

**FOUNDATION INVESTIGATION REPORT
FOR
CULVERTS
HIGHWAY 6 (NEW)
FROM HIGHWAY 403 SOUTHERLY TO EXISTING HIGHWAY 6
CITY OF HAMILTON, ONTARIO
G.W.P. 603-00-00**

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PML Ref: 00HF108
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May 2002

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FOUNDATION INVESTIGATION REPORT
For
Culverts
Highway 6 (New)
From Highway 403 Southerly to Existing Highway 6
City of Hamilton, Ontario
G.W.P. 603-00-00

INTRODUCTION

This report summarizes the results of the foundation investigation carried out for the proposed culverts along the Highway 6 (new) alignment from Highway 403 in the former Town of Ancaster southerly to the existing Highway 6 in the former Township of Glanbrook, now in the City of Hamilton, Ontario, as well as Butter Road and the realigned section of White Church Road adjacent to the Highway 6 (New) alignment. The investigation was conducted for Delcan Corporation on behalf of the Ontario Ministry of Transportation.

Eleven culvert locations identified for foundation investigation are as follows:

| CULVERT NO. | ROADWAY | PROPOSED CENTRELINE HIGHWAY CHAINAGE (m) |
|-------------|-----------------------------|--|
| 1B | Hwy 6 Connection (Initial) | Sta 10+485 |
| 35 | Hwy 6 New (Initial) | Sta 16+775 |
| 50 | Hwy 6 New (Initial) | Sta 18+570 |
| 52 | Hwy 6 New (Initial) | Sta 18+950 |
| 58 | Hwy 6 New (Initial) | Sta 19+545 |
| 70 | Hwy 6 New (Initial) | Sta 20+760 |
| 75 | Hwy 6 New (Initial) | Sta 21+370 |
| 79 | Hwy 6 New (Initial) | Sta 21+780 |
| 34A | Realigned White Church Road | Sta 10+143 |
| 70A | Butter Road | Sta 9+940 |
| 10 | Realigned White Church Road | Sta 9+700 |

This report pertains to the proposed culverts and associated bedding/backfill zones. Information regarding approach embankments is provided in the Pavement Design Report and/or Foundation Investigation Report for Deep Cuts and High Fills.

SITE DESCRIPTION

The site is situated in a rural agricultural setting southwest of the south end of Lake Ontario. It crosses the boundary between the Norfolk Sand Plain and the Haldimand Clay Plain. Topography on the plains is gently rolling with localized steeper slopes.

The overburden along the proposed highway alignment primarily consists of glaciolacustrine deposits of silt, interstratified locally with clay. Glaciolacustrine-deltaic sand is present north of a depositional scarp adjacent to the north side of Book Road. Clayey silt/silty clay till (Halton Till) is exposed locally in the south sections of the proposed roadway. The overburden thickness generally ranges from 20 to 30 m, locally up to 40 m above the scarp at Book Road.

INVESTIGATION PROCEDURES

The field work was carried out between January 18 and March 27, 2001 and continued between January 29 and April 8, 2002. The field work comprised 22 boreholes (two at each culvert location) drilled to a depth of 6.6 m below grade at the locations shown on Drawings 1 to 11. The borehole numbering system included the culvert number for ease of reference (example: boreholes at culvert 70 are numbered 70-1 and 70-2).

The boreholes were advanced using continuous flight solid stem augers, powered by truck and track-mounted CME-75 drill rigs, supplied and operated by specialist drilling contractors, working under the full-time supervision of a member of our engineering staff.

Representative samples of the overburden were recovered at frequent depth intervals using a conventional split spoon sampler during drilling. Standard penetration tests were conducted simultaneously with the sampling operation to assess the strength characteristics of the substrata.

The groundwater conditions in the boreholes were closely monitored during the course of the field work.

All of the recovered samples were returned to our laboratory for detailed visual examination, classification and routine moisture content determinations. Grain size distribution analyses and Atterberg Limits tests were carried out on selected samples.

The locations of the boreholes were established in the field by Peto MacCallum Ltd. relative to roadway centreline stakes positioned by J.D. Barnes Limited. The ground surface elevations were interpolated from contours shown on the digital base plans titled "The King's Highway 6 New", dated May and June 2000 provided by Delcan Corporation.

SUMMARIZED SUBSURFACE CONDITIONS

Reference is made to the appended Record of Borehole sheets for details of the subsurface conditions including soil classifications, inferred stratigraphy, soil boundary elevations, standard penetration test "N" values, penetrometer shear strength test results, groundwater observations and the results of laboratory moisture content determinations. The order of the borehole sheets is consistent with the culvert numbers shown on page 1.

The results of particle size distribution analyses conducted on selected samples recovered during drilling are presented on Figures 1 to 3. The results of the Atterberg Limits testing conducted on cohesive soil samples are provided on the plasticity charts (Figures 4 to 9). The laboratory test results are also noted on the Record of Borehole sheets.

The subsurface stratigraphy encountered at the culvert locations generally comprised a surficial topsoil layer overlying native clays and silts. Localized units of fill, sand, clay till and silt till were encountered at a number of culvert locations.

Pavement/Shoulder Structure

Asphaltic concrete with a thickness of 275 mm was encountered in borehole 10-2 along White Church Road. The asphalt was underlain by sand and gravel fill to a depth of 750 mm. Sand and gravel fill was encountered surficially in borehole 10-1 along the shoulder of White Church Road to a depth of 900 mm.

Topsoil Fill

A 650 mm thick layer of topsoil fill was encountered beneath the pavement structure in borehole 10-2 along White Church Road.

Topsoil

A 180 to 1000 mm, typically 200 to 300 mm thick surficial layer of topsoil was encountered in the boreholes at all culvert locations except culvert 10 along White Church Road. A 500 and 700 mm thick layer of topsoil was encountered beneath the surficial pavement/shoulder structure and/or fill layer in boreholes 10-1 and 10-2 along White Church Road. The topsoil comprised dark brown cohesive clayey silt.

Silty Clay

A layer of firm to very stiff cohesive silty clay was encountered beneath the surficial topsoil in eight of the boreholes and below/within silts in a further eight boreholes. Where fully penetrated, the clay units ranged from 0.3 to 2.6 m, typically 1.0 to 2.0 m, in thickness. The moisture content of the clay ranged from 19 to 29%, typically 20 to 25%. The undrained shear strength of the clay as indicated by penetrometer testing ranged from 125 to 180 kPa, locally 60 kPa. The "N" values within the silty clay typically ranged from 6 to 23.

The liquid limits and plastic limits of selected samples were 28 to 49 and 17 to 24, respectively, indicating the clay material is low to medium plastic (Figures 4 and 5). The results of particle size distribution analyses conducted on selected samples of the clay recovered during drilling are presented on Figure 1. Drilling was terminated within the clay in five boreholes at a depth of 6.6 m.

Silt

Native non-cohesive silt and cohesive clayey silt were encountered in all of the boreholes except three boreholes at culverts 52 and 58. The silt was typically compact/stiff to very dense, locally loose/firm to depths of up to 2.5 m. The moisture content of the silt ranged from 15 to 27%, typically 18 to 24%. The "N" values of the silt ranged from 11 to 76, with localized "N" values ranging from 5 to 7 to a depth of 2.5 m.

The liquid limit and plastic limit of samples displaying plasticity were 23 to 28 and 17 to 22, respectively, indicating the silt material was slightly plastic (Figure 6). Atterberg Limits tests were also carried out on nine selected samples of silt and were determined to be non-plastic. The results of particle size distribution analyses conducted on selected samples of silt recovered during drilling are presented on Figure 2. The silt ranged in thickness from 0.7 to 5.5 m, typically 1.2 to 2.5 m (between elevation 224.0 and 206.9) where fully penetrated. Drilling was terminated within the silt in seven of the remaining boreholes at a depth of 6.6 m.

Silty Clay Till

A unit of very stiff to firm cohesive clay till was encountered beneath the clay layer in boreholes 52-1, 52-2, 58-2 and 75-2. The clay till had a moisture content of 16 to 24%. The "N" values of the till typically ranged from 7 to 21. The liquid limits and plastic limits of selected samples were 25 to 35 and 17 to 19, respectively, indicating the clay material is low plastic (Figure 7). The results of particle size distribution analyses conducted on selected samples of the silty clay till recovered during drilling are presented on Figure 3. Drilling was terminated within the clay till in all four boreholes at a depth of 6.6 m.

Clayey Silt Till

Stiff to very stiff cohesive clayey silt till was encountered in boreholes 70-1, 70-2 and 75-1 beneath the clay and/or silt layers. The moisture content ranged from 15 to 20%. The clayey silt till had "N" values ranging from 9 to 23. The results of Atterberg Limits tests on a sample of the silt till indicated liquid and plastic limits of 24 and 17 (Figure 8). Drilling was terminated within the silt till in all three boreholes at a depth of 6.6 m.

Isolated Deposits

A deposit of soft/very loose, layered clays, silts and sandy silts was revealed below the topsoil in borehole 70A-1. The layered deposit was penetrated at 1.4 m depth (elevation 218.1). Very loose non-cohesive silty fine sand was encountered below the topsoil in borehole 70A-2 and penetrated at 0.9 m depth (elevation 218.9). Drilling was terminated within the unit at a depth of 6.6 m.

A unit of stiff layered cohesive clayey silt and silty clay till was encountered beneath the silt deposit at a depth of 5.5 m (elevation 209.3) in boreholes 10-1 and 10-2. The moisture content of the unit was 23 and 27%. The undrained shear strength of the clay layers as indicated by penetrometer testing was 36 kPa, with "N" values of the deposit being 9 and 10.

The liquid and plastic limits of a selected sample were 36 and 20, indicating the clayey material is medium plastic (Figure 9). The results of a particle size distribution analysis conducted on the sample recovered during drilling are presented on Figure 3. Drilling was terminated within the deposit at a depth of 6.6 m.

Groundwater

During or upon completion of drilling, water was observed in the boreholes at the following depths:

| Borehole | Highest Observed Water Level | |
|----------|------------------------------|-----------|
| | Depth (m) | Elevation |
| 1B-1 | Surface | 212.6 |
| 1B-2 | 0.9 | 211.9 |
| 35-1 | surface | 215.3 |
| 35-2 | surface | 215.5 |
| 50-1 | 0.6 | 217.8 |
| 50-2 | - | - |
| 52-1 | - | - |
| 52-2 | 3.0 | 215.9 |
| 58-1 | - | - |
| 58-2 | - | - |
| 70-1 | 0.1 | 220.2 |
| 70-2 | 1.0 | 219.2 |
| 75-1 | 0.3 | 223.9 |
| 75-2 | 0.3 | 224.0 |
| 79-1 | - | - |
| 79-2 | Surface | 226.5 |
| 34A-1 | - | - |
| 34A-2 | 3.0 | 211.0 |
| 70A-1 | 1.9 | 217.6 |
| 70A-2 | 0.9 | 218.9 |
| 10-1 | 2.5 | 212.3 |
| 10-2 | 3.0 | 211.8 |

Observed water levels are subject to seasonal fluctuations and rainfall patterns.

CLOSURE

The field work was carried out under the supervision of Mr. M. Rapsey and Mr. P. Cullen. The equipment was supplied by Malones Soil Sampling.

The report was prepared by Mr. P. Cullen, B.Eng. and Mr. M.R. Anderson, M.Eng., P.Eng., and reviewed by Mr. D.W. Kerr, P.Eng., Chief Foundation Engineer. Mr. B.R. Gray, P.Eng. carried out an executive review of the report.



Yours very truly

Peto MacCallum Ltd.

A handwritten signature in black ink, appearing to read "D. W. Kerr", written over a horizontal line.

Dennis W. Kerr, M.Eng., P.Eng.
Chief Foundation Engineer



A handwritten signature in black ink, appearing to read "Brian R. Gray", written over a horizontal line.

Brian R. Gray, M.Eng., P.Eng.
President

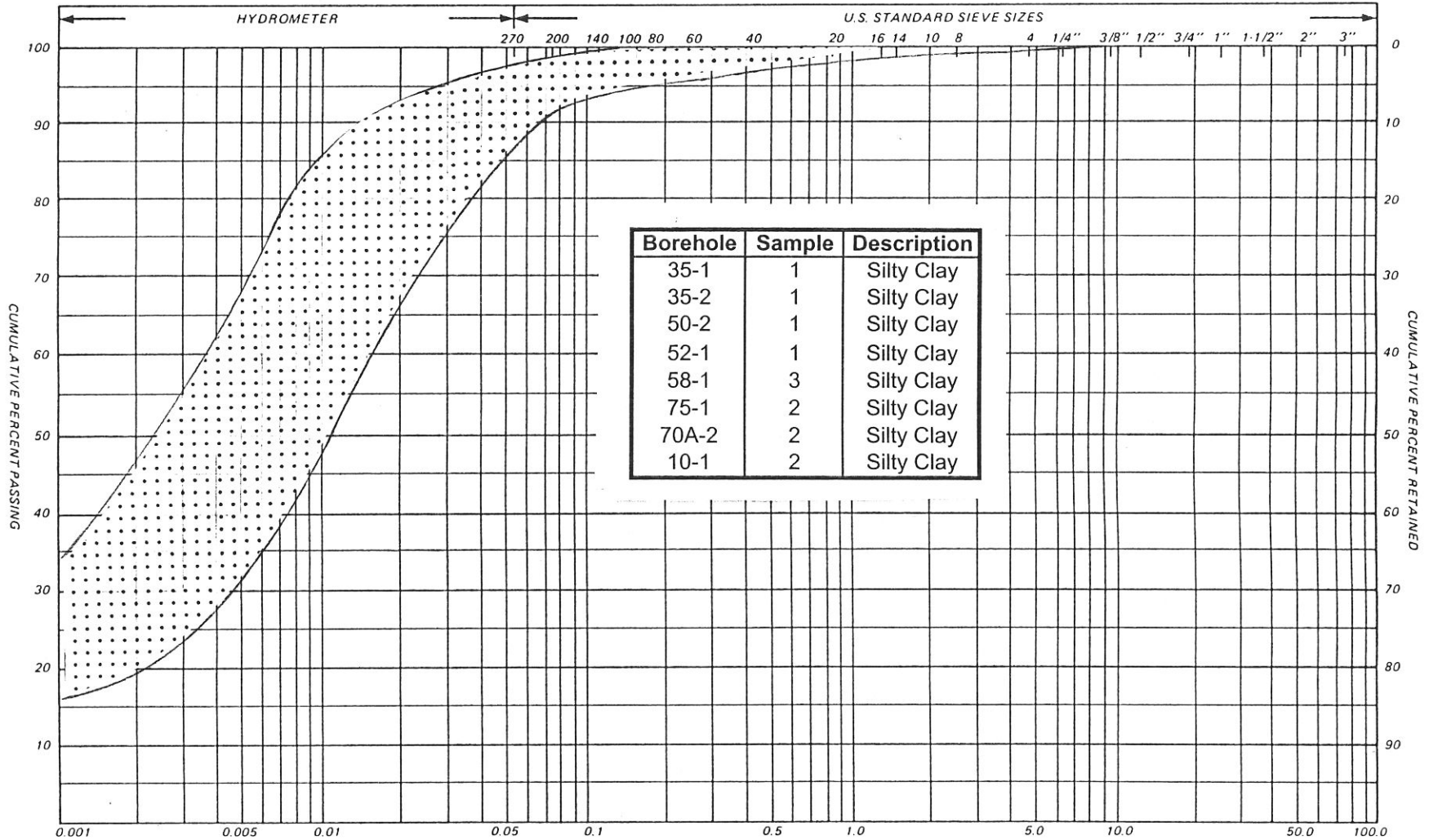
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APPENDIX A

FIGURES 1 TO 3 – PARTICLE SIZE DISTRIBUTION CHARTS

FIGURES 4 TO 9 – PLASTICITY CHARTS

PARTICLE SIZE DISTRIBUTION CHART



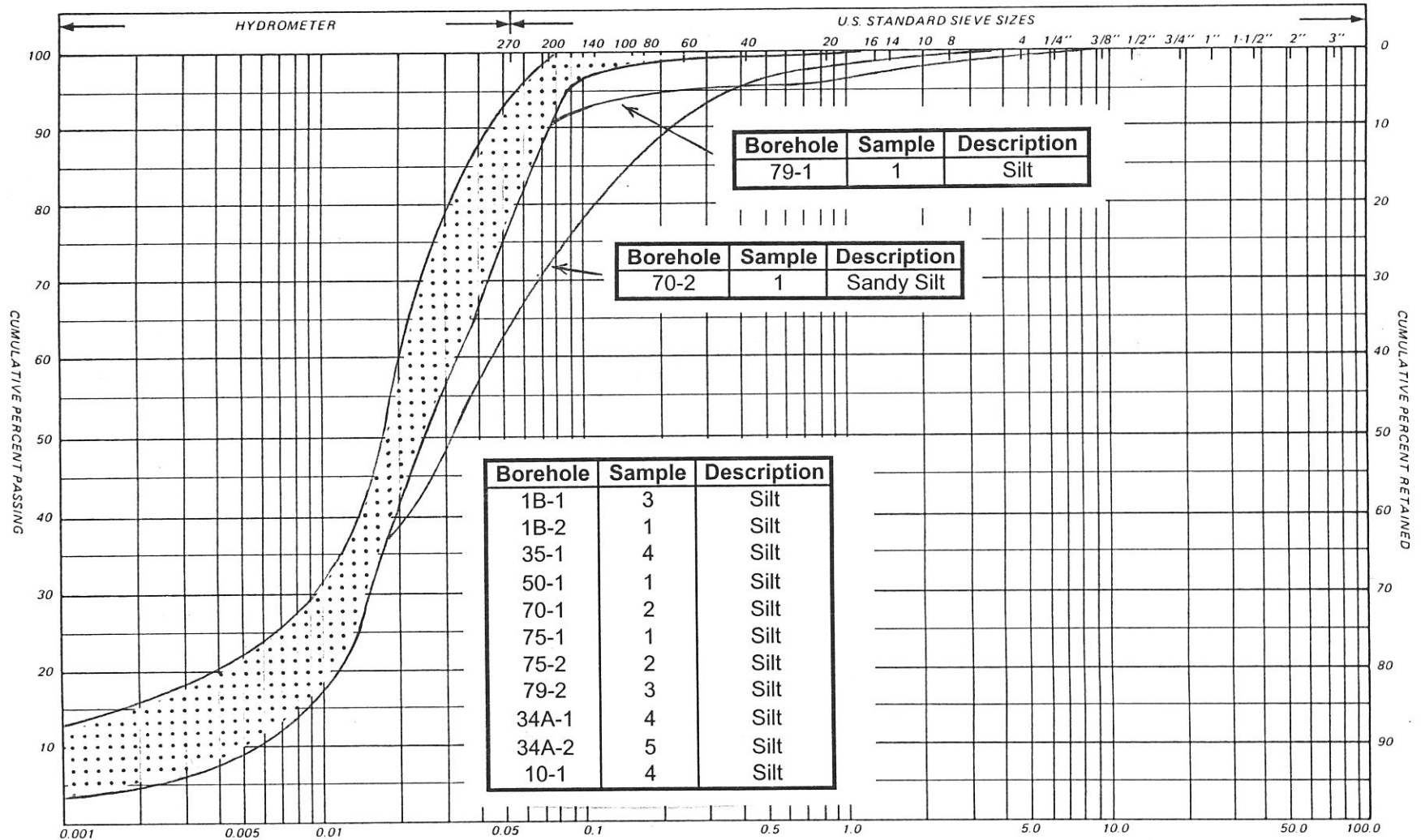
| SILT & CLAY | | | | FINE SAND | | | MEDIUM SAND | | COARSE SAND | | GRAVEL | | COBBLES | UNIFIED |
|-------------|------|--------|--------|-----------|--------|--------|-------------|--------|-------------|--|--------|--|---------|-------------|
| CLAY | FINE | MEDIUM | COARSE | FINE | MEDIUM | COARSE | FINE | MEDIUM | COARSE | | | | | M.I.T. |
| | | | | | | | | | | | | | | U.S. BUREAU |

Silty Clay

REMARKS

PARTICLE SIZE DISTRIBUTION CHART

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REPORT NO. -
FIGURE 2

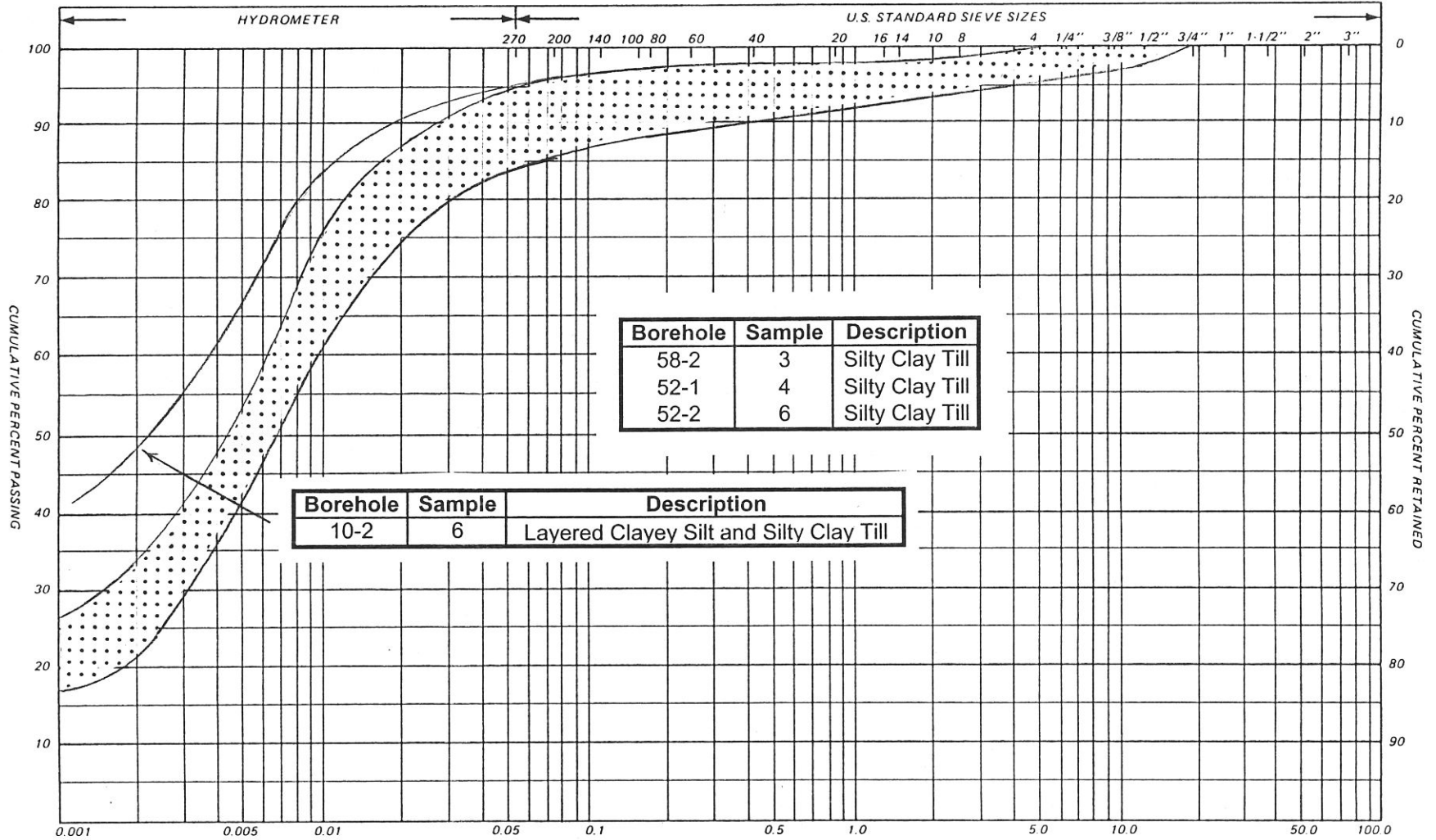


| GRAIN SIZE IN MILLIMETERS | | | | | | | | | | | | | | | | | | |
|---------------------------|------|--|--------|--|--------|---------|------|--------|--------|--------|--------|--------|--------|--------|--|--------------|---------|-------------|
| SILT & CLAY | | | | | | FINE | | MEDIUM | | COARSE | | GRAVEL | | | | COB- BLES | UNIFIED | |
| | | | | | | SAND | | | | | | | | | | | | |
| CLAY | FINE | | MEDIUM | | COARSE | | FINE | | MEDIUM | | COARSE | | GRAVEL | | | | COBBLES | M.I.T. |
| | SILT | | | | | | | | | | | | | | | | | |
| CLAY | | | SILT | | | V. FINE | | FINE | | MED. | | COARSE | | GRAVEL | | | | U.S. BUREAU |
| | | | | | | SAND | | | | | | | | | | | | |

REMARKS _____
Silt

PARTICLE SIZE DISTRIBUTION CHART

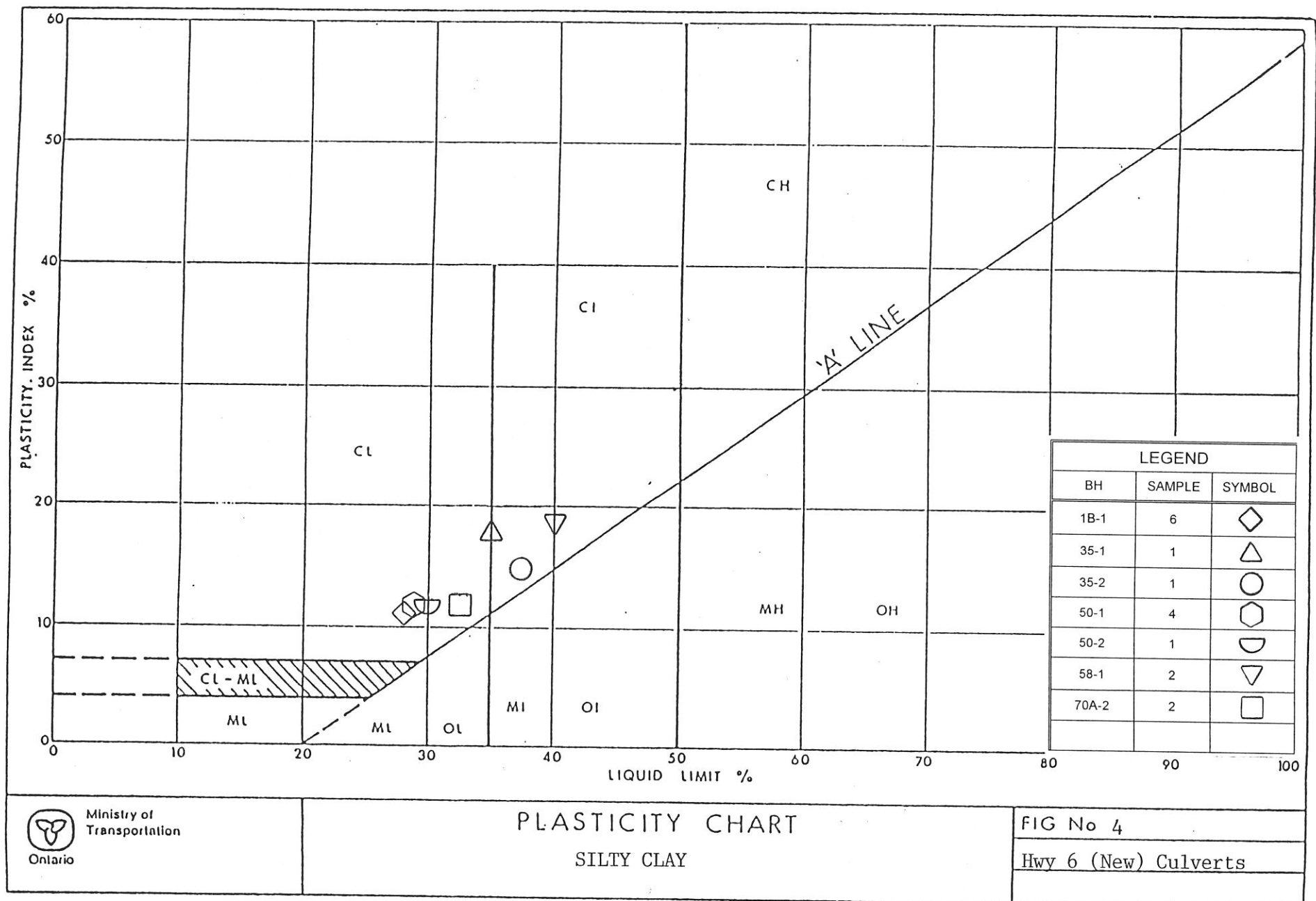
PML REF. 00HF108
REPORT NO. -
FIGURE 3

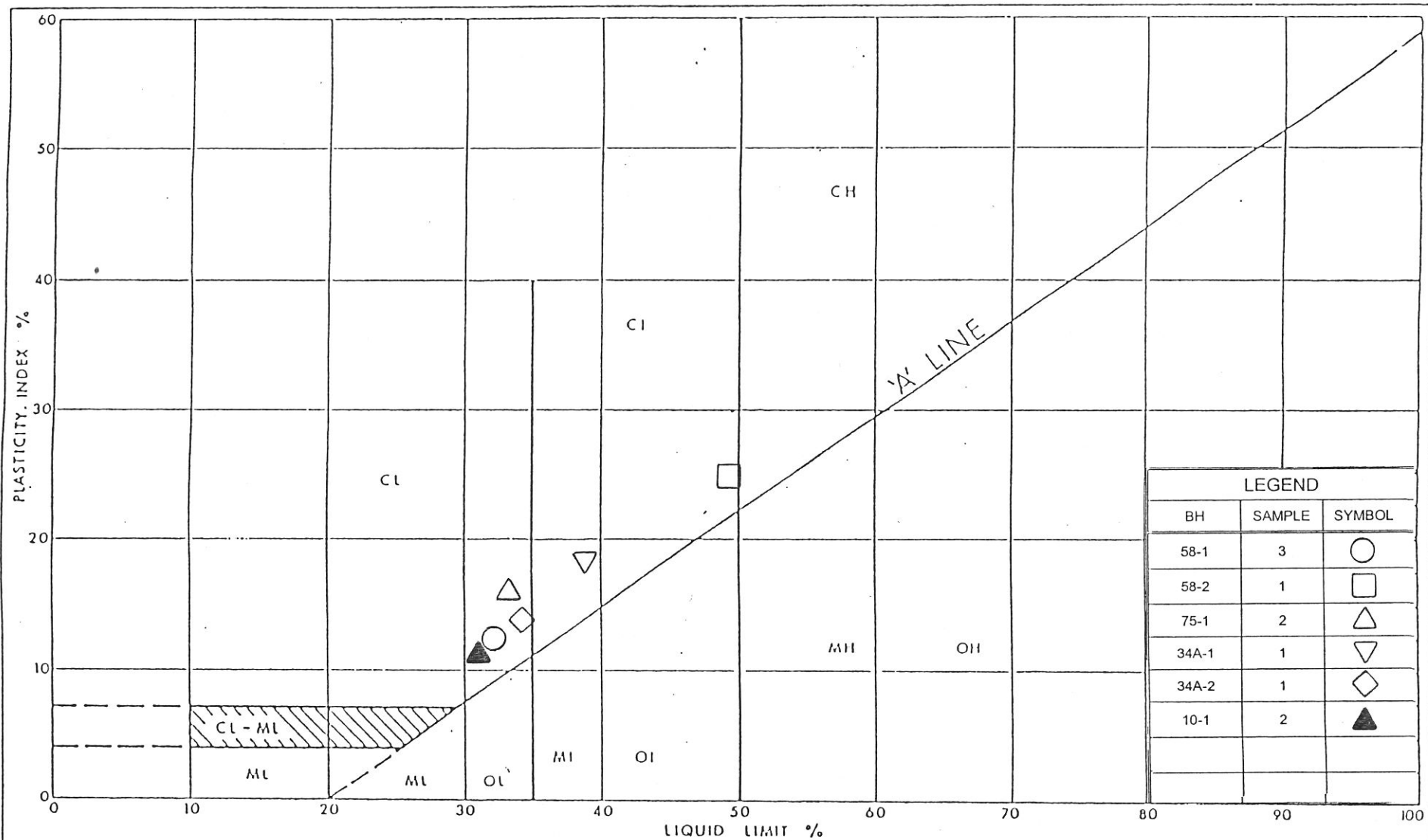


| GRAIN SIZE IN MILLIMETERS | | | | | | | | | | | | UNIFIED | | | | |
|---------------------------|------|------|--------|--|---------|--|--------|--|--------|--|--------|---------|---------|--|---------|-------------|
| SILT & CLAY | | | | | FINE | | MEDIUM | | COARSE | | GRAVEL | | COBBLES | | | |
| CLAY | FINE | | MEDIUM | | COARSE | | FINE | | MEDIUM | | COARSE | | GRAVEL | | COBBLES | M.I.T. |
| | SILT | | | | | | SAND | | | | | | | | | |
| CLAY | | SILT | | | V. FINE | | FINE | | MED. | | COARSE | | GRAVEL | | | U.S. BUREAU |
| | | | | | | | | | | | | | | | | |

Silty Clay Till

REMARKS





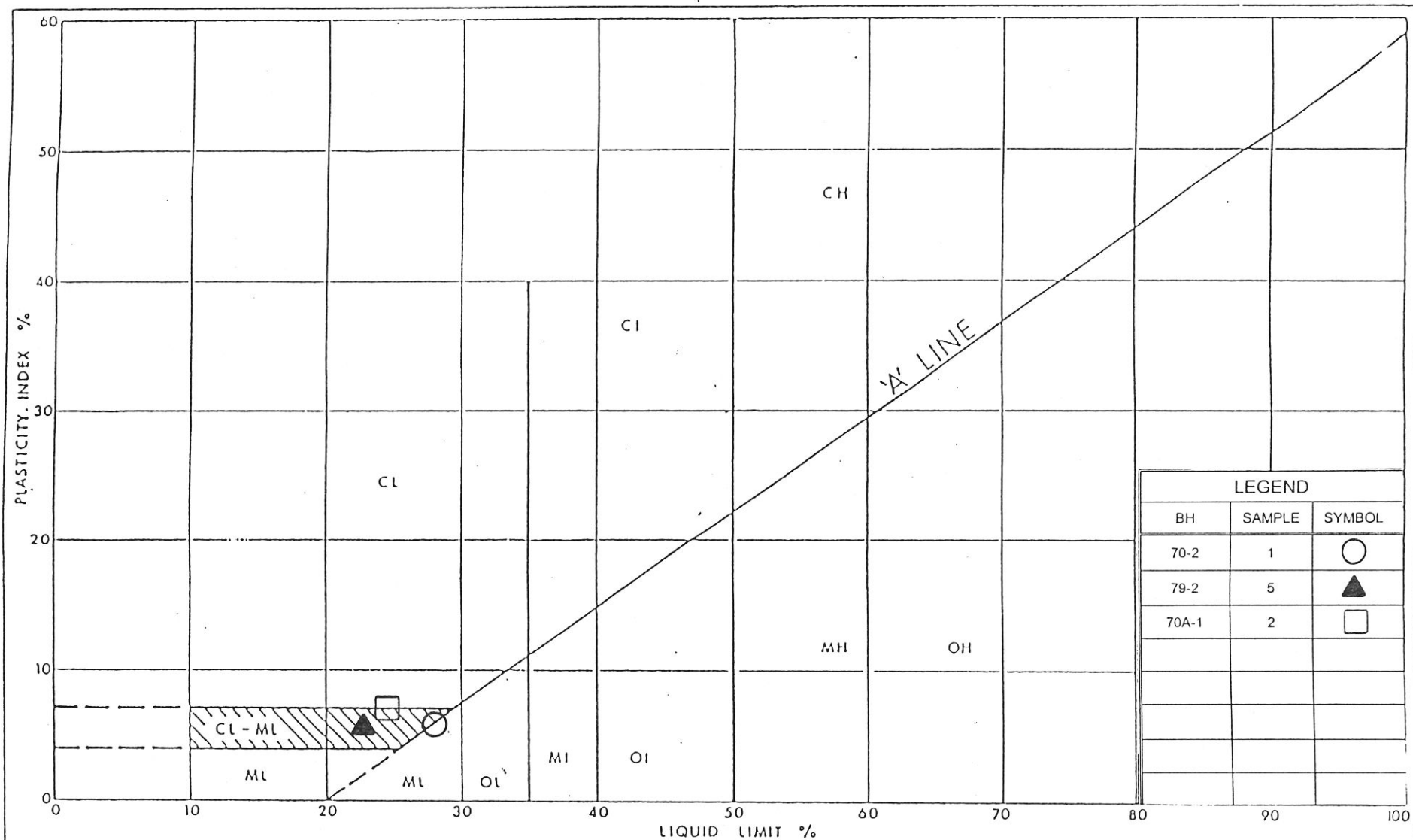
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PLASTICITY CHART SILTY CLAY

FIG No 5

Hwy. 6 (New) Culverts

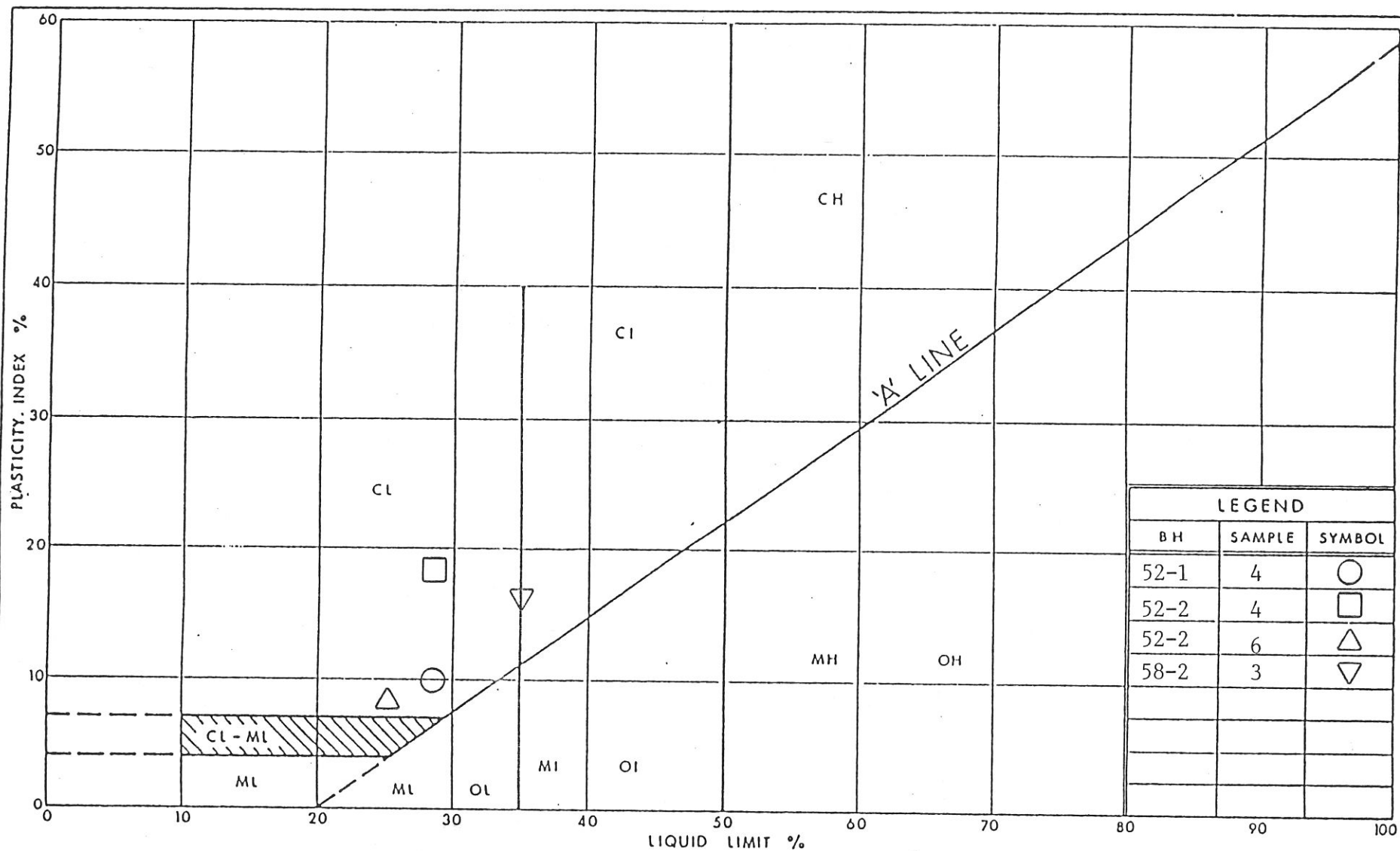


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PLASTICITY CHART SILT/CLAYEY SILT

FIG No 6

Hwy. 6 (New) Culverts



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Transportation

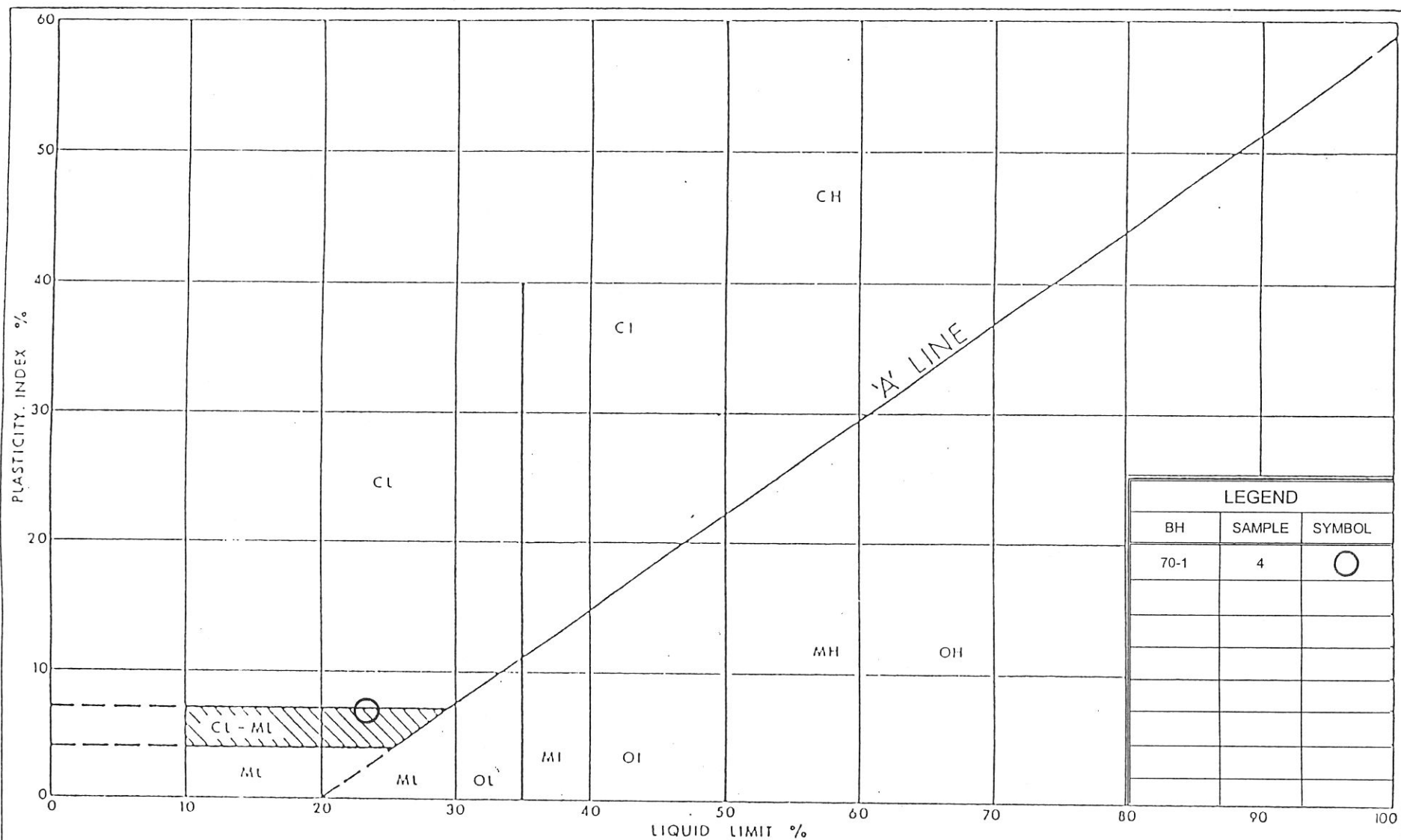
Ontario

PLASTICITY CHART

SILTY CLAY TILL

FIG No 7

Hwy 6 (New) Culverts



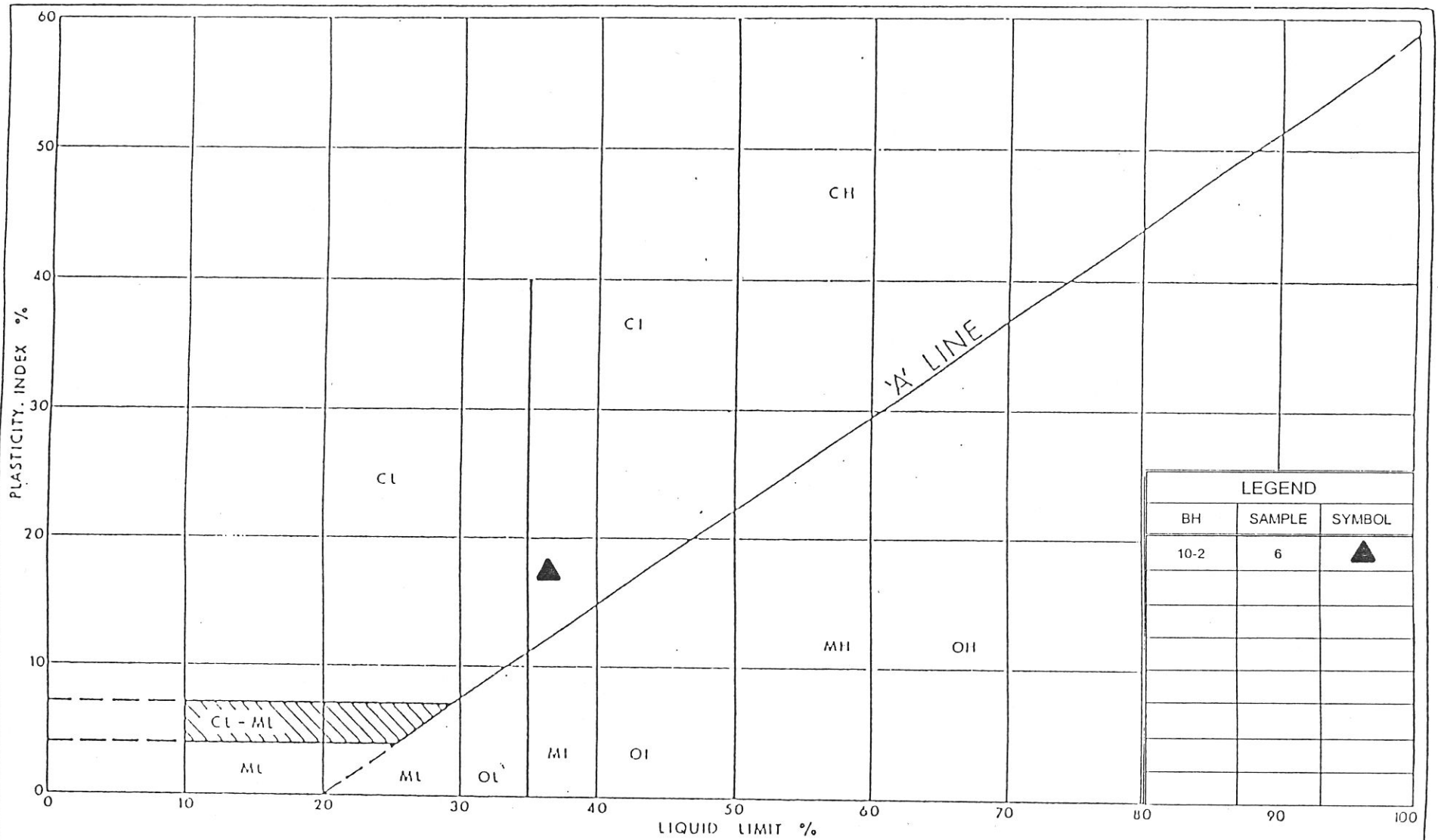
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Ontario

PLASTICITY CHART

CLAYEY SILT TILL

FIG No 8

HWY. 6 (NEW) CULVERTS



| LEGEND | | |
|--------|--------|--------|
| BH | SAMPLE | SYMBOL |
| 10-2 | 6 | ▲ |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |



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Ontario

PLASTICITY CHART LAYERED CLAYEY SILT AND SILTY CLAY TILL

FIG No 9

Hwy. 6 (New) Culverts

APPENDIX B

RECORD OF BOREHOLE LOGS

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N', - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 0.3m INTO THE SUBSOIL. DRIVEN BY MEANS OF A 63.5kg HAMMER FALLING FREELY A DISTANCE OF 0.76m.

DYNAMIC PENETRATION RESISTANCE : - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 51mm, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS. 0.3m INTO THE SUBSOIL. THE DRIVING ENERGY BEING 475 J PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS:-

| <u>CONSISTENCY</u> | <u>'N' BLOWS/0.3 m</u> | <u>c kPa</u> | <u>DENSENESS</u> | <u>'N' BLOWS/0.3 m</u> |
|------------------------------------|------------------------|-----------------------------------|------------------|------------------------|
| VERY SOFT | 0 - 2 | 0 - 12 | VERY LOOSE | 0 - 4 |
| SOFT | 2 - 4 | 12 - 25 | LOOSE | 4 - 10 |
| FIRM | 4 - 8 | 25 - 50 | COMPACT | 10 - 30 |
| STIFF | 8 - 15 | 50 - 100 | DENSE | 30 - 50 |
| VERY STIFF | 15 - 30 | 100 - 200 | VERY DENSE | > 50 |
| HARD | > 30 | > 200 | | |
| W.T.P.L. WETTER THAN PLASTIC LIMIT | | D.T.P.L. DRIER THAN PLASTIC LIMIT | | |
| A.P.L. ABOUT PLASTIC LIMIT | | | | |

TYPE OF SAMPLE

| | | | |
|-----|-----------------------------------|-----|-------------------|
| S.S | SPLIT SPOON | T.W | THINWALL OPEN |
| W.S | WASHED SAMPLE | T.P | THINWALL PISTON |
| S.B | SCRAPER BUCKET SAMPLE | O.S | OESTERBERG SAMPLE |
| A.S | AUGER SAMPLE | F.S | FOIL SAMPLE |
| C.S | CHUNK SAMPLE | R.C | ROCK CORE |
| S.T | SLOTTED TUBE SAMPLE | | |
| | P.H SAMPLE ADVANCED HYDRAULICALLY | | |
| | P.M. SAMPLE ADVANCED MANUALLY | | |

SOIL TESTS

| | | | |
|-----------------|---------------------------------|-----|-----------------|
| Q _u | UNCONFINED COMPRESSION | L.V | LABORATORY VANE |
| Q | UNDRAINED TRIAXIAL | F.V | FIELD VANE |
| Q _{cu} | CONSOLIDATED UNDRAINED TRIAXIAL | C | CONSOLIDATION |
| Q _d | DRAINED TRIAXIAL | | |

▲, Δ - Undisturbed and remoulded shear strength determined from in situ vane test.

■ - Undrained shear strength determined from pocket penetrometer test.

1 of 1

METRIC

Co-ords. 4 778 010 N: 270 067 E.

LOCATION CULVERT 1B - Sta. 10+485, 14m Lt. CL Hwy 6 Connection
(Initial)

ORIGINATED BY M.R.

BOREHOLE TYPE Continuous Flight Solid Stem Augers

COMPILED BY M.R.A.

DATE March 14, 2001

CHECKED BY D.W.K.

+7, x⁵: Numbers refer to Sensitivity



1 of 1

METRIC

Co-ords. 4 778 029 N; 270 087 E.

G W P 603-00-00

LOCATION

CULVERT 1B - Sta. 10+485, 14m Rt. CL Hwy 6 Connection

ORIGINATED BY M.R.

DIST CR HWY 6 (NEW)

BOREHOLE TYPE

Continuous Flight Solid Stem Augers

COMPILED BY M.R.A.

DATUM Geodetic

DATE _____

March 14, 2001

CHECKED BY D.W.K.

+7, x5: Numbers refer to Sensitivity

| RECORD OF BOREHOLE No 35-1 1 of 1 METRIC | | | | | | | | | | | | | |
|--|---|---|--------|------|-----------------------------------|--------------------|---|-----------------|---------------------------------|-------------------------------------|--------------------------------|---------------------------------------|--|
| G W P 603-00-00 | | LOCATION CULVERT 35 - Sta. 16+775, 15m Lt. CL Hwy 6 NEW | | | | ORIGINATED BY M.R. | | | | | | | |
| DIST CR HWY 6 (NEW) | | BOREHOLE TYPE Continuous Flight Solid Stem Augers | | | | COMPILED BY M.R.A. | | | | | | | |
| DATUM Geodetic | | DATE March 14, 2001 | | | | CHECKED BY D.W.K. | | | | | | | |
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS ▽ * | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | 'N' VALUES | 20 40 60 80 100 | | | | | |
| 215.30 | Ground Surface | | | | | | | | | | | | |
| 215.00 | Topsoil | | | | | 215 | | | | | | | |
| 0.30 | Silty clay, trace of sand | | 1 | SS | 8 | | | | | | | | 0 8 67 25 |
| | Stiff Brown | | | | | 214 | | | | | | | |
| 213.90 | Silt, trace of fine sand, trace of clay | | 2 | SS | 13 | | | | | | | | |
| 1.40 | Compact Brown | | | | | 213 | | | | | | | |
| | Grey | | 3 | SS | 22 | | | | | | | | |
| | | | | | | 212 | | | | | | | |
| | | | 4 | SS | 26 | | | | | | | | 0 1 94 5 |
| | | | | | | 211 | | | | | | | |
| | | | | | | 210 | | | | | | | |
| | with layers of silty clay | | 5 | SS | 15 | | | | | | | | |
| 208.75 | End of borehole | | | | | 209 | | | | | | | |
| 6.55 | | | | | | | | | | | | | |
| | * 2001 03 14 | | | | | | | | | | | | |
| | ▽ WATER OBSERVED DURING DRILLING | | | | | | | | | | | | |

| RECORD OF BOREHOLE No 35-2 | | | | | | | | | | 1 of 1 | | METRIC | | | | |
|----------------------------|--------------------------------|------------|---|------|----------------------------|--------------------|---|----|----|--------|----|--|----------------|---|--|---|
| G W P 603-00-00 | | | LOCATION CULVERT 35 - Sta. 16+775, 15m Rt. CL Hwy 6 NEW | | | ORIGINATED BY M.R. | | | | | | | | | | |
| DIST CR HWY 6 (NEW) | | | BOREHOLE TYPE Continuous Flight Solid Stem Augers | | | COMPILED BY M.R.A. | | | | | | | | | | |
| DATUM Geodetic | | | DATE March 14, 2001 | | | CHECKED BY D.W.K. | | | | | | | | | | |
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT Y KN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | VALUES | 20 | 40 | 60 | 80 | 100 | W _p | W | | |
| 215.50 | Ground Surface | | | | | | | | | | | | | | | |
| 215.20 | Topsoil | | | | | | | | | | | | | | | |
| 0.30 | Silty clay, trace of sand | | 1 | SS | 6 | | | | | | | | | | | 0 5 69 26 |
| | Firm Brown | | | | | | | | | | | | | | | |
| | Very stiff | | 2 | SS | 23 | | | | | | | | | | | |
| 213.70 | Silt, trace of fine sand | | | | | | | | | | | | | | | |
| 1.80 | Very dense Brown | | 3 | SS | 76 | | | | | | | | | | | |
| | Compact to dense Grey | | 4 | SS | 30 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 30 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | with layers of silty clay | | 6 | SS | 16 | | | | | | | | | | | |
| 208.95 | End of borehole | | | | | | | | | | | | | | | |
| 6.55 | | | | | | | | | | | | | | | | |
| | * 2001 03 14 | | | | | | | | | | | | | | | |
| | WATER OBSERVED DURING DRILLING | | | | | | | | | | | | | | | |

| <div style="display: flex; justify-content: space-between;"> <div> <p>RECORD OF BOREHOLE No 50-1</p> <p>Co-ords. 4 779 590 N; 268 761 E.</p> </div> <div> <p>1 of 1</p> <p>METRIC</p> </div> </div> | | | | | | | | | | | | | | | | |
|---|---|-------------|--------|--|----------------------------|-------------------------------------|---|--------------------|----|----|----|---|----------------|---|--|---|
| G W P 603-00-00 | | LOCATION | | CULVERT 50 - Sta. 18+563, 16m Lt. CL Hwy 6 NEW | | ORIGINATED BY P.C. | | | | | | | | | | |
| DIST CR | | HWY 6 (NEW) | | BOREHOLE TYPE | | Continuous Flight Solid Stem Augers | | COMPILED BY M.R.A. | | | | | | | | |
| DATUM Geodetic | | DATE | | January 19, 2001 | | CHECKED BY D.W.K. | | | | | | | | | | |
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ KN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | 'N' VALUES | 20 | 40 | 60 | 80 | 100 | W _p | W | | |
| 218.40 | Ground Surface | | | | | | | | | | | | | | | |
| 217.65 | Topsoil | | | | | | | | | | | | | | | |
| 0.75 | Silt, some clay, trace of sand | | 1 | SS | 6 | | | | | | | | | | | 0 9 75 16 |
| | Loose Brown | | 2 | SS | 7 | | | | | | | | | | | |
| 215.90 | Silty clay, trace of sand | | 3 | SS | 17 | | | | | | | | | | | |
| 2.50 | Brown | | | | | | | | | | | | | | | |
| | Grey | | 4 | SS | 9 | | | | | | | | | | | |
| | Stiff to very stiff | | | | | | | | | | | | | | | |
| | with lenses of brown silt | | 5 | SS | 18 | | | | | | | | | | | |
| 211.85 | | | 6 | SS | 15 | | | | | | | | | | | |
| 6.55 | End of borehole | | | | | | | | | | | | | | | |
| | * 2001 01 19 | | | | | | | | | | | | | | | |
| | ∇ WATER LEVEL OBSERVED DURING DRILLING | | | | | | | | | | | | | | | |

METRIC

Co-ords. 4 779 623 N: 268 764 E.

ORIGINATED BY M.R.

COMPILED BY M.R.A.

CHECKED BY D.W.K.

+7, x⁵: Numbers refer to Sensitivity

| RECORD OF BOREHOLE No 52-1 | | | | | | | | | | 1 of 1 | | METRIC | | | | |
|----------------------------|------------------------------------|---|--------|------|----------------------------|--------------------|---|----|----|--------|----|---|----------------|---|--|---|
| G W P 603-00-00 | | LOCATION CULVERT 52 - Sta. 18+940, 16m Lt. CL Hwy 6 NEW | | | | ORIGINATED BY M.R. | | | | | | | | | | |
| DIST CR HWY 6 (NEW) | | BOREHOLE TYPE Continuous Flight Solid Stem Augers | | | | COMPILED BY M.R.A. | | | | | | | | | | |
| DATUM Geodetic | | DATE January 22, 2001 | | | | CHECKED BY D.W.K. | | | | | | | | | | |
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT Y kn/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | 'N' VALUES | 20 | 40 | 60 | 80 | 100 | W _p | W | | |
| 218.00 | Ground Surface | | | | | | | | | | | | | | | |
| 217.82 | Topsoil | | | | | | | | | | | | | | | |
| 0.18 | | | | | | | | | | | | | | | | |
| | Silty clay, trace of sand | | 1 | SS | 8 | | | | | | | | | | | 0 1 53 46 |
| | Stiff | | 2 | SS | 33 | | | | | | | | | | | |
| | Hard | | | | | | | | | | | | | | | |
| 215.60 | | | | | | | | | | | | | | | | |
| 2.40 | Silty clay, trace of sand | | 3 | SS | 26 | | | | | | | | | | | |
| | Very stiff to stiff | | 4 | SS | 13 | | | | | | | | | | | 0 3 69 28 |
| | Grey (Till) | | | | | | | | | | | | | | | |
| | | | 5 | SS | 11 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 211.45 | | | 6 | SS | 12 | | | | | | | | | | | |
| 6.55 | End of borehole | | | | | | | | | | | | | | | |
| | * GROUNDWATER LEVEL NOT DETERMINED | | | | | | | | | | | | | | | |

| RECORD OF BOREHOLE No 52-2 | | | | | | | | | | 1 of 1 | | METRIC | | | | |
|--|--|------------|---|------|-------------------------|--------------------|--|----|----|--------|----|---|----------------|---|-------------|---------------------------------------|
| G W P 603-00-00 | | | LOCATION CULVERT 52 - Sta. 18+900, 16m Rt. CL Hwy 6 NEW | | | ORIGINATED BY M.R. | | | | | | | | | | |
| DIST CR HWY 6 (NEW) | | | BOREHOLE TYPE Continuous Flight Solid Stem Augers | | | COMPILED BY M.R.A. | | | | | | | | | | |
| DATUM Geodetic | | | DATE January 22, 2001 | | | CHECKED BY D.W.K. | | | | | | | | | | |
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | 'N' VALUES | 20 | 40 | 60 | 80 | 100 | W _p | W | | |
| 218.90 | Ground Surface | | | | | | | | | | | | | | | |
| 218.00 | Topsoil | | | | | | | | | | | | | | | |
| 0.90 | Silt, trace of sand Loose Brown to compact With clay | | 1 | SS | 9 | | | | | | | | | | | |
| 216.80 | Trace of clay | | 2 | SS | 11 | | | | | | | | | | | |
| 2.10 | Silty clay, trace of sand | | | | | | | | | | | | | | | |
| 216.50 | Very stiff Brown | | 3 | SS | 20 | | | | | | | | | | | |
| 2.40 | Very stiff | | | | | | | | | | | | | | | |
| | Silty clay, trace of sand and gravel | | 4 | SS | 21 | | | | | | | | | | | |
| | Very stiff to stiff | | | | | | | | | | | | | | | |
| | Grey (Till) | | 5 | SS | 14 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 212.35 | | | 6 | SS | 14 | | | | | | | | | | | |
| 6.55 | End of borehole | | | | | | | | | | | | | | | |
| * 2001 01 22 WATER LEVEL OBSERVED DURING DRILLING | | | | | | | | | | | | | | | | |

| RECORD OF BOREHOLE No 58-1 | | | | | | | | | | 1 of 1 | | METRIC | | | | |
|----------------------------|---|------------|---|------|----------------------------|--------------------|---|----|----|--------|----|---|----------------|---|--|---|
| G W P 603-00-00 | | | LOCATION CULVERT 58 - Sta. 19+550, 18m Lt. CL Hwy 6 NEW | | | ORIGINATED BY M.R. | | | | | | | | | | |
| DIST CR HWY 6 (NEW) | | | BOREHOLE TYPE Continuous Flight Solid Stem Augers | | | COMPILED BY M.R.A. | | | | | | | | | | |
| DATUM Geodetic | | | DATE January 22, 2001 | | | CHECKED BY D.W.K. | | | | | | | | | | |
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | 'N' VALUES | 20 | 40 | 60 | 80 | 100 | W _p | W | | |
| 218.20 | Ground Surface | | | | | | | | | | | | | | | |
| 218.00 | Topsoil | | | | | 218 | | | | | | | | | | |
| 0.20 | Silty clay, trace of sand, with thin lenses of silt | | 1 | SS | 14 | | | | | | | | | | | |
| | Very Brown Stiff | | 2 | SS | 22 | 217 | | | | | | | | | | |
| | | | 3 | SS | 19 | 216 | | | | | | | | | | |
| | Stiff Grey | | 4 | SS | 11 | 215 | | | | | | | | | | |
| | | | 5 | SS | 10 | 214 | | | | | | | | | | |
| | | | 6 | SS | 9 | 213 | | | | | | | | | | |
| 211.65 | End of borehole | | | | | 212 | | | | | | | | | | |
| 6.55 | | | | | | | | | | | | | | | | |
| | * GROUNDWATER LEVEL NOT DETERMINED | | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No 58-2

1 of 1

METRIC

G W P 603-00-00

LOCATION CULVERT 58 - Sta. 19+555, 16m Rt. CL Hwy 6 NEW
(Initial)

ORIGINATED BY M.R.

DIST CR HWY 6 (NEW)

BOREHOLE TYPE Continuous Flight Solid Stem Augers

COMPILED BY M.R.A.

DATUM Geodetic

DATE January 22, 2001

CHECKED BY D.W.K.

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|----------------|---|------------|---------|------|------------|----------------------------|--------------------|---|----|----|----|-----|------------------------------------|-------------------------------------|-----------------------------------|--|---|
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | 'N' VALUES | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 216.60 | Ground Surface | | | | | | | | | | | | | | | | |
| 216.40 0.20 | Topsoil | | | | | | | | | | | | | | | | |
| | Silty clay, trace of sand, with thin lenses of silt | | 1 | SS | 6 | | 216 | | | | | | | | | | |
| | Firm Brown Very stiff | | 2 | SS | 18 | | 215 | | | | | | | | | | |
| 214.50 2.10 | Silty clay, trace of sand and gravel | | 3 | SS | 24 | | 214 | | | | | | | | | | 4 7 56 33 |
| | Very stiff Brown Firm to Grey stiff (Till) | | 4 | SS | 8 | | 213 | | | | | | | | | | |
| | | | 5 | SS | 7 | | 212 | | | | | | | | | | |
| | | | | | | | 211 | | | | | | | | | | |
| 210.05 6.55 | End of borehole | | 6 | SS | 10 | | | | | | | | | | | | |
| | * GROUNDWATER LEVEL NOT DETERMINED | | | | | | | | | | | | | | | | |

| RECORD OF BOREHOLE No 70-1 | | | | | | | | | | 1 of 1 | | METRIC | | | | |
|----------------------------|--|---|--------|------|----------------------------|--------------------|---|----|----|--------|----|---|----------------|---|---|--|
| G W P 603-00-00 | | LOCATION CULVERT 70 - Sta. 20+745, 21m Lt. CL Hwy 6 NEW | | | | ORIGINATED BY M.R. | | | | | | | | | | |
| DIST CR HWY 6 (NEW) | | BOREHOLE TYPE Continuous Flight Solid Stem Augers | | | | COMPILED BY M.R.A. | | | | | | | | | | |
| DATUM Geodetic | | DATE January 23, 2001 | | | | CHECKED BY D.W.K. | | | | | | | | | | |
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
| ELEV. DEPTH | DESCRIPTION | STRAT. PLOT | NUMBER | TYPE | | | 'N' VALUES | 20 | 40 | 60 | 80 | 100 | W _p | W | | |
| 220.30 | Ground Surface | | | | | | | | | | | | | | | |
| 219.30 | Topsoil | | 1 | SS | 6 | | | | | | | | | | | |
| 1.00 | Silt, trace of sand | | | | | | | | | | | | | | | |
| | Loose Brown with clay | | 2 | SS | 18 | | | | | | | | | | | |
| | Compact, trace of clay | | | | | | | | | | | | | | | |
| 217.90 | Clayey silt, trace of sand | | 3 | SS | 15 | | | | | | | | | | | |
| 2.40 | Stiff Grey (Till) | | 4 | SS | 11 | | | | | | | | | | | |
| | | | 5 | SS | 10 | | | | | | | | | | | |
| | | | 6 | SS | 9 | | | | | | | | | | | |
| 213.75 | End of borehole | | | | | | | | | | | | | | | |
| 6.55 | | | | | | | | | | | | | | | | |
| | * 2001 01 23 | | | | | | | | | | | | | | | |
| | ∇ WATER LEVEL OBSERVED DURING DRILLING | | | | | | | | | | | | | | | |

| <div style="display: flex; justify-content: space-between;"> <div> RECORD OF BOREHOLE No 70-2 <small>Co-ords. 4 781 059 N; 267 331 E.</small> </div> <div> 1 of 1 </div> <div> METRIC </div> </div> | | | | | | | | | | | | | | | | |
|---|--|---------------|--------|--|-------------------------|--------------------|--|-----------------|----------------|---|----------------|---|---|--|-------------|---------------------------------------|
| G W P 603-00-00 | | LOCATION | | CULVERT 70 - Sta. 20+780, 20m Rt. CL Hwy 6 NEW | | ORIGINATED BY M.R. | | | | | | | | | | |
| DIST CR HWY 6 (NEW) | | BOREHOLE TYPE | | Continuous Flight Solid Stem Augers | | COMPILED BY M.R.A. | | | | | | | | | | |
| DATUM Geodetic | | DATE | | January 23, 2001 | | CHECKED BY D.W.K. | | | | | | | | | | |
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | 'N' VALUES | 20 40 60 80 100 | W _p | W | W _L | WATER CONTENT (%) | γ | | | |
| 220.20 | Ground Surface | | | | | | | | | | | | | | | |
| 219.80 | Topsoil | | | | | | | | | | | | | | | |
| 0.40 | Sandy silt, some clay, trace of gravel | | 1 | SS | 5 | | | | | | | | | | | |
| | Loose Brown | | | | | | | | | | | | | | | |
| | Compact | | 2 | SS | 28 | | | | | | | | | | | |
| | Grey | | 3 | SS | 27 | | | | | | | | | | | |
| 217.35 | Clayey silt, trace of sand and gravel | | 4 | SS | 11 | | | | | | | | | | | |
| 2.85 | Stiff Grey (Till) | | 5 | SS | 11 | | | | | | | | | | | |
| | | | 6 | SS | 13 | | | | | | | | | | | |
| 213.65 | End of borehole | | | | | | | | | | | | | | | |
| 6.55 | * 2001 01 23 WATER LEVEL OBSERVED DURING DRILLING | | | | | | | | | | | | | | | |

| <div style="text-align: center;"> RECORD OF BOREHOLE No 75-1 1 of 1 METRIC <small>Co-ords. 4 781 621 N; 267 158 E.</small> </div> | | | | | | | | | | | | | | | |
|--|---------------------------------------|---|--------|------|-------------------------|--------------------|--|-----------------|--------------------|----------------|---|----------------|----------|--|---------------------------------------|
| G W P 603-00-00 | | LOCATION CULVERT 75 - Sta. 21+370, 19m Lt. CL Hwy 6 NEW | | | | ORIGINATED BY M.R. | | | | | | | | | |
| DIST CR HWY 6 (NEW) | | BOREHOLE TYPE Continuous Flight Solid Stem Augers | | | | COMPILED BY M.R.A. | | | | | | | | | |
| DATUM Geodetic | | DATE March 27, 2001 | | | | CHECKED BY D.W.K. | | | | | | | | | |
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | 'N' VALUES | 20 40 60 80 100 | 50 100 150 200 250 | W _p | W | W _L | 20 40 60 | | |
| 224.20 | Ground Surface | | | | | | | | | | | | | | |
| 223.92 0.28 | Topsoil | | | | | | | | | | | | | | |
| | Silt, trace of clay and sand | | | | | | | | | | | | | | |
| | Compact Brown | | 1 | SS | 22 | | | | | | | | | | 0 3 90 7 |
| 221.80 | | | | | | | | | | | | | | | |
| 2.40 | Silty clay, trace of sand | | | | | | | | | | | | | | |
| | Very stiff Brown | | 2 | SS | 18 | | | | | | | | | | 0 1 59 40 |
| 220.20 | | | | | | | | | | | | | | | |
| 4.00 | Silt, trace of fine sand | | | | | | | | | | | | | | |
| | Dense Grey | | 3 | SS | 40 | | | | | | | | | | |
| 219.20 | | | | | | | | | | | | | | | |
| 5.00 | Clayey silt, trace of sand and gravel | | | | | | | | | | | | | | |
| | Very stiff Brown (Till) | | 4 | SS | 23 | | | | | | | | | | |
| 217.65 6.55 | End of borehole | | | | | | | | | | | | | | |
| <p>* 2001 03 27</p> <p>▼ WATER LEVEL OBSERVED AFTER DRILLING</p> <p>■ PENETROMETER</p> | | | | | | | | | | | | | | | |

| RECORD OF BOREHOLE No 75-2 | | | | | | | | | | 1 of 1 | | METRIC | |
|----------------------------|---------------------------------------|---|--------|-------------------------|-----------------|--|------------|---------------------------------|-------------------------------|--------------------------------|---------------------------------------|---------------------------------------|----|
| G W P 603-00-00 | | LOCATION CULVERT 75 - Sta. 21+370, 18m Rt. CL Hwy 6 NEW | | ORIGINATED BY M.R. | | | | | | | | | |
| DIST CR HWY 6 (NEW) | | BOREHOLE TYPE Continuous Flight Solid Stem Augers | | COMPILED BY M.R.A. | | | | | | | | | |
| DATUM Geodetic | | DATE March 27, 2001 | | CHECKED BY D.W.K. | | | | | | | | | |
| SOIL PROFILE | | SAMPLES | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | | | TYPE | 'N' VALUES | | | | | | 20 |
| 224.30 | Ground Surface | | | | | | | | | | | | |
| 224.00 0.30 | Topsoil | | | | | | | | | | | | |
| | Clayey silt, trace of sand | | | | | | | | | | | | |
| | Stiff Brown | | | | | | | | | | | | |
| 222.50 1.80 | Silt, trace of fine sand and clay | | 1 | SS | 18 | | | | | | | | |
| | Compact Brown | | | | | | | | | | | | |
| | Grey | | 2 | SS | 23 | | | | | | | | |
| 220.30 4.00 | Silty clay, trace of sand | | | | | | | | | | | | |
| | Stiff Grey | | 3 | SS | 12 | | | | | | | | |
| 219.30 5.00 | Silty clay, trace of sand and gravel | | | | | | | | | | | | |
| | Very stiff Brown (Till) | | 4 | SS | 16 | | | | | | | | |
| 217.75 6.55 | End of borehole | | | | | | | | | | | | |
| | * 2001 03 27 | | | | | | | | | | | | |
| | ▽ WATER LEVEL OBSERVED AFTER DRILLING | | | | | | | | | | | | |
| | ■ PENETROMETER | | | | | | | | | | | | |

RECORD OF BOREHOLE No 79-1

1 of 1 METRIC

G.W.P. 603-00-00 LOCATION Co-ords. 4 782 028 N: 267 102 E Culvert 79 - Sta. 21+780 16m Rt CL Hwy 6 New ORIGINATED BY P.C.
DIST CR HWY 6 (NEW) BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY P.C.
DATUM Geodetic DATE April 08, 2002 CHECKED BY M.R.A.

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|--|----|----|-----|--|------------------------------------|-------------------------------------|-----------------------------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | | | | |
| 226.10 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | |
| 0.00 | Topsoil | | | | | | | | | | | | | | | | |
| 0.10 | Silt, trace of clay, trace of fine sand, trace of gravel, with oxidized stains | | | | | | | | | | | | | | | | |
| | Compact Brown moist to very dense | | 1 | SS | 18 | | | | | | | | | | | 1 9 84 6 | |
| | | | 2 | SS | 48 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 64 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | Grey | | 4 | SS | 36 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 34 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 16 | | | | | | | | | | | | |
| 219.50 | with layer of silty clay, medium to high plastic | | | | | | | | | | | | | | | | |
| 6.60 | Stiff Grey | | | | | | | | | | | | | | | | |
| | End of borehole | | | | | | | | | | | | | | | | |
| | *Groundwater level not determined | | | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No 79-2

1 of 1 METRIC

G.W.P. 603-00-00 LOCATION Co-ords. 4 782 021 N: 267 070 E Culvert 79 - Sta. 21+780 16m Lt CL Hwy 6 New ORIGINATED BY P.C.
DIST CR HWY 6 (NEW) BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY P.C.
DATUM Geodetic DATE April 08, 2002 CHECKED BY M.R.A.

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----|-----|--|--|------------------------------------|-------------------------------------|-----------------------------------|--|---|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | | |
| 226.50 | Ground Surface | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | |
| 0.00 | Topsoil | | | | | | | | | | | | | | | | | |
| 226.15 | Silt, trace of clay, trace of fine sand, trace of gravel, with oxidized stains Loose Brown moist to compact Grey with layer of clayey silt, trace of sand Stiff Grey Compact Brown | | 1 | SS | 5 | | | | | | | | | | | | | |
| 0.35 | | | 2 | SS | 20 | | | | | | | | | | | | | |
| | | | 3 | SS | 21 | | | | | | | | | | | | | |
| | | | 4 | SS | 17 | | | | | | | | | | | | | |
| | | | 5 | SS | 9 | | | | | | | | | | | | | |
| | | | 6 | SS | 29 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 219.90 | End of borehole | | | | | | | | | | | | | | | | | |
| 6.60 | *2002 04 08 Water level measured after drilling | | | | | | | | | | | | | | | | | |

| RECORD OF BOREHOLE No 34A-1 | | | | | | | | | | 1 of 1 | | METRIC | | | | |
|-----------------------------|--|--|--------|------|---------------------------------|--------------------|---|----|----|--------|----|--|----------------|---|--|--|
| G W P 603-00-00 | | LOCATION CULVERT 34A - Sta. 10+140, 18m Lt. CL Realigned White Church Road | | | | ORIGINATED BY M.R. | | | | | | | | | | |
| DIST CR HWY 6 (NEW) | | BOREHOLE TYPE Continuous Flight Solid Stem Augers | | | | COMPILED BY M.R.A. | | | | | | | | | | |
| DATUM Geodetic | | DATE March 14, 2001 | | | | CHECKED BY D.W.K. | | | | | | | | | | |
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS * | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT | | | UNIT WEIGHT Y kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | VALUES | 20 | 40 | 60 | 80 | 100 | W _p | W | | |
| 214.05 | Ground Surface | | | | | | | | | | | | | | | |
| 213.75 | Topsoil | | | | | | | | | | | | | | | |
| 0.30 | Silty clay, trace of sand | | 1 | SS | 10 | | | | | | | | | | | |
| | Stiff Brown | | 2 | SS | 10 | | | | | | | | | | | |
| | | | 3 | SS | 15 | | | | | | | | | | | |
| 211.15 | Silt, trace of fine sand, trace of clay | | 4 | SS | 28 | | | | | | | | | | | |
| 2.90 | Compact Brown to dense to grey | | 5 | SS | 41 | | | | | | | | | | | |
| | | | 6 | SS | 48 | | | | | | | | | | | |
| 207.50 | End of borehole | | | | | | | | | | | | | | | |
| 6.55 | * GROUNDWATER LEVEL NOT DETERMINED ■ PENETROMETER | | | | | | | | | | | | | | | |

| RECORD OF BOREHOLE No 34A-2 1 of 1 METRIC | | | | | | | | | | | | | | |
|---|--|--|--------|------|-------------------------|--------------------|--|----|----|---------------------------------|-------------------------------|--------------------------------|---------------------------------------|--|
| G W P 603-00-00 | | LOCATION CULVERT 34A - Sta. 10+145, 18m Rt. CL Realigned White Church Road | | | | ORIGINATED BY M.R. | | | | | | | | |
| DIST CR HWY 6 (NEW) | | BOREHOLE TYPE Continuous Flight Solid Stem Augers | | | | COMPILED BY M.R.A. | | | | | | | | |
| DATUM Geodetic | | DATE March 14, 2001 | | | | CHECKED BY D.W.K. | | | | | | | | |
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ kn/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | 'N' VALUES | 20 | 40 | | | | | |
| 213.95 | Ground Surface | | | | | | | | | | | | | |
| 213.75 0.20 | Topsoil | | | | | | | | | | | | | |
| | Silty clay, trace of sand | | 1 | SS | 8 | | | | | | | | | |
| | Stiff Brown | | 2 | SS | 10 | | | | | | | | | |
| 211.85 2.10 | Silt, trace of fine sand, trace of clay | | 3 | SS | 28 | | | | | | | | | |
| | Compact Grey to dense | | 4 | SS | 21 | | | | | | | | | |
| | | | 5 | SS | 40 | | | | | | | | | |
| 207.40 6.55 | End of borehole | | 6 | SS | 21 | | | | | | | | | |
| | * 2001 03 14 ▽ WATER LEVEL OBSERVED DURING DRILLING | | | | | | | | | | | | | |

| RECORD OF BOREHOLE No 70A-1 | | | | | | | | | | 1 of 1 | | METRIC | | | | |
|-----------------------------|---|---|--------|------|-------------------------|--------------------|--|----|----|--------|----|---|----------------|---|-------------|---------------------------------------|
| G W P 603-00-00 | | LOCATION CULVERT 70A - Sta. 9+940, 32m Lt. CL Butter Road | | | | ORIGINATED BY P.C. | | | | | | | | | | |
| DIST CR HWY 6 (NEW) | | BOREHOLE TYPE Continuous Flight Solid Stem Augers | | | | COMPILED BY M.R.A. | | | | | | | | | | |
| DATUM Geodetic | | DATE January 18, 2001 | | | | CHECKED BY D.W.K. | | | | | | | | | | |
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | VALUES | 20 | 40 | 60 | 80 | 100 | W _p | W | | |
| 219.50 | Ground Surface | | | | | | | | | | | | | | | |
| 218.90 | Topsoil | | | | | | | | | | | | | | | |
| 0.60 | Layered silty clays, silts and sandy silts | | 1 | SS | 3 | | | | | | | | | | | |
| 218.10 | Soft Brown very loose | | 2 | SS | 20 | | | | | | | | | | | |
| 1.40 | Clayey silt, trace of sand | | 3 | SS | 23 | | | | | | | | | | | |
| | Very Grey stiff | | 4 | SS | 19 | | | | | | | | | | | |
| 214.70 | Silty clay, trace of sand and gravel | | 5 | SS | 13 | | | | | | | | | | | |
| 4.80 | Stiff Grey | | 6 | SS | 11 | | | | | | | | | | | |
| 212.95 | End of borehole | | | | | | | | | | | | | | | |
| 6.55 | * 2001 01 18 ▽ WATER LEVEL OBSERVED DURING DRILLING ▽ WATER LEVEL MEASURED AFTER DRILLING | | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No 70A-2

1 of 1

METRIC

G W P 603-00-00

LOCATION CULVERT 70A - Sta. 9+940, 33m Rt. CL Butter Road

ORIGINATED BY P.C.

DIST CR HWY 6 (NEW)

BOREHOLE TYPE Continuous Flight Solid Stem Augers

COMPILED BY M.R.A.

DATUM Geodetic

DATE January 18, 2001

CHECKED BY D.W.K.

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | WATER CONTENT (%) | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|----------------|--|------------|---------|------|------------|----------------------------|--------------------|---|----|----|----|-----|------------------------------------|-------------------------------------|-----------------------------------|-------------------|--|---|
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | 'N' VALUES | | | 20 | 40 | 60 | 80 | 100 | | | | | | |
| 219.80 | Ground Surface | | | | | | | | | | | | | | | | | |
| 219.50 | Topsoil | | | | | | | | | | | | | | | | | |
| 0.30 | | | | | | | | | | | | | | | | | | |
| 218.90 | Silty fine sand, trace of clay | | | | | | | | | | | | | | | | | |
| 0.90 | Very loose Brown | | 1 | SS | 4 | | 219 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | Silty clay, trace of sand and gravel | | 2 | SS | 21 | | 218 | | | | | | | | | | | 1 4 66 29 |
| | Firm Brown | | | | | | | | | | | | | | | | | |
| | Very stiff | | 3 | SS | 24 | | 217 | | | | | | | | | | | |
| 216.90 | Brown | | | | | | | | | | | | | | | | | |
| 2.90 | Clayey silt, trace of sand and gravel | | 4 | SS | 24 | | 216 | | | | | | | | | | | |
| | Very stiff Grey | | | | | | | | | | | | | | | | | |
| | | | | | | | 215 | | | | | | | | | | | |
| | Very dense Silt, trace of clay and sand | | 5 | SS | 67 | | 214 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | Compact | | | | | | | | | | | | | | | | | |
| 213.25 | | | 6 | SS | 17 | | | | | | | | | | | | | |
| 6.55 | End of borehole | | | | | | | | | | | | | | | | | |
| | * 2001 01 18 | | | | | | | | | | | | | | | | | |
| | ▽ WATER LEVEL OBSERVED DURING DRILLING | | | | | | | | | | | | | | | | | |
| | ▽ WATER LEVEL MEASURED AFTER DRILLING | | | | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No 10-1

1 of 1 METRIC

G.W.P. 603-00-00 LOCATION Co-ords. 4 778 515 N; 269 728 E
DIST CR HWY 6 (NEW) BOREHOLE TYPE Continuous Flight Solid Stem Augers
DATUM Geodetic DATE January 29, 2002

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|--|----|----|-----|--|------------------------------------|-------------------------------------|-----------------------------------|--|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | | | | |
| 214.80 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | |
| 0.00 | Shoulder Structure, sand and gravel fill, trace of silt | | | | | | | | | | | | | | | | |
| 213.90 | Grey | | | | | | | | | | | | | | | | |
| 0.90 | Topsoil | | 1 | SS | 7 | | | | | | | | | | | | |
| 213.40 | Silty clay, trace of sand | | | | | | | | | | | | | | | | |
| 1.40 | Stiff Brown | | 2 | SS | 9 | | | | | | | | | | | 0 2 76 22 | |
| 212.70 | Silt, trace of fine sand, trace of clay | | | | | | | | | | | | | | | | |
| 2.10 | Dense to very dense Brown Moist to wet | | 3 | SS | 36 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 65 | | | | | | | | | | | 0 5 89 6 | |
| | | | | | | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 58 | | | | | | | | | | | | |
| 209.30 | Layered clayey silt and silty clays, trace of sand | | | | | | | | | | | | | | | | |
| 5.50 | Stiff Grey (Till) | | 6 | SS | 9 | | | | | | | | | | | | |
| 208.20 | | | | | | | | | | | | | | | | | |
| 6.60 | End of borehole | | | | | | | | | | | | | | | | |
| | *2002 01 29 | | | | | | | | | | | | | | | | |
| | Water level measured after drilling | | | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No 10-2

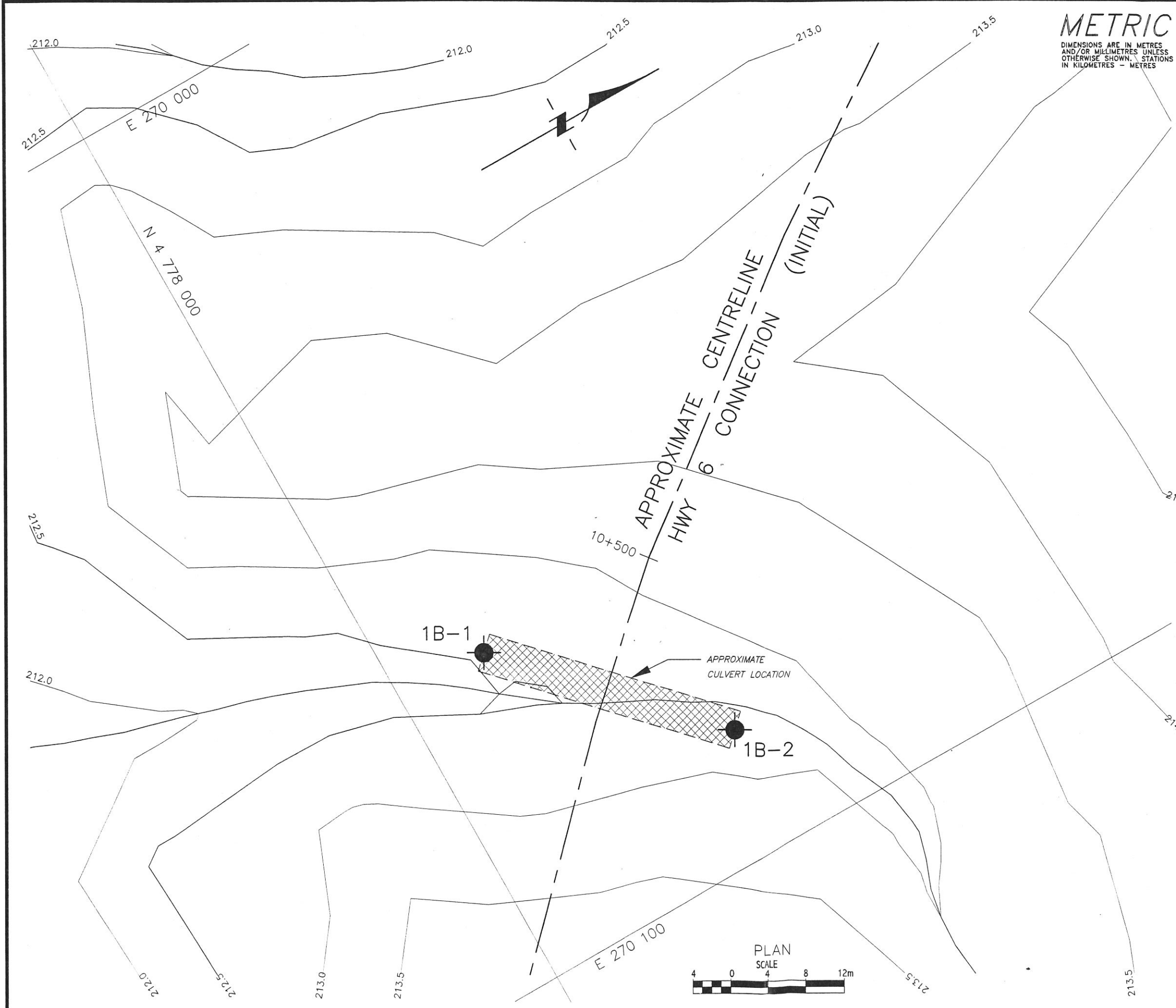
1 of 1 METRIC

G.W.P. 603-00-00 LOCATION Co-ords. 4 778 509 N; 269 726 E
DIST CR HWY 6 (NEW) BOREHOLE TYPE Continuous Flight Solid Stem Augers ORIGINATED BY P.C.
DATUM Geodetic DATE January 29, 2002 COMPILED BY P.C.
CHECKED BY M.R.A.


| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----|----|----|-----|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 214.80 | Ground Surface | | | | | | | | | | | | | | | | |
| 0.00 | Pavement structure, 275mm asphaltic concrete over sand and gravel fill, trace of silt | | | | | | | | | | | | | | | | |
| 214.05 | Topsoil fill | | 1 | SS | 11 | | 214 | | | | | | | | | | |
| 213.40 | Topsoil | | 2 | SS | 8 | | 213 | | | | | | | | | | |
| 212.70 | Silt, some fine sand, trace of clay | | 3 | SS | 23 | | 212 | | | | | | | | | | |
| 2.10 | Compact Brown Moist to wet | | 4 | SS | 56 | | 211 | | | | | | | | | | |
| | Very dense to compact Grey | | | | | | 210 | | | | | | | | | | |
| | | | 5 | SS | 22 | | 209 | | | | | | | | | | |
| 209.30 | Layered clayey silt and silty clays, trace of fine sand and gravel | | | | | | | | | | | | | | | | |
| 5.50 | Stiff Grey (Till) | | 6 | SS | 10 | | | | | | | | | | | | 1 3 48 48 |
| 208.20 | End of borehole | | | | | | | | | | | | | | | | |
| 6.60 | *2002 01 29 Water level measured after drilling | | | | | | | | | | | | | | | | |

APPENDIX C

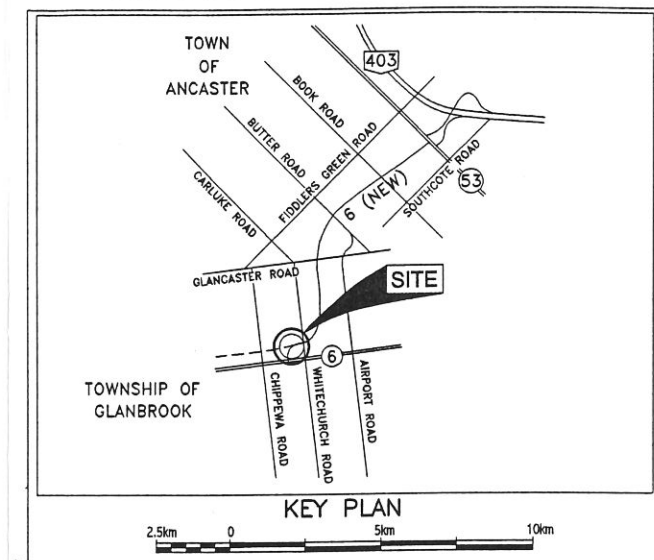
DRAWINGS 1 TO 11



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

| | | |
|--|--|--|
| CONT No. | |  |
| GWP No. 603-00-00 | | |
| HWY 6 (NEW) Proposed Culvert 1B at Station 10+485 (Hwy 6 Connection) BOREHOLE LOCATIONS | | SHEET |

Peto MacCallum Ltd.
CONSULTING ENGINEERS



LEGEND

- Borehole
- Dynamic Cone Penetration Test (Cone)
- Borehole & Cone
- 'N' Blows/0.3m (Std. Pen Test, 475 J / blow)
- CONE Blows/0.3m (60° Cone, 475 J / blow)
- W L at time of investigation or in piezometer
- Head
- ARTESIAN WATER Encountered
- Piezometer

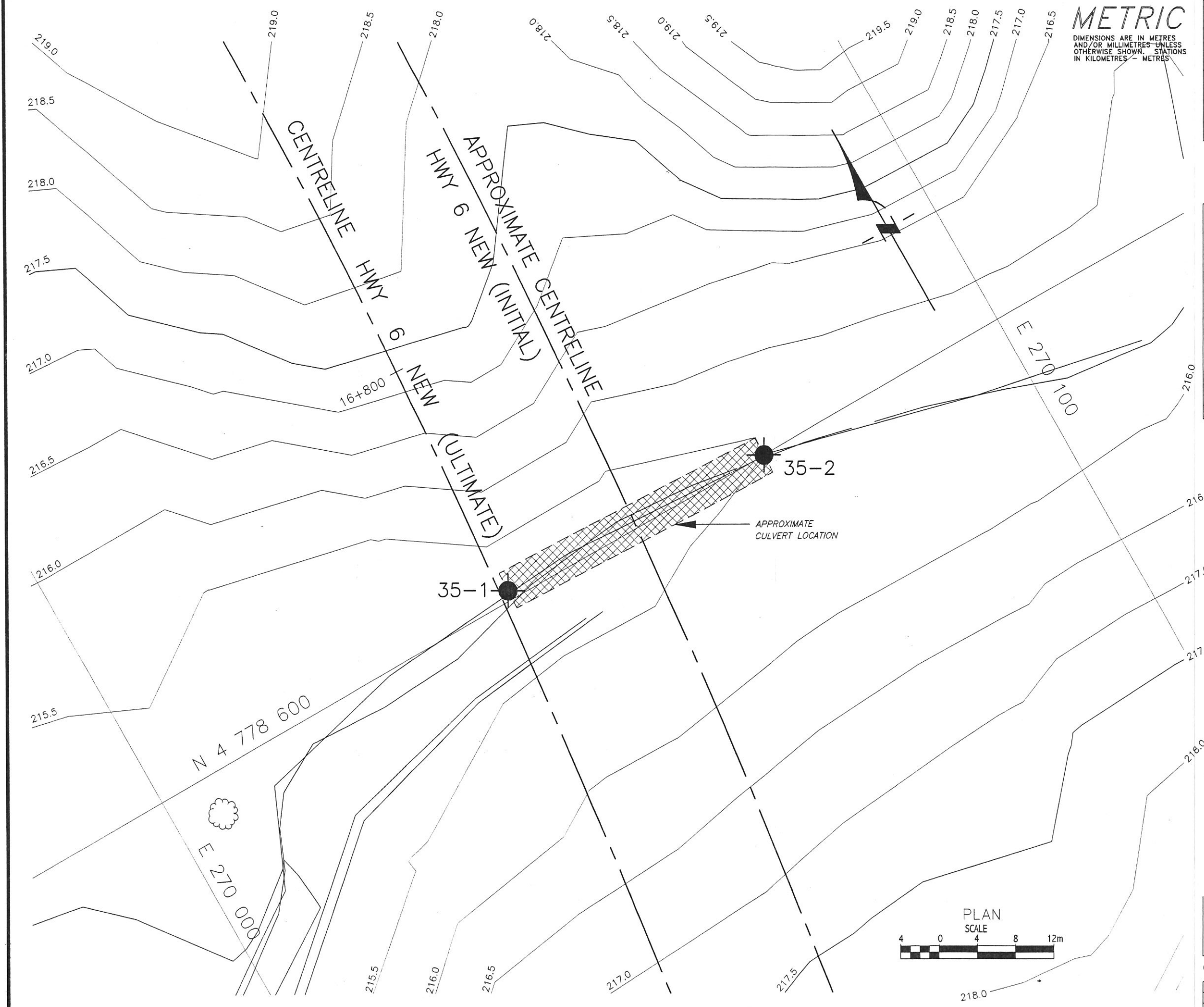
| No | ELEVATION | CO-ORDINATES | |
|------|-----------|--------------|---------|
| | | NORTH | EAST |
| 1B-1 | 212.60 | 4 778 010 | 270 067 |
| 1B-2 | 212.80 | 4 778 029 | 270 087 |

NOTE
Culvert and Centreline Alignment locations are derived from Drawing No. J1 of Pre-Design Report (WP 9-91-00) and are considered approximate.

| | | | |
|-----------|---------------|----|-------------|
| REVISIONS | 16 APRIL 2002 | PC | |
| | 11 APRIL 2002 | PC | |
| | DATE | BY | DESCRIPTION |

Geocres No.

| | | | |
|-----------------|----------------|-----------------|-------|
| HWY No. 6 (NEW) | | DIST | CR |
| SUBM'D P.C. | CHECKED P.C. | DATE APRIL 2002 | SITE |
| DRAWN C.B. | CHECKED M.R.A. | APPROVED D.W.K. | DWG 1 |



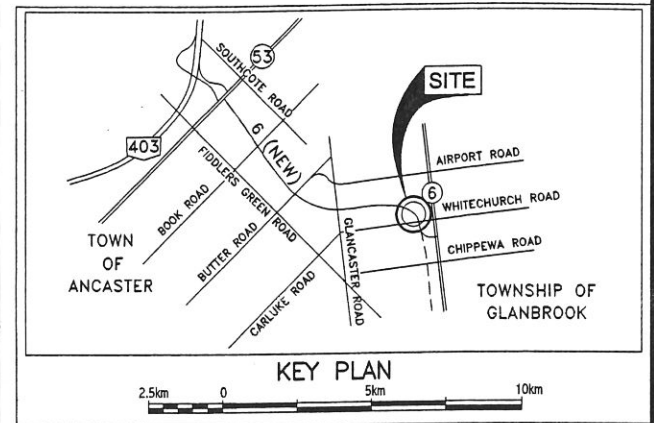
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES UNLESS
OTHERWISE SHOWN. STATIONS
IN KILOMETRES - METRES

CONT No.
GWP No. 603-00-00

HWY 6 (NEW)
Proposed Culvert 35 at
Station 16+775
BOREHOLE LOCATIONS

SHEET

Peto MacCallum Ltd.
CONSULTING ENGINEERS



LEGEND

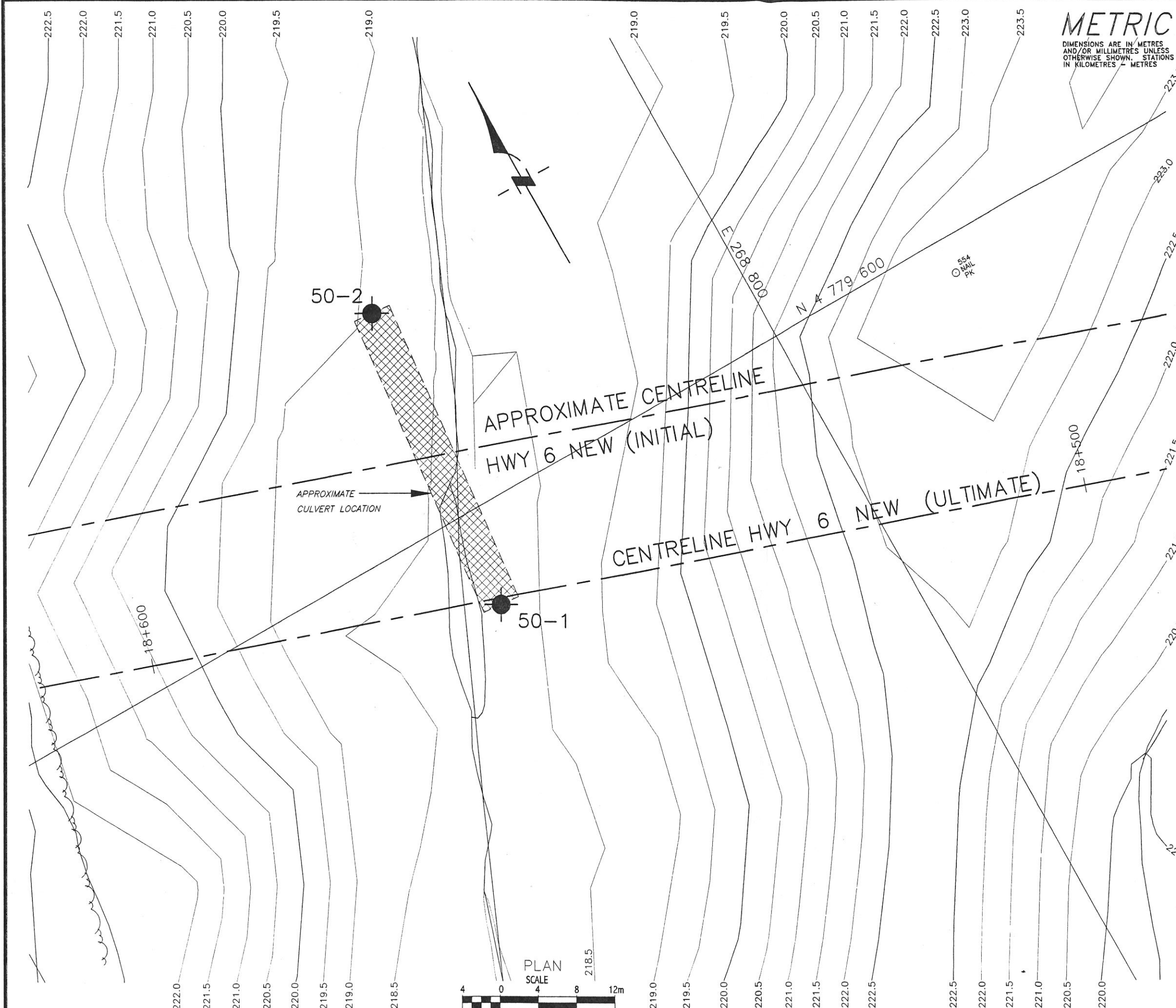
- Borehole
- Dynamic Cone Penetration Test (Cone)
- Borehole & Cone
- 'N' Blows/0.3m (Std. Pen Test, 475 J / blow)
- CONE Blows/0.3m (60° Cone, 475 J / blow)
- W L at time of investigation or in piezometer
- Head
- ARTESIAN WATER Encountered
- Piezometer

| No | ELEVATION | CO-ORDINATES | |
|------|-----------|--------------|---------|
| | | NORTH | EAST |
| 35-1 | 215.30 | 4 778 601 | 270 042 |
| 35-2 | 215.50 | 4 778 600 | 270 072 |
| | | | |
| | | | |
| | | | |


NOTE
Culvert and Centreline Alignment locations are derived from Drawing No. J2 of Pre-Design Report (WP 9-91-00) and are considered approximate.



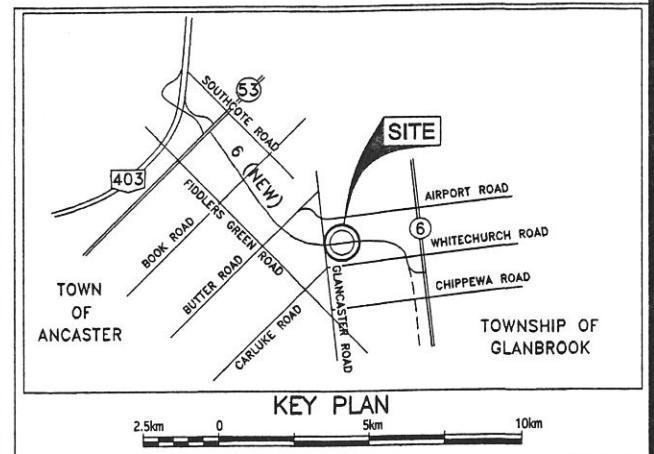
| | | | |
|-----------------|----------------|-----------------|-------------|
| REVISIONS | 16 APRIL 2002 | PC | |
| | 11 APRIL 2002 | PC | |
| | DATE | BY | DESCRIPTION |
| | | | |
| Geocres No. | | | |
| HWY No. 6 (NEW) | | DIST | CR |
| SUBM'D P.C. | CHECKED P.C. | DATE APRIL 2002 | SITE |
| DRAWN C.B. | CHECKED M.R.A. | APPROVED D.W.K. | DWG 2 |












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

| | | |
|---|--|--|
| CONT No. | |  |
| GWP No. 603-00-00 | | |
| HWY 6 (NEW) Proposed Culvert 50 at Station 18+570 | | |
| BOREHOLE LOCATIONS | | |
| SHEET | | |

Peto MacCallum Ltd.
CONSULTING ENGINEERS



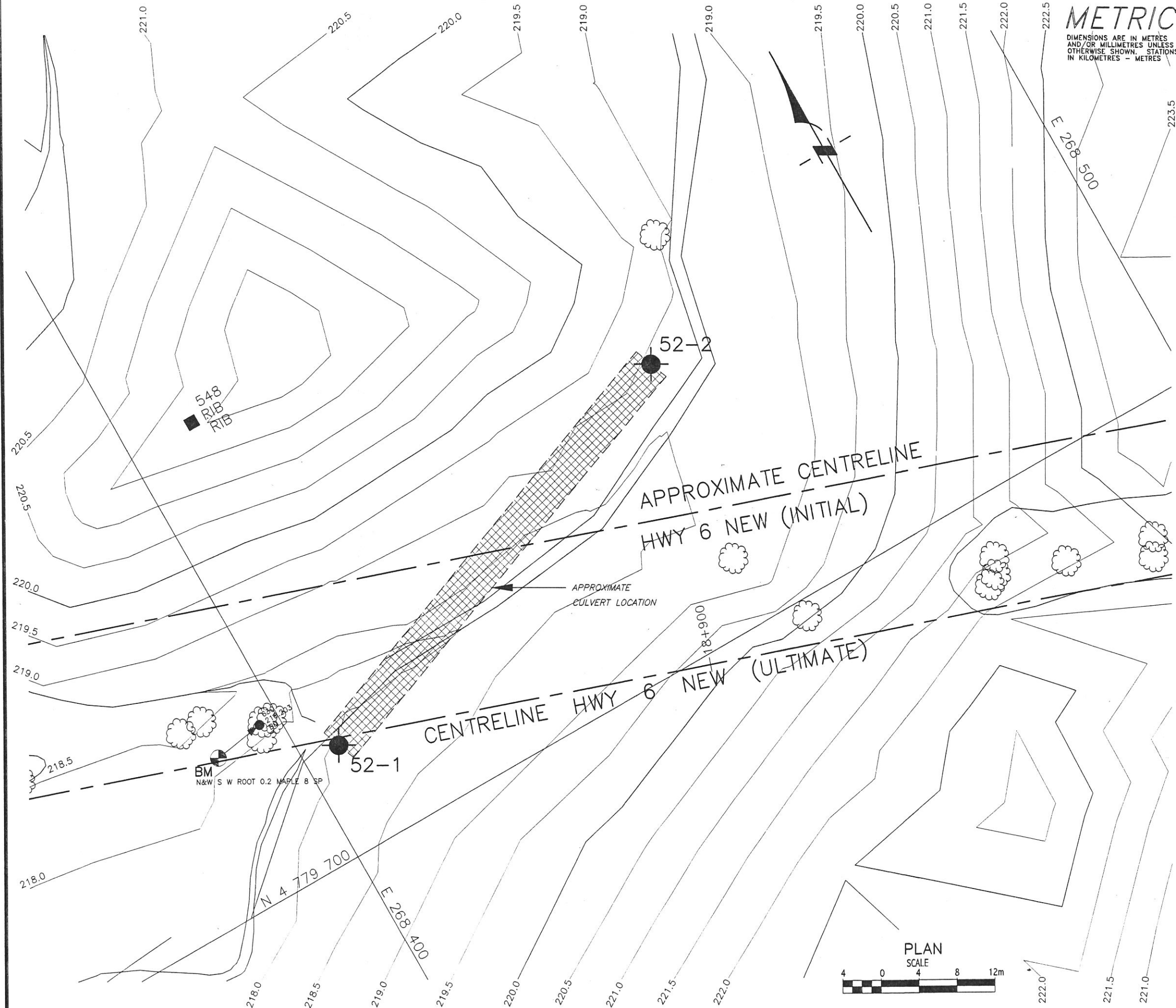
- LEGEND**
-  Borehole
 -  Dynamic Cone Penetration Test (Cone)
 -  Borehole & Cone
 -  'N' Blows/0.3m (Std. Pen Test, 475 J / blow)
 -  CONE Blows/0.3m (60° Cone, 475 J / blow)
 -  W L at time of investigation or in piezometer
 -  Head
 -  ARTESIAN WATER Encountered
 -  Piezometer

| No | ELEVATION | CO-ORDINATES | |
|------|-----------|--------------|---------|
| | | NORTH | EAST |
| 50-1 | 218.40 | 4 779 590 | 268 761 |
| 50-2 | 218.60 | 4 779 623 | 268 764 |
| | | | |
| | | | |
| | | | |


≡ NOTE ≡
Culvert and Centreline Alignment locations are derived from Drawing No. J4 of Pre-Design Report (WP 9-91-00) and are considered approximate.

| REVISIONS | | | |
|-----------|------------|----|-------------|
| | DATE | BY | DESCRIPTION |
| 16 | APRIL 2002 | PC | |
| 12 | APRIL 2002 | PC | |

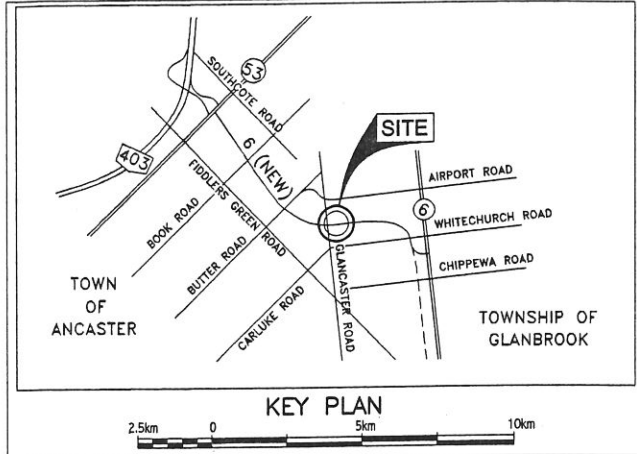
| | | | | |
|-----------------|----------------|-----------------|------|----|
| Geocres No. | | | | |
| HWY No. 6 (NEW) | | | DIST | CR |
| SUBM'D P.C. | CHECKED P.C. | DATE APRIL 2002 | SITE | |
| DRAWN C.B. | CHECKED M.R.A. | APPROVED D.W.K. | DWG | 3 |











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

| | | |
|---|--|--|
| CONT No. | |  |
| GWP No. 603-00-00 | | |
| HWY 6 (NEW) Proposed Culvert 52 at Station 18+950 | | |
| BOREHOLE LOCATIONS | | |
| SHEET | | |

Peto MacCallum Ltd.
CONSULTING ENGINEERS



| LEGEND | | | |
|---|---|--|--|
|  | Borehole | | |
|  | Dynamic Cone Penetration Test (Cone) | | |
|  | Borehole & Cone | | |
|  | Blows/0.3m (Std. Pen Test, 475 J / blow) | | |
|  | Blows/0.3m (60° Cone, 475 J / blow) | | |
|  | W L at time of investigation or in piezometer | | |
|  | Head ARTESIAN WATER Encountered | | |
|  | Piezometer | | |

| No | ELEVATION | CO-ORDINATES | |
|------|-----------|--------------|---------|
| | | NORTH | EAST |
| 52-1 | 218.00 | 4 779 711 | 268 404 |
| 52-2 | 218.90 | 4 779 729 | 268 452 |
| | | | |
| | | | |
| | | | |

NOTE
Culvert and Centreline Alignment locations are derived from Drawing No. J6 of Pre-Design Report (WP 9-91-00) and are considered approximate.

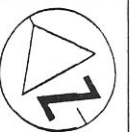
| REVISIONS | | | DESCRIPTION |
|-----------|------------|----|-------------|
| | DATE | BY | |
| 16 | APRIL 2002 | PC | |
| 12 | APRIL 2002 | PC | |

| | |
|---|---------|
| Geocres No. | |
| HWY No. 6 (NEW) | DIST CR |
| SUBM'D P.C. CHECKED P.C. DATE APRIL 2002 | SITE |
| DRAWN C.B. CHECKED M.R.A. APPROVED D.W.K. | DWG 4 |

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

CONT No.

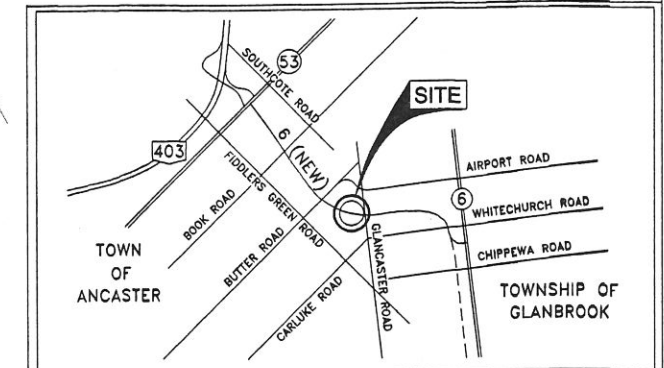
GWP No. 603-00-00



SHEET

HWY 6 (NEW)
Proposed Culvert 58 at
Station 19+545
BOREHOLE LOCATIONS

Peto MacCallum Ltd.
CONSULTING ENGINEERS



KEY PLAN
2.5km 0 5km 10km

LEGEND

- Borehole
- ⊕ Dynamic Cone Penetration Test (Cone)
- ⊙ Borehole & Cone
- 'N' Blows/0.3m (Std. Pen Test, 475 J / blow)
- CONE Blows/0.3m (60° Cone, 475 J / blow)
- ▽ W.L. at time of investigation or in piezometer
- ▽ Head ARTESIAN WATER Encountered
- ▬ Piezometer

| No | ELEVATION | CO-ORDINATES | |
|------|-----------|--------------|---------|
| | | NORTH | EAST |
| 58-1 | 218.20 | 4 779 958 | 267 850 |
| 58-2 | 216.60 | 4 779 986 | 267 870 |
| | | | |
| | | | |
| | | | |

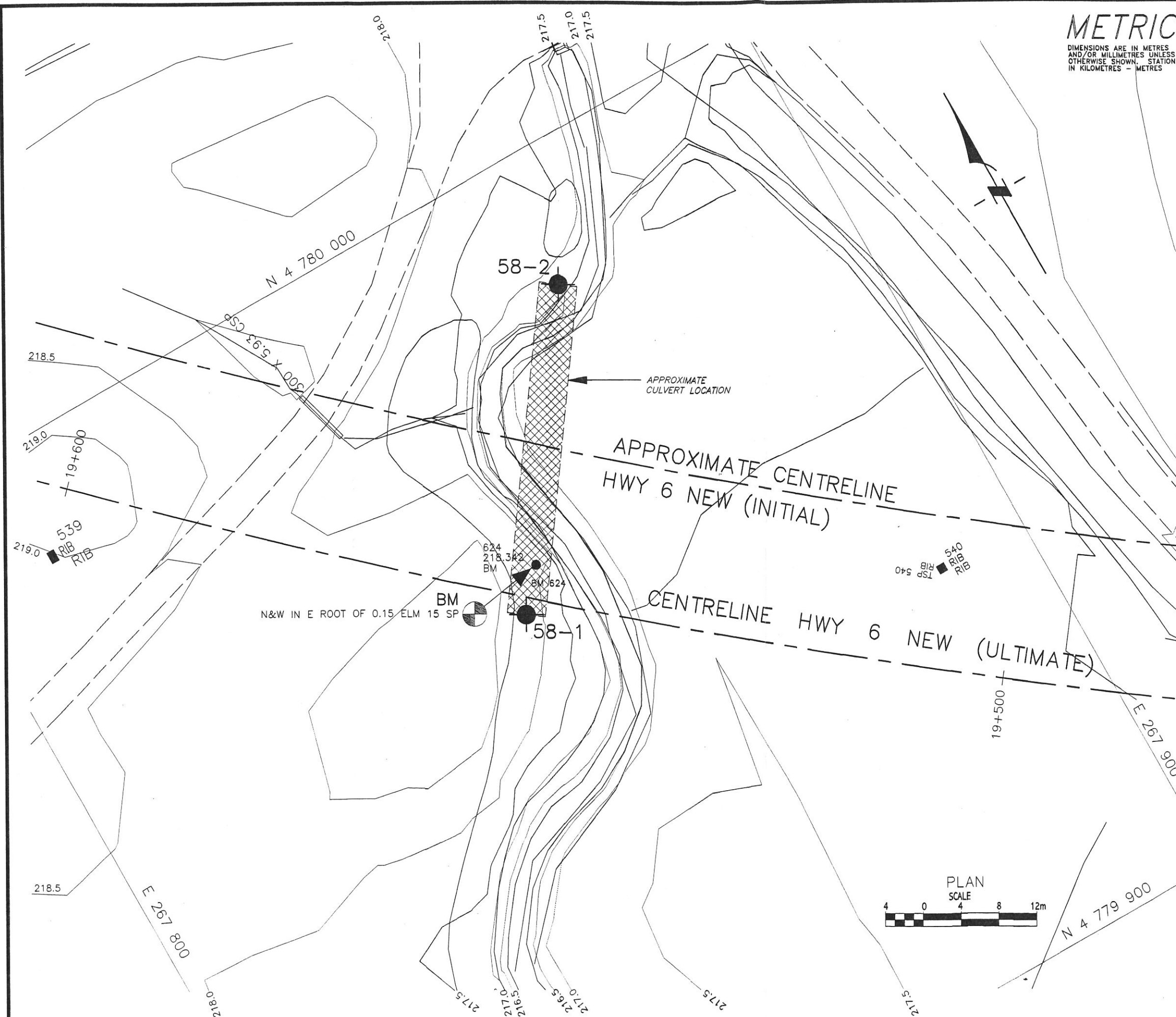
NOTE

Culvert and Centreline Alignment locations are derived from Drawing No. J6 of Pre-Design Report (WP 9-91-00) and are considered approximate.

| | | | |
|----------|---------------|----|-------------|
| REVISION | | | |
| | 15 APRIL 2002 | | |
| | DATE | BY | DESCRIPTION |

Geocres No.

| | | | | | |
|-----------------|----------------|-----------------|------|------|----|
| HWY No. 6 (NEW) | | | | DIST | CR |
| SUBM'D P.C. | CHECKED P.C. | DATE APRIL 2002 | SITE | | |
| DRAWN C.B. | CHECKED M.R.A. | APPROVED D.W.K. | DWG | 5 | |



METRIC

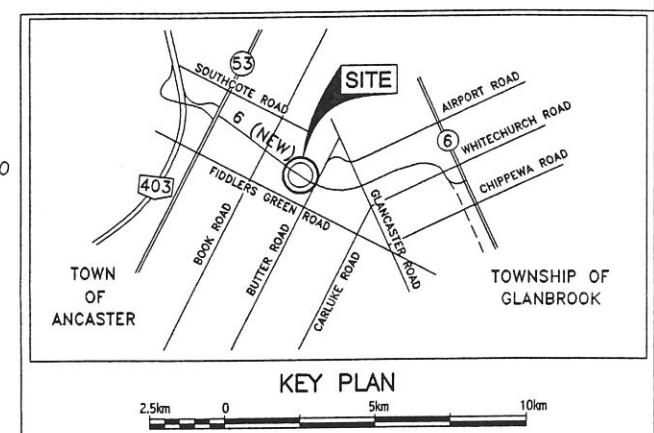
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES UNLESS
OTHERWISE SHOWN. STATIONS
IN KILOMETRES - METRES

CONT No.
GWP No. 603-00-00

HWY 6 (NEW)
Proposed Culvert 70 at
Station 20+760
BOREHOLE LOCATIONS

SHEET

Peto MacCallum Ltd.
CONSULTING ENGINEERS



LEGEND

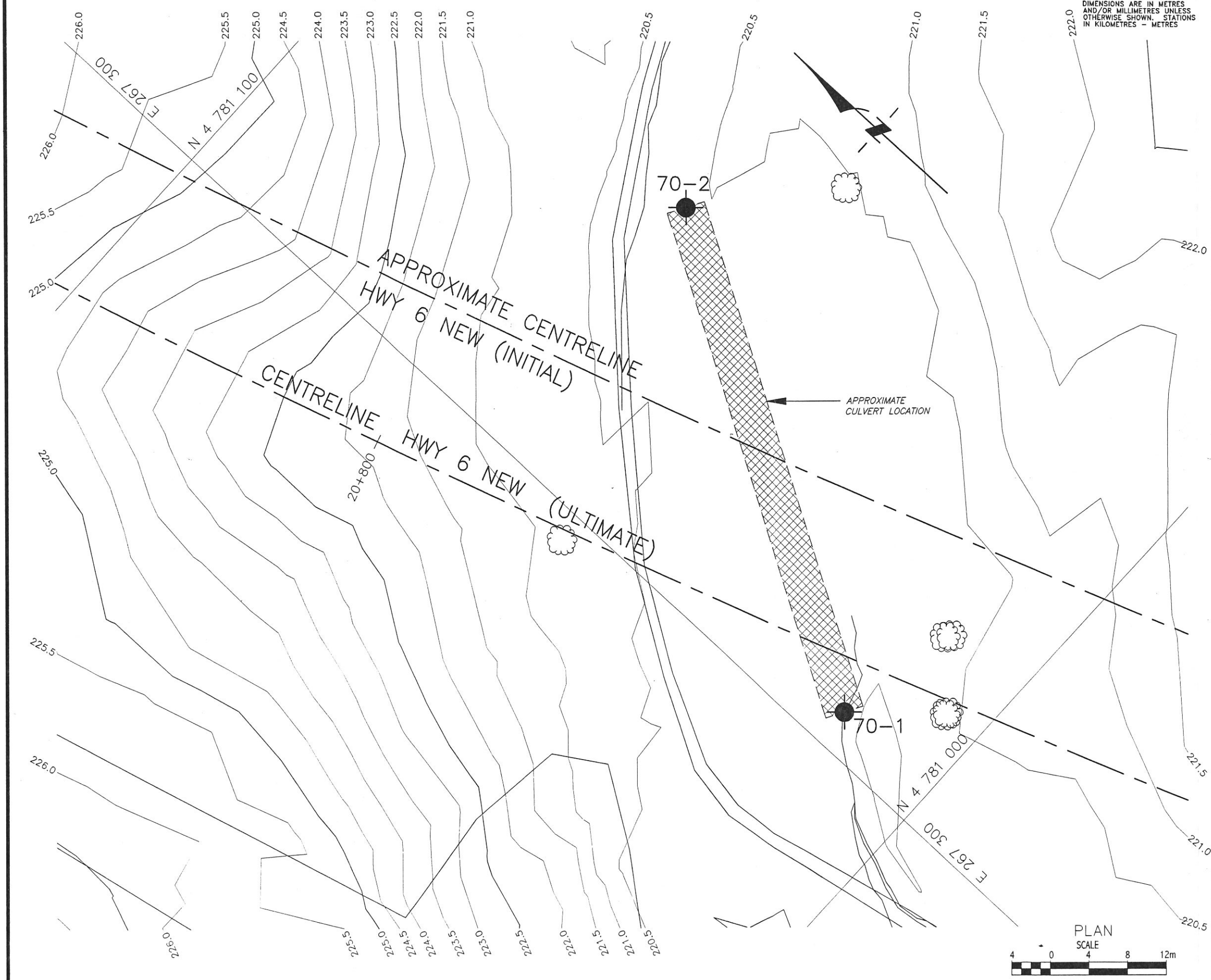
- Borehole
- Dynamic Cone Penetration Test (Cone)
- Borehole & Cone
- 'N' Blows/0.3m (Std. Pen Test, 475 l / blow)
- CONE Blows/0.3m (60° Cone, 475 l / blow)
- W L at time of investigation or in piezometer
- Head
- ARTESIAN WATER Encountered
- Piezometer

| CO-ORDINATES | | | |
|--------------|-----------|-----------|---------|
| No | ELEVATION | NORTH | EAST |
| 70-1 | 220.30 | 4 781 012 | 267 304 |
| 70-2 | 220.20 | 4 781 059 | 267 331 |
| | | | |
| | | | |

= NOTE =
Culvert and Centreline Alignment locations are derived from Drawing No. J7 of Pre-Design Report (WP 9-91-00) and are considered approximate.

| REVISIONS | DATE | BY | DESCRIPTION |
|---------------|------|----|-------------|
| 16 APRIL 2002 | PC | | |
| 11 APRIL 2002 | PC | | |

| | | | |
|-----------------|----------------|-----------------|-------|
| Geocres No. | | | |
| HWY No. 6 (NEW) | | DIST | CR |
| SUBM'D P.C. | CHECKED P.C. | DATE APRIL 2002 | SITE |
| DRAWN C.B. | CHECKED M.R.A. | APPROVED D.W.K. | DWG 6 |



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

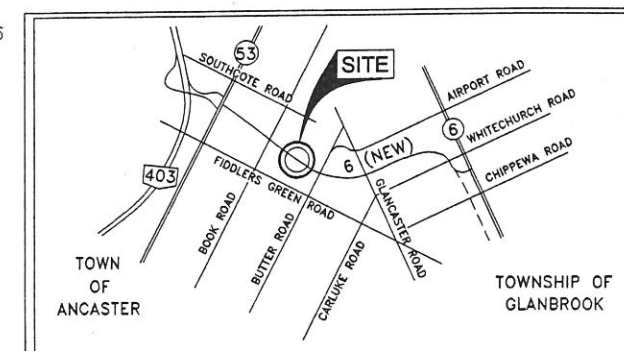
GWP No. 603-00-00



SHEET

HWY 6 (NEW)
Proposed Culvert 75 at
Station 21+370
BOREHOLE LOCATIONS








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KEY PLAN

A horizontal scale bar with tick marks at 2.5km, 0, and 5km. The bar is divided into segments by vertical lines.

LEGEND

- | | |
|---|--|
|  | Borehole |
|  | Dynamic Cone Penetration Test (Cone) |
|  | Borehole & Cone |
| 'N' | Blows/0.3m (Std. Pen Test, 475 l / blow) |
| CONE | Blows/0.3m (60° Cone, 475 l / blow) |
|  | W L at time of Investigation or in piezometer |
|  | Head |
|  | ARTESIAN WATER Encountered |
|  | Piezometer |

| No | ELEVATION | CO-ORDINATES | |
|------|-----------|--------------|---------|
| | | NORTH | EAST |
| 75-1 | 224.20 | 4 781 621 | 267 158 |
| 75-2 | 224.30 | 4 781 629 | 267 194 |
| | | | |
| | | | |
| | | | |

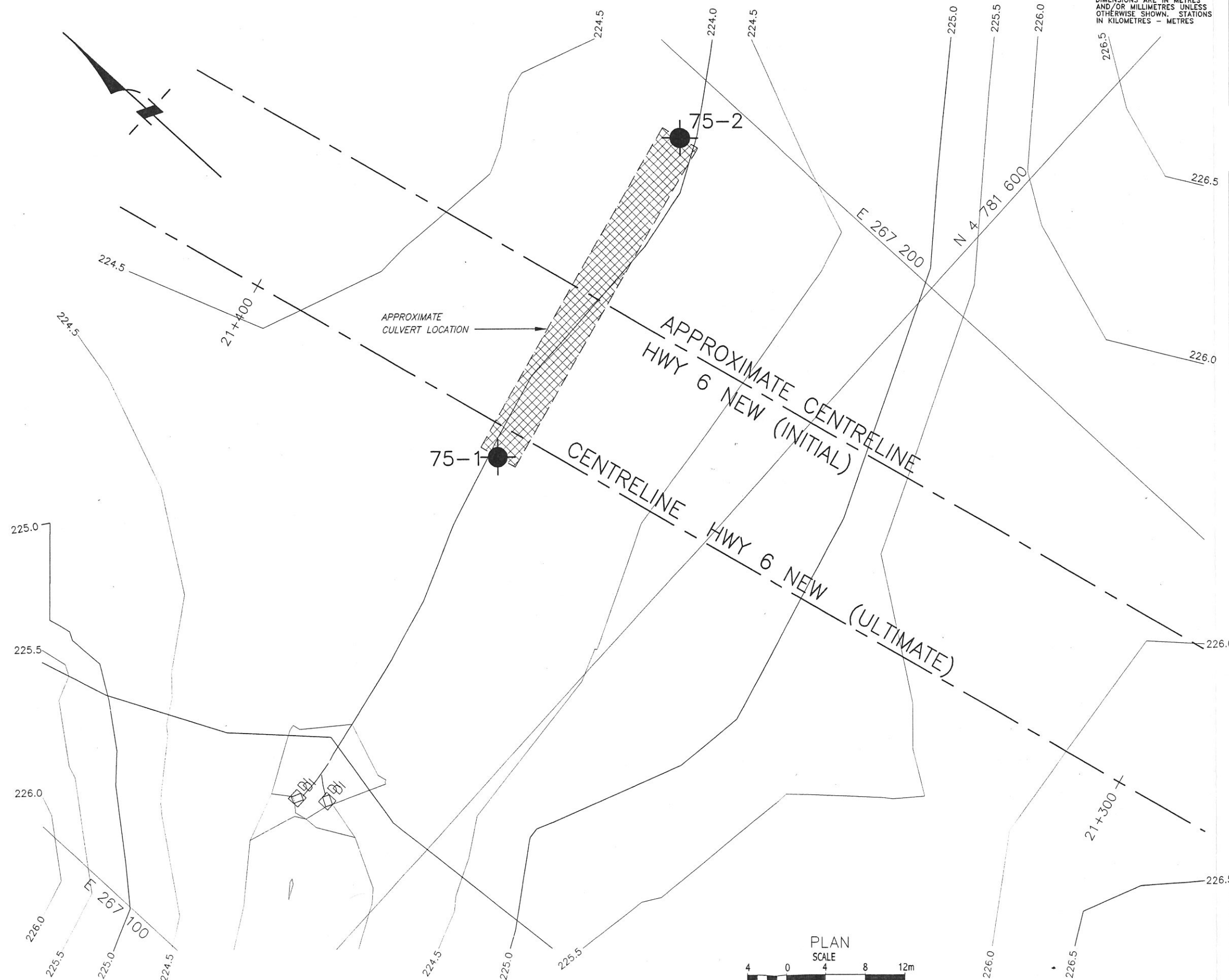
= NOTE =

Culvert and Centreline Alignment locations are derived from Drawing No. J7 of Pre-Design Report (WP 9-91-00) and are considered approximate.

| | | | |
|-----------|---------------|----|-------------|
| REVISIONS | | | |
| | | | |
| | | | |
| | 19 APRIL 2002 | PC | |
| | DATE | BY | DESCRIPTION |

Geocres No.

| | | | | |
|-----------------|----------------|-----------------|------|----|
| HWY No. 6 (NEW) | | | DIST | CR |
| SUBM'D P.C. | CHECKED P.C. | DATE APRIL 2002 | SITE | |
| DRAWN C.B. | CHECKED M.R.A. | APPROVED D.W.K. | DWG | 7 |



PLAN

SCALE



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

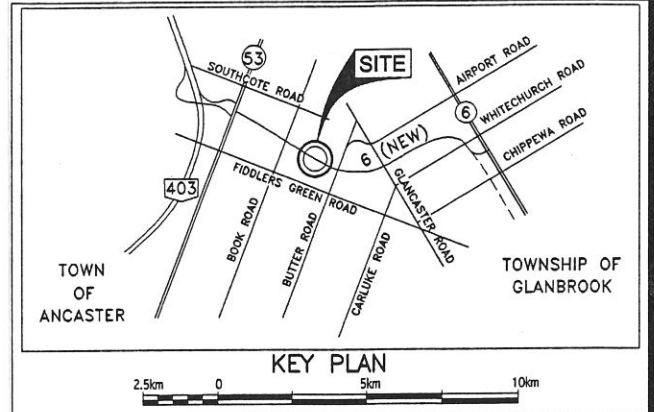
CONT No.
GWP No. 603-00-00



HWY 6 (NEW)
Proposed Culvert 79 at
Station 21+780
BOREHOLE LOCATIONS

SHEET

Peto MacCallum Ltd.
CONSULTING ENGINEERS



| LEGEND | | | |
|--------|---|--|--|
| | Borehole | | |
| | Dynamic Cone Penetration Test (Cone) | | |
| | Borehole & Cone | | |
| 'N' | Blows/0.3m (Std. Pen Test, 475 l / blow) | | |
| CONE | Blows/0.3m (60° Cone, 475 l / blow) | | |
| | W L at time of investigation or in piezometer | | |
| | Head | | |
| | ARTESIAN WATER Encountered | | |
| | Piezometer | | |

| CO-ORDINATES | | | |
|--------------|-----------|-----------|---------|
| No | ELEVATION | NORTH | EAST |
| 79-1 | 226.1 | 4 782 028 | 267 102 |
| 79-2 | 226.5 | 4 782 021 | 267 070 |
| | | | |
| | | | |


NOTE
Culvert and Centreline Alignment locations are derived from Drawing No. J8 of Pre-Design Report (WP 9-91-00) and are considered approximate.

| | | | |
|-----------|---------------|----|-------------|
| REVISIONS | | | |
| | 18 APRIL 2002 | PC | |
| | 16 APRIL 2002 | PC | |
| | DATE | BY | DESCRIPTION |

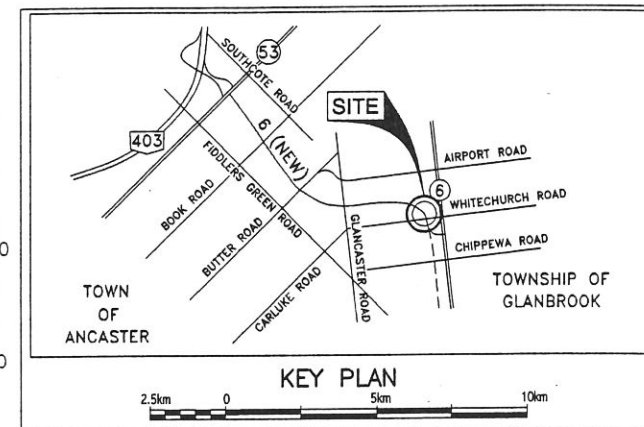
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





| | | | | |
|-----------------|----------------|-----------------|------|----|
| HWY No. 6 (NEW) | | | DIST | CR |
| SUBM'D P.C. | CHECKED P.C. | DATE APRIL 2002 | SITE | |
| DRAWN C.B. | CHECKED M.R.A. | APPROVED D.W.K. | DWG | 8 |

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

| | | |
|--|--|--|
| CONT No. | |  |
| GWP No. 603-00-00 | | |
| HWY 6 (NEW) Proposed Culvert 34A at Station 10+143 White Church Road | | SHEET |
| BOREHOLE LOCATIONS | | |

Peto MacCallum Ltd.
CONSULTING ENGINEERS



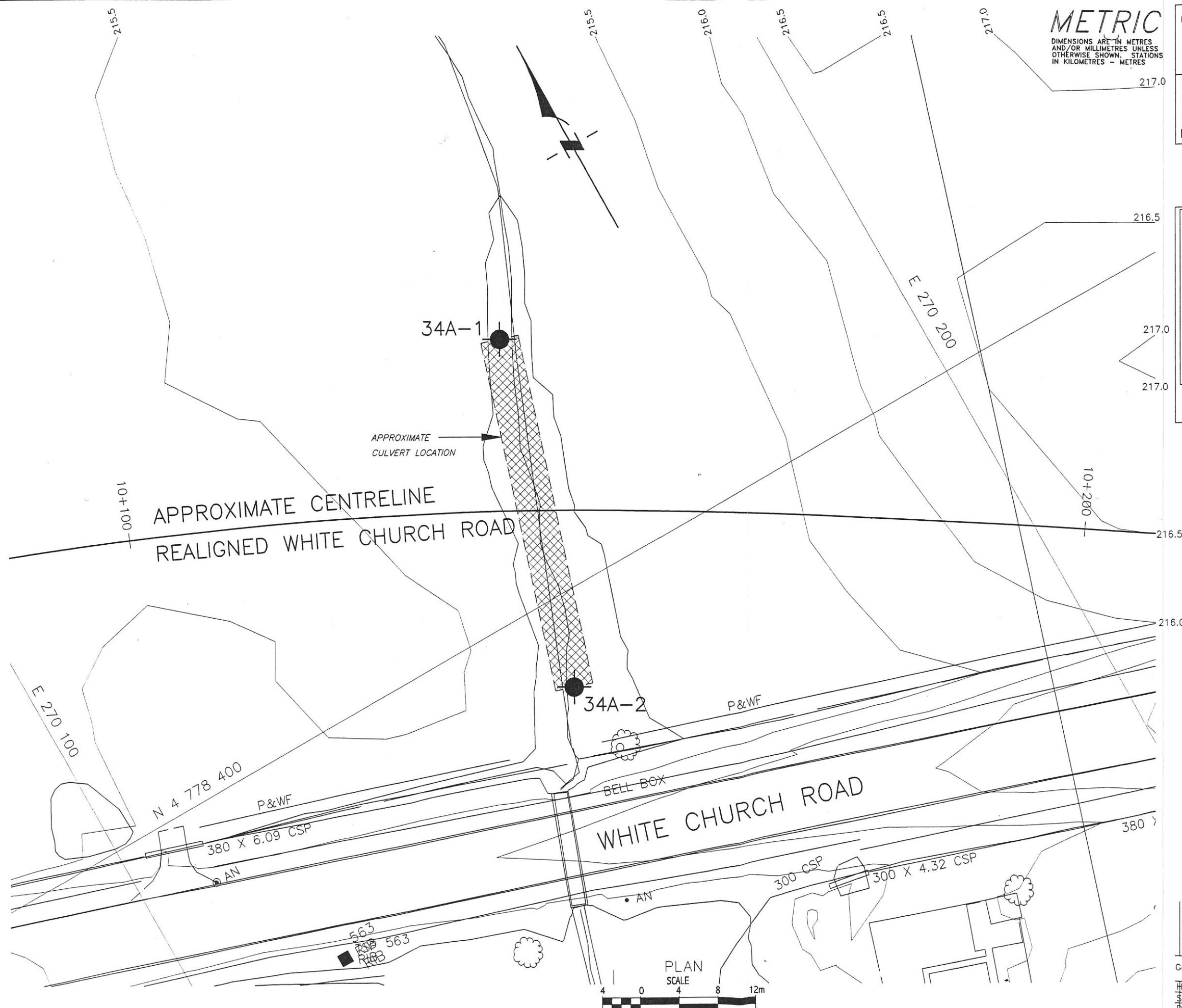
| LEGEND | | | |
|---|--|--|--|
|  | Borehole | | |
|  | Dynamic Cone Penetration Test (Cone) | | |
|  | Borehole & Cone | | |
|  | Blows/0.3m (Std. Pen Test, 475 J / blow) | | |
|  | Blows/0.3m (60° Cone, 475 J / blow) | | |
|  | W L at time of investigation or in piezometer | | |
|  | Head | | |
|  | ARTESIAN WATER Encountered | | |
|  | Piezometer | | |

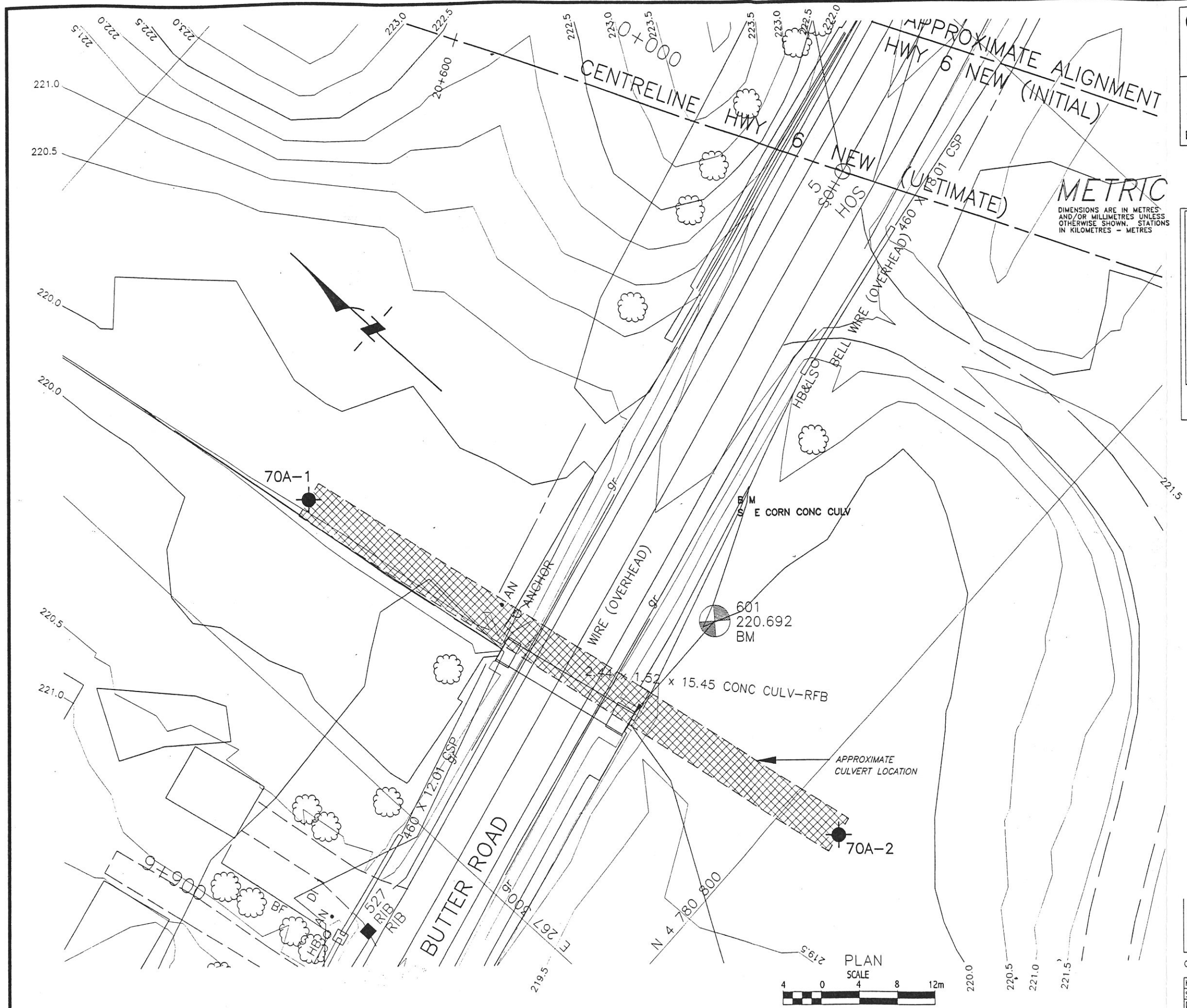
| No | ELEVATION | CO-ORDINATES | |
|-------|-----------|--------------|---------|
| | | NORTH | EAST |
| 34A-1 | 214.05 | 4 778 426 | 270 161 |
| 34A-2 | 213.95 | 4 778 391 | 270 150 |
| | | | |
| | | | |
| | | | |

NOTE
Culvert and Centreline Alignment locations are derived from Drawing No. J2 of Pre-Design Report (WP 9-91-00) and are considered approximate.

| REVISIONS | | DATE | | DESCRIPTION | |
|-----------|------------|------|----|-------------|--|
| 19 | APRIL 2002 | PC | BY | | |

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|-----------------|----------------|----------|------------|-------|
| Geocres No. | | DIST | | CR |
| HWY No. 6 (NEW) | | | | |
| SUBM'D P.C. | CHECKED P.C. | DATE | APRIL 2002 | SITE |
| DRAWN C.B. | CHECKED M.R.A. | APPROVED | D.W.K. | DWG 9 |



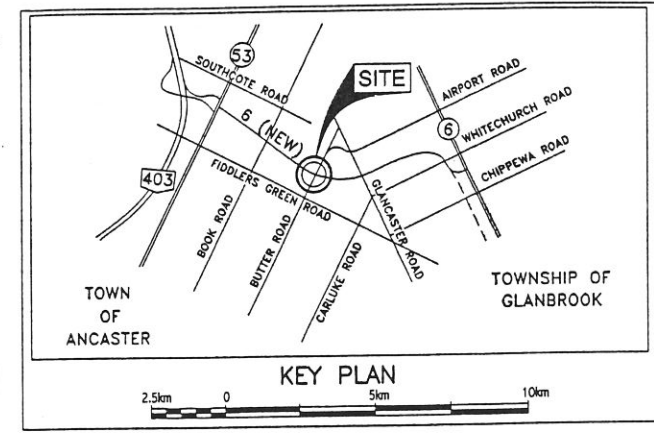


CONT No.
GWP No. 603-00-00

HWY 6 (NEW)
Proposed Culvert 70A at
Station 9+940 BUTTER ROAD
BOREHOLE LOCATIONS

SHEET

Peto MacCallum Ltd.
CONSULTING ENGINEERS



LEGEND

- Borehole
- Dynamic Cone Penetration Test (Cone)
- Borehole & Cone
- 'N' Blows/0.3m (Std. Pen Test, 475 l / blow)
- CONE Blows/0.3m (60° Cone, 475 l / blow)
- W L at time of investigation or in piezometer
- Head
- ARTESIAN WATER Encountered
- Piezometer

| No | ELEVATION | CO-ORDINATES | |
|-------|-----------|--------------|---------|
| | | NORTH | EAST |
| 70A-1 | 219.50 | 4 780 859 | 267 317 |
| 70A-2 | 219.80 | 4 780 794 | 267 329 |
| | | | |
| | | | |
| | | | |

NOTE =
Culvert and Centreline Alignment locations are derived from Drawing No. J7 of Pre-Design Report (WP 9-91-00) and are considered approximate.

| | | | |
|-----------|---------------|----|-------------|
| REVISIONS | | | |
| | | | |
| | 19 APRIL 2002 | PC | |
| | DATE | BY | DESCRIPTION |

Geocres No.

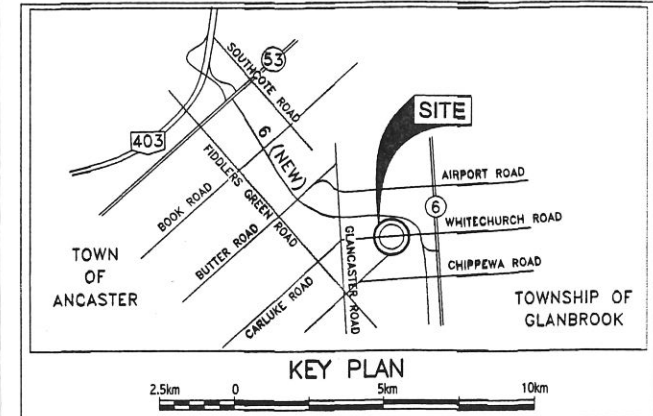
| | | | | |
|-----------------|----------------|-----------------|------|----|
| HWY No. 6 (NEW) | | | DIST | CR |
| SUBM'D P.C. | CHECKED P.C. | DATE APRIL 2002 | SITE | |
| DRAWN C.B. | CHECKED D.W.K. | APPROVED D.W.K. | DWG | 10 |

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

CONT No.
GWP No. 603-00-00
HWY 6 (NEW)
Proposed Culvert 10 at
Station 9+700 White Church Road
BOREHOLE LOCATIONS

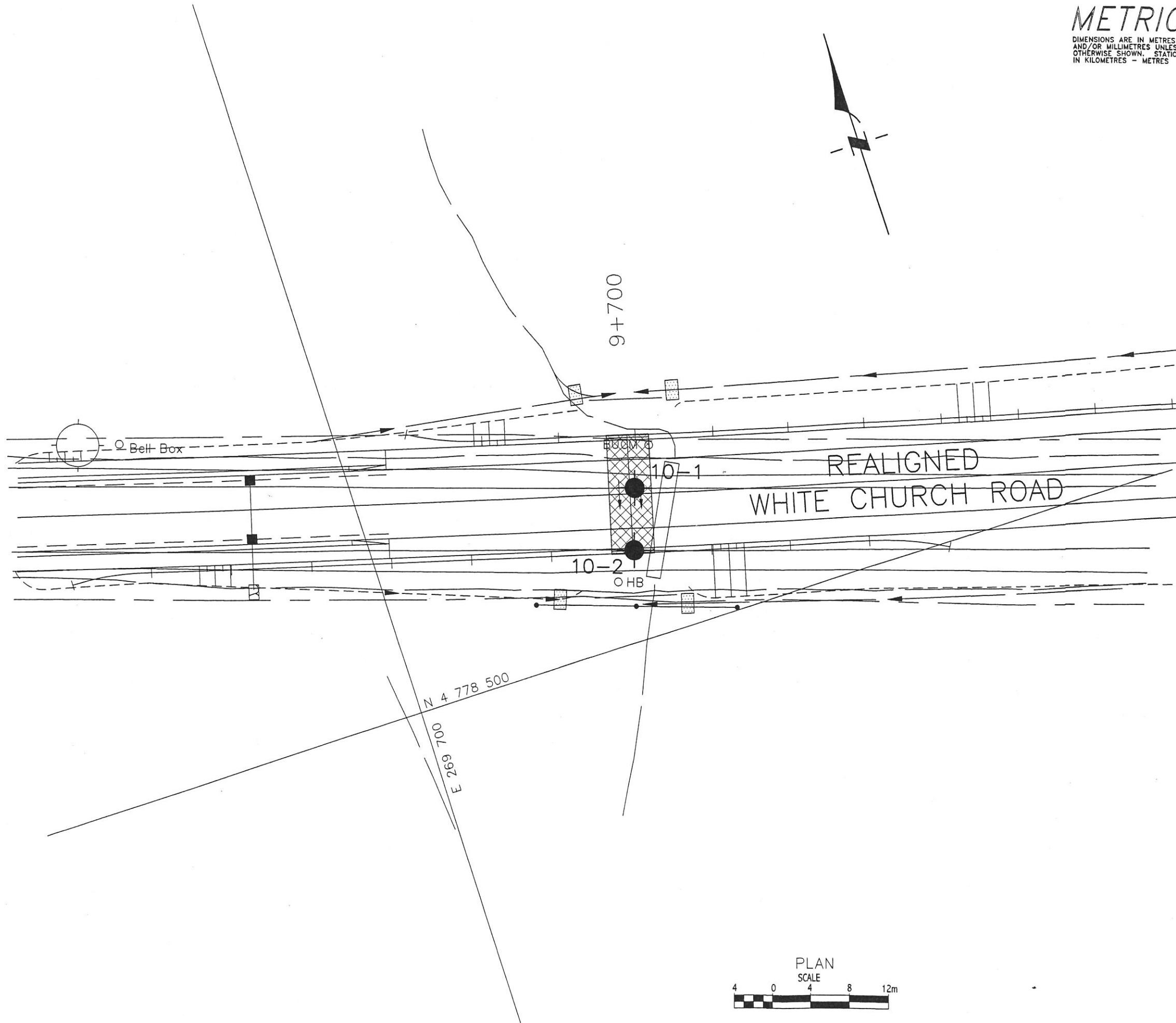


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CONSULTING ENGINEERS



| LEGEND | | | |
|--------|---|--|--|
| | Borehole | | |
| | Dynamic Cone Penetration Test (Cone) | | |
| | Borehole & Cone | | |
| 'N' | Blows/0.3m (Std. Pen Test, 475 J / blow) | | |
| CONE | Blows/0.3m (60° Cone, 475 J / blow) | | |
| | W L at time of investigation or in piezometer | | |
| | Head | | |
| | ARTESIAN WATER Encountered | | |
| | Piezometer | | |

| No | ELEVATION | CO-ORDINATES | |
|------|-----------|--------------|---------|
| | | NORTH | EAST |
| 10-1 | 214.80 | 4 778 515 | 269 728 |
| 10-2 | 214.80 | 4 778 509 | 269 726 |
| | | | |
| | | | |
| | | | |



| REVISIONS | | | |
|-----------|------|----|-------------|
| | DATE | BY | DESCRIPTION |
| | | | |
| | | | |
| | | | |

| | | | |
|-----------------|----------------|-----------------|--------|
| Geocres No. | | | |
| HWY No. 6 (NEW) | | DIST | CR |
| SUBM'D P.C. | CHECKED P.C. | DATE APRIL 2002 | SITE |
| DRAWN C.B. | CHECKED M.R.A. | APPROVED D.W.K. | DWG 11 |