

November 24, 2023

File: 101856.007(2) – Rev0

Planmac Engineering Inc.
2425 Matheson Blvd East, 8th Floor, Suite #734A
Mississauga, Ontario
L4W 5K4

Attention: Jeff Huang, Vice President & Manager (Toronto Office)

**Re: Geotechnical Site Investigation - Eugene Road Bridge Replacement
Addendum #1 – Revised Foundation Recommendations
West Nipissing, Ontario**

1.0 INTRODUCTION

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) has been retained by Planmac Engineering Inc. (Planmac) to undertake a geotechnical site investigation and provide recommendations in support of the Eugene Bridge Replacement project in West Nipissing, Ontario. GEMTEC previously provided the geotechnical site investigation and recommendations report for the project under separate cover in Report No. 101856.007 titled “*Geotechnical Site Investigation, Eugene Road Bridge Replacement, West Nipissing, Ontario*”, dated February 3, 2023.

This letter provides Addendum #1 for additional geotechnical foundation recommendations, as requested by Planmac, to support the revised bridge replacement design, and should be read in conjunction with our original report as referenced above.

2.0 PROJECT UNDERSTANDING

Since the time of GEMTEC’s initial reporting, the project design has been revised to comprise of an unpaved, prefabricated modular bridge structure supported by timber cribs founded on 1 m thick granular pads. Details of the revised foundation design are presented on drawing “General Arrangement” prepared by Planmac for contract number 2023-014, revised 2023-11-16, and are attached following the text of this letter. Based on a review of the attached drawings and discussions with the project team, GEMTEC understands the following:

- The timber cribs will be founded on 1 m thick granular pads at an elevation (El.) of about 198.7 m. The undersides of the granular pads are proposed to be at about El. 197.7 m.
- The granular pads will extend beyond the timber cribs by at least 300 mm in all direction at the top of the pads, and will slope down and away at a maximum inclination of 1 horizontal to 1 vertical (1H:1V).

- The timber cribs and modular bridge structure have a required bearing resistance of 80 kPa at the top surfaces of the granular pads and are capable of tolerating up to 50 mm of total settlement.
- The final ground surface on the creek side of the timber cribs will be sloped at a maximum inclination of 3H:1V to the creek edge and will be stabilized to minimize erosion and provide cover to the granular pads, including a suitable geotextile (i.e., Terrafix 270R or equivalent) between the granular pad and any erosion protection materials.

3.0 ADDITIONAL FOUNDATION RECOMMENDATIONS

3.1.1 Foundations

Timber crib footings with dimensions of approximately 1.8 m by 10.4 m, bearing on a minimum 1 m thick granular pad, constructed within the undisturbed native soils at about El. 198.7 m (underside of granular pad at about El. 197.7 m) may be designed using a factored Ultimate Limit State (ULS) geotechnical resistance of 100 kPa (based on a resistance factor of 0.5), and an unfactored Serviceability Limit State (SLS) geotechnical reaction of 80 kPa (for a total maximum settlement of 50 mm and an anticipated maximum differential settlement of about 40 mm). The granular pad should consist of Granular A material placed in maximum 300 mm loose lift thicknesses and compacted to a minimum 98 per cent SPMDD, and should extend beyond the footprint of the timber cribs as described above.

The native founding materials are considered susceptible to disturbance by construction activity, especially during wet and cold weather, and care should be taken to preserve the integrity of the materials at the founding level. Due to the variability in native soil consistency / compactness (both with depth and side of the watercourse), it will be essential that all founding soils be inspected by GEMTEC prior to placing the granular pads. The founding soils and granular base must be protected from wet conditions and freezing during cold-weather construction.

Foundations should be placed such that the zone of influence of the footings does not intercept proposed or former excavations, or proposed, former or existing underground utilities or structures. The zone of influence of the proposed footings can be defined as any line drawn from the underside edge of the footing down and away at an inclination of 1H:1V (or 45 degrees to the horizontal). Complete removal of any former or existing foundations or underground utilities or lowering of the founding elevation (if appropriate) may be required, subject to an inspection by GEMTEC at the time of construction.

3.1.2 Frost Considerations

The frost penetration depth at the site is anticipated to be 2 m based on Ontario Provincial Standard Drawing (OPSD) 3090.101. If any of the proposed footings (or granular pads) will bear at a depth of less than 2 m, provision should be made to account for frost action, or the structure should be designed for the anticipated frost effects. Otherwise, frost protection measures, such

as rigid polystyrene insulation should be considered and GEMTEC can provide additional guidance on thermal insulation upon request.

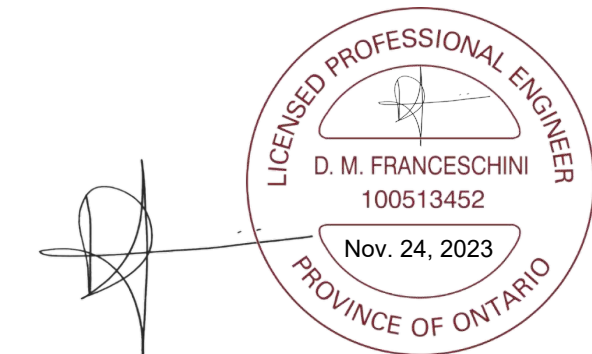
Please note that frost penetration depth is measured by the shortest distance to the ground surface rather than the vertical distance to ground surface (i.e., frost penetration also occurs laterally into the face of the backfill material on the water side).

4.0 CLOSURE

We trust that the information contained in this letter is suitable for your current needs. Please reach out to our office if you have any questions.

Regards,

GEMTEC Consulting Engineers and Scientists



Derek M. Franceschini, P.Eng.
Geotechnical Engineer

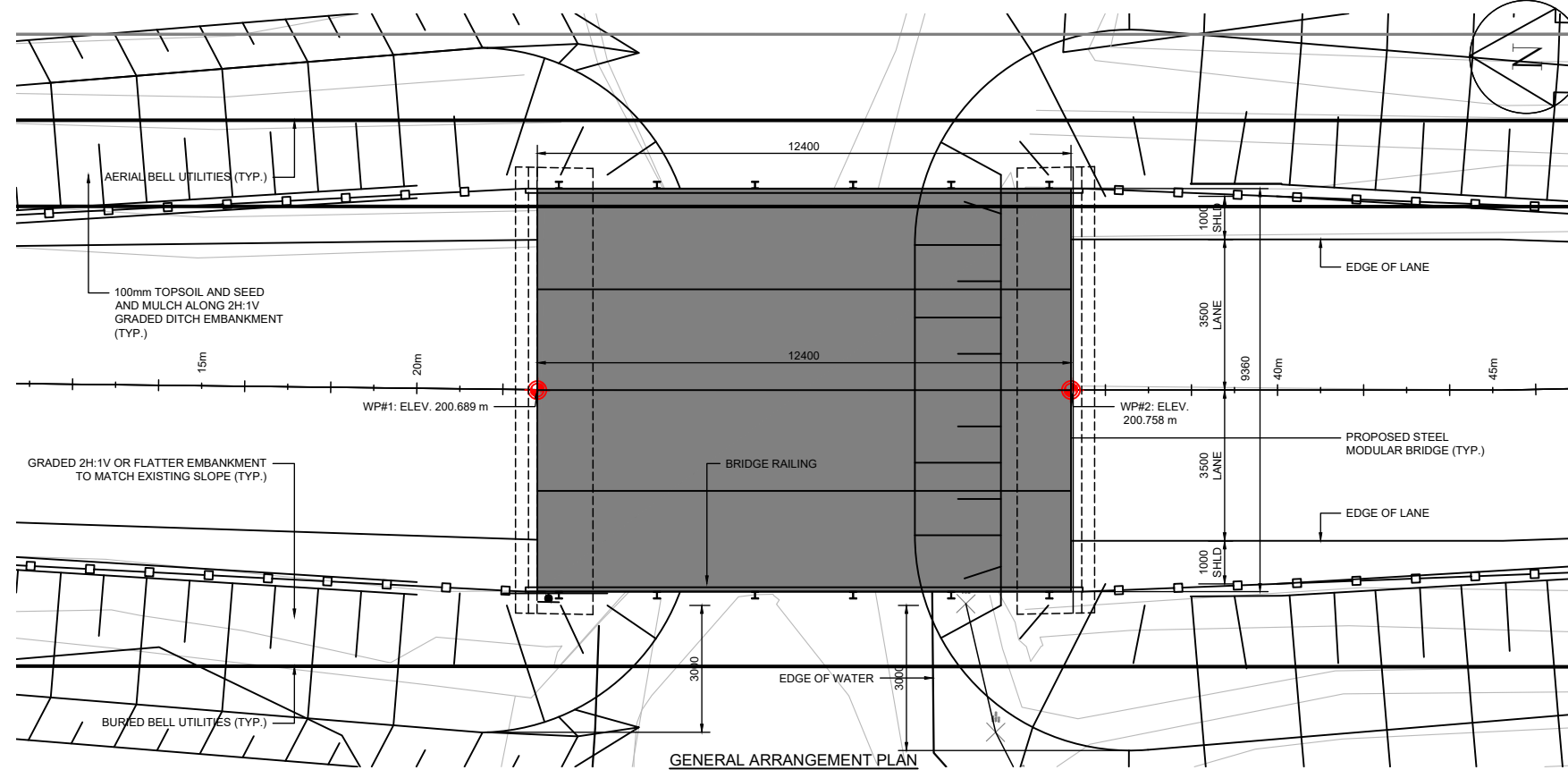
DMF/GDS/sv

A handwritten signature in blue ink, appearing to read "Graeme Skinner".

Graeme Skinner, PhD., P.Eng.
Reviewer, Senior Geotechnical Engineer

Attachment: Revised Bridge Design Drawing

\\Lucid\Drawings and Files\Projects\101800\101856.007\Deliverables\2_Bridge_Design_Input\101856.007_LTR_Revised Creek Crossing Design_Eugene Bridge_2023-11-24_Rev0.docx



GENERAL ARRANGEMENT PLAN
SCALE: 1:75

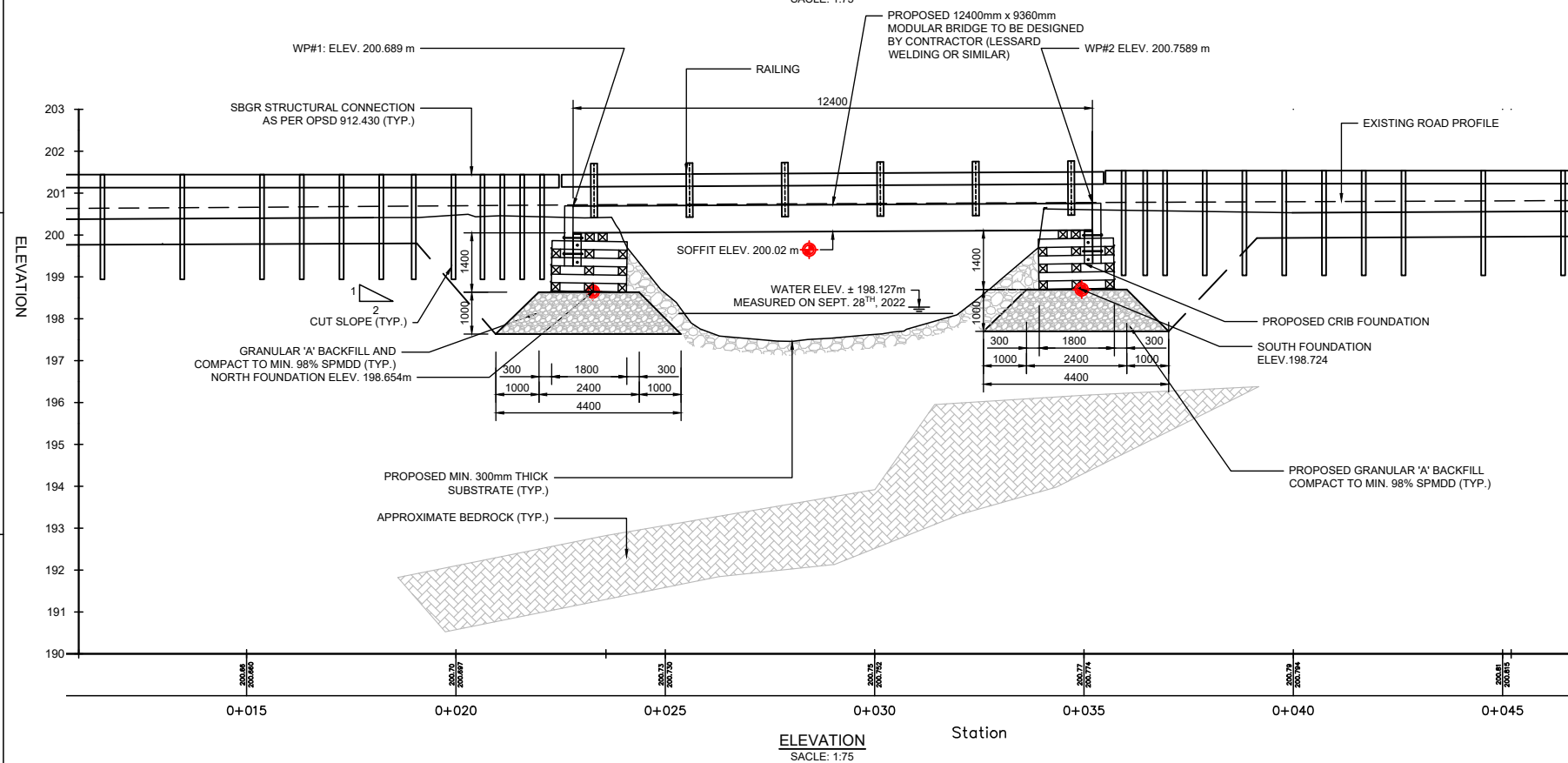
CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL CARRY OUT THE WORK TO PREVENT DEBRIS FROM ENTERING THE WATERCOURSE.
2. THE CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES WITH A METHOD APPROVED BY THE GOVERNING UTILITY.
3. COMPACTED SOIL BEARING CAPACITY : AT SLS =80 kPa
4. FOOTINGS SHALL BE PLACED ON COMPACTED GRANULAR AS PER THE ELEVATION PROVIDED ON THE DRAWING.
5. BACKFILL SHALL BE PLACED SIMULTANEOUSLY BEHIND BOTH SIDES OF THE CRIB FOUNDATION KEEPING THE HEIGHT OF THE BACKFILL APPROXIMATELY THE SAME. AT NO TIME SHALL THE DIFFERENCE IN ELEVATION BE GREATER THAN 500MM.
6. THE CONTRACTOR SHALL VERIFY STREAMBED ELEVATIONS ON SITE BEFORE CONSTRUCTION. THE CONTRACTOR SHALL REPORT THE STREAM BED ELEVATIONS TO THE ENGINEER AND, IF NECESSARY, SHALL MODIFY THE STREAMBED AS DIRECTED BY THE ENGINEER TO ENSURE THAT THE NEW STREAMBED ELEVATIONS MATCH THE EXISTING STREAMBED AND THERE ARE NO SUDDEN RISE OR FALL OBSTRUCTING THE FLOW.
7. THE DEFINED GEOMETRY MEETS THE ENVIRONMENTAL AND HYDRAULIC REQUIREMENTS. FOUNDATION HAS BEEN DESIGNED ACCORDINGLY TO THE SELECTED MODULAR BRIDGE. THE CONTRACTOR SHALL SELECT SUPPLIER PROVIDED THE ENVIRONMENTAL AND HYDRAULIC REQUIREMENTS ARE MET.
8. CRIB FOUNDATION HAS BEEN DESIGNED FOR LESSARD WELDING MODULAR BRIDGE. OTHER MODULAR BRIDGE SUPPLIER CAN BE SELECTED FOR THIS PROJECT .
9. CONTRACTOR IS REQUIRED TO SUBMIT SHOP DRAWINGS FROM SELECTED BRIDGE SUPPLIER ALONG WITH THE FOUNDATION REQUIREMENTS TO THE ENGINEER FOR REVIEW

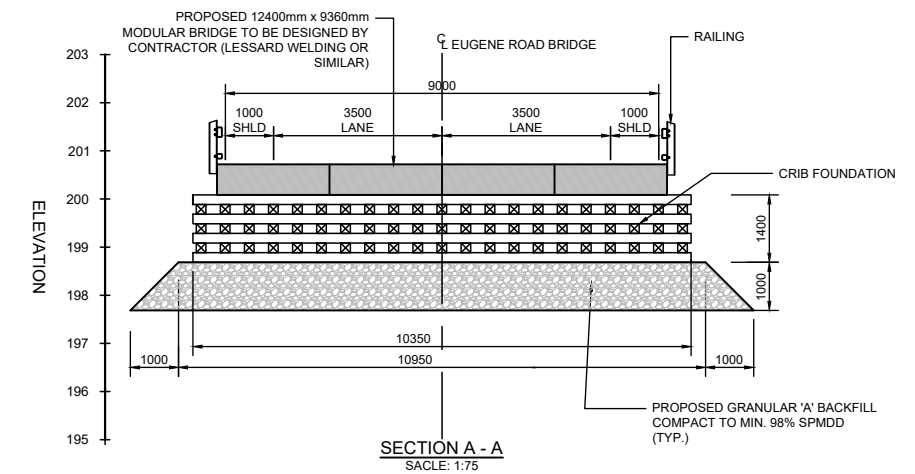
CONSTRUCTION NOTES:

DESIGN STANDARD AND CODES:

- CHBDC CAN/CSA-S6-19 MTO STRUCTURAL MANUAL 2014
- BRIDGE DESIGN LIVE LOADS: CL-625-ONT
- ONTARIO PROVINCIAL STANDARDS SPECIFICATION (OPSS)

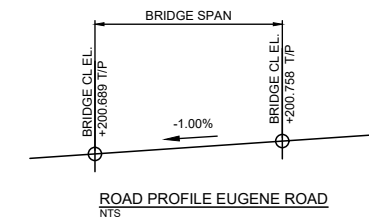


ELEVATION
SCALE: 1:75



SECTION A - A
SCALE: 1:75

	NORTHING	EASTING
WP#1	-	-
WP#2	-	-



ROAD PROFILE EUGENE ROAD
NTS

REVISIONS

DATE	DETAILS	BY
2023-04-14	ISSUED FOR 90% DETAILED DESIGN SUBMISSION	T.Z.
2023-11-16	GENERAL REVISION	K.SH

CAUTION

- ALL UTILITIES ARE NOT NECESSARILY SHOWN ON THIS DRAWING.
- WHERE UTILITIES ARE SHOWN, LOCATIONS ARE NOT GUARANTEED
- LOCATION & SIZE OF ALL UTILITIES MUST BE VERIFIED IN THE FIELD.

PLANMAC
ENGINEERING INC.
2425 Matheson Blvd East, 8th Floor, Suite 793
Mississauga, Ontario
L4W 5K4, Canada
Tel: (905) 631 - 6534

DATE: 2023-04-14

DRAWN: T.Z.
DESIGNED: T.Z.
CHECKED: J.H.
ENGINEER: J.H.
APPROVED: M.N.



GENERAL ARRANGEMENT

EUGENE ROAD BRIDGE

SCALE: AS SHOWN

CONTRACT NO.: 2023-014

CAD/FILE NUMBER:

PAGE NO.: 1 of 1