MINISTRY OF TRANSPORTATION, ONTARIO

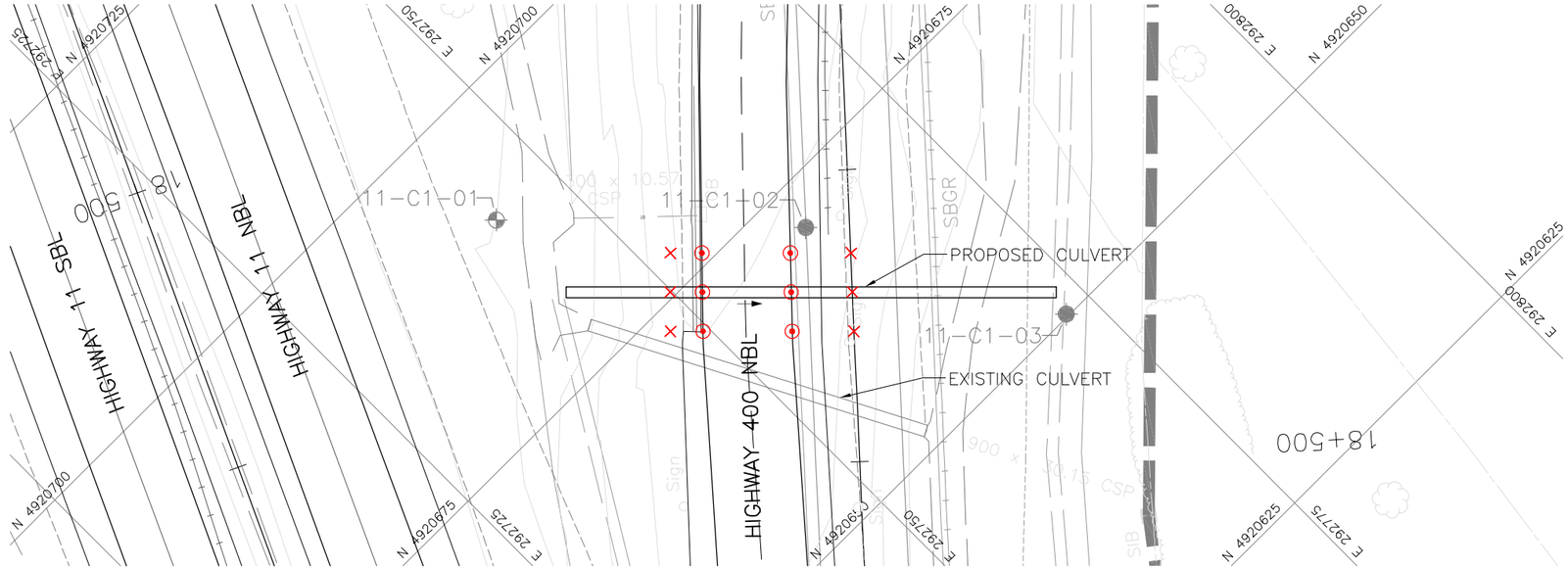
**METRIC**
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN.
STATIONS IN KILOMETRES + METRES.

CONT No.
GWP No. 2179-10-00

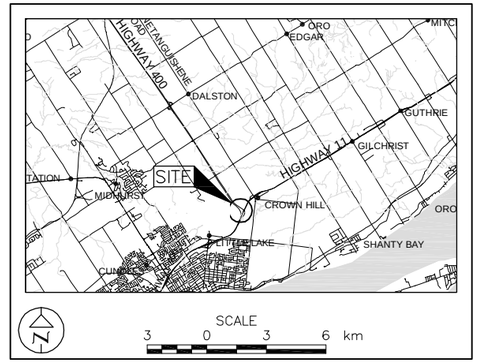
SHEET

CROWN HILL CULVERT REPLACEMENT
HIGHWAY 400 (NBL) – STATION 18+515
MONITORING PROGRAM – TUNNELLING

Golder Associates Ltd.
MISSISSAUGA, ONTARIO, CANADA



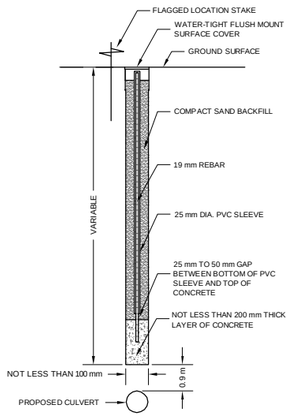

## PLAN
SCALE
5 0 5 10 m



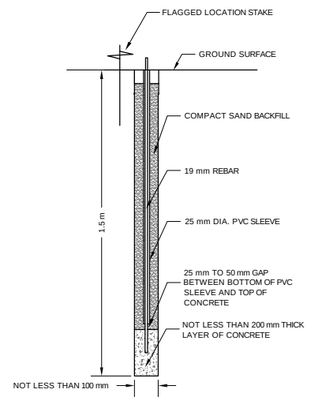

## LEGEND

- Borehole – Current Investigation (Golder, 2011)
- Borehole and DCPT – Current Investigation (Golder,2011)
- In-ground Monitoring Point
- Surface Monitoring Point

| BOREHOLE CO-ORDINATES | | | |
|---|---|---|---|
| No. | ELEVATION | NORTHING | EASTING |
| 11-C1-01 | 231.0 | 4920690.3 | 292743.7 |
| 11-C1-02 | 233.8 | 4920671.2 | 292762.0 |
| 11-C1-03 | 230.9 | 4920650.2 | 292772.6 |




## IN-GROUND MONITORING POINT INSTALLATION DETAIL
N.T.S.




## SURFACE MONITORING POINT (UNPAVED ROW) INSTALLATION DETAIL
N.T.S.

NOTES:

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH GOLDER ASSOCIATES LTD. REPORT NO. 09-1111-0022, DATED JUNE 2012.
2. ALL MONITORING LOCATIONS SHOULD BE CONSIDERED APPROXIMATE AND MUST BE CONFIRMED BY THE CONTRACTOR IN CONSULTATION WITH THE GEOTECHNICAL ENGINEER PRIOR TO INSTALLATION; AND MAY HAVE TO BE ADJUSTED IN THE FIELD TO SUIT LOCAL CONDITIONS/CONTRAINTS.
3. THE CONTRACTOR SHALL RETAIN A SURVEYOR REGISTERED IN ONTARIO FOR ESTABLISHING AND SURVEYING THE MONITORING POINTS FOR THE DURATION OF CONSTRUCTION.
4. ALL MONITORING EQUIPMENT SHALL BE INSTALLED AT LEAST 7 DAYS PRIOR TO ANY EXCAVATION OR TUNNELLING TAKING PLACE.
5. SURFACE MONITORING POINTS INSTALLED ON THE UNPAVED ROW SHALL BE FOUNDED BELOW FROST PENETRATION DEPTH.
6. THE CONTRACTOR SHALL ESTABLISH 1 TEMPORARY BENCHMARK OUTSIDE THE AREA OF CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT THE PROPOSED BENCHMARK LOCATION TO THE ENGINEER FOR APPROVAL. PRIOR TO CONSTRUCTION ALL MONITORING POINTS SHALL BE SURVEYED FOR ELEVATION AND LOCATION TO A TOLERANCE OF NOT MORE THAN 2mm IN THE VERTICAL AND HORIZONTAL DIRECTION.
7. DURING TUNNELLING, ALL POINTS SHALL BE SURVEYED A MINIMUM OF 3 TIMES PER DAY.
8. DURING MONITORING, IF SETTLEMENTS REACH THE "REVIEW LEVEL" OF 10mm, THE CONTRACTOR SHALL PROVIDE A FORMAL PLAN TO ENSURE FURTHER SETTLEMENTS DO NOT OCCUR. IF SETTLEMENTS REACH THE "ALERT LEVEL" OF 15mm, THE CONTRACTOR SHALL SUSPEND TUNNELLING AND THE OWNER WILL HAVE THE AUTHORITY TO ORDER THE CONTRACTOR TO MAKE THE FACE SECURE AND SUSPEND ALL TUNNELLING UNTIL AN APPROVED MITIGATIVE SOLUTION IS DEVELOPED.
9. AFTER TUNNELLING HAS BEEN COMPLETED, THE CONTRACTOR SHALL SURVEY THE MONITORING POINTS ONCE PER DAY FOR 10 DAYS OR UNTIL DATA INDICATES THAT ALL MOVEMENTS HAVE ESSENTIALLY CEASED.
10. WITHIN 2 HOURS OF COMPLETION OF ANY MEASUREMENT A COPY OF PRELIMINARY RESULTS SHALL BE MADE AVAILABLE TO THE ENGINEER AND FINALIZED RESULTS SHALL BE PROVIDED WITHIN 24 HOURS OF COMPLETION OF THE SURVEY.
11. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR TRAFFIC SAFETY.
12. REMOVE ALL MONITORING POINTS ON COMPLETION OF SURVEY, SUBJECT TO APPROVAL FROM THE ENGINEER.

## NOTES

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

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

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

## REFERENCE

Base plans provided in digital format by MH, drawing files x84117Align.dwg, x84117Base.dwg and x84117design.dwg received May 24, 2012 and X094197Contours.dwg, received July 18, 2011. Culvert section obtained from drawing file no. 60% Sections May 2 2012.dwg, received June 4, 2012.

| NO. | DATE | BY | REVISION |
|---|---|---|---|
| | | | |
| | | | |

Geocres No. 31D-548

| | | | |
|---|---|---|---|
| HWY. 400 | PROJECT NO. 09-1111-0022 | | DIST. |
| SUBM'D. TVA | CHKD. RAA | DATE: 9/25/2012 | SITE: |
| DRAWN: CD/JFC | CHKD. | APPD. FJH | DWG. D1 |

PLOT DATE: September 25, 2012
FILENAME: I:\Projects\2009\09-1111-0022 (MH, Vaspro)\-MA- (Crown Hill Culvert Replacement)\09111100224M001.dwg