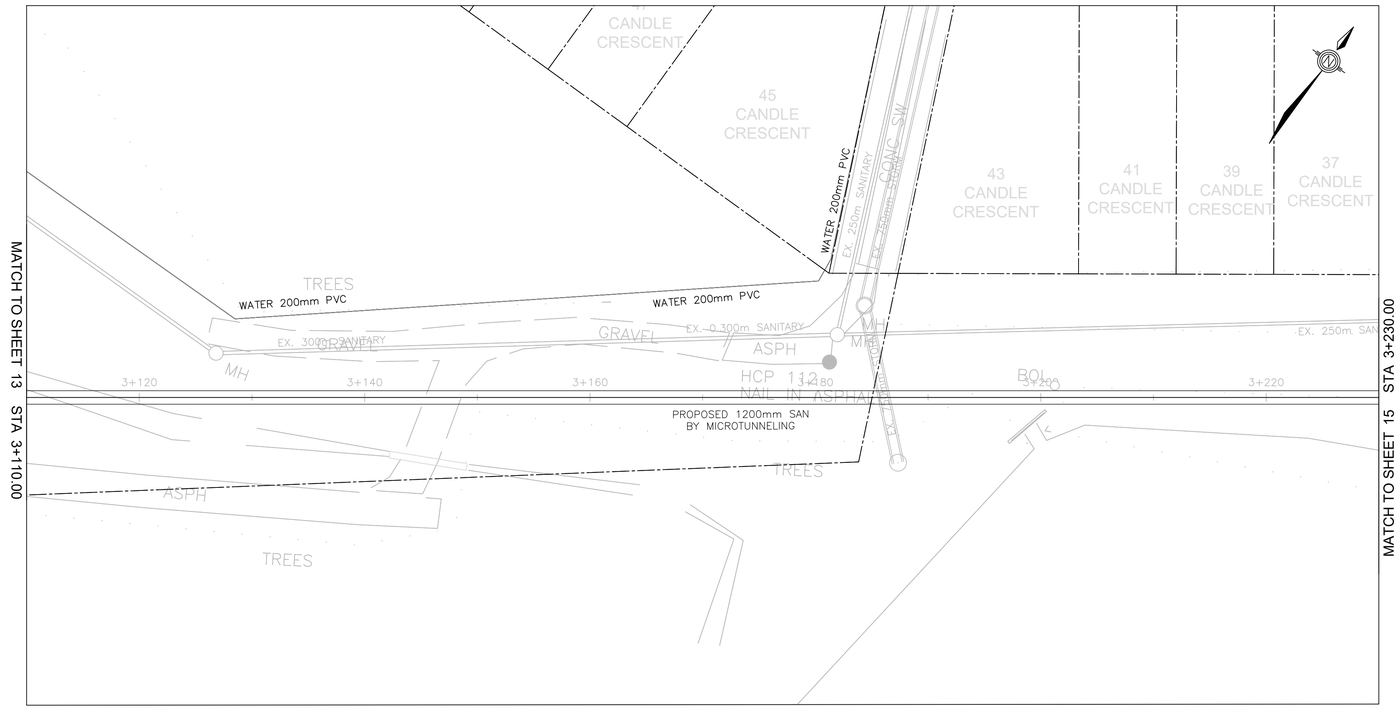

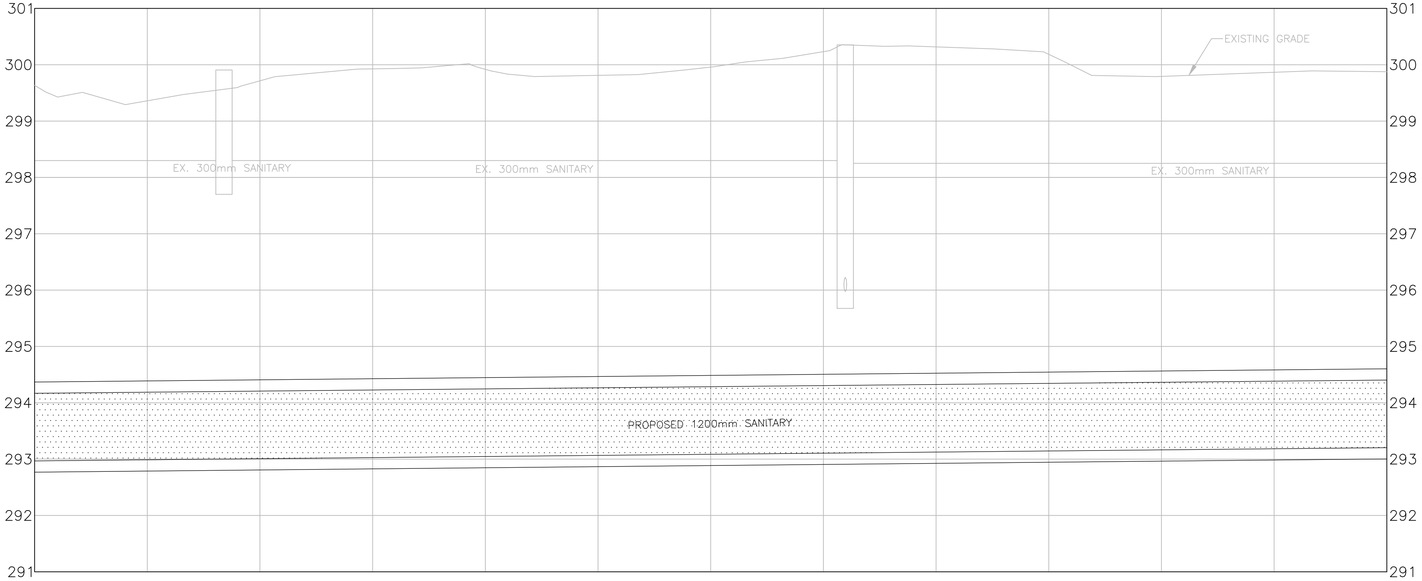

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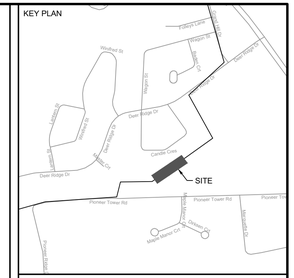

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WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C14
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 14 OF 34
LAYOUT NAME:	

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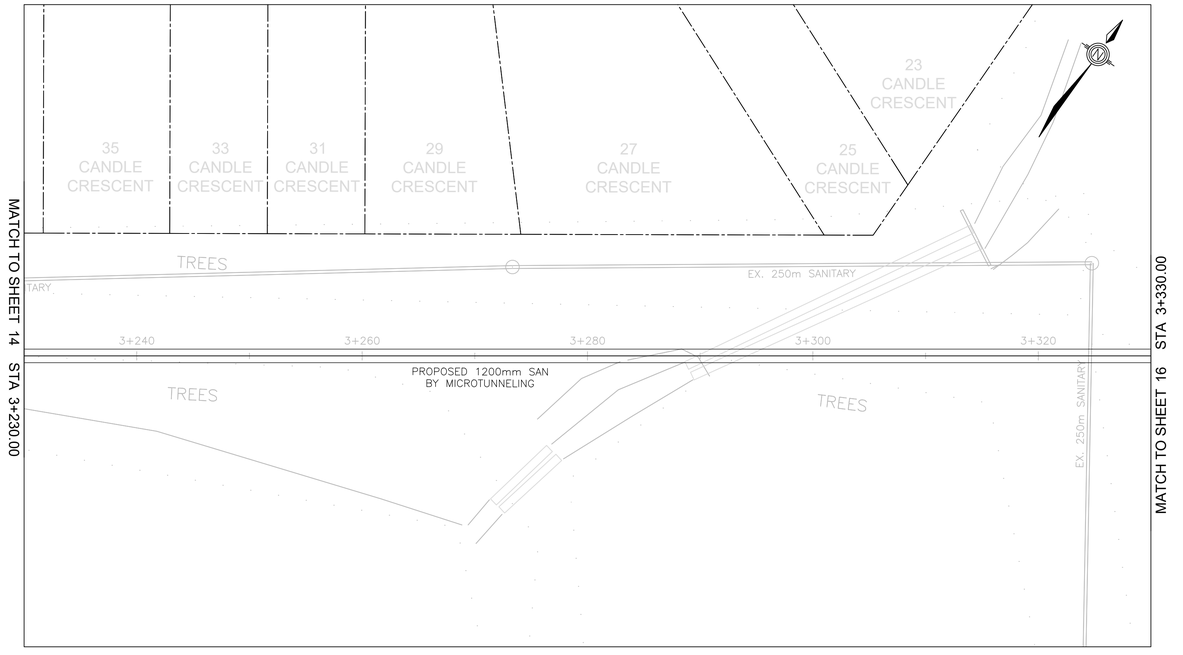

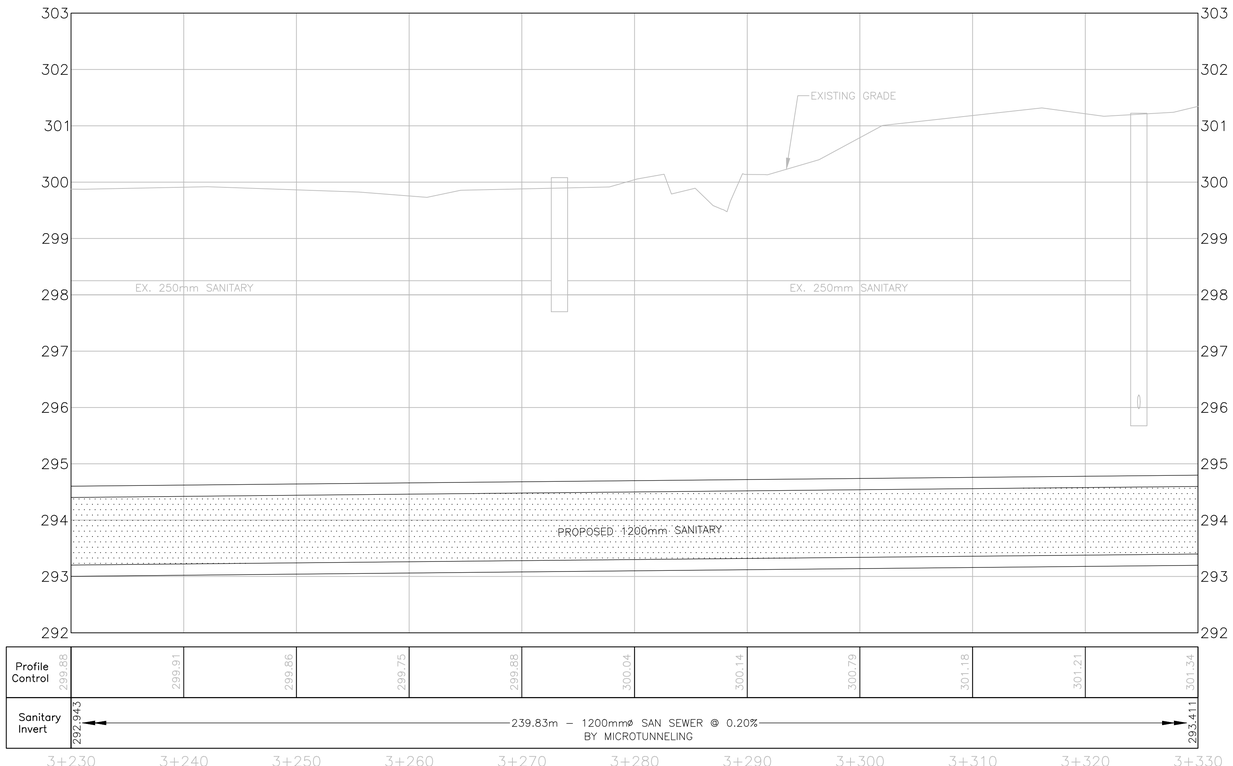

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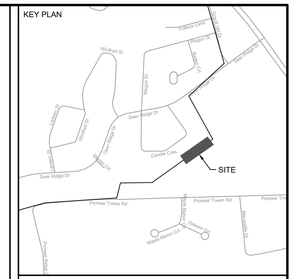

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WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

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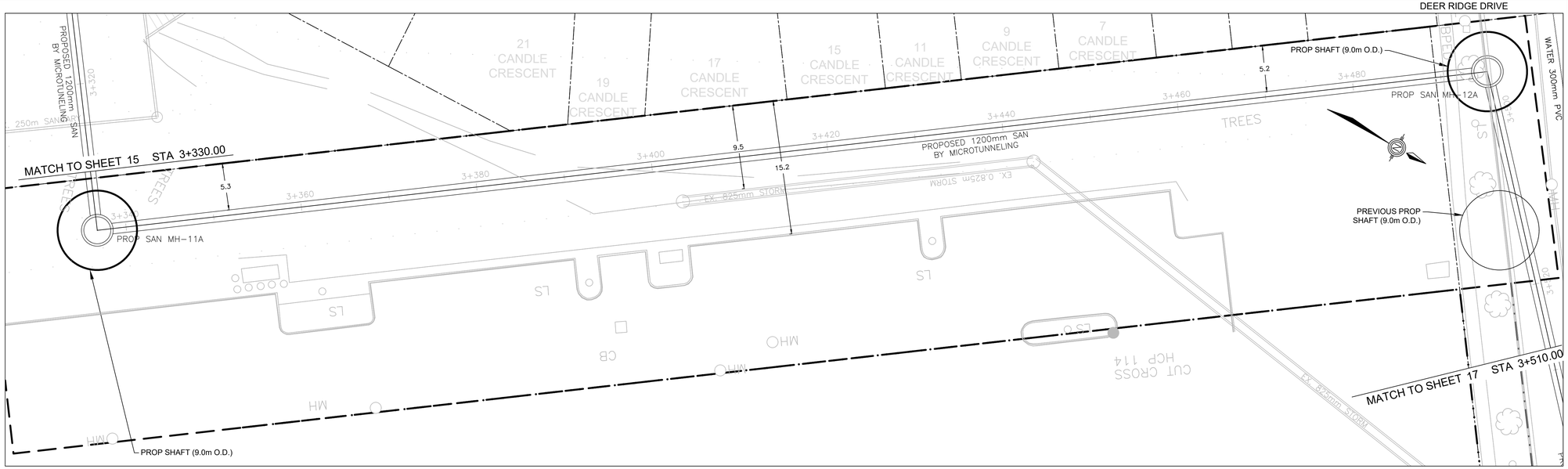
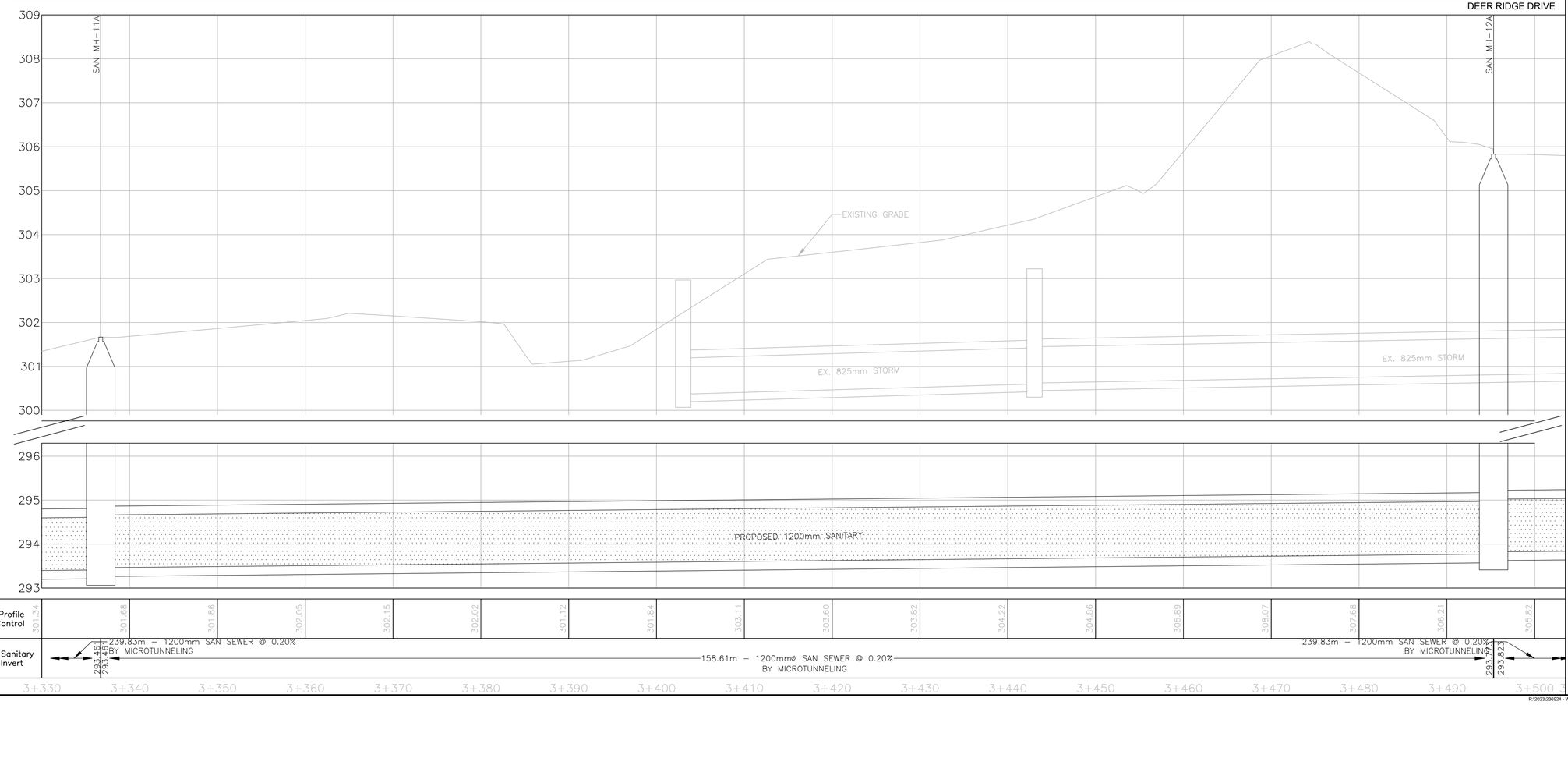
DATE: NOV 08, 2024
SCALE: HOR. 1:250 VERT. 1:50
LAYOUT NAME:

CONTRACT No. -
FILE No. -
DRAWING No. C15
SHEET No. 15 OF 34

R:\2023\236924 - WATERLOO-EAST SIDE TRUNK SEWER\10 CADDWG\01 LINEAR\04 SHEETS\236924_C11-C15.DWG





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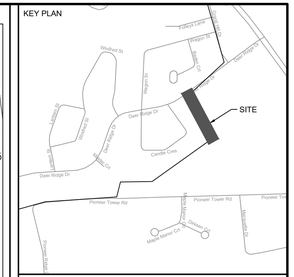

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No.	ISSUE/REVISION	BY	DATE
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WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C16
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 16 OF 34
LAYOUT NAME:	

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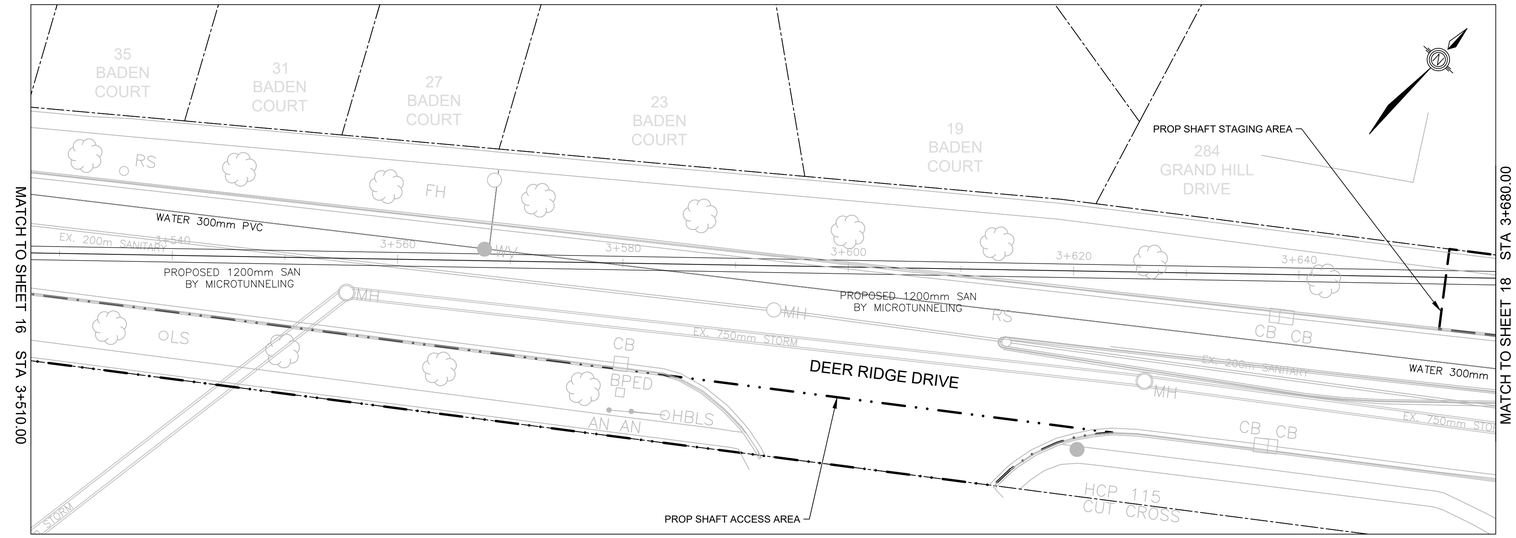

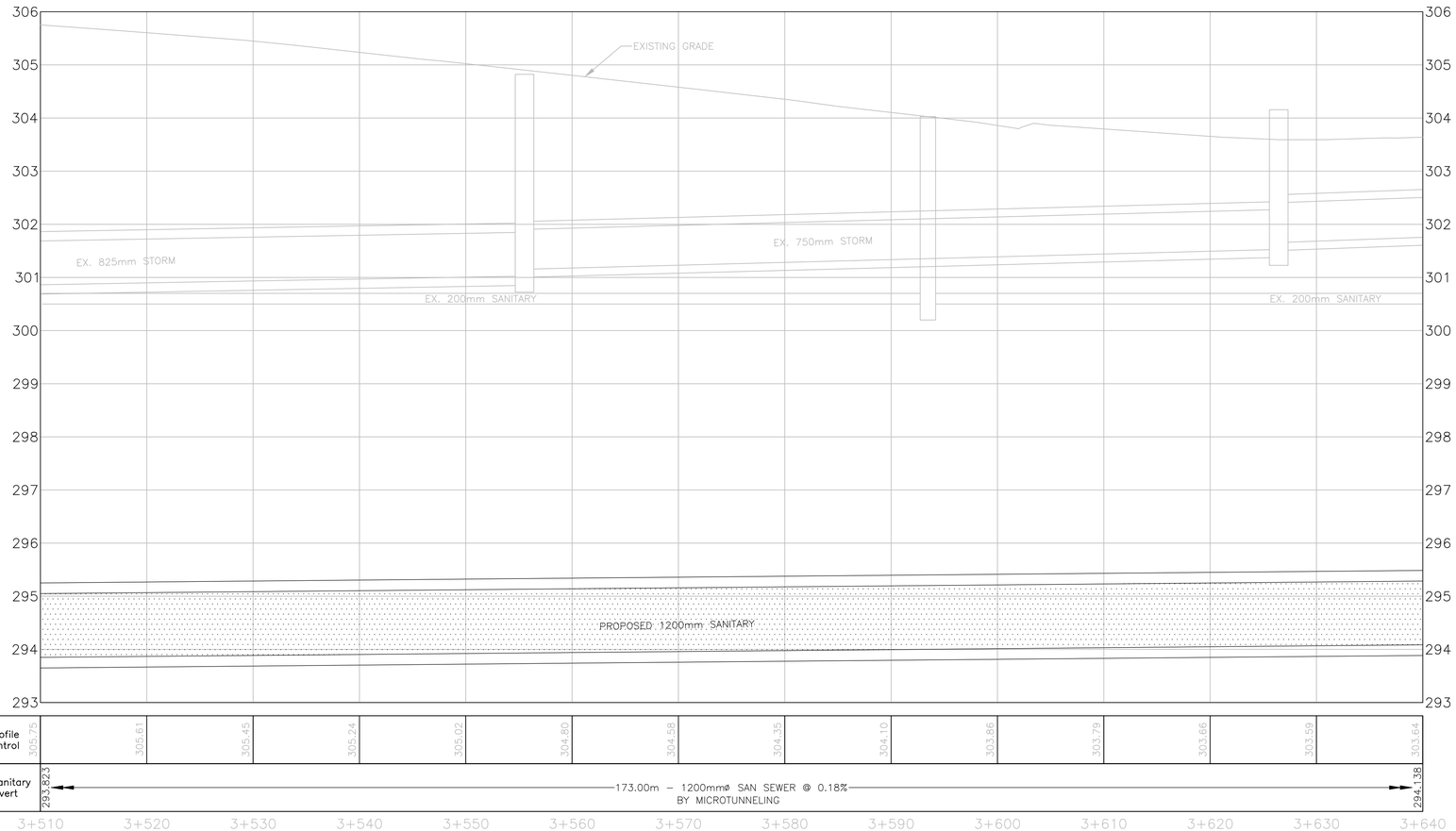

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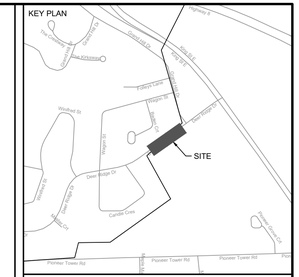

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WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB
CONTRACT No. -
CHECKED BY: EAP
FILE No. -
DATE: NOV 08, 2024
DRAWING No. C17
SCALE HOR. 1:250 VERT. 1:50
SHEET No. 17 OF 34
LAYOUT NAME:

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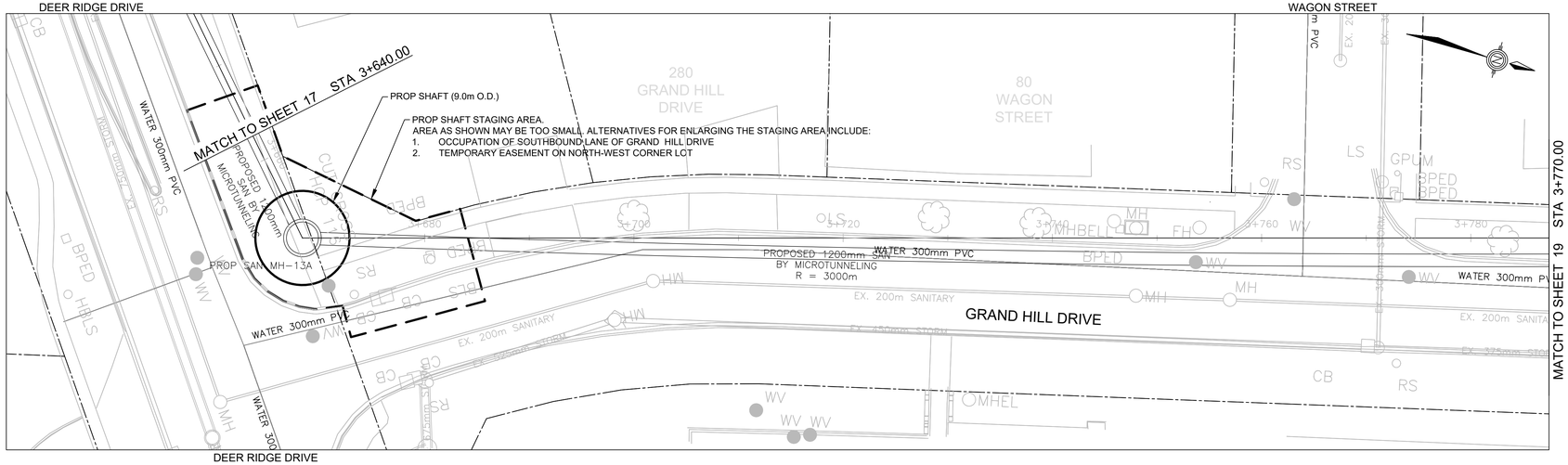

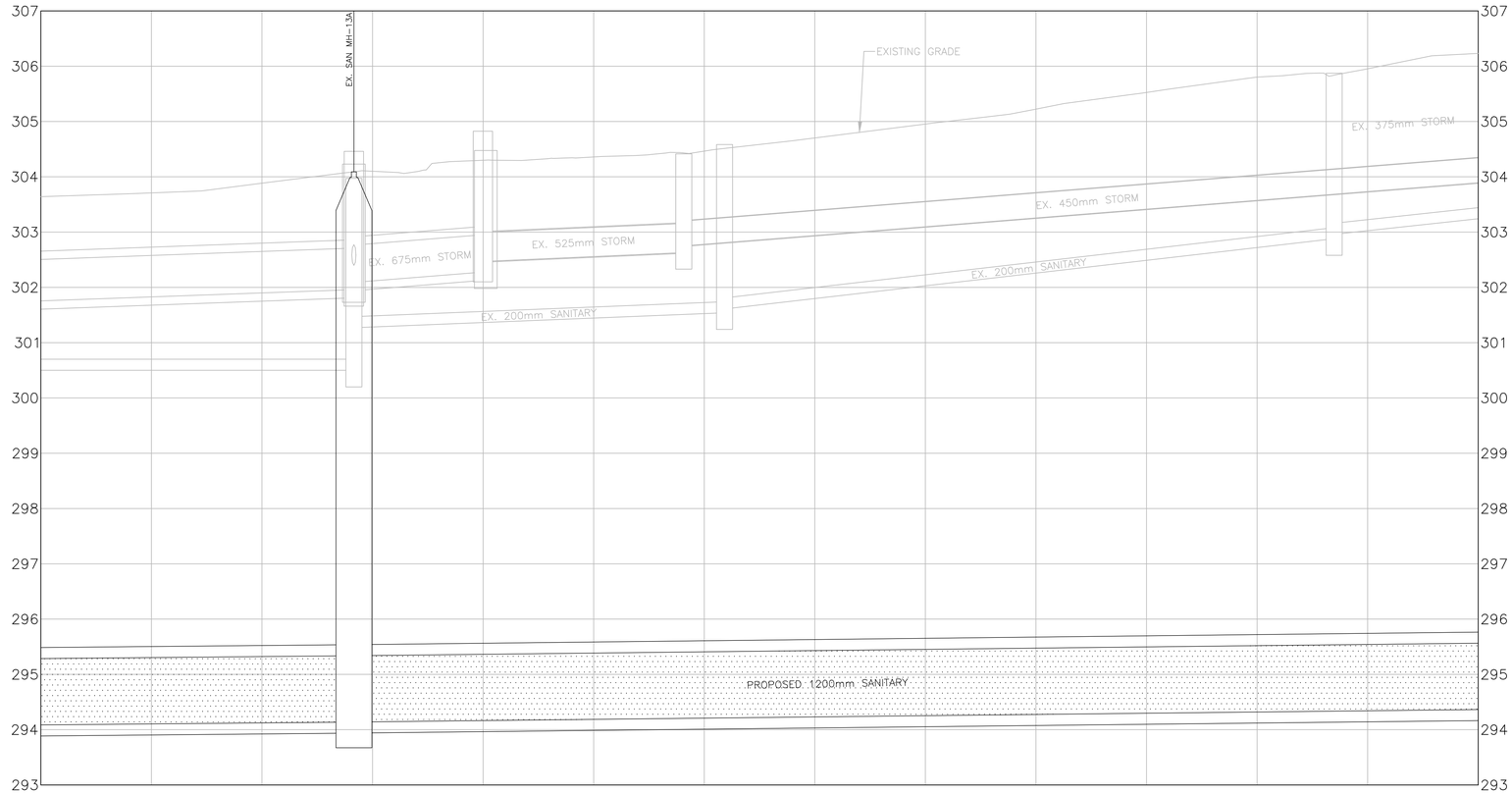

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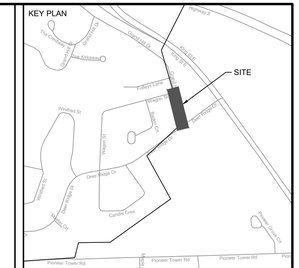

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WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C18
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 18 OF 34

LAYOUT NAME:

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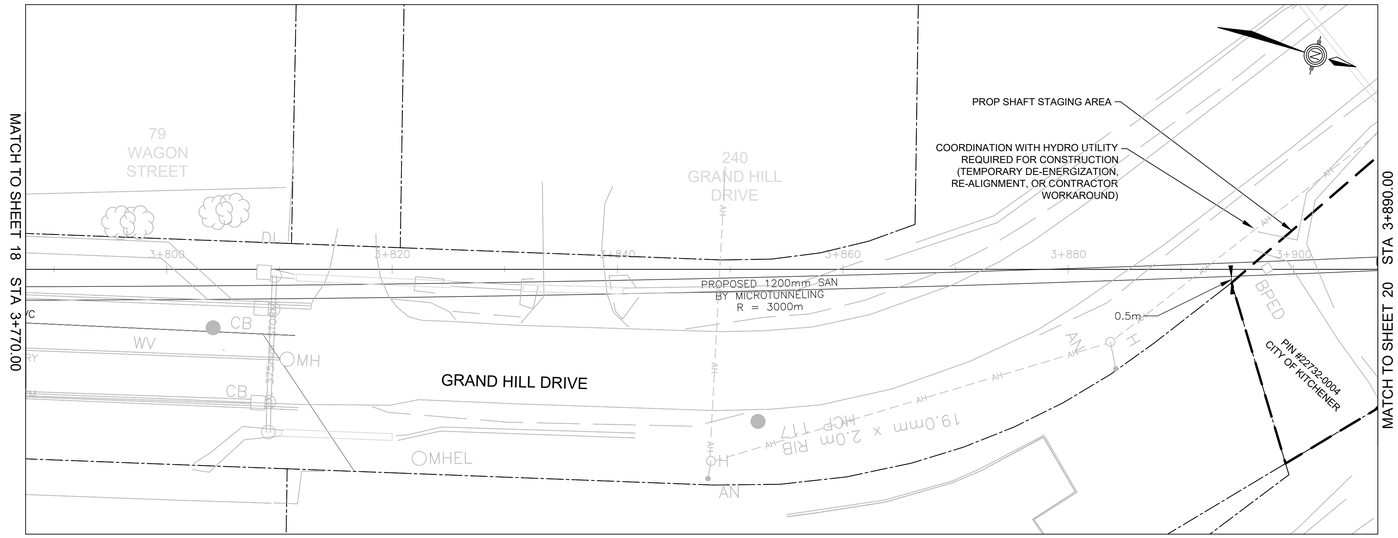

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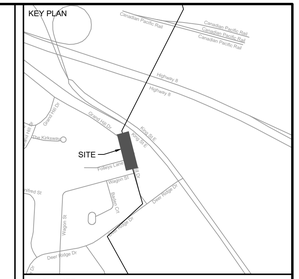

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WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C19
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 19 OF 34

LAYOUT NAME:

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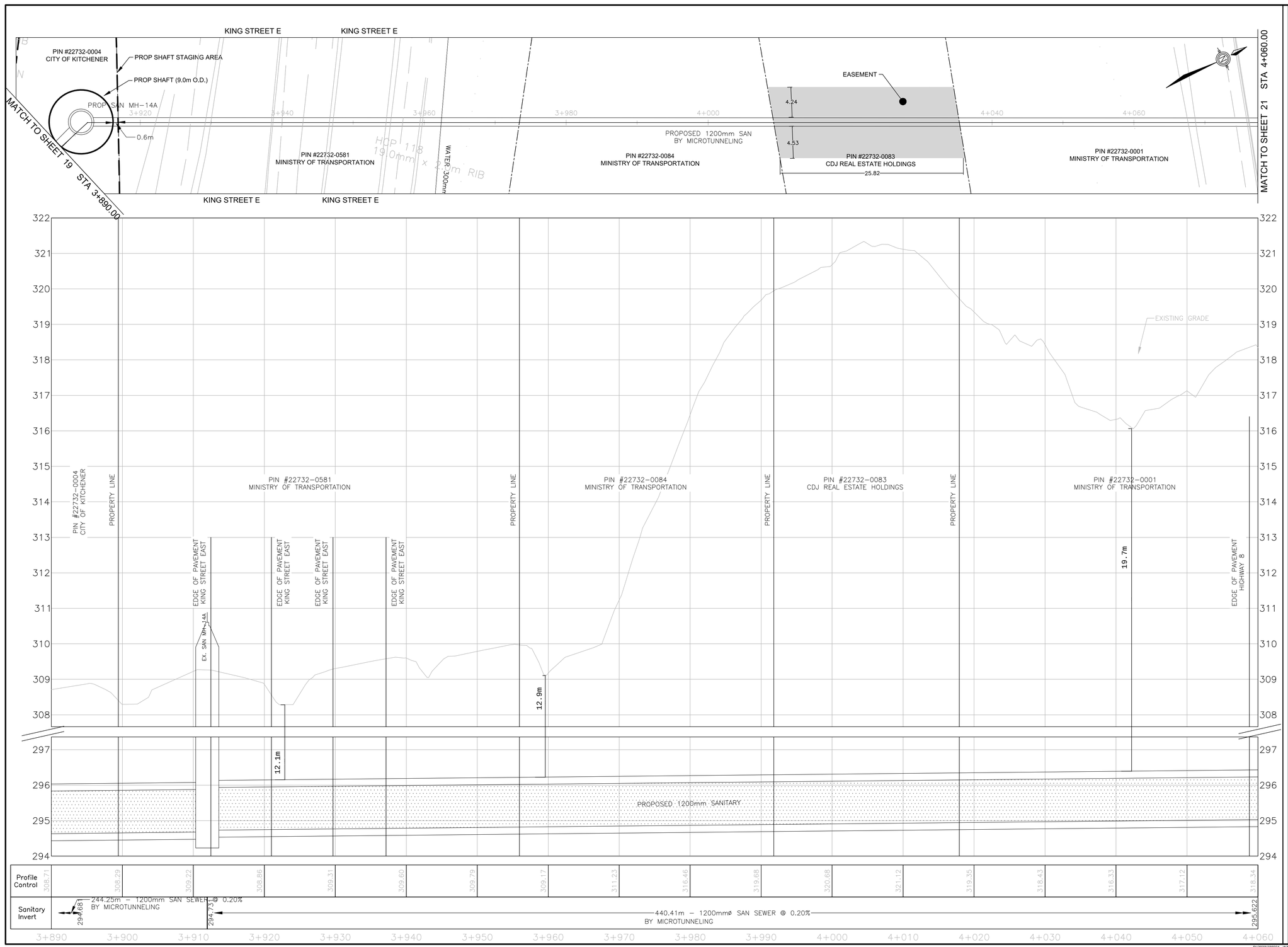

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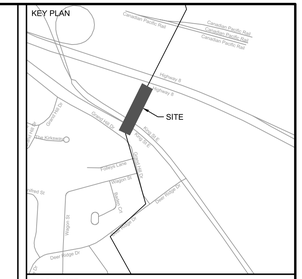

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WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 19, 2024	DRAWING No. C20
SCALE HOR, 1:250 VERT, 1:50	SHEET No. 20 OF 34
LAYOUT NAME:	

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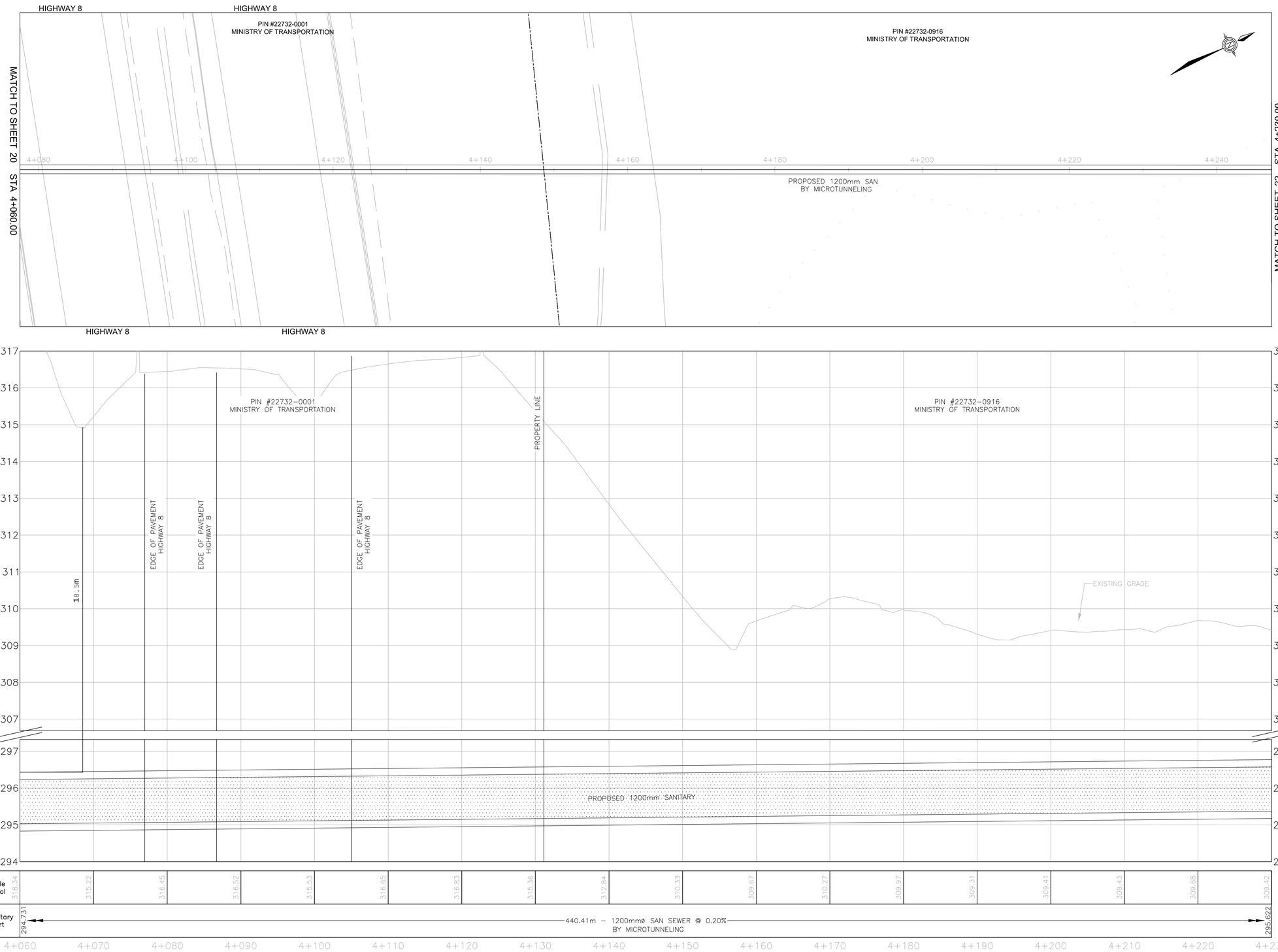

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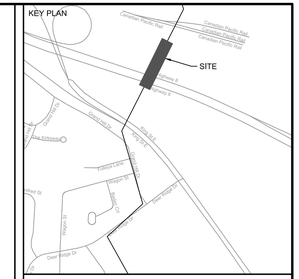

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R.V. ANDERSON ASSOCIATES LIMITED
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Region of Waterloo

CONTROLLING B.M.

FIELD BOOK No.

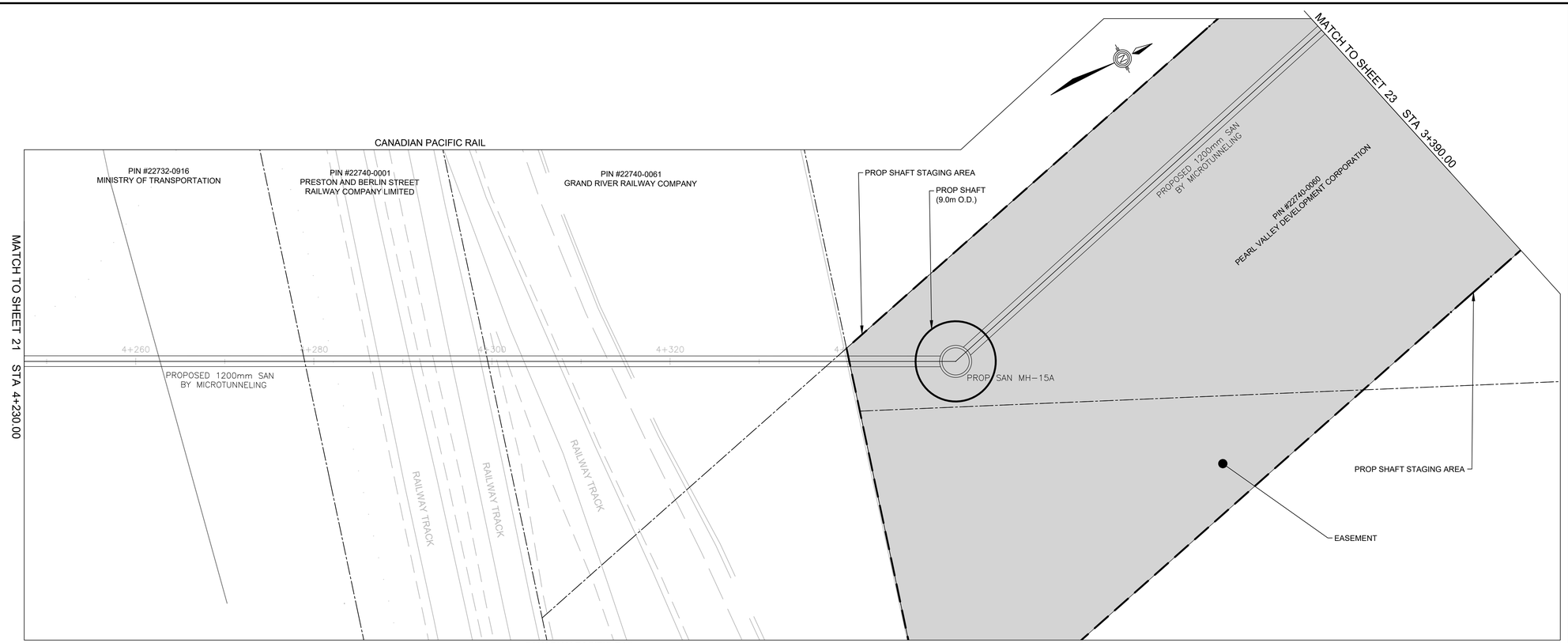
No.	ISSUE/REVISION	BY	DATE
1.	30% INTERIM DESIGN SUBMISSION	E.A.P.	2024.11.08

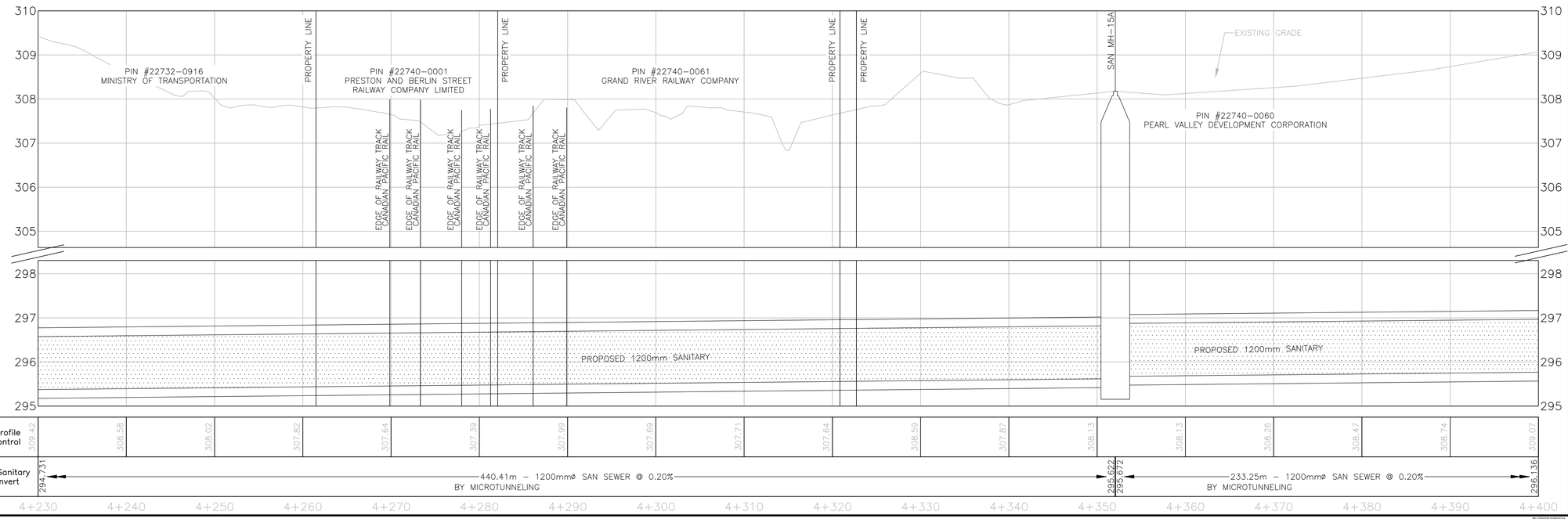
WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 19, 2024	DRAWING No. C21
SCALE HOR, 1:250 VERT, 1:50	SHEET No. 21 OF 34
LAYOUT NAME:	

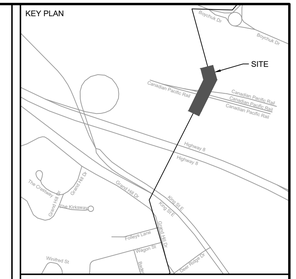
R:\2023\236924 - WATERLOO-EAST SIDE TRUNK SEWER\10 CAD\DWG\01 LINEAR\04 SHEETS\236924_C21-C25.DWG





Profile Control	309.42	308.58	308.02	307.82	307.64	307.39	307.99	307.69	307.71	307.64	308.50	307.87	308.13	308.13	308.26	308.47	308.74	309.07	
Sanitary Invert	294.731	440.41m – 1200mmø SAN SEWER @ 0.20% BY MICROTUNNELING											295.622	295.672	233.25m – 1200mmø SAN SEWER @ 0.20% BY MICROTUNNELING				296.136
	4+230	4+240	4+250	4+260	4+270	4+280	4+290	4+300	4+310	4+320	4+330	4+340	4+350	4+360	4+370	4+380	4+390	4+400	

KEY PLAN



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FIELD BOOK No.

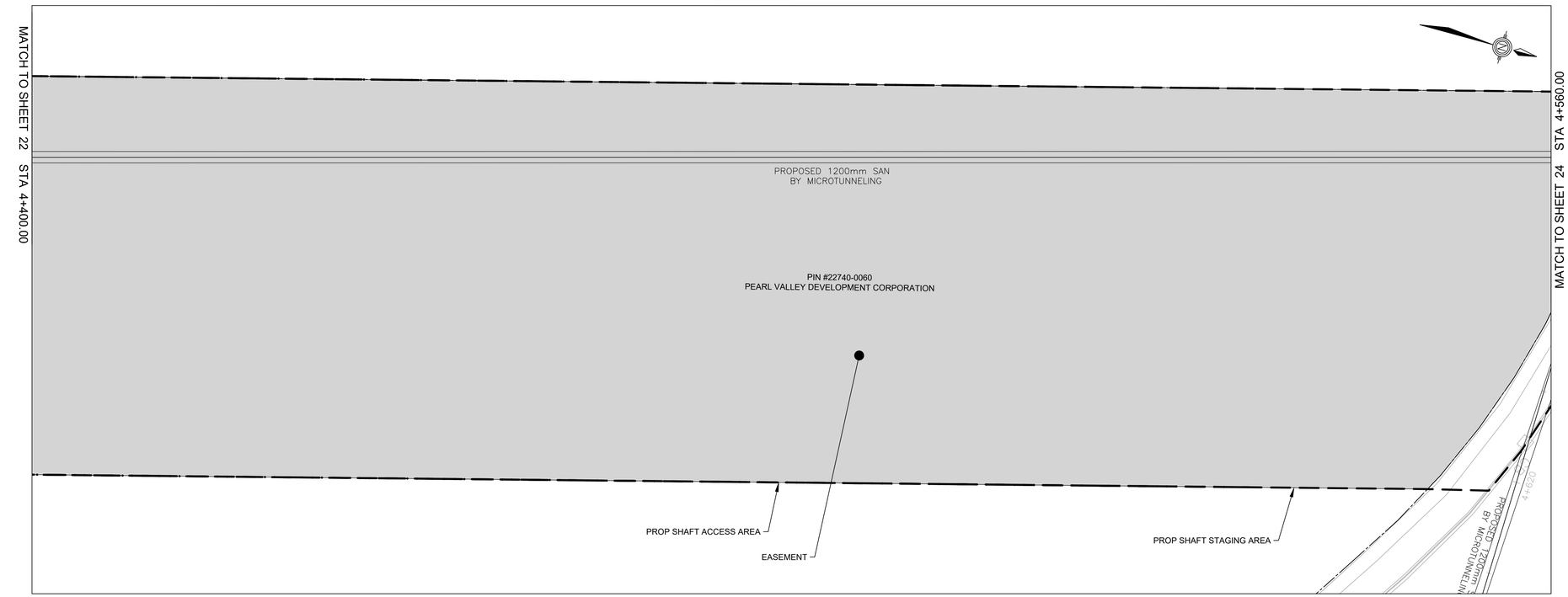
No.	ISSUE/REVISION	BY	DATE
1.	30% INTERIM DESIGN SUBMISSION	E.A.P.	2024.11.08

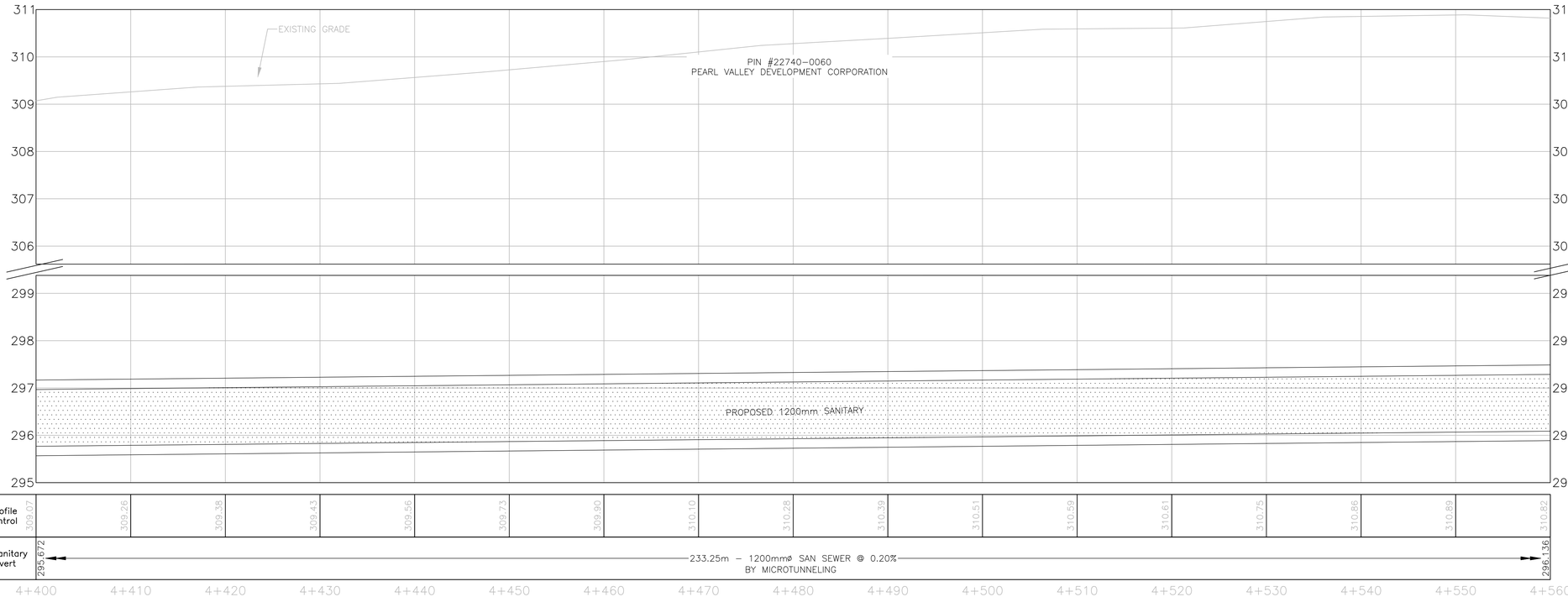
WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C22
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 22 OF 34
LAYOUT NAME:	

R:\2023\236924 - WATERLOO-EAST SIDE TRUNK SEWER\10 CAD\DWG\01 LINEAR\04 SHEETS\236924_C21-C25.DWG





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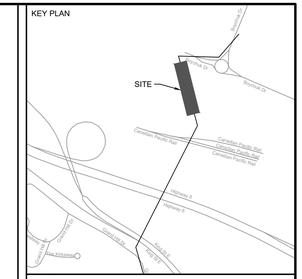

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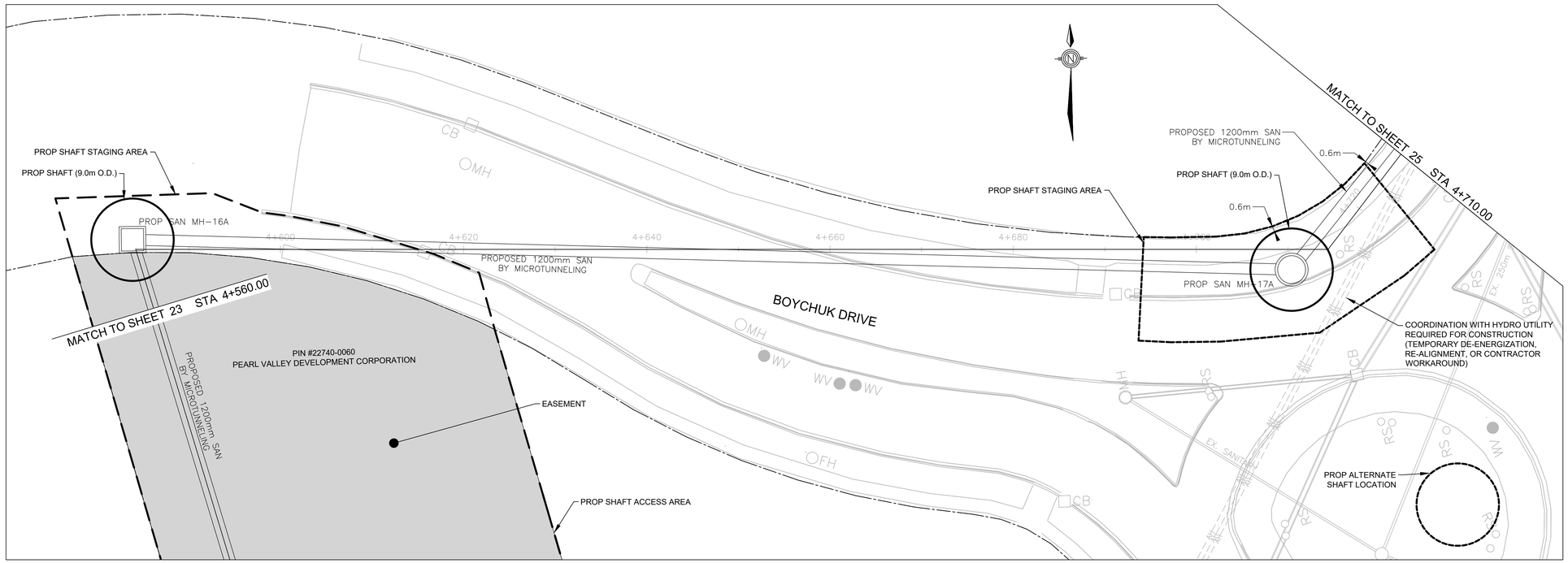
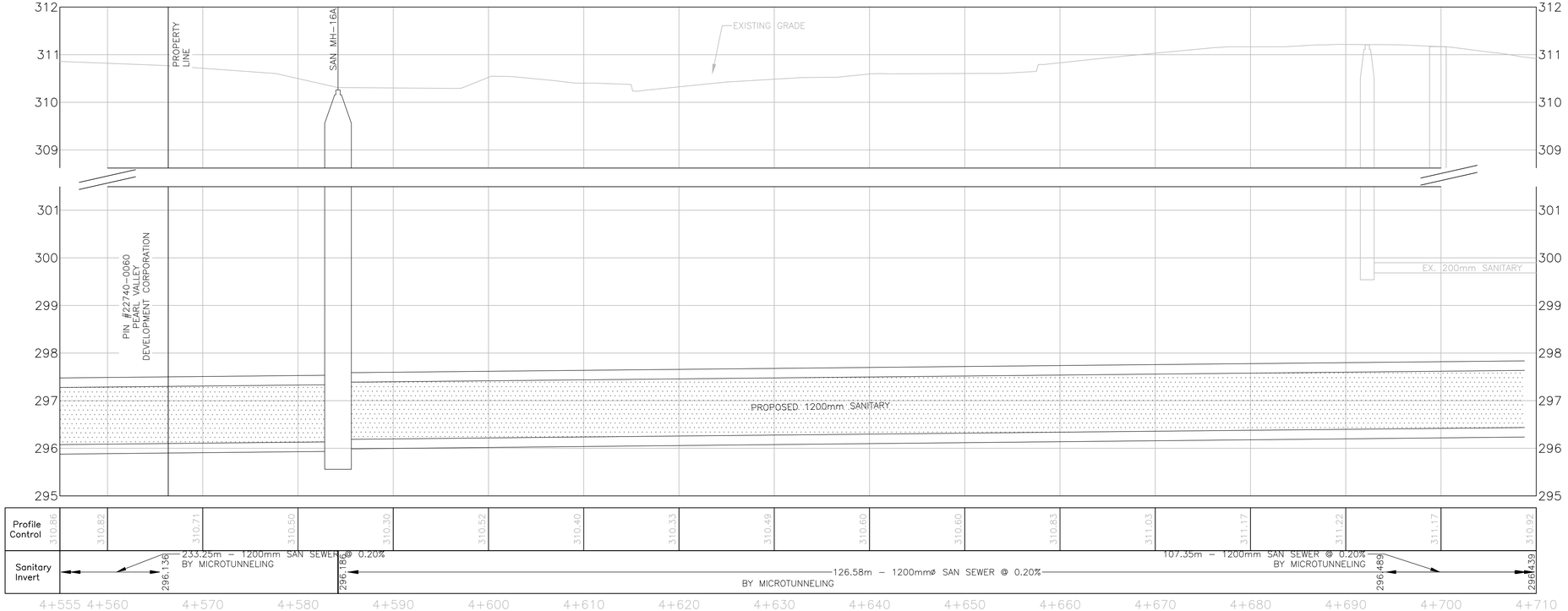
WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB
CONTRACT No. -
CHECKED BY: EAP
FILE No. -
DATE: NOV 08, 2024
DRAWING No. C23
SCALE HOR. 1:250 VERT. 1:50
SHEET No. 23 OF 34
LAYOUT NAME:

R:\2023\236924 - WATERLOO-EAST SIDE TRUNK SEWER\10 CAD\DWG\01 LINEAR\04 SHEETS\236924_C21-C25.DWG





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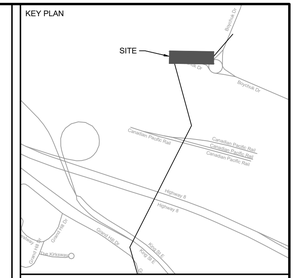

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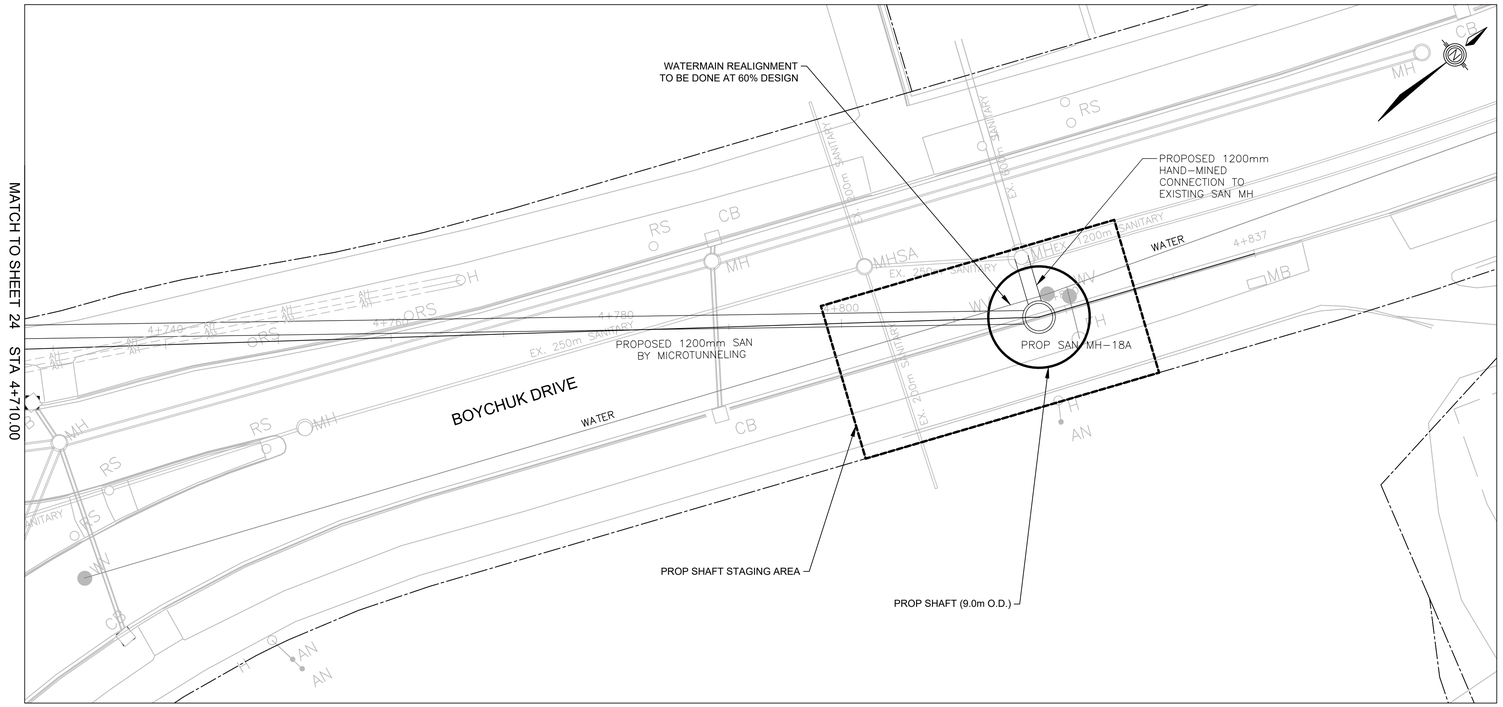
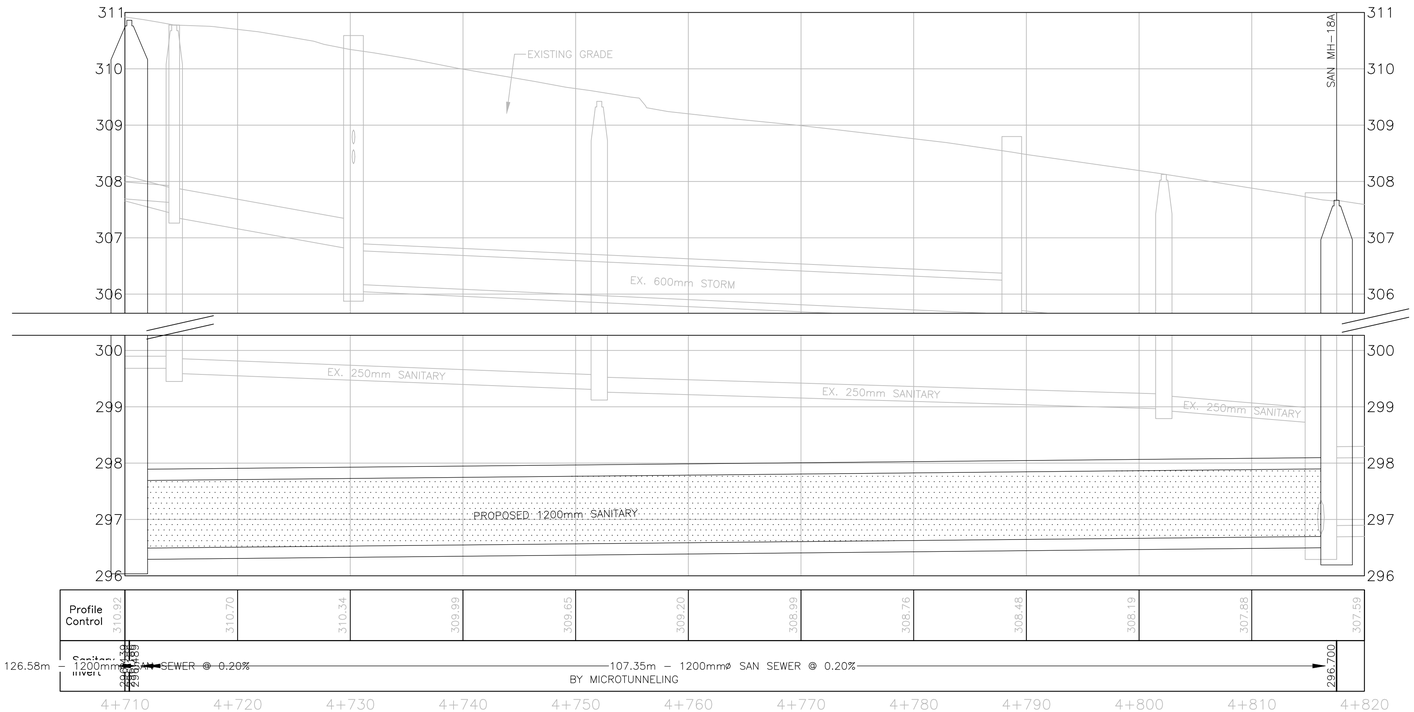
WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C24
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 24 OF 34
LAYOUT NAME:	

R:\2023\236924 - WATERLOO-EAST SIDE TRUNK SEWER\10 CAD\DWG\01 LINEAR\04 SHEETS\236924_C21-C25.DWG





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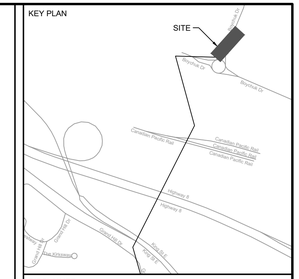

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WATERLOO - EAST SIDE TRUNK SEWER

PLAN AND PROFILE

DRAWN BY: CVBB	CONTRACT No. -
CHECKED BY: EAP	FILE No. -
DATE: NOV 08, 2024	DRAWING No. C25
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 25 OF 34
LAYOUT NAME:	

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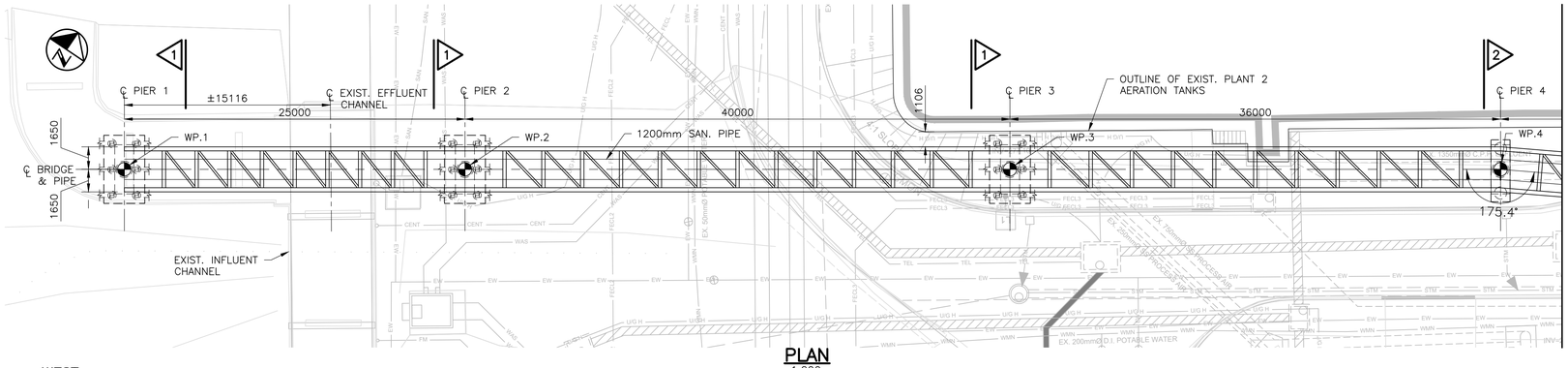

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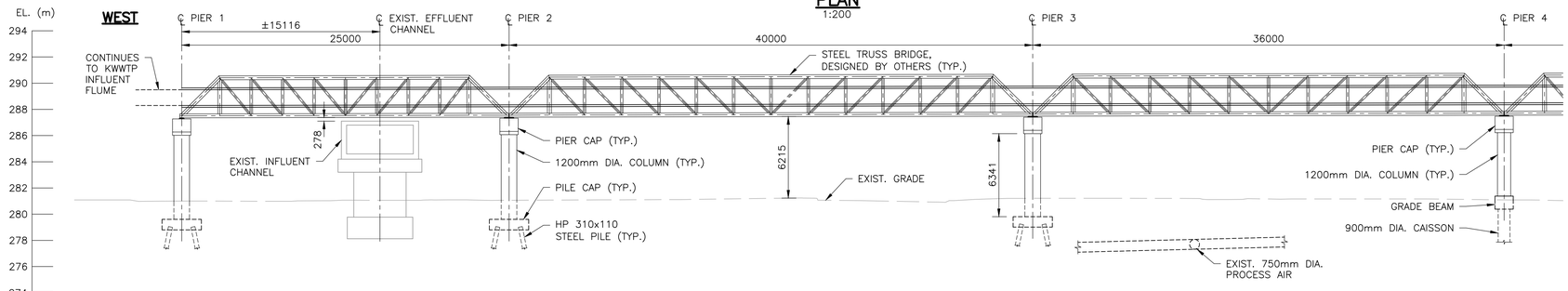

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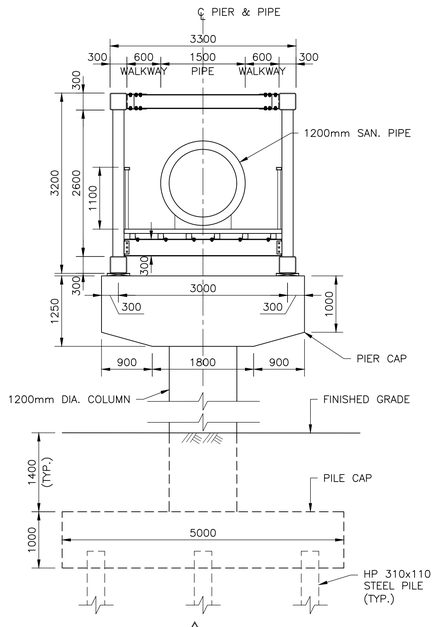
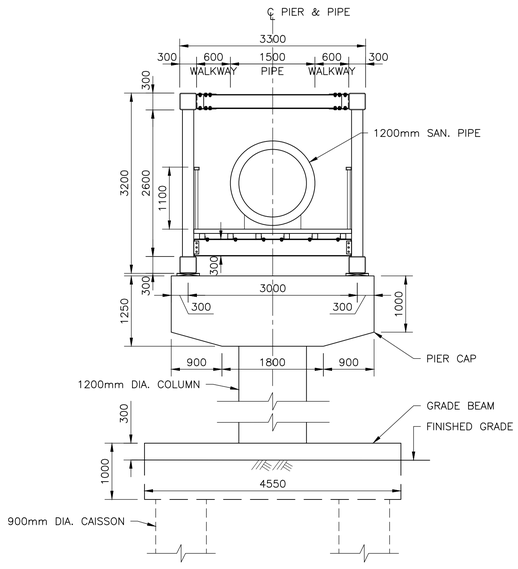


1 SECTION
1:50



2 SECTION
1:50

WORKING POINTS

	STATION AT C/L ROAD	T/ASPHALT ELEVATION (m)	COORDINATES	
			NORTHING	EASTING
WP. 1	X+XXX.XXX	XXX.XXX	4805192.845	546866.407
WP. 2	X+XXX.XXX	XXX.XXX	4805206.822	546887.135
WP. 3	X+XXX.XXX	XXX.XXX	4805229.184	546920.300
WP. 4	X+XXX.XXX	XXX.XXX	4805249.311	546950.148

LIST OF ABBREVIATIONS

ABUT. – DENOTES ABUTMENT
BRG. – DENOTES BREARING
DIA. – DENOTES DIAMETER
DWG. – DENOTES DRAWING
EL. – DENOTES ELEVATION
EXIST. – DENOTES EXISTING
TYP. – DENOTES TYPICAL
WP. – DENOTES WORKING POINT

GENERAL NOTES

1. DESIGN : CAN/CSA–S6–19 WITH ADDENDA
2. LIVE LOAD : CL625–ONT
3. CLASS OF CONCRETE :
   PIER COLUMNS.....35MPa
   REMAINDER.....30MPa

   CLEAR COVER TO REINFORCING STEEL
   FOOTINGS.....100±25
   PIER CAPS.....70±10
   REMAINDER.....70±20
   UNLESS NOTED OTHERWISE
4. REINFORCING STEEL
   – REINFORCING STEEL SHALL BE GRADE 500W.
   – UNLESS SHOWN OTHERWISE, TENSION LAP SPLICES FOR REINFORCING STEEL BARS SHALL BE CLASS B.
   – STAINLESS REINFORCING STEEL SHALL BE TYPE 316LN OR DUPLEX 2205 AND HAVE MINIMUM YIELD STRENGTH OF 500 MPa, UNLESS OTHERWISE SPECIFIED.
   – BAR MARKS WITH PREFIX 'S' DENOTE STAINLESS STEEL BARS.
   – 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 STRUCTURAL STANDARD DRAWING SS12–1, UNLESS INDICATED OTHERWISE.

CONSTRUCTION NOTES

1. THE CONTRACTOR SHALL ESTABLISH THE BEARING SEAT ELEVATIONS BY DEDUCTING THE ACTUAL BEARING THICKNESSES FROM THE TOP OF BEARING ELEVATIONS. IF THE ACTUAL BEARING THICKNESSES ARE DIFFERENT FROM THOSE GIVEN WITH THE BEARING DESIGN DATA, THE CONTRACTOR SHALL ADJUST THE REINFORCING TO SUIT.

STRUCTURAL STEEL NOTES

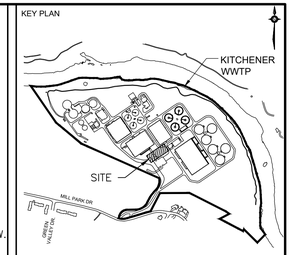
1. ALL STRUCTURAL STEEL SHALL CONFORM TO CSA STANDARD CAN/CSA–G40.20–13/G40.21–13. STEEL MARKED 'PTM' SHALL BE GRADE 350AT AND THE CHARPY IMPACT ENERGY REQUIREMENTS SHALL BE 27 JOULES AT THE TEST TEMPERATURE SHALL BE –20°C. WELD FILLER MATERIAL SHALL MEET THE CHARPY IMPACT ENERGY REQUIREMENTS OF 27 JOULES AT –30°C FOR STEEL MARKED "PTM". ALL OTHER STRUCTURAL SHALL BE GRADE 350A. ROLLED SECTIONS SHALL CONFORM TO CSA STANDARD CAN/CSA–G40.20–13/G40.21–13 OR ASTM SPECIFICATION A588.
2. MEMBERS OR COMPONENTS OF MEMBERS FOR WHICH 'PTM' STEEL IS SIGNIFIED ARE PRIMARY TENSION MEMBERS.

LIST OF DRAWINGS

LEGEND:

EW – EFFLUENT (PLANT) WATER
WMN – POTABLE WATER
STM – SANITARY SEWER
SAN – POTABLE WATER
FM – SANITARY FORCEMAIN
DG – DIGESTER GAS
NG – NATURAL GAS
FECL – CHEMICAL SUPPLY LINES
PRS – PRIMARY SLUDGE TRANSFER
RAS – RETURN ACTIVATED SLUDGE
WAS – WASTE ACTIVATED SLUDGE
DS – DIGESTED SLUDGE
U/G H – UNDERGROUND ELECTRICAL
O/H H – OVERHEAD ELECTRICAL
TEL – TELEPHONE/ COMMUNICATIONS
FOC – FIBRE OPTIC CABLE

KEY PLAN



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FIELD BOOK No.

No.	ISSUE/REVISION	BY	DATE
1	30% DESIGN SUBMISSION	R.M.	2024.06.17

WATERLOO - EAST SIDE TRUNK SEWER BRIDGE

GENERAL ARRANGEMENT 1

DRAWN BY: Y.L.H.	CONTRACT No. -
CHECKED BY: R.M.	FILE No. -
DATE: JUNE 17, 2024	DRAWING No. S01
SCALE AS SHOWN	SHEET No. 26 OF 34

LAYOUT NAME:

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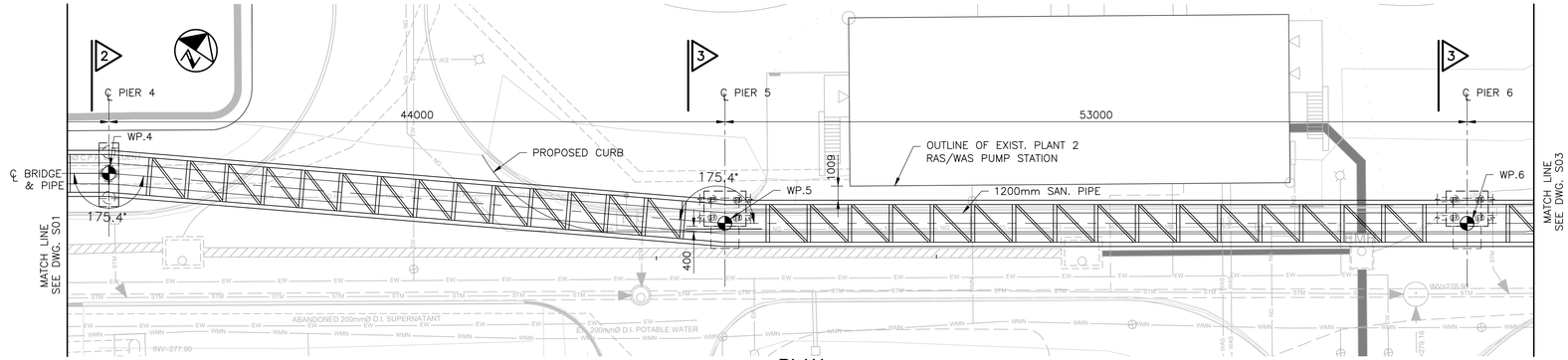

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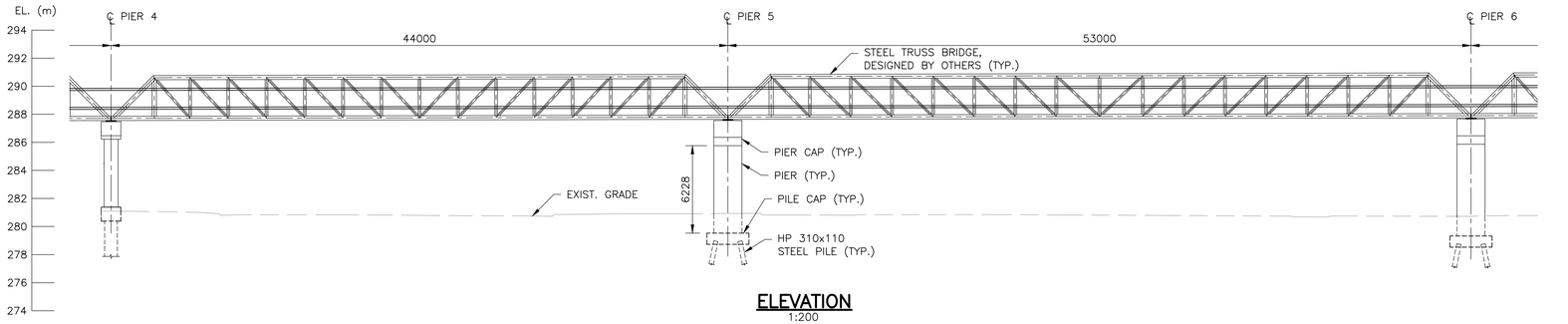
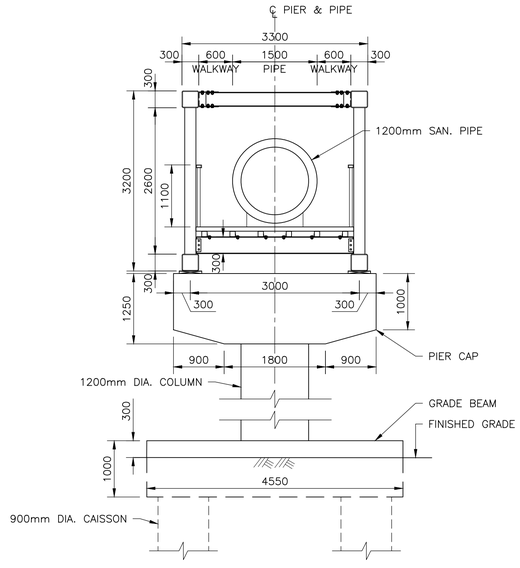


ELEVATION
1:200



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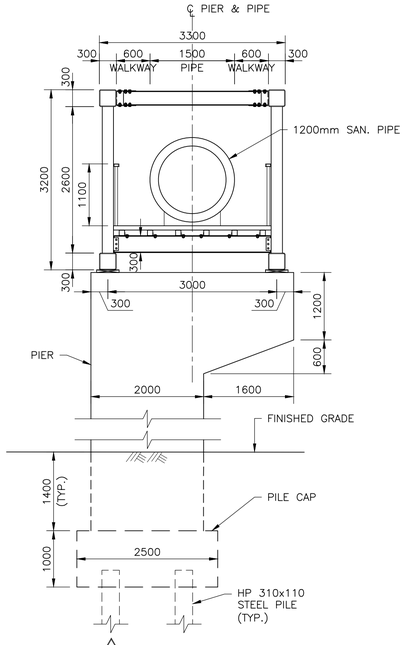
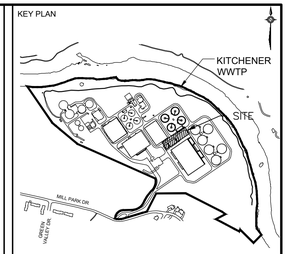
1:50



3 SECTION
1:50

WORKING POINTS				
	STATION AT C/L ROAD	T/ASPHALT ELEVATION (m)	COORDINATES	
			NORTHING	EASTING
WP. 4	X+XXX.XXX	XXX.XXX	4805249.311	546950.148
WP. 5	X+XXX.XXX	XXX.XXX	4805270.950	546988.625
WP. 6	X+XXX.XXX	XXX.XXX	4805300.580	547032.569

KEY PLAN



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WATERLOO - EAST SIDE TRUNK SEWER BRIDGE

GENERAL ARRANGEMENT 2

DRAWN BY: Y.L.H.
CONTRACT No. -
CHECKED BY: R.M.
FILE No. -
DATE: JUNE 17, 2024
DRAWING No. S02
SCALE AS SHOWN
SHEET No. 27 OF 34
LAYOUT NAME:

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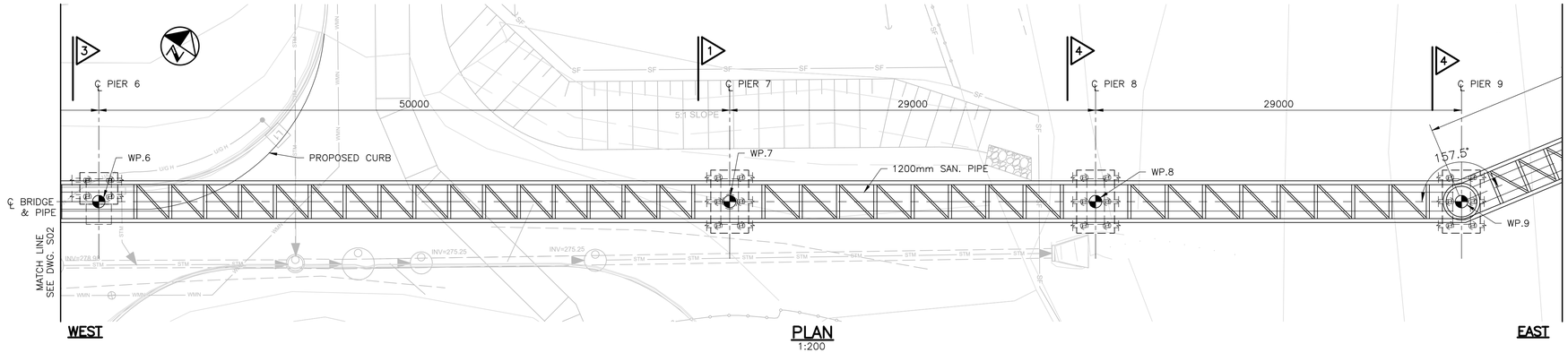

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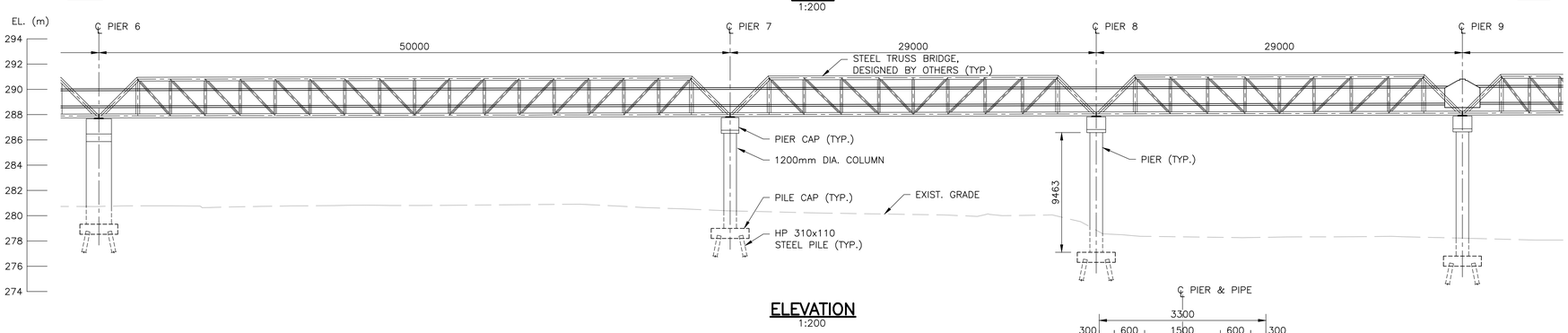

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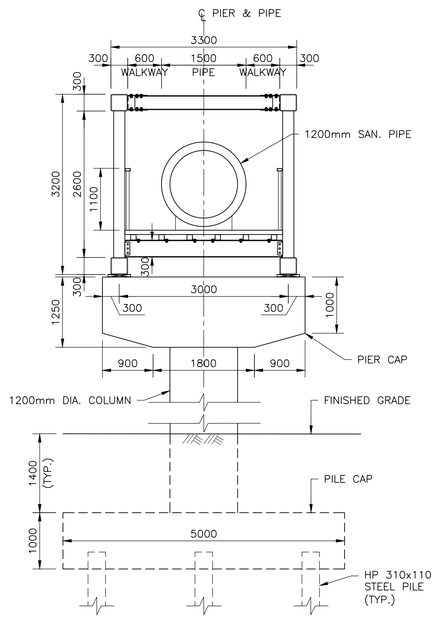

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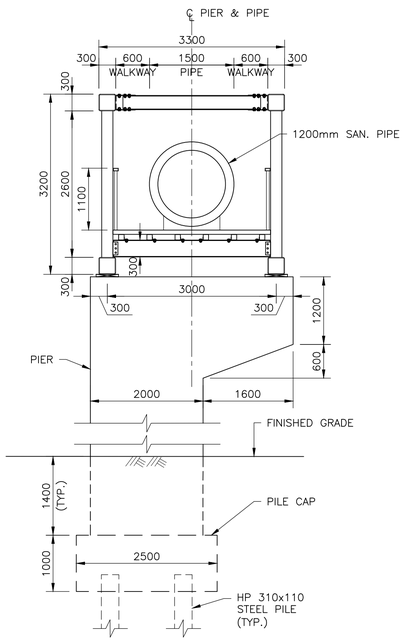

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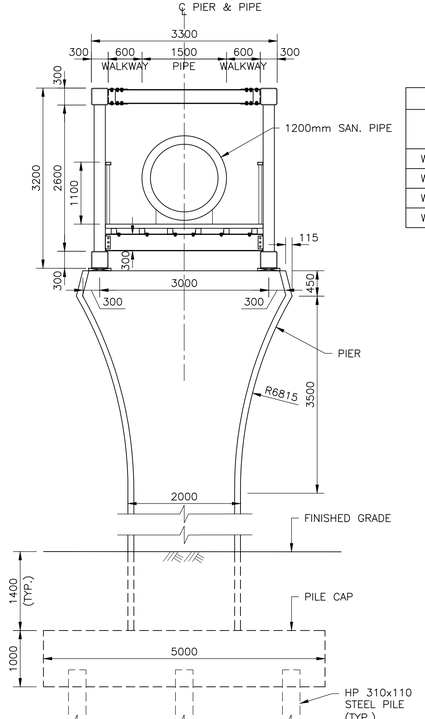
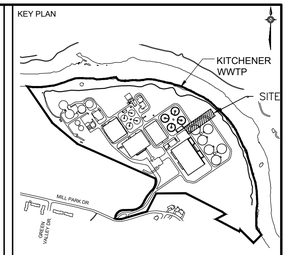


4 SECTION
1:50

WORKING POINTS				
	STATION AT C/L ROAD	T/ASPHALT ELEVATION (m)	COORDINATES	
			NORTHING	EASTING
WP. 6	X+XXX.XXX	XXX.XXX	4805300.580	547032.569
WP. 7	X+XXX.XXX	XXX.XXX	4805328.534	547074.025
WP. 8	X+XXX.XXX	XXX.XXX	4805344.747	547098.070
WP. 9	X+XXX.XXX	XXX.XXX	4805360.959	547122.114

KEY PLAN



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R.V. ANDERSON ASSOCIATES LIMITED
Innovative solutions for complex challenges

Region of Waterloo

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FIELD BOOK No.

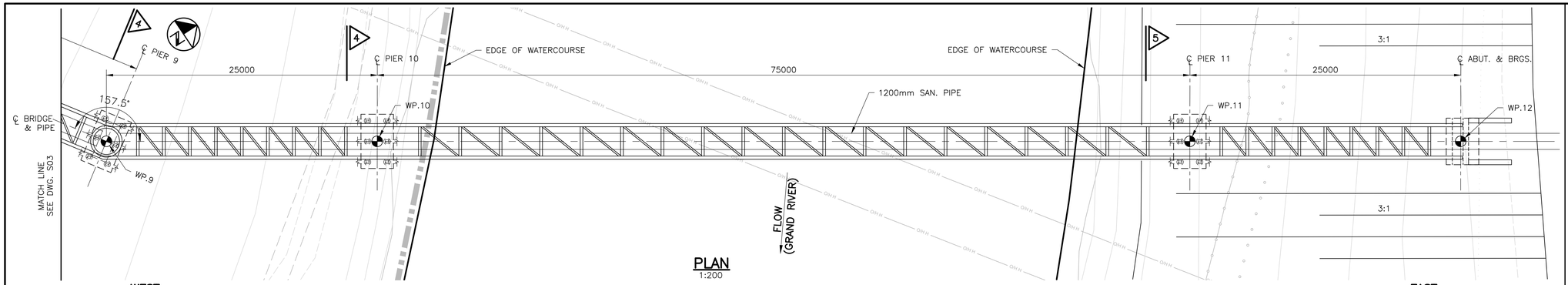
No.	ISSUE/REVISION	BY	DATE
1	30% DESIGN SUBMISSION	R.M.	2024.06.17

WATERLOO - EAST SIDE TRUNK SEWER BRIDGE

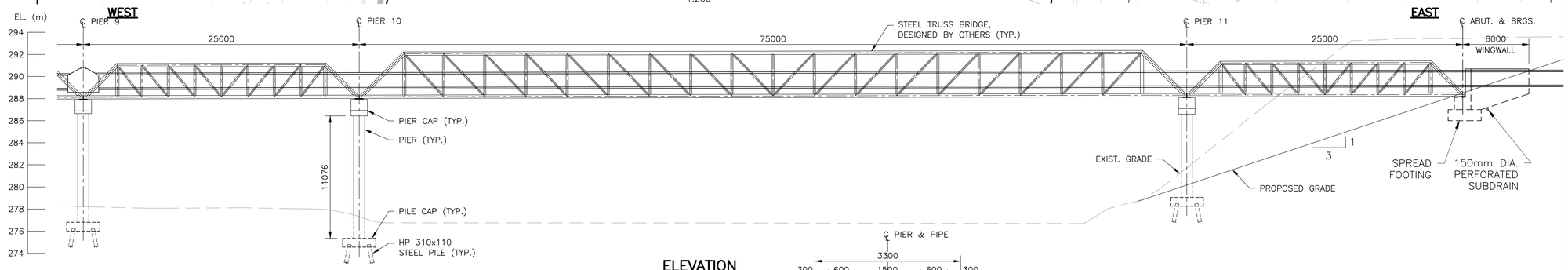
GENERAL ARRANGEMENT 3

DRAWN BY: Y.L.H.	CONTRACT No. -
CHECKED BY: R.M.	FILE No. -
DATE: JUNE 17, 2024	DRAWING No. S03
SCALE AS SHOWN	SHEET No. 28 OF 34
LAYOUT NAME:	

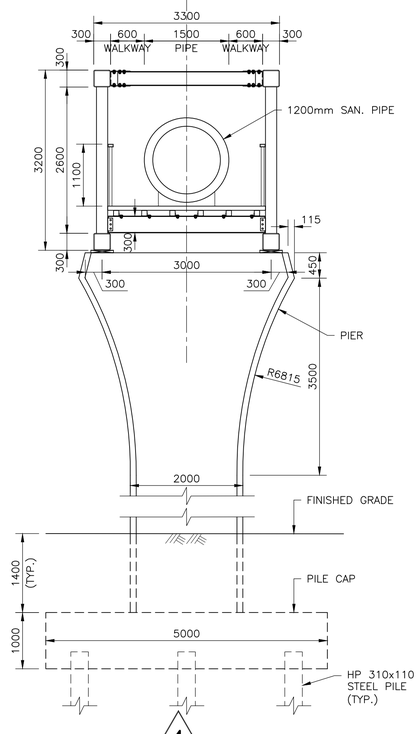
R:\2023\236924 - WATERLOO-EAST SIDE TRUNK SEWER\10 CADD\GI\02 STRUCTURAL\WORKING\20241113 FOR SUBMISSION\236924 - S01-S04 GA.DWG



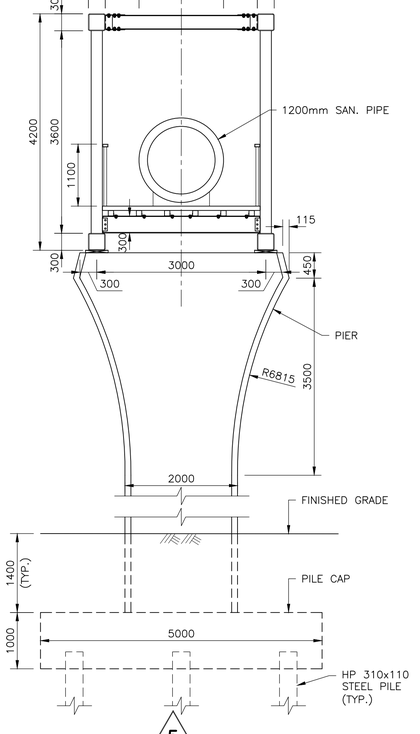
PLAN
1:200



ELEVATION
1:200



4 SECTION
1:50

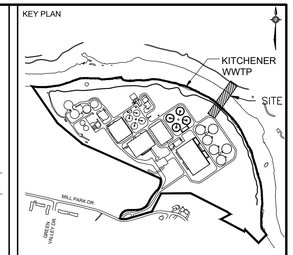


5 SECTION
1:50

WORKING POINTS

	STATION AT C/L ROAD	T/ASPHALT ELEVATION (m)	COORDINATES	
			NORTHING	EASTING
WP. 9	X+XXX.XXX	XXX.XXX	4805360.959	547122.114
WP. 10	X+XXX.XXX	XXX.XXX	4805381.808	547135.911
WP. 11	X+XXX.XXX	XXX.XXX	4805444.353	547177.301
WP. 12	X+XXX.XXX	XXX.XXX	4805465.201	547191.098

KEY PLAN



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WATERLOO - EAST SIDE TRUNK SEWER BRIDGE

GENERAL ARRANGEMENT 4

DRAWN BY: Y.L.H.
CONTRACT No. -
CHECKED BY: R.M.
FILE No. -
DATE: JUNE 17, 2024
DRAWING No. S04
SCALE AS SHOWN
SHEET No. 29 OF 34
LAYOUT NAME:

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