DRAFT

FLUVIAL GEOMORPHOLOGY AND HYDRAULIC ASSESSMENTS
ENVIRONMENTAL ASSESSMENT (EA) AND PRELIMINARY DESIGN FOR DRAINAGE IMPROVEMENTS OF HIGHWAY 50 FROM MAYFIELD ROAD TO HEALEY ROAD
REGION OF PEEL, CALEDON, ONTARIO

Prepared for:
R.V. ANDERSON ASSOCIATES LIMITED

Prepared by:
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1 INTRODUCTION

In January 2020, R.V. Anderson Associates Limited (RVA) retained Matrix Solutions Inc. to complete a fluvial geomorphic and hydraulic assessment in support of a Schedule B Municipal Class Environmental Assessment (EA) for drainage improvements of culverts and ditches on Highway 50 (Regional Road 50; RR50) in the Region of Peel. As part of the project, active transportation improvements (i.e., pedestrian and cycling amenities) along the corridor will also be developed in accordance with the recommendations of Region of Peel's Sustainable Transportation Strategy.

While the EA extends throughout a 2,400 m length of the RR50 corridor between Mayfield Road and Healy Road, this report documents the existing condition and constraints of the natural watercourse within the study area, West Robinson Creek, which extends from north of Mayfield Road to 50 m north of George Bolton Parkway, an approximate length of 1,400 m. A study area plan is provided in Appendix A.

1.1 Study Area

The study area is within the Rainbow Creek subwatershed of the Humber River watershed and is under the jurisdiction of Toronto and Region Conservation Authority (TRCA). The Rainbow Creek subwatershed is drained by two watercourses: Rainbow Creek and Robinson Creek, which merge approximately 330 m north of Highway 7 to form Plunkett Creek.

Within the study area, RR50 is an urban-undivided, five-lane high-capacity arterial road under the jurisdiction of the Region of Peel, located within the Bolton Community of the Town of Caledon. It is understood that the roadway in the study area is in good condition and there are no plans for widening or rehabilitation at this time; however, there are active transportation measures proposed for implementation (cycle track or multi-use path). Within the reach of interest of this study (north of Mayfield Road to North of George Bolton Parkway) a sidewalk exists on the west side of the road, yet no pedestrian facilitates exist on the east side of the road. Despite being urbanized with curb and gutters, ditches and entrance culverts provide urban stormwater conveyance along a significant portion of the road's length, including at many locations where West Robinson Creek is directly adjacent to the roadway, serving as the east roadside ditch.

Adjacent land uses on the east side of the roadway are primarily commercial; mostly utilized for large/open space uses such as vehicle storage, vehicle dealerships, multi-unit plazas, etc. Residential land uses are present on the east side of RR50 toward the southern limit of the study area.

Within the study area West Robinson Creek flows southerly along the east side of roadway, deviating easterly at two pronounced locations behind private land uses. The watercourse crosses through eight culvert structures within the study area, seven of which are entrance culverts, with one crossing RR50 at George Bolton Parkway. Downstream of the study limits is a new crossing structure at Mayfield Road/Albion-Vaughan Road. Upstream of the study limits the natural open watercourse extends

northwesterly, away from RR50, into the industrialized area bound by RR50, George Bolton Parkway, Nixon Road, and McEwan Drive West.

2 EXISTING CONDITIONS

2.1 Field Investigations and Background

A detailed topographic survey of the watercourse corridor was completed by the project team and provided to Matrix in May 2020. During the same time period, a request for historic record drawings was submitted. Applicable record drawings provided to the Matrix team are available in Appendix B. Also during this time period, a request for a historic record of operations/maintenance issues relative to Matrix's study focus was circulated to the project team and owner. Of note, no response to this item was provided.

To ascertain the Matrix team of the current in-field conditions, Matrix staff performed a site walk on September 9, 2020, with a focus to review and document the existing conditions of the watercourse, with a focus on the eight culvert structures identified, below. Detailed crossing sheets and photologs were prepared by Matrix for each structure to document the structure size, orientation, type, and channel approach/departure characteristics, etc. Matrix structure crossing sheets and photologs are available in Appendices C and D, respectively. Of note, although Matrix fieldwork provides general commentary on structure condition, the intention of Matrix appraisals is focused on culvert and channel characteristics, not a detailed condition assessment of the culvert structures.

As a significant portion of the watercourse is within, or interacts with, private property, several permissions-to-enter were obtained prior to mobilization of the site reconnaissance. Also provided prior to the site reconnaissance was structure condition appraisals completed by Region of Peel staff. Notably, not all culvert structures within this study were appraised. Condition appraisals are available in Appendix E.

2.2 Culvert 1

Culvert 1 is located in proximity to the intersection of RR50 and George Bolton Parkway, conveying watercourse flows under RR50 from west to east via a buried culvert/sewer network.

The upstream end is comprised of two protruding culvert barrels: one oriented westerly to convey approaching watercourse flows (Culvert 1) and one oriented northerly to convey approaching roadside ditch flows (Culvert 1A). Culvert 1 is a 600 mm diameter high-density polyethylene (HDPE) pipe with vegetated embankments and no formalized end treatment (Figure 1). Culvert 1A is a 900 mm diameter corrugated steel pipe (CSP) with riprap stone embankments and no formalized end treatment (Figure 2).

FIGURE 1 Culvert 1 Upstream End

FIGURE 2 Culvert 1A Upstream End

The downstream end is a single span cast in place concrete box culvert. The culvert was significantly backwatered and silted-in at the time of the site visit, but it is presumed to be an open bottom structure with span of 1.88 m and rise of 1.05 m (Figures 3 and 4).

The adjacent vacant property upstream of Culvert 1/1A is situated in a low-lying orientation with little freeboard from the normal water levels of the upstream channel. Notably, at the time of the site visit, it was visually evident that utility locates, and small tracked equipment had accessed the site (possibly for a geotechnical investigation) indicating planning for future improvements. The downstream end has riprap stone embankments and no formalized end treatments; discharging directly to a heavily vegetated online pond (see Section 2.11.1).

FIGURE 3 Culvert 1 Downstream End

FIGURE 4 Culvert 1 Downstream End

From a review of available record drawings, it is presumed the culvert system is comprised of a series of historic extensions/enclosures, likely to facilitate roadwork and adjacent private development. A perpendicular box culvert crossing of RR50 extends from the downstream end to a large maintenance hole structure located at the projection of the RR50 west curb line at the centreline of George Bolton

Parkway. Notably, this large maintenance hole structure is also a point of connection for urban stormwater from George Bolton Parkway. From this point the culvert system extends northerly in a single barrel piped system to a maintenance hole located immediately south of the Esso gas station entrance, behind the RR50 west curb line. From this maintenance hole, the dual barrel arrangement extends north of the Esso Station Entrance to the open culvert upstream ends.

Notably the culvert system has minimal cover (less than 1.5 m) and is situated in proximity to several buried infrastructure/utilities and urban surface features. The culvert system is presumed to be situated within the Region of Peel RR50 right-of-way (RoW); however, the upstream end (Culvert 1) appears to extend west of the visible RoW features. Given the enclosed condition of the culvert system, there are significant constraints to visibly assessing the condition/orientation and functionality which may benefit from further investigation (i.e., physical access, cleaning/closed-circuit television [CCTV], downstream pond maintenance, etc.). Resultant of the enclosed condition the culvert system presents a barrier and disconnects the natural environment associated with the natural watercourse. Similarly, the enclosed condition presents less opportunity for larger watercourse flows to access floodplain.

Notably, this structure was not appraised as part of the Region of Peel condition assessments provided to Matrix, likely because of the enclosed condition.

It is recommended, at minimum, the upstream end be further understood by the EA team, as it pertains to ramifications of the assessed alternatives for improvement.

2.3 Culvert 2

Culvert 2 is located at the rear of a private lot, which is currently under the operation of Enterprise car rental. The culvert conveys watercourse flows from north to south via a single barrel 1,500 mm CSP under a gravel parking lot connection road. The culvert is oriented perpendicular to the access road and has minimal cover (less than 1.5 m). The culvert structure is presumed to be situated within private property.

The upstream end is comprised of a protruding culvert barrel; oriented northerly to convey approaching watercourse flows with vegetated embankments and concrete block end walls. The upstream end is partially obstructed by debris (both natural and “urban” debris), slumping slopes, and overhanging vegetation (Figure 5). The downstream end is comprised of a protruding culvert barrel with vegetated embankments and no formalized end treatments (Figure 6).

Notably, this structure was not appraised as part of the Region of Peel condition assessments provided to Matrix, likely because of its location being situated on private property.

FIGURE 5 Culvert 2 Upstream End

FIGURE 6 Culvert 2 Downstream End

2.4 Culvert 3

Culvert 3 is located adjacent to RR50 to facilitate an elevated concrete pathway connection to a newly constructed multi-unit building situated behind (east of) the YMCA building. The culvert conveys watercourse flows from north to south via a single barrel, open bottom 2,900 mm span × 1,780 mm rise multiplate corrugated steel pipe arch (CSPA) under a concrete pathway. The culvert is oriented at a skew to the pathway (and RR50) and has minimal cover (less than 1.5 m). The culvert structure is presumed to be situated within public property (RR 50 RoW); however, the culvert appears to extend east of the visible RoW features.

The upstream end is comprised of an open culvert span, oriented northerly to convey approaching watercourse flows with armourstone wingwalls/headwall (Figure 7). The downstream end is comprised of an open culvert span with armourstone wingwalls/headwall (Figure 8).

The watercourse corridor upstream of Culvert 3 is currently under the process of being realigned by a private landowner (see Section 2.11.2). The adjacent private property downstream of Culvert 3 is situated in a low-lying orientation with little freeboard from the normal water levels of the downstream channel.

Notably, this structure was appraised as “Fair Condition” by the structure condition assessments completed by Region of Peel. The corresponding Region of Peel structure ID is: “FROM - RR050-0215 TO - RR050-0216.”

FIGURE 7 Culvert 3 Upstream End

FIGURE 8 Culvert 3 Downstream End

2.5 Culvert 4

Culvert 4 is located adjacent to RR50 to facilitate an asphalt entrance to multi-unit commercial property, including YMCA facilities. The culvert conveys watercourse flows from north to south via a single barrel, closed bottom 2,250 mm span × 1,620 mm rise CSPA under the paved entrance. The culvert is oriented perpendicular to the entrance and has minimal cover (less than 1.5 m). The culvert structure is presumed to be situated within public property (RR 50 RoW).

The upstream end is comprised of a protruding culvert barrel, oriented northerly to convey approaching watercourse flows with riprap stone/manicured grass embankments and no formalized end treatment (Figure 9). The downstream end is comprised of a protruding culvert barrel with manicured grass embankments and no formalized end treatment (Figure 10).

The adjacent private property upstream of Culvert 4 is situated in a low-lying orientation with little freeboard from the normal water levels of the upstream channel. Immediately downstream of Culvert 4, an open ditch stormwater drainage feature and a roadway light standard exist.

Notably, this structure was appraised as “Fair Condition” by the structure condition assessments completed by Region of Peel. The corresponding Region of Peel structure ID is: “FROM - RR050-0213 TO - RR050-0214.”

FIGURE 9 Culvert 4 Upstream End

FIGURE 10 Culvert 4 Looking Downstream

2.6 Culvert 5

Culvert 5 is located adjacent to RR50 to facilitate an asphalt entrance to a recreational vehicle sales commercial property, which also forms the east leg of RR50/Parr Boulevard signalized intersection. The culvert conveys watercourse flows from north to south via a single barrel, closed bottom 2,080 mm span × 1,780 mm rise CSPA under the paved entrance. The culvert is oriented perpendicular to the entrance and has minimal cover (less than 1.5 m). The culvert structure is presumed to be situated within public property (RR50 RoW).

The upstream end is comprised of a protruding culvert barrel, oriented northerly to convey approaching watercourse flows with riprap stone/manicured grass embankments and no formalized end treatment. The downstream end is comprised of a protruding culvert barrel with riprap stone/manicured grass embankments and no formalized end treatment (Figures 11 and 12).

Immediately downstream of Culvert 5, an open ditch stormwater drainage feature and piped urban stormwater outfall exist.

Notably, this structure was appraised as “Fair Condition” by the structure condition assessments completed by Region of Peel. The corresponding Region of Peel structure ID is: “FROM - RR050-0211 TO - RR050-0212.”

FIGURE 11 Culvert 5 Downstream End

FIGURE 12 Culvert 5 Looking Downstream

2.7 Culvert 6

Culvert 6 is located adjacent to RR50 to facilitate a gravel entrance to a multi-unit commercial property, including U-Haul. The culvert conveys watercourse flows from north to south via a single barrel, closed bottom 2,250 mm span × 1,620 mm rise CSPA under the gravel entrance. The culvert is oriented perpendicular to the entrance and has minimal cover (less than 1.5 m). The culvert structure is presumed to be situated within public property (RR 50 RoW).

The upstream end is comprised of a protruding culvert barrel, oriented northerly to convey approaching watercourse flows with riprap stone/vegetated embankments and no formalized end treatment. The downstream end is comprised of a protruding culvert barrel with riprap stone/vegetated embankments and no formalized end treatment (Figure 13).

Notably, this structure was appraised as “Fair Condition” by the structure condition assessments completed by Region of Peel. The corresponding Region of Peel structure ID is: “FROM - RR050-0209 TO - RR050-0210.”

FIGURE 13 Culvert 6 Downstream End

2.8 Culvert 7

Culvert 7 is located adjacent to RR50 to facilitate a gravel entrance to a vacant lot which has visibly been recently altered (i.e., demolition, removals etc.). Notably the entrance has been temporarily closed; barricaded by concrete blocks. The culvert conveys watercourse flows from north to south via an open bottom single span 4,550 mm × 1,500 mm rise concrete box culvert under a gravel entrance. The culvert is oriented perpendicular to the entrance and has minimal cover (less than 1.5 m). The culvert structure is presumed to be situated within public property (RR 50 RoW).

The upstream end is comprised of an open culvert span; oriented northerly to convey approaching watercourse flows with vegetated embankments and no formalized end treatment (Figure 14). The downstream end is comprised of an open culvert span with vegetated embankments and no formalized end treatment (Figure 15).

Notably, this structure was appraised as “Very Good Condition” by the structure condition assessments completed by Region of Peel. The corresponding Region of Peel structure ID is: “501227.”

FIGURE 14 Culvert 7 Upstream End

FIGURE 15 Culvert 7 Looking Downstream

2.9 Culvert 8

Culvert 8 is located adjacent to RR50 to facilitate a paved entrance to a multi-tenant commercial plaza, including Storage Bolton and Bolton Kia and Bolton Toyota car dealerships. The culvert conveys watercourse flows from north to south via an open bottom single span 4,550 mm × 1,620 mm rise concrete box culvert under a paved entrance which is urbanized with curbs, sidewalk, and guiderails. The culvert is oriented perpendicular to the entrance and has minimal cover (less than 1.5 m). The culvert structure is presumed to be situated within public property (RR 50 RoW).

The upstream end is comprised of an open culvert span; oriented northerly to convey approaching watercourse flows with riprap/vegetated embankments, a concrete headwall and armour stone wingwall along the roadside embankment (Figure 16). The downstream end is comprised of an open culvert span with riprap/vegetated embankments and a concrete headwall and armour stone wingwall along the roadside embankment (Figure 17).

Notably, this structure was appraised as “Very Good Condition” by the structure condition assessments completed by Region of Peel. The corresponding Region of Peel structure ID is: “501220.”

FIGURE 16 Culvert 8 Upstream End

FIGURE 17 Culvert 8 Looking Downstream

2.10 Culvert Summary

TABLE 1 Culvert Summary Table

Culvert	Material	Shape	Open/Closed Bottom	Span/Diameter (m)	Rise (m)	Comment:
1 Inlet	HDPE	Round	Closed	0.6	-	Culvert may be partially on private property. Junction of culvert inlet 1/1A/Outlet not fully understood. Condition not fully understood. Suggest further investigation.
1A Inlet	CSP	Round	Closed	0.9	-	
Outlet	Concrete	Box	Open	1.88	1.05	
2	CSP	Round	Closed	1.5	-	Culvert on private property. Coordinate improvements with landowners.
3	CSP	Arch	Open	2.9	1.78	Culvert may be partially on private property. Coordinate culvert improvements with creek improvements upstream. Downstream private properties visually appear “low-lying.”
4	CSP	Pipe Arch	Closed	2.25	1.62	Upstream private properties visually appear “low-lying.” Coordinate improvements with adjacent private/roadside features.
5	CSP	Pipe Arch	Closed	2.08	1.78	Coordinate improvements with adjacent private/roadside features.
6	CSP	Pipe Arch	Closed	2.25	1.62	Coordinate improvements with adjacent private/roadside features.
7	Concrete	Box	Open	4.55	1.5	Culvert appears new.
8	Concrete	Box	Open	4.55	1.62	Culvert appears new.

HDPE – high-density polyethylene
CSP - corrugated steel pipe

2.11 Specific Areas of Interest

2.11.1 Existing Pond

An online pond exists immediately downstream of Culvert 1. The pond appears to have no formalized inlet/outlet controls and appears largely unmaintained, with heavy siltation and overgrown invasive vegetation (Figure 18). Although the pond is not delineated by security fence along the RR50 boundary, the pond appears to be situated largely beyond the RR50 RoW. In addition to the upstream watercourse areas contributing to the pond, one small diameter inlet from the eastern side was located, presumed to provide some function of stormwater servicing to the adjacent private Ontario Provincial Police property.

FIGURE 18 Existing Pond Looking Upstream

It is recommended that better understanding of the ownership/jurisdiction, form/function and maintenance/ operation of the pond be further understood by the EA project team, as it pertains to ramifications of the assessed alternatives for improvement. It is understood there is a future easterly extension of George Bolton Parkway, which will require due consideration for Culvert 1 and the pond downstream.

2.11.2 Current Channel Realignment

In consultation with the project team, it has been identified that an approximate 200 m length of the watercourse upstream of Culvert 3 is currently under the process of being realigned by a private landowner (Figure 19).

It is recommended that the status of this realignment be further understood by the EA team, as it pertains to ramifications of the assessed alternatives for improvement.

2.11.3 Previous Channel Realignment

In consultation with the project team, it has been identified that an approximate 80 m length of the watercourse upstream of Culvert 7 has been historically realigned by a private landowner (Figure 20), for which TRCA is currently involved and pursuing restitution.

It is recommended that the status of this realignment be further understood by the EA team, as it pertains to ramifications of the assessed alternatives for improvement.

FIGURE 19 Current Channel Realignment Looking Upstream

FIGURE 20 Previous Channel Realignment Looking Upstream

2.11.4 Landowner Concerns

In consultation with the project team, a private landowner located immediately downstream of Culvert 6 has raised concerns associated with recent stormwater/ditching revisions along the RR50 frontage of the subject property exacerbating/resulting in increased watercourse flows at the rear of the subject property (Figure 21). Furthering landowner concern in this regard is the new establishment of a stormwater management pond on the opposing side of the watercourse, particularly during periods of pond maintenance.

The nature of these issues is deemed beyond the scope of the current study by Matrix and the EA project team. However, if jurisdictions having authority (i.e., Region of Peel/Town of Caledon/TRCA) opt to further investigate the issues sited by the landowner, a series of recommended initial steps include the following:

- meeting with landowner onsite to understand issues
- reviewing historic changes along RR50 frontage, watercourse reach, subject property, stormwater management pond, and adjacent properties

- conducting desktop and detailed field investigation, topo survey, etc. of subject property and adjacent properties
- conducting site-specific hydraulic analysis to review flood extents and frequency

FIGURE 21 Looking Downstream from Culvert 6 (Subject Property on Right)

3 FLUVIAL GEOMORPHIC ASSESSMENT

3.1 Background and Context

In-field geomorphic crossing assessments of the eight existing stream crossings (Culverts 1 to 8) along RR50 between George Bolton Parkway and Mayfield Road were completed by Matrix staff on September 9, 2020. The stream crossing assessment collects data specific to the channel and crossing structure within the vicinity of the road crossing and documents evidence of potential channel-related issues near the crossing (e.g., bank erosion, bed scour, debris trapping, and fish passage). Information regarding crossing type, material, shape, dimensions, and structural conditions are also recorded and is summarized in Section 2.

The reaches of West Robinson Creek within the study area are generally ephemeral, headwater-type streams with a relatively small drainage area (<2 km^2). In most locations, the creek is well vegetated with cattails or phragmites, and banks are poorly defined. As a result, it was difficult to accurately ascertain bankfull dimensions of the channel. For the purposes of this assessment, bankfull dimensions were determined as the flow that fills up the channel close to or to the top of bank. Several of the crossings have been historically straightened to serve as roadside drainage ditches along the eastern side of RR50. Crossing locations are illustrated in Appendix A. Seven of the eight crossings within the study area are

located on the east side of RR50. As the proposed cycle track and/or multi-use path is to be constructed on the western side of RR50, West Robinson Creek is expected to have minimal interaction with the pathway, and geomorphic risk to the proposed active transportation measures is considered low. Similarly, for proposed sidewalk on the east side of the roadway between George Bolton Drive and Simona Drive, West Robinson Creek is expected to have minimal interaction with the sidewalk, and geomorphic risk to the proposed active transportation measures is considered low.

Existing geomorphic conditions of each culvert crossing are summarized in the following sections. All references to right or left banks are when looking in the downstream direction.

3.2 Culvert 1

Culvert 1 is located near the intersection of RR50 and George Bolton Parkway, conveying flows under RR50 from west to east. The upstream end consists of two culverts: one oriented westerly to convey approaching watercourse flows (Culvert 1) and one oriented northerly to convey approaching roadside ditch flows (Culvert 1A). Upstream of the crossing the main branch of West Robinson Creek lacks sinuosity and follows a very straight planform with sharp near-90-degree turns. The reach is also largely controlled by ponds both upstream and downstream of RR50. Upstream, the channel contains abundant instream vegetation (cattails) and flow at the time of the field assessment was minimal and generally consisted of stagnant water. The channel is artificially confined along the right bank which borders the Esso gas station. Average bankfull channel dimensions are 3.2 m in width and 0.7 m in depth, with an absence of pool-riffle morphology. The channel is depositional in nature due to the abundance of instream vegetation and substrate dominantly consists of clay and silt. Riprap was previously placed overtop of Culvert 1 and has since slumped into the creek. Average bankfull channel dimensions of the ditch flowing into Culvert 1A are approximately 2.5 m in width and 0.45 m in depth. Roadside banks are near-vertical and stagnant water was present. Similar to Culvert 1, riprap was previously placed overtop of Culvert 1A and has begun to slump into the ditch.

Downstream of RR50, the culvert end was extensively backwatered due to dense instream vegetation (phragmites) and siltation downstream, impeding flow. Backwatering has resulted in local widening of the channel at the culvert, with minor bank erosion noted. Channel banks are poorly defined, making it difficult to accurately determine bankfull dimensions. Locally, at the culvert end the channel, width is larger than the width of the culvert measuring 3.6 m in width with a maximum depth of 1 m. The channel is depositional in nature due to the abundance of instream vegetation and substrate dominantly consists of clay and silt. The watercourse subsequently discharges immediately into a heavily vegetated online pond downstream.

3.3 Culvert 2

Culvert 2 is located approximately 240 m downstream of Culvert 1 at the rear of a private lot and conveys flows from north to south via a single barrel 1,500 mm CSP under a parking lot connection access road.

Upstream, the channel follows a moderately sinuous planform and is confined on both banks. Due to the confined nature of the system, banks were near-vertical and toe/bank erosion was prevalent as evidenced by slumped bank material, fracture lines, and exposed tree roots. Immediately upstream of Culvert 2, a prominent meander exists which is promoting bank erosion and deposition. Exacerbating this issue is a woody debris jam which is currently impeding flow and blocking the connection to the culvert at lower flows. Concrete blocks previously placed as bank protection around the culvert have also failed and begun slumping into the creek. Approximately 90 m upstream of the crossing, the channel is incising with steep bank heights and a suspended armour layer visible in the banks. A man-made weir structure constructed out of concrete has been placed in the channel at this location. Also visible at this location is bank erosion and several displaced small masonry bricks previously placed as bank protection and fill material.

Downstream of the crossing, the channel corridor has been straightened and contains virtually no floodplain as the channel is bordered by an industrial lot. Upstream and downstream, average bankfull channel dimensions were similar, measuring 2.5 m in width and 0.6 m in depth. Channel substrate dominantly consisted of clay and gravel; however, it is possible the gravel is not native and was sourced from the above parking lots during heavy rainfall events.

3.4 Culvert 3

Culvert 3 is located approximately 420 m downstream of Culvert 2 and is adjacent to the east side of RR50. Upstream of the crossing, approximately 200 m of channel is currently in the process of being re-aligned and is under construction, therefore geomorphic observations (i.e., bankfull dimensions, substrate, etc.) were not possible. Wetted channel dimensions at the time of the assessment were 2.95 m in width and 0.5 m in depth at the culvert upstream end. The current crossing appears stable, with the channel width equal to the opening width of the structure and armourstone blocks placed around the culvert for added protection. The channel flows to the right as it enters the culvert, and a gravel point bar has formed toward the downstream end of the culvert. Culvert footings are partially exposed.

Downstream, the channel planform is straight, and the channel serves as a roadside ditch to convey flows parallel to RR50. The watercourse is confined on the right bank by the road embankment and unconfined on the left bank. As a result, at high flow events, flow would dissipate into the adjacent parking lot to the left. The channel is bordered by mowed, well-manicured grass, resulting in minor bank slumping due to the lack of root cohesion. Channel dimensions are much narrower than upstream, with an average bankfull width of 1.2 m and depth of 0.3 m. Rounded to sub-rounded cobble and pebbles were present throughout the reach, in addition to minor sand and clay/silt.

3.5 Culvert 4

Culvert 4 is located approximately 85 m downstream of Culvert 3 and is adjacent to the east side of RR50. Both upstream and downstream of the crossing, the channel serves as a roadside ditch to convey flows parallel to RR50 and is confined by the road embankment to the right, and a parking lot to the left.

Approximately 10 m upstream of the crossing, the channel has been recently armoured with riprap and contains sparse cattails.

Downstream, the entire reach entire reach is filled with cattails. As a result, channel substrate mainly consists of fine sediment (clay and silt) due to the depositional nature of the reach. Average bankfull channel dimensions are approximately 5.5 m in width and 0.4 m in depth.

3.6 Culvert 5

Culvert 5 is located approximately 50 m downstream of Culvert 4 and is adjacent to the east side of RR50. Similar to Culvert 4, the channel serves as a roadside ditch to convey flows and is confined on the right by the road embankment. Immediately downstream of the culvert, there is a stormwater outfall on the right bank, that at the time of the assessment contained standing water. Upstream and downstream of the crossing, the ditch contains abundant cattails. Riprap has been placed over top and around the culvert for added protection. Average bankfull channel dimensions were approximately 3.5 m in width and 0.6 m in depth.

3.7 Culvert 6

Culvert 6 is located approximately 30 m downstream of Culvert 5 and is adjacent to the east side of RR50. Upstream of the crossing, the channel conveys flows as a roadside ditch along RR50, while downstream the channel regains sinuosity and flows easterly behind residential properties through a wooded area. Average bankfull channel dimensions were approximately 3 m in width and 0.4 m in depth.

Downstream of the crossing, most of the reach flows through a wooded area, where woody debris is common within the channel and on the banks. Within this area, the channel is stable with minimal bed and/or bank erosion noted. The channel lacks a sequence of well-defined pool-riffles; however, coarse substrate (gravel, pebbles, cobbles) was observed in the transitional areas. As the creek exits the wooded area and flows back toward RR50, the channel is actively incising, as evidenced by steep bank heights and suspended armour layer in the banks. It is understood that this part of the channel was historically re-aligned by a private landowner, for which TRCA is currently involved and pursuing restitution.

3.8 Culvert 7

Culvert 7 is located approximately 375 m downstream of Culvert 6 and is adjacent to the east side of RR50. Within the vicinity of the crossing, the channel conveys flows as a roadside ditch along RR50. The channel contains abundant instream vegetation such as cattails, tall grasses, and willow shrubs. At the culvert outlet, the presence of dense instream vegetation is impeding flows and has resulted in a buildup of fine sediment and minor debris. Channel substrate mainly consists of fine sediment (clay and silt) due to the depositional nature of the reach. Average bankfull channel dimensions were approximately 4 m in width and 0.6 m in depth.

3.9 Culvert 8

Culvert 8 is located approximately 50 m downstream of Culvert 7 and is adjacent to the east side of RR50. Similar to Culvert 7, the channel conveys flows as a roadside ditch parallel to RR50. Upstream and downstream of the crossing the channel is well vegetated with cattails and tall grasses and as a result, channel substrate dominantly consists of clay and silt. The channel is confined on the right by the road embankment where large armourstone blocks have been placed for added bank/culvert stability. Average bankfull channel dimensions were approximately 3 m in width and 0.7 m in depth.

3.10 Specific Areas of Interest

3.10.1 Culvert 1

The proposed cycle track and/or multi-use path and the resultant drainage improvements are planned on the west side of RR50 over Culvert 1. As such, this is the only location where the creek will have some interaction with the EA improvements, although geomorphic risk to the proposed active transportation measures is considered low. As the pathway is to cross over the Culvert 1, an erosion hazard assessment was not completed. The channel upstream of Culvert 1 is heavily modified (straightened and bermed in locations), and the delineation of the erosion hazard would extend into existing properties, therefore it was deemed not necessary for the purposes of the pathway planning. In this location, West Robinson Creek is an ephemeral, headwater-type feature with a small drainage area (~1 km^2) and poorly defined banks and is not expected to migrate laterally. Additionally, there is no evidence of active erosion near the crossing as the channel is densely vegetated and depositional in nature.

Given the existing culvert system is anticipated to require modifications/extensions, it is recommended, at minimum, the upstream end be further understood by the EA project team, as it pertains to ramifications of the assessed alternatives for improvement.

4 HYDRAULIC ASSESSMENT

A hydraulic assessment was completed to analyze the performance of West Robinson Creek, including Culverts 1 to 8 during various design storm events and the Regional event. An existing HEC-RAS hydraulic model was updated with 2020 topographic survey data provided by RVA and collected hydraulic information to ensure the updated model is appropriate for this study. For each culvert, the hydraulic model was used to verified whether the culvert is fully submerged and whether the driveway over the culvert is overtopped by flowing water. In addition, Culvert 1, and Culverts 3 to 8 are adjacent to RR50. the hydraulic model was used to identify whether water is likely to spill onto RR50 due to backwater impact from the culvert.

4.1 Model Development

TRCA provided the current approved HEC-RAS hydraulic model to use in this study. Matrix updated the TRCA model with the latest topography based on survey data and site reconnaissance within the study area. The following summarizes detailed model updates.

- Culvert 3: Matrix site reconnaissance and RVA topographic survey data showed that Culvert 3 is a corrugated steel arch with height approximately 1.8 m. However, Culvert 3 in the TRCA model indicated a height of 1.4 m. Matrix updated the Culvert 3 height to 1.8 m. A 0.5 m blockage of gravel/cobble was observed during the site reconnaissance; however, Matrix omitted this from the model in order to represent full capacity of the existing culvert.

- Culvert 4: Culvert 4 was not included in the provided TRCA model. Matrix added Culvert 4 based on field survey. This culvert is a corrugated steel arch culvert with a width and height approximately 2.26 m and 1.62 m, respectively. Upstream and downstream invert elevations were obtained from RVA topographic survey data.

- Following a detailed comparison of the modelled cross-sections to the topographic survey data provided by RVA, Matrix revised a number of cross-sections to ensure detailed representation of both the channel and overbank areas including the top of the road elevation. This update to precise cross-section data is important to yield accurate results. These revisions are documented within the model notes.

- In addition to cross-section data, the use of appropriate levee elevation and location in the cross-section is important to the assessment of overtopping conditions. Matrix added levees at appropriate locations and elevation in the cross-section profile. In particular, levees were added at the crown of RR50 as flow in Robinson Creek will not have access to the west ditch.

- Matrix found that cross-sections 2223.38 and 2223.15 were not properly geo-referenced. Matrix updated the cross-section cutline to an appropriate GIS location.

4.2 Design Flows

Design flows in the HEC-RAS model were provided by TRCA, and confirmed to be consistent with the most current available data which is the TRCA Humber River Hydrology Update Report (Civica 2015). Subsequently, TRCA has updated the design flows for channel section between George Bolton Parkway and Mayfield Road/Albion Vaughan Road. Flowrates from 2-year through 100-year and the Regional event were reduced compared to previous values. The validity of updated flowrates was confirmed by RVA. Design flows, ranging from 2- to 100-year events as well as the Regional event were applied at seven different cross-sections of the watercourse. Details are presented in Table 2.

TABLE 2 Design Flows

Cross-section	Description of Location	Flow Rate (m^3/s)						
		2-year	5-year	10-year	25-year	50-year	100-year	Regional
2224.08	Model upstream end near McEwan Drive West	1.98	2.82	3.39	4.27	5.05	5.73	8.70
2223.56	70 m upstream of Hopcroft Road	2.46	3.50	4.21	5.30	6.27	7.11	10.80
2223.45	20 m upstream of Culvert 1 (George Bolton Parkway and RR50)	3.11	4.26	5.11	6.18	7.05	7.90	13.80
2223.37	Upstream face of Culvert 2 (Enterprise Car Rental)	3.34	4.58	5.48	6.64	7.57	8.49	14.97
2223.20	Upstream face of Culvert 6 (U-Haul)	3.57	4.89	5.85	7.08	8.08	9.06	16.25
2223.04	220 m downstream of Culvert 8, 70 m upstream of Mayfield Road	5.69	8.09	9.73	11.99	13.77	15.81	18.56
2219.56	100 m downstream of Mayfield Road	6.08	8.72	10.49	12.98	14.95	17.19	38.30

4.3 Culvert 1

Due to its complex hydraulic situation (i.e., two inlet barrels and one outlet barrel), Culvert 1 and Culvert 1A were modelled using a custom rating curve which was provided within the existing TRCA model. The Cole Engineering Group Ltd. report (2015) indicated that the custom rating curve was derived with appropriate setup of dimension and flow values in FlowMaster. Matrix assumed the rating curve approach in the model is correct.

Table 3 presents the hydraulic results of Culverts 1 and 1A. The results indicate that both Culverts 1 and 1A experience full submergence during the 2-year event and greater. The driveway over Culvert 1, which serves as the northern entrance to the gas station, has a ground elevation of 238.5 m according to the RVA topographic survey data. The water level results from the model indicate that this driveway over Culvert 1 experiences overtopping during the 2-year event and greater. Figure 22 shows the water extent on cross-sections adjacent to Culvert 1 for the Regional event. It is shown that water overtopping the adjacent gas station driveway will spill eastly toward RR50 and spill southerly through the gas station.

TABLE 3 Culvert 1 HEC-RAS Results

Component	Value (m)						
C1 Upstream Invert Elevation	236.76						
C1 Upstream Obvert Elevation	237.36						
C1A Upstream Invert Elevation	236.79						
C1A Upstream Obvert Elevation	237.67						
Driveway Elevation	238.50						
Return Period	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**Regional**
Flow (m^3/s)	3.11	4.26	5.11	6.18	7.05	7.90	13.80
Water Surface Elevation (m)	238.50	238.54	238.56	238.59	238.61	238.63	238.75
Freeboard to Obvert Elevation on Culvert 1 (m)	-1.14	-1.18	-1.20	-1.23	-1.25	-1.27	-1.39
Culvert Submergence on Culvert 1	Y	Y	Y	Y	Y	Y	Y
Freeboard to Obvert Elevation on Culvert 1A (m)	-0.83	-0.87	-0.89	-0.92	-0.94	-0.96	-1.08
Culvert Submergence on Culvert 1A	Y	Y	Y	Y	Y	Y	Y
Freeboard to Driveway (m)	0.00	-0.04	-0.06	-0.09	-0.11	-0.13	-0.25
Driveway Overtopping	Y	Y	Y	Y	Y	Y	Y

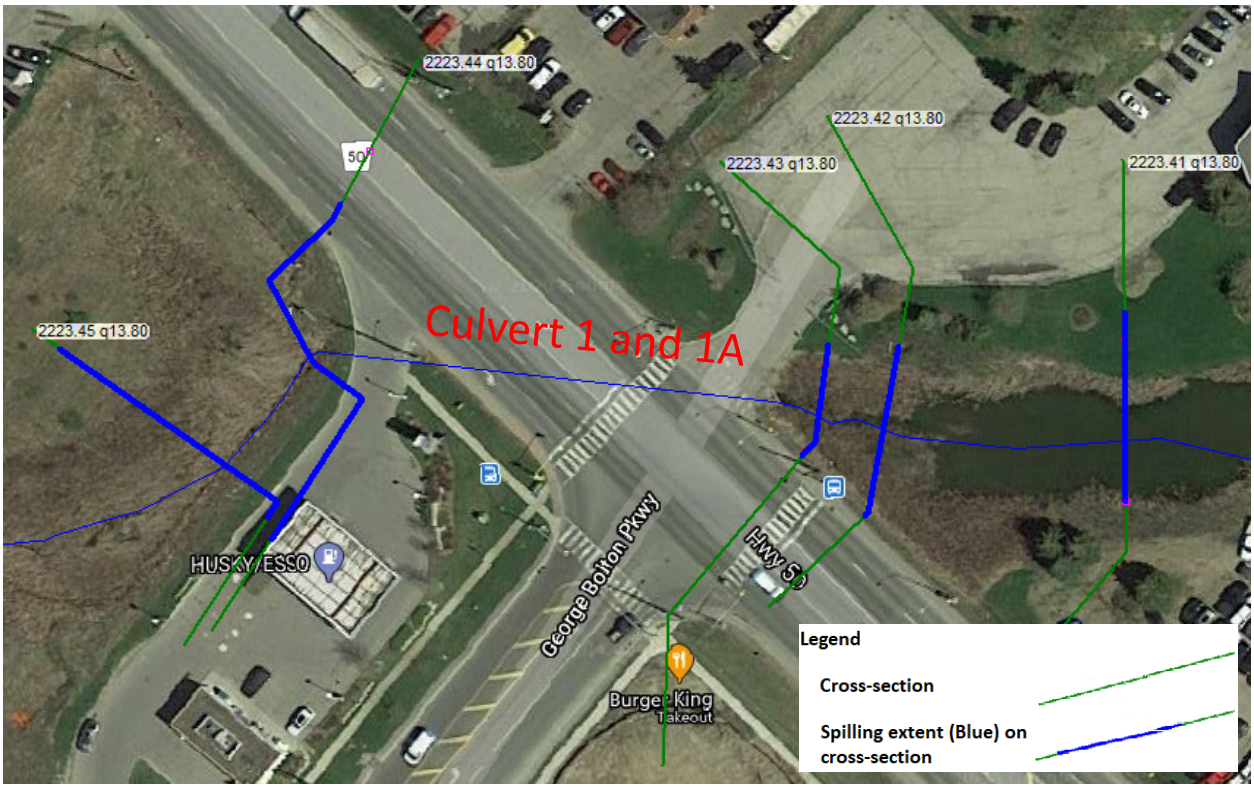


FIGURE 22 Culvert 1 Water Extents on Cross-sections During the Regional Event

4.4 Culvert 2

Table 4 presents the hydraulic results of Culvert 2. The results indicate that Culvert 2 experiences full submergence during the 2-year event and greater. The driveway over Culvert 2 experiences overtopping during the 5-year event and greater. Figure 23 plots water extents on cross-sections adjacent to Culvert 2

during the Regional event. Water overtopping the driveway returns to the channel downstream of the culvert and does not spill toward the north and south directions. As Culvert 2 is located at the rear of a private lot and reasonably distant from RR50 (about 130 m away), water levels at Culvert 2 have no impact on RR50.

TABLE 4 Culvert 2 HEC-RAS Results

Component	Value (m)						
Upstream Invert Elevation	233.38						
Upstream Obvert Elevation	234.93						
Driveway Elevation	235.49						
Return Period	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**Regional**
Flow (m^3/s)	3.34	4.58	5.48	6.64	7.57	8.49	14.97
Water Surface Elevation (m)	235.07	235.53	235.70	235.79	235.86	235.91	236.12
Freeboard to Obvert Elevation (m)	-0.14	-0.60	-0.77	-0.86	-0.93	-0.98	-1.19
Culvert Submergence	Y	Y	Y	Y	Y	Y	Y
Freeboard to Driveway (m)	0.42	-0.04	-0.21	-0.30	-0.37	-0.42	-0.63
Driveway Overtopping	N	Y	Y	Y	Y	Y	Y

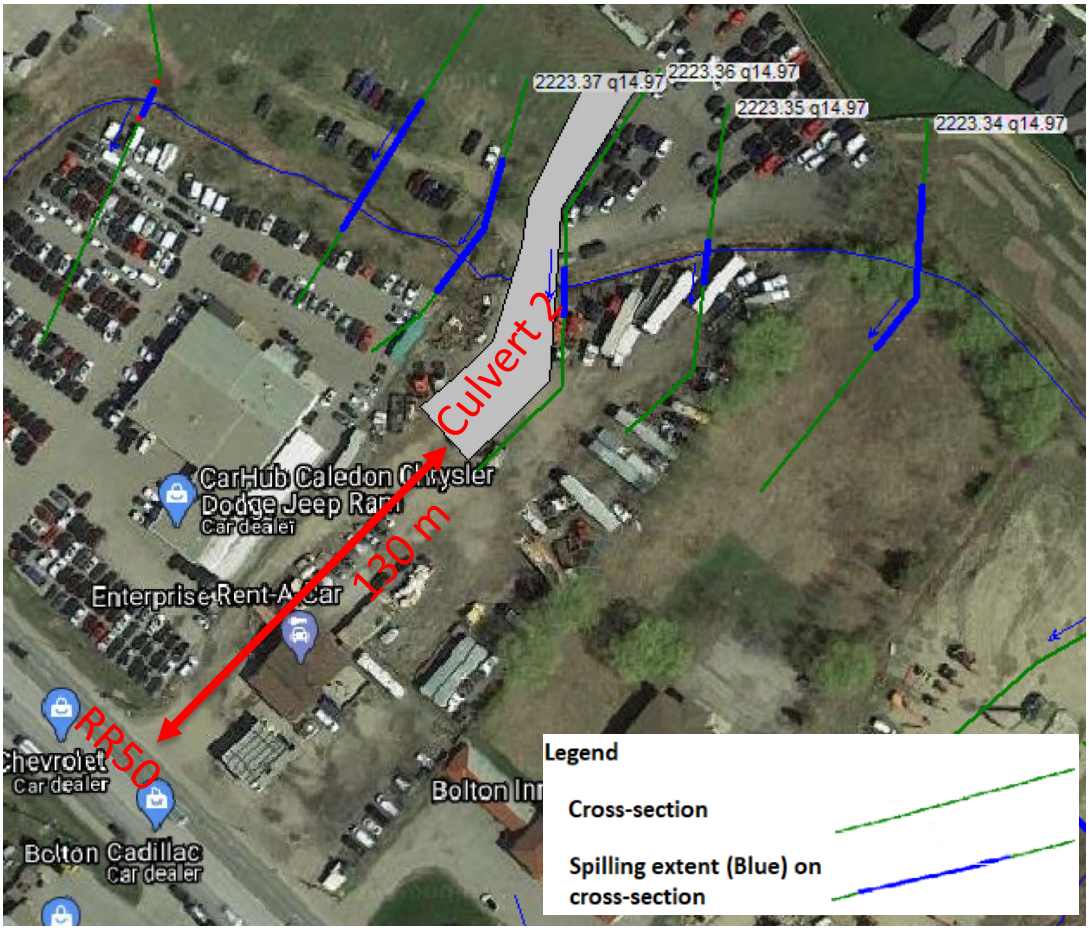


FIGURE 23 Culvert 2 Water Extents on Cross-sections during the Regional Event

4.5 Culvert 3

Tables 5 presents the hydraulic results of Culverts 3. The results indicate that Culvert 3 experiences full submergence during 100-year and Regional events. The driveway over Culvert 3 experiences overtopping during the Regional event.

TABLE 5 Culvert 3 HEC-RAS Results

Component	Value (m)						
Upstream Invert Elevation	231.18						
Upstream Obvert Elevation	233.08						
Driveway Elevation	233.30						
Return Period	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**Regional**
Flow (m^3/s)	3.34	4.58	5.48	6.64	7.57	8.49	14.97
Water Surface Elevation (m)	232.05	232.24	232.40	232.65	232.89	233.09	233.41
Freeboard to Obvert Elevation (m)	1.03	0.84	0.68	0.43	0.19	-0.01	-0.33
Culvert Submergence	N	N	N	N	N	Y	Y
Freeboard to Driveway (m)	1.25	1.06	0.90	0.65	0.41	0.21	-0.11
Driveway Overtopping	N	N	N	N	N	N	Y

4.6 Culvert 4

Tables 6 presents the hydraulic results of Culverts 4. The results indicate Culvert 4 experiences full submergence during the 10-year event and greater. The driveway over Culvert 4 experiences overtopping during the 50-year event and greater.

TABLE 6 Culvert 4 HEC-RAS Results

Component	Value (m)						
Upstream Invert Elevation	230.41						
Upstream Obvert Elevation	232.03						
Driveway Elevation	232.51						
Return Period	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**Regional**
Flow (m^3/s)	3.34	4.58	5.48	6.64	7.57	8.49	14.97
Water Surface Elevation (m)	231.56	231.85	232.05	232.32	232.59	232.75	233.07
Freeboard to Obvert Elevation (m)	0.47	0.18	-0.02	-0.29	-0.56	-0.72	-1.04
Culvert Submergence	N	N	Y	Y	Y	Y	Y
Freeboard to Driveway (m)	0.95	0.66	0.46	0.19	-0.08	-0.24	-0.56
Driveway Overtopping	N	N	N	N	Y	Y	Y

Figure 24 plots water extents on cross-sections adjacent to Culvert 3 and 4 for the 2-year and Regional events. The watercourse in this area experiences high water level during the 2-year through the Regional event. The multi-unit commercial property and its parking lot, which is on the east bank of the watercourse, experience flooding during the 2-year event and greater. RR50, which is on the west bank of the watercourse, does not experience flow on the road during the 2-year through 100-year events During the Regional event, water at the downstream channel of Culvert 4 encroaches on RR50 but does not overtop the road crown or spill to other side of RR50.

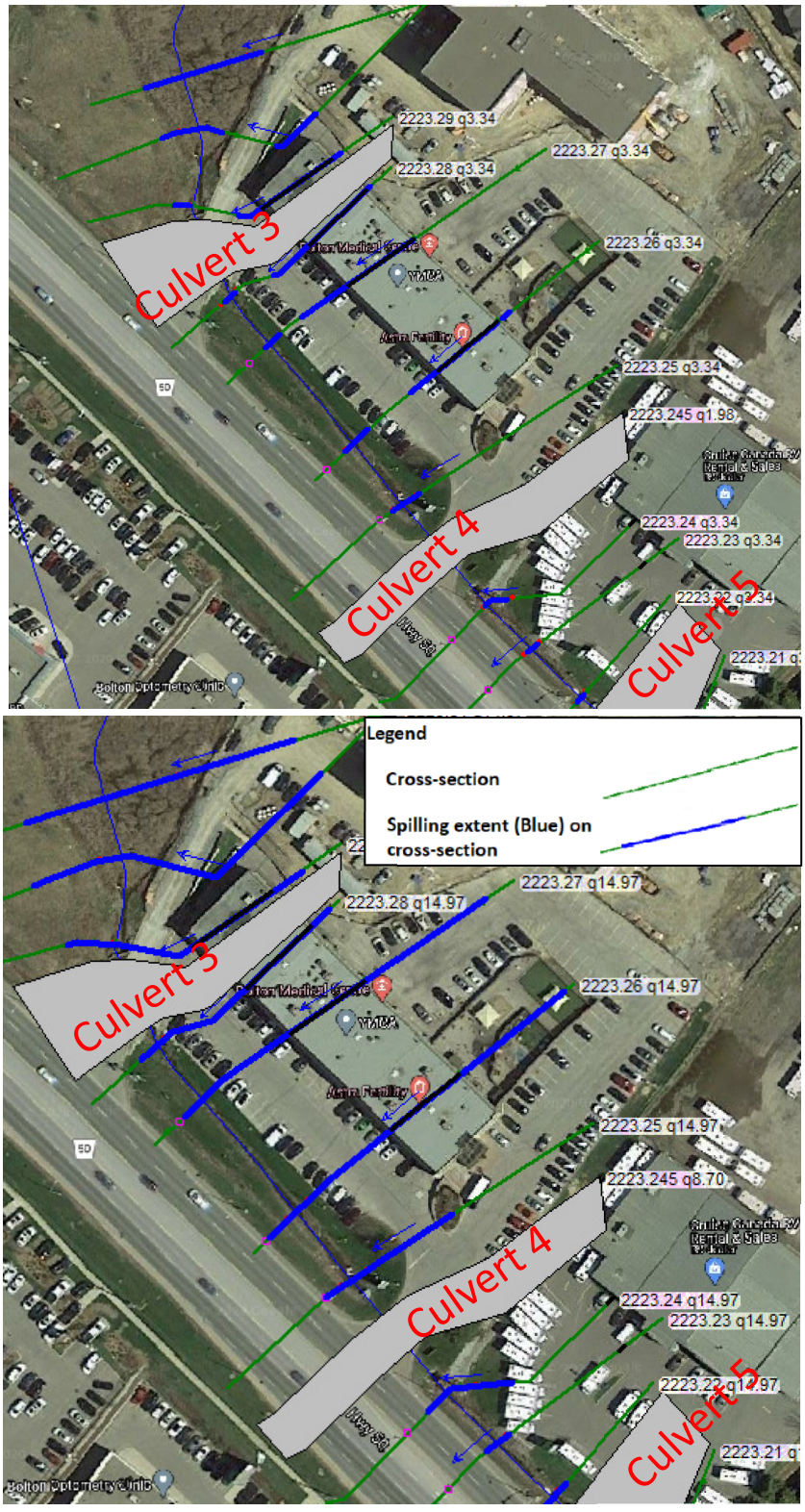


FIGURE 24 Culverts 3 and 4 Water Extents on Cross-sections During the 2-year (Top) and Regional Event (Bottom)

4.7 Culvert 5

Table 7 presents the hydraulic results of Culvert 5. The results indicate that Culvert 5 experiences full submergence during the Regional event. Also, during the Regional event, water encroaches on RR50 and the water level is high enough to overtop to the west side of RR50, as shown in Figure 25. The driveway over Culvert 5 does not experience overtopping during any modelled events.

TABLE 7 Culvert 5 HEC-RAS Results

Component	Value (m)						
Upstream Invert Elevation	230.15						
Upstream Obvert Elevation	231.60						
Driveway Elevation	232.00						
RR50 Elevation	231.85						
Return Period	2-year	5-year	10-year	25-year	50-year	100-year	**Regional**
Flow (m^3/s)	3.34	4.58	5.48	6.64	7.57	8.49	14.97
Water Surface Elevation (m)	230.81	230.96	231.04	231.26	231.43	231.58	231.98
Freeboard to Obvert Elevation (m)	0.79	0.64	0.56	0.34	0.17	0.02	-0.38
Culvert Submergence	N	N	N	N	N	N	Y
Freeboard to Driveway (m)	1.19	1.04	0.96	0.74	0.57	0.42	0.02
Driveway Overtopping	N	N	N	N	N	N	N
Freeboard to RR50 Elevation (m)	1.04	0.89	0.81	0.59	0.42	0.27	-0.13
Overtopping to the West Side of RR50	N	N	N	N	N	N	Y

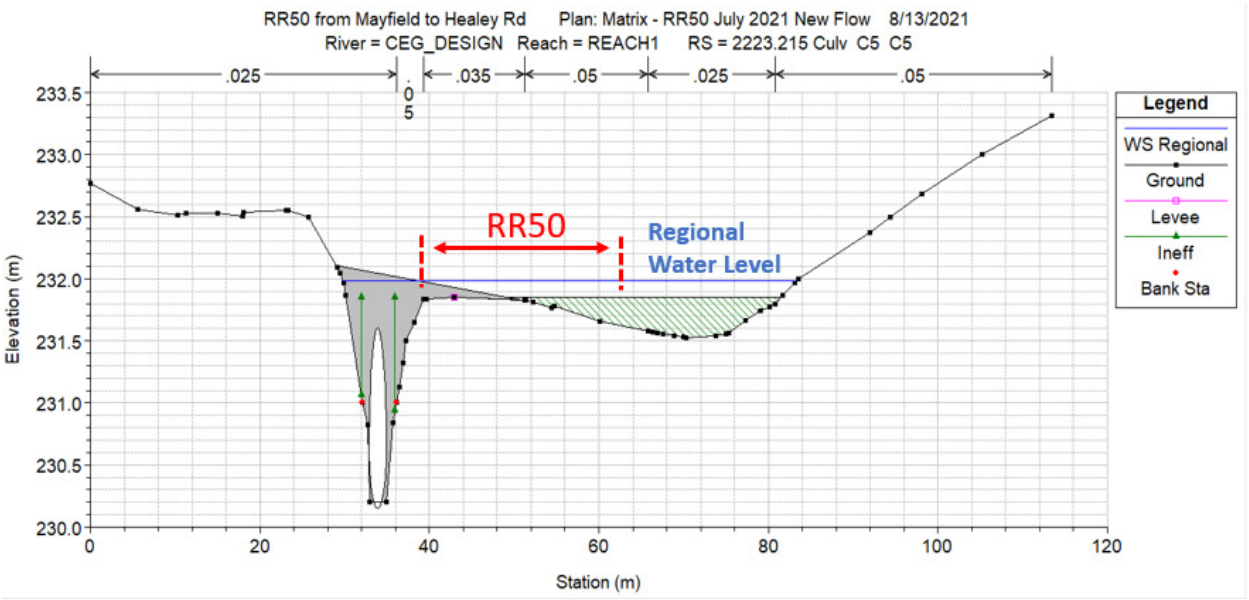


FIGURE 25 Water Levels Overtopping to the West Side of RR50 During the Regional Event at Upstream Face of Culvert 5 (Left to Right Looking Downstream).

4.8 Culvert 6

Table 8 presents the hydraulic results of Culvert 6. The results indicate that Culvert 6 experiences full submergence and driveway overtopping during the Regional event.

TABLE 8 Culvert 6 HEC-RAS Results

Component	Value (m)						
Upstream Invert Elevation	229.30						
Upstream Obvert Elevation	230.90						
Driveway Elevation	231.28						
Return Period	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**Regional**
Flow (m^3/s)	3.57	4.89	5.85	7.08	8.08	9.06	16.25
Water Surface Elevation (m)	230.12	230.27	230.38	230.56	230.67	230.75	231.52
Freeboard to Obvert Elevation (m)	0.78	0.63	0.52	0.34	0.23	0.15	-0.62
Culvert Submergence	N	N	N	N	N	N	Y
Freeboard to Driveway (m)	1.16	1.01	0.90	0.72	0.61	0.53	-0.24
Driveway Overtopping	N	N	N	N	N	N	Y

Figure 26 plots water extents on cross-sections adjacent to Culverts 4, 5, and 6 for the 100-year and Regional events. During 2-year through 100-year events, water is contained in the channel and does not encroach on RR50. During the Regional event, the watercourse experiences high water levels from backwater upstream of Culvert 5. In this case, water encroaches RR50 and spills across to the west side of the road. Water is contained in the channel sections between Culvert 5 and 6 during 2-year through 100-year events. During the Regional event in this reach, water encroaches on RR50 but does not overtop the road crown.

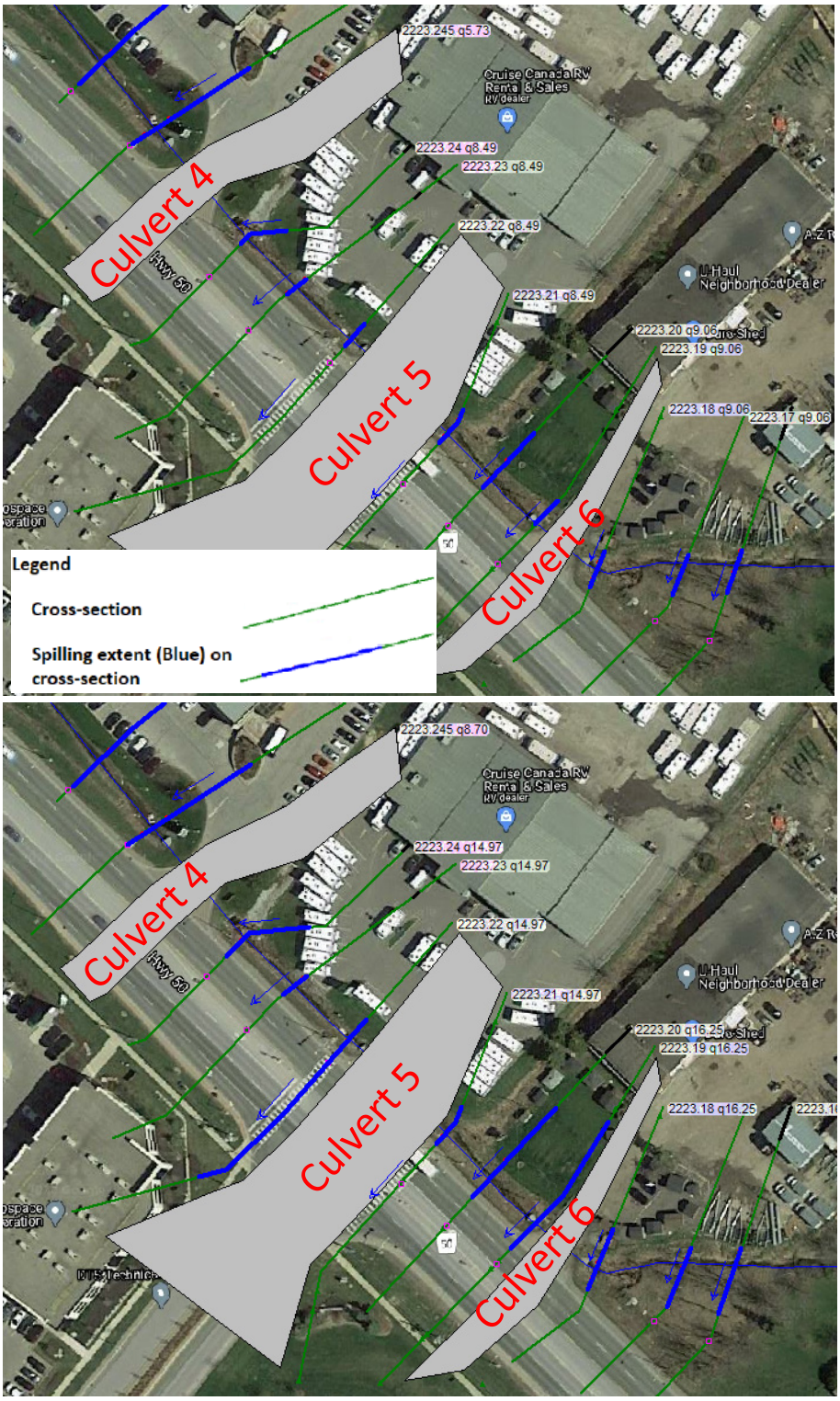


FIGURE 26 Culverts 5 and 6 Water Extents on Cross-sections during the 100-year (Top) and Regional Events (Bottom)

4.9 Culvert 7

Tables 9 presents the hydraulic results of Culverts 7. The results indicate that Culvert 7 experiences full submergence during the 25-year event and greater. The driveway over Culvert 7 experiences overtopping during the Regional event. RR50 Adjacent to Culvert 7 has the same roadway elevation with driveway elevation. During the Regional event, water encroaches on RR50 and the water level is high enough to overtop to the west side of RR50, as shown in Figure 27.

TABLE 9 Culvert 7 HEC-RAS Results

Component	Value (m)						
Upstream Invert Elevation	226.70						
Upstream Obvert Elevation	228.15						
Driveway Elevation	228.74						
Return Period	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**Regional**
Flow (m^3/s)	3.57	4.89	5.85	7.08	8.08	9.06	16.25
Water Surface Elevation (m)	227.85	227.99	228.04	228.19	228.28	228.36	228.82
Freeboard to Obvert Elevation (m)	0.30	0.16	0.11	-0.04	-0.13	-0.21	-0.67
Culvert Submergence	N	N	N	Y	Y	Y	Y
Freeboard to Driveway (m)	0.89	0.75	0.70	0.55	0.46	0.38	-0.08
Driveway Overtopping	N	N	N	N	N	N	Y

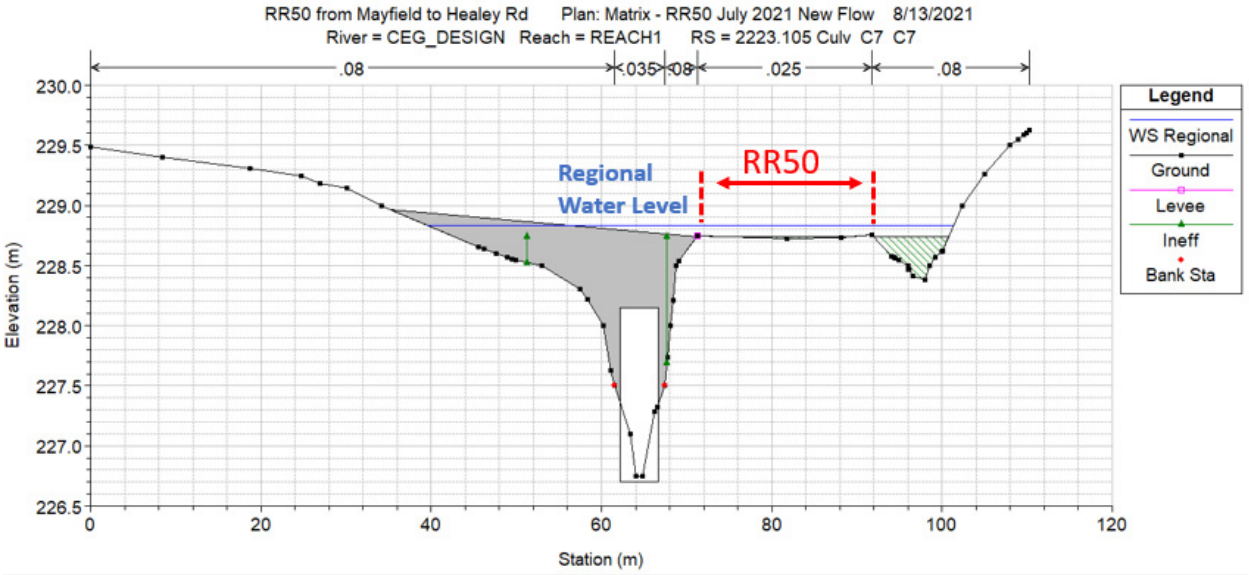


FIGURE 27 Water Levels Overtopping to the West Side of RR50 During the Regional Event at Upstream Face of Culvert 7 (Left to Right Looking Downstream).

4.10 Culvert 8

Tables 10 presents the hydraulic results of Culverts 8. Culvert 8 is capable of conveying flows for all modelled events with no submergence or driveway overtop.

TABLE 10 Culvert 8 HEC-RAS Results

Component	Value (m)						
Upstream Invert Elevation	226.29						
Upstream Obvert Elevation	227.99						
Driveway Elevation	228.25						
Return Period	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**Regional**
Flow (m^3/s)	3.57	4.89	5.85	7.08	8.08	9.06	16.25
Water Surface Elevation (m)	226.94	227.10	227.19	227.31	227.39	227.46	227.82
Freeboard to Obvert Elevation (m)	1.05	0.89	0.80	0.68	0.60	0.53	0.17
Culvert Submergence	N	N	N	N	N	N	N
Freeboard to Driveway (m)	1.31	1.15	1.06	0.94	0.86	0.79	0.43
Driveway Overtopping	N	N	N	N	N	N	N

Figure 28 plots water extents on cross-sections adjacent to Culverts 7 and 8 for the Regional event. During the 2-year through 100-year events, water does not encroach RR50 at any adjacent. During the Regional event, the watercourse experiences high water levels from backwater upstream of Culvert 7. In this case, water encroaches RR50 and spills across to the west side of the road. For reaches downstream of Culvert 7 and adjacent to Culvert 8, water is contained in the channel and does not encroach RR50.

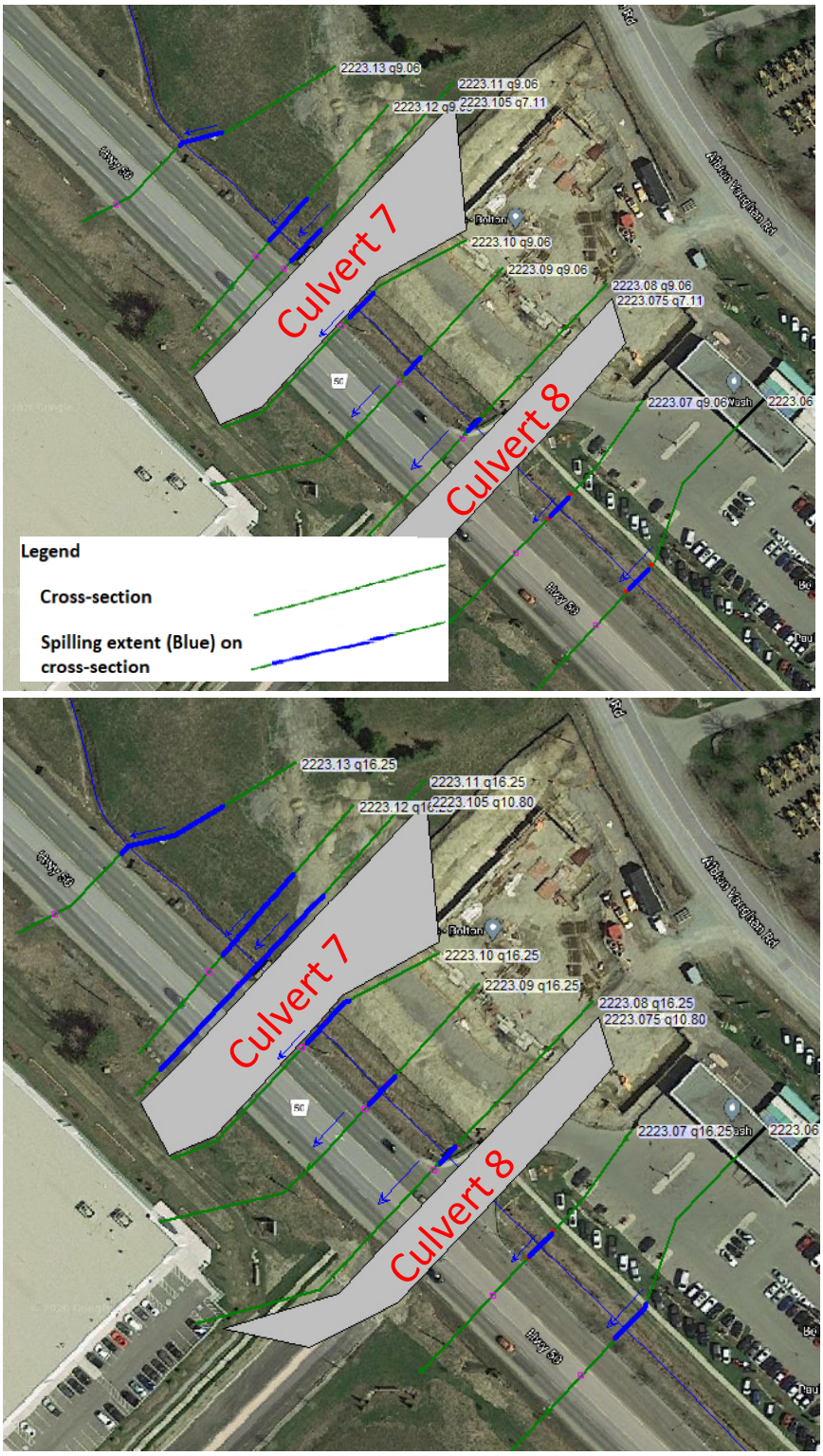


FIGURE 28 Culverts 7 and 8 Water Extents on Cross-sections During the 100-year (Top) and Regional Event (Bottom)

4.11 Specific Areas of Interest

4.11.1 Regional Road 50

Based on Ontario Ministry of Transportation's *Highway Drainage Design Standards* (MTO 2008) for arterial and collector roads adjacent to watercourses, new culverts for parallel watercourses should be designed to convey the 100-year flow and maintain 0.5 m freeboard to the top of the adjacent road subgrade (MTO 2008, Section SD 12). This standard is most commonly applied to new culvert installations and exceptions can be made based on limitations caused by local constraints. Model results of existing conditions showing that Culverts 1 to 7 experience driveway overtopping during high flow events indicate that the culverts are unlikely to meet this standard. Culverts 1, 5, 6, and 7 cause flow to spill onto RR50 while Culverts 2, 3, 4, and 8 do not. Culvert 8 is the only culvert that does not experience submergence or overtopping for all modelled events.

- Backwater from Culvert 1 is expected to spill on RR50 through the entrance driveway of the gas station during the 2-year event.
- As Culvert 2 is distant from RR50, backwater from Culvert 2 has no impact on RR50.
- Backwater from Culverts 3 and 4 generally do not cause flooding on RR50 but do cause flooding on the east bank where the multi-unit commercial property is located.
- Backwater from Culvert 5 contributes to flooding on RR50 during the Regional event. Water is expected to spill over the road crown and to the west side of RR50.
- Backwater from Culvert 6 encroaches RR50 during the Regional event. Water encroaching on RR50 is not high enough to spill over the road crown.
- Backwater from Culvert 7 contributes to flooding on RR50 during the Regional event. Water is expected to spill over the road crown and to the west side of RR50.
- Culverts 8 is capable of conveying water within the channel and not spill on RR50 during all modelled events.

4.11.2 Spilling Extent

Refer to Appendix F for results of flood extents over entire watercourse along Culverts 1 to 8, summarizing water extents on each HEC-RAS cross-section for storm events from 2-year through the Regional event.

4.11.3 Sensitivity Analysis on Proposed Mayfield Road Culvert

RVA informed Matrix that the Mayfield Road culvert, which is located approximately 290 m downstream of Culvert 8, will be replaced with a new design of twin culverts during future construction. To verify the

effects of the proposed twin culverts within the study area, a sensitivity analysis was carried out to compare the hydraulic conditions resulting from the existing culvert and the proposed twin culverts. Table 11 summarizes the dimensions of existing culvert and proposed twin culverts.

TABLE 11 Culvert 8, Dimensions of Existing Culvert and Proposed Twin Culverts at Mayfield Road

Parameters	Existing Culvert	Proposed Twin Culverts
Number of Barrels	1	2
Shape	box	box
Material	concrete	concrete
Height (m)	1.5	1.5
Width (m)	4.5	3
Upstream Invert Elevation (m)	224	224
Downstream Invert Elevation (m)	223.75	223.61

Figure 29 shows water level profiles for existing and proposed conditions during three storm events including the 2-year, 25-year, and the Regional events. The results show that the proposed twin culverts lower water levels immediately upstream, but the improvements do not extend as far upstream as Culvert 8 for any of the events. Near Mayfield Road, the increased capacity of proposed twin culverts leads water level decrease compared with the existing water level. Table 12 shows the water levels and differences between the existing and proposed conditions at the upstream end of Mayfield Road. It is found that water levels are decreased on the proposed conditions from 2-year through the Regional event. Overall, the proposed Mayfield Road twin culverts do not alter the hydraulic performance of Culvert 8 and do not alter spill conditions on RR50 during all modelled events.

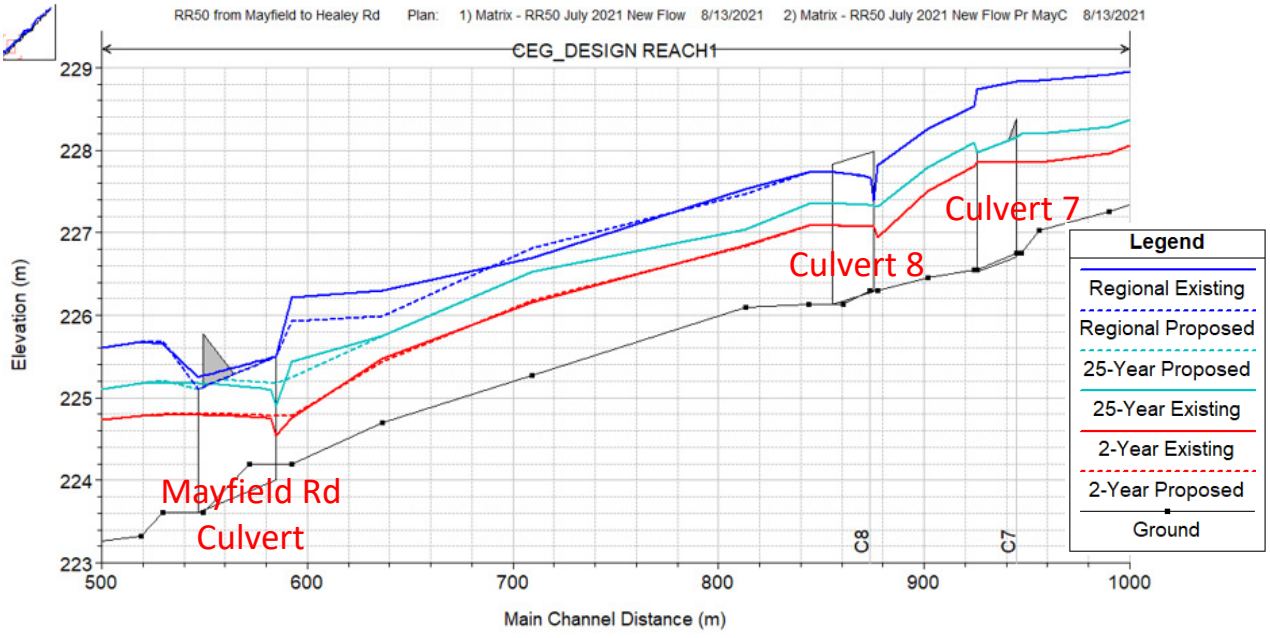


FIGURE 29 Water Level Profile for Existing Mayfield Road Culvert and Proposed Mayfield Road Culvert During the 2-year, 25-year, and the Regional events

TABLE 12 Water Levels and Differences Between Existing Culvert and Proposed Twin Culverts at the Upstream End of Mayfield Road (Cross-section 2223.03)

Event	Existing Culvert Water Surface Elevation at Inlet (m)	Proposed Twin Culverts Water Surface Elevation at Inlet (m)	Difference (Proposed - Existing) (m)
2-year	224.76	224.79	0.03
25-year	225.43	225.25	-0.18
Regional	226.22	225.93	-0.29

5 REFERENCES

Civica Infrastructure Inc. (Civica). 2015. *Final Report Humber River Hydrology Update*. Prepared for Toronto and Region Conservation Authority (TRCA). Vaughan, Ontario. June 2015.

Cole Engineering Group Ltd. (Cole Engineering). 2015. *Floodplain Mapping Development: Assignment #2 EWR-14-03 Engineering Retainer - 2014 Flood Mapping*. March 2015.

Ontario Ministry of Transportation (MTO). 2008. *Highway Drainage Design Standards*. Downsview, Ontario. January 2008.

DRAFT

APPENDIX A
Study Area Plan

DRAFT

Existing Online Pond

Current Channel Re-Alignment

Approx. Location of Private Resident Concern

Previous Channel Re-Alignment

Albion Vaughan Road

Regional Road 50

George Bolton Parkway

Simona Drive

Parr Boulevard

1 2 3 4 5 6 7 8

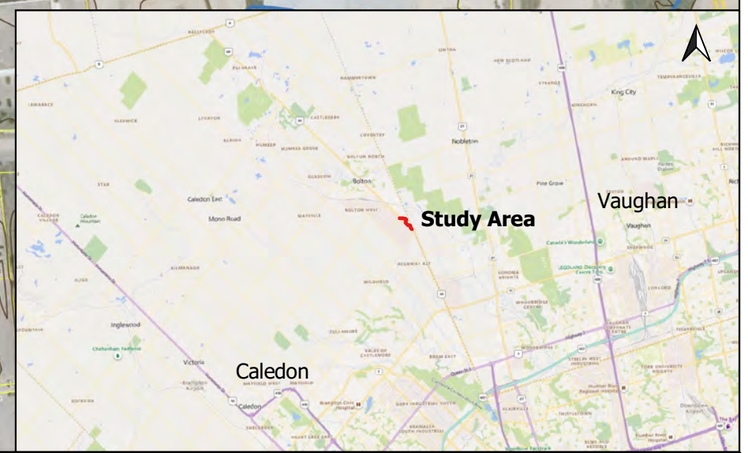


Figure Date: December 4, 2020

Legend

- Culvert Crossing
- Special Areas of Interest
- Study Area
- Contours 1m
- Active Transportation and Drainage Improvements
- Waterbody
- West Robinson Creek
- Property Boundaries

0 100 200 300 400 m

Notes:
1. Aerial photo from Bing (2020 Microsoft Corporation)
2. This drawing must be used in conjuction with the attached report, dated December 2020 and is subject to the same limitations and conditions stated in the memorandum.

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

30854 - RVA Regional Road 50 EA

Project #:

Study Area Plan

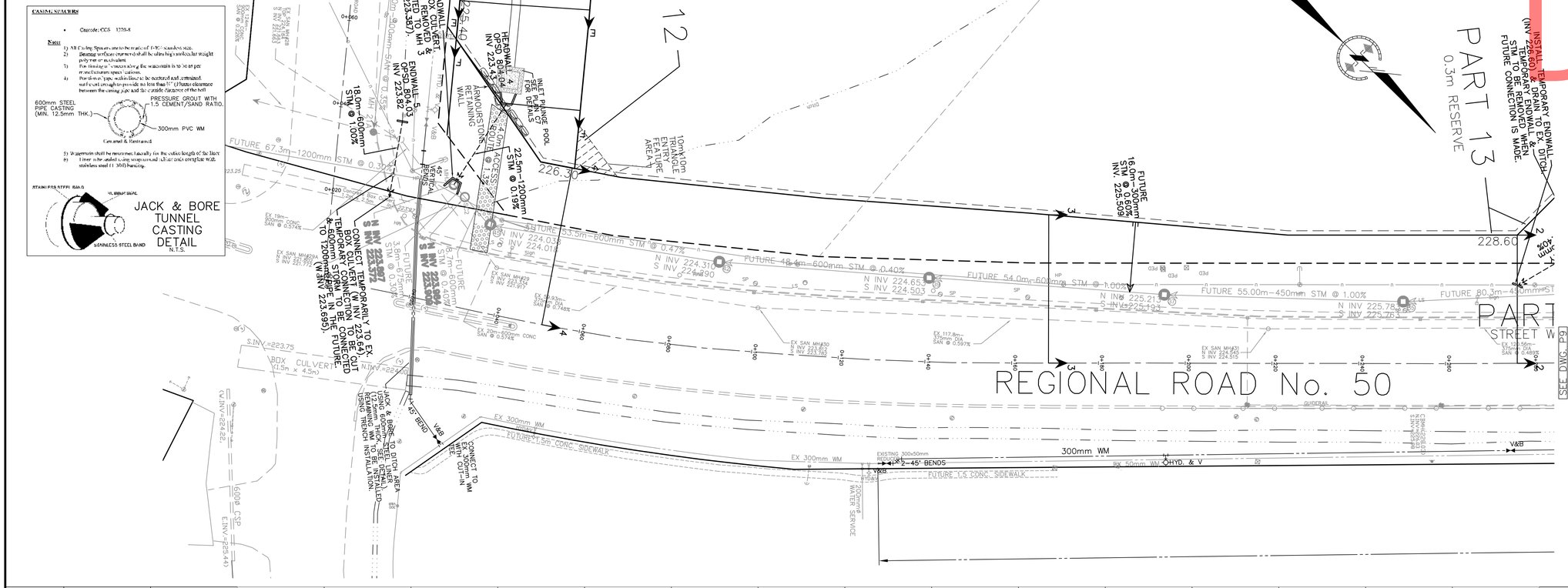
msamson
pcampbell

Figure A

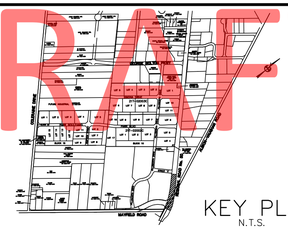
\\matrix-solutions.com\public\Mississauga\PROJECTS\30854 - RVA - RR50 EA\08 GIS\FiguresandTables\30854 - RV Study Area.qgz|Study Area|pg1|2020-12-04

DRAFT

APPENDIX B
Applicable Record Drawings



DRAFT



KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C3

LEGEND

- HYDRANT AND VALVE
- CATCHBASIN
- DOUBLE CATCHBASIN
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- 236.00 PROPOSED ELEVATION
- 235.50 EXISTING ELEVATION
- VALVE AND BOX
- VALVE AND CHAMBER

TOWN OF CALEDON

APPROVED AS NOTED

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.

THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.

DATE: _____

APPROVED BY: _____
C.A. CAMPBELL, C.E.T
DIRECTOR OF PUBLIC WORKS & ENGINEERING

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PLAN OF SUBDIVISION OF
PART OF THE EAST HALF OF LOT 1,
CONCESSION 6,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK

REGION OF PEEL #37 ELEV. 227.187m
ON THE NORTH FACE AT THE EAST CORNER OF A RED INSUL-BRICK HOUSE LOCATED ON THE SOUTH WEST CORNER OF SEVENTEENTH SIDEROAD (REGION ROAD #14) AND HIGHWAY #50

No.	Date	By	REVISIONS
7	08/28/08	M.F.S.	FINAL SUBMISSION, PHASE II FOR REGION
6	02/21/08	M.F.S.	4th SUBMISSION, PHASE II FOR TOWN
5	12/18/07	M.F.S.	3rd SUBMISSION, PHASE II FOR TOWN
4	07/18/07	M.F.S.	3rd SUBMISSION, PHASE II FOR REGION
3	06/28/07	M.F.S.	2nd SUBMISSION, PHASE II FOR TOWN
2	06/22/07	M.F.S.	2nd SUBMISSION, PHASE II FOR REGION
1	07/07/06	M.F.S.	1st SUBMISSION

a.m.candaras associates inc.
consulting engineers
8551 Weston rd., suite 203
Woodbridge ont. L4L 9R4
905–850–8020 Fax 905–850–8099
Email: civil@amcai.com

21T–06001Ca (PHASE II)

GIFFELS ENTERPRISES

REGIONAL ROAD No. 50 & MAYFIELD ROAD

DEVELOPMENT

TOWN OF CALEDON

REGIONAL ROAD No. 50

0+000.000 TO 0+280.000

SCALE: HORIZ 1:500 VERT 1:50	DATE: APRIL 2006	PROJ No. 0496	
DRAWN: M.F.S.	CHK'D: A.M.C.	PLAN No. 56547-D	
DESIGNED: M.F.S.	SHEET 8 OF 9		

FILENAME: O:\2496\2496-PROPHASE 1\1.dwg
PLOTDATE: Oct 14, 2015 – 1:39pm
PLOTTED BY: Marie

DRAFT

ALBION-VAUGHAN ROAD

REGIONAL ROAD No. 50

STREET 'A'

PROPOSED ONE-STOREY CAR WASH
#12129 REGIONAL ROAD 50
FF: 228.75
GFA=520.4 sq.m

PROPOSED ONE-STOREY CAR DEALERSHIP
#12080 ALBION VAUGHAN ROAD
FFF: 228.15
GFA=719.0 sq.m

CANOPY

CAR DISPLAY

12130 ALBION VAUGHAN ROAD

EX. DWELLING

EXISTING SEPTIC TANK TO BE ABANDONED IN ACCORDANCE WITH MOE REGULATION

EXISTING GRAVEL DRIVEWAY TO BE REMOVED

NOTE: SEPARATE SERVICE CONNECTION APPLICATION REQUIRED FOR PHASE 3

LIMIT OF PROPERTY

OWNER SHALL OBTAIN AN ROAD OCCUPANCY PERMIT FROM THE TOWN (PUBLIC WORKS AND ENGINEERING DEPARTMENT) AND PERMISSION/OR PERMIT FROM THE TOWN OF VAUGHAN FOR ANY WORKS IN THE RIGHT OF WAY OF ALBION-VAUGHAN ROAD

PAVEMENT WIDENING (SEE DETAIL)

EX. DRIVEWAY AND CULVERT TO BE REMOVED AND BLVD TO BE RESTORED

EX. DRIVEWAY AND CULVERT TO BE REMOVED AND BLVD TO BE RESTORED

PROP. 28m-525mm DIA BOSS 2000 CULVERT

INSTALL APPROVED 150mm TAPPING SLEEVE AND VALVE

CONTRACTOR IS TO CONTACT HYDRO ONE (ORANGEVILLE HYDRO) TO ARRANGE FOR THE RELOCATION OF EX. HYDROPOLE

REMOVE EX. CURB

REMOVE EX. GUARDRAIL

REMOVE EX. GUIDE RAIL

REMOVE EX. CURB

REMOVE EX. CURB

REMOVE EX. DRIVEWAY

MATCH EX. GRADES

3:1 SLOPE

3:1 SLOPE MAX

TOE WALL OPSD 3120.100

HEAVY DUTY SIDEWALK (SEE GENERAL NOTE #8, DWG SSG-2

PROP. 42m-5.0mX1.8m CONCRETE BOX CULVERT

47.5m CURB CUT

23.0m

CONCRETE CURB & GUTTER OPSD 600.04

STEP JOINT (SEE DETAIL)

SIDEWALK RAMP OPSD 310.030 (BOTH SIDES OF DRIVEWAY)

10mx1.3m LOOP DETECTOR EASEMENT

2.0m SIDEWALK EASEMENT

0.30m RESERVE

PROP. 1.5m SIDEWALK

EX. 5.0mX1.8m CONC. BOX CULVERT

ARMOUR STONE WING WALL

EX. GUARDRAIL

EX. CENTRE LINE OF ROAD

EX. CENTRE LINE OF STREET 'A'

FUTURE CONC. SIDEWALK

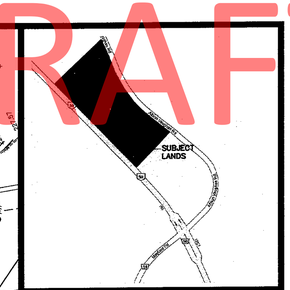
PROPERTY LINE

REGION OF PEEL
ETPS DEVELOPMENT ENGINEERING
REVIEWED FOR WATER, SANITARY AND/OR STORM SEWERS
IN ACCORDANCE WITH LATEST
REGION OF PEEL STANDARDS AND SPECIFICATIONS
DATE Oct. 19/2010
MUNICIPAL SIDE & REGIONAL EASEMENTS ONLY

INSPECTORS COPY

NOTE:
1. FOR NOTES AND DETAILS REFER TO DWG SSG-2
2. FOR EROSION AND SEDIMENT CONTROL REFER TO DWG SSG-3
3. FOR ALBION-VAUGHAN ROAD DRIVEWAY ACCESS IMPROVEMENTS REFER TO DWG SSG-4
4. FOR REGIONAL ROAD No. 50 DRIVEWAYS REFER TO DWG SSG-5

SEE DWG SSG-2



LEGEND:

TW / BW	TOP OF WALL / BOTTOM OF WALL
227.05	EXISTING ELEVATION
188.5	EXISTING CONTOUR
2%	DRAINAGE FLOW DIRECTION AND SLOPE
228.00	PROPOSED ELEVATION
	STORM MANHOLE
	STORM CATCHBASIN MANHOLE
	STORM DOUBLE CATCHBASIN MANHOLE
	CATCHBASIN
	SANITARY MANHOLE
	VALVE AND BOX
M	WATER METER LOCATION
HYD&V	VALVED HYDRANT
	FIRE DEPARTMENT CONNECTION
	PROP. OVERLAND FLOW DIRECTION
FFE	FINISHED GROUND FLOOR ELEVATION
	EXTERIOR DOOR LOCATION
	ROAD RESTORATION (SEE DETAIL)
	SURFACE STORMWATER DETENTION AREA - 100 YEAR HWL
	SURFACE DRAINAGE DIVIDE LINE
	PROPERTY LINE
	PHASING LIMITS
RD	ROOF DRAIN
	REGIONAL FLOODLINE

BENCHMARK:
TOPOGRAPHIC SURVEY PREPARED BY YOUNG & YOUNG SURVEYING INC. O.L.S. PROJECT: 08-05874
ELEVATIONS ARE GEODETIC AND REFERRED TO MTO BENCHMARK NO. 758056, ELEVATION = 251.263m.

NO.	DATE	REVISIONS	BY
8.	30/08/10	AS PER REGION COMMENTS	D.G.
7.	02/07/10	REDLINED BY TOWN	D.G.
6.	24/06/10	AS PER REVISED SITE PLAN	D.G.
5.	13/05/10	AS PER REVISED SITE PLAN	D.G.
4.	04/05/10	AS PER TOWN COMMENTS	D.G.
3.	26/04/10	DRIVEWAY DETAILS ADDED	D.G.
2.	07/04/10	RESUBMISSION OF SITE PLAN & H REMOVAL	D.G.
1.	25/03/10	TOWN, REGION & TRCA COMMENTS	D.G.

LICENSED PROFESSIONAL ENGINEER D. A. GIUGOVAZ AUG 30,2010 PROVINCE OF ONTARIO

DRWN BY: T.E.R NOV 15/10 RVR

VALDOR ENGINEERING INC.
Consulting Engineers - Project Managers
651 CHRISLEA ROAD, SUITE 11, WOODBRIDGE, ONTARIO, L4L 8A5
TEL (905)264-0054, FAX (905)264-0069
E-MAIL: info@valdor-engineering.com
www.valdor-engineering.com

PROJECT
PROPOSED CAR DEALERSHIP
COFFEY PHASE 2
12129 REGIONAL ROAD 50 & 12080 ALBION VAUGHAN ROAD, BOLTON, TOWN OF CALEDON
REGION FILE No. D-05011819E

SITE SERVICING & GRADING PLAN

SCALE	1:300	DATE OF DRAWING	DEC. 2009
PROJECT NO.	08140		
DRAWN BY	P.C./L.S.	DWG. NO.	SSG-1
CHKD BY	D.G.		

INSPECTORS COPY

SUB #9
C-457330

CASING SPACERS

- Cascade: CCS 1120-S

Notes:

1) All Casing Spacers are to be made of T-304 stainless steel.
2) Bending tertiary runners shall be ultra high molecular weight polyester or equivalent.
3) Positioning of runners along the watermain is to be as per manufacturers specifications.
4) Portion in type within limits to be sectioned and ventilated, cut from straight to provide no less than 1/4" (6mm) clearance between the casing pipe and the outside diameter of the bell.

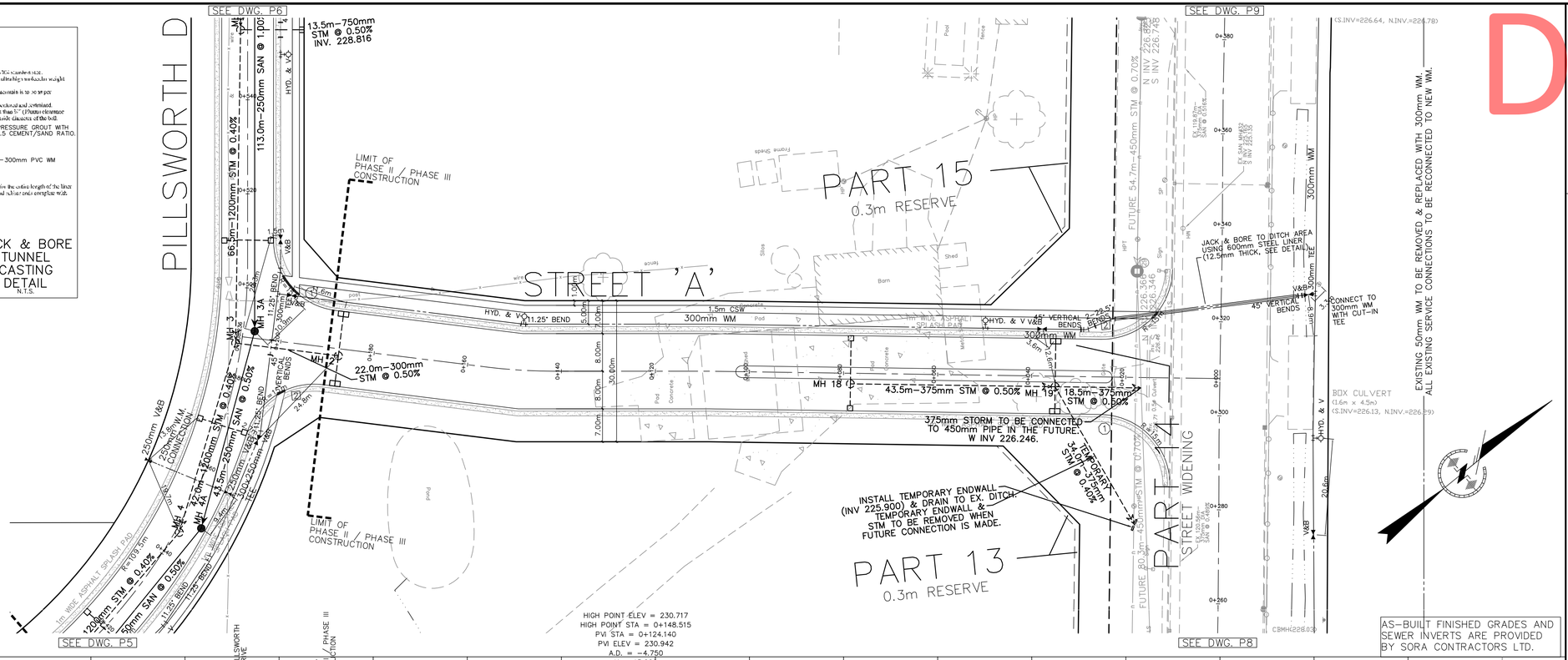
600mm STEEL PIPE CASING (MIN. 12.5mm THK.) — PRESSURE GROUT WITH 1:5 CEMENT/SAND RATIO — 300mm PVC WM

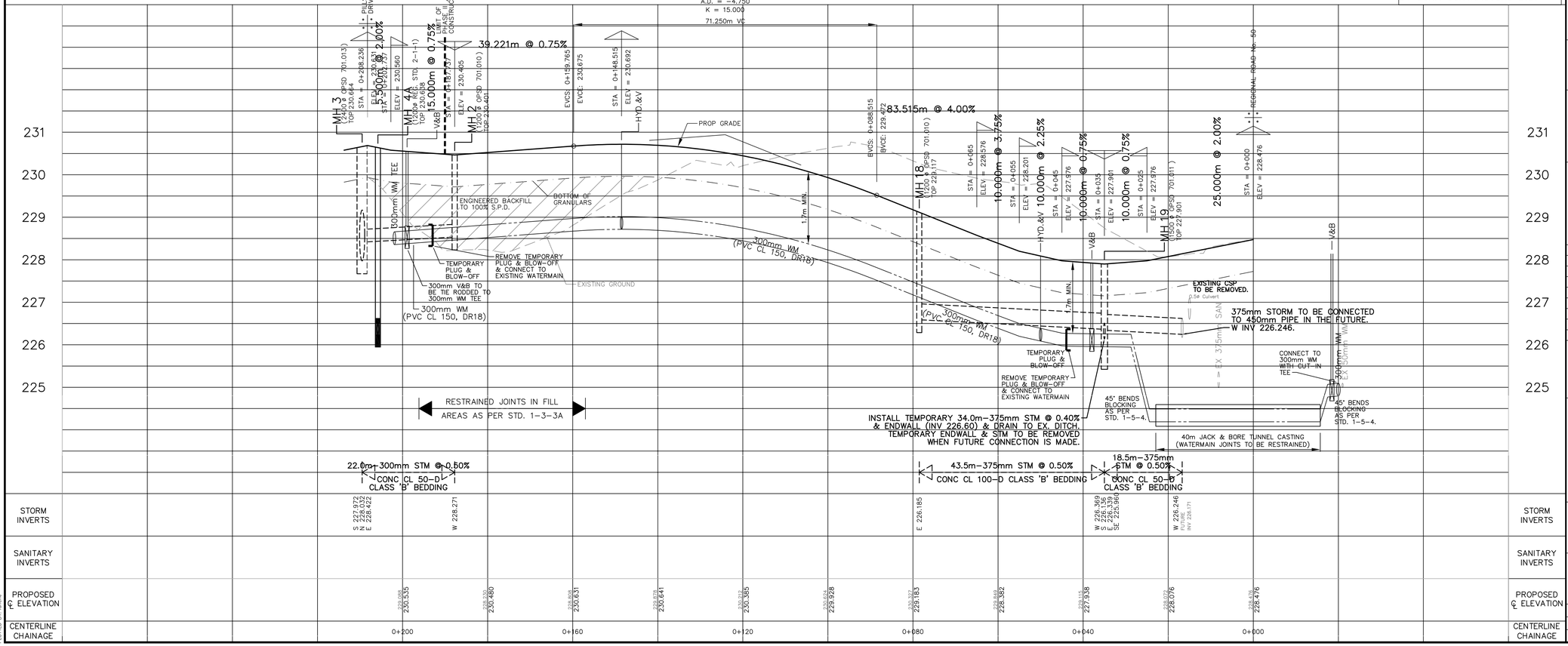
Centered & Restrained

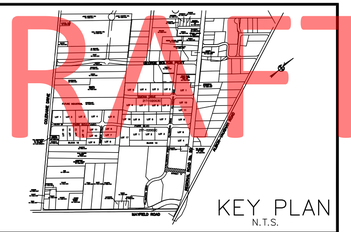
5) Watermain shall be restrained laterally for the entire length of the liner.
6) Liner to be sealed using strap around carrier and watermain with stainless steel (1.3mm) banding.

STAINLESS STEEL BAND — ¼ BEAD SEAL — STAINLESS STEEL BAND

JACK & BORE TUNNEL CASING DETAIL
N.T.S.







KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C3

LEGEND

- HYDRANT AND VALVE
- CATCHBASIN
- DOUBLE CATCHBASIN
- PROPOSED STORM MANHOLE
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- PROPOSED CATCHBASIN MANHOLE
- 236.00 PROPOSED ELEVATION
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- VALVE AND CHAMBER

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PLAN OF SUBDIVISION OF
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REGIONAL MUNICIPALITY OF PEEL

BENCH MARK

REGION OF PEEL #37 ELEV. 227.187m
ON THE NORTH FACE AT THE EAST CORNER OF A RED INSUL BRICK HOUSE LOCATED ON THE SOUTH WEST CORNER OF SEVENTEENTH SIDEROAD (REGION ROAD #14) AND HIGHWAY #50

No.	Date	By	REVISIONS
8	01/08/09	D.P.	AS–CONSTRUCTED
7	08/28/08	M.F.S.	FINAL SUBMISSION, PHASE II FOR REGION
6	02/21/08	M.F.S.	4th SUBMISSION, PHASE II FOR TOWN
5	12/18/07	M.F.S.	3rd SUBMISSION, PHASE II FOR TOWN
4	07/18/07	M.F.S.	3rd SUBMISSION, PHASE II FOR REGION
3	06/28/07	M.F.S.	2nd SUBMISSION, PHASE II FOR TOWN
2	06/22/07	M.F.S.	2nd SUBMISSION, PHASE II FOR REGION
1	07/07/06	M.F.S.	1st SUBMISSION

a.m.candaras associates inc.
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Email: civil@amcai.com

21T–06001Ca (PHASE II)

GIFFELS ENTERPRISES

REGIONAL ROAD No. 50 & MAYFIELD ROAD

DEVELOPMENT

TOWN OF CALEDON

AS–CONSTRUCTED

STREET 'A'

0+000.000 TO 0+208.236

SCALE: HORIZ 1:500 VERT 1:50	DATE: APRIL 2006	PROJ No.	0496
DRAWN: M.F.S.	CHK'D: A.M.C.	PLAN No.	56546-D
DESIGNED: M.F.S.	SHEET 7 OF 9		

DRAFT

HIGHWAY No. 50

RE-BENCH EX. SAN.MH TO SUIT

PROP. SAN.MH 34

PROP. 375mm SAN.

PROP. SAN.MH 33

PROP. 375mm SAN.

TEST PIT

PROP. SAN.MH 32

PROP. 375mm SAN.

250 SAN

150 FM

150 SD

600 CSP

14.8m

14.81m

8 CON

POST&WIRE F.

PUMPING STATION

400 DIA CONIF.

800 DIA DECID

1000 DIA DECID

PROP. 20m CONCRETE ENCASEMENT

GUARD RAIL

REFER TO DWG. No. 28260-D

THIS PUMPING STATION WAS REMOVED & THE 150 FORCEMAIN WAS ABANDONED AS PER CAM JOHNSTON SEPT 25TH, 2009

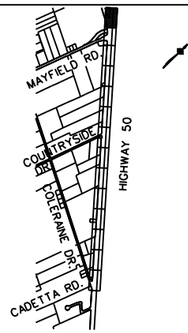
FOR GENERAL NOTES AND DETAILS SEE DWG. No. 28248-D & 28262-D

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS	IX/24/01	J.P.
STORM SEWERS	IX/21/01	J.P.	BELL U/G CABLE	XI/22/01	J.P.
WATERMAINS			HYDRO U/G CABLE	X/12/01	J.P.
TRANSIT			ONT. HYDRO		
PARKS & REC.			CTV		
ONT. CLEAN WATER	IX/27/01	J.P.		X/15/01	J.P.

REVISIONS

DATE	DETAILS	INIT.
SEPT.02	AS CONSTRUCTED	J.P.



KEY PLAN N.T.S.

EX. SAN.MH 16

C/L OF R.O.W.

EX. GRADE OVER PROP. SAN.

EX. 150mm FM

EX. 50mm POLY W/M

Ex. 250mm SAN. @0.59%

PROP. 3.25m-375mm DIA. SAN. SEWER @ 0.462%

PROP. 20m CONCRETE ENCASEMENT

EX. N.INV. 226.334
EX. W.INV. 226.324
PROP. E. INV. 226.300

PROP. 90.38m - 375mm DIA. SAN. SEWER @ 0.504%

PROP. 119.87m - 375mm DIA. SAN. SEWER @ 0.516%

PROP. 120.56m - 375mm DIA. SAN. SEWER @ 0.488%

SAN.MH 34
1200mm R.P.STD 2-1-1
(TOP 230.661)
STA. 4+439
W. INV. 226.309
S. INV. 226.279

SAN.MH 33
1200mm R.P.STD 2-1-1
(TOP 229.610)
STA. 4+340.5
N. INV. 226.823
S. INV. 226.783

SAN.MH 32
1200mm R.P.STD 2-1-1
(TOP 228.445)
STA. 4+220.5
N. INV. 225.165
S. INV. 225.135

232 231 230 229 228 227 226 225 224 223 222 221

4+460 4+440 4+420 4+400 4+380 4+360 4+340 4+320 4+300 4+280 4+260 4+240 4+220 4+200 4+180 4+160 ROAD CHAINAGE

General Notes

- ALL DRIVEWAYS ASPHALT UNLESS OTHERWISE NOTED.
- ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN THE FIELD
- DENOTES BUILDING - NOT LOCATED
- DENOTES BUILDING LOCATED
- TYPE 'B' BEDDING UNLESS OTHERWISE NOTED (SAN)

B.M. NO. ELEV.

THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO AND DURING CONSTRUCTION LOCATION OF EXISTING UTILITIES APPROXIMATE ONLY. TO BE VERIFIED IN FIELD BY CONTRACTOR.

DESIGNED BY | APPROVED BY

CHKD.

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL TELEPHONE COMPANY
CONSUMERS GAS COMPANY
MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ELECTRIC POWER COMM. OF ONTARIO
HYDRO ELECTRIC COMM. CITY OF MISSISSAUGA
HYDRO ELECTRIC COMM. CITY OF BRAMPTON
CABLE TELEVISION

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

Region of Peel
Public Works

BOLTON/BRAMPTON TRUNK SEWER

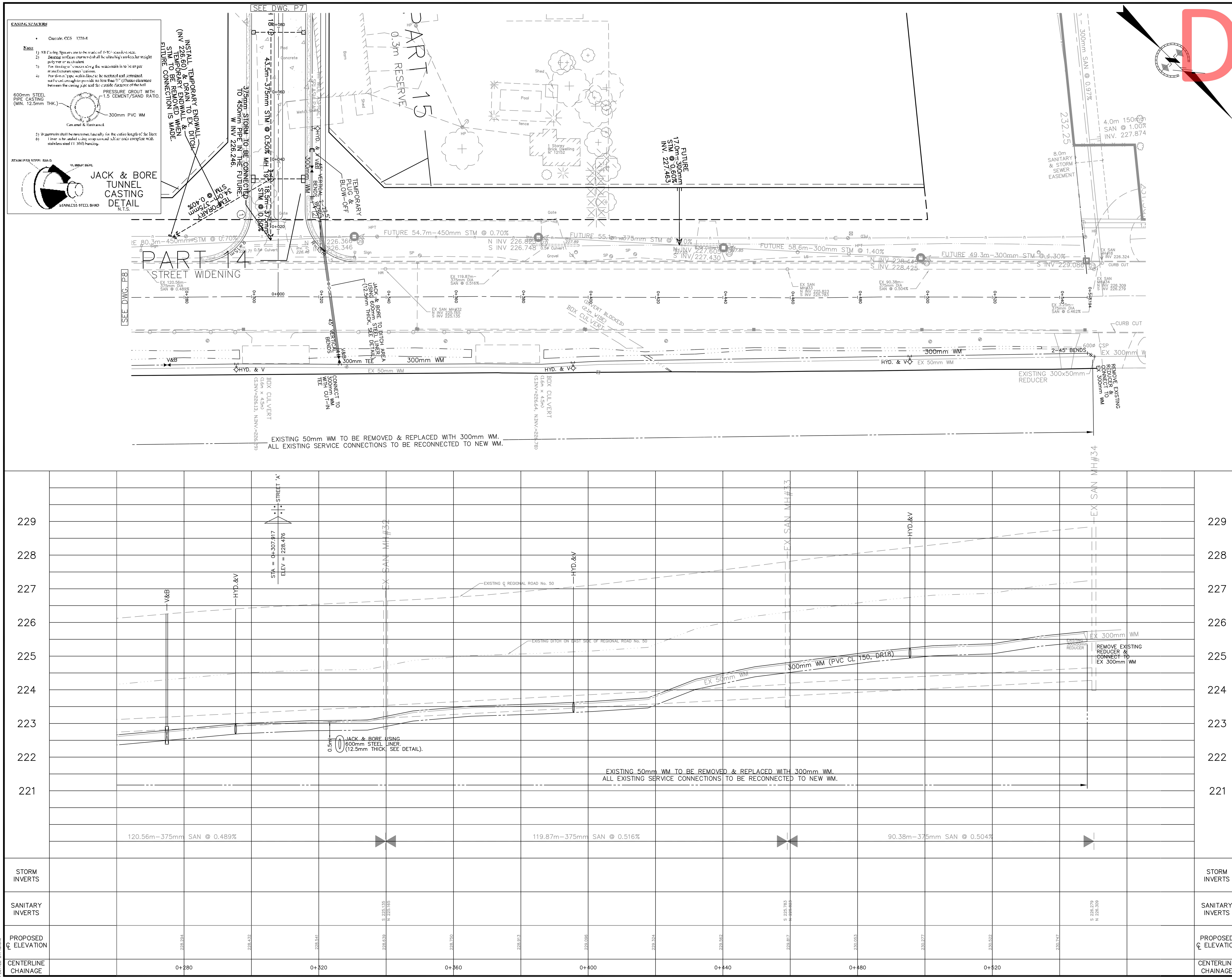
(FROM COLERAINE DR. TO MAYFIELD RD.)

PROP. 375mm SANITARY SEWER

Sta. 4+160 **To Sta.** 4+460

LOTS	AREA B-26/ C-2	PROJECT NO. 02-2140
CHECKED BY	DRAWN BY J.P.	PLAN NO. 28261-D
DATE MARCH, 2002	SHEET 14 OF 14	

28261-D.dgn 27/04/10 4:07:55 PM



KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C3

LEGEND

	HYDRANT AND VALVE
	CATCHBASIN
	DOUBLE CATCHBASIN
	PROPOSED STORM MANHOLE
	PROPOSED SANITARY MANHOLE
	PROPOSED CATCHBASIN MANHOLE
236.00	PROPOSED ELEVATION
235.50	EXISTING ELEVATION
	VALVE AND BOX
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PLAN OF SUBDIVISION OF
PART OF THE EAST HALF OF LOT 1,
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REGIONAL MUNICIPALITY OF PEEL

BENCH MARK

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ON THE NORTH FACE AT THE EAST CORNER OF A RED INSUL. BRICK HOUSE LOCATED ON THE SOUTH WEST CORNER OF SEVENTEENTH SIDEROAD (REGION ROAD #14) AND HIGHWAY #50

No.	Date	By	REVISIONS
7	08/28/08	M.F.S.	FINAL SUBMISSION, PHASE II FOR REGION
6	02/21/08	M.F.S.	4th SUBMISSION, PHASE II FOR TOWN
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21T-06001Ca (PHASE II)

GIFFELS ENTERPRISES

REGIONAL ROAD No. 50 & MAYFIELD ROAD

DEVELOPMENT

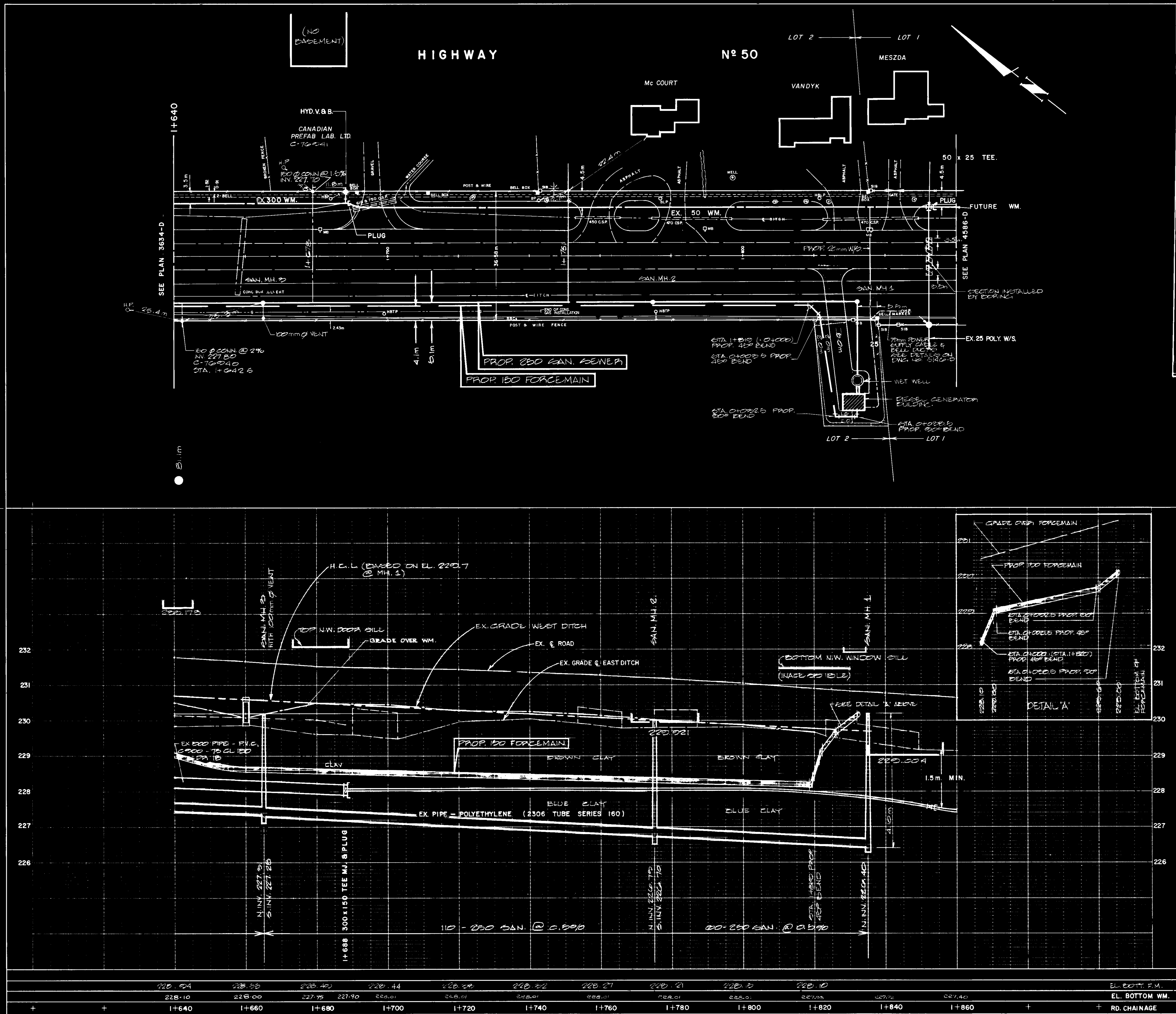
TOWN OF CALEDON

REGIONAL ROAD No. 50

0+280.000 TO 0+548.194

SCALE: HORIZ 1:500 VERT 1:50	DATE: APRIL 2006	PROJ No. 0496
DRAWN: M.F.S.	CHK'D: A.M.C.	PLAN No. 56548-D
DESIGNED: M.F.S.	SHEET 9 OF 9	

FILENAME: O:\0496\0496-P9(PHASE II).dwg
PLOTDATE: Oct 14, 2015 - 1:42pm
PLOTTED BY: fanche



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS	80.09.10	E.F.
STORM SEWERS			BELL U/G CABLE	12th JULY 79	EWK
WATERMAINS			HYDRO U/G CABLE		

REVISIONS		
DATE	DETAILS	INIT.
4th NOV 79	GRADE OF WM. REVISED & GRADE OVER WM. ADDED	EWK
23 APR. 80	AS CONSTRUCTED	EWK
MAR '81	50mm ADDED	B.E.
MAR. '82	PROP. SAN. SEWER, FORCEMAIN & PUMP STATION ADDED MAY 84 AS CONTR.	E.F.
	AS CONSTRUCTED	EF.

KEY PLAN
NOT TO SCALE

HEALEY RD, HOPCROFT RD, INDUSTRIAL RD, COMMERCIAL RD, HIGHWAY 50, INDIAN LINE, C.P.R., Lot 5, Lot 4, Lot 3, Lot 2

PROJ. No. 81-2134

Designed by ____ Chkd. ____ Approved by ____

General Notes

- – – All Driveways Gravel Unless Otherwise Noted.
- – – All Service Locations Are Approximate And Must Be Located Accurately In Field.
- ● Denotes Building – Not Located
- ▭ Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

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PROJ. No. 78-1101

Designed by ____ chkd. ____ Approved by ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL TELEPHONE COMPANY
CONSUMERS GAS COMPANY
MINISTRY OF TRANSPORTATION
MINISTRY OF ENVIRONMENT
HYDRO ELECTRIC POWER COMM. OF ONTARIO
HYDRO ELECTRIC COMM. CITY OF MISSISSAUGA
HYDRO ELECTRIC COMM. CITY OF BRAMPTON
HYDRO ELECTRIC COMM. PORT CREDIT
HYDRO ELECTRIC COMM. STREETSVILLE
CABLE TELEVISION

Region of Peel

Department of Public Works

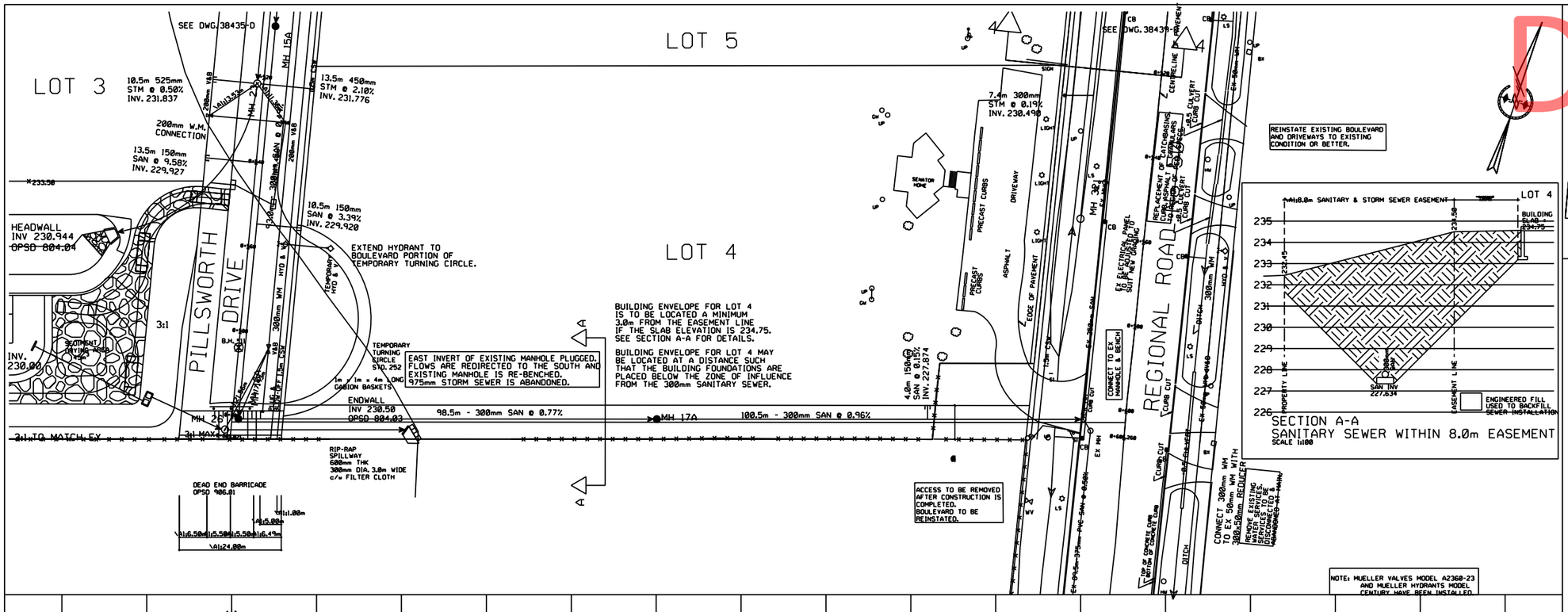
HIGHWAY 50

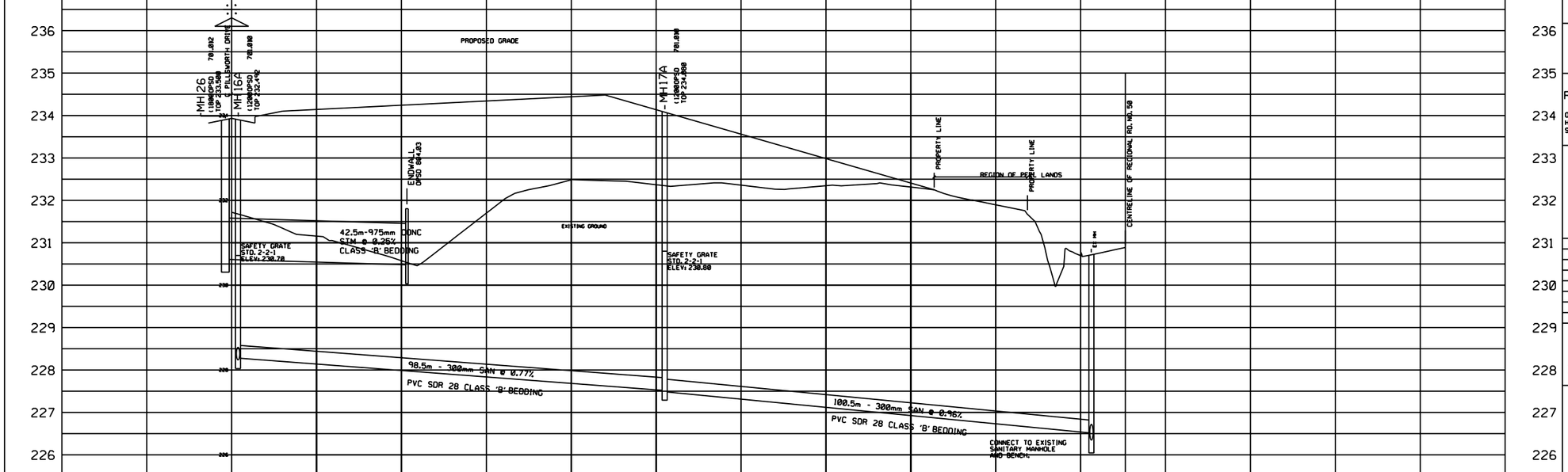
PROPOSED 250 SANITARY SEWER & 150 FORCEMAIN

Sta. 1+640 To Sta. 1+860

Lots 1-5	Area C-2	Project No. 81-2134
Scale Hor. 1:500 Ver. 1:50	Drawn by E.W.K.	Checked by KK
Date MAY 79	Sheet 7 of 7	Plan No. 3635-D

3635-D





PLAN OF SUBDIVISION OF PART OF THE EAST HALF OF LOT 2, CONCESSION 6, TOWN OF CALEDON REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
REGION OF PEEL #37 ELEV. 227.187m
ON THE NORTH FACE AT THE EAST CORNER OF A RED INSUL.BRICK HOUSE LOCATED ON THE SOUTH WEST CORNER OF SEVENTEENTH SIDEROAD (REGION ROAD #14) AND HIGHWAY #50

NO.	DATE	BY	REVISIONS
7	02/03/09	M.F.S.	AS-CONSTRUCTED PLAN (REGION OF PEEL)
6	04/19/04	M.F.S.	REVISED AS PER REGION 4th SUBMISSION COMMENTS
5	03/17/04	M.F.S.	REVISED AS PER TOWN 3rd SUBMISSION COMMENTS
4	03/12/04	M.F.S.	REVISED AS PER REGION COMMENTS
3	12/04/03	M.F.S.	REVISED AS PER REGION COMMENTS
2	09/18/03	M.F.S.	REVISED AS PER TOWN 2nd SUBMISSION COMMENTS
1	06/23/03	M.F.S.	REVISED AS PER REGION & TOWN 1st SUBMISSION COMMENTS

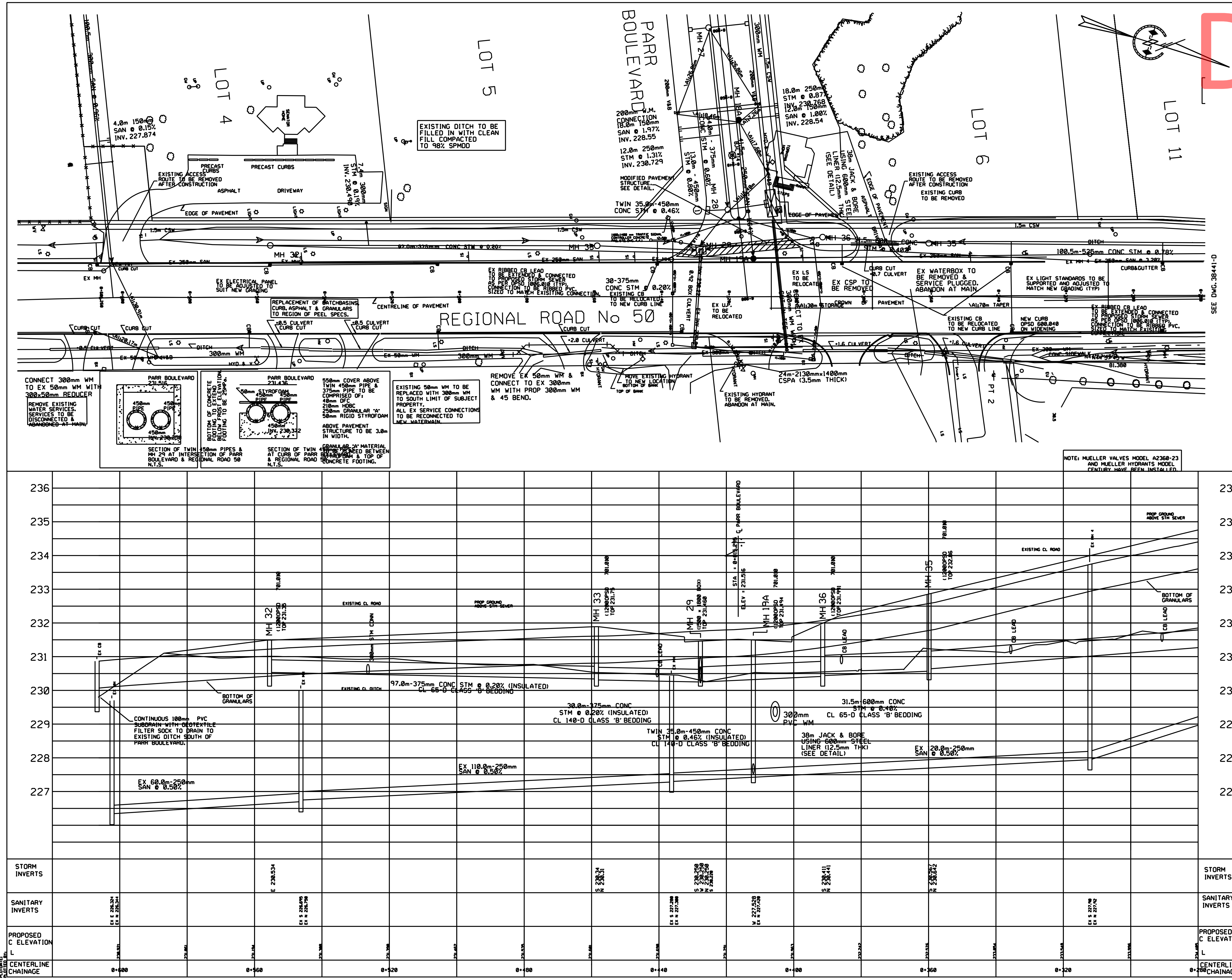
A.M.CANDARAS ASSOCIATES INC.
CONSULTING ENGINEERS
8551 WESTON RD., SUITE 203
WOODBRIDGE ONT. L4L 9R4
905-850-8020 FAX 905-850-8099
EMAIL: CIVIL@AMCAI.COM

21T-02002C/21T-02003C
SOLMAR DEVELOPMENT CORP.
EQUITY PRESTIGE
BUSINESS PARK
EAST PHASE

TOWN OF CALEDON

SANITARY SEWER EASEMENT
0+000.000 TO 0+210.000

SCALE: HORIZ 1:500 VERT 1:50 | DATE: JUNE 2003 | PROJ No. 0311
DRAWN: M.F.S. | CHK'D: A.M.C. | PLAN No. 38440-D
DESIGNED: A.M.C. | SHEET 14 OF 14



KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C3

LEGEND

- HYDRANT AND VALVE
- CATCHBASIN
- DOUBLE CATCHBASIN
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- 236.00 PROPOSED ELEVATION
- 235.50 EXISTING ELEVATION
- VALVE AND BOX
- VALVE AND CHAMBER

NO ROAD WORKS ON REGIONAL ROAD NO. 50 TO BE UNDERTAKEN UNTIL APPROVALS HAVE BEEN GIVEN FROM THE REGION OF PEEL & TOWN OF CALEDON.

SATISFACTORY CONSTRUCTION OF WORKS ON REGIONAL ROAD NO. 50 TO BE APPROVED BY THE REGION OF PEEL & TOWN OF CALEDON PRIOR TO REGISTRATION.

TOWN OF CALEDON
APPROVED AS NOTED

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.

THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.

DATE:
APPROVED BY:
C.A. CAMPBELL, C.E.T

PLAN OF SUBDIVISION OF
PART OF THE EAST HALF OF LOT 2,
CONCESSION 6,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
REGION OF PEEL #37 ELEV. 227.187m
ON THE NORTH FACE AT THE EAST CORNER OF A RED INSUL. BRICK HOUSE LOCATED ON THE SOUTH WEST CORNER OF SEVENTEENTH SIDEROAD (REGION ROAD #14) AND HIGHWAY #50

NO.	DATE	BY	REVISIONS
7	02/03/09	M.F.S.	AS-CONSTRUCTED PLAN (REGION OF PEEL)
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4	03/12/04	M.F.S.	REVISED AS PER REGION COMMENTS
3	12/04/03	M.F.S.	REVISED AS PER REGION COMMENTS
2	09/18/03	M.F.S.	REVISED AS PER TOWN 2nd SUBMISSION COMMENTS
1	06/23/03	N.A.C.	REVISED AS PER REGION + TOWN 1st SUBMISSION COMMENTS

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EMAIL: CIVIL@AMCAI.COM

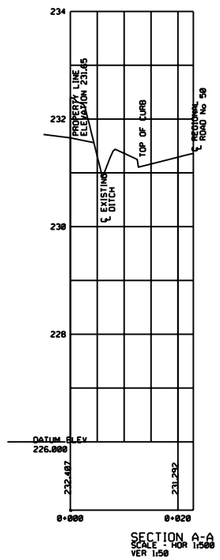
21T-02002C/21T-02003C
SOLMAR DEVELOPMENT CORP.
EQUITY PRESTIGE BUSINESS PARK
EAST PHASE

TOWN OF CALEDON

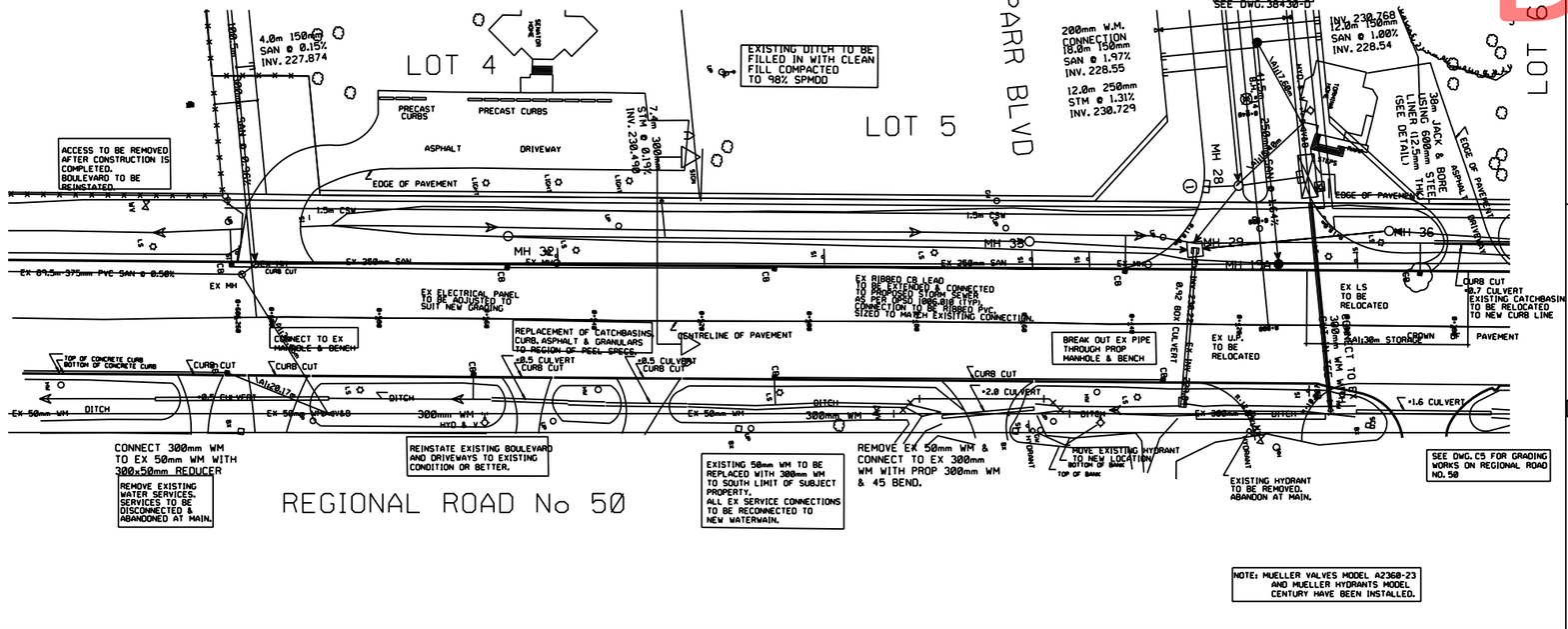
REGIONAL ROAD No. 50
0+320.000 TO 0+606.261

SCALE: HORIZ 1:500 VERT 1:50	DATE: MAY 2004	PROJ No. 0311
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. 38442-D
DESIGNED: A.M.C.	SHEET 16 OF 16	

DRAFT

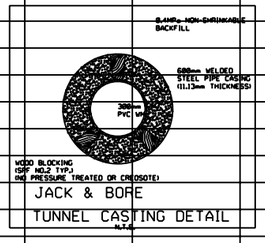


SECTION A-A
SCALE - HOR 1:500
VER 1:50

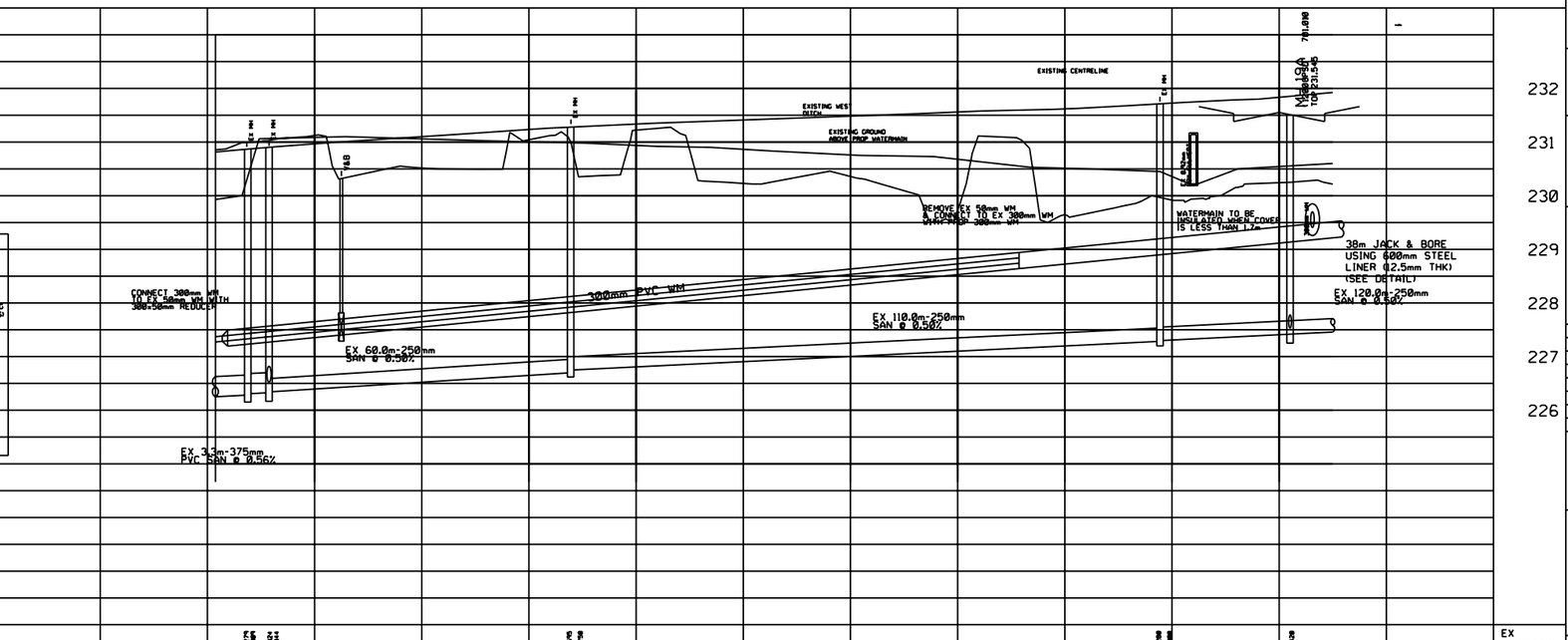


REGIONAL ROAD No 50

NOTE: MUELLER VALVES MODEL A2360-23 AND MUELLER HYDRANTS MODEL CENTURY HAVE BEEN INSTALLED.



JACK & BORE
TUNNEL CASTING DETAIL
N.T.S.



EX SANITARY INVERTS
SANITARY INVERTS
PROPOSED C ELEVATION
L
CENTERLINE CHAINAGE

KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C3

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- CATCHBASIN
- DOUBLE CATCHBASIN
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
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- 236.00 PROPOSED ELEVATION
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- VALVE AND BOX
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FINAL DESIGN OF WORKS ON REGIONAL ROAD NO. 50 TO BE APPROVED BY THE REGION OF PEEL & TOWN OF CALEDON PRIOR TO REGISTRATION.

TOWN OF CALEDON
APPROVED AS NOTED

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DATE: _____

APPROVED BY: _____
C.A. CAMPBELL, C.E.T

PLAN OF SUBDIVISION OF
PART OF THE EAST HALF OF LOT 2,
CONCESSION 6,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
REGION OF PEEL #37 ELEV. 227.187m

ON THE NORTH FACE AT THE EAST CORNER OF A RED INSUL. BRICK HOUSE LOCATED ON THE SOUTH WEST CORNER OF SEVENTEENTH SIDEROAD (REGION ROAD #14) AND HIGHWAY #50

NO.	DATE	BY	REVISIONS
7	02/03/09	M.F.S.	AS-CONSTRUCTED PLAN (REGION OF PEEL)
6	04/19/04	M.F.S.	REVISED AS PER REGION 4th SUBMISSION COMMENTS
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2	09/18/03	M.F.S.	REVISED AS PER TOWN 2nd SUBMISSION COMMENTS
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905-850-8020 FAX 905-850-8099
EMAIL: CIVIL@AMCAI.COM

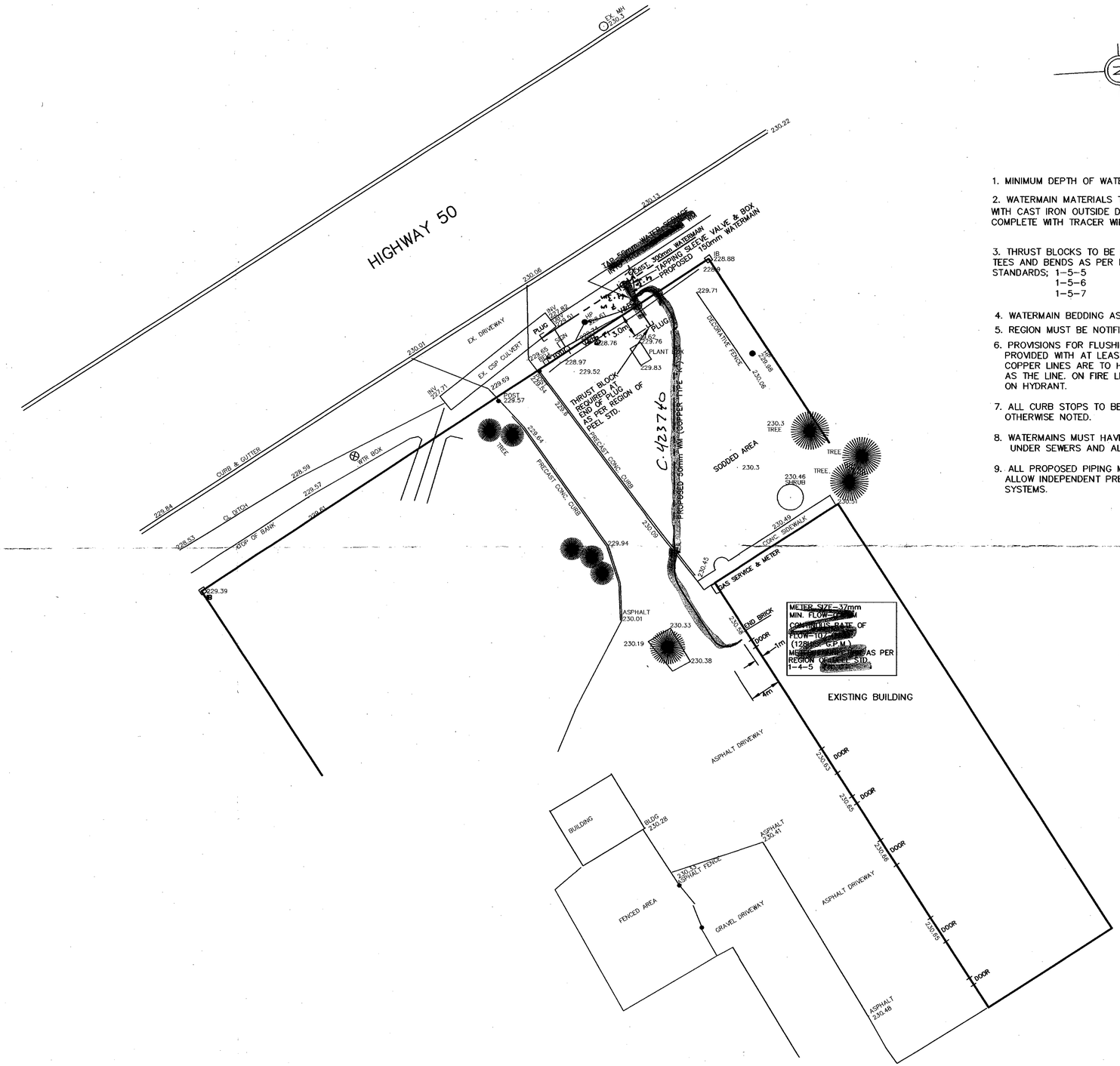
21T-02002C/21T-02003C
EQUITY PRESTIGE BUSINESS PARK
EAST PHASE

TOWN OF CALEDON

REGIONAL ROAD 50 SANITARY SEWER & WATERMAIN
0+000.000 TO 0+200.000

SCALE: HORIZ 1:500 VERT 1:50	DATE: JUNE 2003	PROJ No. 0311
DRAWN: N.A.C.	CHK'D: A.M.C.	PLAN No. 38439-D
DESIGNED: A.M.C.	SHEET 13 OF 14	

PLOTTED: 27/04/09 3:24:38 PM



1. MINIMUM DEPTH OF WATERMAIN 1.7m

2. WATERMAIN MATERIALS TO BE PVC CLASS 150 WITH CAST IRON OUTSIDE DIAMETER (A.W.W.A C900 SPECIFICATION) COMPLETE WITH TRACER WIRE AS PER REGION OF PEEL SPECIFICATIONS

3. THRUST BLOCKS TO BE INSTALLED AT ALL TEES AND BENDS AS PER REGION OF PEEL STANDARDS; 1-5-5
1-5-6
1-5-7

4. WATERMAIN BEDDING AS PER REGION OF PEEL STD. 1-5-1

5. REGION MUST BE NOTIFIED 48 HOURS PRIOR TO START OF CONSTRUCTION.

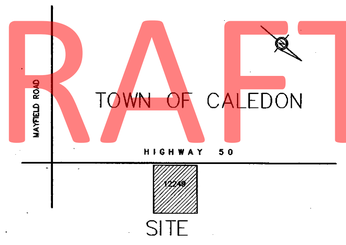
6. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED WITH AT LEAST A 50mm(2") OUTLET ON 100mm(4") AND LARGER LINES. COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE THE END ,THE SAME SIZE AS THE LINE. ON FIRE LINES, FLUSHING OUTLET TO BE 100mm(4") DIA. MINIMUM ON HYDRANT.

7. ALL CURB STOPS TO BE 3.0m(10') OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED.

8. WATERMAINS MUST HAVE A MINIMUM CLEARANCE OF .15m(6") OVER/.3m(12") UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING.

9. ALL PROPOSED PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING FROM EXISTING SYSTEMS.

DRAFT



GENERAL NOTES:

ALL DIMENSIONS ARE IN METERS, EXCEPT PIPE DIAMETERS WHICH ARE IN MILLIMETERS OTHERWISE SPECIFIED.

GENERAL:

1. ALL WORK SHALL BE IN ACCORDANCE WITH CURRENT REGION OF PEEL SPECIFICATIONS AND STANDARD DRAWINGS.
2. ALL UNDERGROUND SERVICES MATERIALS AND INSTALLATIONS TO BE IN ACCORDANCE WITH THE LATEST STANDARDS AND CODES.
3. ORDER OF PRECEDENCE OF STANDARD DRAWINGS IS FIRSTLY REGION OF PEEL STANDARD DRAWINGS, AND SECONDLY ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD)
4. LOCATION OF EXISTING SERVICES AND UTILITIES ARE NOT GUARANTEED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND MAINTAINING EXISTING UTILITIES. ANY CHANGES SHALL BE REPAIRED AT THE CONTRACTORS COST TO THE SATISFACTION OF THE APPROPRIATE UTILITY.
5. NATIVE AND GRANULAR MATERIAL, SUITABLE FOR BACKFILL, SHALL BE COMPACTED TO A MIN. 95% SPDD EXCEPT TOP 0.3m WHICH MUST BE COMPACTED TO 98% SPDD, OR AS RECOMMENDED BY A QUALIFIED SOILS CONSULTANT.
6. ALL AREAS DISRUPTED DUE TO INSTALLATION OF WATERMAIN TO BE RESTORED BACK TO ORGINAL CONDITION.

C-423740

12249 Highway 50, C

No.	By	Date	Revison	Chk'd
1	DH	NOV. 25/02	PER REGION OF PEEL COMMENTS	B.W.
1	DH	NOV. 18/02	PER REGION OF PEEL COMMENTS	B.W.

Client:
M & C LANDSCAPERS LTD.
Mr. LARRY MOZZOLA
416-888-7347

Municipality:
THE CORPORATION OF THE
TOWN OF CALEDON

LICENSED PROFESSIONAL ENGINEER
B. D. WORSLEY
02-11-26
PROVINCE OF ONTARIO

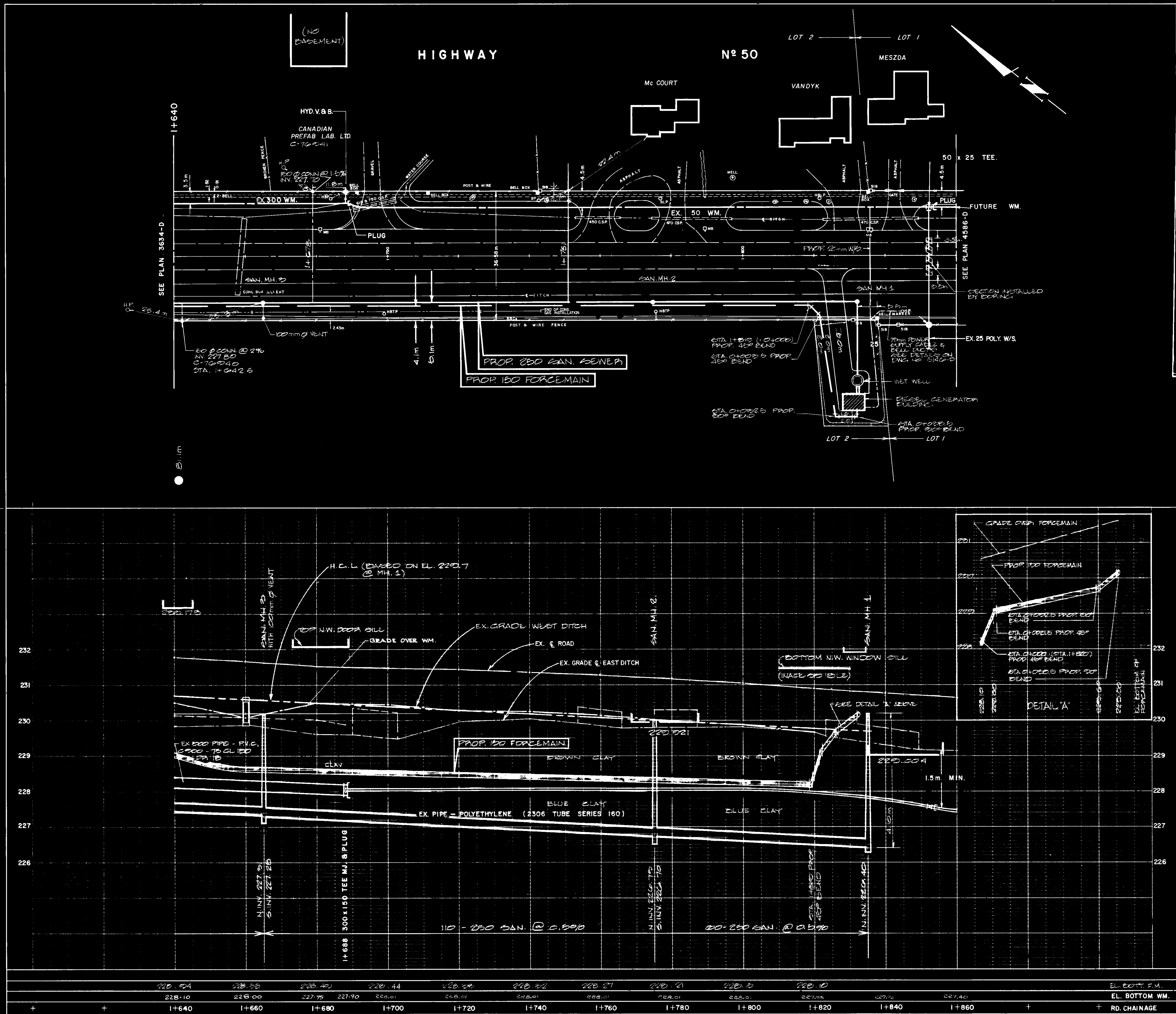
PART OF LOT 1
CONCESSION 7
GEOGRAPHIC TOWNSHIP OF ALBION
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

AQUAFOR BEECH LIMITED
14 ABACUS ROAD
Brampton, Ontario
L6T 5B7
Tel (905) 794-2367 Fax (905) 794-2338 E-Mail brampton@aquaforbeech.com

WATER SERVICE CONNECTION
12249 HIGHWAY 50

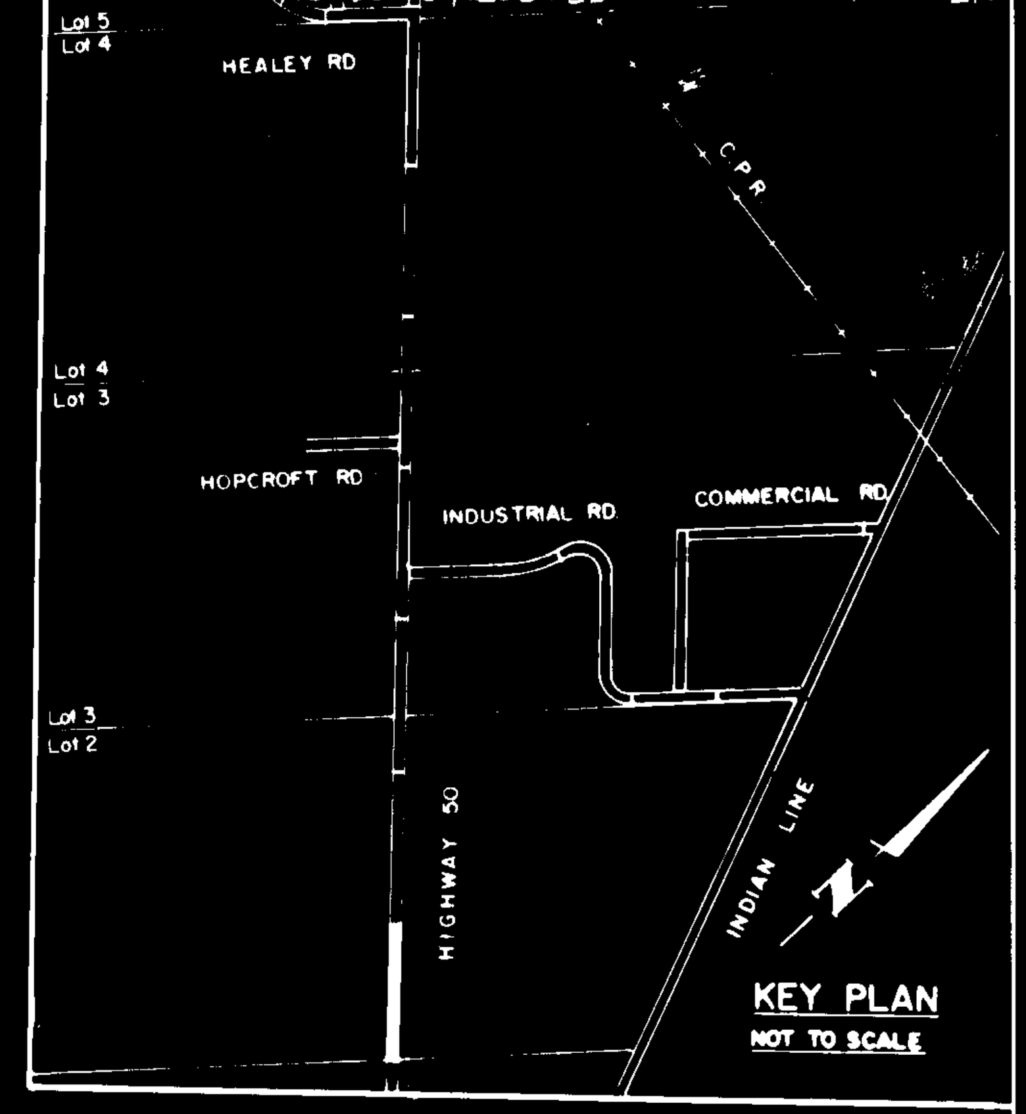
Surveyed by:AQUAFOR BEECH LIMITED		File:	
Drawn by: DH	Chk'd by: R.J.W.	Drawing No.	Sheet No.
Designed by: DH	Chk'd by: RJW	64134	1/1
Scale: 1 : 300	Date NOV. 2002		

Archived Box CT



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS	80.09.10	E.F.
STORM SEWERS			BELL U/G CABLE	12th JULY 79	EWK
WATERMAINS			HYDRO U/G CABLE		

REVISIONS		
DATE	DETAILS	INIT.
4th NOV 79	GRADE OF WM. REVISED & GRADE OVER WM. ADDED	EWK
23 APR. 80	AS CONSTRUCTED	EWK
MAR '81	50mm ADDED	B.E.
MAR. '82	PROP. SAN. SEWER, FORCEMAIN & PUMP STATION ADDED MAY 84 AS CONTR.	E.F.
	AS CONSTRUCTED	E.F.



PROJ. No. 81-2134

Designed by ____ Chkd. ____ | Approved by ____

General Notes

- All Driveways Gravel Unless Otherwise Noted.
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- ● Denotes Building – Not Located
- ▭ Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. Nº Elev.

The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction. Location of Existing Utilities Approximate Only, To Be Verified In Field By Contractor.

PROJ. No. 78-1101

Designed by ____ chkd. ____ | Approved by ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
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CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
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CONSUMERS GAS COMPANY
MINISTRY OF TRANSPORTATION
MINISTRY OF ENVIRONMENT
HYDRO ELECTRIC POWER COMM. OF ONTARIO
HYDRO ELECTRIC COMM. CITY OF MISSISSAUGA
HYDRO ELECTRIC COMM. CITY OF BRAMPTON
HYDRO ELECTRIC COMM. PORT CREDIT
HYDRO ELECTRIC COMM. STREETSVILLE
CABLE TELEVISION

Region of Peel

Department of Public Works

HIGHWAY 50

PROPOSED 250 SANITARY SEWER & 150 FORCEMAIN

Sta. 1+640 To Sta. 1+860

Lots 1-5	Area C-2	Project No. 81-2134
Scale Hor. 1:500 Ver. 1:50	Drawn by E.W.K.	Checked by KK
Date MAY 79	Sheet 7 of 7	Plan No. 3635-D

3635-D

DRAFT

HIGHWAY

MEDICAL CENTRE

No. 50

HERMANN MOTORS

HYD. V. & B.

V. & CH.

HYD. V. & B.

I+360

I+640

SEE PLAN 3633-D

SEE PLAN 3635-D

EX. 300 WM.

SAN. MH. 3

SAN. MH. 4

PROP. 250 SAN. SEWER

PROP. 150 FORCEMAIN

LINDSAY
C-57075-25mm W/S

SAN MH 5

SAN MH 4

EX. ℄ ROAD

EX. GRADE ℄ EAST DITCH

EX. GRADE OVER WM.

GRADE OVER WM.

EX. GRADE WEST DITCH

PROP. 150 FORCEMAIN

BROWN & BLUE CLAY

EX. 300 P.V.C. C900-75 CL 150 DR 18

MEDICAL BUILDING (NO BASEMENT)

EX. 150 SAN. CONN. (CONNECTED TO MAIN SEWER)

H.G.L. (BASED ON EL. 220.7 @ MH.1)

FIRM CLAY

CLAY

FLOOR OF GARAGE (N.W. SERVICE DAY

300 BUTT V. & CH. STD. 2053-A

300 x 150 TEE M.J.

I+415

I+520

I+525

120 - 250 SAN. @ 0.5%

90 - 250 SAN. @ 0.2%

160 - 250 SAN. @ 0.5%

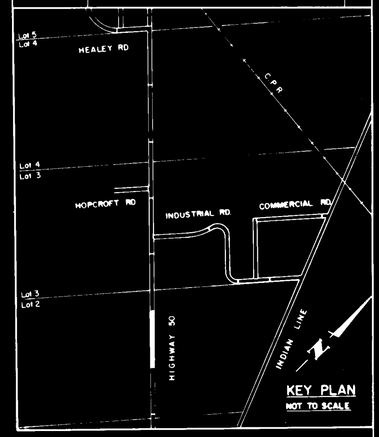
234.10	233.70	233.40	233.1	232.86	232.25	232.05	231.50	230.98	230.60	230.41	230.16	229.64	229.40	228.24 EL. BOTT. F.M.
233.70	233.45	233.20	232.95	232.70	232.45	231.85	231.25	230.65	229.90	229.10	228.30	228.25	228.15	228.10 EL. BOTTOM WM.
+	I+360	I+380	I+400	I+420	I+440	I+460	I+480	I+500	I+520	I+540	I+560	I+580	I+600	I+620	I+640 RD. CHAINAGE

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS	80 09 10	E.F.
STORM SEWERS			BELL U/G CABLE	12th JULY 79	[illegible]
WATERMAINS			HYDRO U/G CABLE		

REVISIONS

DATE	DETAILS	INIT.
8th NOV 79	GRADE OF WM. REVISED & GRADE OVER WM ADDED	E.F.
23 APR. 80	AS CONSTRUCTED	E.F.
MAR. 82	PROP. SANITARY SEWER & FORCEMAIN	E.F.
MAY 84	AS CONSTRUCTED	E.F.



PROJ. No. 81-2134

Designed by S.H. LAM — Chkd ___

Approved by ___

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- ▭ Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN.)

B.M. N° Elev.

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PROJ. No. 78-1101

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HYDRO ELECTRIC COMM. PORT CREDIT
HYDRO ELECTRIC COMM. STREETSVILLE
CABLE TELEVISION

Region of Peel

Department of Public Works

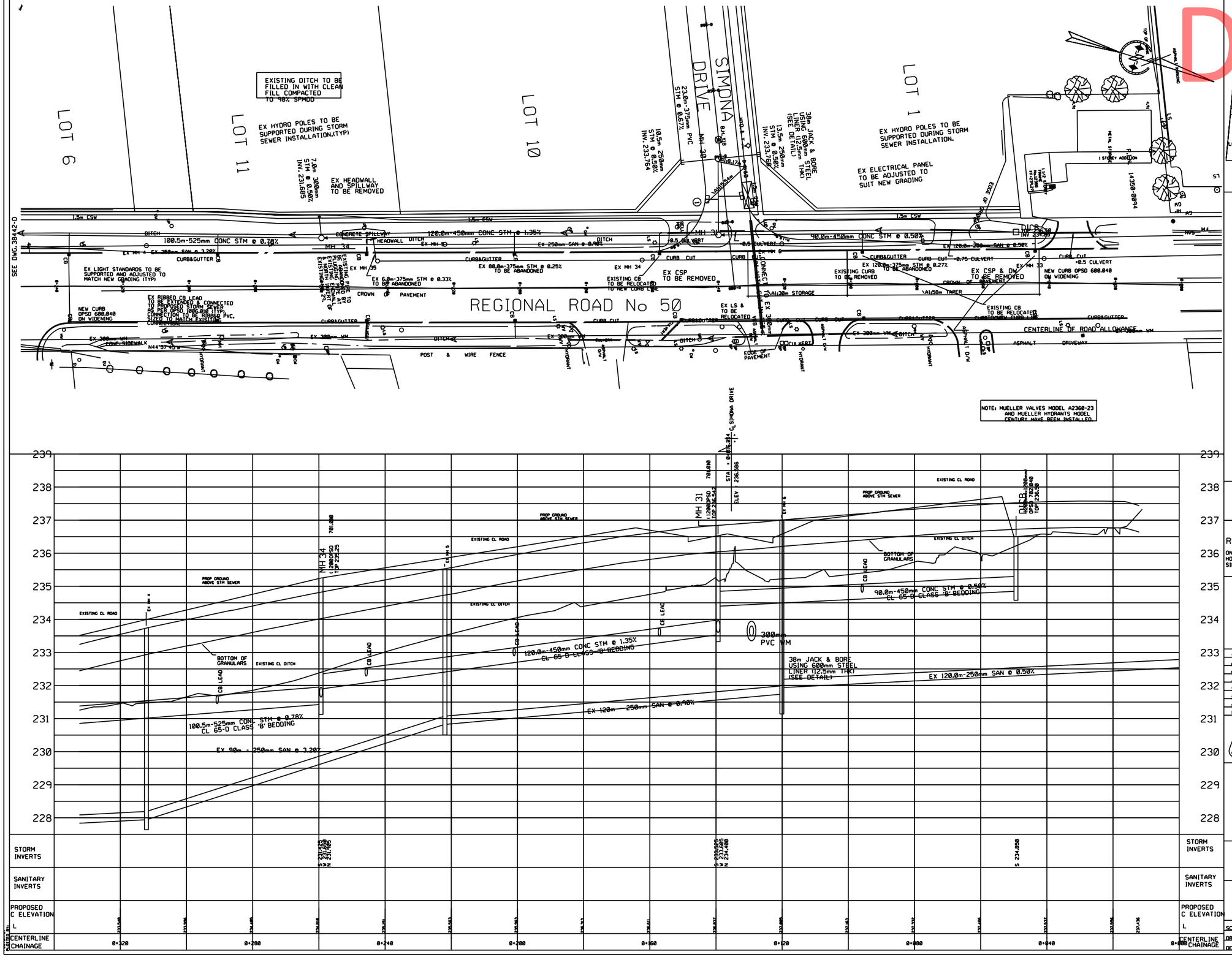
HIGHWAY 50

PROPOSED 250 SANITARY SEWER & 150 FORCEMAIN

Sta. I+360 To Sta. I+640

Lots 1-5	Area C-2	Project No. 81-2134	
Scale Hor. 1:500 Ver. 1:50	Drawn by E.W.K.	Checked by R.K.	
Date MAY 79	Sheet 6 of 7	Plan No. 3634-D	

3634 - D



FOR GENERAL NOTES REFER TO DWG C3

LEGEND

- HYDRANT AND VALVE
- CATCHBASIN
- DOUBLE CATCHBASIN
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- 236.00 PROPOSED ELEVATION
- 235.50 EXISTING ELEVATION
- VALVE AND BOX
- VALVE AND CHAMBER

NO ROAD WORKS ON REGIONAL ROAD NO. 50 TO BE UNDERTAKEN UNTIL APPROVALS HAVE BEEN GIVEN FROM THE REGION OF PEEL & TOWN OF CALEDON. SATISFACTORY CONSTRUCTION OF WORKS ON REGIONAL ROAD NO.50 TO BE APPROVED BY THE REGION OF PEEL & TOWN OF CALEDON PRIOR TO REGISTRATION.

TOWN OF CALEDON
APPROVED AS NOTED

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.

THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.

DATE:
APPROVED BY:
C.A. CAMPBELL, C.E.T

PLAN OF SUBDIVISION OF
PART OF THE EAST HALF OF LOT 2,
CONCESSION 6,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK

REGION OF PEEL #37 ELEV. 227.187m

ON THE NORTH FACE AT THE EAST CORNER OF A RED INSUL.BRICK HOUSE LOCATED ON THE SOUTH WEST CORNER OF SEVENTEENTH SIDEROAD (REGION ROAD #141) AND HIGHWAY #50

NO.	DATE	BY	REVISIONS
7	02/03/09	M.F.S	AS-CONSTRUCTED PLAN (REGION OF PEEL)
6	04/19/04	M.F.S	REVISED AS PER REGION 4th SUBMISSION COMMENTS
5	03/17/04	M.F.S	REVISED AS PER TOWN 3rd SUBMISSION COMMENTS
4	03/12/04	M.F.S	REVISED AS PER REGION COMMENTS
3	12/04/03	M.F.S	REVISED AS PER REGION COMMENTS
2	09/18/03	M.F.S	REVISED AS PER TOWN 2nd SUBMISSION COMMENTS
1	06/23/03	N.A.C	REVISED AS PER REGION & TOWN 1st SUBMISSION COMMENTS

A.M. CANDARAS ASSOCIATES INC.
CONSULTING ENGINEERS
8551 WESTON RD., SUITE 203
WOODBRIDGE ONT. L4L 9R4
905-850-8020 FAX 905-850-8099
EMAIL: CIVIL@AMCAL.COM

21T-02002C/21T-02003C
SOLMAR DEVELOPMENT CORP.
EQUITY PRESTIGE BUSINESS PARK
EAST PHASE

TOWN OF CALEDON

REGIONAL ROAD No. 50
0+000.000 TO 0+320.000

SCALE: HORIZ 1:500 VERT 1:50
DATE: MAY 2004
PROJ No. 0311
DRAWN: F.P.
CHK'D: A.M.C.
PLAN No. 38441-D
DESIGNED: A.M.C.
SHEET 15 OF 16

DRAFT

HIGHWAY

MEDICAL CENTRE

No. 50

HERMANN MOTORS

HYD. V. & B.

V. & CH.

HYD. V. & B.

I+360

I+640

SEE PLAN 3633-D

SEE PLAN 3635-D

EX. 300 WM.

SAN. MH. 3

SAN. MH. 4

PROP. 250 SAN. SEWER

PROP. 150 FORCEMAIN

LINDSAY
C-57075-25mm W/S

SAN MH 5

SAN MH 4

EX. ℄ ROAD

EX. GRADE ℄ EAST DITCH

EX. GRADE OVER WM.

GRADE OVER WM.

EX. GRADE WEST DITCH

PROP. 150 FORCEMAIN

BROWN & BLUE CLAY

EX. 300 P.V.C. C900-75 CL 150 DR 18

MEDICAL BUILDING (NO BASEMENT)

EX. 150 SAN. CONN. (CONNECTED TO MAIN SEWER)

H.G.L. (BASED ON EL. 220.7 @ MH.1)

FIRM CLAY

CLAY

FLOOR OF GARAGE (N.W. SERVICE DAY

300 BUTT V. & CH. STD. 2053-A

300 x 150 TEE M.J.

I+415

I+520

I+525

120 - 250 SAN. @ 0.5%

90 - 250 SAN. @ 0.2%

160 - 250 SAN. @ 0.5%

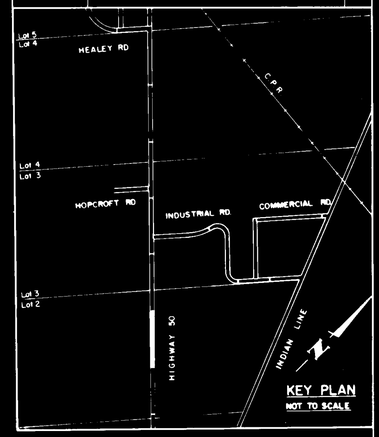
234.10	233.70	233.40	233.1	232.86	232.25	232.05	231.50	230.98	230.60	230.41	230.16	229.64	229.40	228.24 EL. BOTT. F.M.
233.70	233.45	233.20	232.95	232.70	232.45	231.85	231.25	230.65	229.90	229.10	228.30	228.25	228.15	228.10 EL. BOTTOM WM.
+	I+360	I+380	I+400	I+420	I+440	I+460	I+480	I+500	I+520	I+540	I+560	I+580	I+600	I+620	I+640 RD. CHAINAGE

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS	80 09 10	E.F.
STORM SEWERS			BELL U/G CABLE	12th JULY 79	[illegible]
WATERMAINS			HYDRO U/G CABLE		

REVISIONS

DATE	DETAILS	INIT.
8th NOV 79	GRADE OF WM. REVISED & GRADE OVER WM ADDED	E.F.
23 APR. 80	AS CONSTRUCTED	E.F.
MAR. 82	PROP. SANITARY SEWER & FORCEMAIN	E.F.
MAY 84	AS CONSTRUCTED	E.F.



PROJ. No. 81-2134

Designed by S.H. LAM — Chkd ___

Approved by ___

General Notes

- All Driveways Gravel Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In Field.
- ● Denotes Building - Not Located
- ▭ Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN.)

B.M. N° Elev.

The Contractor is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction Location of Existing Utilities Approximate Only, To Be Verified In Field By Contractor.

PROJ. No. 78-1101

Designed by ___ Chkd. ___ Approved by ___

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL TELEPHONE COMPANY
CONSUMERS GAS COMPANY
MINISTRY OF TRANSPORTATION
MINISTRY OF ENVIRONMENT
HYDRO ELECTRIC POWER COMM. OF ONTARIO
HYDRO ELECTRIC COMM. CITY OF MISSISSAUGA
HYDRO ELECTRIC COMM. CITY OF BRAMPTON
HYDRO ELECTRIC COMM. PORT CREDIT
HYDRO ELECTRIC COMM. STREETSVILLE
CABLE TELEVISION

Region of Peel

Department of Public Works

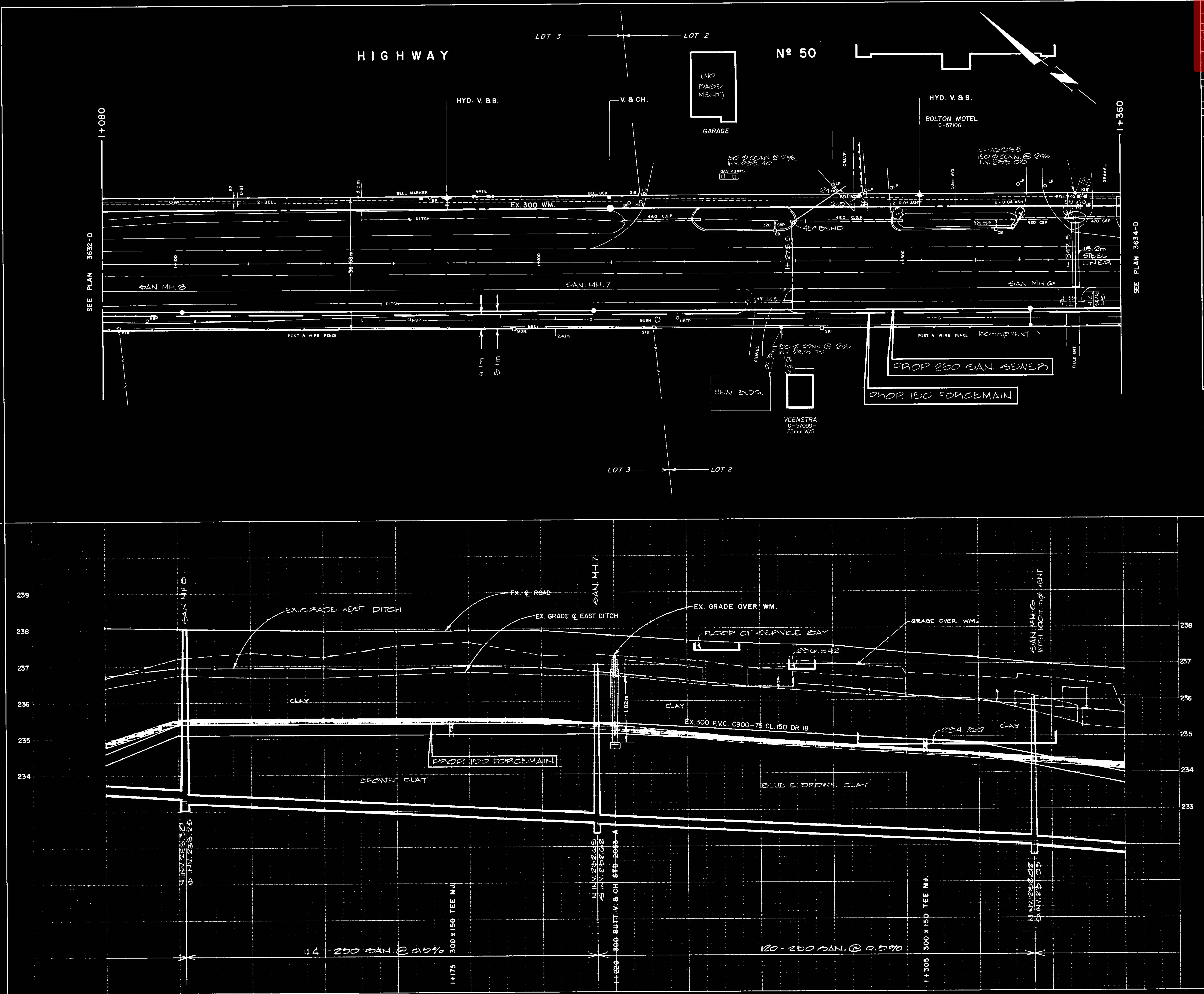
HIGHWAY 50

PROPOSED 250 SANITARY SEWER & 150 FORCEMAIN

Sta. I+360 To Sta. I+640

Lots 1-5	Area C-2	Project No. 81-2134	
Scale Hor. 1:500 Ver. 1:50	Drawn by E.W.K.	Checked by R.K.	
Date MAY 79	Sheet 6 of 7	Plan No. 3634-D	

3634 - D



	1+080	1+100	1+120	1+140	1+160	1+180	1+200	1+220	1+240	1+260	1+280	1+300	1+320	1+340	1+360
EL. BOTT. F.M.	234.75	235.30	235.37	235.35	235.36	235.30	235.28	235.15	234.98	234.84	234.68	234.54	234.40	234.28	234.10
EL. BOTTOM WM.	234.30	235.10	235.10	235.10	235.10	235.10	235.10	235.10	235.00	234.85	234.75	234.65	234.50	234.10	233.70
RD. CHAINAGE	1+080	1+100	1+120	1+140	1+160	1+180	1+200	1+220	1+240	1+260	1+280	1+300	1+320	1+340	1+360

DRAFT

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS	81.05.10	E.F.
STORM SEWERS			BELL U/G CABLE	12 JULY 79	E.W.K.
WATERMAINS			HYDRO U/G CABLE		

REVISIONS

DATE	DETAILS	INIT.
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MAR. '82	PROP. SANITARY SEWER & FORCEMAIN	E.F.
MAY 84	AS CONSTRUCTED	E.F.

KEY PLAN
NOT TO SCALE

PROJ. No. 81-2134

REGISTERED PROFESSIONAL ENGINEER S. H. LAM PROVINCE OF ONTARIO

Designed by ____ Chkd. ____ Approved by ____

General Notes

- — All Driveways Gravel Unless Otherwise Noted.
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PROJ. No. 78-1101

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CABLE TELEVISION

Region of Peel

Department of Public Works

HIGHWAY 50

PROPOSED 250 SANITARY SEWER & 150 FORCEMAIN

Sta. 1+080 To Sta. 1+360

Lots 1-5	Area C-2	Project No. 81-2134
Scale Hor. 1:500 Ver. 1:50	Drawn by E.W.K.	Checked by R.K.
Date MAY 79	Sheet 5 of 7	Plan No. 3633-D

3633-D

DRAFT

EXISTING UTILITIES:

THERE MAY BE VARIOUS UTILITIES WITHIN THE LIMITS OF THE CONTRACT. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE LOCAL UTILITY AUTHORITIES AND THE LOCATE AGENCY TO DETERMINE THE EXACT LOCATION OF ALL UTILITIES, AND IF NECESSARY TO ENGAGE THE SERVICES OF A PRIVATE LOCATE COMPANY TO LOCATE SERVICES WITHIN THE VICINITY OF THE REQUIRED WORKS ALL AT THE CONTRACTOR'S COST.

NO RESPONSIBILITY WILL BE ASSUMED BY THE ENGINEER OR THE OWNER FOR THE CORRECTNESS OR COMPLETENESS OF ANY DRAWINGS WITH RESPECT TO EXISTING UTILITIES, PIPES, OR OTHER OBJECTS EITHER UNDERGROUND OR ON THE SURFACE AND NEITHER THE ENGINEER OR THE OWNER SHALL BE LIABLE FOR THE INCORRECTNESS OR INADEQUACY THEREOF. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE LOCATION OF ALL SUCH UTILITIES, PIPES OR OTHER OBJECTS.

ALL COSTS OF WORKING AROUND, SUPPORTING AND/OR PROTECTING ALL EXISTING UTILITIES AND SERVICES ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

GENERAL NOTES

ALL WORKS, MATERIALS AND INSTALLATIONS MUST CORRESPOND TO THE CURRENT REGION OF PEEL AND TOWN OF CALEDON AND SPECIFICATIONS AND THE CURRENT ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS IN THE EVENT OF A DISCREPANCY BETWEEN THEM, THE REGION OF PEEL AND/OR THE TOWN OF CALEDON STANDARDS AND SPECIFICATIONS SHALL PREVAIL.

ALL CONSTRUCTION WORKS ARE TO BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.

1. ALL ELEVATIONS ARE IN METRES AND REFERENCED TO GEODETIC DATUM. ALL DIMENSIONS ARE IN METRIC UNITS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LAYOUT AND SURVEY CONTROL DURING CONSTRUCTION.
4. THE CONTRACTOR SHALL DELINEATE THE REQUIRED WORKING AREA ON-SITE PRIOR TO THE START OF WORK AND SHALL CONFINE OPERATIONS WITHIN THE DEFINED AREA.
5. WORKING AREAS, ACCESS REQUIREMENTS, AND TEMPORARY MATERIAL STORAGE AREAS TO BE MAINTAINED IN GOOD REPAIR BY THE CONTRACTOR AT ALL TIMES. AREAS AFFECTED BY THE CONTRACTOR'S ACTIVITIES ARE TO BE REINSTATED TO THE EXISTING CONDITIONS OR BETTER.
6. ALL GENERAL BACKFILL TO BE OF APPROVED MATERIAL AND COMPACTED TO A MINIMUM 95% PROCTOR DENSITY UNLESS OTHERWISE STATED.
7. THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND DISPOSAL OF ALL DEBRIS AND EXCESS MATERIAL OFF SITE.
8. ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES ARE TO RESTORED TO A CONDITION EQUAL TO OR BETTER THAN ORIGINAL ALL TO THE SATISFACTION OF THE OWNER OF THE AFFECTED LANDS.

EROSION & SEDIMENT CONTROL

THE CONTRACTOR IS TO SUPPLY AND INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES, SUCH AS SILT FENCING, CRUSHED STONE BERMS, AND OTHER BARRIERS AS MAY BE APPROPRIATE TO THE CONTRUCTION METHODS BEING EMPLOYEED BY THE CONTRACTOR TO STOP THE SILTATION OF ADJACENT LANDS AND/OR LOCAL STORM SEWER SYSTEM, DITCHES, ETC.

CONTRACTOR/BUILDER SHALL REGULARLY INSPECT, MAINTAIN AND REPAIR ALL EROSION SEDIMENT CONTROL FACILITIES AND TO ADD ADDITIONAL EROSION AND SEDIMENT CONTROL FACILITIES AT HIS COST DURING THE COURSE OF THE WORK, AS MAY BE NECESSARY BY VIRTUE OF HIS CONSTRUCTION PROCEDURES.

THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL COSTS TO RECTIFY ANY AND ALL DAMAGE EXTERNAL THE WORK AREA RESULTING FROM THE WORK AND HIS CONSTRUCTION PROCEDURES.

THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR THE CONTROL OF DUST, MUD AND OTHER DEBRIS RESULTING FROM HIS WORKS. THIS COST AND THE COST OF ANY CLEANING FLUSHING, SWEEPING, SCRAPING OF EXISTING ROADS AND/OR DRIVEWAYS USED BY THE CONTRACTOR, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR

1. TEMPORARY EROSION AND SEDIMENT CONTROLS TO BE INSTALLED PRIOR TO THE START OF CONSTRUCTION AS IDENTIFIED ON OR IMPLIED BY THE PLANS AND SPECIFICATIONS.
2. ON-SITE EQUIPMENT REFUELING AND MAINTENANCE IS TO BE ONLY COMPLETED IN DESIGNATED AREAS.
3. SILTATION CONTROL FENCING TO BE INSTALLED ALONG THE DOWNSTREAM PERIMETER OF THE SITE LIMITS.
4. SILTATION CONTROLS TO BE INSPECTED AT LEAST WEEKLY AND AFTER EACH RAINFALL EVENT, ACCUMULATIONS OF SILT AND DEBRIS TO BE REMOVED BEFORE IT MAY CAUSE DAMAGE TO THE SILTATION CONTROL MEASURE IN PLACE.
5. DAMAGE TO SILTATION CONTROL MEASURES TO BE PROMPTLY CORRECTED AS MAY BE REQUIRED BY THE CONTRACTOR.
6. THE SILTATION CONTROL MEASURES INDICATED ON THE PLAN ARE CONSIDERED TO BE MINIMUM REQUIREMENTS, ADDITIONAL MEASURES ARE TO BE INSTALLED AS MAY BE REQUIRED TO SUIT CONSTRUCTION PROCEDURES AND CHANGES IN SITE CONDITIONS.
7. IT IS INTENDED THAT THE WORKS PROCEED IN A MANNER WHICH MINIMIZES ANY ADVERSE EFFECTS ON THE NATURAL ENVIRONMENT OF THE PROJECT AND THE LANDS DOWNSTREAM. ALL WORK IS TO BE CARRIED OUT IN A MANNER CONSISTENT WITH AVOIDING ENVIRONMENTAL DAMAGE.
8. TEMPORARY SEDIMENTATION CONTROLS ARE TO BE REMOVED FROM SITE FOLLOWING COMPLETION OF CONSTRUCTION AND WITH THE INSTALLATION OF FINISH SURFACE TREATMENTS (ie, paving, sodding, plantings, etc.)

NOTES: REGION OF PEEL GENERAL CONSTRUCTION STANDARDS

1. ALL WATERMAINS AND WATER SERVICE MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO THE CURRENT REGION OF PEEL PUBLIC WORKS STANDARDS AND SPECIFICATIONS.
2. WATERMAINS AND/OR WATER SERVICE MATERIALS 100mm (4") AND LARGER MUST BE P.V.C. CLASS 150, MFG. TO A.W.W.A. SPEC. C900-75. SIZES 50mm (2") AND SMALLER, POLYETHYLENE PIPE TO BE 3306 TUBE SERIES 160 IN ACCORDANCE WITH C.S.A. B.137.1 -1970; A.W.W.A. SPEC. C901-78 IN SIZES 20 TO 50mm (1" TO 2")
3. WATERMAINS AND/OR WATER SERVICES ARE TO HAVE A MINIMUM COVER OF 1.7m (5'-0") WITH A MINIMUM HORIZONTAL SPACING OF 1.2m (4'-0") FROM THEMSELVES AND ALL OTHER UTILITIES.
4. PROVISIONS FOR FLUSHING WATER LINES PRIOR TO TESTING MUST BE PROVIDED WITH AT LEAST A 50mm (2") OUTLET ON 100mm (4") AND LARGER LINES. COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE END AS SAME AS THE LINE. THEY MUST ALSO BE HOSED OR PIPED TO ALLOW THE WATER TO DRAIN INTO A PARKING LOT OR DOWN A DRAIN ON FIRE LINES, FLUSHING OUTLET TO BE 100mm (4") DIA. MINIMUM, OR A HYDRANT.
5. ALL CURB STOPS TO BE 3.0m (10') OFF THE FACE OF THE BUILDING UNLESS NOTED OTHERWISE.
6. HYDRANT AND VALVE SET TO REGION STANDARD 1-6-1. DIMENSIONS A AND B - .7m (2') AND .9m (3').
7. ALL HYDRANTS ARE TO HAVE PUMPER NOZZLE OUTLET.
8. WATERMAINS TO BE INSTALLED TO GRADES AS SHOWN ON APPROVED COPY OF GRADE SHEET WHICH MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK WHERE REQUESTED BY THE INSPECTOR. GRADE SHEET TO SPECIFY GRADE OF WATERMAIN, THE FINISHED GRADE OVER THE WATERMAIN AT INTERVALS OF AT LEAST 15 metres AND THE ELEVATIONS AT POINTS OF CROSSING OF THE WATERMAIN AND AND WATER SERVICES WITH OTHER UTILITIES AND DITCHES
9. WATERMAINS MUST HAVE A MINIMUM VERTICAL CLEARANCE OF .15m (6") OVER AND .3m (12") UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING.
10. ALL PROPOSED WATERMAIN PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING EXISTING SYSTEM.
11. NOTE: 50mm P.E. PIPE IS EQUIVALENT TO 50mm TYPE 'K' COPPER, METER SIZE IS TO BE ONE SIZE SMALLER THAN THE INCOMING WATER SERVICE.
12. WHERE POLYETHYLENE PIPE (OR OTHER NON METALLIC PIPE) IS USED IN PLACE OF COPPER, A 12 GAUGE TMU STRANDED COPPER LIGHT COLOURED PLASTIC COATED TRACER WIRE MUST BE INSTALLED PER REGION OF PEEL STANDARDS.

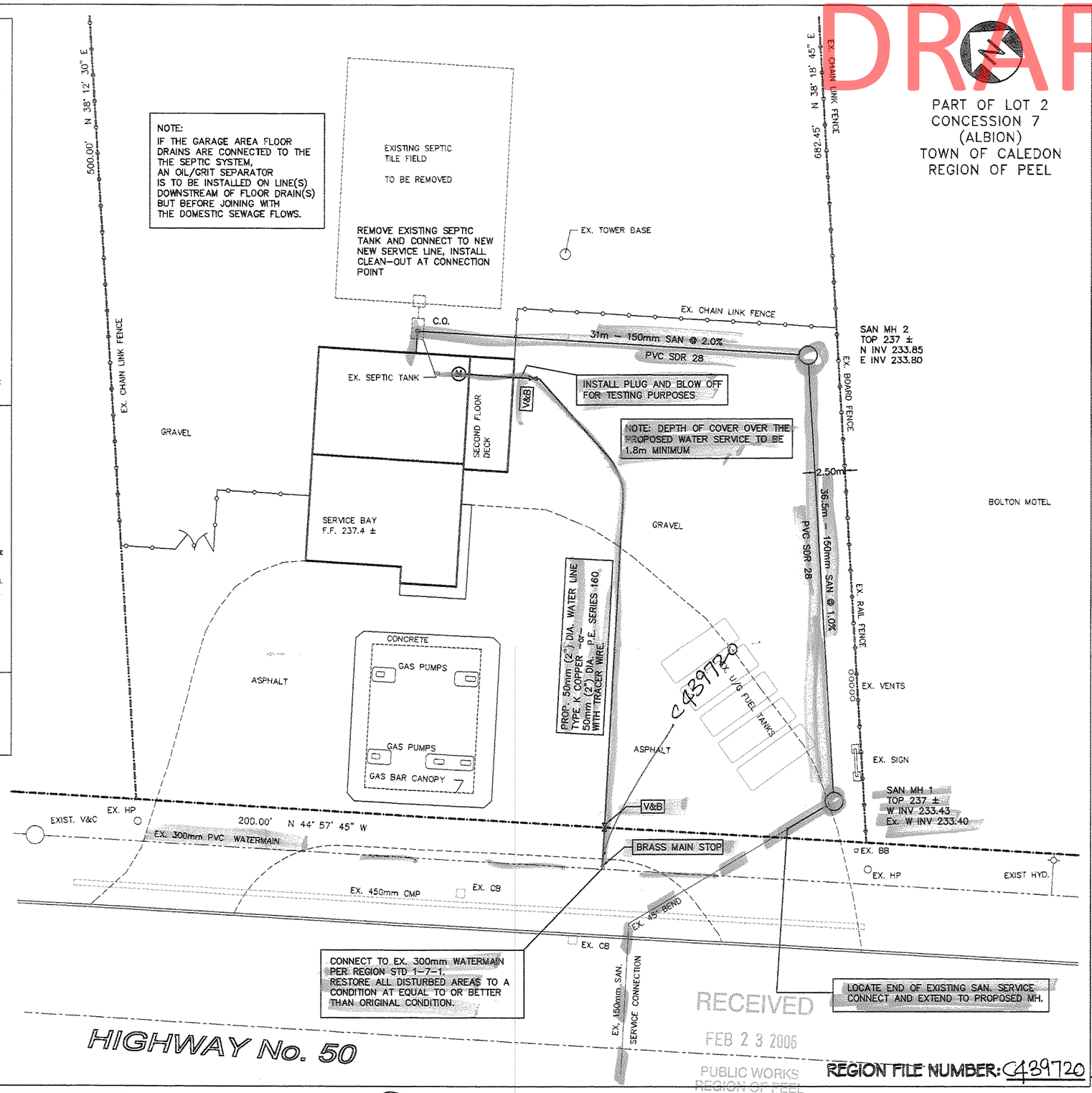
NOTES: SANITARY SEWER CONSTRUCTION

1. ALL SANITARY SEWERS AND SANITARY SERVICE MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO THE CURRENT PEEL PUBLIC WORKS STANDARDS AND SPECIFICATIONS.
2. MAINLINE NON-PRESSURE PIPE SHALL BE POLYVINYL CHLORIDE (PVC) PIPE; 250 TO 375mm INCLUSIVE, TO BE MANUFACTURED TO LATEST EDITION OF C.S.A. STANDARD B182.2 (A.S.T.M. SPECIFICATION D 3034) WITH RUBBER GASKETTED BELL AND SPIGOT JOINTS. PIPE AND FITTINGS SHALL HAVE A MAXIMUM STANDARD DIMENSION RATIO OF 35 (SDR 35) AND A MINIMUM PIPE STIFFNESS OF 320 kPa, OR HIGHER STRENGTH AS MAY BE REQUIRED BY BY DESIGN.
3. SERVICE CONNECTIONS NON-PRESSURE PIPE OUTSIDE CONTROLLED SOLID WALL POLYVINYL CHLORIDE (PVC) PIPE; MANUFACTURED TO THE LATEST EDITION OF C.S.A. STANDARD B182.1 (A.S.T.M. SPECIFICATION D 3034). FITTINGS TO BE MANUFACTURED TO THE RUBBER GASKETTED BELL AND SPIGOT JOINTS. PIPE AND FITTINGS SHALL HAVE HAVE A MINIMUM OF PIPE PIPE STIFFNESS OF 630 kPa (SDR 28)
4. FITTINGS SUPPLIED TO A PROJECT SHALL BE COMPATIBLE WITH THE PIPE DELIVERED TO SITE; SHALL HAVE RUBBER GASKETTED BELL AND SPIGOT JOINTS. REFER TO REGION STANDARDS FITTING SPECIFICATIONS. REFER TO REGION OF PEEL MATERIAL SPECIFICATIONS FOR; MANHOLES, MANHOLE FITTINGS, BEDDING AND BACKFILL AND SERVICE CONNECTIONS.
5. UNLESS OTHERWISE NOTED:
   - MANHOLES SHALL BE 1200mm PRECAST PER STD DWG 2-1-1,
   - MANHOLE BENCHING PER STD DWG 2-1-4,
   - MANHOLE FRAME AND COVERS PER STD DWG 2-2-2,
   - PIPE BEDDING PER STD DWG 2-3-1, CLASS B, COVER MATERIAL GRANULAR C, BEDDING MATERIAL HLS STONE,
   - FLEXIBLE SERVICE CONNECTION PIPE PER STD DWG 2-4-2.

NOTES: COMPACTION

- COMPACT FULL WIDTH OF TRENCH BOTTOM TO AT LEAST 95% S.P.D.
- BEDDING MATERIAL TO AT LEAST 98% S.P.D.
- COVER MATERIAL TO AT LEAST 98% S.P.D.
- TRENCH BACKFILL TO AT LEAST 95% S.P.D.
- GRANULAR SUB-BASE MATERIALS TO AT LEAST 100% S.P.D.
- HOT MIX ASPHALT TO AT LEAST 92% S.P.D.

METER PER REGION OF PEEL STD 1-4-5, 38mm ø DOMESTIC WATER METER, MIN. 0 GPM, MAX. CONT. RATE 80 GPM (M)



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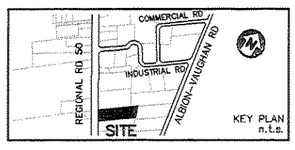
FEB 23 2006
PUBLIC WORKS
REGION OF PEEL

REGION FILE NUMBER: C439720



No.	Revision/Issue	Date

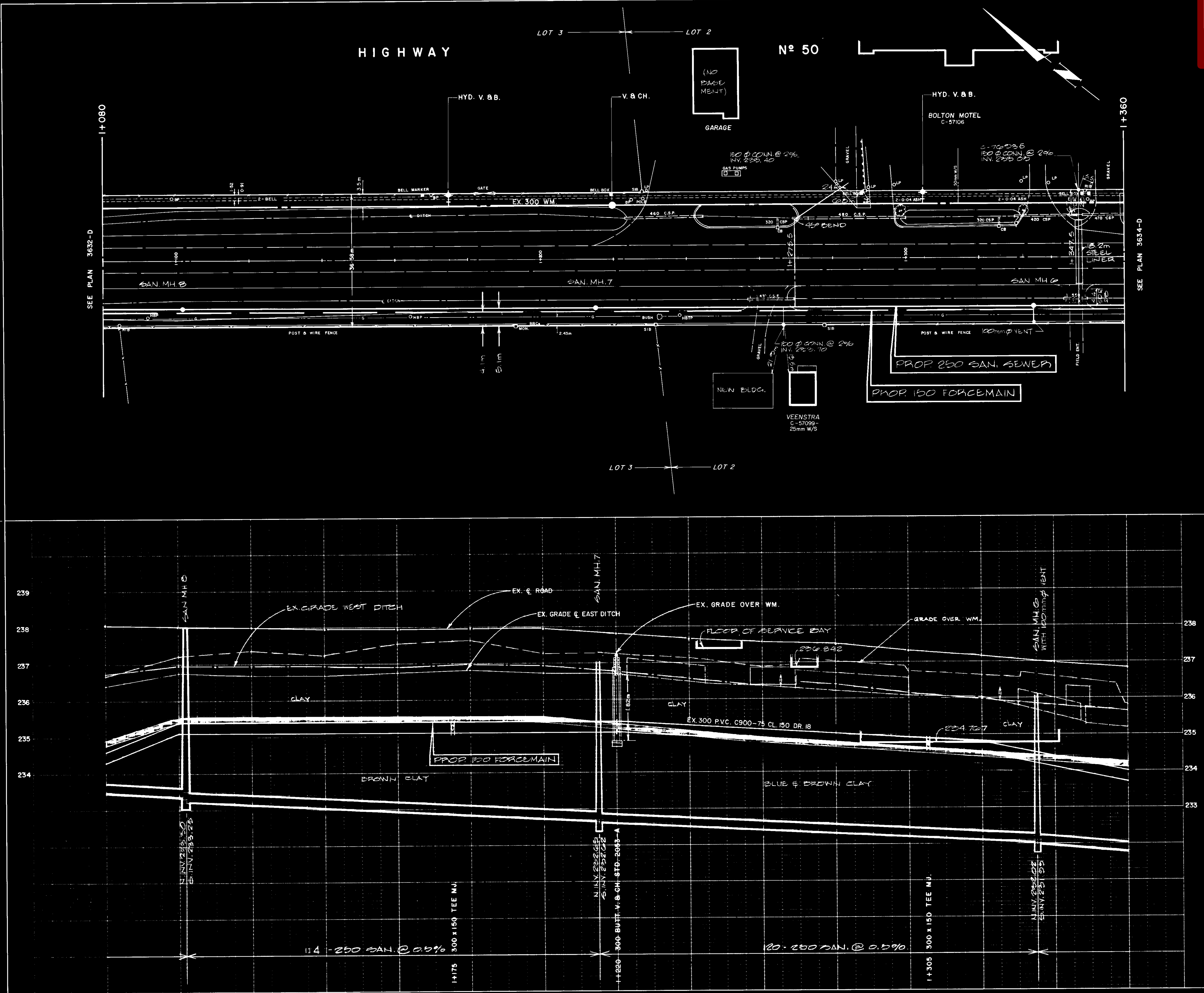
LICENSED PROFESSIONAL ENGINEER
B.B. BEECH
PROVINCE OF ONTARIO

Beech Engineering Limited
236 Longwood Drive
Bolton, Ontario L7E 4A1
Tel (905) 857-6658

Project Name & Address:
GREG PANNIA
(SHAMROCK GAS BAR)
12393 HIGHWAY 50
BOLTON
TOWN OF CALEDON

Title:
WATER & SANITARY SERVICE SERVICE CONNECTIONS

Project No.
Date: FEBRUARY 2006
Scale: 1:250
Sheet: S-1



234.75	235.30	235.37	235.35	235.36	235.30	235.28	235.10	234.98	234.84	234.68	234.54	234.40	234.25	234.10	EL. BOTT. F.M.
234.30	235.10	235.10	235.10	235.10	235.10	235.10	235.10	235.00	234.85	234.75	234.65	234.50	234.10	233.70	EL. BOTTOM WM.
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DRAFT

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PROJ. No. 81-2134

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Designed by ____ Chkd. ____ Approved by ____

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PROJ. No. 78-1101

Designed by ____ chkd. ____ Approved by ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL TELEPHONE COMPANY
CONSUMERS GAS COMPANY
MINISTRY OF TRANSPORTATION
MINISTRY OF ENVIRONMENT
HYDRO ELECTRIC POWER COMM. OF ONTARIO
HYDRO ELECTRIC COMM. CITY OF MISSISSAUGA
HYDRO ELECTRIC COMM. CITY OF BRAMPTON
HYDRO ELECTRIC COMM. PORT CREDIT
HYDRO ELECTRIC COMM. STREETSVILLE
CABLE TELEVISION

Region of Peel

Department of Public Works

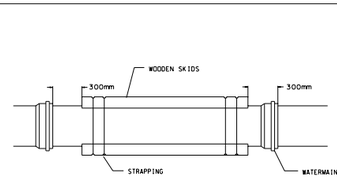
HIGHWAY 50

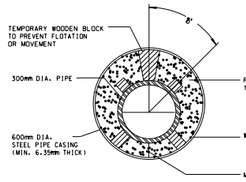
PROPOSED 250 SANITARY SEWER & 150 FORCEMAIN

Sta. 1+080 To Sta. 1+360

Lots 1-5	Area C-2	Project No. 81-2134
Scale Hor. 1:500 Ver. 1:50	Drawn by E.W.K.	Checked by RK.
Date MAY 79	Sheet 5 of 7	Plan No. 3633-D

3633-D



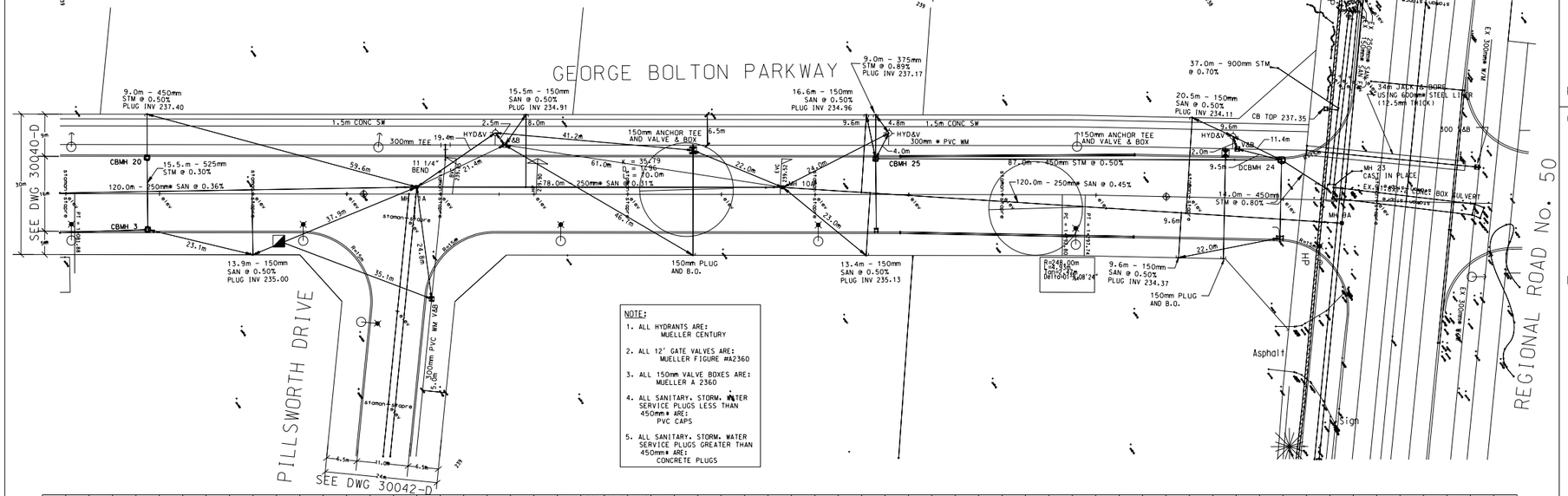


NOTE:

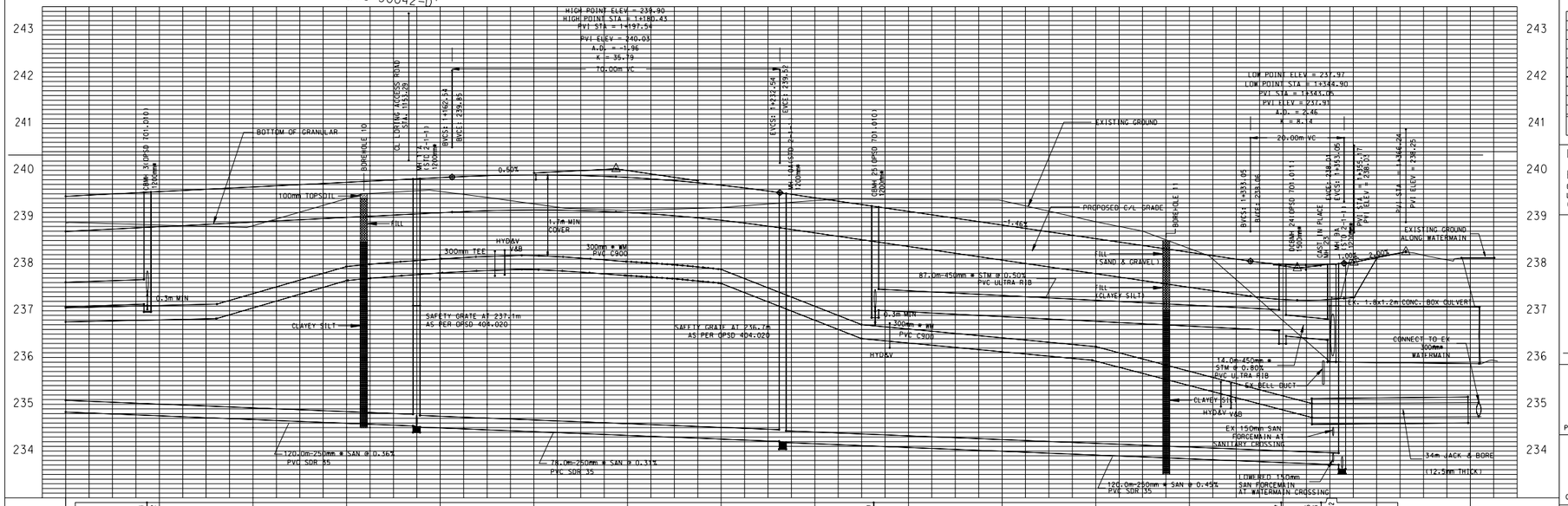
1. WOODEN SKIDS MUST BE TREATED WITH WOOD PRESERVATIVE PRIOR TO INSTALLATION.
2. SKIDS MUST PROVIDE SUFFICIENT HEIGHT TO PERMIT CLEARANCE BETWEEN BELL JOINT & CASING WALL.
3. DRILLING MUD OR FLAX SOAP MAY BE USED AS LUBRICANT BETWEEN SKIDS AND CASING TO FACILITATE INSTALLATION. NO PETROLEUM PRODUCTS SHALL BE USED.
4. RESTRAIN JOINTS PER PIPE MANUFACTURER'S SPECIFICATIONS.

JACK & BORE TUNNEL CASING

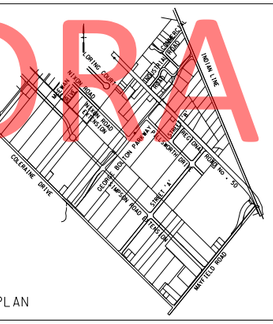
SEE DWG D1 FOR WIDENING DETAILS AND MH 23 DETAILS



NOTE:
1. ALL HYDRANTS ARE: MUELLER CENTURY
2. ALL 12" GATE VALVES ARE: MUELLER FIGURE #A2360
3. ALL 150mm VALVE BOXES ARE: MUELLER A 2360
4. ALL SANITARY, STORM, WATER SERVICE PLUGS LESS THAN 450mm ø ARE: PVC CAPS
5. ALL SANITARY, STORM, WATER SERVICE PLUGS GREATER THAN 450mm ø ARE: CONCRETE PLUGS



STORM INVERT	W. 237.14 N. 237.22						N. 237.09 E. 237.01				W. 236.57 E. 236.76	W. 236.35 N. 236.03		STORM INVERT
SANITARY INVERT			S. 234.59 N. 234.53 E. 234.31				W. 234.27 E. 234.25						EX.E.235.92	SANITARY INVERT
PROPOSED GRADES	239.542	239.642	239.742	239.842	239.900	239.846	239.681	239.412	239.120	238.829	238.538	238.247	237.985	238.129	PROPOSED GRADES
℄ CHAINAGE	1+120		1+160		1+200		1+240		1+280		1+320		1+360		℄ CHAINAGE



GENERAL NOTES:

LEGEND

	CATCHBASIN
CBMH 21	CATCHBASIN MANHOLE
DCBMH 22	DOUBLE CATCHBASIN MANHOLE
MH 16	STORM MANHOLE
MH 19A	SANITARY MANHOLE
V&B	VALVE AND BOX
HYD&V	HYDRANT AND VALVE
BH 2	BOREHOLE LOCATION AND NUMBER
	HYDRO POLE WITH STREET LIGHT
	GUY WIRE
	50kVA PADMOUNTED SINGLE PHASE TRANSFORMER (SUPPLIED AND INSTALLED BY DEVELOPER)

No.	By	Date	Revision	Cons. Checked	Town Appr'd
5.	B.A.	10/21/03	REVISED AS CONSTRUCTED		
4.	J.A.	JAN28/02	AS CONSTRUCTED		
3.	E.A.	AUG22/01	REVISED JACK AND BORE WATERMAIN SECTION		
2.	E.A.	JUL26/01	REVISED BOX CULVERT AT MH 23		
1.	E.A.	JUL6/01	REVISED JACK AND BORE WATERMAIN SECTION		

BENCHMARK

REGION OF PEEL #37 ELEV. 227.187m
ON THE NORTH FACE AT THE EAST CORNER OF A RED INSUL. BRICK HOUSE LOCATED ON THE SOUTH WEST CORNER OF SEVENTEENTH SIDEROAD (REGION ROAD #141) AND HIGHWAY #50.

CHKD. _____

BOLTON SOUTH BUSINESS PARK

PROJECT REGION OF PEEL FILE C02.303

BURNSIDE DEVELOPMENT SERVICES
A DIVISION OF R.J. BURNSIDE AND ASSOCIATES LIMITED
DEVELOPMENT ENGINEERING & MANAGEMENT,
STORMWATER MANAGEMENT & COMMUNAL SYSTEMS
8500 TORBRAM ROAD, SUITE 56, BRAMPTON, ONTARIO L6T 5C6
TELEPHONE: 905-793-9239 FAX: 905-793-5018
CONSULTANT

THE CORPORATION OF THE TOWN OF CALEDON

GEORGE BOLTON PARKWAY

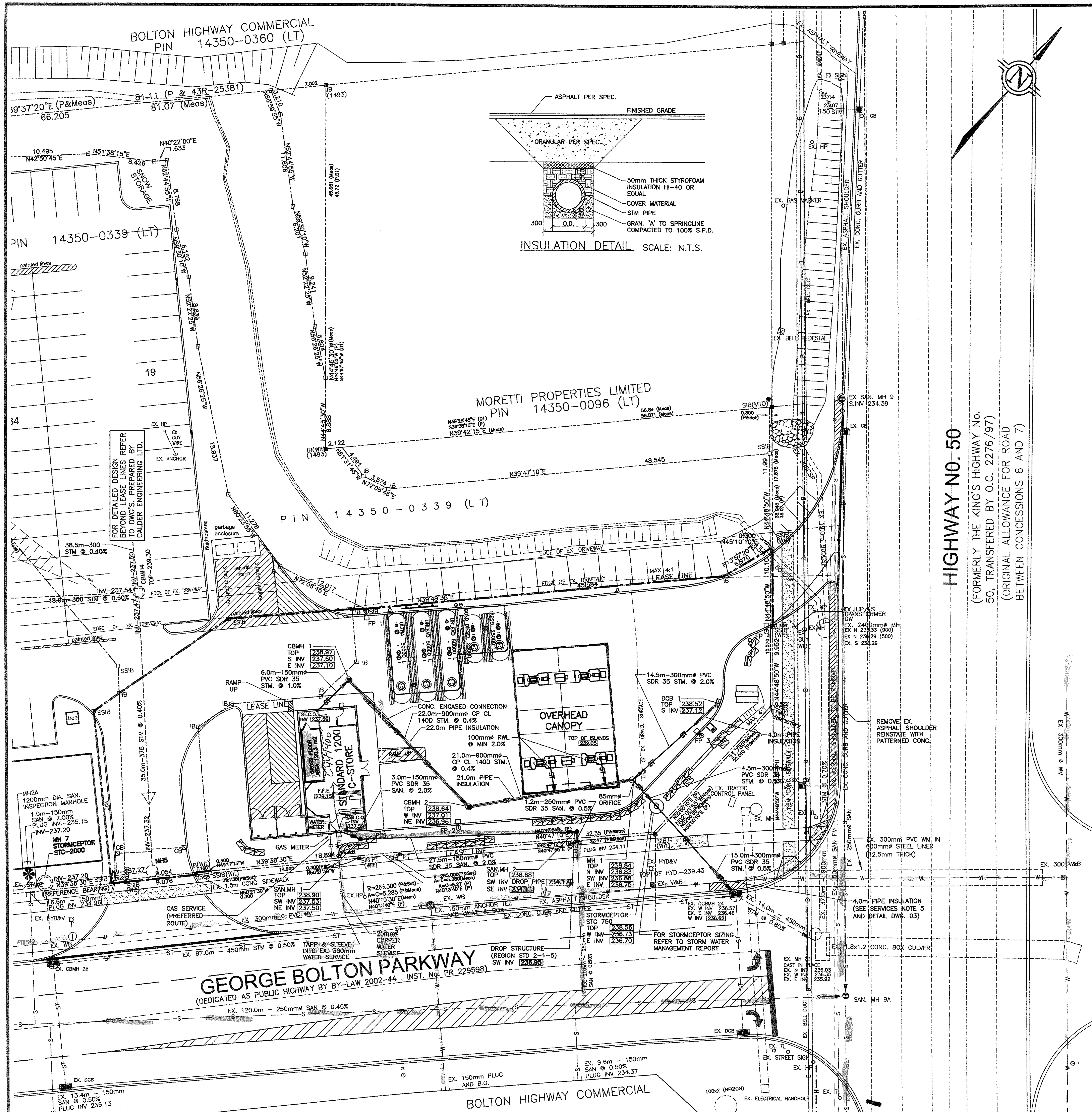
PLAN AND PROFILE
STN. 1+080 TO STN. 1+384.63

SCALE HORZ. 1:500 VERT. 1:50	APPROVED BY	DATE SEPT. 00	
DRAWN BY R.A.	PROJECT No. PB00088	DRAWING No. 30041-D	
CHECKED BY			

PB00088P5

XREF PB00088BASE.DWG PB00088P5.DWG
PB00088DTM.DWG

30041-D_VER 7.dgn 23/06/04 12:04:48 PM



STORM DRAINAGE:

1. (A) ALL STORM WATER SHALL BE DIRECTED IN SUCH A MANNER THAT WATER WILL NOT ACCUMULATE AT OR NEAR A BUILDING INCLUDING FOUNDATION WALLS, WINDOWS, ENTRANCES AND WALKWAYS.
   (B) WHERE THE EXISTING GRADE IS ALTERED DUE TO GRADING, EXCAVATION, FILLING OR ANY OTHER RELATED WORK ALL SUCH WORK SHALL BE UNDERTAKEN AND COMPLETED IN ACCORDANCE WITH GOOD ENGINEERING PRACTICE TO ENSURE STABLE CONDITIONS AND SO AS NOT TO ADVERSELY AFFECT OR DAMAGE PUBLIC OR PRIVATE PROPERTY.
   (C) STORM DRAINAGE SYSTEM TO CONFORM TO THE STORM WATER MANAGEMENT REPORT PREPARED BY TROW ASSOCIATES INC.
2. THE CONTRACTOR MUST PERFORM ALL NECESSARY WORKS TO ENSURE THAT NO SURFACE DRAINAGE PROBLEMS ARE CREATED ON OR ADJACENT TO PRIVATE OR PUBLIC LANDS BY REASON OF HIS DEVELOPMENT.

SITE SERVICES NOTES:

1. LEGAL INFORMATION TAKEN FROM DRAWINGS PREPARED BY YOUNG & YOUNG SURVEYING INC. (PROJECT No. 00-B3756).
2. GENERAL CONTRACTOR TO ENGAGE A HYDRO LOCATE COMPANY TO CONFIRM THE LOCATION OF HIGH VOLTAGE CABLES, PRIOR TO START OF CONSTRUCTION.
3. MANHOLES SHALL BE LOCATED A MINIMUM OF 1.5m AWAY FROM THE FACE OF CURB AND/OR ANY OTHER SERVICE.
4. WHERE THE DIFFERENCE IN ELEVATION BETWEEN THE OBVERT OF THE INLET AND OUTLET PIPES EXCEED 0.9m, A DROP PIPE AS INDICATED ON REGION OF PEEL STANDARD DWG. 2-1-5 SHALL BE PLACED ON THE INLET PIPE.
5. THE DEPTH OF COVER OVER THE PROPOSED STORM & SANITARY SEWERS SHOULD BE CHECKED. WHEREVER THE COVER IS 1.2m OR LESS, IT IS TO BE INSULATED WITH 100mm THICK x 1.2m WIDE INSULATION PLACED INTO TWO (2) LAYERS WITH STAGGERED JOINTS, AND TO BE STYROFOAM BRAND H.I. TYPE IV.

STORM SEWERS:

1. ALL STORM SEWERS & CONSTRUCTION METHODS TO BE IN ACCORDANCE WITH CURRENT MUNICIPAL SPECIFICATION.
2. STORM SEWERS AND CONNECTIONS 375mmø AND SMALLER TO BE PVC SDR 35.
3. STORM SEWERS 675mmø AND OVER SHALL BE CONCRETE AND EQUAL TO CSA SPECIFICATION A257.2 CLASS 500 OR LATEST AMENDMENT, UNLESS NOTED OTHERWISE.
4. ALL STORM SEWERS INCLUDING CATCH BASIN LEADS AND SERVICE CONNECTIONS TO BE FITTED WITH RUBBER GASKET JOINTS.
5. SEWER BEDDING TO BE IN ACCORDANCE WITH O.P.S.D. 802.03 FOR RIGID PIPE OR O.P.S.D. 802.04 FOR FLEXIBLE PIPE.
6. CBMH'S 1 & 2, MANHOLE 1 TO BE CONSTRUCTED IN ACCORDANCE WITH O.P.S.D. 701.012 (1800mmø). CBMH'S SHALL HAVE CAST IRON COVER & SQUARE FRAME O.P.S.D. 401.010 TYPE 'B' AND MANHOLE 1 SHALL HAVE CAST IRON COVER & SQUARE FRAME O.P.S.D. 401.010 TYPE 'A'.
7. CATCH BASINS TO BE IN ACCORDANCE WITH O.P.S.D. 705.01, TWIN INLET CATCH BASIN TO BE IN ACCORDANCE WITH O.P.S.D. 705.02 WITH FRAME AND GRATE AS PER O.P.S.D. 400.01, UNLESS NOTED OTHERWISE.
8. ALL CATCH BASINS AMD MANHOLES TO HAVE MINIMUM 300mm SUMP AND TOP AS PER MUNICIPAL STANDARDS.

SANITARY SEWERS:

1. PVC SEWER PIPE, UNLESS OTHERWISE NOTED MUST MEET THE REQUIREMENTS OF THE FOLLOWING STANDARDS.
   - CSA 182.1. ASTM D-2729 AND ASTM D-3034 OR LATEST AMENDMENT, CLASS SDR35.
   - CSA B183.4-M90 FOR RIBBED PVC SEWER PIPE. (NOTE THAT THE MANUFACTURES DIRECTIONS FOR INSTALLATION BEDDING AND BACK FILLING MUST BE FOLLOWED).
2. MANHOLES TO BE CONSTRUCTED IN ACCORDANCE WITH REGION OF PEEL STD. 2-1-1 (1200mmø) WITH RUBBER GASKET JOINTS.
3. ALL SANITARY SEWER AND SERVICE CONNECTIONS TO BE FITTED WITH CHEMICALLY RESISTANT JOINTS AS PER MUNICIPAL STANDARDS. SANITARY CONNECTIONS TO BE PER O.P.S.D. 1006.020.
4. SEWER BEDDING TO BE IN ACCORDANCE WITH O.P.S.D 1005. (UNLESS NOTED OTHERWISE).
5. SAFETY PLATFORMS TO BE IN ACCORDANCE WITH O.P.S.D. 404.02.
6. SANITARY MANHOLES TO HAVE FRAME AND GRATE AS PER O.P.S.D. 401.03.
7. MAINLINE AND STREETLINE MANHOLES TO BE IN ACCORDANCE WITH REGION OF PEEL STANDARDS.
8. MAX. DROP BETWEEN THE INLET AND OUTLET ELEVATIONS OF SANITARY MANHOLE IS 0.03m. MIN. DEPTH OF SANITARY MANHOLE IS 2.13m.

WATERMAINS:

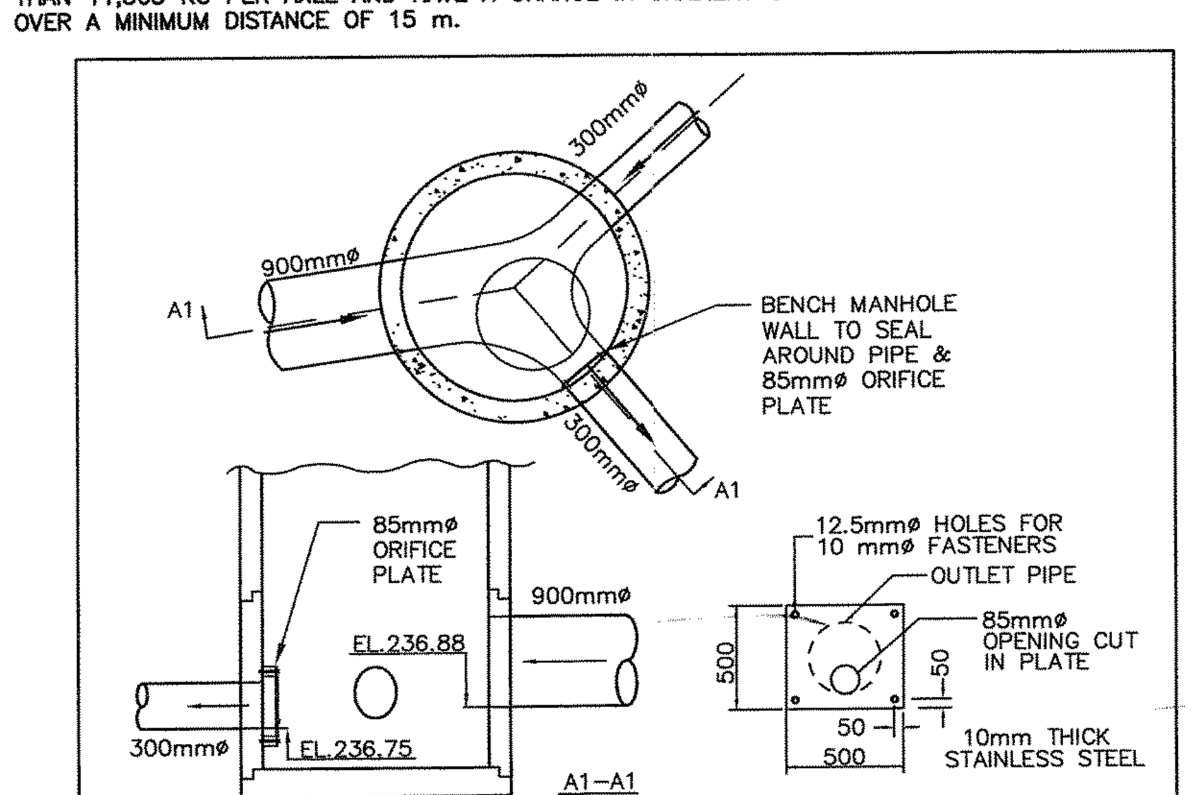
1. ALL MATERIAL AND CONSTRUCTION METHODS MUST CORRESPOND TO THE CURRENT PEEL PUBLIC WORKS STANDARDS AND SPECIFICATIONS.
2. WATERMAIN AND/OR WATER SERVICE MATERIALS 100mmø AND LARGER MUST BE CLASS 150, A.W.W.A. C 900-75 P.V.C. PIPE. SIZE LARGER THAN 50ømm TO 100mmø TO BE P.V.C. 2306 TUBE SERIES 160 C.S.A. B.137.1 (A.W.W.A. C901). PIPE 50mmø AND SMALLER TO BE SOFT COPPER TYPE 'K'.
3. WATERMAINS AND/OR WATER SERVICES ARE TO HAVE A MINIMUM COVER OF 1.7m WITH A MINIMUM HORIZONTAL SPACING OF 1.2m FROM THEMSELVES AND ALL OTHER UTILITIES.
4. PROVISIONS FOR FLUSHING WATER LINES PRIOR TO TESTING, etc. MUST BE PROVIDED WITH AT LEAST A 50mmø OUTLET ON 100mm AND LARGER LINES. COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE END, THE SAME SIZE AS THE LINE. THEY MUST ALSO BE HOSED OR PIPED TO ALLOW THE WATER TO DRAIN ONTO A PARKING LOT OR DOWN A DRAIN. ON FIRE LINES, FLUSHING OUTLET TO BE 100mmø MINIMUM ON A HYDRANT.
5. ALL CURB STOPS TO BE 3.0m OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED.
6. HYDRANT AND VALVE SET TO REGION STANDARD 1-6-1 DIMENSION A AND B, 0.7m AND 0.9m AND TO HAVE PUMPER NOZZLE.
7. WATERMAINS TO BE INSTALLED TO GRADE AS SHOWN ON APPROVED SITE PLAN. COPY OF GRADE SHEET MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK, WHERE REQUESTED BY INSPECTOR.
8. WATERMAINS MUST HAVE A MINIMUM VERTICAL CLEARANCE OF 0.3m OVER / 0.5m UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING.
9. ALL PROPOSED WATER PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING FROM EXISTING SYSTEMS.
10. ALL LIVE TAPPING AND OPERATION OF REGION WATER VALVES SHALL BE ARRANGED TROUGH THE REGIONAL INSPECTOR ASSIGNED OR BY CONTACTING THE OPERATIONS AND MAINTENANCE DIVISION.

TRAFFIC SAFETY AND CONTROL:

1. IT IS THE RESPONSIBILITY OF THE SITE DEVELOPER TO PROVIDE ALL TRAFFIC SAFETY AND CONTROL MEASURES IN ACCORDANCE WITH THE ONTARIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, TEMPORARY CONDITIONS. THE SITE DEVELOPER SHALL MAKE ARRANGEMENTS WITH THE MUNICIPALITY AT LEAST 30 DAYS PRIOR TO COMMENCING WORK ON ANY PUBLIC ROADS.

FIRE DEPARTMENT:

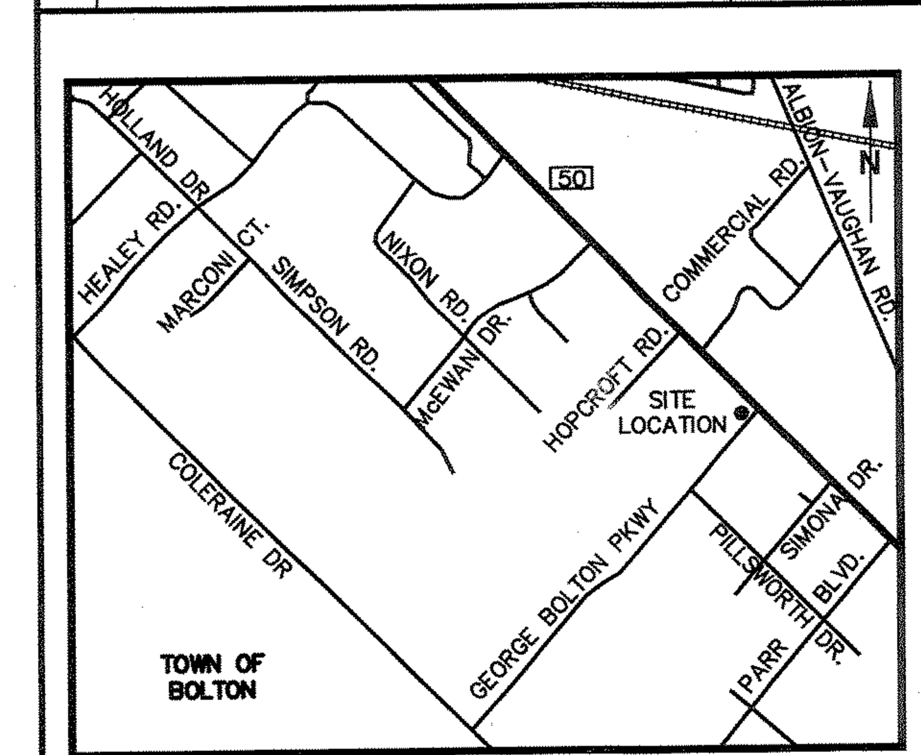
1. FIRE ROUTE WILL BE DESIGNATED AS PER MUNICIPAL BY-LAW.
2. THE FIRE DEPARTMENT ACCESS ROUTE SHALL BE DESIGNED TO SUPPORT A LOAD OF NOT LESS THAN 11,363 KG PER AXLE AND HAVE A CHANGE IN GRADIENT OF NOT MORE THAN 1 IN 12.5 OVER A MINIMUM DISTANCE OF 15 m.



ORIFICE PLATE AT MH 1 SCALE: NTS

DRAFT

NO.	REVISIONS	DATE	BY	APP.
E	SANITARY SERVICE, WATER SERVICE, SITE SERVICES NOTE 4, WATERMAIN NOTE 8 REVISED. WATERMAIN NOTE 10 AND SANITARY SEWER NOTE 8 ADDED. STORM SERVICE BEYOND LEASE LINE SHOWN.	OCT 17 2007	A.B.	
D	DWG UPDATED TO REFLECT SITE PLAN REV "E".	SEP 10 2007	A.B.	
C	DWG UPDATED TO REFLECT SITE PLAN REV "D".	SEP 05 2007	A.B.	
B	DWG UPDATED TO REFLECT SITE PLAN REV "C". STORM SERVICE REVISED. CITY FILE NUMBER ADDED.	JUL 05 2007	A.B.	
A	ISSUED FOR INFORMATION.	MAR 09 2007	A.B.	



KEY PLAN SCALE: N.T.S.

LEGEND:

IB	EX. IRON BAR	—ST—	EX. STORM SEWER
SIB	EX. STANDARD I.B.	—S—	EX. SANITARY SEWER
TL	EX. TRAFFIC LIGHT	—W—	EX. WATER MAINS
HP	EX. HYDRO POLE	—G—	EX. GAS MAINS
ICV	EX. IRRIGATION CONTROL VALVE	—H—	EX. OVERHEAD HYDRO
WV	EX. WATER VALVE	—UH—	EX. U/G HYDRO SERVICE
HYD	EX. FIRE HYDRANT	—B—	EX. U/G BELL SERVICE
C.O.	NEW CLEAN OUT	—F—	EX. FIBER OPTICS LINE
RWL	NEW DOWNSPOUT	—ST—	NEW STORM SEWER
BP	EX. BELL PEDESTAL	—S—	NEW SANITARY SEWER
	NEW FLOODPOLE	—W—	NEW WATER SERVICE
	EX. STORM M.H.	—G—	NEW GAS SERVICE
	NEW STORM M.H.	—H—	NEW HYDRO SERVICE
	EX. SANITARY M.H.	—B—	NEW BELL SERVICE
	NEW SANITARY M.H.		EX. CONC. CURB
	EX. CATCH BASIN		NEW CONC. CURB
	NEW CATCH BASIN		NEW DEPRESSED CURB
	NEW CATCH BASIN M.H.		NEW CURB CUT
2.0%	NEW SLOPE	+ (92.73)	EX. ELEVATION
	MAJOR OVERLAND FLOW DIRECTION	+ 92.53	EX. ELEVATION TO REMAIN
		+ [93.45]	ELEVATION (PROPOSED)
		+ [92.73]	PROPOSED ELEVATION (BY OTHERS)

SCALE 1:250 METRES

0 5 10 15 20 25 METRES

METRIC

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

LICENSED PROFESSIONAL ENGINEER D. TOTA 46772505 OCT 17 2007 PROVINCE OF ONTARIO

OWNER:

Farview Holdings
12599 Hwy. 50, Unit 7
Bolton, ON. L7E 1M4
Tel.: (416) 420-7709
Fax.: (905) 893-3100

APPLICANT/CLIENT:

SUNCOR ENERGY
SUNCOR ENERGY PRODUCTS INC. 36 YORK MILLS RD., TORONTO, ON. M2P 2C5
TEL: (416) 733-7224, FAX: (416) 733-2113

Trow Associates Inc.
1595 Clark Boulevard
Brampton, Ontario L6T 4V1
Tel.: (905) 793-9800
Fax: (905) 793-0641

LOCATION:

12476 REGIONAL ROAD 50
@ GEORGE BOLTON PKWY
TOWN OF CALEDON, ONTARIO

TITLE:

SITE SERVICES PLAN

SPA07-021

DESIGNED:	A.B.	DRAWN:	A.B.	S/S NO.:	I.D. No.:
CHECKED:	B.H.	DATE:	FEB. 2007		
SCALE:	1:250	PROJ. NO.:	bri002335130	DWG. NO.	03
CAD FILE:	233513Asite03				

REGION OF PEEL PUBLIC WORKS/ENGINEERING & CONSTRUCTION DIVISION APPROVED FOR WATER, SANITARY AND/OR STORM SEWERS IN ACCORDANCE WITH LATEST REGION OF PEEL STANDARDS AND SPECIFICATIONS

DATE Mar. 18 / 08

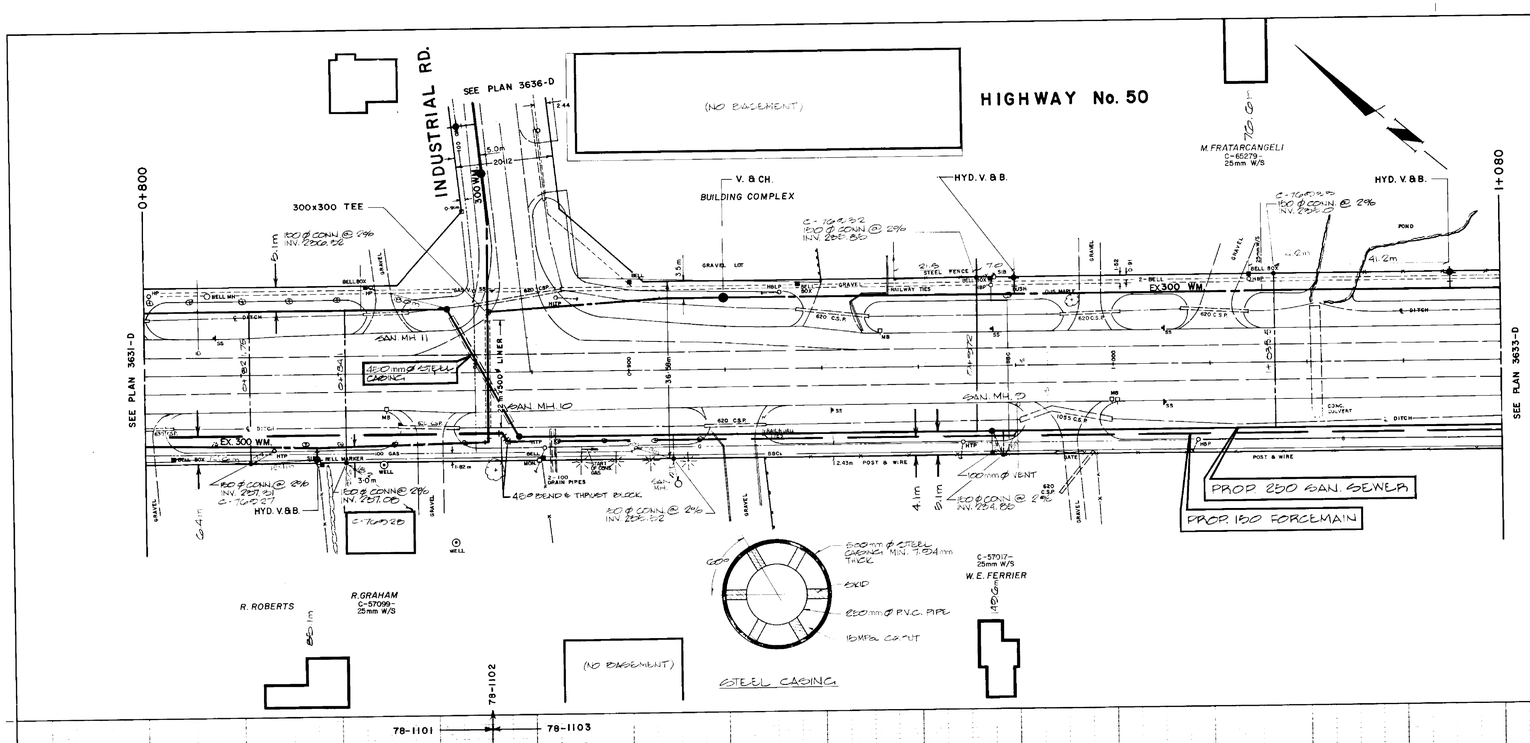
MUNICIPAL SIDE & REGIONAL EASEMENTS ONLY

RECEIVED OCT 18 2007 PUBLIC WORKS REGION OF PEEL

C447400

INSPECTORS COPY

DRAFT



SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS	28th MAY 79	KRK
STORM SEWERS			BELL U/G CABLE	12th JUNE 79	KRK
WATERMAINS			HYDRO U/G CABLE		

REVISIONS

DATE	DETAILS	INIT.
8th NOV 79	GRADE OF WM. REVISED & GRADE OVER WM. ADDED.	D.R.
23 APR. 80	AS CONSTRUCTED	KRK
MAR. 81	PROP. SAN. MH. 9 REVISED & FORCEMAIN	E.F.
MAY 84	AS CONSTRUCTED	E.F.

PROJ. No. 81-2134

Designed by — Chkd. —

Approved by

General Notes

- All Driveways Gravel Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In Field.
- ● Denotes Building - Not Located
- ▭ Denotes Building - Located
- Type B Bedding Unless Otherwise Noted (SAN.)

B.M. No — Elev.

The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction. Location of Existing Utilities Approximate Only, To Be Verified In Field By Contractor.

PROJ. No. 78-1101

Designed by — Chkd.

Approved by

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL TELEPHONE COMPANY
CONSUMERS GAS COMPANY
MINISTRY OF TRANSPORTATION
MINISTRY OF ENVIRONMENT
HYDRO ELECTRIC POWER COMM. OF ONTARIO
HYDRO ELECTRIC COMM. CITY OF MISSISSAUGA
HYDRO ELECTRIC COMM. CITY OF BRAMPTON
HYDRO ELECTRIC COMM. PORT CREDIT
HYDRO ELECTRIC COMM. STREETSVILLE
CABLE TELEVISION

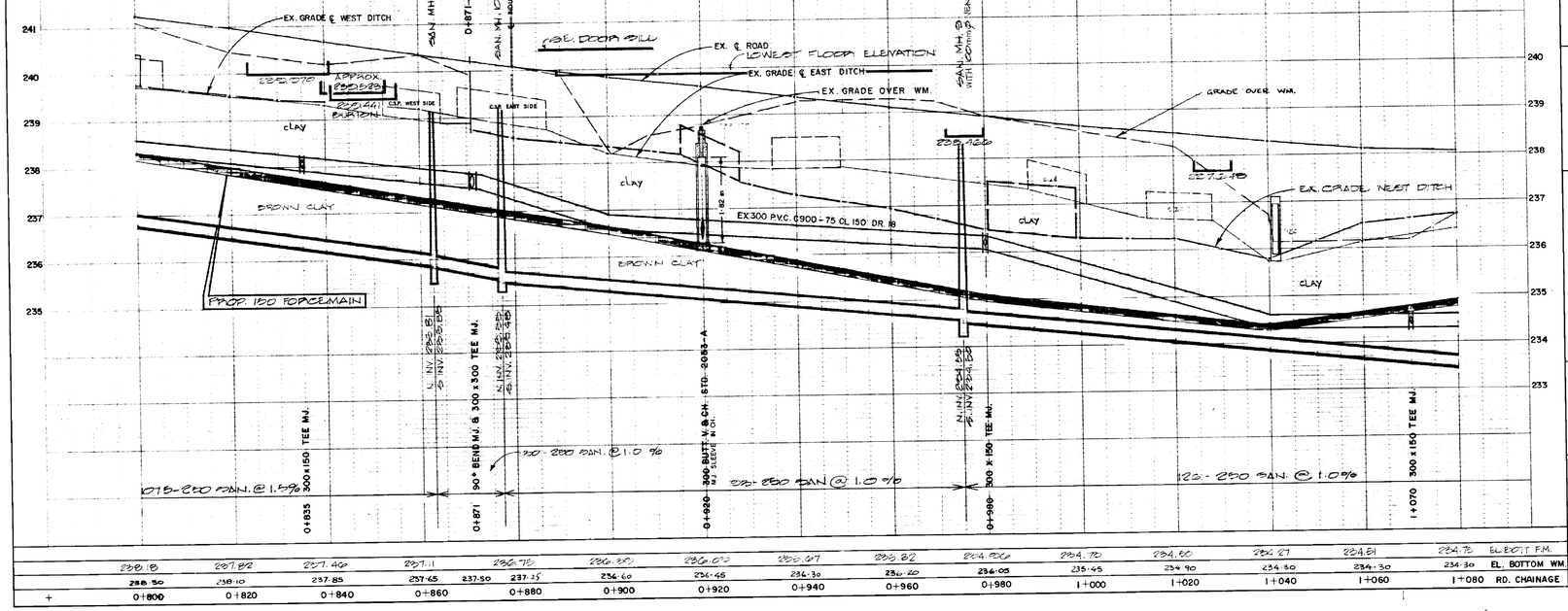
Region of Peel

Department of Public Works

HIGHWAY 50

PROPOSED 250 SANITARY SEWER & 150 FORCEMAIN

Sta. 0+800 **To Sta.** 1+080



+	0+800	0+820	0+840	0+860		0+880	0+900	0+920	0+940	0+960	0+980	1+000	1+020	1+040	1+060	1+080	RD. CHAINAGE
	238.18	237.82	237.46	237.11	237.50	236.75	236.25	236.07	236.07	235.82	234.82	234.72	234.60	234.27	234.81	234.72	EL. EXIST. F.M.
	238.50	238.10	237.85	237.65		237.25	236.60	236.45	236.30	236.20	236.05	235.45	234.90	234.30	234.30	234.30	EL. BOTTOM WM.

Lots 1-5	Area C-2	Project No. 81-2134	
Scale hor. 1:500 ver. 1:50	Drawn by E.W.K.	Checked by RE	
Date MAY 79	Sheet 4 of 7	Plan No. 3632-D	

3632-D

APPENDIX C
Matrix Crossing Structure Sheets and Photolog

PARISH geomorphic

Stream Crossing Assessment Form

Date: **Sept 9/20** ***Stream:*** **Crossing 1** ***Crew:*** NC/PC
Road Name: **Regional Road 50** ***Recorder:*** NC
Location: **Caledon** ***Weather Description:*** overcast, 20 degrees

Channel Dimensions (Measured/Estimated)

black = upstream of crossing
red = downstream

Bankfull Width (m) 3.2/3.6/0.5 (main channel d/s) Bankfull Depth (m) 0.75/1 m/ no bankfull downstream

Wetted Width (m) 2.5/2.5/1.5 Wetted Depth (m) 0.1/0.6/0.07

Gradient [X] Low [ ] Medium [ ] High Entrenchment [ ] Low [ ] Medium [ ] High

Sinuosity [X] Low [ ] Medium [ ] High Valley Setting unconfined

Riparian Vegetation Width (m) ~10 m Type cattails, grass

Channel Disturbance Hardened with riprap around culvert at road

Cross-sectional Sketch:

Planform Sketch:

Road Type (Highway, Regional, Local) _____

Crossing Type

[ ] Pre-Cast Culvert [ ] Open Bottom [ ] Closed Bottom
[ ] Cast-in-place Culvert [ ] Open Bottom [ ] Closed Bottom
[ ] Bridge
[X] Other HDPE, closed bottom

Material

[X] Concrete [ ] Bridge [ ] Aluminum [ ] Corrugated Steel [X] Other HDPE

Bridge Design

[ ] Free Span [ ] Piers [ ] Abutments [ ] Number of Spans _____

Culvert Shape

[X] Circular [X] Box [ ] Arch [ ] Elliptical [ ] Mulitple (# ____) [ ] Other _____

Dimensions

Width (m) 0.6 m/1.88 m Height (m) 0.6 m/1.05 Length (m) _____ Age HDP new box 10+ years

PARISH geomorphic

Stream Crossing Assessment Form

Date: ***Stream:*** ***Crew:***

Road Name: ***Recorder:***

Structure Condition

[X] Good [ ] Collapsed [ ] Mechanical Damage [ ] Rust [ ] Other _____

X

Evidence of Flow Restriction and Erosion Upstream of Crossing

[X] No Pooling	[ ] Minor Pooling	[ ] Major Pooling
[ ] No Erosion	[X] Minor Erosion	[ ] Major Erosion

Evidence of Scour Pool and Erosion Downstream of Crossing

[ ] No Pooling	[X] Minor Pooling	[ ] Major Pooling
[ ] No Erosion	[X] Minor Erosion	[ ] Major Erosion

Relative Crossing Sizing

[ ] Channel Width < Opening [X] Channel Width = Opening [X] Channel Width > Opening

channel widened at culvert

Embankment Erosion Protection

[X] Riprap	[ ] Vegetation	[ ] Armour Stone
[ ] Slope Paving	[ ] Retaining Wall	[ ] Other _____

Debris Trapping

[X] No Debris [ ] Minor Debris [ ] Major Debris

Evidence of:

Patching or pavement built-up	[ ] yes	[X] X no
Cracks running parallel to the structure centerline	[ ] yes	[X] X no
Erosion or failure of the embankment slope over the structure	[X] yes	[ ] X no
Sink holes over the structure	[ ] yes	[X] X no

Substrate Present Through Crossing? [ ] yes [X] no Comment: cattails, depositional

Substrate Type [ ] Natural [ ] Constructed Comment: _____

Concerns Regarding Fish Passage? [ ] yes [X] no Comment: _____

Culvert Perched or Overhanging? [ ] yes [X] no Amount (m) _____

Comment on road alignment with respect to the valley and channel planform: part of culvert system

Does Light Penetrate Under Entire Crossing? [ ] yes [X] no Comment: _____

Noise Level at Time of Inspection [ ] High [X] Medium [ ] Low

Photos Taken of Structure? Upstream _____ Downstream _____

Comments: upstream channel choked with cattails, water flowing minimally

HDPE likely a culvert extension from box that is visible downstream

concrete box downstream, channel lined with dense phragmites, outlets to pond downstream

PARISH geomorphic

Stream Crossing Assessment Form

Date: **Sept 9/20** ***Stream:*** **Crossing 1a** ***Crew:*** NC/PC
Road Name: **Regional Road 50** ***Recorder:*** NC
Location: **Caledon** ***Weather Description:*** overcast, 20 degrees

black = upstream of crossing
red = downstream

Channel Dimensions (Measured/Estimated)

Bankfull Width (m) 2.5 m Bankfull Depth (m) 0.45 m

Wetted Width (m) 1.1 m Wetted Depth (m) 0.1

Gradient [X] Low [ ] Medium [ ] High Entrenchment [ ] Low [ ] Medium [ ] High

Sinuosity [X] Low [ ] Medium [ ] High Valley Setting Straightened ditch

Riparian Vegetation Width (m) ~20 m Type road on left, grass on right

Channel Disturbance Hardened with riprap around culvert at road

Cross-sectional Sketch:

Planform Sketch:

Road Type (Highway, Regional, Local) _____

Crossing Type

[ ] Pre-Cast Culvert [ ] Open Bottom [ ] Closed Bottom
[ ] Cast-in-place Culvert [ ] Open Bottom [ ] Closed Bottom
[ ] Bridge
[X] Other CSP, closed bottom

Material

[ ] Concrete [ ] Bridge [ ] Aluminum [X] Corrugated Steel [ ] Other _____

Bridge Design

[ ] Free Span [ ] Piers [ ] Abutments [ ] Number of Spans _____

Culvert Shape

[X] Circular [ ] Box [ ] Arch [ ] Elliptical [ ] Mulitple (# ____) [ ] Other _____

Dimensions

Width (m) 0.9 m Height (m) 0.9 m Length (m) _____ Age 10+ years

PARISH geomorphic

Stream Crossing Assessment Form

Date: ***Stream:*** ***Crew:***

Road Name: ***Recorder:***

Structure Condition

invert rusted out

[ ] Good [ ] Collapsed [ ] Mechanical Damage [X] Rust [ ] Other _____

Evidence of Flow Restriction and Erosion Upstream of Crossing

[X] No Pooling	[ ] Minor Pooling	[ ] Major Pooling
[ ] No Erosion	[X] Minor Erosion	[ ] Major Erosion

Evidence of Scour Pool and Erosion Downstream of Crossing

[ ] No Pooling	[ ] Minor Pooling	[ ] Major Pooling
[ ] No Erosion	[ ] Minor Erosion	[ ] Major Erosion

Relative Crossing Sizing

[ ] Channel Width < Opening [X] Channel Width = Opening [ ] Channel Width > Opening

Embankment Erosion Protection

[X] Rip Rap	[ ] Vegetation	[ ] Armour Stone
[ ] Slope Paving	[ ] Retaining Wall	[ ] Other riprap old and failing

Debris Trapping

[X] No Debris [ ] Minor Debris [ ] Major Debris

Evidence of:

Patching or pavement built-up	[ ] yes	[X] no
Cracks running parallel to the structure centerline	[ ] yes	[X] no
Erosion or failure of the embankment slope over the structure	[X] yes	[ ] no
Sink holes over the structure	[ ] yes	[X] no

Substrate Present Through Crossing? [ ] yes [X] no Comment: _____

Substrate Type [ ] Natural [ ] Constructed Comment: _____

Concerns Regarding Fish Passage? [ ] yes [X] no Comment: _____

Culvert Perched or Overhanging? [ ] yes [X] no Amount (m) _____

Comment on road alignment with respect to the valley and channel planform: part of culvert system

Does Light Penetrate Under Entire Crossing? [ ] yes [X] no Comment: _____

Noise Level at Time of Inspection [ ] High [X] Medium [ ] Low

Photos Taken of Structure? Upstream _____ Downstream _____

Comments: ditch along Highway 50, filled with cattails, banks near-vertical ~0.15 m high

PARISH geomorphic

Stream Crossing Assessment Form

Date: **Sept 9/20** ***Stream:*** **Crossing 2** ***Crew:*** NC/PC
Road Name: **Regional Road 50** ***Recorder:*** NC
Location: **Caledon** ***Weather Description:*** overcast, 20 degrees

Channel Dimensions (Measured/Estimated)

black = upstream of crossing
red = downstream

Bankfull Width (m) 2.5 m Bankfull Depth (m) 0.6 m

Wetted Width (m) 1.1 m Wetted Depth (m) 0.03/0.15

Gradient ☐ Low ☒ Medium ☐ High Entrenchment ☐ Low ☐ Medium ☐ High

Sinuosity ☐ Low ☒ Medium ☐ High Valley Setting Partially confined

Riparian Vegetation Width (m) ~5 m Type Meadow, then gravel car lots beyond meadow

Channel Disturbance Old concrete blocks around culvert sides (failing)

Cross-sectional Sketch:

Planform Sketch:

Road Type (Highway, Regional, Local) _____

Crossing Type

☐ Pre-Cast Culvert ☐ Open Bottom ☐ Closed Bottom
☐ Cast-in-place Culvert ☐ Open Bottom ☐ Closed Bottom
☐ Bridge
☒ Other CSP, closed bottom

Material

☐ Concrete ☐ Bridge ☐ Aluminum ☒ Corrugated Steel ☐ Other _____

Bridge Design

☐ Free Span ☐ Piers ☐ Abutments ☐ Number of Spans _____

Culvert Shape

☒ Circular ☐ Box ☐ Arch ☐ Elliptical ☐ Mulitple (# ____) ☐ Other _____

Dimensions

Width (m) 1.55 m Height (m) 1.5 m Length (m) _____ Age 10+ years

PARISH geomorphic

Stream Crossing Assessment Form

Date: ***Stream:*** ***Crew:***

Road Name: ***Recorder:***

Structure Condition

[X] Good [ ] Collapsed [ ] Mechanical Damage [ ] Rust [ ] Other _____

Evidence of Flow Restriction and Erosion Upstream of Crossing

[ ] No Pooling	[X] Minor Pooling	[ ] Major Pooling
[ ] No Erosion	[X] Minor Erosion	[ ] Major Erosion

Evidence of Scour Pool and Erosion Downstream of Crossing

[X] No Pooling	[ ] Minor Pooling	[ ] Major Pooling
[X] No Erosion	[ ] Minor Erosion	[ ] Major Erosion

Relative Crossing Sizing

[ ] Channel Width < Opening [X] X Channel Width = Opening [ ] Channel Width > Opening

Embankment Erosion Protection

[ ] Rip Rap	[ ] Vegetation	[ ] Armour Stone
[ ] Slope Paving	[ ] Retaining Wall	[X] Other concrete blocls
		X None

Debris Trapping

[ ] No Debris [ ] Minor Debris [X] Major Debris

Evidence of:

Patching or pavement built-up	[ ] yes	[X] X no
Cracks running parallel to the structure centerline	[ ] yes	[X] X no
Erosion or failure of the embankment slope over the structure	[X] X yes	[ ] no
Sink holes over the structure	[ ] yes	[X] X no

Substrate Present Through Crossing? [ ] yes [X] no Comment: _____

Substrate Type [ ] Natural [ ] Constructed Comment: _____

Concerns Regarding Fish Passage? [X] yes [ ] no Comment: woody debris jam blocking upstream culvert connection

Culvert Perched or Overhanging? [ ] yes [X] no Amount (m) _____

Comment on road alignment with respect to the valley and channel planform: Away from road N/A

Does Light Penetrate Under Entire Crossing? [ ] yes [X] no Comment: _____

Noise Level at Time of Inspection [ ] High [ ] Medium [ ] Low

Photos Taken of Structure? Upstream _____ Downstream _____

Comments: sinuous upstream, bank erosion around meanders, channel substrate clay and fine gravel
gravel potentially sourced from parking lots above during rainfall

no erosion downstream, channels straight not sinuous, no floodplain channel is bordered by gravel lots
Channel substrate consists of clay and fine gravel

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Stream Crossing Assessment Form

Date: **Sept 9/20** ***Stream:*** **Crossing 3** ***Crew:*** NC/PC
Road Name: **Regional Road 50** ***Recorder:*** NC
Location: **Caledon** ***Weather Description:*** overcast, 20 degrees

Channel Dimensions (Measured/Estimated)

black = upstream of crossing
red = downstream

Bankfull Width (m): no bankfull upstream (design)
1.2 m

Bankfull Depth (m): no bankfull upstream (design)
0.3 m

Wetted Width (m): 2.95 at culvert
0.6 m

Wetted Depth (m): 0.5 m in culvert
0.15 m

Gradient [X] Low [ ] Medium [ ] High

Entrenchment [ ] Low [ ] Medium [ ] High

Sinuosity [X] Low [ ] Medium [ ] High

Valley Setting: unconfined

Riparian Vegetation Width (m): ~10 m Type: cattails, grass

Channel Disturbance: Channel being realigned upstream (ongoing construction)

Cross-sectional Sketch:

Planform Sketch:

Road Type (Highway, Regional, Local) _____

Crossing Type

[ ] Pre-Cast Culvert [ ] Open Bottom [ ] Closed Bottom
[ ] Cast-in-place Culvert [X] Open Bottom [ ] Closed Bottom
[ ] Bridge
[X] Other CSP arch, open bottom

Material

[ ] Concrete [ ] Bridge [ ] Aluminum [X] Corrugated Steel [ ] Other _____

Bridge Design

[ ] Free Span [ ] Piers [ ] Abutments [ ] Number of Spans _____

Culvert Shape

[ ] Circular [ ] Box [X] Arch [ ] Elliptical [ ] Mulitple (# ____) [ ] Other _____

Dimensions

Width (m) 2.90 Height (m) 1.78 Length (m) _____ Age 10+ years

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Stream Crossing Assessment Form

Date: ***Stream:*** ***Crew:***
Road Name: ***Recorder:***

Structure Condition
[X] Good [ ] Collapsed [ ] Mechanical Damage [ ] Rust [ ] Other _____

Evidence of Flow Restriction and Erosion Upstream of Crossing

[X] No Pooling	[ ] Minor Pooling	[ ] Major Pooling
[X] No Erosion	[ ] Minor Erosion	[ ] Major Erosion

Evidence of Scour Pool and Erosion Downstream of Crossing

[X] No Pooling	[ ] Minor Pooling	[ ] Major Pooling
[ ] No Erosion	[X] Minor Erosion	[ ] Major Erosion

Relative Crossing Sizing
[X] Channel Width < Opening [ ] Channel Width = Opening [ ] Channel Width > Opening
channel widened at culvert

Embankment Erosion Protection
X

[ ] Riprap	[ ] Vegetation	[X] Armour Stone around culvert
[ ] Slope Paving	[ ] Retaining Wall	[ ] Other _____

Debris Trapping
[X] No Debris [ ] Minor Debris [ ] Major Debris

Evidence of:

Patching or pavement built-up	[ ] yes	[X] X no
Cracks running parallel to the structure centerline	[ ] yes	[X] X no
Erosion or failure of the embankment slope over the structure	[ ] yes	[X] X no
Sink holes over the structure	[ ] yes	[X] X no

Substrate Present Through Crossing? [X] yes [ ] no Comment: gravel, cobbles (sourced from bank likely)

Substrate Type [X] Natural [ ] Constructed Comment: _____

Concerns Regarding Fish Passage? [ ] yes [X] no Comment: _____

Culvert Perched or Overhanging? [ ] yes [X] no Amount (m) _____

Comment on road alignment with respect to the valley and channel planform: skewed ~45 degrees to road

Does Light Penetrate Under Entire Crossing? [ ] yes [X] no Comment: _____

Noise Level at Time of Inspection [ ] High [X] Medium [ ] Low

Photos Taken of Structure? Upstream _____ Downstream _____

Comments: channel undergoing realignment, being shifted east
channel flows towards right of culvert, gravel bar has formed towards downstream end of culvert
can see culvert footings, minor bed erosion, outlets into ditch with mowed lawn on either side
cobbles on bed throughout ditch (possibly placed?)

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Stream Crossing Assessment Form

Date: **Sept 9/20** ***Stream:*** **Crossing 4** ***Crew:*** NC/PC
Road Name: **Regional Road 50** ***Recorder:*** NC
Location: **Caledon** ***Weather Description:*** overcast, 20 degrees

Channel Dimensions (Measured/Estimated)

black = upstream of crossing
red = downstream

Bankfull Width (m) 5.5 m Bankfull Depth (m) 0.4 m

Wetted Width (m) 2.1 m Wetted Depth (m) 0.1

Gradient [X] Low [ ] Medium [ ] High Entrenchment [ ] Low [ ] Medium [ ] High

Sinuosity [X] Low [ ] Medium [ ] High Valley Setting confined by road

Riparian Vegetation Width (m) _____ Type straightened ditch, mowed grass on either side

Channel Disturbance riprap at crossing on banks

Cross-sectional Sketch:

Planform Sketch:

Road Type (Highway, Regional, Local) _____

Crossing Type

[ ] Pre-Cast Culvert [ ] Open Bottom [ ] Closed Bottom
[ ] Cast-in-place Culvert [ ] Open Bottom [ ] Closed Bottom
[ ] Bridge
[X] Other CSP arch, closed bottom

Material

[ ] Concrete [ ] Bridge [ ] Aluminum [X] Corrugated Steel [ ] Other _____

Bridge Design

[ ] Free Span [ ] Piers [ ] Abutments [ ] Number of Spans _____

Culvert Shape

[ ] Circular [ ] Box [X] Arch [ ] Elliptical [ ] Mulitple (# ____) [ ] Other _____

Dimensions

Width (m) 2.25 m Height (m) 1.62 m Length (m) _____ Age 10+yrs

PARISH geomorphic

Stream Crossing Assessment Form

Date: ***Stream:*** ***Crew:***

Road Name: ***Recorder:***

Structure Condition

[X] Good [ ] Collapsed [ ] Mechanical Damage [ ] Rust [ ] Other light rust marks

Evidence of Flow Restriction and Erosion Upstream of Crossing

[X] No Pooling	[ ] Minor Pooling	[ ] Major Pooling
[X] No Erosion	[ ] Minor Erosion	[ ] Major Erosion

Evidence of Scour Pool and Erosion Downstream of Crossing

[ ] No Pooling	[X] Minor Pooling	[ ] Major Pooling
[X] No Erosion	[ ] Minor Erosion	[ ] Major Erosion

Relative Crossing Sizing

[ ] Channel Width < Opening [X] X Channel Width = Opening [ ] Channel Width > Opening

Embankment Erosion Protection

[X] Riprap X	[ ] Vegetation	[ ] Armour Stone
[ ] Slope Paving	[ ] Retaining Wall	[ ] Other

Debris Trapping

[X] No Debris [ ] Minor Debris [ ] Major Debris

Evidence of:

Patching or pavement built-up	[ ] yes	[X] X no
Cracks running parallel to the structure centerline	[ ] yes	[X] X no
Erosion or failure of the embankment slope over the structure	[ ] yes	[X] X no
Sink holes over the structure	[ ] yes	[X] X no

Substrate Present Through Crossing? [ ] yes [X] no Comment:

Substrate Type [ ] Natural [ ] Constructed Comment:

Concerns Regarding Fish Passage? [ ] yes [X] no Comment:

Culvert Perched or Overhanging? [ ] yes [X] no Amount (m)

Comment on road alignment with respect to the valley and channel planform: parallel to road

Does Light Penetrate Under Entire Crossing? [ ] yes [X] no Comment:

Noise Level at Time of Inspection [ ] High [X] Medium [ ] Low

Photos Taken of Structure? Upstream Downstream

Comments: cattails ~10 m upstream of crossing, fine substrates, culvert protected by riprap

pooling downstream, remains ditched, channel choked with cattails

PARISH geomorphic

Stream Crossing Assessment Form

Date: **Sept 9/20** ***Stream:*** **Crossing 5** ***Crew:*** NC/PC

Road Name: **Regional Road 50** ***Recorder:*** NC

Location: **Caledon** ***Weather Description:*** overcast, 20 degrees

Channel Dimensions (Measured/Estimated)

black = upstream of crossing
red = downstream

Bankfull Width (m) 3.5 m Bankfull Depth (m) 0.6 m

Wetted Width (m) 1.7 m Wetted Depth (m) 0.2

Gradient [X] Low [ ] Medium [ ] High Entrenchment [ ] Low [ ] Medium [ ] High

Sinuosity [X] Low [ ] Medium [ ] High Valley Setting confined by road

Riparian Vegetation Width (m) _____ Type straightened ditch, grass on either side

Channel Disturbance riprap at crossing on banks and road embankment

Cross-sectional Sketch:

Planform Sketch:

Road Type (Highway, Regional, Local) _____

Crossing Type

[ ] Pre-Cast Culvert [ ] Open Bottom [ ] Closed Bottom
[ ] Cast-in-place Culvert [ ] Open Bottom [ ] Closed Bottom
[ ] Bridge
[X] Other CSP arch, closed bottom

Material

[ ] Concrete [ ] Bridge [ ] Aluminum [X] Corrugated Steel [ ] Other _____

Bridge Design

[ ] Free Span [ ] Piers [ ] Abutments [ ] Number of Spans _____

Culvert Shape

[ ] Circular [ ] Box [X] Arch [ ] Elliptical [ ] Mulitple (# ____) [ ] Other _____

Dimensions

Width (m) 2.08 m Height (m) 1.45 m Length (m) _____ Age 10+yrs

PARISH geomorphic

Stream Crossing Assessment Form

Date: ***Stream:*** ***Crew:***

Road Name: ***Recorder:***

Structure Condition

[ ] Good [ ] Collapsed [ ] Mechanical Damage [X] Rust [ ] Other rusting through bottom

Evidence of Flow Restriction and Erosion Upstream of Crossing

[X]	No Pooling	[ ]	Minor Pooling	[ ]	Major Pooling
[X]	No Erosion	[ ]	Minor Erosion	[ ]	Major Erosion

Evidence of Scour Pool and Erosion Downstream of Crossing

[X]	No Pooling	[ ]	Minor Pooling	[ ]	Major Pooling
[X]	No Erosion	[ ]	Minor Erosion	[ ]	Major Erosion

Relative Crossing Sizing

[ ] Channel Width < Opening [X] Channel Width = Opening [ ] Channel Width > Opening

Embankment Erosion Protection

[X]	Riprap	[ ]	Vegetation	[ ]	Armour Stone
[ ]	Slope Paving	[ ]	Retaining Wall	[ ]	Other

Debris Trapping

[X] No Debris [ ] Minor Debris [ ] Major Debris

Evidence of:

Patching or pavement built-up	[ ]	yes	[X]	no	
Cracks running parallel to the structure centerline	[ ]	yes	[X]	no	
Erosion or failure of the embankment slope over the structure	[ ]	yes	[X]	no	
Sink holes over the structure	[ ]	yes	[X]	no	

Substrate Present Through Crossing? [ ] yes [X] no Comment:

Substrate Type [ ] Natural [ ] Constructed Comment:

Concerns Regarding Fish Passage? [ ] yes [X] no Comment:

Culvert Perched or Overhanging? [ ] yes [X] no Amount (m)

Comment on road alignment with respect to the valley and channel planform: parallel to road

Does Light Penetrate Under Entire Crossing? [ ] yes [X] no Comment:

Noise Level at Time of Inspection [ ] High [X] Medium [ ] Low

Photos Taken of Structure? Upstream _____ Downstream _____

Comments: ditch lined with cattails upstream

0.9 m concrete box on right bank (likely storm sewer related)

ditch downstream lined with more cattails

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Stream Crossing Assessment Form

Date: **Sept 9/20** ***Stream:*** **Crossing 6** ***Crew:*** NC/PC
Road Name: **Regional Road 50** ***Recorder:*** NC
Location: **Caledon** ***Weather Description:*** overcast, 20 degrees

Channel Dimensions (Measured/Estimated)

black = upstream of crossing
red = downstream

Bankfull Width (m) 3 m Bankfull Depth (m) 0.4 m

Wetted Width (m) 1.6 m Wetted Depth (m) 0.06 m

Gradient [X] Low [ ] Medium [ ] High Entrenchment [ ] Low [ ] Medium [ ] High

Sinuosity [X] Low [ ] Medium [ ] High Valley Setting confined by road

Riparian Vegetation Width (m) _____ Type straightened ditch, road and parking lot on either side

Channel Disturbance none

Cross-sectional Sketch:

Planform Sketch:

Road Type (Highway, Regional, Local) _____

Crossing Type

[ ] Pre-Cast Culvert [ ] Open Bottom [ ] Closed Bottom
[ ] Cast-in-place Culvert [ ] Open Bottom [ ] Closed Bottom
[ ] Bridge
[X] Other CSP arch, closed bottom

Material

[ ] Concrete [ ] Bridge [ ] Aluminum [X] Corrugated Steel [ ] Other _____

Bridge Design

[ ] Free Span [ ] Piers [ ] Abutments [ ] Number of Spans _____

Culvert Shape

[ ] Circular [ ] Box [X] Arch [ ] Elliptical [ ] Mulitple (# ____) [ ] Other _____

Dimensions

Width (m) 2.25 m Height (m) 1.62 m Length (m) _____ Age 10+yrs

PARISH geomorphic

Stream Crossing Assessment Form

Date: ***Stream:*** ***Crew:***

Road Name: ***Recorder:***

Structure Condition

[ ] Good [ ] Collapsed [ ] Mechanical Damage [X] Rust [ ] Other light rust marks

Evidence of Flow Restriction and Erosion Upstream of Crossing

[X] No Pooling	[ ] Minor Pooling	[ ] Major Pooling
[X] No Erosion	[ ] Minor Erosion	[ ] Major Erosion

Evidence of Scour Pool and Erosion Downstream of Crossing

[X] No Pooling	[ ] Minor Pooling	[ ] Major Pooling
[X] No Erosion	[ ] Minor Erosion	[ ] Major Erosion

Relative Crossing Sizing

[ ] Channel Width < Opening [X] X Channel Width = Opening [ ] Channel Width > Opening

Embankment Erosion Protection

[ ] Riprap	[ ] Vegetation	[ ] Armour Stone
[ ] Slope Paving	[ ] Retaining Wall	[X] Other none

X

Debris Trapping

[X] No Debris [ ] Minor Debris [ ] Major Debris

Evidence of:

Patching or pavement built-up	[ ] yes	[X] X no
Cracks running parallel to the structure centerline	[ ] yes	[X] X no
Erosion or failure of the embankment slope over the structure	[ ] yes	[X] X no
Sink holes over the structure	[ ] yes	[X] X no

Substrate Present Through Crossing? [ ] yes [X] no Comment: _____

Substrate Type [ ] Natural [ ] Constructed Comment: _____

Concerns Regarding Fish Passage? [ ] yes [X] no Comment: _____

Culvert Perched or Overhanging? [ ] yes [X] no Amount (m) _____

Comment on road alignment with respect to the valley and channel planform: parallel to road

Does Light Penetrate Under Entire Crossing? [ ] yes [X] no Comment: _____

Noise Level at Time of Inspection [ ] High [X] Medium [ ] Low

Photos Taken of Structure? Upstream _____ Downstream _____

Comments: cattails upstream of culvert

downstream becomes sinuous as channel meanders through forested area

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Stream Crossing Assessment Form

Date: **Sept 9/20** ***Stream:*** **Crossing 7** ***Crew:*** NC/PC
Road Name: **Regional Road 50** ***Recorder:*** NC
Location: **Caledon** ***Weather Description:*** overcast, 20 degrees

Channel Dimensions (Measured/Estimated)

black = upstream of crossing
red = downstream

Bankfull Width (m) 4 m Bankfull Depth (m) 0.6 m

Wetted Width (m) 2.5 m Wetted Depth (m) 0.3 m at culvert, 0.15 m u/s

Gradient [X] Low [ ] Medium [ ] High Entrenchment [ ] Low [ ] Medium [ ] High

Sinuosity [X] Low [ ] Medium [ ] High Valley Setting confined by road

Riparian Vegetation Width (m) _____ Type straightened ditch, meadow on left

Channel Disturbance none

Cross-sectional Sketch:

Planform Sketch:

Road Type (Highway, Regional, Local) _____

Crossing Type

[ ] Pre-Cast Culvert	[ ] Open Bottom	[ ] Closed Bottom
[X] Cast-in-place Culvert	[X] Open Bottom	[ ] Closed Bottom
[ ] Bridge		
[ ] Other _____		

Material

[X] Concrete [ ] Bridge [ ] Aluminum [ ] Corrugated Steel [ ] Other _____

Bridge Design

[ ] Free Span [ ] Piers [ ] Abutments [ ] Number of Spans _____

Culvert Shape

[ ] Circular [X] Box [ ] Arch [ ] Elliptical [ ] Mulitple (# ____) [ ] Other _____

Dimensions

Width (m) 4.55 m Height (m) 1.5 m Length (m) _____ Age new

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Stream Crossing Assessment Form

Date: ***Stream:*** ***Crew:***

Road Name: ***Recorder:***

Structure Condition

[X] Good [ ] Collapsed [ ] Mechanical Damage [ ] Rust [ ] Other _____

Evidence of Flow Restriction and Erosion Upstream of Crossing

[X] No Pooling	[ ] Minor Pooling	[ ] Major Pooling
[X] No Erosion	[ ] Minor Erosion	[ ] Major Erosion

Evidence of Scour Pool and Erosion Downstream of Crossing

[X] No Pooling	[ ] Minor Pooling	[ ] Major Pooling
[X] No Erosion	[ ] Minor Erosion	[ ] Major Erosion

Relative Crossing Sizing

[X] Channel Width < Opening [ ] Channel Width = Opening [ ] Channel Width > Opening

X

Embankment Erosion Protection

[ ] Riprap	[ ] Vegetation	[ ] Armour Stone
[ ] Slope Paving	[ ] Retaining Wall	[X] Other none

X

Debris Trapping

[X] No Debris [ ] Minor Debris [ ] Major Debris

Evidence of:

Patching or pavement built-up	[ ] yes	[X] X no
Cracks running parallel to the structure centerline	[ ] yes	[X] X no
Erosion or failure of the embankment slope over the structure	[ ] yes	[X] X no
Sink holes over the structure	[ ] yes	[X] X no

Substrate Present Through Crossing? [ ] yes [X] no Comment: silt, small gravel,sediment buildup at downstream end

Substrate Type [X] Natural [ ] Constructed Comment: _____

Concerns Regarding Fish Passage? [ ] yes [X] no Comment: _____

Culvert Perched or Overhanging? [ ] yes [X] no Amount (m) _____

Comment on road alignment with respect to the valley and channel planform: parallel to road

Does Light Penetrate Under Entire Crossing? [ ] yes [X] no Comment: _____

Noise Level at Time of Inspection [ ] High [X] Medium [ ] Low

Photos Taken of Structure? Upstream _____ Downstream _____

Comments: ditch with cattails upstream, no erosion

sediment buildup at downstream culvert outlet, debris caught in cattails, ditch continues

PARISH geomorphic

Stream Crossing Assessment Form

Date: **Sept 9/20** ***Stream:*** **Crossing 8** ***Crew:*** NC/PC
Road Name: **Regional Road 50** ***Recorder:*** NC
Location: **Caledon** ***Weather Description:*** overcast, 20 degrees

Channel Dimensions (Measured/Estimated)

black = upstream of crossing
red = downstream

Bankfull Width (m) 3 m Bankfull Depth (m) 0.7 m

Wetted Width (m) 1.1 m Wetted Depth (m) 0.2 m

Gradient [X] Low [ ] Medium [ ] High Entrenchment [ ] Low [ ] Medium [ ] High

Sinuosity [X] Low [ ] Medium [ ] High Valley Setting confined by road

Riparian Vegetation Width (m) _____ Type straightened ditch, no floodplain

Channel Disturbance armourstone on bank against road

Cross-sectional Sketch:

Planform Sketch:

Road Type (Highway, Regional, Local) _____

Crossing Type

[ ] Pre-Cast Culvert	[ ] Open Bottom	[ ] Closed Bottom
[X] Cast-in-place Culvert	[X] Open Bottom	[ ] Closed Bottom
[ ] Bridge		
[ ] Other _____		

Material

[X] Concrete [ ] Bridge [ ] Aluminum [ ] Corrugated Steel [ ] Other _____

Bridge Design

[ ] Free Span [ ] Piers [ ] Abutments [ ] Number of Spans _____

Culvert Shape

[ ] Circular [X] Box [ ] Arch [ ] Elliptical [ ] Mulitple (# ____) [ ] Other _____

Dimensions

Width (m) 4.55 m Height (m) 1.62 m Length (m) _____ Age new

PARISH geomorphic

Stream Crossing Assessment Form

Date: ***Stream:*** ***Crew:***

Road Name: ***Recorder:***

Structure Condition

[X] Good [ ] Collapsed [ ] Mechanical Damage [ ] Rust [ ] Other _____

Evidence of Flow Restriction and Erosion Upstream of Crossing

[X] No Pooling	[ ] Minor Pooling	[ ] Major Pooling
[X] No Erosion	[ ] Minor Erosion	[ ] Major Erosion

Evidence of Scour Pool and Erosion Downstream of Crossing

[X] No Pooling	[ ] Minor Pooling	[ ] Major Pooling
[X] No Erosion	[ ] Minor Erosion	[ ] Major Erosion

Relative Crossing Sizing

[X] Channel Width < Opening [ ] Channel Width = Opening [ ] Channel Width > Opening

X

Embankment Erosion Protection

[ ] Riprap	[ ] Vegetation	X [X] Armour Stone
[ ] Slope Paving	[ ] Retaining Wall	[ ] Other _____

Debris Trapping

[X] No Debris [ ] Minor Debris [ ] Major Debris

Evidence of:

Patching or pavement built-up	[ ] yes	[X] X no
Cracks running parallel to the structure centerline	[ ] yes	[X] X no
Erosion or failure of the embankment slope over the structure	[ ] yes	[X] X no
Sink holes over the structure	[ ] yes	[X] X no

Substrate Present Through Crossing? [ ] yes [X] no Comment: silt, small gravel

Substrate Type [X] Natural [ ] Constructed Comment: _____

Concerns Regarding Fish Passage? [ ] yes [X] no Comment: _____

Culvert Perched or Overhanging? [ ] yes [X] no Amount (m) _____

Comment on road alignment with respect to the valley and channel planform: parallel to road

Does Light Penetrate Under Entire Crossing? [ ] yes [X] no Comment: _____

Noise Level at Time of Inspection [ ] High [X] Medium [ ] Low

Photos Taken of Structure? Upstream _____ Downstream _____

Comments: ditch with cattails upstream, no erosion

cattails at culvert outlet, armourstone against road, no erosion

DRAFT

APPENDIX D
Matrix Photolog

Matrix Solutions Inc. - September 9, 2020

1. Upstream of Culvert 1

Matrix Solutions Inc. - September 9, 2020

2. Upstream of Culvert 1

Matrix Solutions Inc. - September 9, 2020

3. Upstream of Culvert 1

Matrix Solutions Inc. - September 9, 2020

4. Upstream of Culvert 1

Matrix Solutions Inc. - September 9, 2020

5. Upstream of Culvert 1

Matrix Solutions Inc. - September 9, 2020

6. Culvert C1 (Inlet)

Matrix Solutions Inc. - September 9, 2020

7. Culvert C1 (Inlet)

Matrix Solutions Inc. - September 9, 2020

8. Culvert C1 (Inlet)

Matrix Solutions Inc. - September 9, 2020

9. Culvert C1a (Inlet)

Matrix Solutions Inc. - September 9, 2020

10. Culvert C1a (Inlet)

Matrix Solutions Inc. - September 9, 2020

11. Culvert C1a (Inlet)

Matrix Solutions Inc. - September 9, 2020

12. Culvert C1a (Inlet)

Matrix Solutions Inc. - September 9, 2020

13. Culvert C1a (Inlet)

Matrix Solutions Inc. - September 9, 2020

14. Culvert 1 Outlet

Matrix Solutions Inc. - September 9, 2020

15. Culvert 1 Outlet

Matrix Solutions Inc. - September 9, 2020

16. Culvert 1 Outlet

Matrix Solutions Inc. - September 9, 2020

17. Culvert 1 Outlet

Matrix Solutions Inc. - September 9, 2020

18. Culvert 1 Outlet

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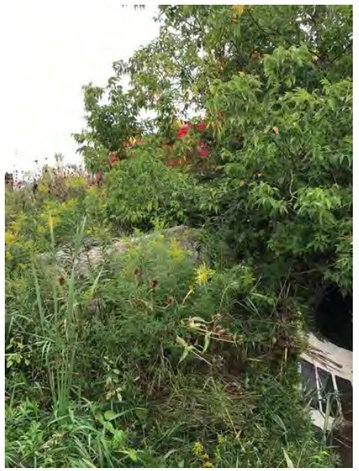
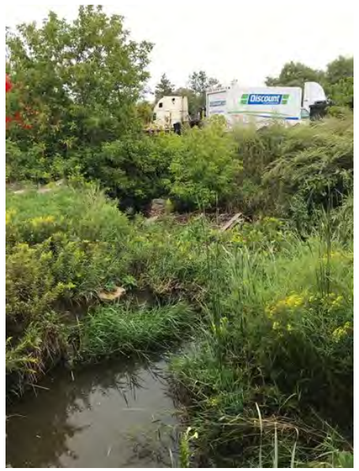


4.



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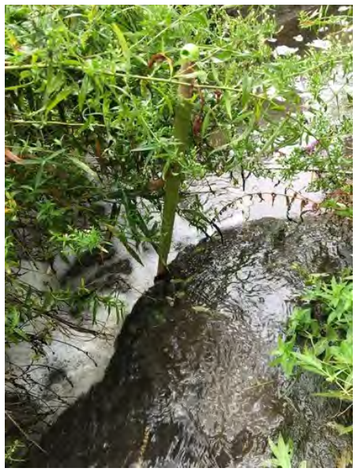

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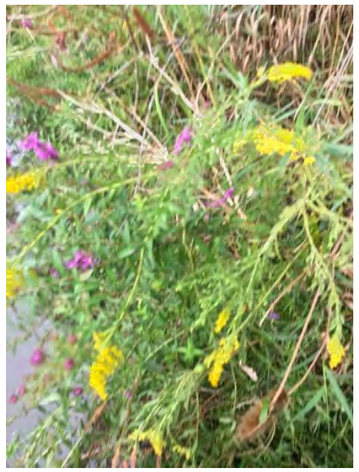

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Matrix Solutions Inc. - September 9, 2020

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Matrix Solutions Inc. - September 9, 2020

2. 177651

Matrix Solutions Inc. - September 9, 2020

3. 177651

Matrix Solutions Inc. - September 9, 2020

4. 177651

Matrix Solutions Inc. - September 9, 2020

5. 177651

Matrix Solutions Inc. - September 9, 2020

6. 177651

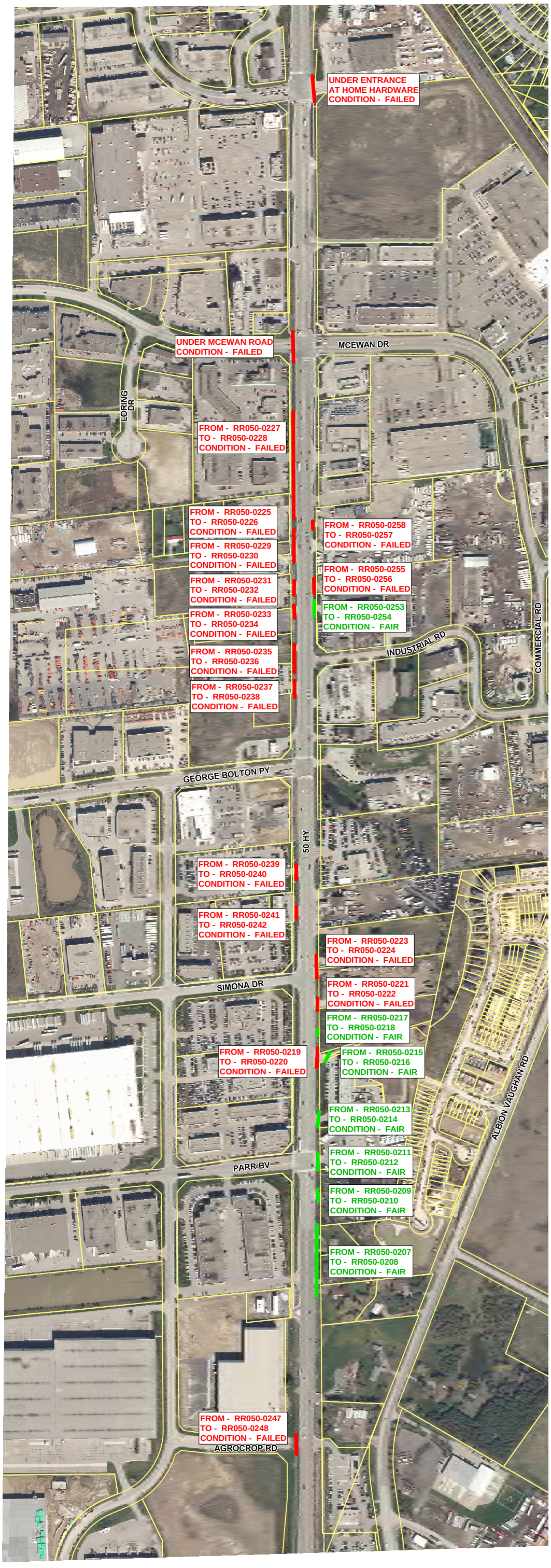
APPENDIX E
Region of Peel Structure Condition Appraisals

MINOR CULVERT CONDITION ASSESSMENT
HIGHWAY 50 - REGION OF PEEL

SCALE 1:5,000

0 50 100 150 200 250

Meters



LEGEND

	STORM CULVERT - FAIR CONDITION
	STORM CULVERT - FAILED CONDITION
	PROPERTY PARCEL
MAIN ST	STREET NAME

Region of Peel
working with you

Map Created by: Information Management Group, Operations Support, Public Works
Map Number: PW_IMG_GDA_640 (Optimal Plot Size - 11"x17")
Date: December 12, 2017

ASSET # INLET	ASSET # OUTLET	ADDRESS	CONDITION	OPTION	LENGTH	SIZE -MM	GRANULAR	HL3	TOPSOIL	CONCRETE CURB REP	SAW CUTTING	RESTORATION/ M	SOIL DISPOSAL (GRANULAR X 1.25)	HRS TO REPAIR
NORTHBOUND FROM MAYFIELD RD														
RR050-0219	RR050-0220	12295 NORTH ENTRANCE AT ROAD	STARTING TO LOSE BOTTOM	LINER	30	600	67	23		$ 15,937.50	13	$ 1,200.00	$ 2,000.00	30
RR050-0221	RR050-0222	12343 SOUTH	BOTTOM FAILING	LINER	19	525	42	15		$ 10,093.75	8	$ 760.00	$ 1,266.67	19
RR050-0223	RR050-0224	12343 NORTH	BOTTOM FAILING	LINER	35	500	78	27		$ 18,593.75	16	$ 1,400.00	$ 2,333.33	35
RR050-0255	RR050-0256	1553	HOLE IN TOP IN OUTLET - HOLDING WATER		22	600	49	17		$ 11,687.50	10	$ 880.00	$ 1,466.67	22
RR050-0258	RR050-0257	12585	FULL OF DEBRIS - LOOKS TO BE FAILING		12	600	27	9		$ 6,375.00	5	$ 480.00	$ 800.00	12
		PIPE UNDER ENTRANCE AT HOME HARDWARE	PLUGGED, FAILING, UNKNOWN OUTLET		30	450	66.66666667	23		$ 15,937.50	13	$ 1,200.00	$ 2,000.00	30
SOUTHBOUND FROM HEALEY RD														
ASSET # INLET	**ASSET # OUTLET**	**ADDRESS**	**CONDITION**	**OPTION**	**LENGTH**	**SIZE - MM**								**HRS TO REPAIR**
		UNDER MCEWEN	UNABLE TO SEE DUE TO WATER; OUTLET HAS 2M EXTENSION AND CONCRETED OVER BOTH PIPES FOR COUPLER		24	900	53	19		$ 12,750.00	11	$ 960.00	$ 1,600.00	24
RR050-0227	RR050-0228	S/O MCEWEN	STORM/CULVERT FAILED BOTTOM		163.73	900	364	0	6000	$ 86,981.56	73	$ 6,549.20	$ 10,915.33	164
RR050-0225	RR050-0226	12596 - TIM'S DRIVETHROUGH	FAILED		10.86	900	24	8		$ 5,769.38	5	$ 434.40	$ 724.00	11
RR050-0229	RR050-0230	HOPCROFT	FAILED		34.85	900	77	27		$ 18,514.06	15	$ 1,394.00	$ 2,323.33	35
RR050-0231	RR050-0232	12550	FAILED		22.14	600	49	17		$ 11,761.88	10	$ 885.60	$ 1,476.00	22
RR050-0233	RR050-0234	12544	FAILED		19.68	900	44	15		$ 10,455.00	9	$ 787.20	$ 1,312.00	20
RR050-0235	RR050-0235	12532	FAILED		43.16	900	96	34		$ 22,928.75	19	$ 1,726.40	$ 2,877.33	43
RR050-0237	RR050-0238	12500	FAILED		26.02	700	58	20		$ 13,823.13	12	$ 1,040.80	$ 1,734.67	26
RR050-0239	RR050-0240	12420	FAILED		23.17	600	51	18		$ 12,309.06	10	$ 926.80	$ 1,544.67	23
RR050-0241	RR050-0242	12388	FAILING		17.93	600	40	14		$ 9,525.31	8	$ 717.20	$ 1,195.33	18
RR050-0247	RR050-0248	GREEN PVC AT NEW ROADWAY (AGROCROP RD??)	NEEDS PROPER CULVERT		30.811	400	68	24		$ 16,368.34	14	$ 1,232.44	$ 2,054.07	31
							1254	312	6000	$ 299,811.47	251	$ 22,574.04	$ 37,623.40	

TOPSOIL	**6000**
GRANULAR "A"	**1254.11**
HL3	**312**
C&G REPAIR	**299811**
SAW CUTTING	**251**
RESTORATION	**$ 22,574.04**
SOIL DISPOSAL	$ 37,623.40

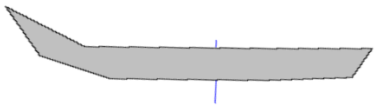
* AVG HOURS FOR REPAIR IS 10 FOR EVERY 9 M

APPENDIX F
HEC-RAS Output

APPENDIX F HEC-RAS OUTPUT

Item 1 – Spilling Extent on Cross-sections

Legend for Spilling Extent Figures

Watercourse	
Cross-section (2223.14 is cross-section ID)	
Spilling extent (Blue) on cross-section (q17.09 is flow value in m^3/s)	
Culvert	

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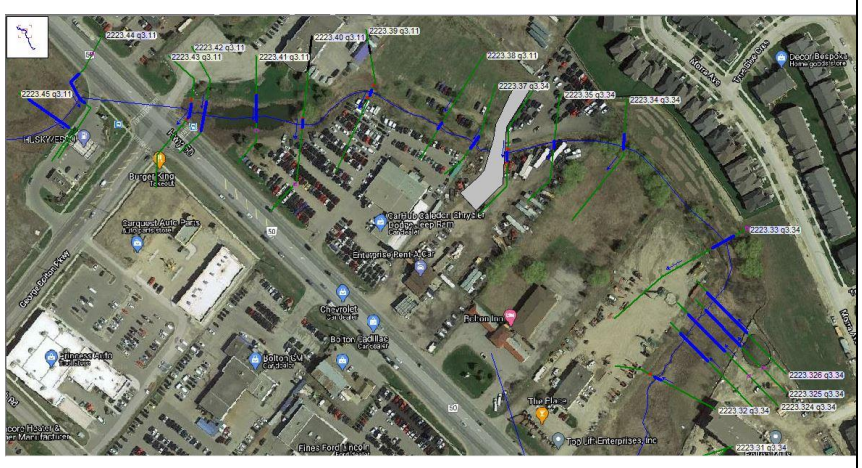
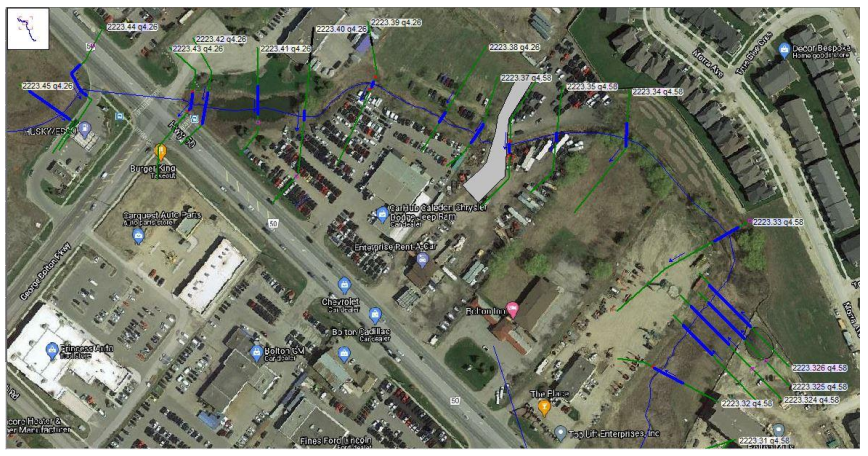
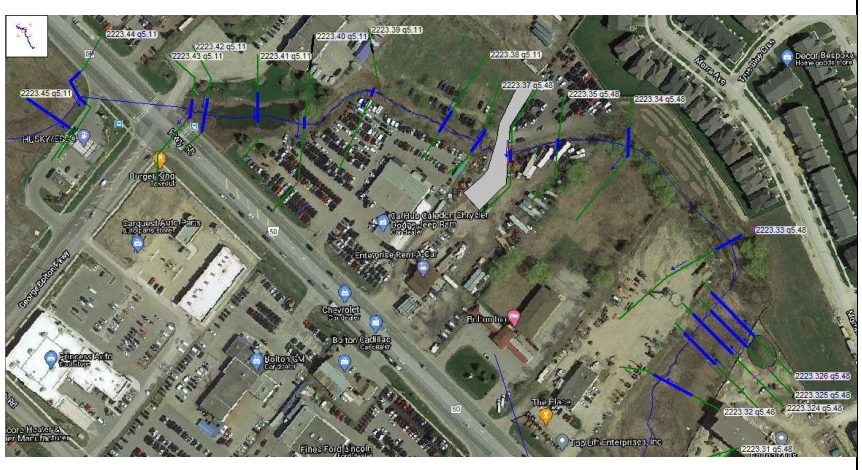
2-Year



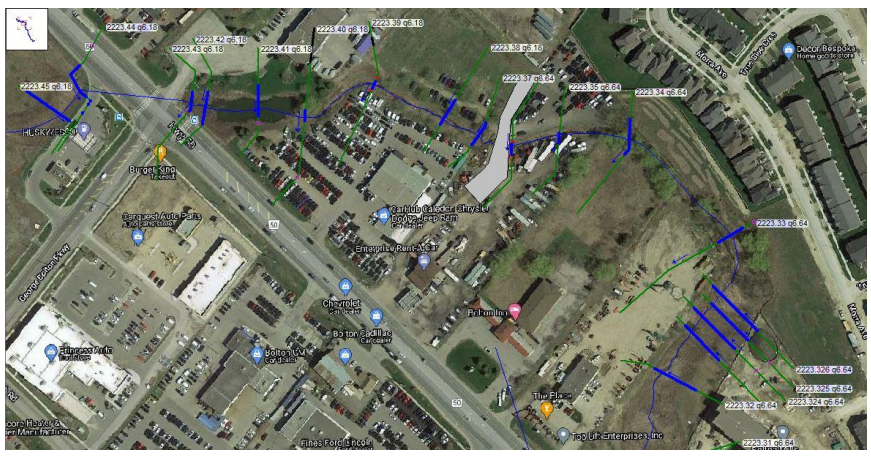
5-Year



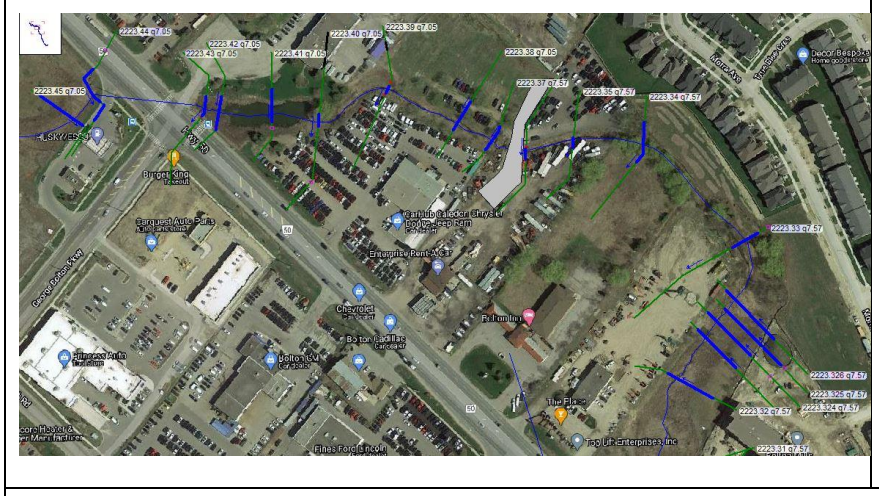
10-Year



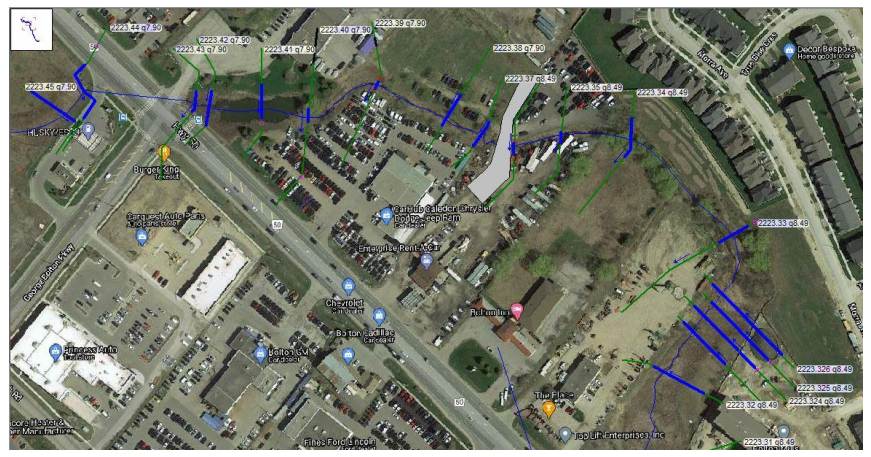
25-Year



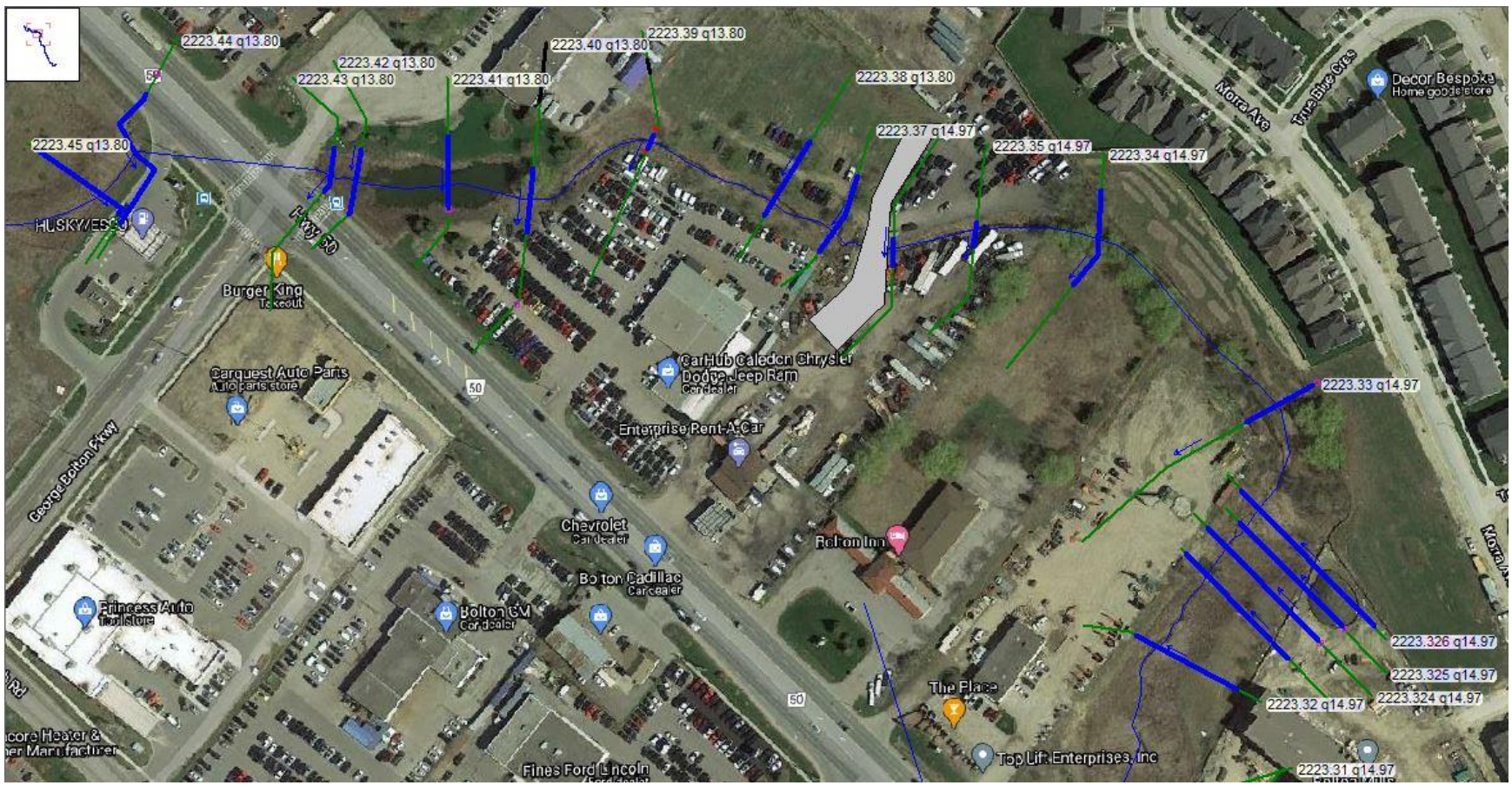
50-Year



100-Year



Regional



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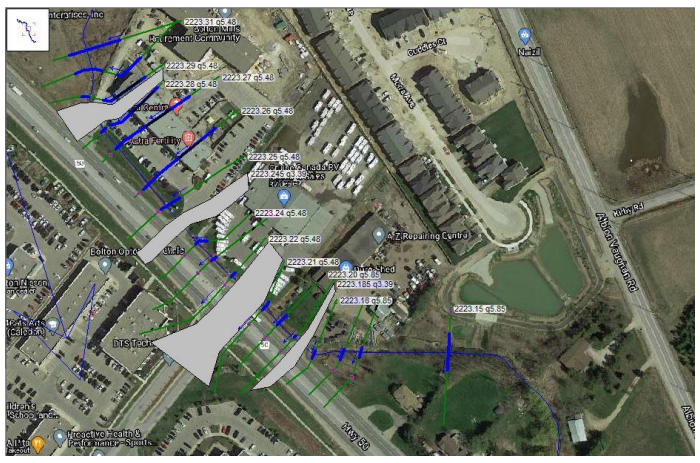
2-Year

5-Year

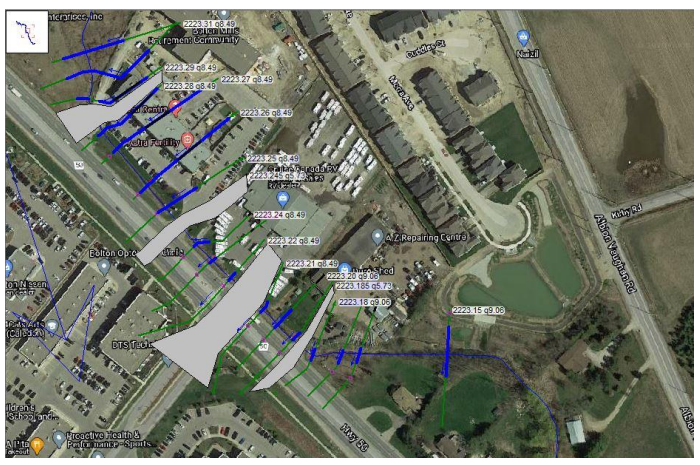
10-Year



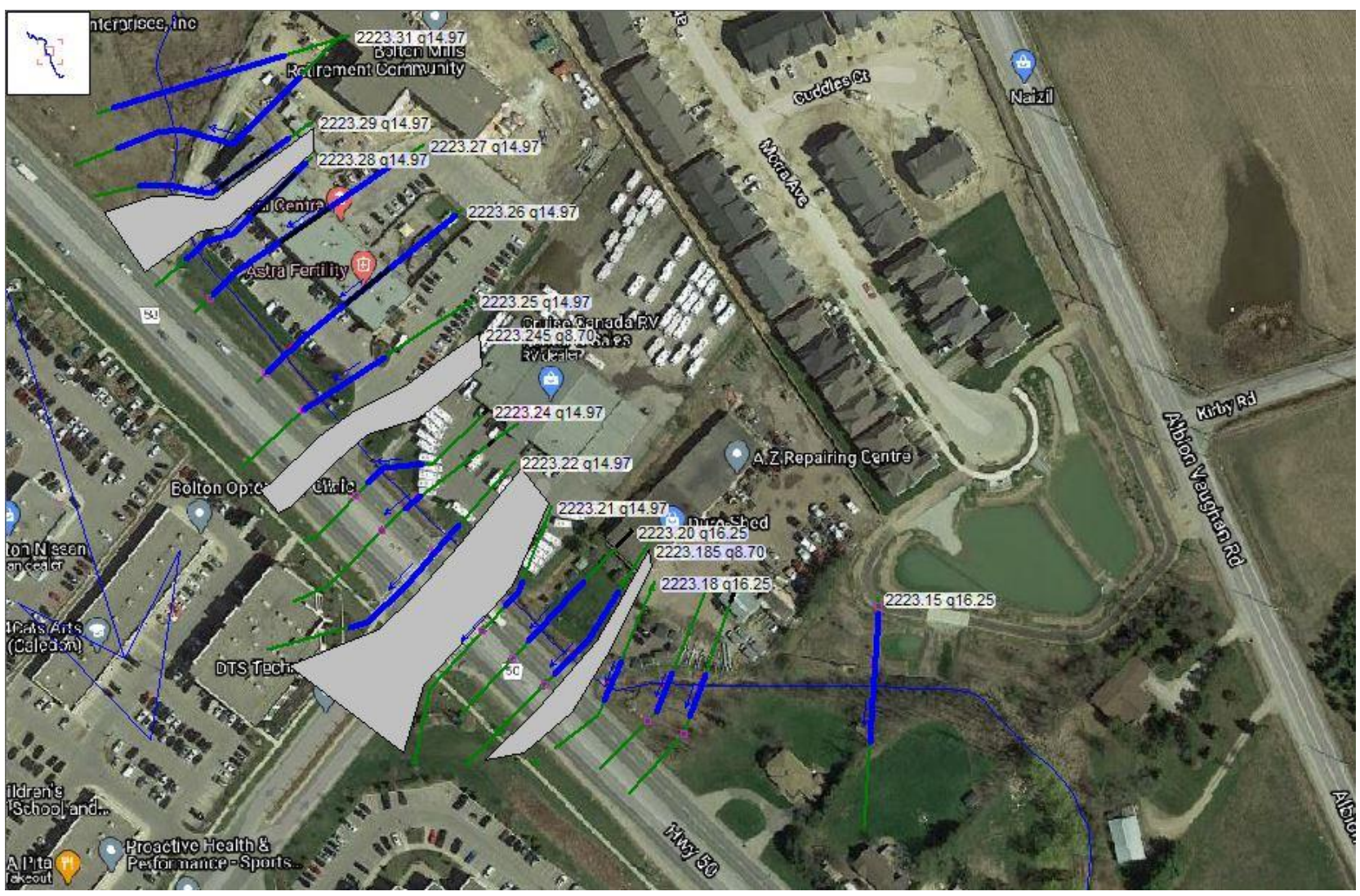
25-Year

50-Year

100-Year



Regional



DRAFT

2-Year

5-Year

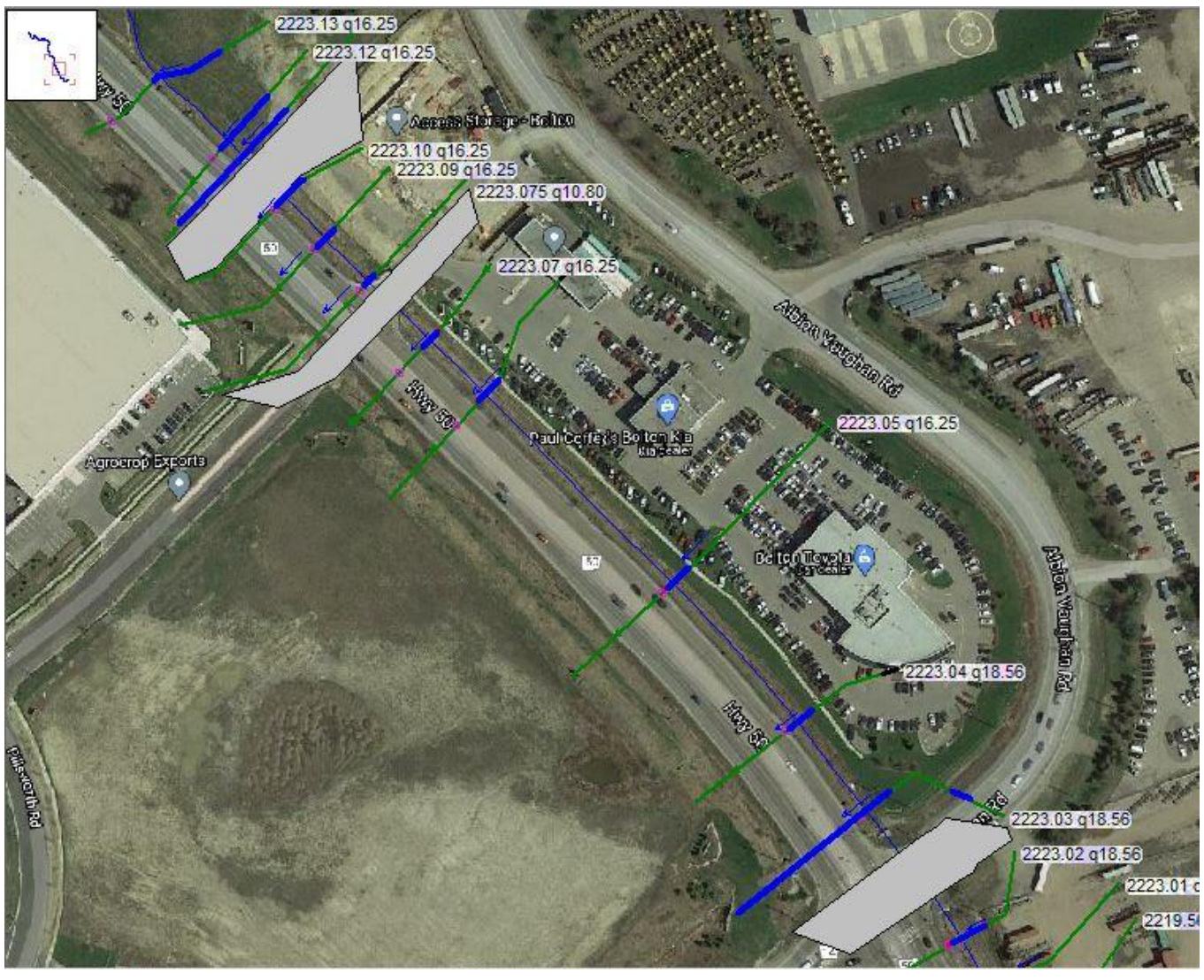
10-Year

25-Year

50-Year

100-Year

Regional



APPENDIX F HEC-RAS OUTPUT

Item 2 – Hydraulic Table of Cross-section

HEC-RAS Plan: Matrix - RR50 Aug 2021 River: CEG_DESIGN Reach: REACH1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
REACH1	2224.08	2-Year	1.98	242.90	243.42	243.29	243.44	0.004498	0.88	2.93	18.18	0.49
REACH1	2224.08	5-Year	2.82	242.90	243.46		243.49	0.004513	0.95	3.78	18.29	0.50
REACH1	2224.08	10-Year	3.39	242.90	243.50		243.53	0.003958	0.93	4.45	18.37	0.48
REACH1	2224.08	25-Year	4.27	242.90	243.55		243.58	0.003331	0.93	5.45	19.68	0.45
REACH1	2224.08	50-Year	5.05	242.90	243.60		243.63	0.002866	0.92	6.37	20.78	0.42
REACH1	2224.08	100-Year	5.73	242.90	243.64		243.67	0.002455	0.90	7.29	22.70	0.40
REACH1	2224.08	Regional	8.70	242.90	243.67	243.56	243.73	0.004438	1.26	7.93	24.02	0.54
REACH1	2224.07	2-Year	1.98	241.78	242.27	242.25	242.42	0.011890	1.75	1.34	4.63	0.85
REACH1	2224.07	5-Year	2.82	241.78	242.39	242.35	242.54	0.009610	1.85	1.94	5.59	0.79
REACH1	2224.07	10-Year	3.39	241.78	242.43	242.41	242.61	0.010802	2.04	2.15	5.89	0.85
REACH1	2224.07	25-Year	4.27	241.78	242.47	242.47	242.71	0.012643	2.32	2.43	6.27	0.93
REACH1	2224.07	50-Year	5.05	241.78	242.51	242.49	242.79	0.014533	2.58	2.67	7.09	1.00
REACH1	2224.07	100-Year	5.73	241.78	242.53	242.49	242.88	0.016907	2.85	2.85	8.47	1.09
REACH1	2224.07	Regional	8.70	241.78	242.82	242.82	242.96	0.005979	2.13	7.93	27.28	0.69
REACH1	2224.06	2-Year	1.98	241.50	241.80	241.77	241.85	0.008355	1.04	2.20	14.08	0.66
REACH1	2224.06	5-Year	2.82	241.50	241.81	241.81	241.90	0.013974	1.38	2.36	14.59	0.86
REACH1	2224.06	10-Year	3.39	241.50	241.84	241.84	241.93	0.013434	1.44	2.74	15.73	0.86
REACH1	2224.06	25-Year	4.27	241.50	241.87	241.87	241.97	0.012895	1.52	3.29	17.25	0.86
REACH1	2224.06	50-Year	5.05	241.50	241.90	241.90	242.00	0.012625	1.58	3.75	18.43	0.86
REACH1	2224.06	100-Year	5.73	241.50	241.92	241.92	242.03	0.012263	1.62	4.16	19.41	0.85
REACH1	2224.06	Regional	8.70	241.50	242.00	242.00	242.12	0.011498	1.78	5.78	22.97	0.85
REACH1	2224.05	2-Year	1.98	241.00	241.54		241.57	0.003806	0.88	5.78	55.74	0.46
REACH1	2224.05	5-Year	2.82	241.00	241.65		241.65	0.001173	0.58	11.85	62.04	0.27
REACH1	2224.05	10-Year	3.39	241.00	241.67		241.68	0.001236	0.61	13.20	63.67	0.28
REACH1	2224.05	25-Year	4.27	241.00	241.70		241.71	0.001231	0.64	15.46	66.84	0.28
REACH1	2224.05	50-Year	5.05	241.00	241.73		241.74	0.001244	0.66	17.24	69.24	0.28
REACH1	2224.05	100-Year	5.73	241.00	241.75		241.76	0.001247	0.68	18.72	70.45	0.28
REACH1	2224.05	Regional	8.70	241.00	241.82		241.83	0.001403	0.77	23.58	74.12	0.31
REACH1	2224.04	2-Year	1.98	240.50	241.56		241.56	0.000003	0.04	52.52	116.35	0.01
REACH1	2224.04	5-Year	2.82	240.50	241.65		241.65	0.000004	0.05	64.00	125.07	0.02
REACH1	2224.04	10-Year	3.39	240.50	241.67		241.67	0.000005	0.06	66.73	127.06	0.02
REACH1	2224.04	25-Year	4.27	240.50	241.71		241.71	0.000007	0.07	71.15	130.21	0.02
REACH1	2224.04	50-Year	5.05	240.50	241.73		241.73	0.000008	0.08	74.56	132.59	0.03
REACH1	2224.04	100-Year	5.73	240.50	241.75		241.75	0.000010	0.09	77.36	134.51	0.03
REACH1	2224.04	Regional	8.70	240.50	241.82		241.82	0.000018	0.13	86.55	140.57	0.04
REACH1	2224.03	2-Year	1.98	240.50	241.56		241.56	0.000002	0.04	60.27	71.69	0.01
REACH1	2224.03	5-Year	2.82	240.50	241.65		241.65	0.000003	0.05	67.12	72.43	0.02
REACH1	2224.03	10-Year	3.39	240.50	241.67		241.67	0.000004	0.06	68.69	72.60	0.02
REACH1	2224.03	25-Year	4.27	240.50	241.71		241.71	0.000006	0.08	71.18	72.87	0.02
REACH1	2224.03	50-Year	5.05	240.50	241.73		241.73	0.000008	0.09	73.19	94.10	0.03
REACH1	2224.03	100-Year	5.73	240.50	241.75		241.75	0.000010	0.10	75.54	131.16	0.03
REACH1	2224.03	Regional	8.70	240.50	241.82		241.82	0.000019	0.14	86.71	182.90	0.04
REACH1	2224.02	2-Year	1.98	240.27	241.53	241.06	241.55	0.002733	0.72	5.02	37.72	0.39
REACH1	2224.02	5-Year	2.82	240.27	241.63	241.45	241.65	0.001557	0.65	9.24	43.57	0.31
REACH1	2224.02	10-Year	3.39	240.27	241.65	241.48	241.67	0.001876	0.73	10.00	44.55	0.34
REACH1	2224.02	25-Year	4.27	240.27	241.68	241.49	241.70	0.002236	0.83	11.30	46.17	0.38
REACH1	2224.02	50-Year	5.05	240.27	241.70	241.56	241.72	0.002573	0.92	12.27	47.33	0.41
REACH1	2224.02	100-Year	5.73	240.27	241.71	241.58	241.74	0.003444	1.07	12.64	55.71	0.47
REACH1	2224.02	Regional	8.70	240.27	241.71	241.65	241.79	0.007943	1.63	12.83	60.26	0.72
REACH1	2224.015		Culvert									
REACH1	2224.01	2-Year	1.98	239.91	240.78	240.78	241.17	0.013871	2.77	0.71	12.20	1.00
REACH1	2224.01	5-Year	2.82	239.91	240.99	240.99	241.48	0.012867	3.12	0.90	70.67	1.01
REACH1	2224.01	10-Year	3.39	239.91	241.23	241.23	241.28	0.010668	1.32	7.69	88.32	0.75
REACH1	2224.01	25-Year	4.27	239.91	241.26	241.26	241.30	0.009672	1.32	9.96	95.46	0.72
REACH1	2224.01	50-Year	5.05	239.91	241.27	241.27	241.32	0.012007	1.49	10.47	96.06	0.81
REACH1	2224.01	100-Year	5.73	239.91	241.27	241.27	241.33	0.012889	1.57	11.29	97.26	0.84
REACH1	2224.01	Regional	8.70	239.91	241.31	241.31	241.38	0.015252	1.82	14.68	101.37	0.93
REACH1	2223.56	2-Year	2.46	239.85	240.63	240.63	240.69	0.007054	1.31	5.93	60.54	0.62
REACH1	2223.56	5-Year	3.50	239.85	240.66	240.66	240.73	0.008519	1.50	7.93	70.32	0.68
REACH1	2223.56	10-Year	4.21	239.85	240.68	240.68	240.74	0.008975	1.57	9.17	71.70	0.71
REACH1	2223.56	25-Year	5.30	239.85	240.70	240.70	240.77	0.009588	1.68	10.87	73.55	0.74
REACH1	2223.56	50-Year	6.27	239.85	240.72	240.72	240.79	0.010353	1.78	12.10	74.87	0.77
REACH1	2223.56	100-Year	7.11	239.85	240.74	240.74	240.80	0.009930	1.78	13.57	75.78	0.76
REACH1	2223.56	Regional	10.80	239.85	240.78	240.78	240.86	0.012542	2.11	16.97	77.18	0.86
REACH1	2223.55	2-Year	2.46	239.56	240.53		240.53	0.000055	0.18	28.81	89.49	0.06
REACH1	2223.55	5-Year	3.50	239.56	240.55		240.55	0.000097	0.25	30.60	90.86	0.09
REACH1	2223.55	10-Year	4.21	239.56	240.56		240.56	0.000130	0.29	31.75	91.75	0.10
REACH1	2223.55	25-Year	5.30	239.56	240.58		240.59	0.000184	0.35	33.53	93.10	0.12
REACH1	2223.55	50-Year	6.27	239.56	240.60		240.60	0.000236	0.40	34.85	94.09	0.14
REACH1	2223.55	100-Year	7.11	239.56	240.61		240.61	0.000284	0.44	35.95	94.91	0.15
REACH1	2223.55	Regional	10.80	239.56	240.65		240.66	0.000514	0.61	40.06	97.90	0.20
REACH1	2223.54	2-Year	2.46	239.55	240.52	240.44	240.53	0.002920	0.62	9.81	104.96	0.39
REACH1	2223.54	5-Year	3.50	239.55	240.53	240.46	240.54	0.003696	0.72	11.50	107.82	0.44

HEC-RAS Plan: Matrix - RR50 Aug 2021 River: CEG_DESIGN Reach: REACH1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
REACH1	2223.54	10-Year	4.21	239.55	240.54	240.48	240.55	0.003961	0.77	12.67	109.74	0.46
REACH1	2223.54	25-Year	5.30	239.55	240.56	240.51	240.57	0.003967	0.80	14.62	112.76	0.46
REACH1	2223.54	50-Year	6.27	239.55	240.57	240.52	240.59	0.004144	0.84	15.96	114.11	0.48
REACH1	2223.54	100-Year	7.11	239.55	240.58	240.53	240.60	0.004210	0.86	17.12	115.25	0.48
REACH1	2223.54	Regional	10.80	239.55	240.62	240.56	240.64	0.004748	0.98	21.21	119.76	0.52
REACH1	2223.535		Culvert									
REACH1	2223.53	2-Year	2.46	239.25	240.35	240.35	240.39	0.017492	1.23	4.77	51.87	0.88
REACH1	2223.53	5-Year	3.50	239.25	240.36	240.36	240.43	0.026762	1.58	5.33	52.65	1.10
REACH1	2223.53	10-Year	4.21	239.25	240.39	240.39	240.44	0.020302	1.49	6.84	55.19	0.98
REACH1	2223.53	25-Year	5.30	239.25	240.40	240.40	240.47	0.022731	1.65	7.83	57.60	1.05
REACH1	2223.53	50-Year	6.27	239.25	240.41	240.41	240.49	0.026366	1.83	8.38	58.20	1.13
REACH1	2223.53	100-Year	7.11	239.25	240.42	240.42	240.51	0.030906	2.00	8.67	58.50	1.23
REACH1	2223.53	Regional	10.80	239.25	240.49	240.49	240.58	0.026290	2.15	13.11	74.68	1.18
REACH1	2223.52	2-Year	2.46	239.15	239.84		239.89	0.007753	1.18	4.15	24.75	0.65
REACH1	2223.52	5-Year	3.50	239.15	239.89		239.95	0.008378	1.35	5.51	28.49	0.69
REACH1	2223.52	10-Year	4.21	239.15	239.96		240.01	0.005720	1.24	7.67	33.78	0.58
REACH1	2223.52	25-Year	5.30	239.15	240.03		240.08	0.004617	1.23	10.20	38.07	0.54
REACH1	2223.52	50-Year	6.27	239.15	240.09		240.13	0.003993	1.22	12.34	40.39	0.51
REACH1	2223.52	100-Year	7.11	239.15	240.14		240.17	0.003491	1.20	14.34	42.44	0.48
REACH1	2223.52	Regional	10.80	239.15	240.31		240.34	0.002624	1.22	22.11	49.67	0.43
REACH1	2223.51	2-Year	2.46	238.75	239.42		239.49	0.004474	1.24	2.60	8.95	0.54
REACH1	2223.51	5-Year	3.50	238.75	239.59		239.64	0.002809	1.17	4.35	12.17	0.45
REACH1	2223.51	10-Year	4.21	238.75	239.58		239.66	0.004353	1.44	4.22	11.98	0.55
REACH1	2223.51	25-Year	5.30	238.75	239.62		239.73	0.005087	1.63	4.83	12.83	0.60
REACH1	2223.51	50-Year	6.27	238.75	239.66		239.79	0.005785	1.79	5.29	13.44	0.65
REACH1	2223.51	100-Year	7.11	238.75	239.67	239.60	239.83	0.006932	1.99	5.45	13.65	0.71
REACH1	2223.51	Regional	10.80	238.75	239.77	239.76	240.01	0.009373	2.50	6.90	15.46	0.85
REACH1	2223.50	2-Year	2.46	238.52	239.44		239.44	0.000088	0.25	22.23	38.65	0.08
REACH1	2223.50	5-Year	3.50	238.52	239.60		239.60	0.000089	0.28	28.62	41.86	0.09
REACH1	2223.50	10-Year	4.21	238.52	239.59		239.60	0.000132	0.34	28.44	41.78	0.11
REACH1	2223.50	25-Year	5.30	238.52	239.65		239.65	0.000170	0.40	30.65	42.87	0.12
REACH1	2223.50	50-Year	6.27	238.52	239.68		239.69	0.000207	0.45	32.32	43.67	0.13
REACH1	2223.50	100-Year	7.11	238.52	239.70		239.71	0.000249	0.50	33.10	44.05	0.15
REACH1	2223.50	Regional	10.80	238.52	239.82		239.83	0.000391	0.66	38.22	46.40	0.19
REACH1	2223.49	2-Year	2.46	238.04	239.41	238.84	239.43	0.001205	0.76	9.00	38.47	0.29
REACH1	2223.49	5-Year	3.50	238.04	239.59	239.05	239.59	0.000617	0.63	15.88	42.52	0.22
REACH1	2223.49	10-Year	4.21	238.04	239.57	239.35	239.59	0.000966	0.78	15.40	42.23	0.27
REACH1	2223.49	25-Year	5.30	238.04	239.62	239.39	239.64	0.001099	0.86	17.53	43.50	0.29
REACH1	2223.49	50-Year	6.27	238.04	239.66	239.42	239.68	0.001230	0.94	19.10	44.42	0.31
REACH1	2223.49	100-Year	7.11	238.04	239.67	239.44	239.69	0.001462	1.03	19.68	44.75	0.34
REACH1	2223.49	Regional	10.80	238.04	239.78	239.51	239.81	0.001897	1.26	24.47	47.41	0.39
REACH1	2223.485		Culvert									
REACH1	2223.48	2-Year	2.46	237.92	238.84	238.84	239.25	0.014988	2.81	0.87	19.40	1.01
REACH1	2223.48	5-Year	3.50	237.92	239.05	239.05	239.56	0.013924	3.17	1.10	22.56	1.01
REACH1	2223.48	10-Year	4.21	237.92	239.29	239.29	239.38	0.009684	1.63	4.89	28.59	0.75
REACH1	2223.48	25-Year	5.30	237.92	239.32	239.32	239.42	0.010260	1.75	5.80	29.39	0.78
REACH1	2223.48	50-Year	6.27	237.92	239.36	239.36	239.45	0.009149	1.73	6.94	30.37	0.74
REACH1	2223.48	100-Year	7.11	237.92	239.36	239.36	239.48	0.010943	1.90	7.13	30.53	0.81
REACH1	2223.48	Regional	10.80	237.92	239.45	239.45	239.58	0.010451	2.05	9.88	32.75	0.81
REACH1	2223.47	2-Year	2.46	237.80	238.51		238.51	0.000225	0.22	11.32	31.31	0.12
REACH1	2223.47	5-Year	3.50	237.80	238.55		238.56	0.000318	0.28	12.65	31.50	0.14
REACH1	2223.47	10-Year	4.21	237.80	238.59		238.59	0.000361	0.31	13.62	31.64	0.15
REACH1	2223.47	25-Year	5.30	237.80	238.63		238.63	0.000429	0.36	14.89	31.82	0.17
REACH1	2223.47	50-Year	6.27	237.80	238.65		238.66	0.000496	0.40	15.79	31.95	0.18
REACH1	2223.47	100-Year	7.11	237.80	238.68		238.69	0.000542	0.43	16.61	32.07	0.19
REACH1	2223.47	Regional	10.80	237.80	238.83		238.84	0.000553	0.50	21.40	32.74	0.20
REACH1	2223.46	2-Year	2.46	237.57	238.51		238.51	0.000055	0.20	26.92	43.66	0.07
REACH1	2223.46	5-Year	3.50	237.57	238.54		238.55	0.000094	0.27	28.59	44.14	0.09
REACH1	2223.46	10-Year	4.21	237.57	238.57		238.57	0.000121	0.31	29.84	44.50	0.10
REACH1	2223.46	25-Year	5.30	237.57	238.61		238.61	0.000165	0.37	31.44	44.95	0.12
REACH1	2223.46	50-Year	6.27	237.57	238.63		238.64	0.000209	0.42	32.54	45.25	0.13
REACH1	2223.46	100-Year	7.11	237.57	238.65		238.66	0.000247	0.47	33.54	45.53	0.14
REACH1	2223.46	Regional	10.80	237.57	238.80		238.80	0.000339	0.60	40.15	47.31	0.17
REACH1	2223.45	2-Year	3.11	237.00	238.50		238.50	0.000064	0.29	29.54	34.04	0.08
REACH1	2223.45	5-Year	4.26	237.00	238.54		238.54	0.000109	0.38	30.76	34.88	0.10
REACH1	2223.45	10-Year	5.11	237.00	238.56		238.57	0.000146	0.45	31.67	35.47	0.12
REACH1	2223.45	25-Year	6.18	237.00	238.60		238.60	0.000194	0.53	32.85	36.13	0.13
REACH1	2223.45	50-Year	7.05	237.00	238.62		238.62	0.000237	0.59	33.63	36.57	0.15
REACH1	2223.45	100-Year	7.90	237.00	238.64		238.64	0.000282	0.65	34.35	36.96	0.16
REACH1	2223.45	Regional	13.80	237.00	238.76		238.77	0.000616	1.00	39.17	43.30	0.24
REACH1	2223.44	2-Year	3.11	236.30	238.50		238.50	0.000030	0.19	26.51	26.55	0.05
REACH1	2223.44	5-Year	4.26	236.30	238.54		238.54	0.000052	0.25	27.45	27.53	0.07

HEC-RAS Plan: Matrix - RR50 Aug 2021 River: CEG_DESIGN Reach: REACH1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
REACH1	2223.44	10-Year	5.11	236.30	238.56		238.56	0.000071	0.30	28.16	28.25	0.08
REACH1	2223.44	25-Year	6.18	236.30	238.59		238.60	0.000096	0.35	29.09	31.27	0.09
REACH1	2223.44	50-Year	7.05	236.30	238.61		238.62	0.000118	0.39	29.90	42.90	0.10
REACH1	2223.44	100-Year	7.90	236.30	238.63		238.64	0.000142	0.43	30.76	46.48	0.11
REACH1	2223.44	Regional	13.80	236.30	238.75		238.77	0.000304	0.66	37.38	65.05	0.16
REACH1	2223.43 C1	2-Year	3.11	236.13	236.78		236.85	0.009824	1.13	2.74	10.59	0.71
REACH1	2223.43 C1	5-Year	4.26	236.13	236.89		236.95	0.006413	1.07	3.98	12.21	0.60
REACH1	2223.43 C1	10-Year	5.11	236.13	236.96		237.02	0.005150	1.05	4.86	13.00	0.55
REACH1	2223.43 C1	25-Year	6.18	236.13	237.04		237.10	0.004083	1.04	5.94	13.94	0.50
REACH1	2223.43 C1	50-Year	7.05	236.13	237.10		237.16	0.003497	1.04	6.80	14.45	0.47
REACH1	2223.43 C1	100-Year	7.90	236.13	237.16		237.21	0.003110	1.05	7.62	14.92	0.45
REACH1	2223.43 C1	Regional	13.80	236.13	237.47		237.54	0.002051	1.14	12.72	17.71	0.40
REACH1	2223.42	2-Year	3.11	236.07	236.80		236.81	0.000314	0.32	9.95	21.37	0.14
REACH1	2223.42	5-Year	4.26	236.07	236.91		236.91	0.000314	0.37	12.24	22.19	0.15
REACH1	2223.42	10-Year	5.11	236.07	236.98		236.98	0.000316	0.39	13.78	22.67	0.15
REACH1	2223.42	25-Year	6.18	236.07	237.06		237.07	0.000318	0.43	15.61	23.19	0.16
REACH1	2223.42	50-Year	7.05	236.07	237.12		237.13	0.000320	0.45	17.02	23.62	0.16
REACH1	2223.42	100-Year	7.90	236.07	237.17		237.18	0.000322	0.47	18.34	24.00	0.16
REACH1	2223.42	Regional	13.80	236.07	237.49		237.50	0.000345	0.60	26.26	26.46	0.17
REACH1	2223.41	2-Year	3.11	236.00	236.80	236.13	236.80	0.000059	0.18	17.33	23.18	0.07
REACH1	2223.41	5-Year	4.26	236.00	236.91	236.16	236.91	0.000071	0.22	19.84	24.38	0.07
REACH1	2223.41	10-Year	5.11	236.00	236.98	236.18	236.98	0.000079	0.24	21.54	25.17	0.08
REACH1	2223.41	25-Year	6.18	236.00	237.05	236.21	237.06	0.000088	0.27	23.59	26.56	0.08
REACH1	2223.41	50-Year	7.05	236.00	237.11	236.23	237.12	0.000094	0.29	25.23	27.78	0.09
REACH1	2223.41	100-Year	7.90	236.00	237.17	236.25	237.18	0.000100	0.30	26.81	28.92	0.09
REACH1	2223.41	Regional	13.80	236.00	237.49	236.36	237.49	0.000130	0.41	36.96	35.36	0.11
REACH1	2223.40	2-Year	3.11	236.00	236.63	236.63	236.78	0.018419	1.74	1.79	5.77	1.00
REACH1	2223.40	5-Year	4.26	236.00	236.71	236.71	236.88	0.017670	1.85	2.30	6.73	1.00
REACH1	2223.40	10-Year	5.11	236.00	236.76	236.76	236.95	0.016685	1.94	2.65	7.30	0.99
REACH1	2223.40	25-Year	6.18	236.00	236.81	236.81	237.03	0.015769	2.05	3.08	7.94	0.98
REACH1	2223.40	50-Year	7.05	236.00	236.85	236.85	237.09	0.015295	2.14	3.40	8.40	0.98
REACH1	2223.40	100-Year	7.90	236.00	236.89	236.89	237.14	0.014789	2.21	3.74	8.84	0.98
REACH1	2223.40	Regional	13.80	236.00	237.18	237.18	237.46	0.009447	2.37	7.75	25.29	0.84
REACH1	2223.39	2-Year	3.11	234.75	235.59		235.66	0.003323	1.12	2.78	4.43	0.45
REACH1	2223.39	5-Year	4.26	234.75	235.68		235.77	0.004372	1.35	3.16	4.65	0.52
REACH1	2223.39	10-Year	5.11	234.75	235.80		235.90	0.003899	1.36	3.76	4.98	0.50
REACH1	2223.39	25-Year	6.18	234.75	235.89		236.00	0.004132	1.46	4.23	5.22	0.52
REACH1	2223.39	50-Year	7.05	234.75	235.96		236.08	0.004388	1.55	4.56	5.38	0.54
REACH1	2223.39	100-Year	7.90	234.75	236.00		236.14	0.004731	1.64	4.82	5.52	0.56
REACH1	2223.39	Regional	13.80	234.75	236.23		236.49	0.007723	2.24	6.17	6.37	0.73
REACH1	2223.38	2-Year	3.11	234.50	235.11	235.11	235.30	0.016960	1.92	1.67	5.13	0.98
REACH1	2223.38	5-Year	4.26	234.50	235.51		235.58	0.002635	1.21	4.42	8.66	0.44
REACH1	2223.38	10-Year	5.11	234.50	235.68		235.75	0.001873	1.16	6.41	16.01	0.38
REACH1	2223.38	25-Year	6.18	234.50	235.78		235.85	0.001827	1.23	8.19	20.34	0.38
REACH1	2223.38	50-Year	7.05	234.50	235.85		235.92	0.001823	1.28	9.61	23.24	0.39
REACH1	2223.38	100-Year	7.90	234.50	235.89		235.97	0.001899	1.34	10.76	25.32	0.40
REACH1	2223.38	Regional	13.80	234.50	236.12		236.23	0.002462	1.71	17.49	34.32	0.46
REACH1	2223.37	2-Year	3.34	233.51	235.07	234.28	235.10	0.000631	0.74	4.49	10.92	0.21
REACH1	2223.37	5-Year	4.58	233.51	235.53	234.38	235.54	0.000201	0.49	13.35	15.89	0.13
REACH1	2223.37	10-Year	5.48	233.51	235.70	234.45	235.71	0.000190	0.51	16.15	17.63	0.13
REACH1	2223.37	25-Year	6.64	233.51	235.79	234.54	235.81	0.000223	0.58	17.92	18.68	0.14
REACH1	2223.37	50-Year	7.57	233.51	235.86	234.60	235.88	0.000250	0.63	19.15	19.40	0.15
REACH1	2223.37	100-Year	8.49	233.51	235.91	234.66	235.93	0.000284	0.68	20.07	19.94	0.16
REACH1	2223.37	Regional	14.97	233.51	236.12	235.04	236.17	0.000617	1.08	25.61	34.10	0.24
REACH1	2223.365 C2		Culvert									
REACH1	2223.36	2-Year	3.34	233.69	234.41	234.30	234.55	0.007386	1.66	2.01	6.31	0.70
REACH1	2223.36	5-Year	4.58	233.69	234.53	234.40	234.71	0.007499	1.89	2.42	6.98	0.73
REACH1	2223.36	10-Year	5.48	233.69	234.58	234.47	234.80	0.008426	2.10	2.61	7.22	0.78
REACH1	2223.36	25-Year	6.64	233.69	234.64	234.56	234.92	0.009605	2.36	2.81	7.50	0.85
REACH1	2223.36	50-Year	7.57	233.69	234.68	234.62	235.01	0.010323	2.54	2.98	7.72	0.89
REACH1	2223.36	100-Year	8.49	233.69	234.73	234.68	235.10	0.010965	2.71	3.13	7.93	0.92
REACH1	2223.36	Regional	14.97	233.69	235.07	235.07	235.67	0.011519	3.45	4.34	10.65	1.00
REACH1	2223.35	2-Year	3.34	233.50	234.07	234.04	234.22	0.013153	1.72	1.96	5.49	0.88
REACH1	2223.35	5-Year	4.58	233.50	234.13	234.13	234.34	0.015973	2.06	2.27	5.86	0.99
REACH1	2223.35	10-Year	5.48	233.50	234.18	234.18	234.43	0.015279	2.18	2.61	6.24	0.99
REACH1	2223.35	25-Year	6.64	233.50	234.25	234.25	234.52	0.014301	2.31	3.06	6.71	0.98
REACH1	2223.35	50-Year	7.57	233.50	234.31	234.31	234.59	0.013750	2.40	3.42	7.07	0.97
REACH1	2223.35	100-Year	8.49	233.50	234.35	234.35	234.66	0.013315	2.48	3.77	7.39	0.97
REACH1	2223.35	Regional	14.97	233.50	234.65	234.65	235.06	0.011140	2.91	6.29	9.35	0.94
REACH1	2223.34	2-Year	3.34	233.00	233.48	233.45	233.59	0.012328	1.56	2.64	10.76	0.84
REACH1	2223.34	5-Year	4.58	233.00	233.57	233.52	233.69	0.010139	1.64	3.82	16.17	0.79
REACH1	2223.34	10-Year	5.48	233.00	233.62	233.58	233.75	0.009126	1.69	4.83	20.24	0.77
REACH1	2223.34	25-Year	6.64	233.00	233.70	233.64	233.82	0.007259	1.66	6.67	25.88	0.70

HEC-RAS Plan: Matrix - RR50 Aug 2021 River: CEG_DESIGN Reach: REACH1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
REACH1	2223.34	50-Year	7.57	233.00	233.75	233.68	233.86	0.006829	1.69	7.89	28.94	0.69
REACH1	2223.34	100-Year	8.49	233.00	233.74	233.72	233.89	0.009315	1.95	7.57	28.16	0.80
REACH1	2223.34	Regional	14.97	233.00	233.92	233.90	234.10	0.008986	2.28	13.74	40.46	0.82
REACH1	2223.33	2-Year	3.34	232.50	233.11		233.14	0.002235	0.72	5.07	17.64	0.37
REACH1	2223.33	5-Year	4.58	232.50	233.16		233.20	0.002772	0.87	5.97	18.87	0.42
REACH1	2223.33	10-Year	5.48	232.50	233.19		233.24	0.003159	0.97	6.54	19.59	0.45
REACH1	2223.33	25-Year	6.64	232.50	233.20		233.27	0.004321	1.15	6.72	19.82	0.53
REACH1	2223.33	50-Year	7.57	232.50	233.22		233.30	0.004812	1.25	7.15	20.33	0.56
REACH1	2223.33	100-Year	8.49	232.50	233.33		233.39	0.002962	1.11	9.53	23.01	0.45
REACH1	2223.33	Regional	14.97	232.50	233.63		233.70	0.002061	1.21	17.53	30.07	0.41
REACH1	2223.326	2-Year	3.34	232.03	232.63	232.63	232.69	0.008943	1.50	6.07	39.43	0.72
REACH1	2223.326	5-Year	4.58	232.03	232.70		232.74	0.006617	1.42	8.86	40.77	0.63
REACH1	2223.326	10-Year	5.48	232.03	232.75		232.79	0.005291	1.35	11.02	41.75	0.57
REACH1	2223.326	25-Year	6.64	232.03	232.88		232.90	0.002418	1.05	16.73	43.99	0.40
REACH1	2223.326	50-Year	7.57	232.03	233.05		233.06	0.001038	0.80	24.56	46.86	0.27
REACH1	2223.326	100-Year	8.49	232.03	233.23		233.24	0.000688	0.74	34.28	67.74	0.23
REACH1	2223.326	Regional	14.97	232.03	233.59		233.59	0.000422	0.70	60.19	74.88	0.19
REACH1	2223.325	2-Year	3.34	232.00	232.62	232.48	232.64	0.001881	0.66	9.82	38.35	0.33
REACH1	2223.325	5-Year	4.58	232.00	232.69	232.52	232.70	0.001871	0.73	12.26	38.60	0.34
REACH1	2223.325	10-Year	5.48	232.00	232.74	232.54	232.75	0.001741	0.75	14.18	38.81	0.34
REACH1	2223.325	25-Year	6.64	232.00	232.87	232.57	232.89	0.000983	0.66	19.48	39.36	0.26
REACH1	2223.325	50-Year	7.57	232.00	233.05	232.59	233.06	0.000496	0.55	27.28	58.72	0.19
REACH1	2223.325	100-Year	8.49	232.00	233.23	232.60	233.23	0.000322	0.51	38.02	61.26	0.16
REACH1	2223.325	Regional	14.97	232.00	233.58	232.71	233.59	0.000256	0.55	60.20	63.04	0.15
REACH1	2223.324	2-Year	3.34	231.99	232.60	232.48	232.61	0.003095	0.98	9.43	36.12	0.44
REACH1	2223.324	5-Year	4.58	231.99	232.66	232.53	232.68	0.003070	1.06	11.78	37.13	0.45
REACH1	2223.324	10-Year	5.48	231.99	232.71	232.55	232.73	0.002796	1.07	13.76	37.95	0.43
REACH1	2223.324	25-Year	6.64	231.99	232.86	232.57	232.87	0.001449	0.89	19.53	39.72	0.32
REACH1	2223.324	50-Year	7.57	231.99	233.04	232.59	233.05	0.000716	0.72	26.93	41.63	0.23
REACH1	2223.324	100-Year	8.49	231.99	233.22	232.61	233.23	0.000417	0.61	34.86	56.76	0.18
REACH1	2223.324	Regional	14.97	231.99	233.58	232.71	233.59	0.000425	0.74	56.09	61.27	0.19
REACH1	2223.323	2-Year	3.34	231.98	232.56		232.59	0.002562	0.88	7.27	28.79	0.41
REACH1	2223.323	5-Year	4.58	231.98	232.61		232.65	0.002939	1.01	8.91	30.21	0.44
REACH1	2223.323	10-Year	5.48	231.98	232.67		232.70	0.002751	1.04	10.58	31.57	0.43
REACH1	2223.323	25-Year	6.64	231.98	232.84		232.86	0.001332	0.86	16.29	35.51	0.32
REACH1	2223.323	50-Year	7.57	231.98	233.03		233.04	0.000653	0.70	23.54	39.39	0.23
REACH1	2223.323	100-Year	8.49	231.98	233.21		233.22	0.000390	0.61	31.16	43.31	0.18
REACH1	2223.323	Regional	14.97	231.98	233.57		233.58	0.000385	0.73	48.63	59.07	0.19
REACH1	2223.32	2-Year	3.34	231.67	232.21	232.21	232.39	0.018616	1.85	1.80	5.40	1.01
REACH1	2223.32	5-Year	4.58	231.67	232.40	232.35	232.49	0.007998	1.36	4.81	22.57	0.69
REACH1	2223.32	10-Year	5.48	231.67	232.57		232.61	0.002781	0.97	9.27	29.21	0.43
REACH1	2223.32	25-Year	6.64	231.67	232.80		232.82	0.000927	0.71	16.40	32.47	0.26
REACH1	2223.32	50-Year	7.57	231.67	233.01		233.02	0.000453	0.59	23.57	35.47	0.19
REACH1	2223.32	100-Year	8.49	231.67	233.20		233.21	0.000282	0.52	30.63	38.55	0.15
REACH1	2223.32	Regional	14.97	231.67	233.56		233.57	0.000312	0.65	45.22	44.38	0.17
REACH1	2223.31	2-Year	3.34	231.51	232.24		232.24	0.000265	0.30	12.68	30.53	0.13
REACH1	2223.31	5-Year	4.58	231.51	232.42		232.43	0.000170	0.29	18.66	33.99	0.11
REACH1	2223.31	10-Year	5.48	231.51	232.57		232.57	0.000123	0.28	23.85	36.08	0.10
REACH1	2223.31	25-Year	6.64	231.51	232.80		232.80	0.000077	0.26	32.35	38.28	0.08
REACH1	2223.31	50-Year	7.57	231.51	233.01		233.01	0.000053	0.24	40.67	40.33	0.07
REACH1	2223.31	100-Year	8.49	231.51	233.20		233.20	0.000041	0.24	48.69	43.44	0.06
REACH1	2223.31	Regional	14.97	231.51	233.56		233.56	0.000055	0.32	67.78	62.34	0.07
REACH1	2223.30	2-Year	3.34	231.50	232.20	231.96	232.23	0.002103	0.97	6.27	28.25	0.39
REACH1	2223.30	5-Year	4.58	231.50	232.39	232.04	232.42	0.001365	0.93	9.36	34.12	0.33
REACH1	2223.30	10-Year	5.48	231.50	232.54	232.08	232.57	0.001005	0.89	12.06	39.10	0.29
REACH1	2223.30	25-Year	6.64	231.50	232.78	232.13	232.80	0.000642	0.82	16.87	50.82	0.24
REACH1	2223.30	50-Year	7.57	231.50	233.01	232.17	233.01	0.000153	0.45	42.27	58.71	0.12
REACH1	2223.30	100-Year	8.49	231.50	233.20	232.20	233.20	0.000091	0.38	54.00	63.01	0.09
REACH1	2223.30	Regional	14.97	231.50	233.55	232.41	233.56	0.000093	0.43	77.74	71.77	0.10
REACH1	2223.29	2-Year	3.34	231.18	232.05	231.80	232.15	0.005815	1.40	2.38	13.06	0.56
REACH1	2223.29	5-Year	4.58	231.18	232.24	231.93	232.35	0.004537	1.48	3.15	15.10	0.52
REACH1	2223.29	10-Year	5.48	231.18	232.40	232.01	232.51	0.003600	1.48	3.81	17.02	0.47
REACH1	2223.29	25-Year	6.64	231.18	232.65	232.10	232.75	0.002457	1.42	4.85	19.44	0.41
REACH1	2223.29	50-Year	7.57	231.18	232.89	232.16	232.98	0.001762	1.35	5.87	21.47	0.35
REACH1	2223.29	100-Year	8.49	231.18	233.09	232.23	233.17	0.001435	1.32	6.76	24.14	0.33
REACH1	2223.29	Regional	14.97	231.18	233.41	232.59	233.52	0.001702	1.62	14.77	35.64	0.37
REACH1	2223.285 C3		Culvert									
REACH1	2223.28	2-Year	3.34	231.14	231.82	231.74	231.99	0.012304	1.81	1.84	16.88	0.81
REACH1	2223.28	5-Year	4.58	231.14	231.87	231.87	232.13	0.018296	2.26	2.02	19.11	1.00
REACH1	2223.28	10-Year	5.48	231.14	232.02	231.94	232.24	0.011719	2.05	2.67	27.52	0.83
REACH1	2223.28	25-Year	6.64	231.14	232.31	232.02	232.45	0.005176	1.67	3.98	31.14	0.58
REACH1	2223.28	50-Year	7.57	231.14	232.55	232.09	232.66	0.002884	1.48	5.16	32.57	0.45
REACH1	2223.28	100-Year	8.49	231.14	232.71	232.15	232.82	0.002301	1.44	5.93	33.30	0.41

HEC-RAS Plan: Matrix - RR50 Aug 2021 River: CEG_DESIGN Reach: REACH1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
REACH1	2223.28	Regional	14.97	231.14	232.98	232.48	233.20	0.003734	2.09	7.22	34.56	0.54
REACH1	2223.27	2-Year	3.34	231.10	231.71	231.71	231.79	0.008203	1.45	3.19	19.90	0.70
REACH1	2223.27	5-Year	4.58	231.10	231.91	231.75	231.93	0.001221	0.72	8.12	37.32	0.29
REACH1	2223.27	10-Year	5.48	231.10	232.11	231.78	232.12	0.000357	0.47	13.37	42.37	0.16
REACH1	2223.27	25-Year	6.64	231.10	232.37	231.81	232.38	0.000133	0.34	20.48	47.97	0.10
REACH1	2223.27	50-Year	7.57	231.10	232.60	231.83	232.61	0.000073	0.29	26.88	52.30	0.08
REACH1	2223.27	100-Year	8.49	231.10	232.76	231.85	232.76	0.000057	0.27	31.29	55.05	0.07
REACH1	2223.27	Regional	14.97	231.10	233.08	231.94	233.09	0.000077	0.36	43.21	62.48	0.09
REACH1	2223.26	2-Year	3.34	230.74	231.59	231.28	231.63	0.002213	0.91	4.12	20.22	0.38
REACH1	2223.26	5-Year	4.58	230.74	231.90	231.37	231.91	0.000308	0.45	13.31	41.76	0.15
REACH1	2223.26	10-Year	5.48	230.74	232.11	231.44	232.11	0.000128	0.33	20.10	46.22	0.10
REACH1	2223.26	25-Year	6.64	230.74	232.37	231.51	232.37	0.000060	0.26	29.08	52.50	0.07
REACH1	2223.26	50-Year	7.57	230.74	232.60	231.66	232.61	0.000036	0.23	37.13	58.07	0.06
REACH1	2223.26	100-Year	8.49	230.74	232.76	231.70	232.76	0.000029	0.22	42.67	61.14	0.05
REACH1	2223.26	Regional	14.97	230.74	233.08	231.82	233.09	0.000043	0.29	56.76	66.81	0.07
REACH1	2223.25	2-Year	3.34	230.50	231.56	231.03	231.60	0.001112	0.86	3.91	7.82	0.29
REACH1	2223.25	5-Year	4.58	230.50	231.85	231.13	231.89	0.000842	0.89	5.13	11.15	0.26
REACH1	2223.25	10-Year	5.48	230.50	232.05	231.20	232.10	0.000719	0.91	5.99	14.09	0.25
REACH1	2223.25	25-Year	6.64	230.50	232.32	231.28	232.36	0.000597	0.93	7.11	20.08	0.23
REACH1	2223.25	50-Year	7.57	230.50	232.59	231.33	232.60	0.000294	0.55	21.01	28.53	0.13
REACH1	2223.25	100-Year	8.49	230.50	232.75	231.39	232.76	0.000226	0.51	25.61	28.89	0.12
REACH1	2223.25	Regional	14.97	230.50	233.07	231.73	233.08	0.000299	0.65	34.96	30.35	0.14
REACH1	2223.245 C4		Culvert									
REACH1	2223.24	2-Year	3.34	230.20	231.24	230.75	231.29	0.002046	0.98	3.40	6.73	0.35
REACH1	2223.24	5-Year	4.58	230.20	231.40	230.87	231.46	0.002097	1.12	4.08	8.36	0.37
REACH1	2223.24	10-Year	5.48	230.20	231.49	230.95	231.57	0.002194	1.22	4.49	9.28	0.38
REACH1	2223.24	25-Year	6.64	230.20	231.59	231.04	231.68	0.002392	1.35	4.91	10.23	0.40
REACH1	2223.24	50-Year	7.57	230.20	231.68	231.11	231.79	0.002403	1.43	5.30	11.13	0.41
REACH1	2223.24	100-Year	8.49	230.20	231.78	231.18	231.90	0.002333	1.48	5.73	12.09	0.41
REACH1	2223.24	Regional	14.97	230.20	232.28	231.52	232.33	0.001035	1.10	16.62	22.35	0.29
REACH1	2223.23	2-Year	3.34	230.20	231.11	230.86	231.22	0.006357	1.48	2.26	3.48	0.59
REACH1	2223.23	5-Year	4.58	230.20	231.25	231.00	231.39	0.007031	1.63	2.81	4.08	0.63
REACH1	2223.23	10-Year	5.48	230.20	231.34	231.09	231.49	0.007398	1.73	3.17	4.43	0.65
REACH1	2223.23	25-Year	6.64	230.20	231.41	231.19	231.59	0.008247	1.88	3.54	4.76	0.70
REACH1	2223.23	50-Year	7.57	230.20	231.54	231.27	231.71	0.006840	1.82	4.16	5.26	0.64
REACH1	2223.23	100-Year	8.49	230.20	231.68	231.34	231.83	0.005113	1.75	4.91	5.77	0.57
REACH1	2223.23	Regional	14.97	230.20	231.96	231.69	232.24	0.006409	2.33	6.73	6.88	0.67
REACH1	2223.22	2-Year	3.34	230.20	230.81	230.81	231.06	0.009991	2.24	1.49	2.90	1.00
REACH1	2223.22	5-Year	4.58	230.20	230.96	230.96	231.23	0.009493	2.29	2.00	3.79	1.00
REACH1	2223.22	10-Year	5.48	230.20	231.04	231.04	231.33	0.009092	2.40	2.29	4.22	1.00
REACH1	2223.22	25-Year	6.64	230.20	231.26	231.12	231.49	0.004481	2.09	3.20	5.28	0.74
REACH1	2223.22	50-Year	7.57	230.20	231.43	231.18	231.63	0.003139	1.98	3.86	5.97	0.64
REACH1	2223.22	100-Year	8.49	230.20	231.58	231.24	231.77	0.002415	1.91	4.47	7.00	0.57
REACH1	2223.22	Regional	14.97	230.20	231.98	231.98	232.15	0.001857	2.00	13.16	53.46	0.53
REACH1	2223.215 C5		Culvert									
REACH1	2223.21	2-Year	3.34	230.00	230.62	230.51	230.74	0.003953	1.58	2.11	5.80	0.70
REACH1	2223.21	5-Year	4.58	230.00	230.76	230.60	230.91	0.003256	1.70	2.70	6.83	0.66
REACH1	2223.21	10-Year	5.48	230.00	230.88	230.67	231.03	0.002706	1.72	3.18	7.58	0.62
REACH1	2223.21	25-Year	6.64	230.00	231.02	230.75	231.18	0.002329	1.78	3.73	8.46	0.59
REACH1	2223.21	50-Year	7.57	230.00	231.11	230.80	231.29	0.002168	1.84	4.12	9.17	0.58
REACH1	2223.21	100-Year	8.49	230.00	231.21	230.86	231.39	0.002052	1.89	4.49	9.82	0.57
REACH1	2223.21	Regional	14.97	230.00	231.38	231.21	231.80	0.003954	2.89	5.19	11.05	0.81
REACH1	2223.20	2-Year	3.57	229.70	230.55	230.44	230.65	0.007848	1.38	2.59	6.45	0.68
REACH1	2223.20	5-Year	4.89	229.70	230.74	230.53	230.82	0.004218	1.30	3.95	8.21	0.53
REACH1	2223.20	10-Year	5.85	229.70	230.88	230.59	230.95	0.002940	1.24	5.20	9.92	0.46
REACH1	2223.20	25-Year	7.08	229.70	231.03	230.65	231.10	0.002178	1.21	6.86	11.86	0.41
REACH1	2223.20	50-Year	8.08	229.70	231.14	230.70	231.21	0.001879	1.21	8.28	14.93	0.39
REACH1	2223.20	100-Year	9.06	229.70	231.24	230.75	231.30	0.001618	1.20	9.91	17.49	0.36
REACH1	2223.20	Regional	16.25	229.70	231.50	231.05	231.60	0.002145	1.58	15.54	28.56	0.43
REACH1	2223.19	2-Year	3.57	229.45	230.12	230.12	230.44	0.025252	2.53	1.41	2.16	1.00
REACH1	2223.19	5-Year	4.89	229.45	230.27	230.27	230.67	0.026322	2.80	1.74	2.19	1.00
REACH1	2223.19	10-Year	5.85	229.45	230.38	230.38	230.82	0.026648	2.96	1.98	2.20	1.00
REACH1	2223.19	25-Year	7.08	229.45	230.56	230.56	230.99	0.021560	2.93	2.52	5.66	0.90
REACH1	2223.19	50-Year	8.08	229.45	230.67	230.67	231.11	0.019417	2.96	2.92	6.75	0.87
REACH1	2223.19	100-Year	9.06	229.45	230.75	230.75	231.21	0.019062	3.06	3.21	7.53	0.87
REACH1	2223.19	Regional	16.25	229.45	231.52	231.22	231.56	0.001457	1.16	19.51	37.66	0.26
REACH1	2223.185 C6		Culvert									
REACH1	2223.18	2-Year	3.57	229.37	230.17	229.93	230.26	0.004028	1.33	2.72	4.98	0.51
REACH1	2223.18	5-Year	4.89	229.37	230.32	230.03	230.43	0.003959	1.49	3.35	5.63	0.52
REACH1	2223.18	10-Year	5.85	229.37	230.39	230.10	230.53	0.004236	1.64	3.68	5.95	0.55
REACH1	2223.18	25-Year	7.08	229.37	230.48	230.19	230.64	0.004554	1.80	4.05	6.32	0.58

HEC-RAS Plan: Matrix - RR50 Aug 2021 River: CEG_DESIGN Reach: REACH1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
REACH1	2223.18	50-Year	8.08	229.37	230.54	230.25	230.72	0.004875	1.94	4.31	7.41	0.60
REACH1	2223.18	100-Year	9.06	229.37	230.58	230.31	230.80	0.005276	2.07	4.52	8.70	0.63
REACH1	2223.18	Regional	16.25	229.37	230.80	230.69	231.27	0.009125	3.08	5.48	14.70	0.85
REACH1	2223.17	2-Year	3.57	228.87	229.77	229.77	230.06	0.015749	2.42	1.67	3.81	0.96
REACH1	2223.17	5-Year	4.89	228.87	229.95	229.95	230.24	0.012091	2.49	2.59	6.32	0.87
REACH1	2223.17	10-Year	5.85	228.87	230.06	230.06	230.35	0.010348	2.51	3.40	7.86	0.82
REACH1	2223.17	25-Year	7.08	228.87	230.16	230.16	230.47	0.010041	2.64	4.20	8.74	0.83
REACH1	2223.17	50-Year	8.08	228.87	230.23	230.23	230.55	0.009905	2.74	4.83	9.38	0.83
REACH1	2223.17	100-Year	9.06	228.87	230.29	230.29	230.62	0.009740	2.82	5.45	9.97	0.83
REACH1	2223.17	Regional	16.25	228.87	230.63	230.63	231.06	0.010332	3.43	9.40	14.67	0.89
REACH1	2223.16	2-Year	3.57	228.57	229.49	229.49	229.68	0.018599	1.93	1.85	4.85	0.99
REACH1	2223.16	5-Year	4.89	228.57	229.58	229.58	229.81	0.016879	2.11	2.37	6.26	0.98
REACH1	2223.16	10-Year	5.85	228.57	229.65	229.65	229.89	0.015289	2.19	2.83	7.36	0.96
REACH1	2223.16	25-Year	7.08	228.57	229.72	229.72	229.99	0.014013	2.29	3.44	8.62	0.94
REACH1	2223.16	50-Year	8.08	228.57	229.78	229.78	230.06	0.013491	2.38	3.93	9.50	0.93
REACH1	2223.16	100-Year	9.06	228.57	229.83	229.83	230.12	0.012846	2.45	4.45	10.36	0.92
REACH1	2223.16	Regional	16.25	228.57	230.15	230.15	230.50	0.010337	2.79	8.57	16.00	0.88
REACH1	2223.15	2-Year	3.57	228.50	229.19	228.87	229.21	0.002540	0.56	6.87	19.66	0.26
REACH1	2223.15	5-Year	4.89	228.50	229.27	228.94	229.29	0.002963	0.65	8.46	23.02	0.28
REACH1	2223.15	10-Year	5.85	228.50	229.32	228.97	229.34	0.003158	0.71	9.67	25.57	0.29
REACH1	2223.15	25-Year	7.08	228.50	229.37	229.02	229.40	0.003400	0.77	11.14	28.36	0.30
REACH1	2223.15	50-Year	8.08	228.50	229.41	229.05	229.44	0.003510	0.81	12.41	30.85	0.30
REACH1	2223.15	100-Year	9.06	228.50	229.45	229.08	229.48	0.003624	0.84	13.64	33.65	0.31
REACH1	2223.15	Regional	16.25	228.50	229.65	229.27	229.70	0.004290	1.05	21.61	45.24	0.34
REACH1	2223.14	2-Year	3.57	227.98	228.75	228.64	228.80	0.003584	1.12	5.44	26.66	0.48
REACH1	2223.14	5-Year	4.89	227.98	228.84		228.89	0.003059	1.14	8.14	33.94	0.46
REACH1	2223.14	10-Year	5.85	227.98	228.89		228.93	0.002956	1.18	9.87	38.38	0.45
REACH1	2223.14	25-Year	7.08	227.98	228.94		228.98	0.002906	1.22	11.79	41.03	0.46
REACH1	2223.14	50-Year	8.08	227.98	228.96		229.01	0.003052	1.28	12.92	42.21	0.47
REACH1	2223.14	100-Year	9.06	227.98	228.99		229.04	0.003129	1.33	14.04	43.10	0.48
REACH1	2223.14	Regional	16.25	227.98	229.21		229.26	0.002689	1.45	24.71	57.59	0.46
REACH1	2223.13	2-Year	3.57	227.25	227.96	227.96	228.19	0.017754	2.14	1.67	3.57	1.00
REACH1	2223.13	5-Year	4.89	227.25	228.14	228.14	228.34	0.018056	1.96	2.50	6.38	1.00
REACH1	2223.13	10-Year	5.85	227.25	228.22	228.22	228.41	0.017497	1.94	3.02	8.08	0.99
REACH1	2223.13	25-Year	7.08	227.25	228.29	228.27	228.48	0.014783	1.97	3.65	9.55	0.93
REACH1	2223.13	50-Year	8.08	227.25	228.37	228.32	228.55	0.010976	1.88	4.53	11.16	0.82
REACH1	2223.13	100-Year	9.06	227.25	228.45	228.37	228.61	0.008528	1.80	5.47	12.42	0.74
REACH1	2223.13	Regional	16.25	227.25	228.91	228.61	229.01	0.002935	1.53	14.78	28.99	0.48
REACH1	2223.12	2-Year	3.57	227.02	227.85	227.62	227.91	0.003056	1.11	3.53	7.43	0.46
REACH1	2223.12	5-Year	4.89	227.02	228.00	227.70	228.07	0.002711	1.21	4.70	8.72	0.45
REACH1	2223.12	10-Year	5.85	227.02	228.04	227.76	228.13	0.003110	1.35	5.15	9.63	0.48
REACH1	2223.12	25-Year	7.08	227.02	228.20	227.83	228.28	0.002393	1.33	6.88	12.68	0.44
REACH1	2223.12	50-Year	8.08	227.02	228.29	227.89	228.38	0.002222	1.36	8.09	14.44	0.43
REACH1	2223.12	100-Year	9.06	227.02	228.37	227.93	228.46	0.002064	1.38	9.38	16.11	0.42
REACH1	2223.12	Regional	16.25	227.02	228.84	228.26	228.94	0.001600	1.54	19.47	27.83	0.39
REACH1	2223.11	2-Year	3.57	226.75	227.85	227.46	227.88	0.001397	0.83	4.48	7.30	0.31
REACH1	2223.11	5-Year	4.89	226.75	227.99	227.54	228.04	0.001402	0.94	5.52	7.83	0.32
REACH1	2223.11	10-Year	5.85	226.75	228.04	227.60	228.10	0.001666	1.06	5.89	8.28	0.36
REACH1	2223.11	25-Year	7.08	226.75	228.20	227.66	228.26	0.001420	1.09	7.21	9.87	0.34
REACH1	2223.11	50-Year	8.08	226.75	228.29	227.71	228.35	0.001398	1.14	8.06	10.82	0.34
REACH1	2223.11	100-Year	9.06	226.75	228.37	227.76	228.44	0.001379	1.19	8.96	12.63	0.34
REACH1	2223.11	Regional	16.25	226.75	228.84	228.04	228.92	0.001194	1.37	21.32	61.79	0.34
REACH1	2223.105 C7		Culvert									
REACH1	2223.10	2-Year	3.57	226.55	227.81	227.43	227.87	0.002377	1.07	3.48	5.77	0.39
REACH1	2223.10	5-Year	4.89	226.55	227.93	227.55	228.01	0.002678	1.26	4.21	6.30	0.43
REACH1	2223.10	10-Year	5.85	226.55	228.01	227.62	228.10	0.002864	1.37	4.68	6.71	0.45
REACH1	2223.10	25-Year	7.08	226.55	228.10	227.70	228.21	0.003070	1.51	5.25	8.08	0.47
REACH1	2223.10	50-Year	8.08	226.55	228.16	227.76	228.29	0.003250	1.62	5.66	9.09	0.49
REACH1	2223.10	100-Year	9.06	226.55	228.21	227.82	228.36	0.003430	1.71	6.02	10.02	0.51
REACH1	2223.10	Regional	16.25	226.55	228.53	228.18	228.77	0.004335	2.27	10.52	15.58	0.59
REACH1	2223.09	2-Year	3.57	226.45	227.51	227.50	227.71	0.019425	1.98	1.80	4.44	0.99
REACH1	2223.09	5-Year	4.89	226.45	227.63	227.61	227.84	0.016413	2.06	2.38	4.87	0.94
REACH1	2223.09	10-Year	5.85	226.45	227.71	227.68	227.93	0.014981	2.11	2.78	5.13	0.91
REACH1	2223.09	25-Year	7.08	226.45	227.79	227.75	228.04	0.014075	2.19	3.24	5.93	0.90
REACH1	2223.09	50-Year	8.08	226.45	227.86	227.82	228.12	0.013365	2.25	3.63	6.18	0.89
REACH1	2223.09	100-Year	9.06	226.45	227.91	227.87	228.19	0.012867	2.31	3.99	6.41	0.88
REACH1	2223.09	Regional	16.25	226.45	228.26	228.20	228.60	0.009877	2.62	6.76	10.10	0.83
REACH1	2223.08	2-Year	3.57	226.30	226.94	226.94	227.22	0.020316	2.32	1.54	2.78	1.00
REACH1	2223.08	5-Year	4.89	226.30	227.10	227.10	227.40	0.019477	2.46	1.99	3.20	1.00
REACH1	2223.08	10-Year	5.85	226.30	227.19	227.19	227.52	0.019028	2.53	2.31	3.55	1.00
REACH1	2223.08	25-Year	7.08	226.30	227.31	227.31	227.64	0.018250	2.56	2.77	4.12	1.00
REACH1	2223.08	50-Year	8.08	226.30	227.39	227.39	227.73	0.017973	2.60	3.10	4.51	1.00
REACH1	2223.08	100-Year	9.06	226.30	227.46	227.46	227.81	0.017694	2.64	3.43	4.85	1.00

HEC-RAS Plan: Matrix - RR50 Aug 2021 River: CEG_DESIGN Reach: REACH1 (Continued)

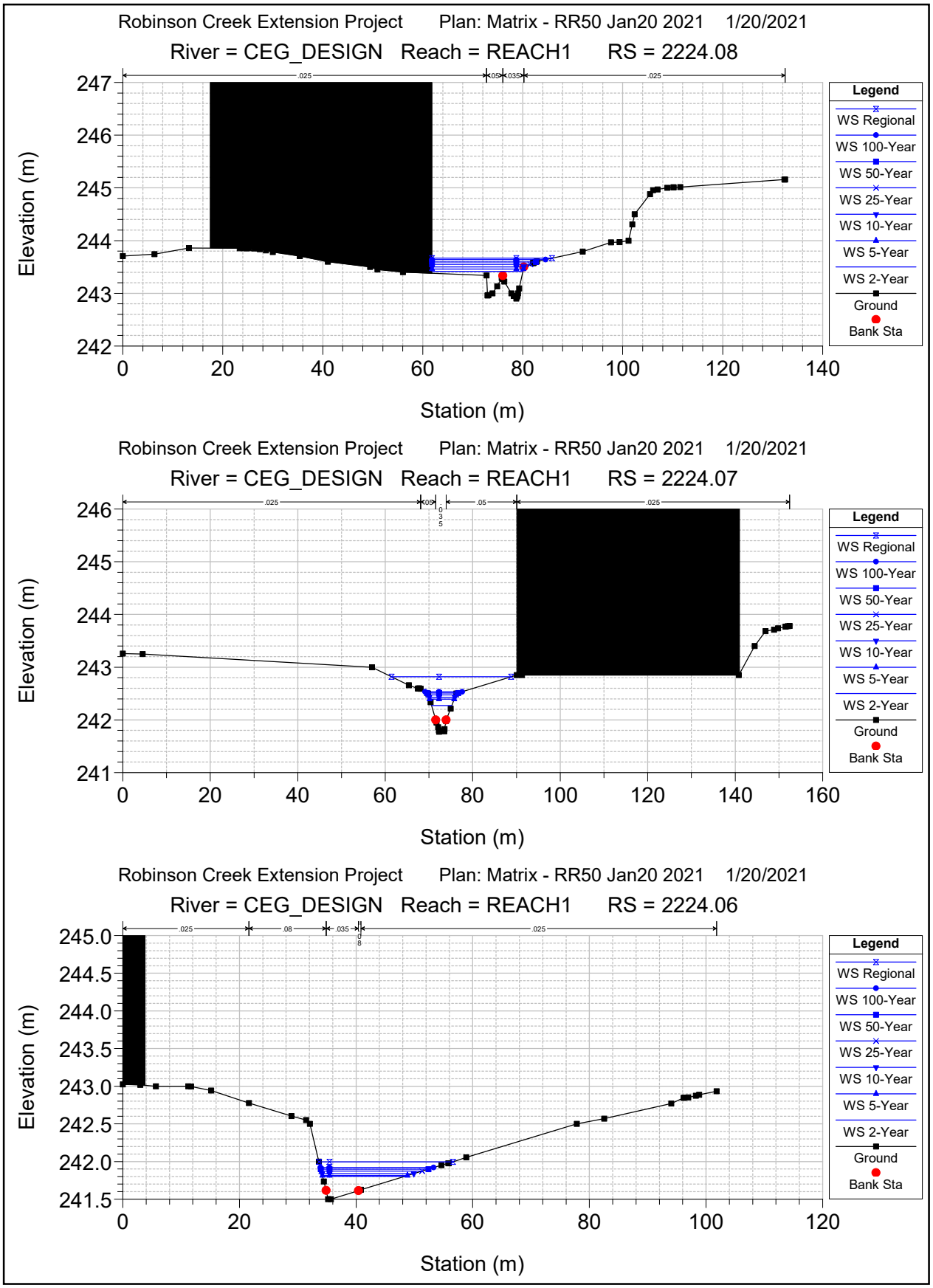
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
REACH1	2223.08	Regional	16.25	226.30	227.82	227.82	228.28	0.016409	3.02	5.38	5.86	1.01
REACH1	2223.075 C8		Culvert									
REACH1	2223.07	2-Year	3.57	226.13	227.08	226.55	227.12	0.001346	0.80	4.45	5.68	0.29
REACH1	2223.07	5-Year	4.89	226.13	227.20	226.65	227.25	0.001721	0.95	5.15	6.24	0.33
REACH1	2223.07	10-Year	5.85	226.13	227.27	226.71	227.33	0.001939	1.05	5.59	6.56	0.36
REACH1	2223.07	25-Year	7.08	226.13	227.35	226.79	227.42	0.002180	1.16	6.11	6.94	0.38
REACH1	2223.07	50-Year	8.08	226.13	227.41	226.85	227.49	0.002337	1.25	6.47	7.21	0.40
REACH1	2223.07	100-Year	9.06	226.13	227.46	226.90	227.55	0.002484	1.33	6.81	7.45	0.42
REACH1	2223.07	Regional	16.25	226.13	227.73	227.27	227.92	0.003695	1.89	8.58	8.70	0.53
REACH1	2223.06	2-Year	3.57	226.10	226.85	226.84	227.00	0.017399	1.75	2.04	6.23	0.98
REACH1	2223.06	5-Year	4.89	226.10	226.93	226.93	227.11	0.017581	1.91	2.56	6.93	1.00
REACH1	2223.06	10-Year	5.85	226.10	226.98	226.98	227.18	0.016600	1.98	2.96	7.30	0.99
REACH1	2223.06	25-Year	7.08	226.10	227.04	227.04	227.26	0.016489	2.09	3.39	7.62	1.00
REACH1	2223.06	50-Year	8.08	226.10	227.08	227.08	227.32	0.016080	2.16	3.74	7.87	1.00
REACH1	2223.06	100-Year	9.06	226.10	227.13	227.13	227.38	0.015776	2.22	4.08	8.10	1.00
REACH1	2223.06	Regional	16.25	226.10	227.53	227.38	227.75	0.007993	2.09	7.86	12.06	0.76
REACH1	2223.05	2-Year	3.57	225.27	226.16	225.93	226.22	0.003960	1.11	3.23	6.42	0.50
REACH1	2223.05	5-Year	4.89	225.27	226.33	226.02	226.39	0.003235	1.10	4.45	7.67	0.46
REACH1	2223.05	10-Year	5.85	225.27	226.42	226.08	226.49	0.003179	1.13	5.16	8.38	0.46
REACH1	2223.05	25-Year	7.08	225.27	226.53	226.15	226.60	0.003001	1.15	6.14	9.30	0.45
REACH1	2223.05	50-Year	8.08	225.27	226.60	226.21	226.67	0.002881	1.18	6.85	10.27	0.45
REACH1	2223.05	100-Year	9.06	225.27	226.67	226.26	226.74	0.002781	1.22	7.52	11.50	0.45
REACH1	2223.05	Regional	16.25	225.27	226.69	226.55	226.92	0.008060	2.11	7.82	11.95	0.76
REACH1	2223.04	2-Year	5.69	224.70	225.48	225.43	225.66	0.012720	1.92	2.96	6.19	0.89
REACH1	2223.04	5-Year	8.09	224.70	225.57	225.57	225.83	0.015542	2.28	3.55	6.66	1.00
REACH1	2223.04	10-Year	9.73	224.70	225.64	225.64	225.93	0.015236	2.38	4.08	7.06	1.00
REACH1	2223.04	25-Year	11.99	224.70	225.74	225.74	226.06	0.014802	2.50	4.80	7.56	1.00
REACH1	2223.04	50-Year	13.77	224.70	225.81	225.81	226.15	0.014534	2.57	5.35	7.92	1.00
REACH1	2223.04	100-Year	15.81	224.70	225.92	225.89	226.25	0.012875	2.55	6.19	8.45	0.95
REACH1	2223.04	Regional	18.56	224.70	226.29	225.99	226.48	0.004515	1.93	9.92	11.49	0.60
REACH1	2223.03	2-Year	5.69	224.20	224.76	224.76	225.01	0.016821	2.20	2.59	5.23	1.00
REACH1	2223.03	5-Year	8.09	224.20	225.03	224.90	225.23	0.009309	1.99	4.07	6.03	0.77
REACH1	2223.03	10-Year	9.73	224.20	225.21	224.99	225.39	0.006404	1.86	5.22	6.97	0.66
REACH1	2223.03	25-Year	11.99	224.20	225.43	225.10	225.60	0.004390	1.80	6.65	8.11	0.57
REACH1	2223.03	50-Year	13.77	224.20	225.59	225.17	225.75	0.003607	1.80	7.67	8.97	0.53
REACH1	2223.03	100-Year	15.81	224.20	225.76	225.25	225.92	0.003053	1.81	8.76	14.43	0.50
REACH1	2223.03	Regional	18.56	224.20	226.22	225.35	226.34	0.001587	1.58	11.73	81.66	0.38
REACH1	2223.025 Mayfield Culvert		Culvert									
REACH1	2223.02	2-Year	5.69	223.68	224.79	224.23	224.84	0.001404	0.95	6.00	7.99	0.32
REACH1	2223.02	5-Year	8.09	223.68	224.97	224.37	225.04	0.001567	1.13	7.17	9.01	0.34
REACH1	2223.02	10-Year	9.73	223.68	225.07	224.46	225.15	0.001708	1.25	7.81	9.57	0.36
REACH1	2223.02	25-Year	11.99	223.68	225.17	224.57	225.27	0.001966	1.41	8.48	10.16	0.40
REACH1	2223.02	50-Year	13.77	223.68	225.24	224.64	225.36	0.002215	1.55	8.89	10.52	0.42
REACH1	2223.02	100-Year	15.81	223.68	225.29	224.71	225.44	0.002539	1.70	9.27	10.85	0.46
REACH1	2223.02	Regional	18.56	223.68	225.66	224.81	225.79	0.001643	1.60	11.63	12.98	0.38
REACH1	2223.01	2-Year	5.69	223.33	224.78	224.20	224.82	0.001112	0.77	7.35	9.59	0.28
REACH1	2223.01	5-Year	8.09	223.33	224.97	224.34	225.01	0.001218	0.88	9.20	10.62	0.30
REACH1	2223.01	10-Year	9.73	223.33	225.07	224.41	225.11	0.001298	0.94	10.30	11.18	0.31
REACH1	2223.01	25-Year	11.99	223.33	225.18	224.51	225.23	0.001447	1.04	11.55	11.79	0.33
REACH1	2223.01	50-Year	13.77	223.33	225.24	224.58	225.31	0.001591	1.11	12.35	12.17	0.35
REACH1	2223.01	100-Year	15.81	223.33	225.31	224.65	225.38	0.001776	1.20	13.14	12.53	0.38
REACH1	2223.01	Regional	18.56	223.33	225.68	224.74	225.73	0.001016	1.02	18.20	14.62	0.29
REACH1	2219.56	2-Year	6.08	223.16	224.62	224.30	224.70	0.004223	1.26	4.84	7.82	0.51
REACH1	2219.56	5-Year	8.72	223.16	224.78	224.47	224.88	0.004558	1.41	6.20	9.03	0.54
REACH1	2219.56	10-Year	10.49	223.16	224.87	224.56	224.98	0.004802	1.50	7.03	15.67	0.56
REACH1	2219.56	25-Year	12.98	223.16	224.96	224.67	225.09	0.004875	1.61	9.57	33.53	0.58
REACH1	2219.56	50-Year	14.95	223.16	225.02	224.75	225.16	0.005003	1.70	11.68	43.36	0.59
REACH1	2219.56	100-Year	17.19	223.16	225.03	224.82	225.21	0.006068	1.89	12.44	45.59	0.65
REACH1	2219.56	Regional	38.30	223.16	225.47	225.34	225.61	0.003778	1.97	39.45	95.39	0.55
REACH1	2219.55	2-Year	6.08	222.82	223.49	223.49	223.68	0.017370	1.95	3.13	8.30	1.01
REACH1	2219.55	5-Year	8.72	222.82	223.61	223.61	223.83	0.016430	2.09	4.16	9.48	1.01
REACH1	2219.55	10-Year	10.49	222.82	223.68	223.68	223.92	0.015544	2.15	4.87	10.21	1.00
REACH1	2219.55	25-Year	12.98	222.82	223.77	223.77	224.02	0.015250	2.24	5.80	11.33	1.00
REACH1	2219.55	50-Year	14.95	222.82	223.84	223.83	224.09	0.014297	2.25	6.64	12.23	0.98
REACH1	2219.55	100-Year	17.19	222.82	223.97	223.89	224.18	0.010286	2.07	8.30	13.53	0.84
REACH1	2219.55	Regional	38.30	222.82	224.31	224.31	224.69	0.013501	2.74	13.99	18.41	1.00
REACH1	2219.54	2-Year	6.08	221.60	223.01		223.01	0.000307	0.54	30.36	53.22	0.16
REACH1	2219.54	5-Year	8.72	221.60	223.63		223.64	0.000071	0.35	70.91	74.26	0.08
REACH1	2219.54	10-Year	10.49	221.60	223.77		223.77	0.000071	0.36	81.42	78.02	0.08
REACH1	2219.54	25-Year	12.98	221.60	223.90		223.90	0.000081	0.40	91.21	81.27	0.09
REACH1	2219.54	50-Year	14.95	221.60	223.97		223.97	0.000090	0.44	97.20	83.19	0.10
REACH1	2219.54	100-Year	17.19	221.60	224.07		224.07	0.000096	0.47	105.59	86.51	0.10

HEC-RAS Plan: Matrix - RR50 Aug 2021 River: CEG_DESIGN Reach: REACH1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
REACH1	2219.54	Regional	38.30	221.60	224.23		224.24	0.000353	0.94	120.28	95.14	0.19
REACH1	2219.53	2-Year	6.08	220.75	222.79	221.91	222.93	0.004266	1.64	3.76	29.07	0.39
REACH1	2219.53	5-Year	8.72	220.75	223.52	222.19	223.60	0.004015	1.33	12.78	77.30	0.46
REACH1	2219.53	10-Year	10.49	220.75	223.74	222.36	223.76	0.001256	0.86	29.86	84.55	0.26
REACH1	2219.53	25-Year	12.98	220.75	223.87	222.59	223.88	0.000892	0.78	41.36	89.62	0.23
REACH1	2219.53	50-Year	14.95	220.75	223.94	222.76	223.96	0.000819	0.78	48.13	93.57	0.22
REACH1	2219.53	100-Year	17.19	220.75	224.04	222.93	224.06	0.000679	0.75	57.99	98.72	0.20
REACH1	2219.53	Regional	38.30	220.75	224.15	223.82	224.19	0.002147	1.40	68.99	103.55	0.36
REACH1	2219.525		Culvert									
REACH1	2219.52	2-Year	6.08	220.65	222.06	222.06	222.60	0.036106	3.26	1.86	1.74	1.01
REACH1	2219.52	5-Year	8.72	220.65	222.40	222.40	223.02	0.031508	3.50	2.51	28.84	0.99
REACH1	2219.52	10-Year	10.49	220.65	222.57	222.57	223.26	0.029531	3.69	2.89	43.58	0.97
REACH1	2219.52	25-Year	12.98	220.65	222.79	222.79	223.58	0.028379	3.96	3.36	51.32	0.98
REACH1	2219.52	50-Year	14.95	220.65	222.95	222.95	223.81	0.027241	4.13	3.73	58.99	0.97
REACH1	2219.52	100-Year	17.19	220.65	223.12	223.12	224.06	0.026424	4.32	4.11	65.41	0.97
REACH1	2219.52	Regional	38.30	220.65	223.73	223.73	223.93	0.010384	3.01	38.89	95.57	0.66
REACH1	2219.51	2-Year	6.08	220.50	222.03	221.82	222.04	0.003166	0.88	14.69	40.93	0.37
REACH1	2219.51	5-Year	8.72	220.50	222.11		222.13	0.003388	1.00	18.41	43.88	0.39
REACH1	2219.51	10-Year	10.49	220.50	222.18		222.20	0.003308	1.05	21.12	45.92	0.39
REACH1	2219.51	25-Year	12.98	220.50	222.25		222.27	0.003233	1.11	24.72	48.37	0.40
REACH1	2219.51	50-Year	14.95	220.50	222.31		222.33	0.003187	1.15	27.39	49.85	0.40
REACH1	2219.51	100-Year	17.19	220.50	222.36		222.39	0.003172	1.20	30.26	51.47	0.40
REACH1	2219.51	Regional	38.30	220.50	222.76		222.80	0.003201	1.53	53.54	63.73	0.43
REACH1	2219.50	2-Year	6.08	220.15	221.37	221.37	221.59	0.017409	2.11	2.98	7.56	1.00
REACH1	2219.50	5-Year	8.72	220.15	221.55	221.55	221.74	0.010478	2.03	6.04	23.95	0.82
REACH1	2219.50	10-Year	10.49	220.15	221.61	221.61	221.81	0.009838	2.11	7.76	27.46	0.80
REACH1	2219.50	25-Year	12.98	220.15	221.69	221.69	221.90	0.009545	2.22	9.96	31.10	0.81
REACH1	2219.50	50-Year	14.95	220.15	221.74	221.74	221.96	0.009391	2.30	11.66	33.62	0.81
REACH1	2219.50	100-Year	17.19	220.15	221.80	221.80	222.02	0.009170	2.38	13.61	36.31	0.81
REACH1	2219.50	Regional	38.30	220.15	222.14	222.14	222.42	0.009216	2.97	29.44	54.20	0.85

APPENDIX F HEC-RAS OUTPUT

Item 3 – Cross-section Profile


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2224.08
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2224.07
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2224.06
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta

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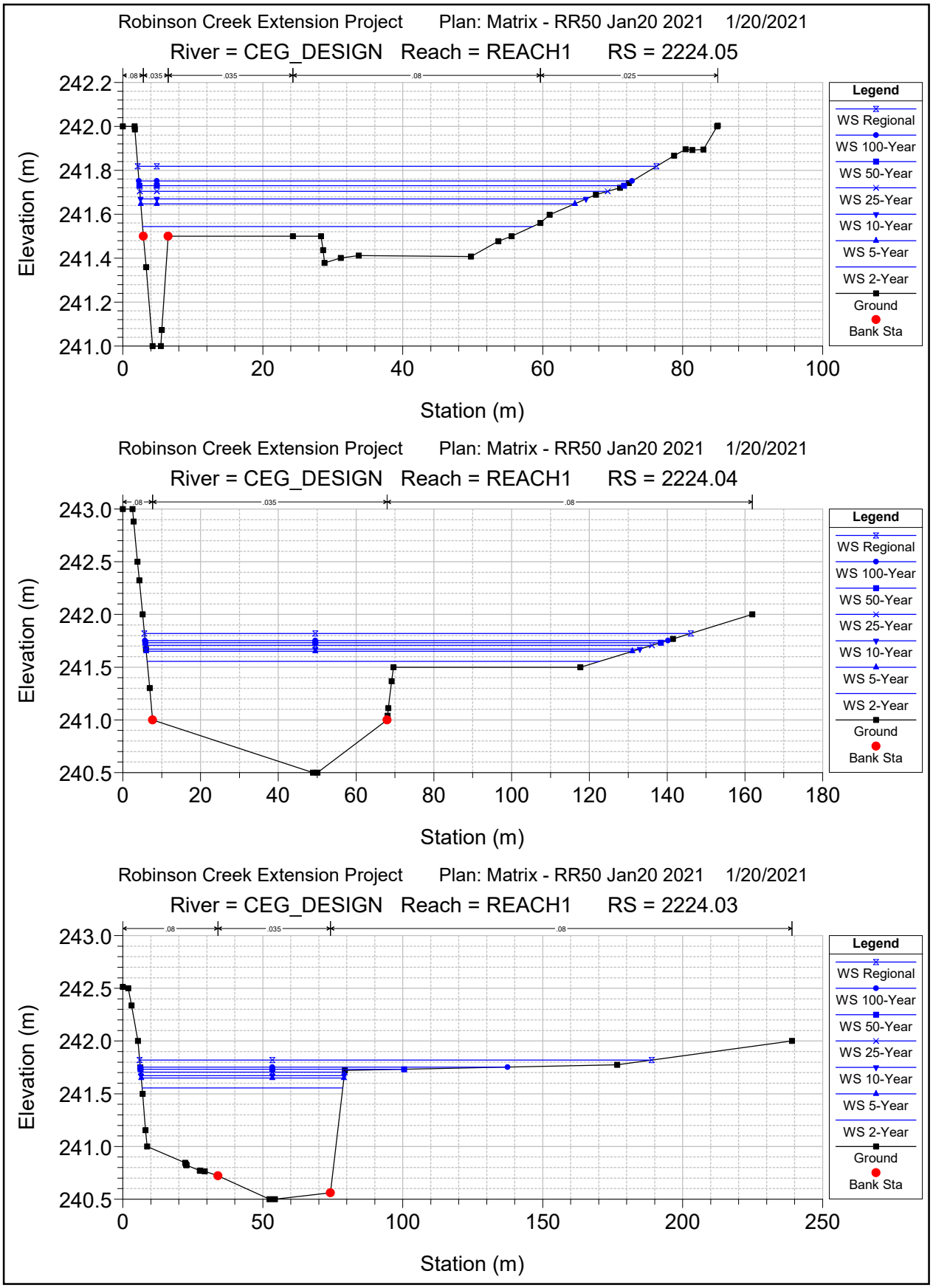
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2224.05
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2224.04
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2224.03
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta

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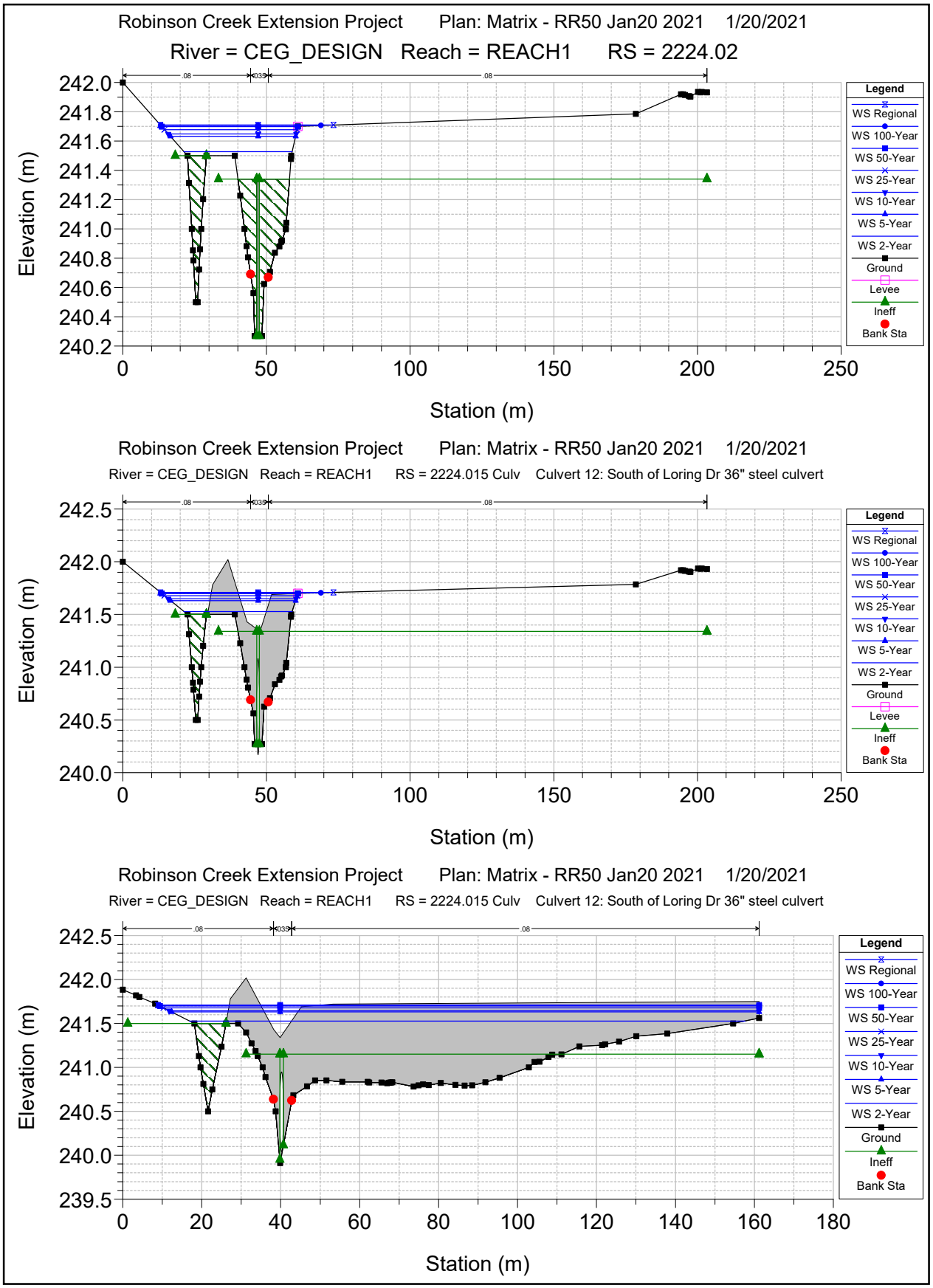
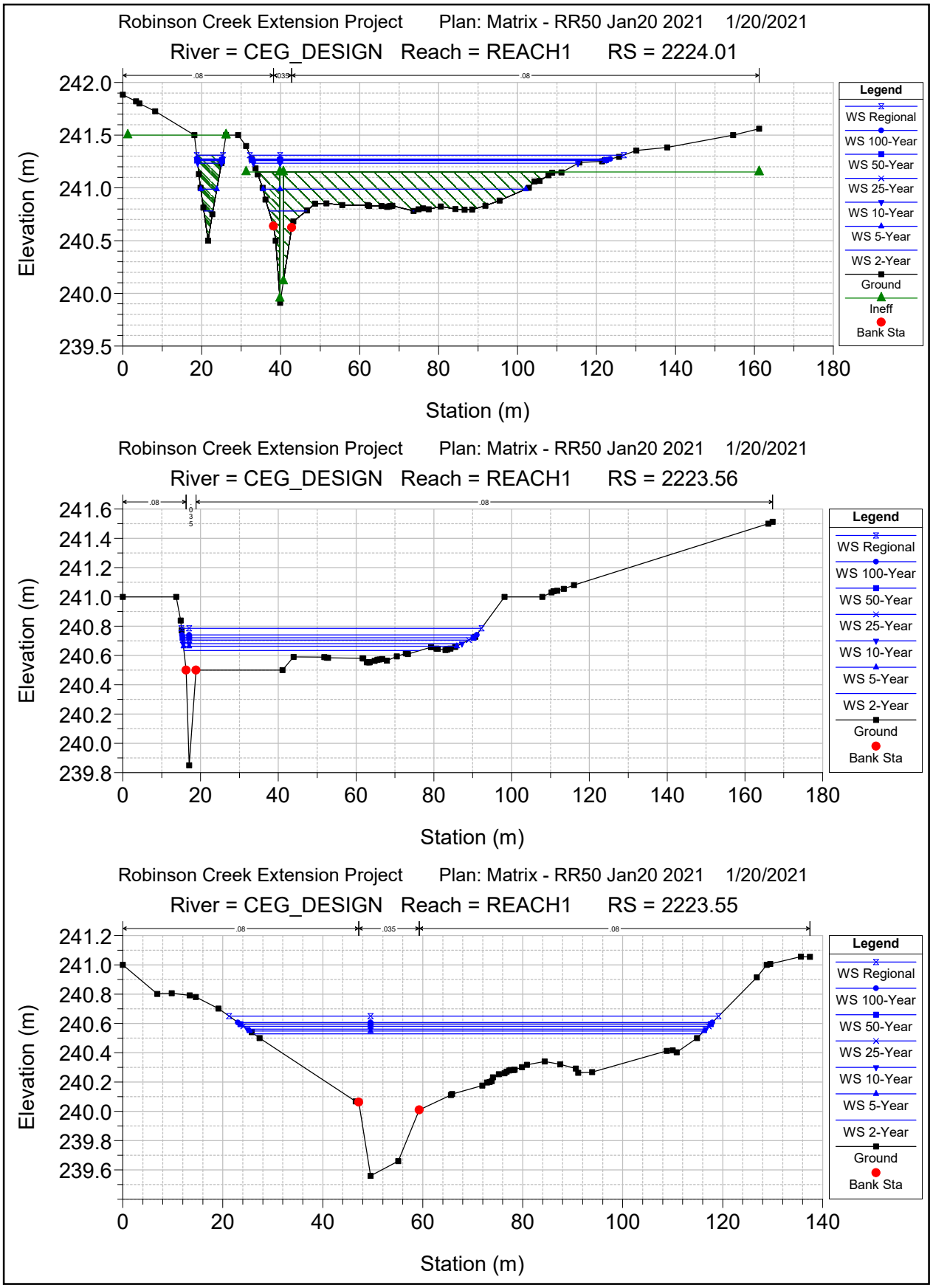

Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2224.02
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2224.015 Culv Culvert 12: South of Loring Dr 36" steel culvert
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2224.015 Culv Culvert 12: South of Loring Dr 36" steel culvert
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2224.01
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.56
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.55
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta

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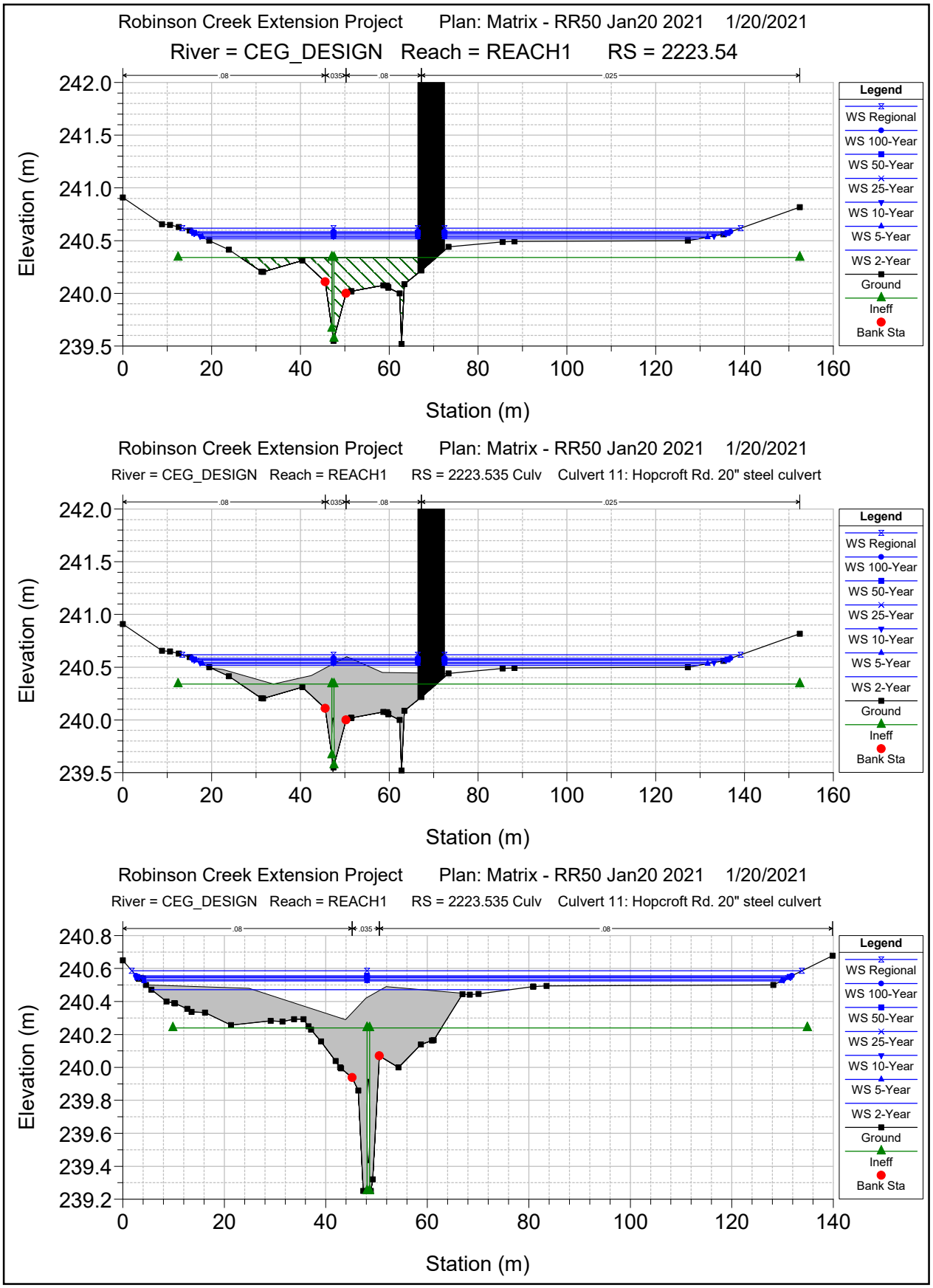
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.54
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.535 Culv Culvert 11: Hopcroft Rd. 20" steel culvert
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.535 Culv Culvert 11: Hopcroft Rd. 20" steel culvert
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta

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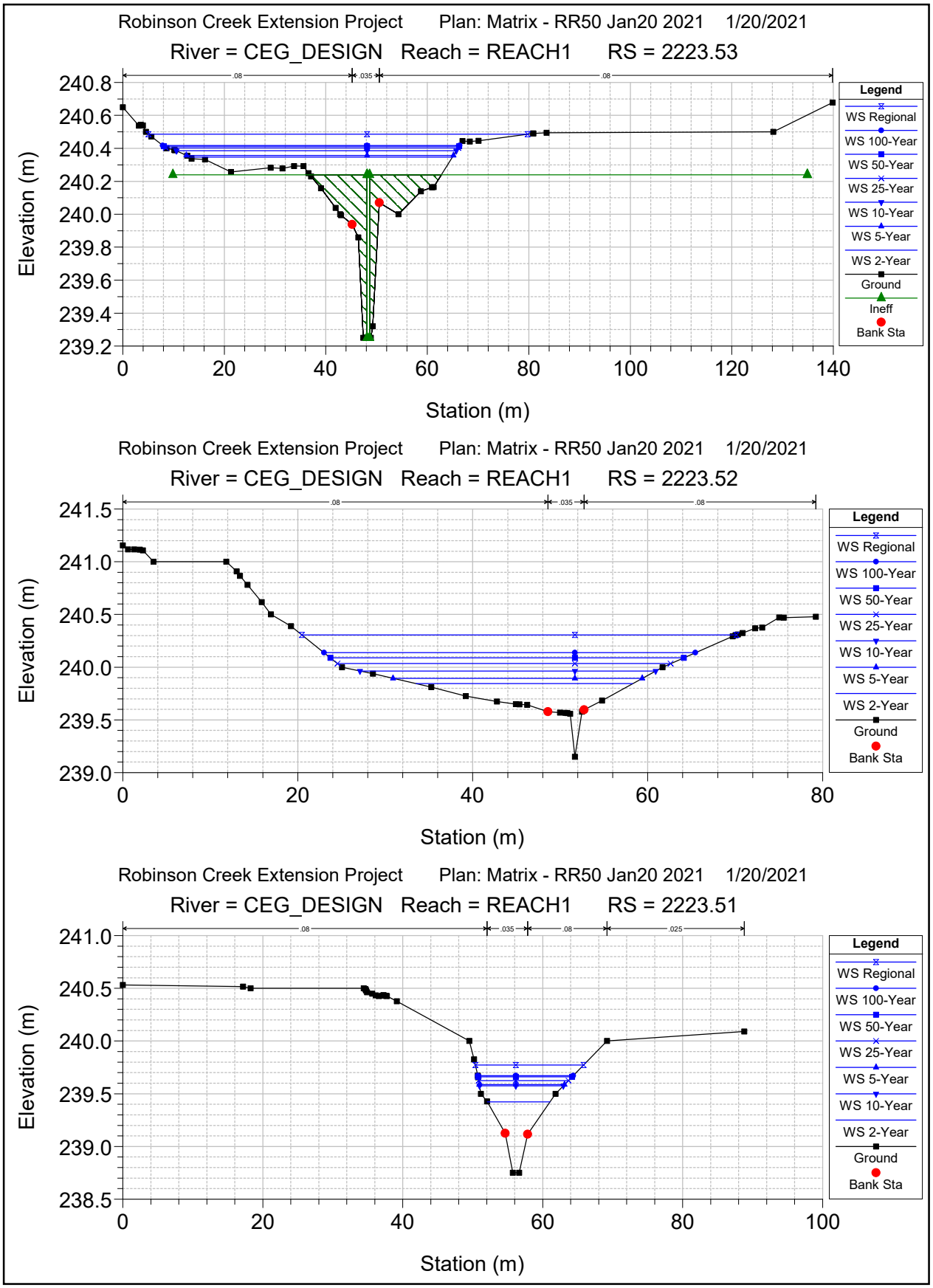
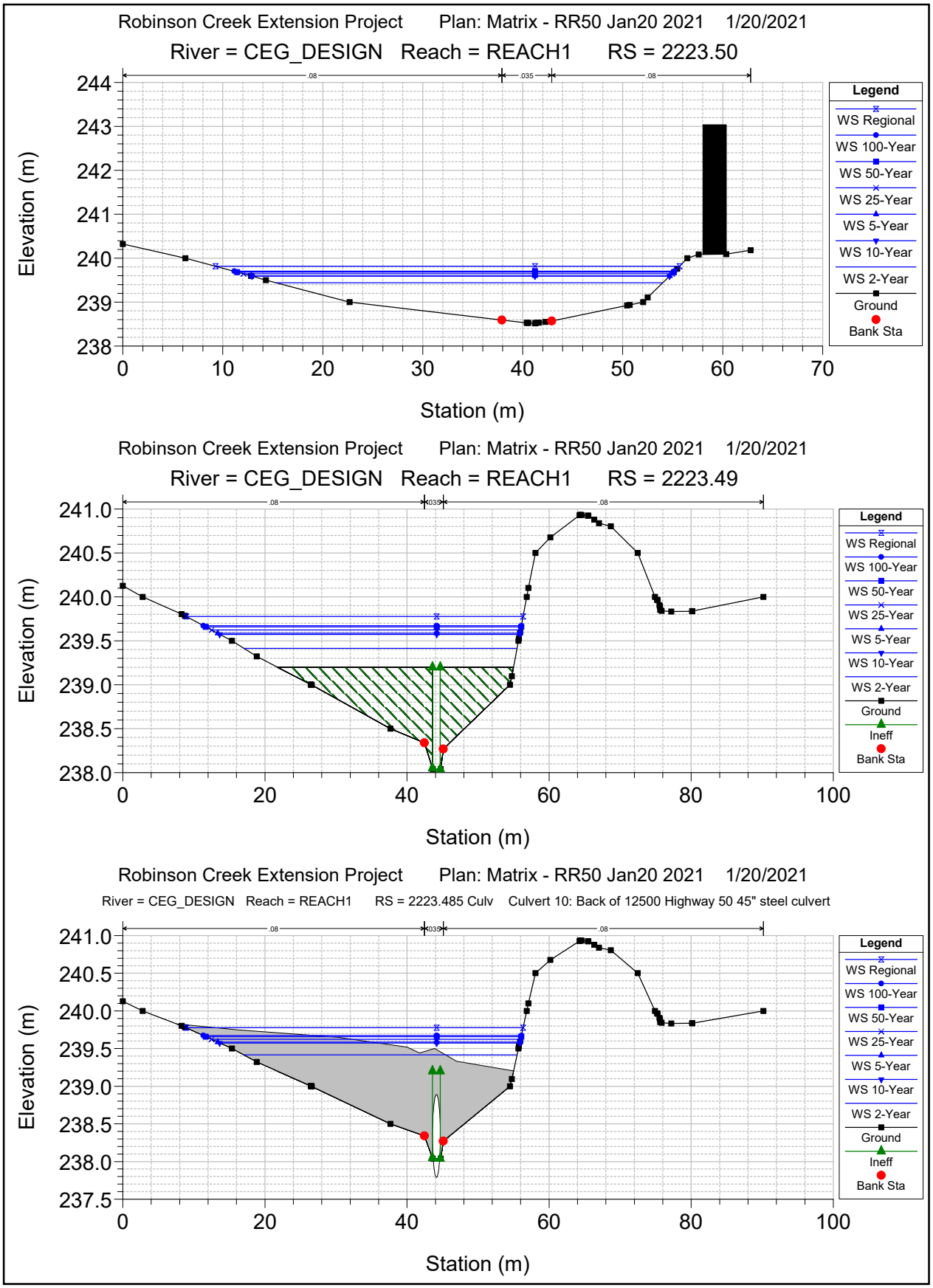
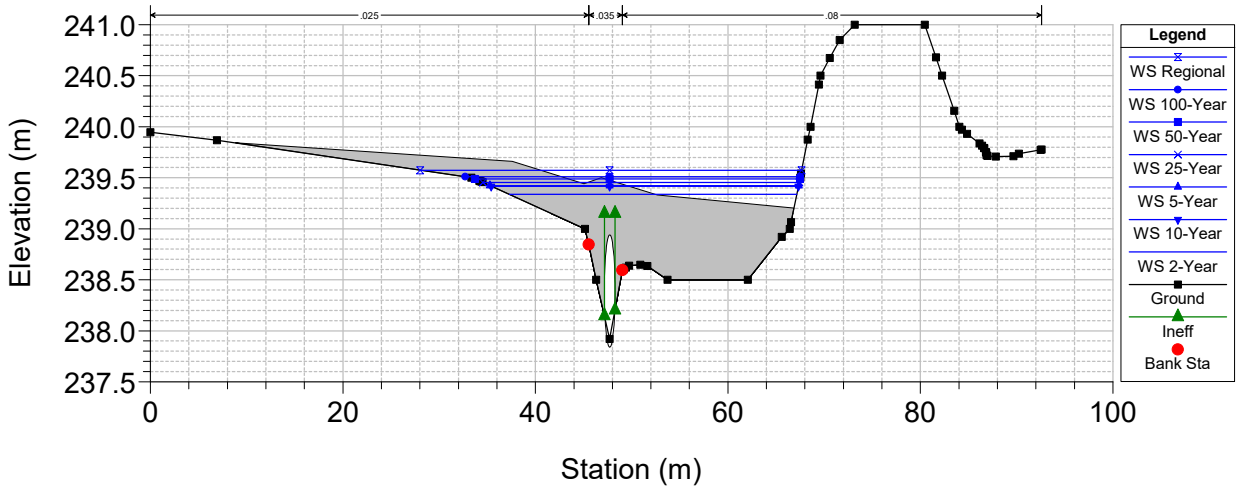

Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.53
.08
.035
.08
240.8
240.6
240.4
240.2
240.0
239.8
239.6
239.4
239.2
Elevation (m)
0
20
40
60
80
100
120
140
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.52
.08
.035
.08
241.5
241.0
240.5
240.0
239.5
239.0
Elevation (m)
0
20
40
60
80
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.51
.08
.035
.08
.025
241.0
240.5
240.0
239.5
239.0
238.5
Elevation (m)
0
20
40
60
80
100
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 5-Year
WS 10-Year
WS 2-Year
Ground
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.50
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 5-Year
WS 10-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.49
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 5-Year
WS 10-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.485 Culv Culvert 10: Back of 12500 Highway 50 45" steel culvert
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 5-Year
WS 10-Year
WS 2-Year
Ground
Ineff
Bank Sta

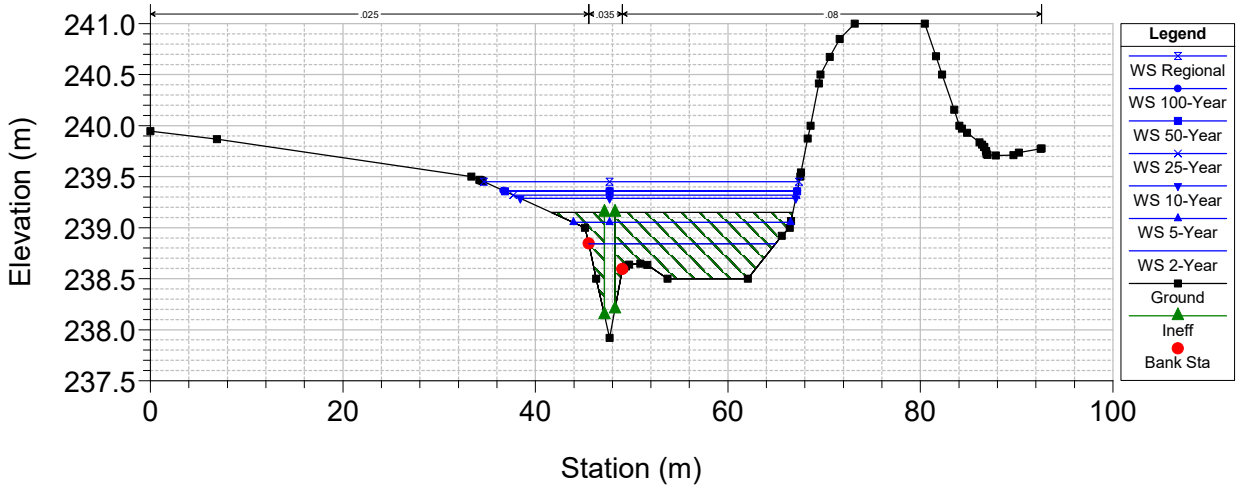
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021

River = CEG_DESIGN Reach = REACH1 RS = 2223.485 Culv Culvert 10: Back of 12500 Highway 50 45" steel culvert



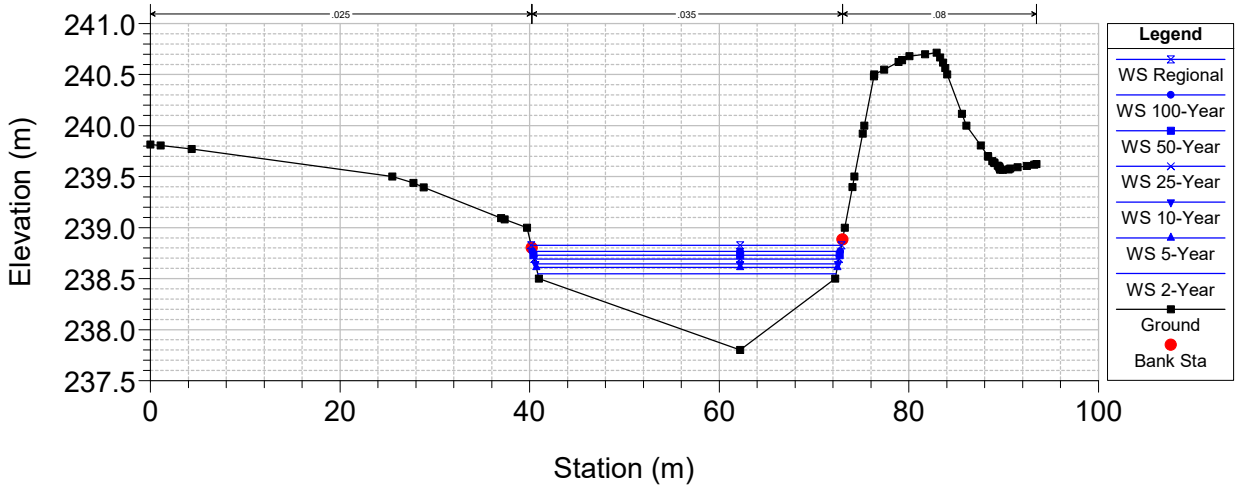
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021

River = CEG_DESIGN Reach = REACH1 RS = 2223.48



Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021

River = CEG_DESIGN Reach = REACH1 RS = 2223.47



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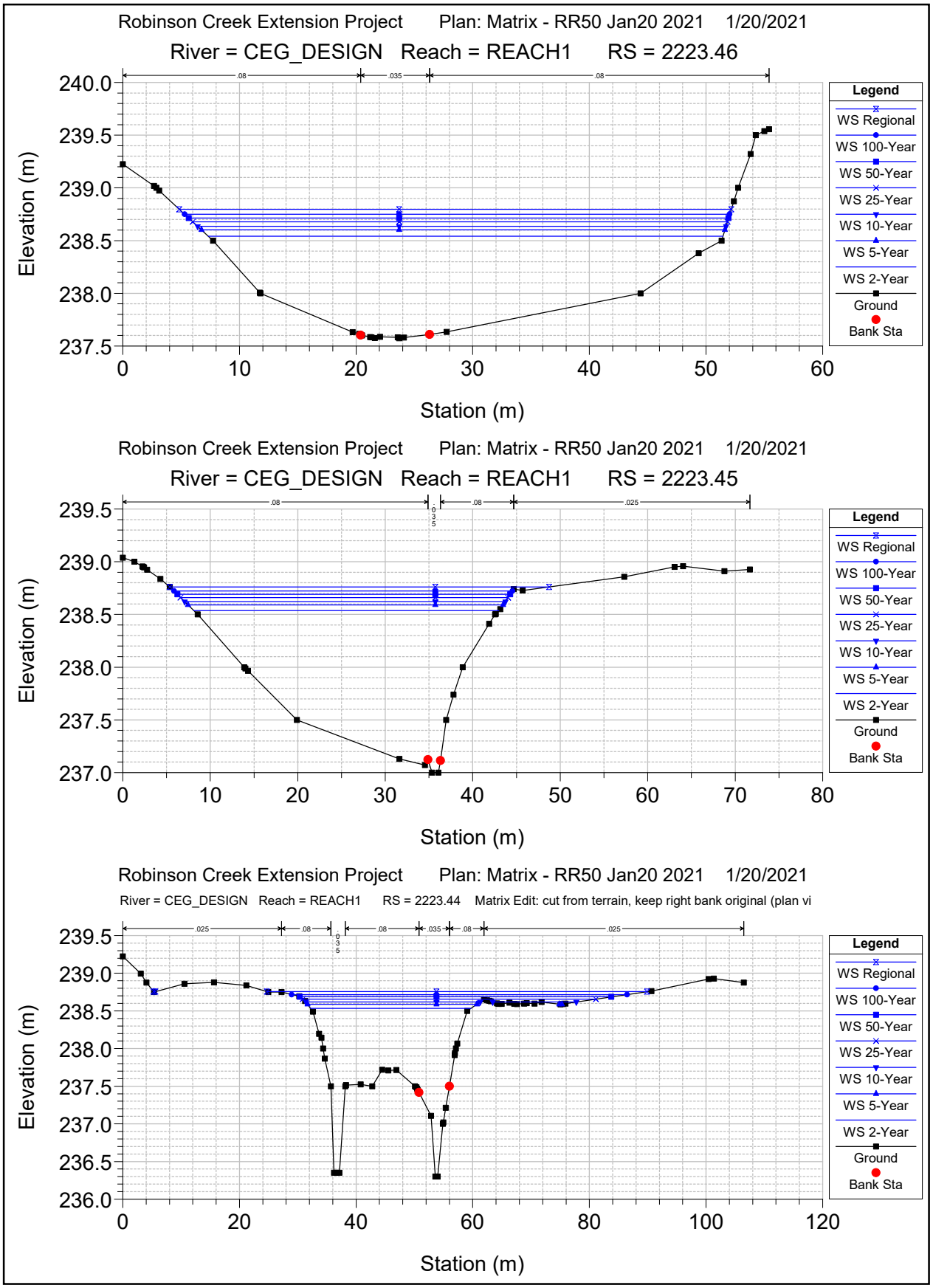
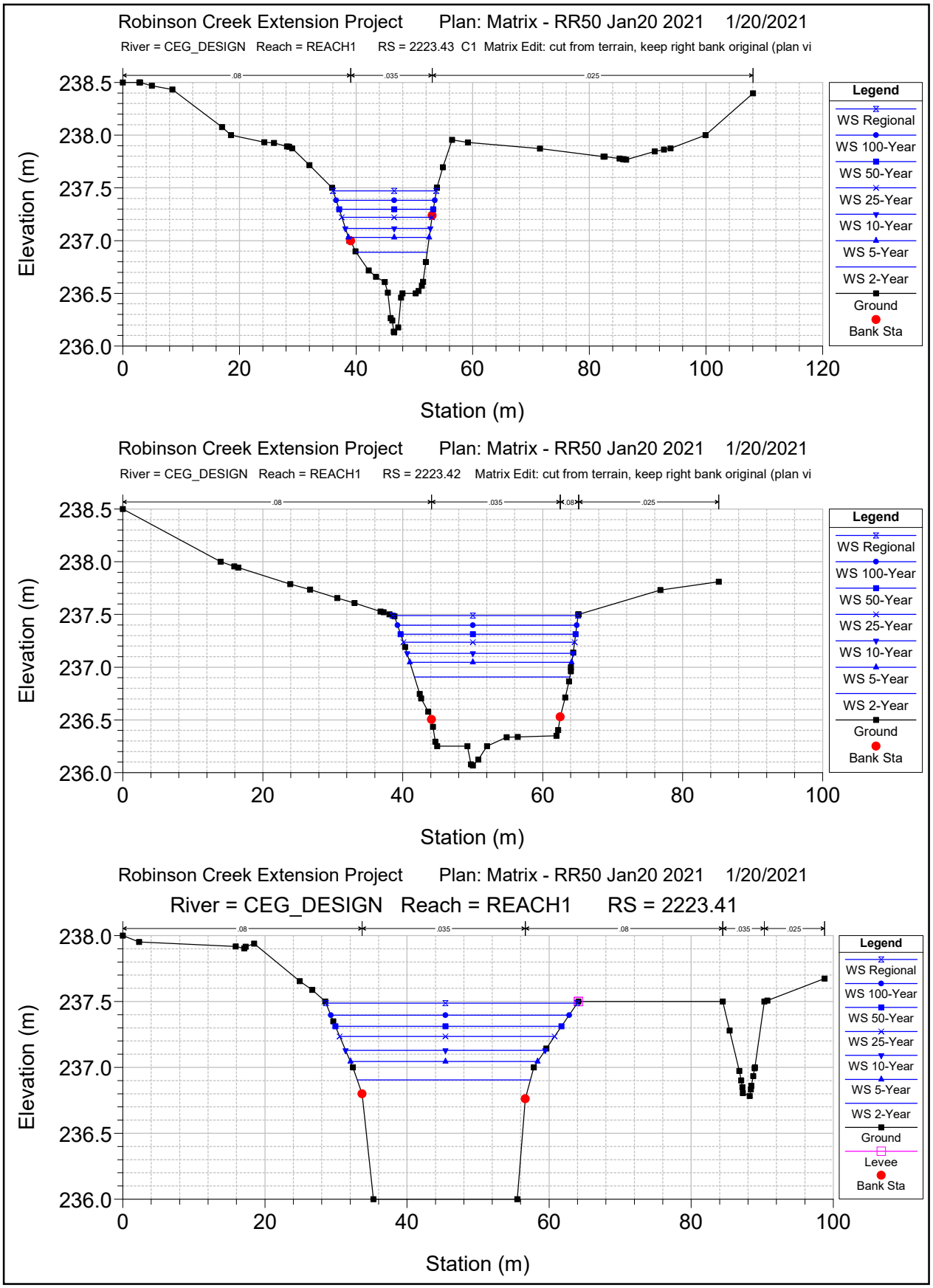
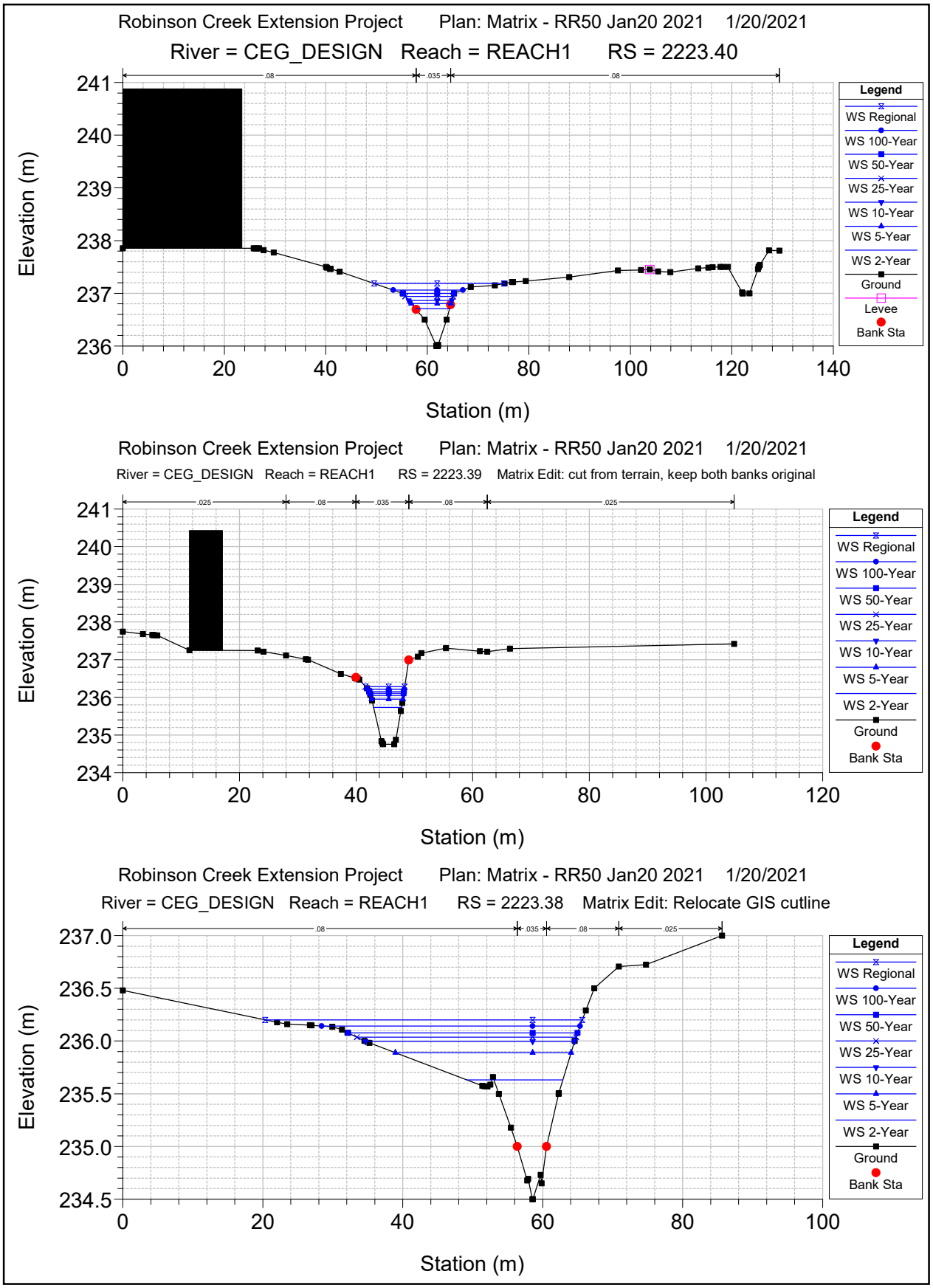

Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.46
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.45
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.44 Matrix Edit: cut from terrain, keep right bank original (plan vi
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta

DRAFT


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.43 C1 Matrix Edit: cut from terrain, keep right bank original (plan vi
.08
.035
.025
Elevation (m)
238.5
238.0
237.5
237.0
236.5
236.0
0
20
40
60
80
100
120
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.42 Matrix Edit: cut from terrain, keep right bank original (plan vi
.08
.035
.08
.025
Elevation (m)
238.5
238.0
237.5
237.0
236.5
236.0
0
20
40
60
80
100
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.41
.08
.035
.08
.035
.025
Elevation (m)
238.0
237.5
237.0
236.5
236.0
0
20
40
60
80
100
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.40
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.39 Matrix Edit: cut from terrain, keep both banks original
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.38 Matrix Edit: Relocate GIS cutline
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta

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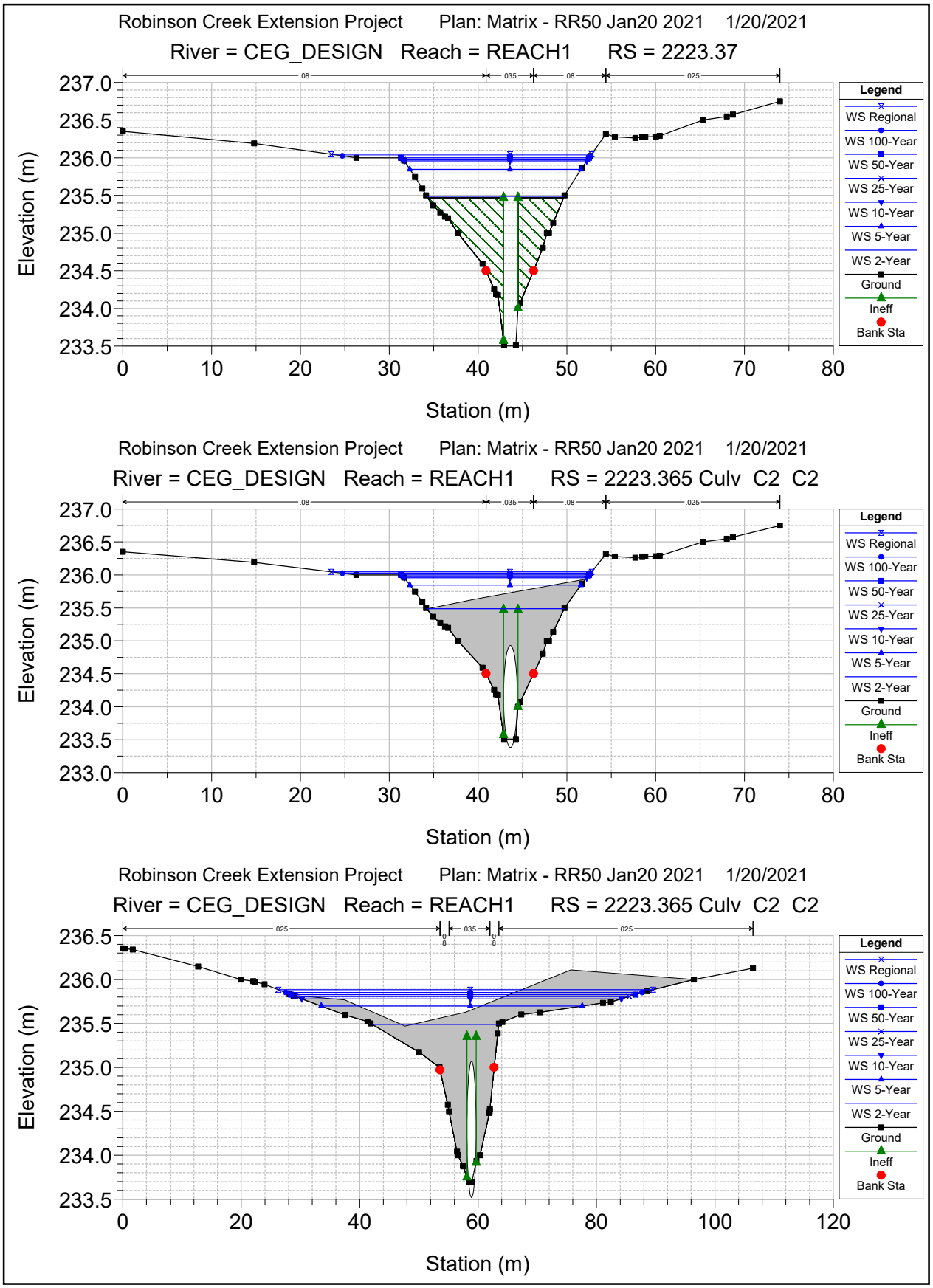
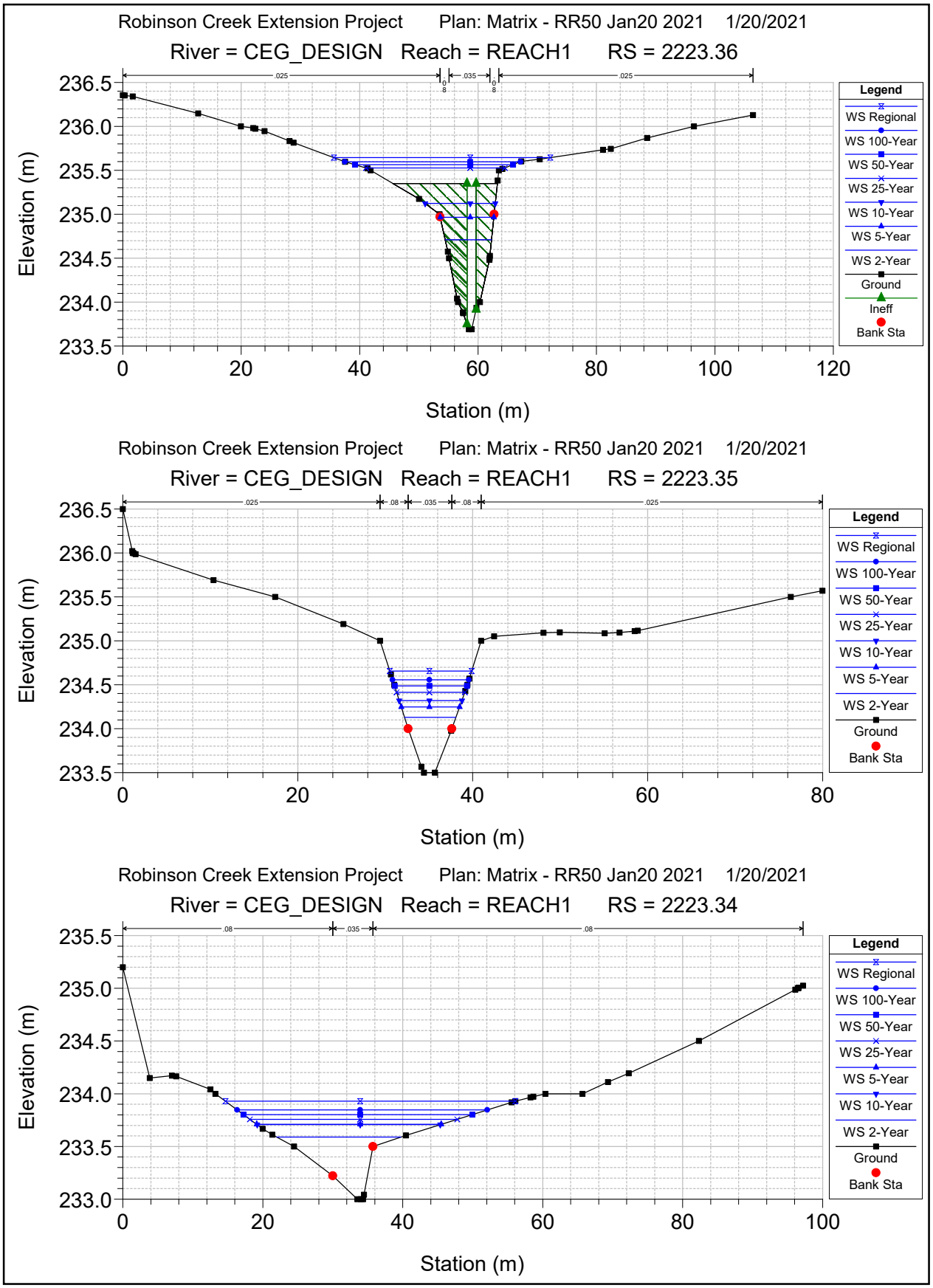

Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.37
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.365 Culv C2 C2
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.365 Culv C2 C2
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.36
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.35
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.34
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 5-Year
WS 10-Year
WS 2-Year
Ground
Bank Sta

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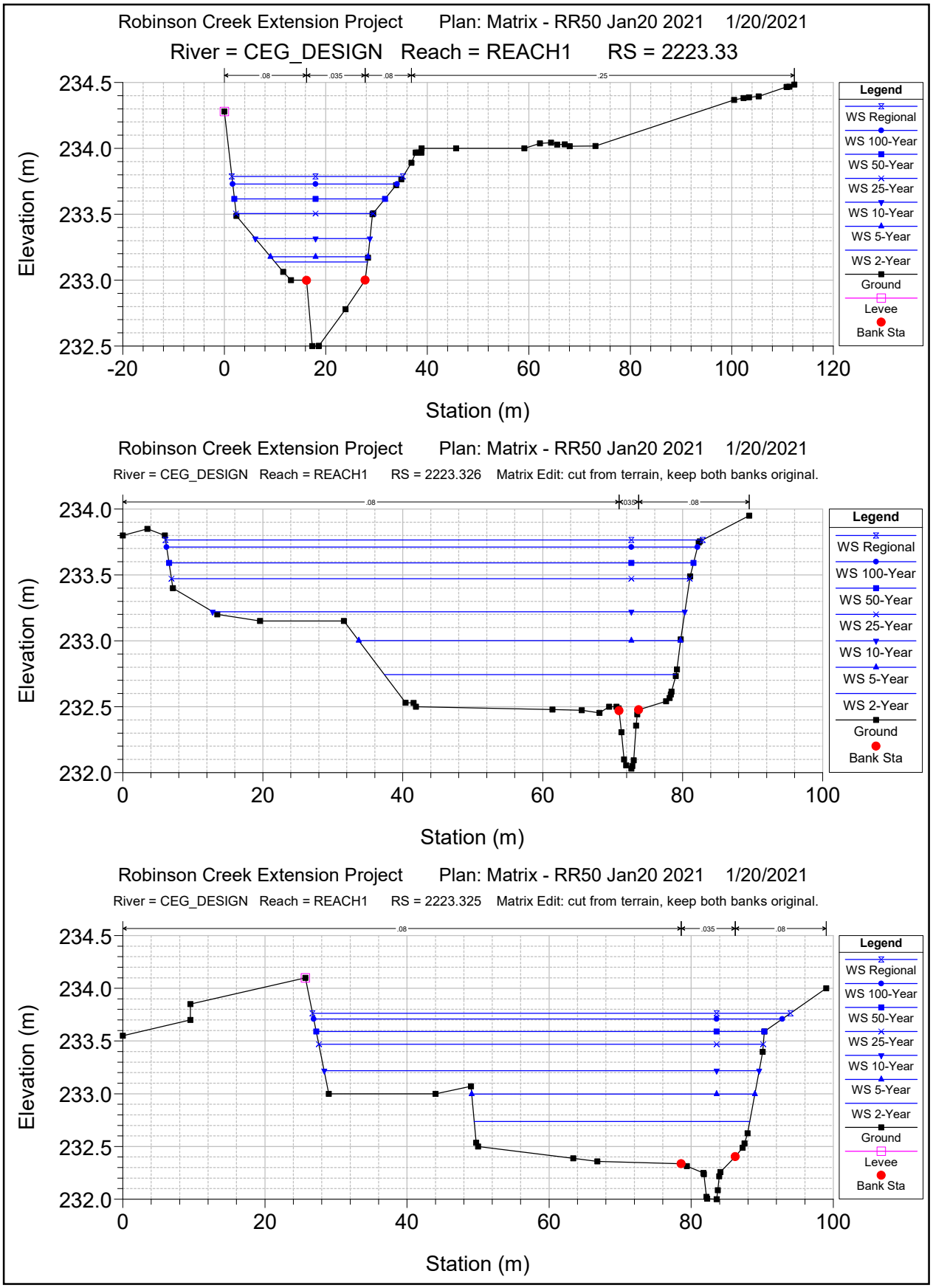
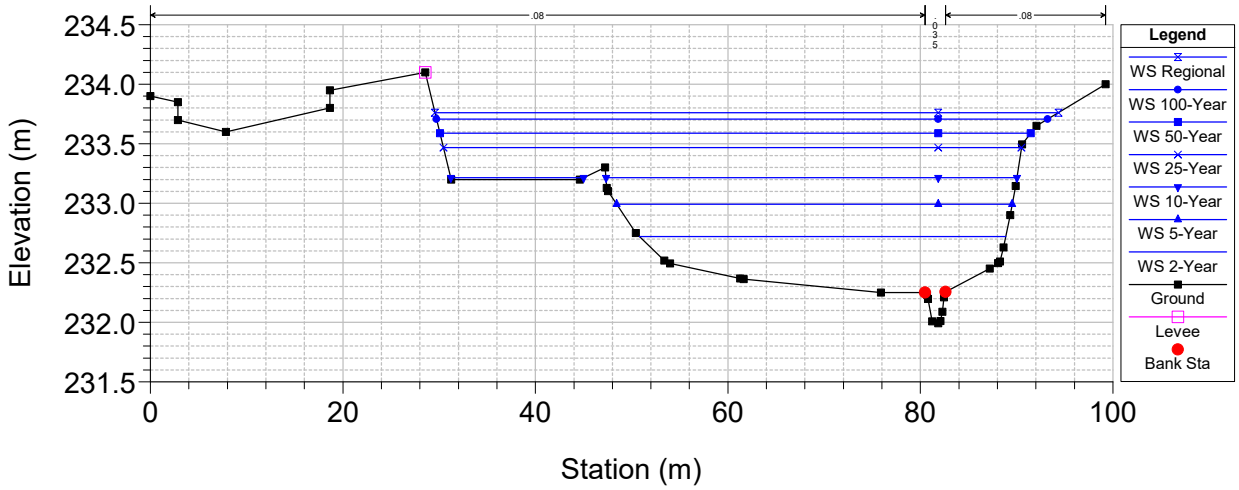

Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.33
.08
.035
.08
.25
Elevation (m)
234.5
234.0
233.5
233.0
232.5
-20
0
20
40
60
80
100
120
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.326 Matrix Edit: cut from terrain, keep both banks original.
.08
.035
.08
Elevation (m)
234.0
233.5
233.0
232.5
232.0
0
20
40
60
80
100
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.325 Matrix Edit: cut from terrain, keep both banks original.
.08
.035
.08
Elevation (m)
234.5
234.0
233.5
233.0
232.5
232.0
0
20
40
60
80
100
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Bank Sta

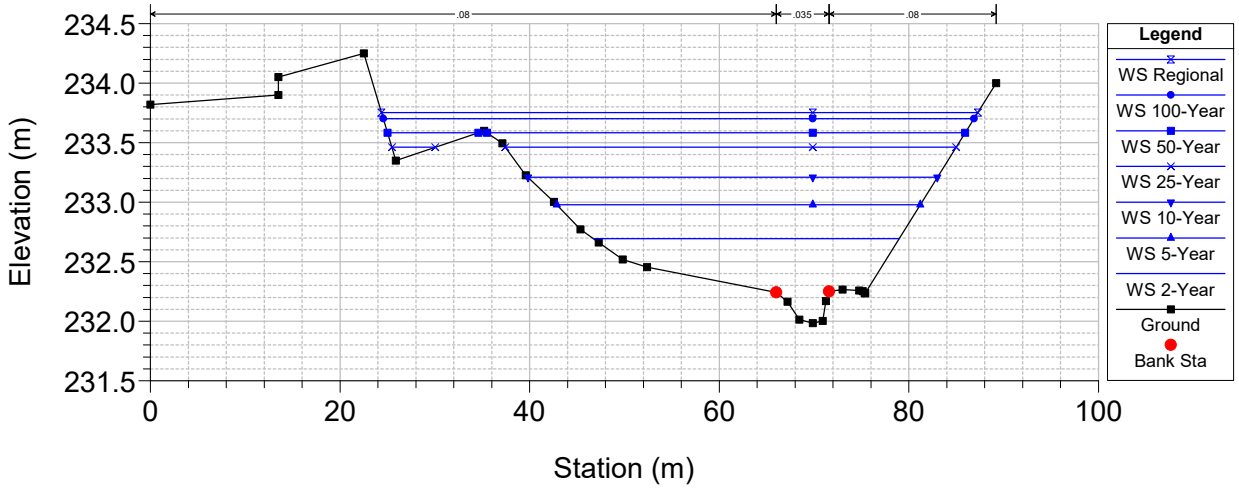
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021

River = CEG_DESIGN Reach = REACH1 RS = 2223.324 Matrix Edit: cut from terrain, keep both banks original.



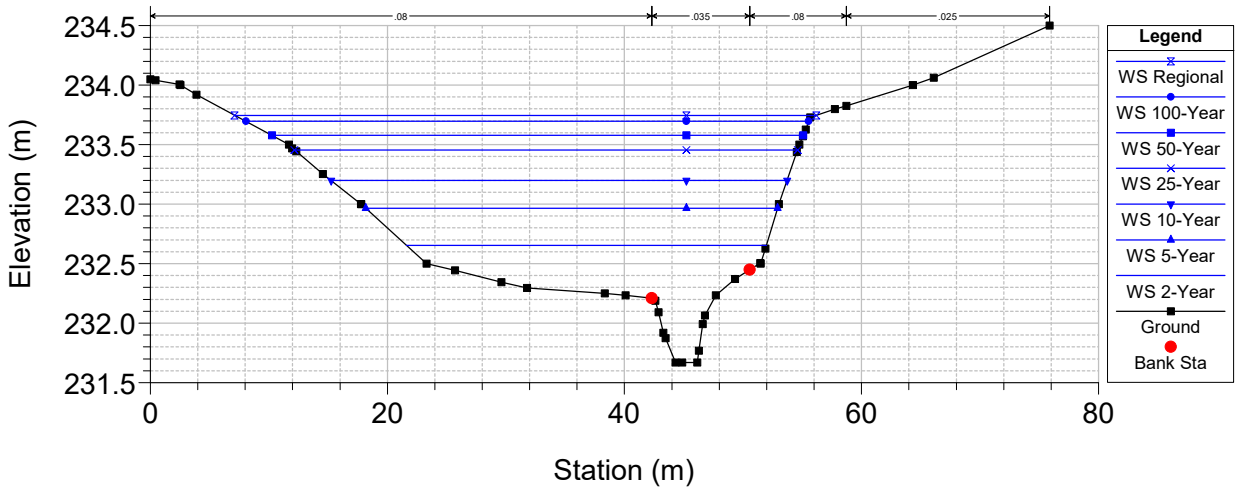
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021

River = CEG_DESIGN Reach = REACH1 RS = 2223.323 Matrix Edit: cut from terrain, keep both banks original.



Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021

River = CEG_DESIGN Reach = REACH1 RS = 2223.32 Matrix Edit: cut from terrain, keep both banks original. Keep in



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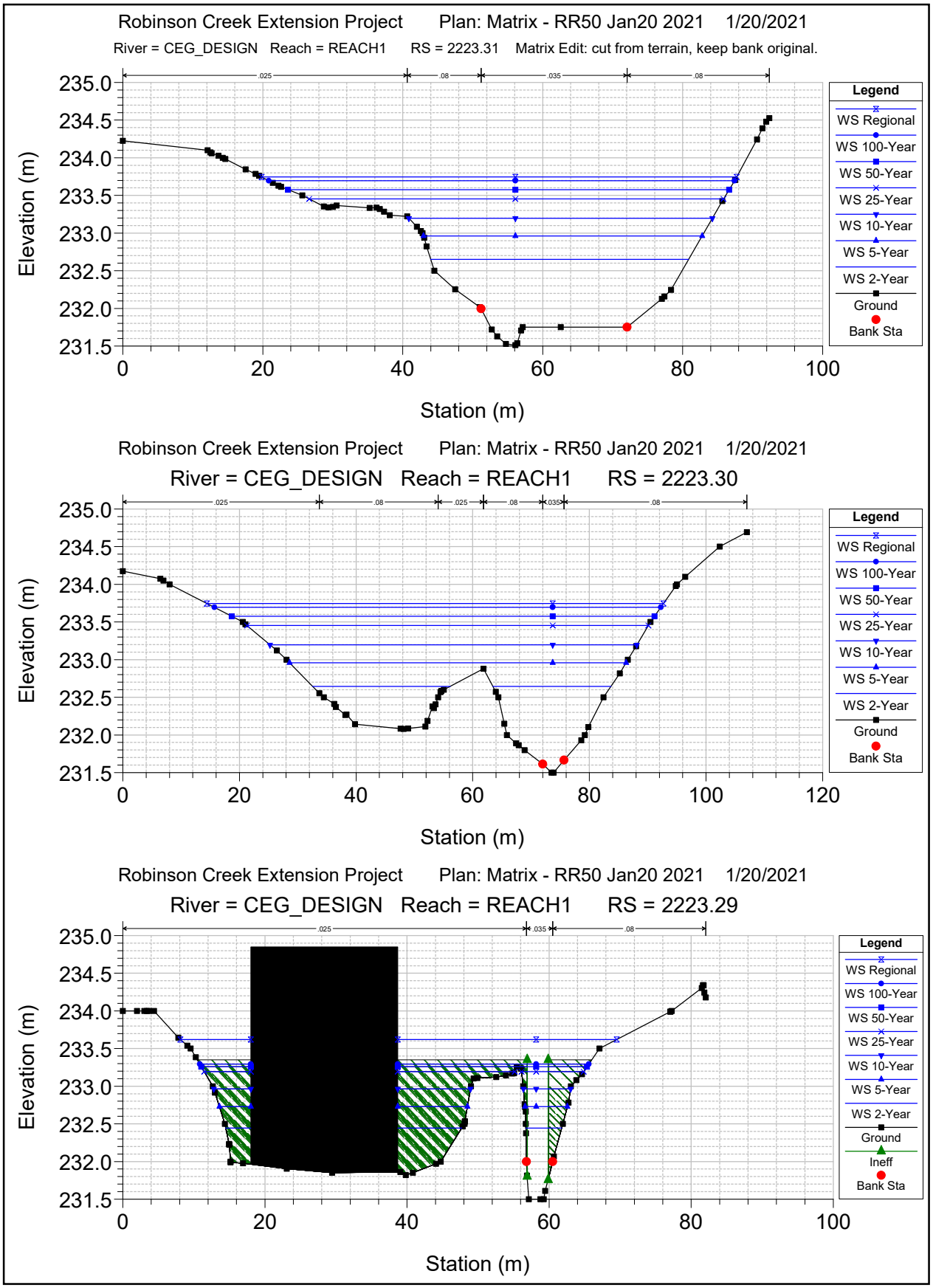
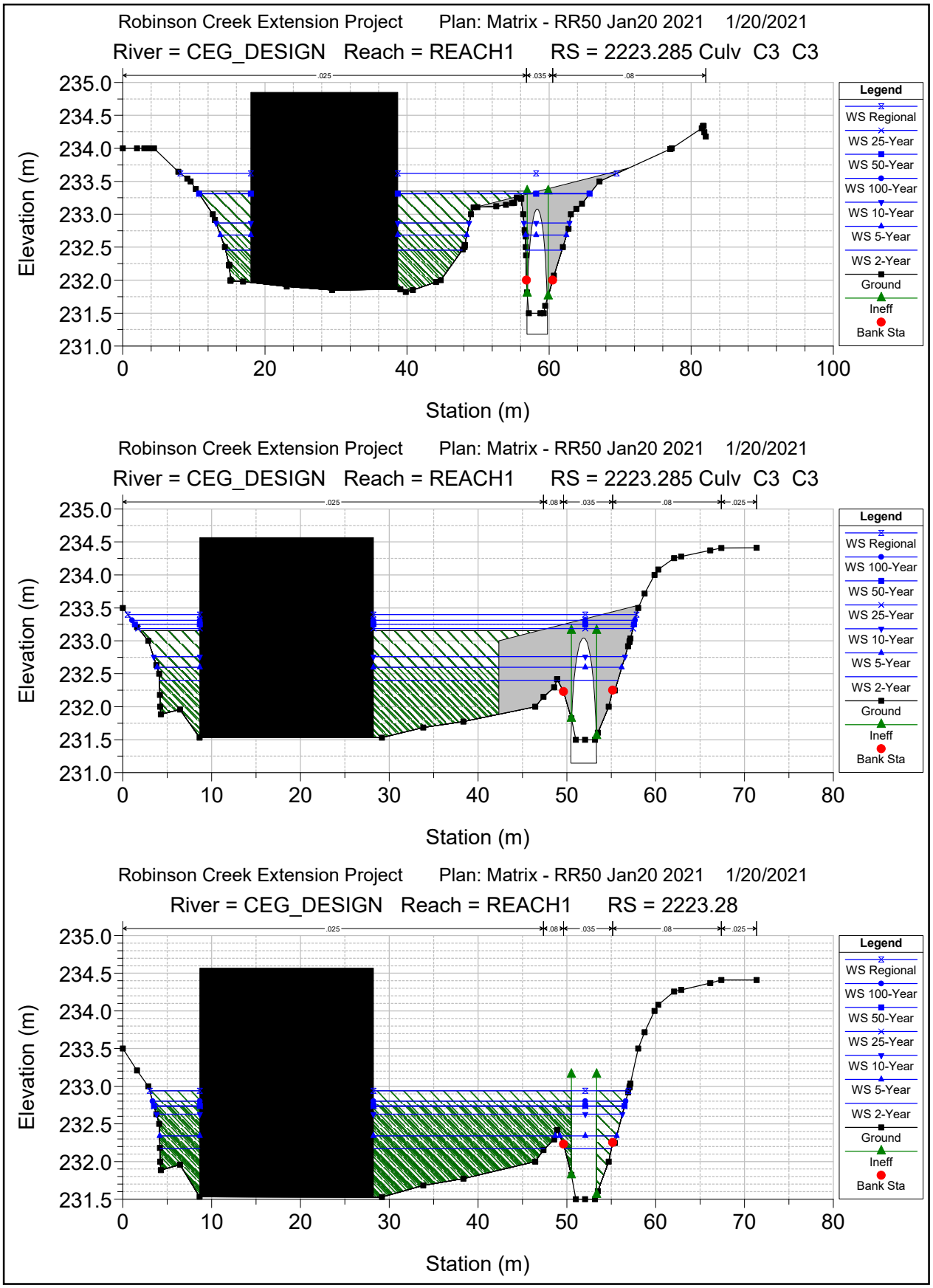
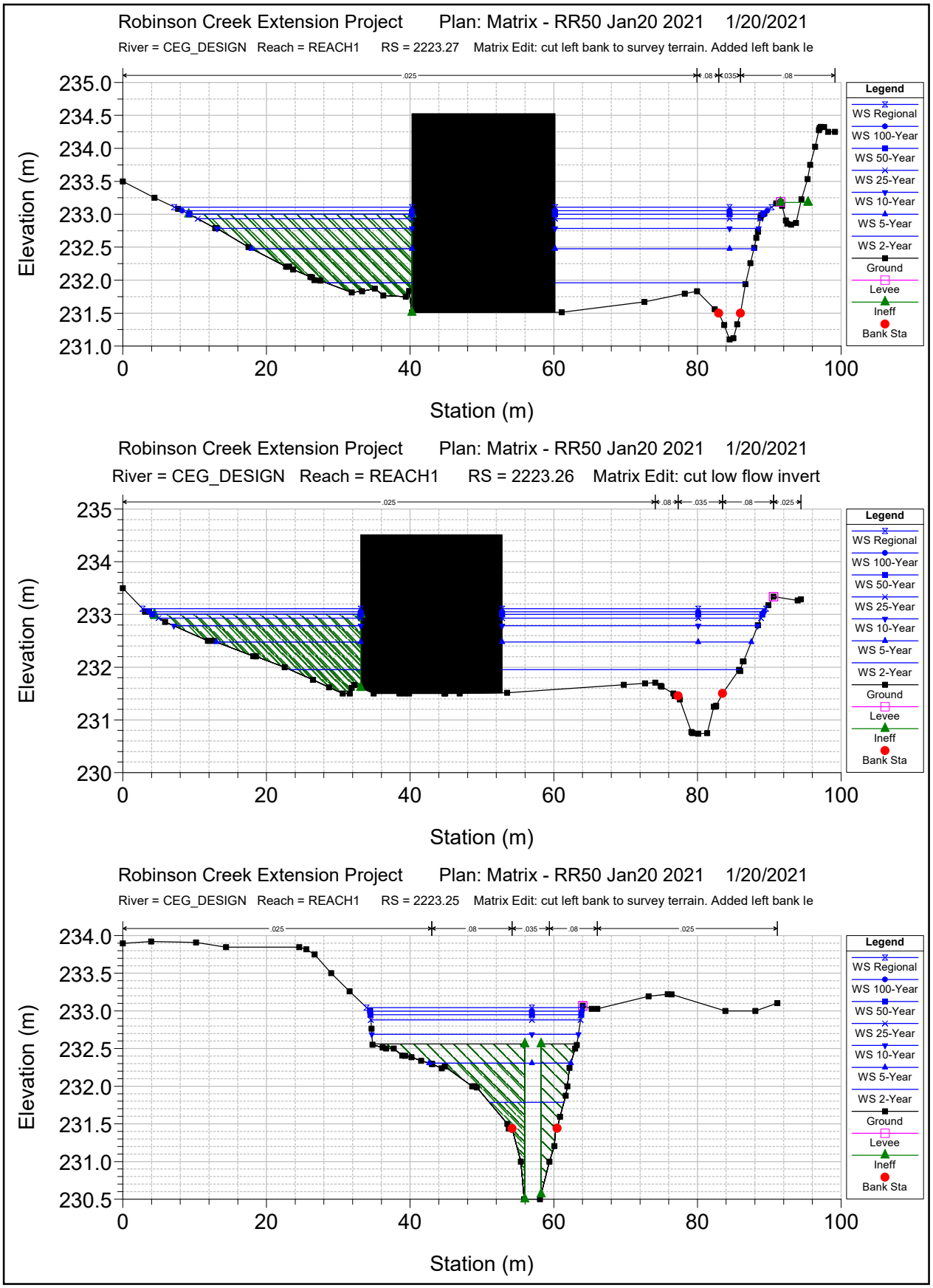
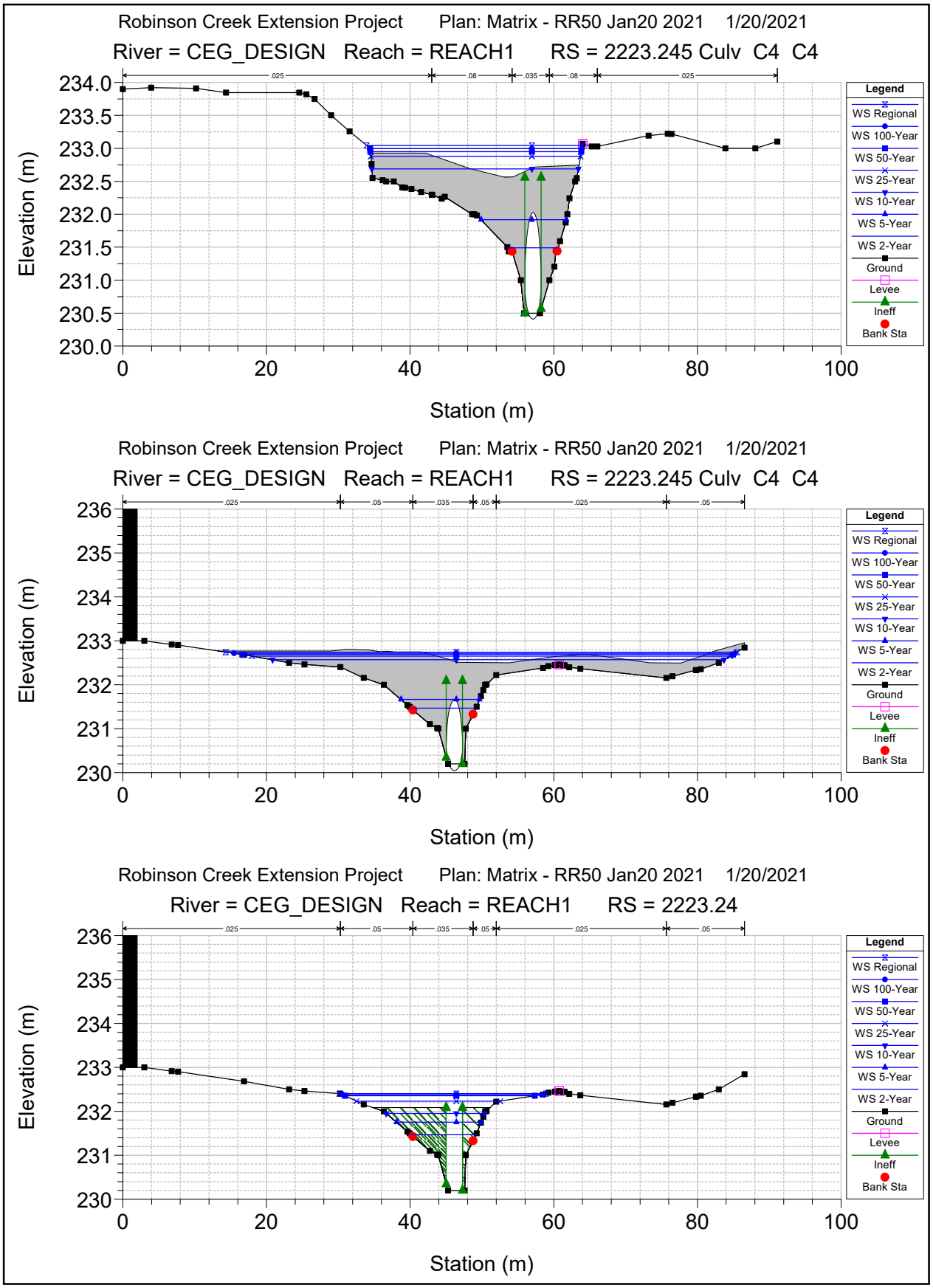
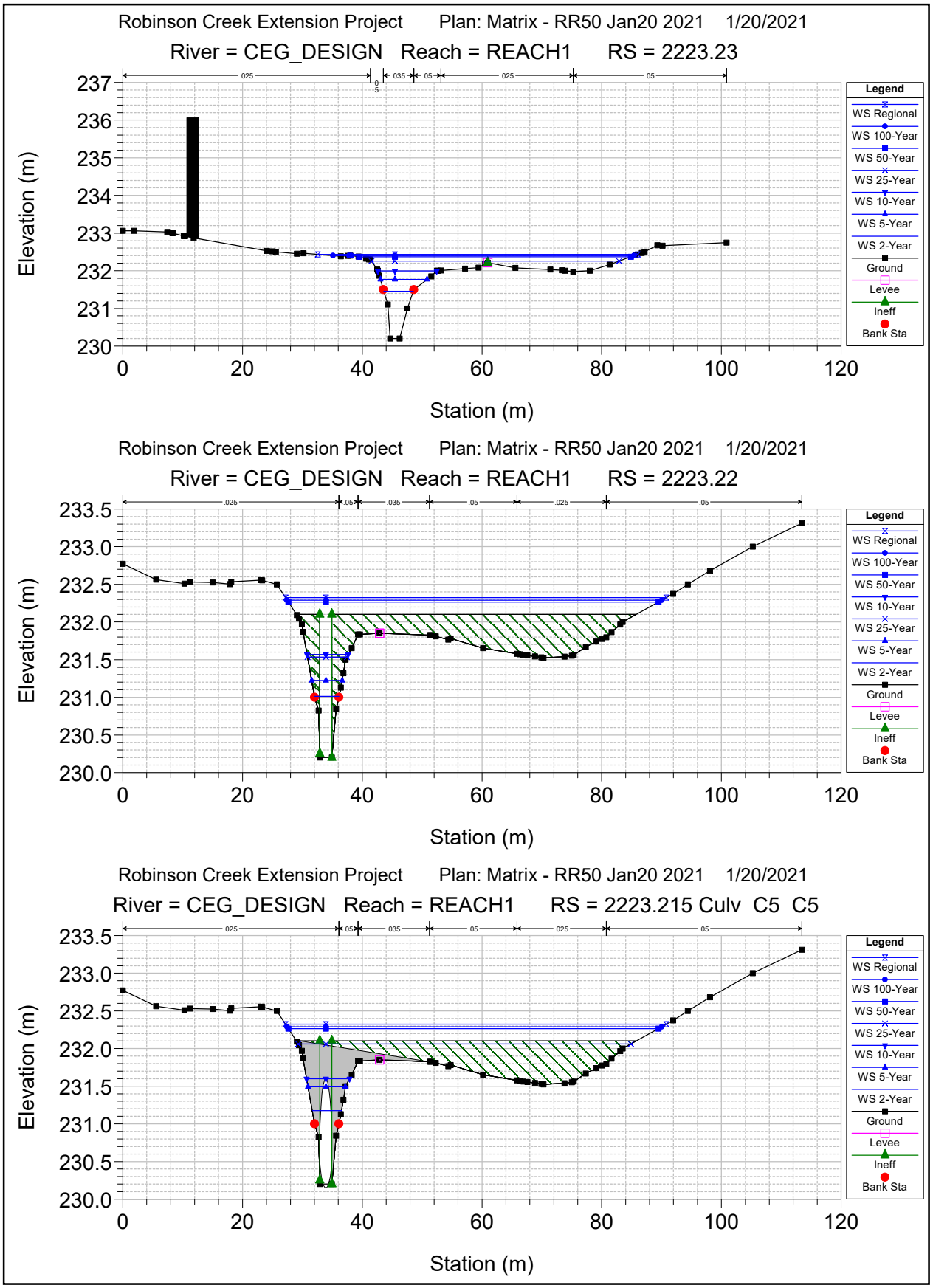

Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.31 Matrix Edit: cut from terrain, keep bank original.
.025
.08
.035
.08
Elevation (m)
235.0
234.5
234.0
233.5
233.0
232.5
232.0
231.5
0
20
40
60
80
100
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.30
.025
.08
.025
.08
.035
.08
Elevation (m)
235.0
234.5
234.0
233.5
233.0
232.5
232.0
231.5
0
20
40
60
80
100
120
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.29
.025
.035
.08
Elevation (m)
235.0
234.5
234.0
233.5
233.0
232.5
232.0
231.5
0
20
40
60
80
100
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.285 Culv C3 C3
Elevation (m)
Station (m)
Legend
WS Regional
WS 25-Year
WS 50-Year
WS 100-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.285 Culv C3 C3
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.28
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.27 Matrix Edit: cut left bank to survey terrain. Added left bank le
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.26 Matrix Edit: cut low flow invert
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.25 Matrix Edit: cut left bank to survey terrain. Added left bank le
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.245 Culv C4 C4
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.245 Culv C4 C4
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.24
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.23
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.22
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 10-Year
WS 25-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.215 Culv C5 C5
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta

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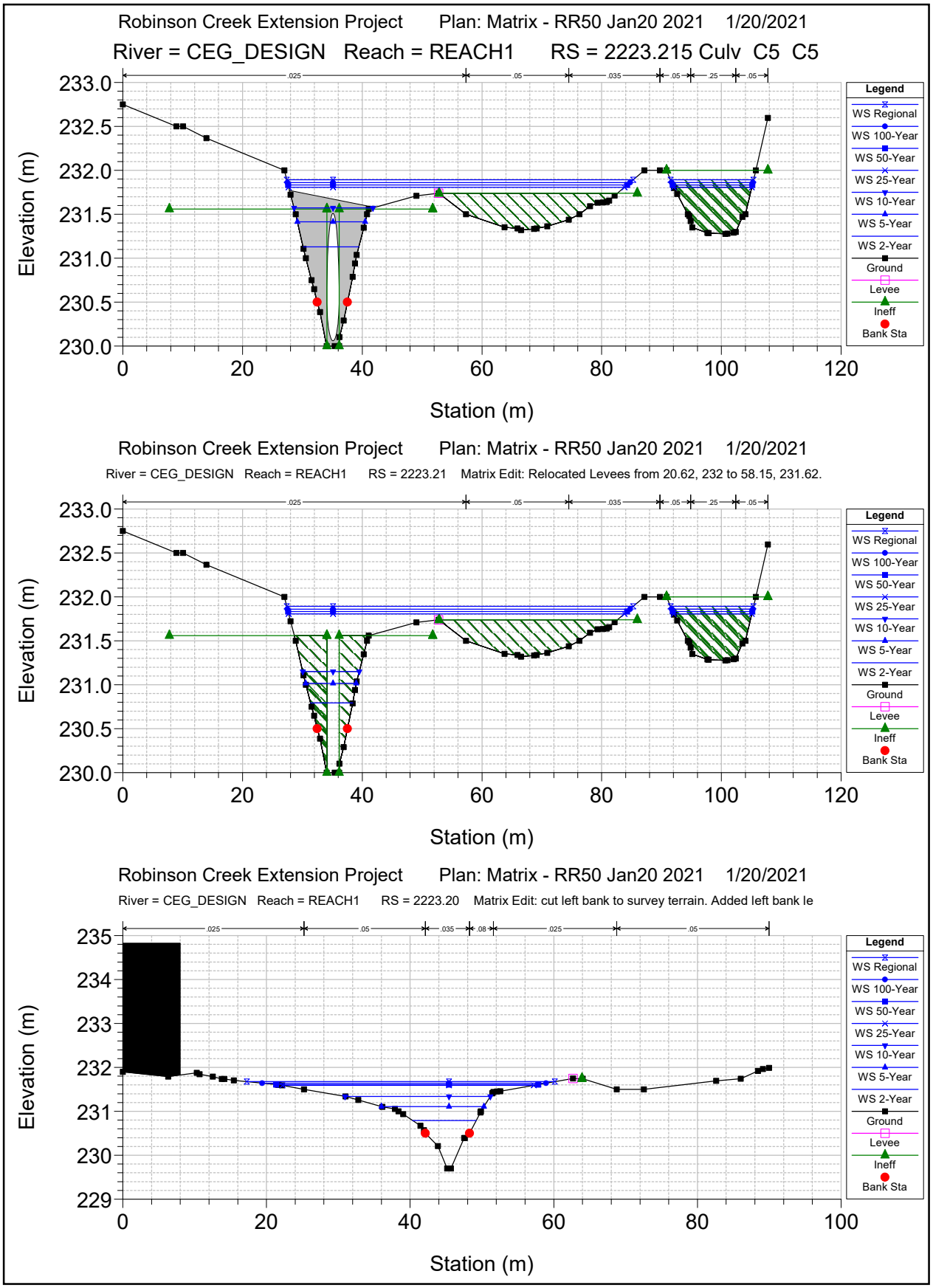
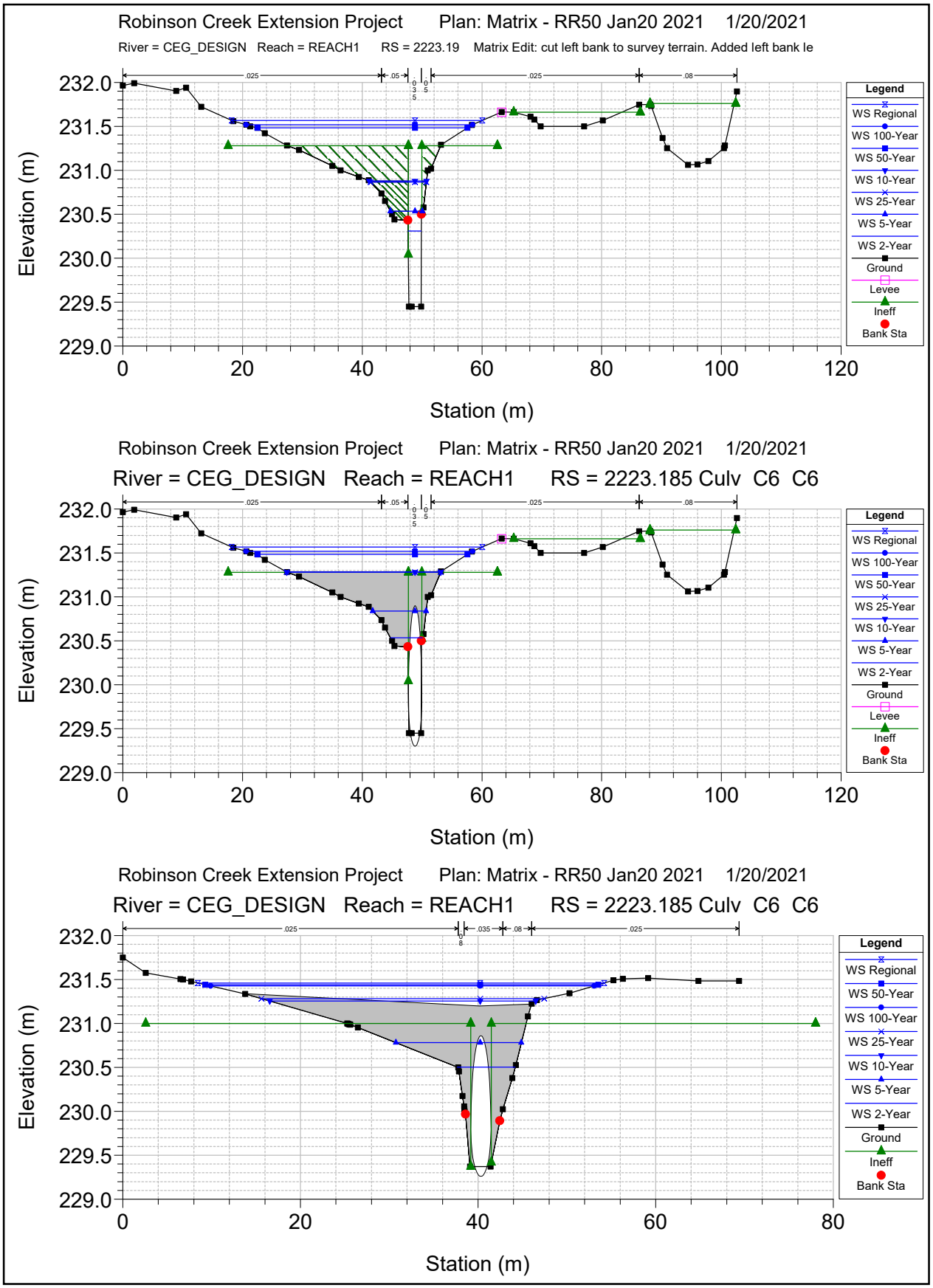

Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.215 Culv C5 C5
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.21 Matrix Edit: Relocated Levees from 20.62, 232 to 58.15, 231.62.
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.20 Matrix Edit: cut left bank to survey terrain. Added left bank le
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.19 Matrix Edit: cut left bank to survey terrain. Added left bank le
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 10-Year
WS 25-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.185 Culv C6 C6
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.185 Culv C6 C6
Elevation (m)
Station (m)
Legend
WS Regional
WS 50-Year
WS 100-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta

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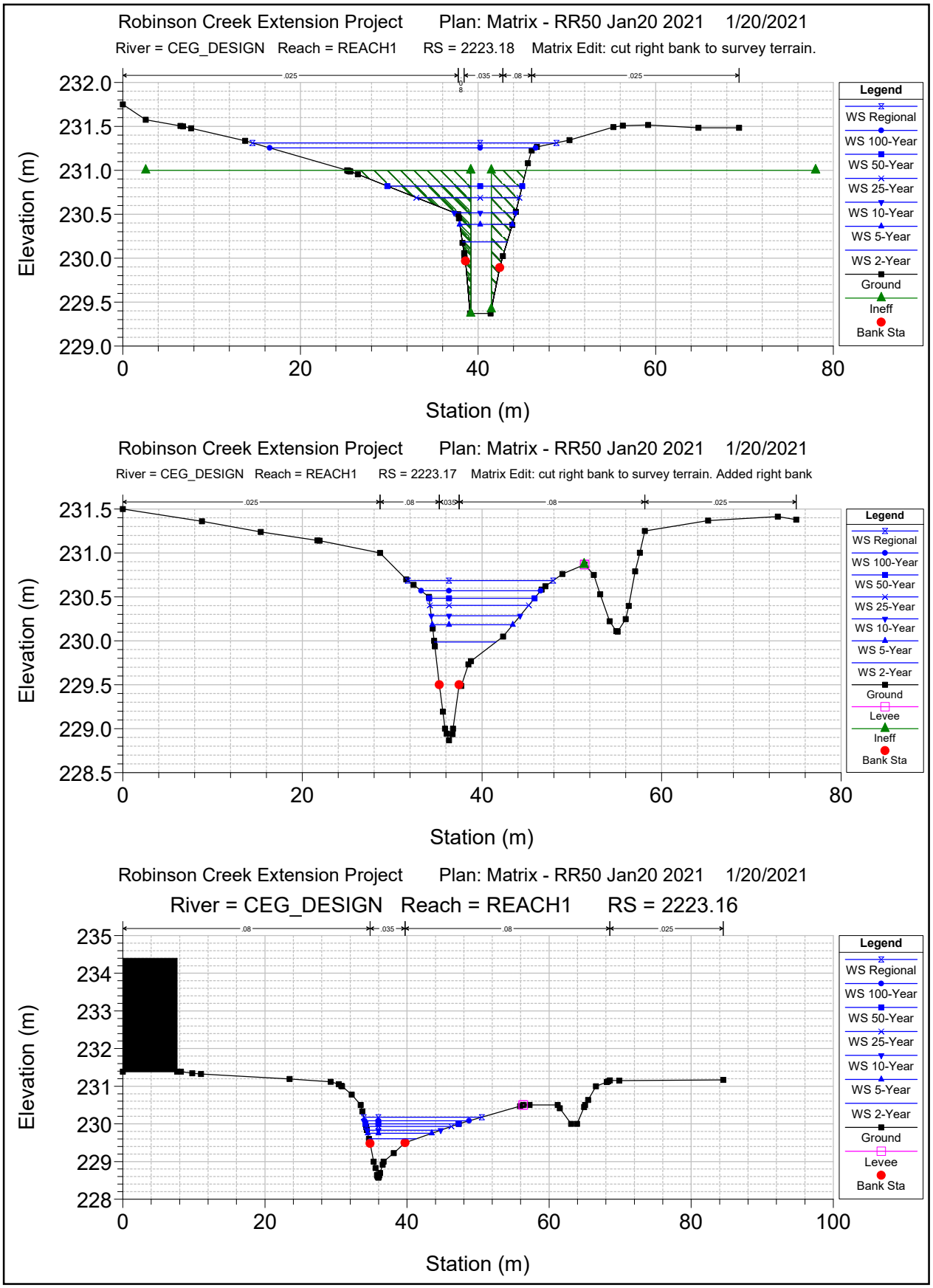
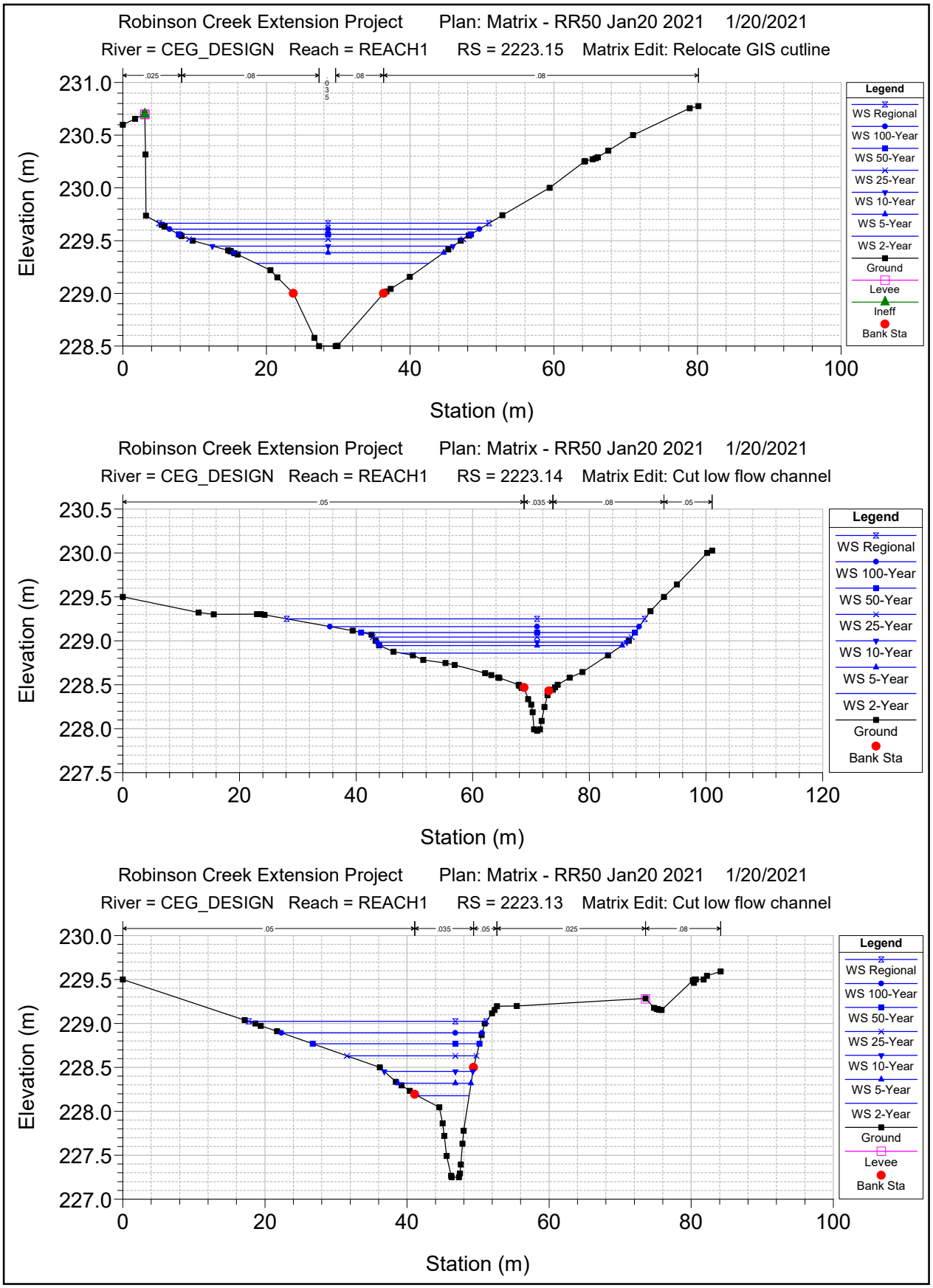
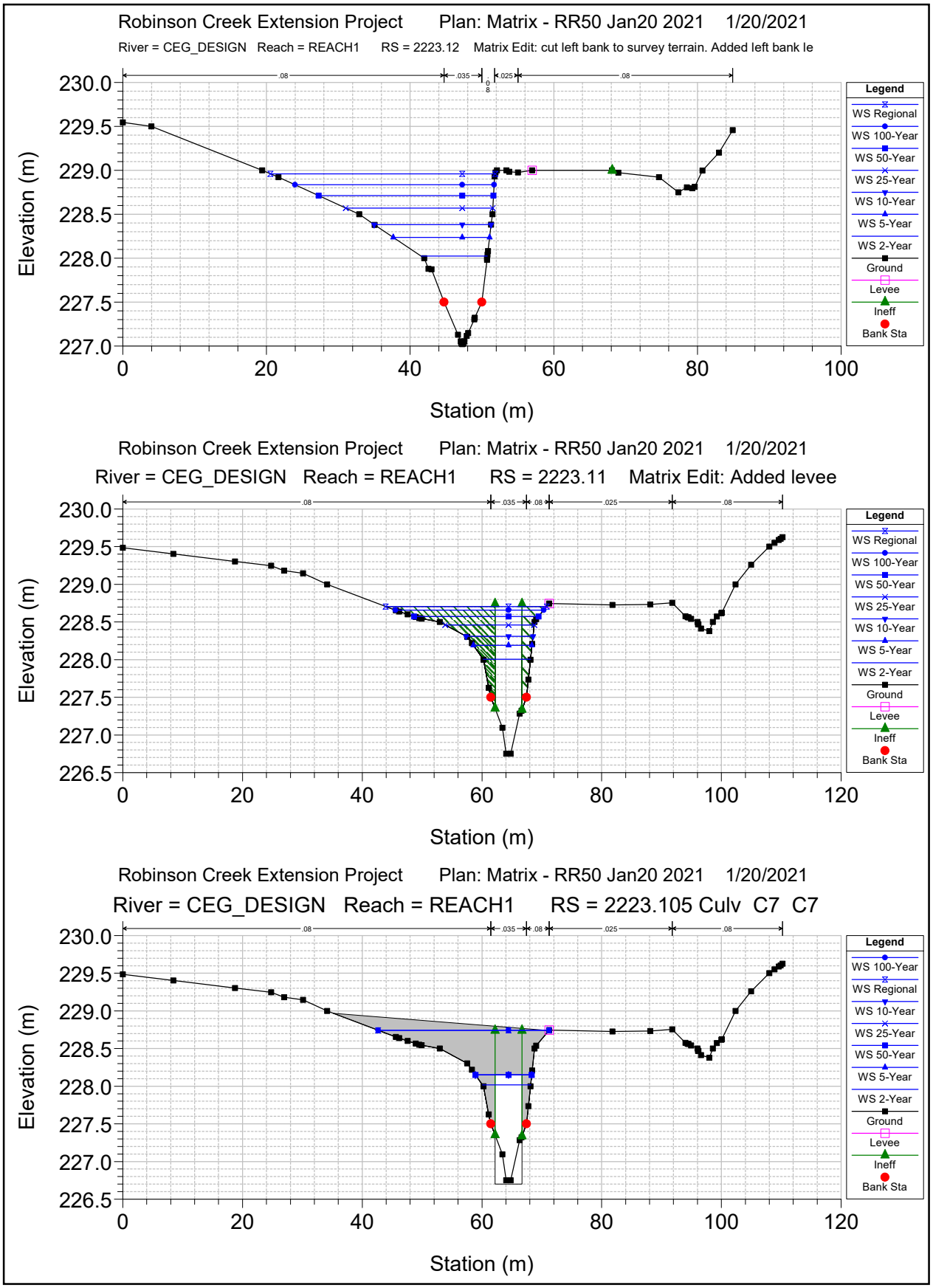

Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.18 Matrix Edit: cut right bank to survey terrain.
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.17 Matrix Edit: cut right bank to survey terrain. Added right bank
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.16
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.15 Matrix Edit: Relocate GIS cutline
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.14 Matrix Edit: Cut low flow channel
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.13 Matrix Edit: Cut low flow channel
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.12 Matrix Edit: cut left bank to survey terrain. Added left bank le
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.11 Matrix Edit: Added levee
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.105 Culv C7 C7
Elevation (m)
Station (m)
Legend
WS 100-Year
WS Regional
WS 10-Year
WS 25-Year
WS 50-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta

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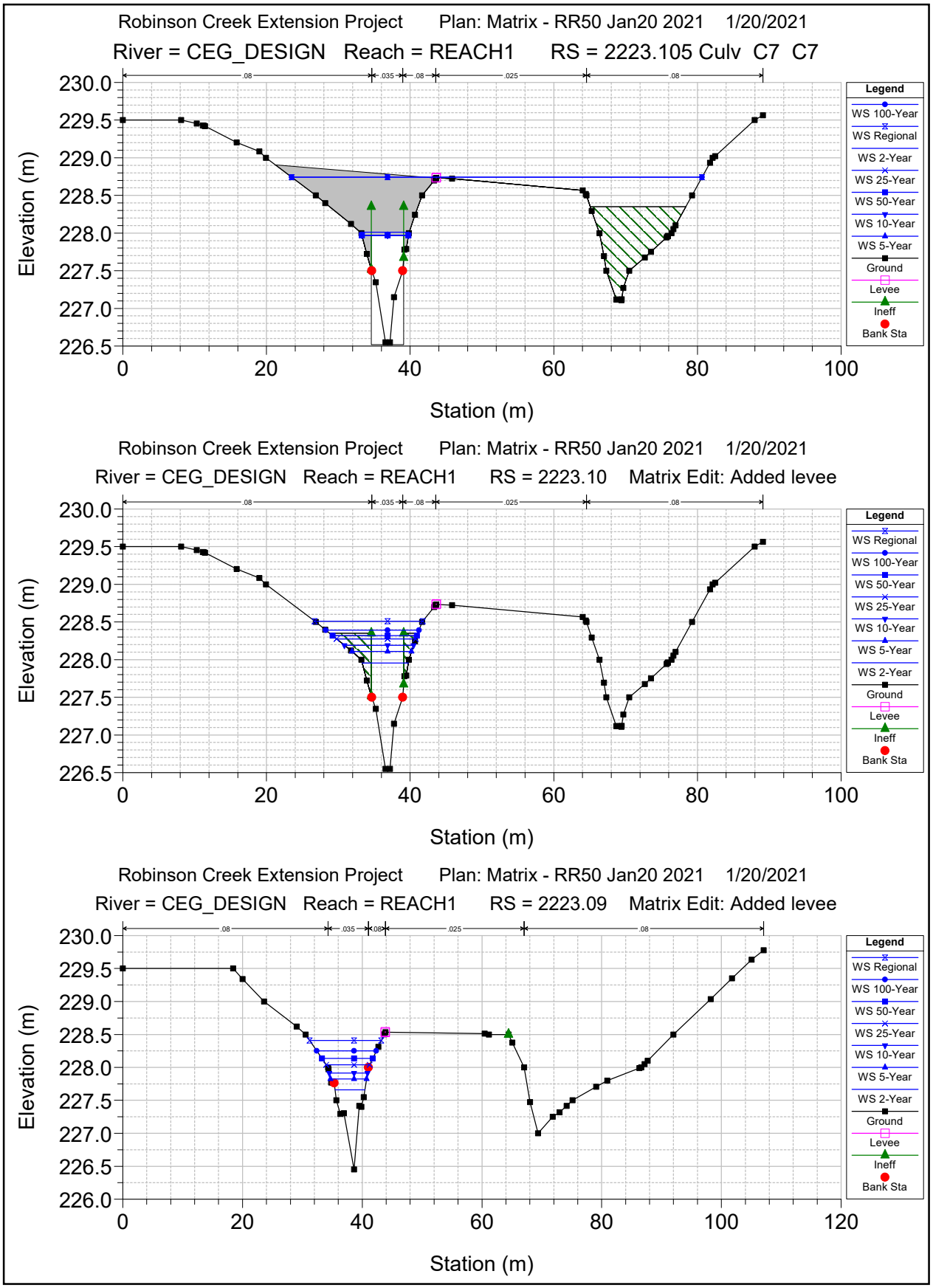
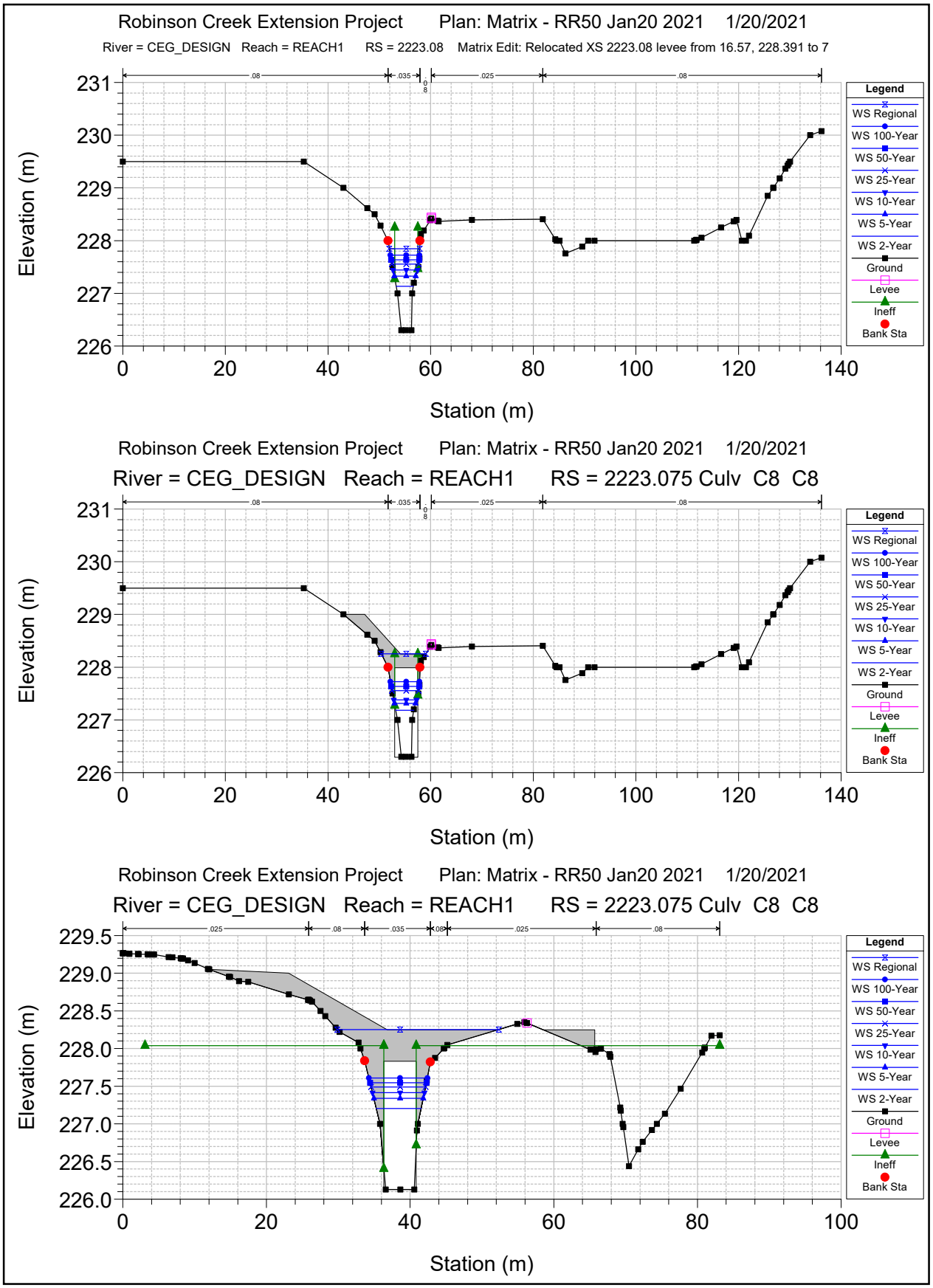

Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.105 Culv C7 C7
Elevation (m)
Station (m)
Legend
WS 100-Year
WS Regional
WS 2-Year
WS 25-Year
WS 50-Year
WS 10-Year
WS 5-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.10 Matrix Edit: Added levee
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.09 Matrix Edit: Added levee
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.08 Matrix Edit: Relocated XS 2223.08 levee from 16.57, 228.391 to 7
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.075 Culv C8 C8
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.075 Culv C8 C8
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta

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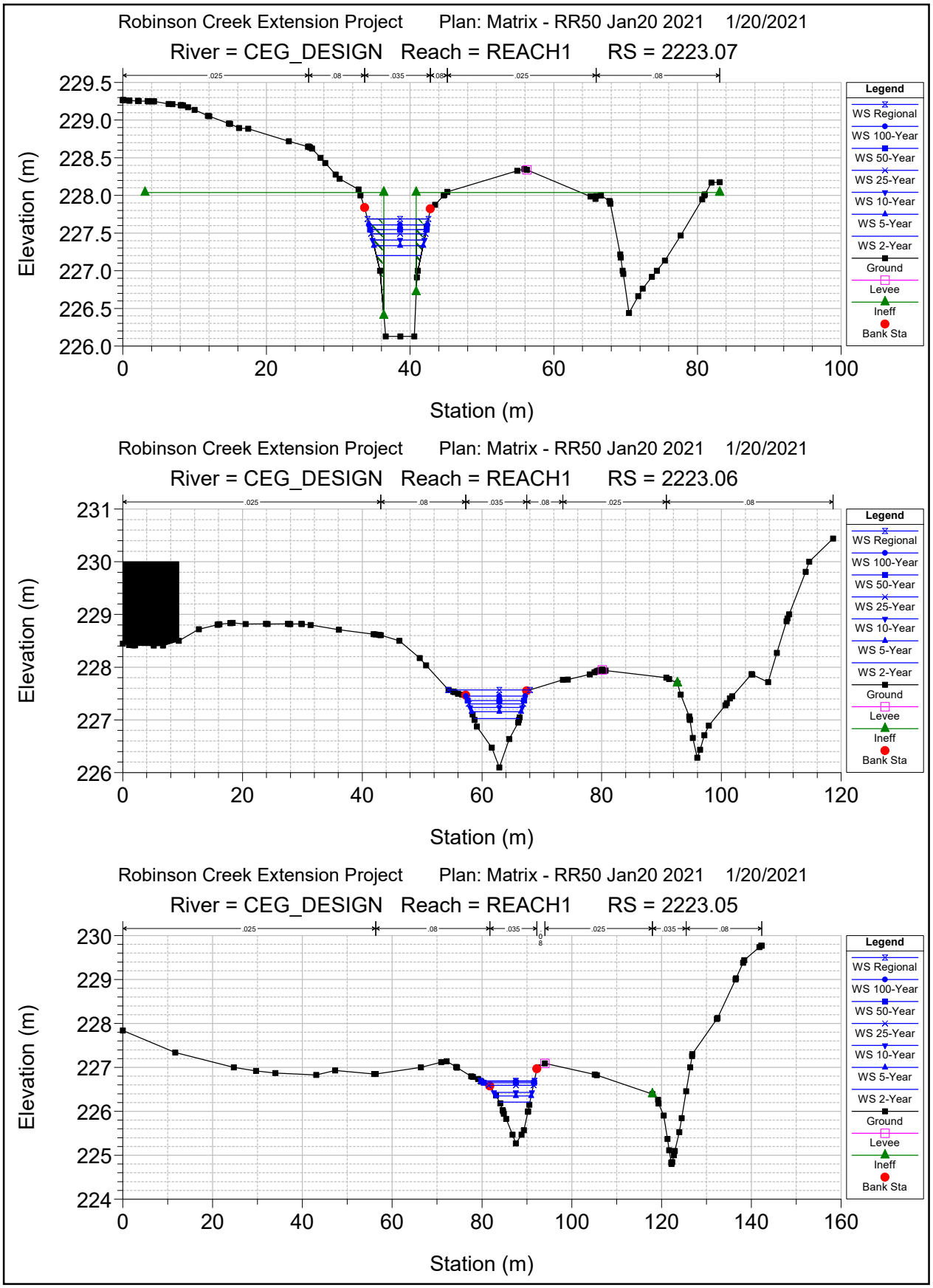
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.07
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.06
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.05
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta

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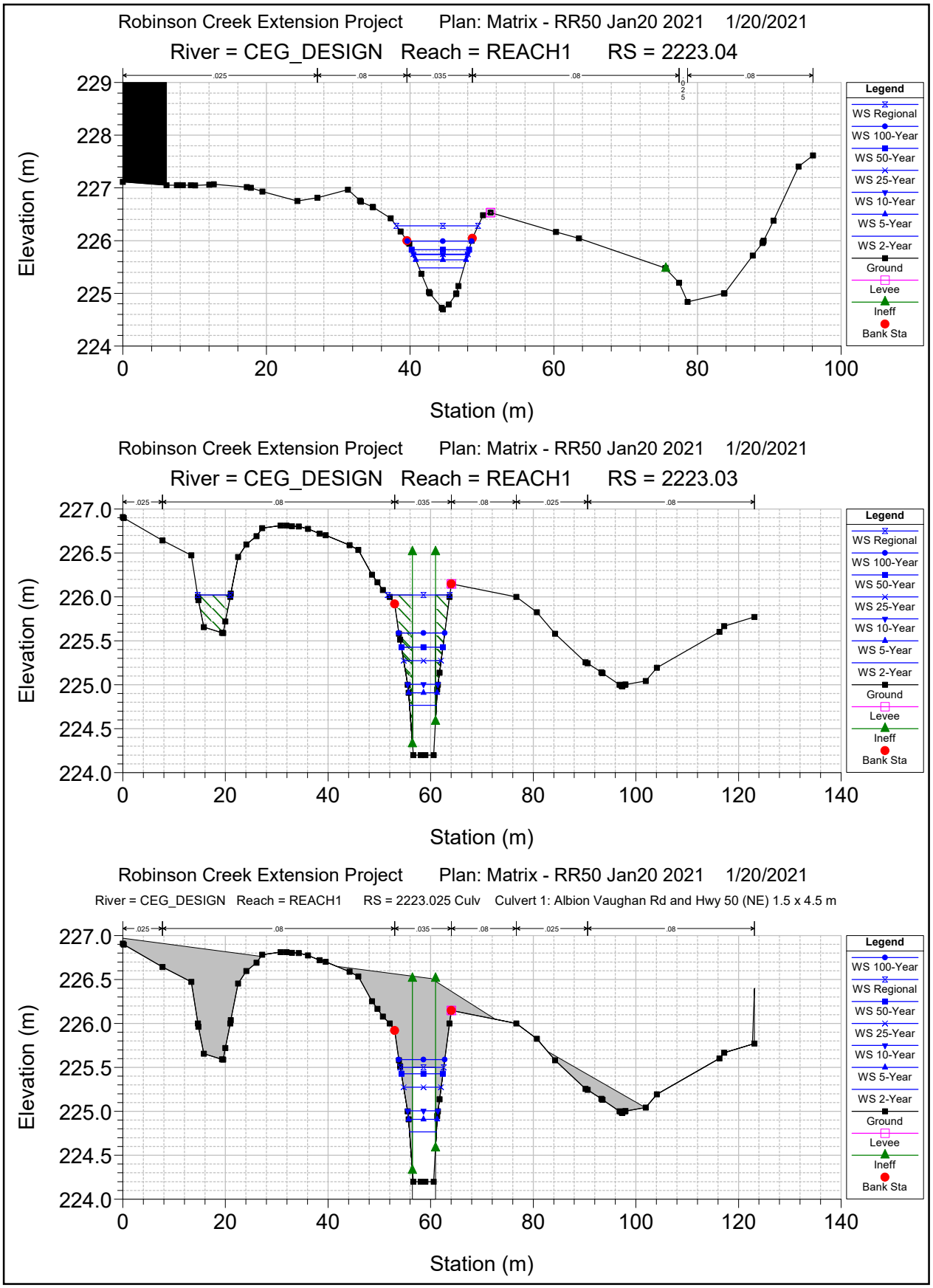
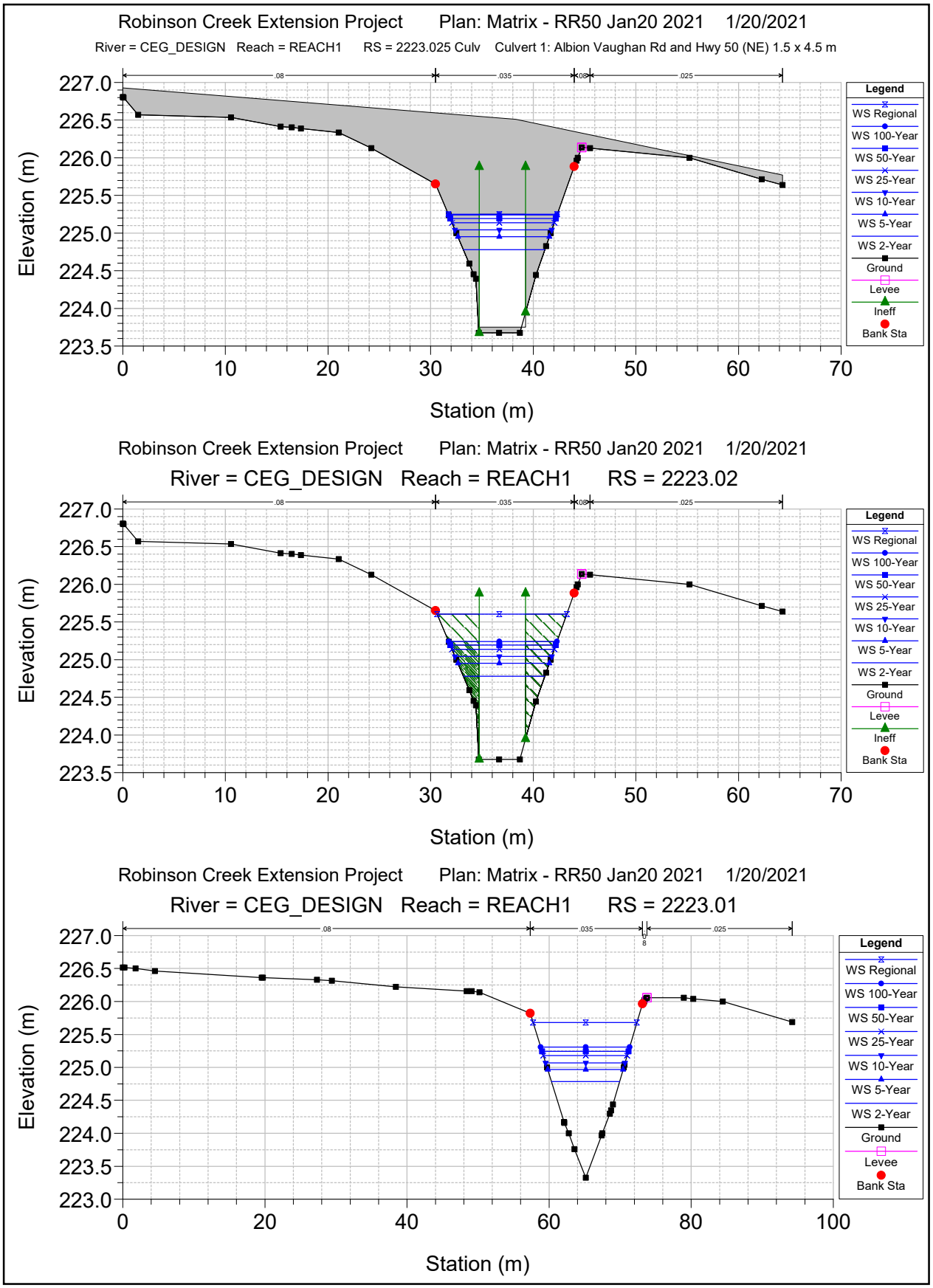

Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.04
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.03
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.025 Culv Culvert 1: Albion Vaughan Rd and Hwy 50 (NE) 1.5 x 4.5 m
Elevation (m)
Station (m)
Legend
WS 100-Year
WS Regional
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.025 Culv Culvert 1: Albion Vaughan Rd and Hwy 50 (NE) 1.5 x 4.5 m
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.02
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2223.01
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Bank Sta

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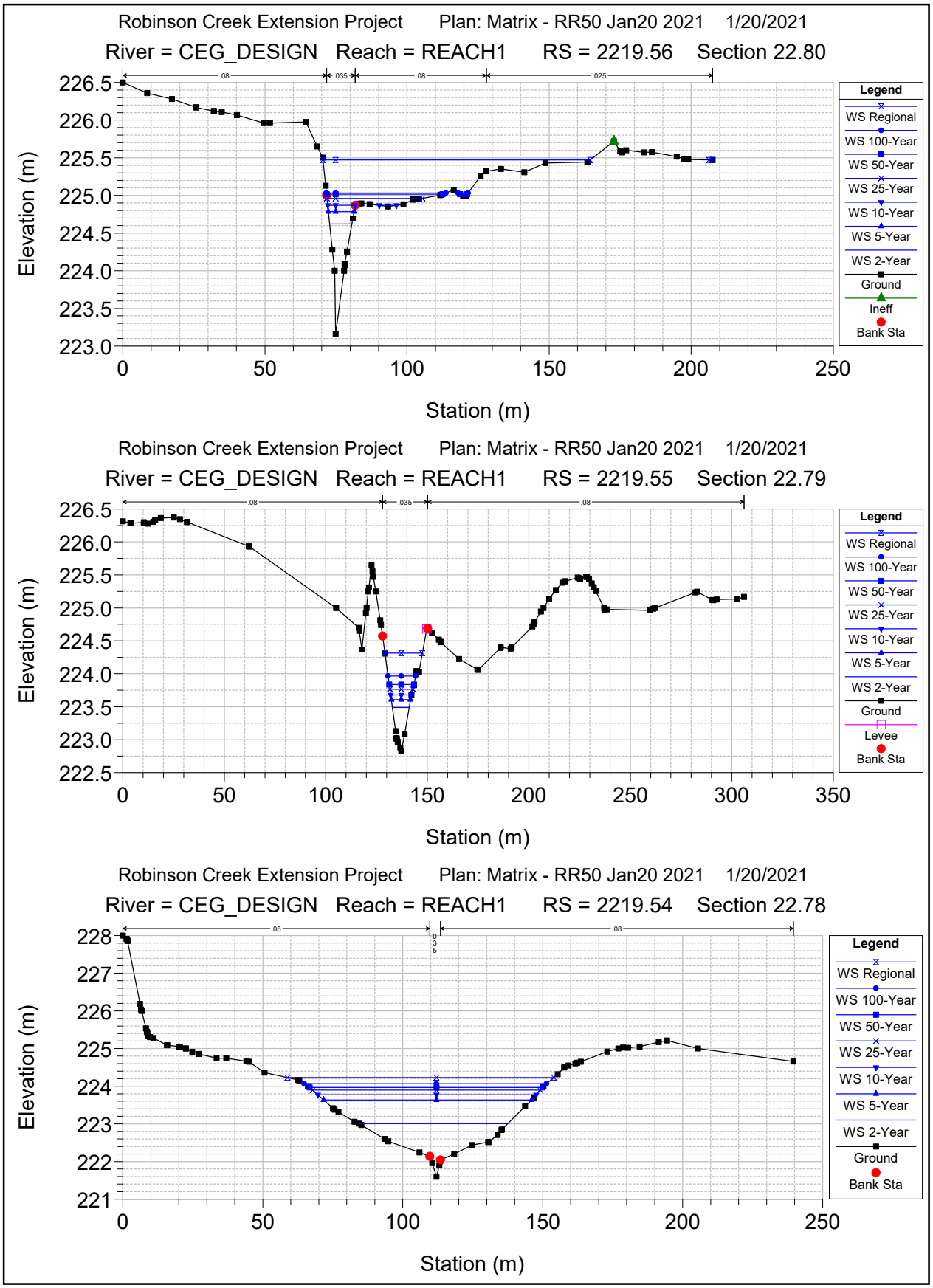
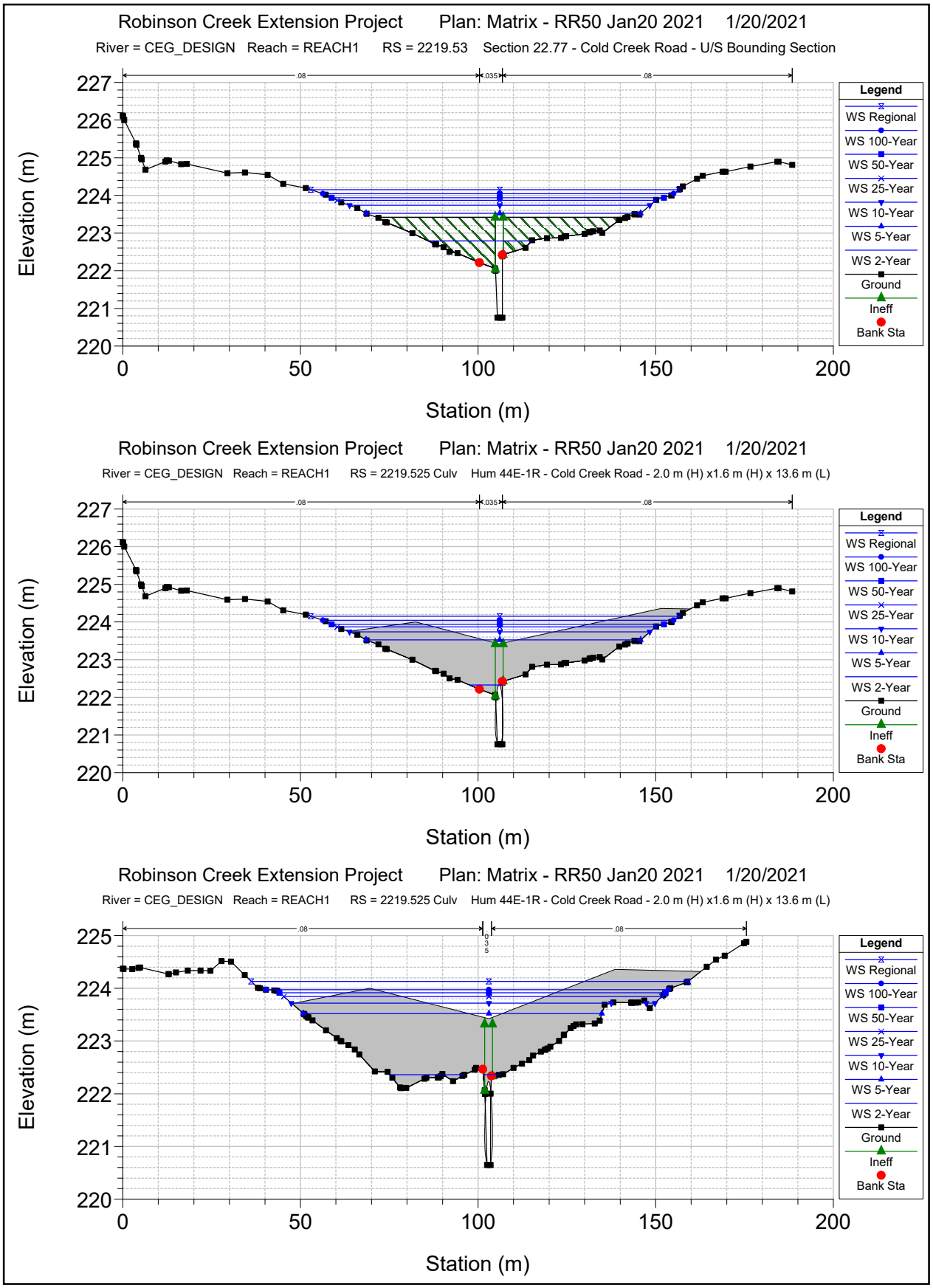
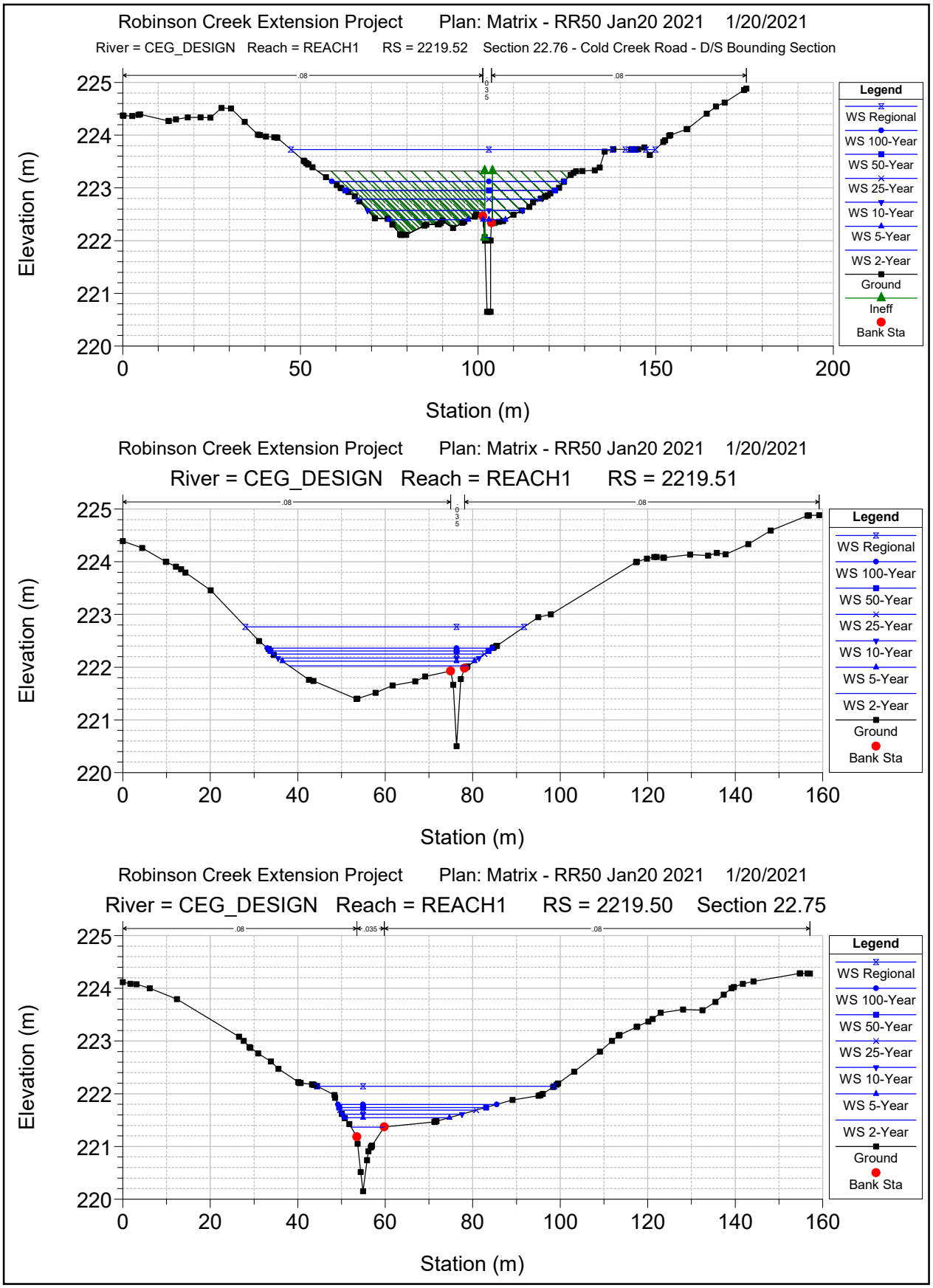

Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2219.56 Section 22.80
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2219.55 Section 22.79
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Levee
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2219.54 Section 22.78
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2219.53 Section 22.77 - Cold Creek Road - U/S Bounding Section
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2219.525 Culv Hum 44E-1R - Cold Creek Road - 2.0 m (H) x1.6 m (H) x 13.6 m (L)
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2219.525 Culv Hum 44E-1R - Cold Creek Road - 2.0 m (H) x1.6 m (H) x 13.6 m (L)
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta


Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2219.52 Section 22.76 - Cold Creek Road - D/S Bounding Section
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Ineff
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2219.51
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta
Robinson Creek Extension Project Plan: Matrix - RR50 Jan20 2021 1/20/2021
River = CEG_DESIGN Reach = REACH1 RS = 2219.50 Section 22.75
Elevation (m)
Station (m)
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Bank Sta

APPENDIX F HEC-RAS OUTPUT

Item 4 – Water Surface Elevation Profile

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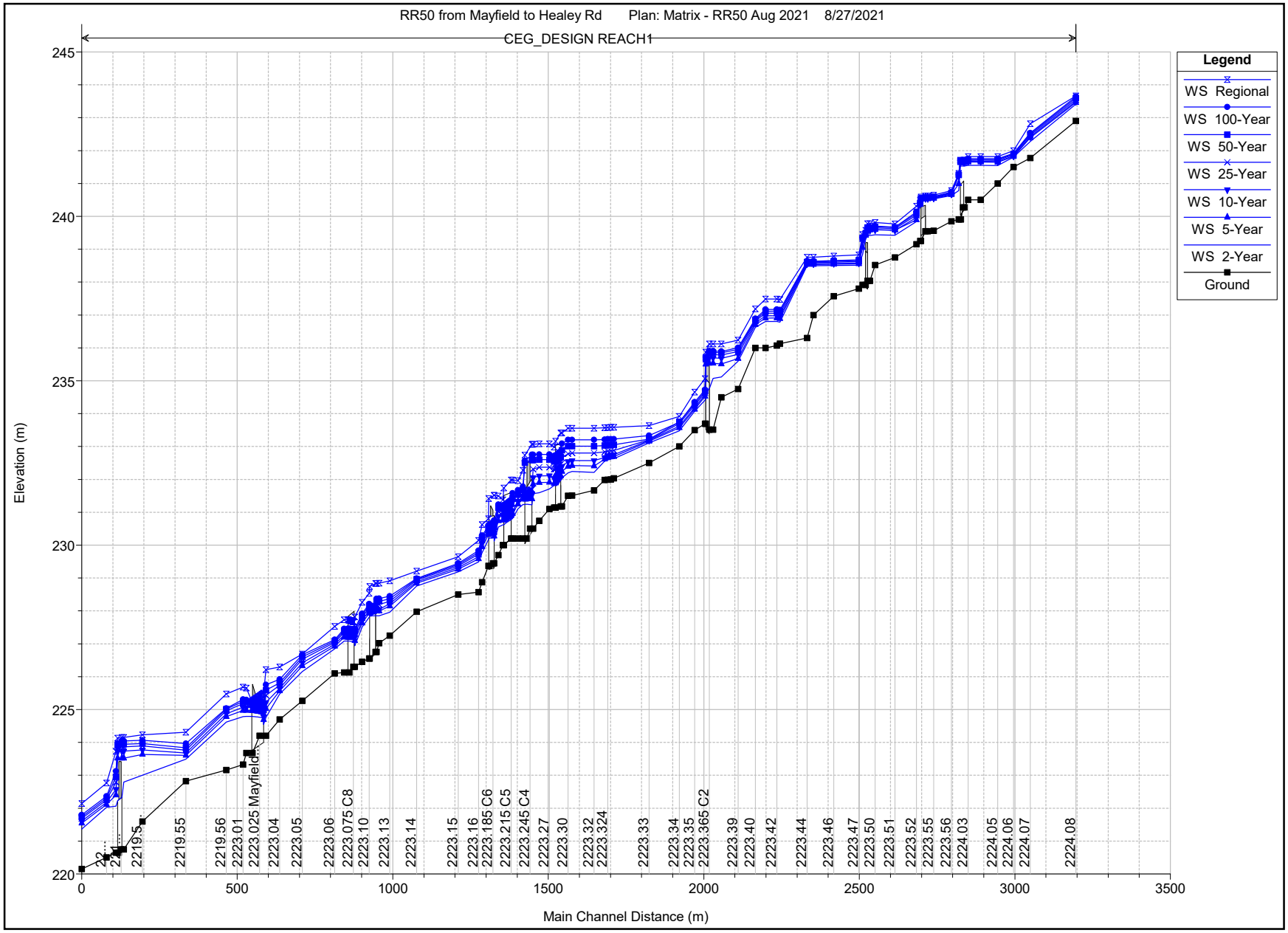
RR50 from Mayfield to Healey Rd Plan: Matrix - RR50 Aug 2021 8/27/2021
CEG_DESIGN REACH1
Legend
WS Regional
WS 100-Year
WS 50-Year
WS 25-Year
WS 10-Year
WS 5-Year
WS 2-Year
Ground
Elevation (m)
Main Channel Distance (m)
245
240
235
230
225
220
0
500
1000
1500
2000
2500
3000
3500
2219.5
2219.55
2219.56
2223.01
2223.025 Mayfield
2223.04
2223.05
2223.06
2223.075 C8
2223.10
2223.13
2223.14
2223.15
2223.16
2223.185 C6
2223.215 C5
2223.245 C4
2223.27
2223.30
2223.32
2223.324
2223.33
2223.34
2223.35
2223.365 C2
2223.39
2223.40
2223.42
2223.44
2223.46
2223.47
2223.50
2223.51
2223.52
2223.55
2223.56
2224.03
2224.05
2224.06
2224.07
2224.08