GEOCREs No 52E-43

DST
CONSULTING ENGINEERS

GEOTECHNICAL DESIGN REPORT
G.W.P. No. 767-91-00
Highway 17 from 2.1 km east of the Junction of Highway 71 westerly from 4.7 km
Highway 71 from the Junction of Highway 17 southerly for 0.4 km
Highway 17, 5.0 km east of Highway 71, settlement in eastbound lane
Highway 17A, 1.0 km west of the east Junction of Highway 17, settlement in westbound lane
Highway 17A, 2.1 km west of the east Junction of Highway 17, settlement in westbound lane
District 61, Thunder Bay

September 1999

TG99102

Prepared For:
Engineering Northwest Limited
Thunder Bay, Ontario

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DST CONSULTING ENGINEERS INC.
605 Hewitson Street, Thunder Bay, Ontario P7B 5V5
Phone: 1-807-623-2929 Fax: 1-807-623-1792

EXECUTIVE SUMMARY

This project includes the resurfacing of 4.7 km of Highway 17 and 0.4 km of Highway 71, the realignment of the junction of Highways 17 and 71, and the treatment of three settlement areas outside the project limits. Recommendations for the relocation of the Great River Road Monument site, currently at the junction of Highways 17 and 71, are provided.

The recommended general pavement strategy for this section of Highway 17 is to mill 50 mm, pulverize full depth and pave with 130 mm 20/80 recycled hot mix. Highway 71 will be pulverized and paved with 90 mm 20/80 recycled hot mix.

The settlement on Highway 17 of the eastbound auxiliary lane and paved shoulder 5.0 km east of the junction of Highway 71 will be treated by excavating the 3 to 5 m highway embankment and organics under the road.

Rockberms/slope flattening have been discussed to stabilize the highway embankments on Highway 17A.

Distress treatments along with drainage improvements will be completed throughout the project.

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1.0 INTRODUCTION

DST Consulting Engineers Inc. (DST) has been retained by Engineering Northwest Limited (ENL) to provide Geotechnical Design services as a part of the Total Project Management for the Ministry of Transportation's G.W.P. No. 767-91-00. This project consists of the resurfacing of 4.7 km of Highway 17 and 0.4 km of Highway 71, the realignment of the Highway 17/71 intersection, the relocation of the Great River Road monument site and the treatment of three settlement areas outside the project limits.

Recommendations contained in this report are based on information available at the time of submission. DST will review cross sections and design drawings as they become available to provide further recommendations as appropriate.

2.0 GENERAL DATA

Data was compiled from a number of sources to complete this report. The information was provided by the MTO and will not be repeated within this report. The following documents can be referred to for this data:

- Preliminary Design Report, March 1999
- Highway Performance Notes, undated, Mar 3/98, Mar 5/98, April 12/99
- Performance Records, 1997/03/27
- 1998 Traffic Data in Memorandum from Traffic Section to D. Cooper, June 16, 1999
- Memorandum from Foundation Design Section to J. B. MacMaster, 1985.08.21, Re: W.P. 902-77-01 Foundation Problem Areas, Hwy 17, Kenora By-Pass
- Report Subsurface Geotechnical Conditions, Proposed Highway 71 and 17 Interchange, WP 305-85-01, October 1990, by Geocon Inc.
- pg 29 from Construction Contract Review Package for Contract 89-213

Highways 17 and 71 form a part of the Trans-Canada Highway system and are classified as Rural Arterial Kings Highways. Both highways are fully assumed by the Ministry.

The project was last resurfaced under Contracts 70-65 and 77-33 with PCB spill patching and treatment completed under Contracts 86-509 and 96-206.

Realignment alternatives for the Highway 17 and 71 intersection were reviewed by the Ministry. The realignment option investigated within this project was chosen by the Ministry. The realignment will provide 340 m decision sight distance, which is the minimum desirable for this type of intersection. Highway 71 will be realigned to intersect Highway 17 at 90 degrees. The horizontal alignment on Highway 17 will be upgraded from R380 (95 km/hr) to R525 (110 km/hr). The horizontal alignment on Highway 71 will be upgraded from R175 (68 km/hr) to a R250 (80 km/hr). The approach grade on Highway 17 will be revised from +1.7 % to +0.9% and the crest curve will be revised from a K70 to a K110.

3.0 PAVEMENT PERFORMANCE

Pavement conditions include extensive slight to moderate wheel track rutting, centreline, transverse and random cracking along with several areas of frost heaving and settlement. The Pavement Condition Index was 63 over the project in 1996.

4.0 TRAFFIC VOLUMES

Based on a ten year average, the estimated 20 year equivalent axle loading for the 4.7 km section of Highway 17 is approximately 4.9 million axles. Traffic data and Equivalent Single Axle Loading (ESAL) calculations are summarised in Table 1.

TABLE 1
20 Year ESAL Calculations

Hwy 17 - Vermilion Bay to Hwy 71

YEAR	1998	2008	2018
AADT	2490*	2615*	
#COMM	951*	951*	
#LT	800*	800*	
LANES	1	1	
ONE DIRECTIONAL TRAFFIC	1245	1308	
ONE DIRECTIONAL TRUCKS	476	476	
%HEAVY COMM. TRUCKS	84%	84%	
TRUCK FACTOR	1.7	1.75	
9 TONNE AXLES/DAY	808	832	
9 TONNE AXLES/YEAR	242505	249638	
AVERAGE		246071	
10 YEAR 9 TONNE AXLES		2460713	
20 YEAR 9 TONNE AXLES			4921425

*Provided by MTO Traffic Section

TABLE 1
20 Year ESAL Calculations

Hwy 17 - Hwy 71 to Kenora Bypass

YEAR	1998	2008	2018
AADT	3325*	3490*	
#COMM	951*	951*	
#LT	800*	800*	
LANES	1	1	
ONE DIRECTIONAL TRAFFIC	1663	1745	
ONE DIRECTIONAL TRUCKS	476	476	
%HEAVY COMM. TRUCKS	84%	84%	
TRUCK FACTOR	1.7	1.75	
9 TONNE AXLES/DAY	808	832	
9 TONNE AXLES/YEAR	242505	249638	
AVERAGE		246071	
10 YEAR 9 TONNE AXLES		2460713	
20 YEAR 9 TONNE AXLES			4921425

*Provided by MTO Traffic Section

According to the Northwest Region Pavement Treatment Chart, these loadings on Highway 17 require 130 mm of asphalt.

Based on a ten year average, the estimated 20 year equivalent axle loading for the 0.4 km section of Highway 71 is approximately 1.2 million axles. Traffic data and Equivalent Single Axle Loading (ESAL) calculations are summarised in Table 2.

TABLE 2
20 Year ESAL Calculations

Hwy 71 - Andy Lake Rd to Hwy 17

YEAR	1998	2008	2018
AADT	1365*	1500*	
#COMM	228*	228*	
#LT	202*	202*	
LANES	1	1	
ONE DIRECTIONAL TRAFFIC	683	750	
ONE DIRECTIONAL TRUCKS	114	114	
%HEAVY COMM. TRUCKS	89%	89%	
TRUCK FACTOR	1.7	1.7	
9 TONNE AXLES/DAY	194	194	
9 TONNE AXLES/YEAR	58140	58140	
AVERAGE		58140	
10 YEAR 9 TONNE AXLES		581400	
20 YEAR 9 TONNE AXLES			1162800

*Provided by MTO Traffic Section

According to the Northwest Region Pavement Treatment Chart, these loadings on Highway 71 require 90 mm of asphalt.

5.0 INVESTIGATIONS

The Ministry provided borehole and pedological logs for the settlement on Highway 17, 5.0 km east of the Junction of Highway 71. These were completed in the Fall of 1998. These logs are included in Appendix C.

DST completed field investigations for this project in July and September 1999. Soil investigations were conducted with a CME 55 truck mount drill rig equipped for geotechnical soil investigations and a portable power auger. Asphalt coring and samples were taken using an electric diamond barrel core drill. DST Borehole data is included in Appendix B and asphalt core data including test results and the mix design verification is in Appendix D.

6.0 GRANULAR MATERIAL

The Ministry of Transportation, Ontario will provide the Aggregate Sources List for this project.

The following granular materials will be used on this project. These materials are to meet appropriate specifications including Ministry OPSS specifications. Material weight/volume conversion rates as shown may be used during design:

Granular 'A' conversion factor of 2.40 tonne/m^3

Granular 'B', Type I, conversion factor of 2.00 tonne/m^3

20/80 RHM conversion factor of 2.45 tonne/m^3

Ministry investigations are underway to determine if rock from the revision area is available as Granular 'A' quarry material for this or future projects.

7.0 GRANULAR BASE EQUIVALENCIES

MTO Empirical Design analysis was used to determine the adequacy of the existing roadbed and several pavement design alternatives.

The majority of this section of Highway 17 is through bedrock cuts or over high rockfills with several swamp crossings. The native overburden encountered outside of these areas was a silty clay although this was present at only one granular check borehole. A bedrock/rockfill subgrade was used as the design subgrade for the project. MTO Northwest Region Pavement Thickness chart specifies highways built on a bedrock/rockfill subgrade require 300 mm of granulars. Specific recommendations for distresses through swamp crossings and silty clay subgrades are detailed further in the report.

Existing granular depths used in the design were based on the median of the encountered granular check base and subbase depths. The median base and subbase thicknesses are 235 and 335 mm respectively. The base thickness measured in the granular check boreholes may not reflect the base thickness under the driving lanes. This is because approximately half of the project has existing fully paved shoulders and therefore shouldering material is included in some of the base measurements. This was considered during design.

None of the base samples tested met Granular 'A' gradation specifications with excess material passing the 300 µm to the 9.5 mm sieves. Generally the base samples met the requirement for 2 - 8% passing the 75 µm sieve with one sample being slightly over this specification. Half of the subbase samples did not meet Granular 'B' gradation specifications containing excess passing the 75 µm sieve with up to 12.7%. GBE calculations reflect this by using reconstruction granular equivalency factors for existing base and subbase of 0.6 and 0.4 respectively.

Core thickness data indicates a median pavement thickness of 118 in the driving lanes, not including patch areas. This is in agreement with historical data which indicates an asphalt thickness of 115 mm. Several of the cores through patch areas were over 150 mm thick. Asphalt core analysis indicated the average percent retained on the 4.75 mm sieve is lower than gradation requirements for HL4 surface based on Table II of OPSS 1149 at 32.8%. The average passing the 75 µm sieve was within specification at 4.9%. Full testing results may be found in Appendix D.

The design Granular Base Equivalency (GBE) is based on design thicknesses recommended by the MTO Northwest Region Pavement Design Thickness Chart. Twenty year OPAC loadings on Highway 17 of over 4.5 million, with a bedrock/rockfill subgrade using standard equivalence factors were used to determine the design GBE of 510. The existing pavement structure has a GBE of 393 and is therefore inadequate. A summary of GBE calculations for the design and existing pavement is shown in Table 3. The calculations are based on core asphalt thickness and base and subbase thicknesses determined from borehole logs.

TABLE 3

Granular Base Equivalence Calculations

DESIGN GBE

Material	Thickness	Factor	GBE
Asphalt	130	2	260
Granular 'A'	150	1	150
Granular 'B', Type I	150	0.67	100
		Total	510

EXISTING GBE

Material	Thickness	Factor	GBE
Asphalt	118	1	118
Base	235	0.6	141
Subbase	335	0.4	134
		Total	393

8.0 ALTERNATIVE PAVEMENT DESIGNS

Numerous pavement structures were considered for this section of Highway 17. Several of these were not feasible and therefore were not further investigated. Granular Base Equivalency (GBE) calculations and life cycle cost analyses were completed for the remaining options. Thicknesses provided are in millimetres of consolidated bituminous pavement or compacted granulars.

The existing pavement is not suited to a simple pavement overlay. With areas of wheel track rutting, distortion and severe transverse cracks, a pavement overlay would exhibit premature reflection cracking. Simple overlays over pavement this thick may increase the total hot mix thickness to a point where future pavement strategy options become limited.

The following pavement designs were considered feasible and were investigated more thoroughly. Life cycle costs were completed for a 30 year analysis period. Life cycle cost analyses including a summary of unit costs used for analysis are included in Appendix E.

Option 1: Mill 50 mm, Pulverize and Pave with 130 mm 20/80 Recycled Hot Mix (RHM)

The GBE calculated for this option is 630. This is above the design GBE of 510. The initial cost of this option is $121,555 per kilometre. The option has the lowest life cycle cost of $140,240 per kilometre. Specifying a 20/80 recycled hot mix allows the use of the existing asphalt material without the added cost of a polymerized asphalt required for higher RAP/virgin asphalt blends. This option will produce enough recycled hot mix to include the realignment of intersection 17/71 therefore requiring only one asphalt mix.

Option 2: Pulverize and Pave with 130 mm HL4

This option has the highest initial cost of the alternatives analysed of $126,580 per kilometre. The life cycle cost for this option is $141,400 per kilometre with a GBE of 700. This option will only require one asphalt mix.

Option 3: Cold-In-Place Recycle and Pave with 40 mm HL4 Surface Coarse

This option has the lowest initial cost of options analyzed of $108,085 and the highest life cycle cost of $150,050 per kilometre. This option has a GBE of 529, meeting design requirements. Cold-In-Place Recycling results in several construction problems. The approximate 1.0 km long realignment section would not be able to have cold-in-place completed. Costing therefore includes providing an HL4 hot mix on the realignment portion. This option will therefore require two asphalt mixes. Shoulders would be fully paved with only 40 mm of asphalt compared to Options 1 and 2 which would have 50 mm thick asphalt shoulders. This will result in earlier shoulder distresses and therefore increased maintenance.

8.1 Alternative Pavement Designs Discussion

The GBE, estimated life cycle and initial costs for the analysed options are summarised in the following table. The design GBE for this project is 510.

TABLE 4

Pavement Design Alternative Summary

Option	GBE	Initial Cost (/km)	Life Cycle Cost (/km)	Net Grade Raise
1: Mill 50 mm, Pulv, Pave 130 mm 20/80 RHM	630	$121,555	$140,240	80 mm
2: Pulv, Pave 130 mm HL4	700	$126,580	$141,400	130 mm
3: Cold-In-Place, Pave 40 mm HL4	529	$108,085	$150,050	40 mm

The initial costs for Option 3 do not include anticipated extras which may result due to construction complications concerning the two asphalt mixes. Scheduling of the contract award would be critical if cold-in-place methods were recommended due to the limited industry and short season. The short length of this contract increases the relative mobilizations costs. Due to these and the high life cycle cost of this option, Option 3 is not recommended.

Although the most straightforward construction, Option 2 has the highest initial cost due to the higher cost of virgin asphalt. Due to costs this option is not recommended.

Option 1, milling 50 mm, pulverizing and paving with 130 mm of 20/80 recycled hot mix is recommended as the preferred general pavement strategy based on constructability and the low life cycle cost.

The pavement strategy for the 0.4 km on Highway 71 on the project has been based on the recommended strategy for the remainder of the project on Highway 17. It is recommended to pulverize and pave with 90 mm of 20/80 Recycled Hot Mix. The existing thickness of asphalt on Highway 71 does not allow milling without the risk of breakthrough. Milling thicknesses available from Highway 17 should provide sufficient quantities of RAP to produce the 20/80 recycled mix for the extra 0.4 km on Highway 71.

9.0 RECOMMENDATIONS

The Pavement Treatment Charts in Appendix F contain detailed recommendations for this project. Areas not referred to in the chart are to be treated with the general pavement treatment strategy.

9.1 General Pavement Strategy Treatment

The recommended general pavement treatment strategy for Highway 17 from 2.1 km east of the junction of Highway 71, westerly for 4.7 km is milling 50 mm, full depth, in place processing for the full width of the existing asphalt and the placement of 130 mm of 20/80 Recycled Hot Mix.

The general pavement strategy treatment for Highway 71 from the junction of Highway 17, southerly 0.4 km is full depth, in place processing for the full width of the existing asphalt and the placement of 90 mm of 20/80 Recycled Hot Mix.

It is anticipated that sufficient quantities of RAP will be available to produce a 20/80 RHM for this project consisting of the 4.7 km of Highway 17 and the 0.4 km of Highway 71, including the intersection realignment, the three short settlement areas, the new monument site and the new truck layby site. A trial 20/80 Recycled Hot Mix which met current specifications in OPSS 313 and 1149 has been completed for this project using RAP generated from the bulk asphalt samples and aggregate, including VFA, from Contract 98-230. The results of the mix verification are found in Appendix D.

Two 3.75 m lanes with fully paved, 2.5 m wide, non-driveable shoulders and 0.5 m shoulder rounding are to be provided for Highway 17, where they can be placed on the existing platform. This design cross section may be reduced to use a 2.0 m wide paved shoulder with 0.5 m shoulder rounding where the platform is narrow. A minimum width rock ditch of 0.5 m is to be provided. Through the realignment

a design standard of 3.75 m lanes, 3.0 m, fully paved shoulders with 1.0 m rounding will be applied.

The following paving depths are recommended.

Highway 17 driving and auxiliary lanes (including eastbound exit ramp to Hwy 71)

- 50 mm average, 40 mm minimum 20/80 RHM Surface Course
- 2 - 40 mm average, 30 mm minimum 20/80 RHM Binder Course*

Fully paved shoulders

- 50 mm average, 40 mm minimum 20/80 RHM Surface Course

Sideroad entrances

- 50 mm average, 40 mm minimum 20/80 RHM Surface Course

Snowplow turnarounds and truck laybys

- 50 mm average, 40 mm minimum 20/80 RHM Surface Course

Highway 71 driving and auxiliary lanes

- 50 mm average, 40 mm minimum 20/80 RHM Surface Course
- 40 mm average, 30 mm minimum 20/80 RHM Binder Course*

Fully paved shoulders

- 50 mm average, 40 mm minimum 20/80 RHM Surface Course

Snowplow turnarounds and monument site

- 50 mm average, 40 mm minimum 20/80 RHM Surface Course

*It is understood that a new Special Provision may be approved shortly allowing the use of a 30/70 RHM in the binder courses without requiring the polymerized asphalt, PAC 52-40. RAP quantity calculations during Detailed Design will determine if this is feasible for this project. This will be reviewed with Engineering Northwest Ltd. during the detailed design phase.

100mm grade raise is to be provided. Transitions are to be completed outside of the stated grade raise limits. Stripping of the shoulder rounding and foreslopes throughout grade raise areas is to be completed prior to granular lift placement.

9.3 Drainage

For estimating purposes, a depth of 500 mm for excavation should be allowed for ditch clean out unless stated otherwise. Ditching for granulars will be excavated 500 mm below stated granular depth for earth ditches and 250 mm for rock ditches as per OPSD 200.020 and 201.010. Where line drilling is specified, rock is to be shattered and excavated. Ensure positive drainage.

Drainage requirements are further detailed in the Pavement Structure Treatment Chart.

The Designer is to ensure positive drainage is provided over the full length of the project.

9.4 Slope Flattening

Waste material may be used in fill sections for slope flattenings to reduce guide rail requirements. Ensure positive drainage through these sections. Slope flattenings are to be below 900 mm and are to be constructed as per OPSD 202.010 with drainage gaps as per 202.020. A minimum of 500 mm thick rockfill drainage layer should be provided at the base in order to allow continued seepage of water through rockfill embankments as required.

Shattered/blasted bedrock may be used as slope flattening material if it is not required for rockfill or rock protection. This material must be covered with earth borrow to make it transferable.

9.5 Culverts

For culvert extensions and new culvert installations, a bedding depth of 150 mm is recommended for sections of silt, clay, rock and bouldery earth material. Additional recommendations are as follows.

- Granular 'B', Type I, with 100% passing the 25 mm sieve is recommended for bedding as per OPSS 421 and OPSS 1010
- A frost penetration depth of 2.4 m shall be used in determining frost tapers with culvert backfill as per OPSD 803.03
- Frost tapers shall be 10:1 in granular material and 20:1 in silty and clay type material as per OPSD 803.03

Culverts being replaced do not require tapers as they are all located in rockfill with no history of heaving.

9.6 Frost Heaves

Several frost heaves exist within this work project. One is within the abandoned realignment and will not be treated. The other frost heaves/heaving areas are being treated with improved drainage. These are detailed in the Pavement Treatment Charts. Frost heave pedo sketches are included at the end of Appendix B, with the borehole logs. Frost depth for this project is 2.4 m.

9.7 Erosion Control and Slope Stability

Substandard shoulder crossfall exists throughout the project. This is to be brought to standard, OPSD 206.01.

Granular sealing will be provided throughout as fully paved shoulders are being constructed.

Newly constructed or regraded earth slopes are to be seeded with the Standard Roadside Seed Mix.

9.8 Realignment/Widening Areas

The Highway 17/71 intersection realignment extends on Highway 17 from 9+600 to 10+238 and on Highway 71 from 16+900 To 17+265 Township of Kirkup.

Two new snowplow turnarounds have been proposed, one on Highway 17 at 8+775 Rt and one on Highway 71 at 17+065 Rt, Township of Kirkup. The Great River Monument Site is to be relocated to Highway 71, 15+275 to 15+350 Rt, Township of Kirkup. These are to be considered and treated as widenings.

The following design recommendations are to be applied to the new construction.

The following granular depths shall apply to this work project and will consist of 150 mm of Granular 'A' with the remainder of Granular 'B', Type I.

a) Over rock - in cuts and fills - 300 mm.

b) Over bouldery acceptable material - in cuts and fills - 300 mm.

c) Over acceptable granular material - in cuts and fills - 150 mm.

d) Over sands and gravels containing 10 to 25% passing the 75 µm sieve
- in cuts - 450 mm; in fills - 300 mm.

e) Over sands and gravels containing 25 to 40% passing the 75 µm sieve
- in cuts - 600 mm; in fills - 450 mm.

f) Over sands and gravels containing 40% passing the 75 µm sieve

- in cuts and fills - 600 mm.

g) Over silts and clays (moisture content is < 5% above optimum)

- in cuts and fills - 750 mm.

h) Over silts and clays (moisture content is > 5% above optimum)

- in cuts and fills - 900 mm.

l) Grade Raises

In grade raises up to 300 mm, use all Granular 'A' material.

In grade raises from 300 mm to 1.0 m, use 150 mm Granular 'A' with the balance Granular 'B'.

In grade raises deeper than 1.0 m, use materials as listed in a) to h).

Provide ditching for granular depths and transitions encountered. Ensure positive drainage of the roadbed granulars detailed above.

Cross sections will be graded as per OPSD 200.010 and 201.010 and 206.01 as applicable.

Where the existing platform is being widened/joined, excavate shoulders from edge of existing pavement to outer edge of rounding to provide for 150 mm new Granular 'A'. New Granular 'A' is required as the existing shoulders through this project have been contaminated with winter sand and vegetation. Excavate the foreslope from inner edge of shoulder rounding to provide for depth of Granular 'B' required as stated above for the noted subgrades.

Where the proposed roadbed crosses an existing ditch, the ditch is to be excavated to a firm inorganic bottom regardless of depth. If excessive depths are encountered, the Geotechnical Designer is to be consulted.

The shoulder rounding and foreslopes of all earth fill widening sections will be stripped. For design purposes, an average depth of 150 mm should be allowed for stripping starting at the outer edge of rounding.

Overburden is to be wasted unless specified otherwise in the Pavement Treatment Charts.

Benching of earth slopes is required on all revisions over 600 mm in height to provide proper compaction. The top 2 m of rockfill beginning at the outer edge of shoulder rounding is also to be benched to remove larger rockfill boulders that tend to roll to the outside of the embankment as they may cause excessive infiltration of granulars into the rockfill.

Consideration should be given to providing a wider platform than required in new construction rockfill areas if extra rock is available on the project. This would provide the required platform for a grade raise to accommodate any future settlement which may occur.

The following OPSD standards will be applied as necessary and are specified as required in the Pavement Treatment Charts:

Embankments over swamp, existing slopes maintained OPSD 203.030
Embankments over swamp, existing slope excavated to 1:1 OPSD 203.020
Boulder treatment OPSD 204.010
Transition treatment, earth cut to earth fill OPSD 205.010
Transition treatment, rock cut to rock fill OPSD 205.020
Transition treatment, rock cut to earth fill OPSD 205.030
Transition treatment, earth fill to rock fill and earth fill to granular fill OPSD 205.040
Transition treatment, rock cut to earth cut OPSD 205.050
Benching of Earth Slopes OPSD 208.010

Cross sections and typical will be reviewed for geotechnical concerns as they become available.

9.9 Settlement Areas

The treatment of three settlement areas outside of the limits of the resurfacing project is included with this report. These areas have been reviewed in the field by the Geotechnical Designers and geotechnical boreholes and pedo holes completed through the areas. No recent foundation investigations have been performed through these areas. A letter has been forwarded to the Ministry detailing possible causes, treatments and the risks involved with the treatments. The following general description of the recommendations are made in anticipation of the Ministry acceptance of the risks inherent with these treatments.

high rock fill 45° sliding.

9.9.1 Hwy 17A, 2.1 km west of east Jct Hwy 17

This settlement is mainly in the westbound auxiliary lane of the highway on an approximate 12 m high rockfill embankment. This is indicated by a crescent shaped crack extending from the shoulder into the inner wheel track of the westbound auxiliary lane accompanied by an up to 300 mm drop in the asphalt. A full width patch has been placed here indicating a history of distress throughout the cross section. Boreholes indicate up to 3.0 m of organics at the toe of the embankment that were not excavated according to the contract drawings. Historical data from the construction contract review package (Contract 89-213) indicates that the original ground section has a "critical slope" that the constructed rockfill embankment may be sliding on the interface. A stream currently exists at the left toe of this rockfill embankment which must be maintained for environmental reasons. It is understood that blasting of the bedrock backslope to the north of the embankment or to install a culvert parallel to the toe to provide a stream bed are not recommended for environmental reasons.

It is recommended that the existing left foreslope be flattened with rockfill as much as possible without blocking off the stream at the toe. Consideration is to be given to diverting the stream northerly (left)

to increase the area available for slope flattening. This added weight may improve the current conditions, although the movements may be aggravated during construction and may continue in the future.

Details on this treatment are provided in the Pavement Treatment Charts in Appendix F.

9.9.2 Hwy 17A, 1.0 km west of east Jct Hwy 17

This settlement is in the westbound auxiliary lane of the highway rockfill embankment. This section traverses a swamp to the left. This area has been settling and repeatedly patched since the construction of the Kenora Bypass during Contract 89-213. The centreline culvert through the section can not be found on the left side of the highway and is presumed to have settled well below the water level in the swamp. Historical data indicates that the organics and soft clays under this section of road were not fully excavated during construction. While the larger settlements and soil conditions indicate consolidation settlement of the subgrade is occurring, slight crescent shaped cracks appearing in the recent patch indicate a possible shear failure may be coupled with the consolidation of the underlying soft materials.

It is recommended that a rockfill berm be constructed to stabilize this embankment. No environmental restrictions have been placed on the construction of this berm.

Details of this treatment are provided in the Pavement Treatment Charts in Appendix F.

9.9.3 Hwy 17, 5.0 km east of Jct Hwy 71

This settlement is in the eastbound auxiliary lane and paved shoulder. It is understood it has been patched several times since the shoulder was widened in 1998 when it settled within a couple weeks

after paving. No excavation of organics was completed when the auxiliary lane was constructed or in 1998 when the shoulder was widened. We understand excavation of organics was completed during the original construction. Boreholes and pedo holes are available from an investigation completed in 1998. These logs indicate a loose rockfill embankment over up to 9.0 m of organics.

Recommendations are provided in the Pavement Treatment Charts for the 3 to 5 m high rockfill highway embankment and underlying organics to be excavated under the auxiliary lane and shoulder to alleviate this settlement.

10.0 LIMITATIONS OF REPORT

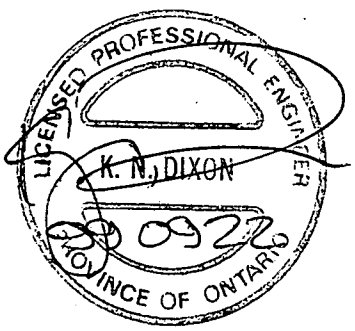
A description of limitations that are inherent in carrying out site investigation studies is given in Appendix A and this forms an integral part of this report.

11.0 CLOSURE

We trust that this satisfies your present needs. If you have any further questions or comments, please contact the undersigned at your convenience.

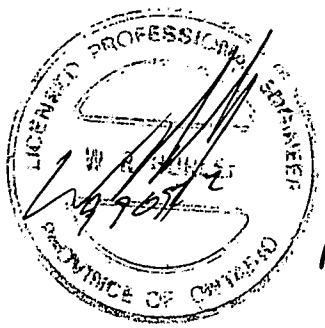
For DST CONSULTING ENGINEERS INC.

Prepared by:



Kayla Dixon, P. Eng.

Reviewed by:



Should have been MTO Contact Mike Fabiani

Wayne Hurley, P. Eng.
Manager, Thunder Bay Office

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APPENDIX 'A'

LIMITATIONS OF REPORT

APPENDIX 'A'

LIMITATIONS OF REPORT

The conclusions and recommendations presented in this report are based on information determined at the testhole locations. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the specific locations tested, and conditions may become apparent during construction which were not detected and could not be anticipated at the time of the site investigation. It is recommended practice that DST Consulting Engineers be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the testholes. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the testhole locations and should not be used for other purposes, such as grading, excavation, planning, development, etc.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.
Unless otherwise noted, the information contained herein in no way reflects on environmental aspects of either the site or the subsurface conditions.

The comments given in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of testholes may not be sufficient to determine all the factors that may affect construction methods and costs, e.g. the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusion as to how the subsurface conditions may affect their work.

APPENDIX 'B'

BOREHOLE LOGS AND PEDO SKETCHES

Township of Kirkup
DST Reference No.: TG99102

Station 18+440 15.0 Rt D-3.5

0	- 600	Gry Si(y) Cl (Stiff)
600		NFP Poss BR

Station 18+450 14.0 Rt D-3.0

0	- 300	Br F-M Si(y) Sa Tr Gr (water @ 0)
300	- 800	Gry Si(y) Cl Tr Sa
800		NFP Poss BR

Station 18+450 6.1 Rt (fully paved shoulder)

0	- 80	Asph
80	- 260	Cr Gr & Sa
260	- 800	Br F-M Sa Tr Gr Si
800		NFP RF

Station 18+700 6.1 Lt (fully paved shoulder)

0	- 50	Asph
50	- 290	Cr Gr & Sa
290	- 800	Br F-M Sa Tr Gr Si
800		NFP RF

Station 18+700 6.1 Lt @ 100	
Passing 4.75mm	64.8
Passing 75 μm	7.1
LSFH	
Group Symbol	SW
Station 18+700 6.1 Lt	
Passing 4.75	72.4
Passing 75 μm	8.2
LSFH	
Group Symbol	SW

Station 7+686 6.3 Rt

0	- 110	Asph
110	- 230	Cr Gr & Sa
230	- 1.5	Br F-M Sa Tr Gr Si
1.5		NFP RF

Station 7+706 6.2 Lt

0	- 90	Asph
90	- 390	Cr Gr & Sa
390	- 1.3	Br F-M Sa Tr Gr Si
1.3		NFP RF

Station 7+730 6.1 Rt

0	- 190	Asph
190	- 350	Cr Gr & Sa
350	- 1.8	Br F-M Sa Tr Gr Si
1.8		NFP RF

Station 7+745 6.1 Lt

0	- 40	Asph
40	- 360	Cr Gr & Sa
360	- 800	Br F-M Sa Tr Gr Si
800	- 1.0	Br F-M Sa with Si Tr Gr (wet)
1.0	- 1.1	Br F-M Sa Tr Gr Si (dry)
1.1		NFP RF

Station 7+762 6.1 Lt

0	- 40	Asph
40	- 300	Cr Gr & Sa
300	- 1.1	Br F-M Sa Tr Gr Si (moist @ 700)
1.1		NFP RF

Station 7+837 11.0 Lt D-1.3

0	- 300	Br F-M Sa Tr Si Gr (wet @ 0)
300	- 1.3	Gry Si(y) Cl (Stiff)

Station 7+837 11.0 Rt D-2.45

0	- 300	Blk Org M (F Fib) (wet @ 0)
300	- 1.2	Gry Si(y) Cl (Stiff)

Station 7+838 6.3 Lt

0	- 40	Asph
40	- 300	Cr Gr & Sa
300	- 800	Br F-M Sa Tr Gr Si
800		NFP RF

Station 7+843 6.1 Lt

0	- 110	Asph
110	- 230	Cr Gr & Sa
230	- 1.8	Br F-M Sa Tr Gr Si
1.8		NFP RF

Station 7+852 6.1 Lt

0	- 100	Asph
100	- 200	Cr Gr & Sa
200	- 1.0	Br F-M Sa Tr Gr Si Occ Cob
1.0		NFP RF

Station 7+899 6.1 Lt

0	- 90	Asph
90	- 280	Cr Gr & Sa
280	- 500	Br F-M Sa Tr Gr Si
500		NFP RF

Station 7+900 6.2 Rt

0	- 40	Asph
40	- 230	Cr Gr & Sa
230	- 700	Br F-M Sa Tr Gr Si
700		NFP RF

Station 7+940 9.0 Lt D-900

0	- 50	Tps
50	- 800	Br F-M Sa Tr Gr Si Occ Cob (wet @ 300)
800		NFP Cob

Station 7+950 9.0 Lt D-700

0	- 50	Tps
50	- 500	Br F-M Sa Tr Gr Si
500		NFP Poss BR

Station 7+950 6.0 Lt

0	- 50	Asph
50	- 270	Cr Gr & Sa
270	- 700	Br F-M Sa Tr Gr Si
700		NFP RF

Station 7+960 9.0 Lt D-700

0	- 60	Tps
60	- 800	Br F-M Sa Tr Gr Si (wet @ 300)
800		NFP Poss BR

Station 7+968 6.2 Lt

0	- 80	Asph
80	- 180	Cr Gr & Sa
180	- 500	Br F-M Sa Tr Gr Si
500		NFP RF

Station 7+970 9.0 Lt D-650

0	- 50	Tps
50	- 650	Br F-M Sa Tr Gr Si (wet @ 300)
650		NFP Prob BR

Station 7+980 8.0 Lt D-500

0	- 50	Tps
50	- 900	Br F-M Sa Tr Gr Si (wet @ 500)
900		NFP Prob BR

Station 7+980 6.2 Lt

0	- 70	Asph
70	- 270	Cr Gr & Sa
270	- 700	Br F-M Sa Tr Gr Si
700		NFP RF

Station 7+990 8.0 Lt D-550

0	- 50	Tps
50	- 300	Br F-M Sa & Gr (wet @ 300)
300		NFP Prob BR

Station 8+000 8.0 Lt D-400

0	- 500	Br F-M Sa & Gr
500		NFP Prob BR

Station 8+010 8.0 Lt D-600

0	- 400	Br F-M Sa & Gr
400		NFP Cob

Station 8+020 8.0 Lt D-600

0	- 550	Br F-M Sa Tr Gr Occ Cob
550		NFP Prob BR

Station 8+030 8.0 Lt D-500

0	- 600	Br F-M Sa & Gr
600		NFP Prob BR

Station 8+040 8.5 Lt D-500

0	- 600	Br F-M Sa & Gr
600		NFP Prob BR

Station 8+050 8.0 Lt D-500

0	- 600	Br F-M Sa & Gr
600		NFP Prob BR

Station 8+060 8.0 Lt D-500

0	- 200	Br F-M Sa & Gr
200		NFP Poss BR

Station 8+070 8.0 Lt D-650

0	- 250	Br F-M Sa Tr Gr Si
250		NFP Poss BR

Station 8+075 6.1 Rt

0	- 50	Asph
50	- 300	Cr Gr & Sa
300	- 800	Br F-M Sa Tr Gr Si
800		NFP RF

Station 8+080 8.0 Lt D-650

0	- 50	Tps
50	- 400	Br F-M Sa & Gr
400		NFP Prob BR

Station 8+090 8.0 Lt D-650

0	- 50	Tps (wet @ 0)
50	- 650	Br F-M Sa Tr Gr Si
650		NFP Prob BR

Station 8+100 8.0 Lt D-700

0	- 400	Blk Org M (F Fib) Tr Sa & Gr (wet @ 0)
400		NFP Prob BR

Station 8+100 8.0 Rt D-1.0

0	- 500	Br F-M Sa & Gr (wet @ 300)
500		NFP Prob BR

Station 8+104 6.2 Lt

0	- 70	Asph
70	- 230	Cr Gr & Sa
230	- 400	Br F-M Sa Tr Gr Si
400		NFP Prob BR

Station 8+110 8.0 Rt D-1.1

0	- 350	Br F-M Sa & Gr (wet @ 0)
350		NFP Prob BR

Station 8+110 8.0 Lt D-650
0 - 50 Tps
50 - 800 Br F-M Sa Tr Gr Si (wet @ 100)

Station 8+120 8.0 Lt D-850
0 - 50 Tps (wet @ 0)
50 - 400 Br F-M Sa & Gr
400 NFP Prob BR

Station 8+120 8.0 Rt D-1.0
0 - 50 Tps (wet @ 0)
50 - 700 Br F-M Sa & Gr
700 NFP Prob BR

Station 8+125 6.0 Lt
0 - 70 Asph
70 - 280 Cr Gr & Sa
280 - 1.7 Br F-M Sa Tr Gr Si (wet @ 1.2)
1.7 NFP Sh Rk

Station 8+130 8.0 Rt D-900
0 - 50 Tps (wet @ 0)
50 - 700 Gry Si(y) Cl (soft)
700 - 1.2 Gry Si(y) Sl (stiff)

Station 8+130 8.0 Lt D-900
0 - 50 Tps
50 - 800 Br F-M Sa & Gr (wet @ 200)
800 NFP Cob

Station 8+140 8.0 Rt D-800
0 - 100 Tps (wet @ 0)
100 - 1.0 Blk Org M (F Fib)
1.0 NFP Prob BR

Station 8+150 6.1 Lt
0 - 70 Asph
70 - 230 Cr Gr & Sa
230 - 1.0 Br F-M Sa Tr Gr Si
1.0 - 1.8 Br Si(y) Cl Tr Sa Gr
1.8 NFP Sh Rk
Station 8+150 6.1 Lt @ 1.5
WL 76
WP 20
PI 56

Station 8+165 6.1 Lt
0 - 50 Asph
50 - 230 Cr Gr & Sa
230 - 800 Br F-M Sa Tr Gr Si
800 NFP RF

Station 8+170 8.0 Rt D-900
0 - 100 Tps
100 - 1.0 Blk Org M (F Fib) (wet @ 300)
1.0 NFP Prob BR

Station 8+200 6.0 Rt
0 - 40 Asph
40 - 260 Cr Gr & Sa
260 - 600 Br F-M Sa Tr Gr Si
600 NFP RF

Station 8+200 8.0 Rt D-1.2
0 - 100 Tps (wet @ 0)
100 - 600 Blk Org M (F Fib)
600 NFP Prob BR

Station 8+240 6.2 Rt
0 - 60 Asph
60 - 270 Cr Gr & Sa
270 - 600 Br F-M Sa Tr Gr Si
600 NFP Sh Rk

Station 8+265 6.0 Lt
0 - 70 Asph
70 - 270 Cr Gr & Sa
270 - 700 Br F-M Sa Tr Gr Si
700 NFP RF

Station 8+285 6.0 Rt
0 - 60 Asph
60 - 250 Cr Gr & Sa
250 - 2.0 Br F-M Sa Tr Gr Si Occ Cob

Station 8+300 6.0 Lt
0 - 30 Asph
30 - 200 Cr Gr & Sa
200 - 1.1 Br F-M Sa Tr Gr Si Occ Cob
1.1 NFP RF

Station 8+315 20.0 Rt D-8.0
0 - 100 Tps
100 - 400 Blk Org M (F Fib) (wet @ 200)
400 - 2.2 Br Gry Si(y) Cl (Stiff)

Station 8+322 20.0 Rt D-8.0
0 - 100 Tps (wet @ 0)
100 - 300 Blk Org M (F Fib)
300 - 2.0 Gry Si(y) Cl (Stiff)

Station 8+325 28.0 Lt D-10.0
0 - 100 Tps
100 - 300 Blk Org M (F Fib)
300 - 2.1 Br Gry Si(y) Cl (Stiff)

Station 8+325 28.0 Lt D-10.0
0 - 100 Tps (wet @ 0)

100	- 300	Blk Org M (F Fib)
300	- 2.0	Gry Br Si(y) Cl (Stiff)
2.0		NFP Si(y) Sa

Station 8+325 6.0 Rt

0	- 100	Asph
100	- 300	Cr Gr & Sa
300	- 700	Br F-M Sa Tr Gr Si
700		NFP RF

Station 8+333 6.0 Rt

0	- 100	Asph
100	- 330	Cr Gr & Sa
330	- 700	Br F-M Sa Tr Gr Si
700		NFP RF

Station 8+333 6.0 Lt

0	- 50	Asph
50	- 300	Cr Gr & Sa
300	- 1.0	Br F-M Sa Tr Gr Si
1.0		NFP RF

Station 8+348 6.0 Lt

0	- 60	Asph
60	- 230	Cr Sa& Gr
230	- 500	Br F-M Sa Tr Gr Si
500		NFP RF

Station 8+359 6.0 Rt

0	- 30	Asph
30	- 300	Cr Gr & Sa
300	- 700	Br F-M Sa Tr Gr Si
700		NFP RF

Station 8+424 6.0 Rt

0	- 80	Asph
80	- 290	Cr Gr & Sa
290	- 1.0	Br F-M Sa Tr Gr Si
1.0		NFP RF

Station 8+425 10.0 Rt D-1.4

0	- 400	Br F-M Sa Tr Gr Si (wet @ 0)
400		NFP Poss BR

Station 8+428 10.0 Lt D-1.3

0	- 100	Tps Tr Sa Gr (wet @ 0)
100	- 1.3	Gry Si(y) Cl (Stiff)

Station 8+430 6.0 Lt

0	- 50	Asph
50	- 400	Cr Gr & Sa
400	- 900	Br F-M Sa Tr Gr Si
900		NFP RF

Station 8+445 6.0 Rt

0	- 70	Asph
70	- 340	Cr Gr & Sa
340	- 800	Br F-M Sa Tr Gr Si
800		NFP Sh Rk

Station 8+500 7.0 Lt

0	- 200	Cr Gr & Sa
200	- 600	Br F-M Sa Tr Gr Occ Cob
600		NFP Sh Rk

Station 8+599 13.0 Lt D-2.5

0	- 300	Blk Org M (F Fib) (wet @ 0)
300	- 1.4	Gry Si(y) Cl (Stiff)

Station 8+599 11.0 Rt D-2.5

0	- 400	Blk Org M (F Fib) Tr RF (wet @ 0)
400	- 1.1	Gry Si(y) Cl (Stiff)
1.1		NFP Cob

Station 8+725 6.0 Rt

0	- 70	Asph
70	- 220	Cr Gr & Sa
220	- 800	Br F-M Sa Tr Gr Si
800		NFP Sh Rk

Station 8+735 22.0 Rt D-1.5

0	- 250	Tps (wet @ 0)
250	- 1.9	Br Gry Si(y) Cl (Stiff)
1.9		NFP Cob

Station 8+736 6.0 Rt

0	- 50	Asph
50	- 170	Cr Gr & Sa
170	- 800	Br F-M Sa Tr Gr Si (moist @ 800)
800		NFP RF

Station 8+750 25.0 Rt D-400

0	- 80	Tps
80	- 1.5	Br Gry Si(y) Cl (Stiff)

Station 8+755 6.0 Rt

0	- 70	Asph
70	- 300	Cr Gr & Sa
300	- 1.0	Br F-M Sa Tr Gr Si
1.0		NFP RF

Station 8+790 25.0 Rt D-100

0	- 50	Tps
50	- 1.5	Br Gry Si(y) Cl (Stiff)

Station 8+800 6.0 Lt

0	- 40	Asph
40	- 270	Cr Gr & Sa

270 - 600	Br F-M Sa Tr Gr Si
600	NFP Sh Rk

Station 8+813 8.0 Rt D-400

0 - 250	Br F-M Sa & Gr
250	NFP Prob BR

Station 8+820 8.5 Rt D-300

0 - 700	Br F-M Sa Tr Gr Si Occ Cob
700	NFP Poss BR

Station 8+831 25.0 Lt D-900

0 - 80	Tps
80 - 1.5	Br F-M Sa Tr Gr Si Occ Cob (wet @ 600)

Station 8+835 8.5 Rt D-300

0 - 100	Cr Gr & Sa
100 - 1.7	Br F-M Sa Tr Gr Si Occ Cob (wet @ 1.0)
1.7	NFP Prob BR

Station 8+840 22.0 Rt D-400

0 - 60	Tps
60 - 1.5	Br F-M Sa Tr Si Occ Cob (wet @ 1.0)

Station 8+843 8.0 Lt D-450

0 - 450	Br F-M Sa & Gr (wet @ 200)
450	NFP Prob BR

Station 8+850 8.5 Rt D-250

0 - 60	Cr Gr & Sa
60 - 1.0	Br F-M Sa Tr Gr Si Occ Cob (wet @ 1.0)
1.0	NFP Prob BR

Station 8+852 21.0 Rt D-250

0 - 300	Cr Sa & Gr
300 - 950	Br F-M Sa Tr Gr Si Occ Cob (wet @ 600)
950	NFP Poss BR

Station 8+853 8.0 Lt D-350

0 - 300	Br F-M Sa & Gr
300	NFP Prob BR

Station 8+853 9.0 Rt D-650

0 - 20	Tps
20 - 400	Br F-M Sa & Gr
400	NFP Prob BR

Station 8+863 8.0 Rt D-500

0 - 400	Br F-M Sa & Gr
400	NFP Prob BR

Station 8+863 8.0 Lt D-350

0 - 250	Br F-M Sa & Gr
250	NFP Prob BR

Station 8+873 8.0 Lt D-500

0 - 500	Br F-M Sa & Gr
500	NFP Prob BR

Station 8+883 8.0 Lt D-500

0 - 500	Br F-M Sa
500	NFP Prob BR

Station 8+893 8.0 Lt D-400

0 - 400	Br F-M Sa & Gr
400	NFP Prob BR

Station 8+893 8.0 Rt D-450

0 - 300	Br F-M Sa & Gr
300	NFP Prob BR

Station 8+900 6.0 Rt

0 - 40	Asph
40 - 120	Cr Gr & Sa
120 - 400	Br F-M Sa Tr Gr Si
400	NFP Sh Rk

Station 8+903 8.0 Lt D-450

0 - 400	Br F-M Sa & Gr
400	NFP Prob BR

Station 8+913 8.0 Lt D-350

0 - 700	Br F-M Sa & Gr
700	NFP Sh Rk

Station 8+913 8.0 Rt D-450

0 - 300	Br F-M Sa & Gr
300	NFP Sh Rk

Station 8+923 8.0 Lt D-300

0 - 500	Br F-M Sa & Gr
500	NFP Sh Rk

Station 8+923 8.0 Rt D-500

0 - 450	Br F-M Sa & Gr
450	NFP Sh Rk

Station 8+925 6.1 Rt

0 - 50	Asph
50 - 230	Cr Gr & Sa
230 - 450	Br F-M Sa Tr Gr Si
450	NFP Sh Rk

Station 8+933 8.0 Rt D-500

0 - 450	Br F-M Sa & Gr

450	NFP Sh Rk

Station 8+933 8.0 Lt D-300

0 - 500	Br F-M Sa & Gr
500	NFP Sh Rk

Station 8+950 8.0 Lt D-550

0 - 50	Tps
50 - 300	Br F-M Sa & Gr
300	NFP Poss BR

Station 8+950 8.0 Rt D-700

0 - 50	Tps
50 - 400	Br F-M Sa & Gr
400	NFP Sh Rk

Station 8+960 8.0 Lt D-350

0 - 50	Tps
50 - 600	Br F-M Sa & Gr
600	NFP Poss BR

Station 8+960 8.0 Rt D-200

0 - 50	Tps
50 - 400	Br F-M Sa Tr Gr Si Occ Cob
400	NFP Poss BR

Station 8+970 8.0 Rt D-550

0 - 50	Tps
50 - 280	Br F-M Sa & Gr
280	NFP Sh Rk

Station 8+970 8.0 Lt D-450

0 - 650	Br F-M Sa & Gr
650	NFP Prob BR

Station 8+980 8.0 Lt D-450

0 - 500	Br F-M Sa & Gr
500	NFP Prob BR

Station 8+980 8.0 Lt D-850

0 - 50	Tps
50 - 650	Br F-M Sa &Gr
650	NFP Prob BR

Station 8+990 8.0 Lt D-500

0 - 850	Br F-M Sa & Gr
850	NFP Prob BR

Station 8+990 8.0 Rt D-200

0 - 50	Tps
50 - 600	Br F-M Sa & Gr
600	NFP Prob BR

Station 9+000 8.0 Lt D-500

0 - 700	Br F-M Sa & Gr
700	NFP Prob BR

Station 9+000 8.0 Rt D-550

0 - 400	Br F-M Sa & Gr
400	NFP Prob BR

Station 9+010 8.0 Rt D-800

0 - 600	Br F-M Sa & Gr
600	NFP Prob BR

Station 9+010 8.0 Lt D-650

0 - 800	Br F-M Sa & Gr
800	NFP Prob BR

Station 9+020 8.0 Lt D-550

0 - 700	Br F-M Sa & Gr
700	NFP Prob BR

Station 9+020 8.0 Rt D-700

0 - 900	Br F-M Sa & Gr
900	NFP Prob BR

Station 9+030 8.0 Lt D-550

0 - 850	Br F-M Sa & Gr
850	NFP Prob BR

Station 9+030 8.0 Rt D-700

0 - 800	Br F-M Sa & Gr
800	NFP Prob Bld

Station 9+050 8.0 Lt D-600

0 - 450	Br F-M Sa & Gr
450	NFP Prob BR

Station 9+100 6.1 Rt

0 - 50	Asph
50 - 200	Cr Gr & Sa
200 - 400	Br F-M Sa Tr Gr Si
400	NFP Sh Rk
Station 9+100 6.1 Rt @ 100	
Passing 4.75mm	73.1
Passing 75 μm	7.8
FMC	5.5
LSFH	
Group Symbol	SW

Station 9+125 6.1 Lt

0 - 40	Asph
40 - 300	Cr Gr & Sa
300 - 1.0	Br F-M Sa Tr Gr Si
1.0	NFP Sh Rk
Station 9+125 6.1 Lt @500	
Passing 4.75mm	71.5

Passing 75 μm	7.8
FMC	5.5
Group Symbol	SW

Station 9+300 21.0 Lt D-1.6

0 - 200	Tps Tr RF
200 - 800	Br Si(y) Cl Tr Gr
800	NFP Poss BR

Station 9+325 6.0 Rt

0 - 80	Asph
80 - 400	Cr Gr & Sa
400 - 600	Br F-M Sa Tr Gr Si
600	NFP RF

Station 9+350 19.0 Rt D+2.0

0	BR

Station 9+350 25.0 Lt D-13.0

0 - 100	Tps
100 - 1.3	Gry Si(y) Cl Tr Sa Gr
1.3	NFP Cob

Station 9+400 25.0 Lt D-20.0

0 - 200	Br F-M Sa Tr Gr Si (wet @ 0)
200 - 1.5	Br Si(y) Cl
1.5 - 2.5	Gry Si(y) Cl
2.5	NFP Cob

Station 9+400 25.0 Rt D-10.0

0 - 100	Tps
100	NFP BR

Station 9+450 30.0 Lt D-10.0

0 - 200	Tps (wet @ 0)
200 - 1.8	Br Gry Si(y) Cl Tr Sa Gr
1.8	NFP Cob

Station 9+450 21.0 Lt D-6.5

0 - 100	Tps
100 - 600	Br Si(y) Cl
600 - 950	Br F-M Sa Tr Gr Si (wet @ 700)
950	NFP Cob

Station 9+475 16.0 Lt D-2.7

0 - 1.0	Br F-M Sa Tr Gr Si (wet @ 0)
1.0 - 2.1	Gry Si(y) Cl (Stiff)
2.1	NFP Cob

Station 9+475 14.0 Rt D-3.0

0 - 1.0	Br F-M Sa Tr Gr Si (wet @ 0)
1.0 - 2.5	Gry Si(y) Cl (Stiff)
2.5	NFP Cob

Station 9+510 21.0 Lt D-10.0

0 - 1.3	Gry Si(y) Cl Tr Gr Cob (wet @ 0)
1.3	NFP Cob

Station 9+550 19.0 Lt D-1.5

0 - 200	Tps
200 - 1.0	Br Si(y) Cl (wet @ 600)
1.0	NFP Poss BR

Station 9+550 22.0 Rt D-3.0

0 - 200	Tps
200 - 400	Br F-M Sa Tr Si Gr
400 - 700	Gry Si(y) Cl (Stiff) (wet @ 600)
700	NFP Cob

Station 9+700 15.0 Lt D-3.5

0 - 200	Tps (wet @ 0)
200 - 300	Br F-M Sa Tr Gr Si
300 - 2.0	Br Gry Si(y) Cl (Stiff)

Station 9+705 19.0 Rt D-6.0

0 - 400	Blk Org M (F Fib) (wet @ 0)
400 - 1.0	Br Si(y) Cl (Stiff)
1.0 - 2.5	Gry Si(y) Cl (Stiff)
2.5	NFP Cob

Station 9+710 12.0 Rt D-6.0

0 - 200	Tps
200 - 600	Blk Org M (F Fib) Tr Sa Gr (wet @ 300)
600 - 1.6	Gry Br Si(y) Cl (Stiff)
1.6	NFP Cob

Station 9+710 13.0 Lt D-3.0

0 - 200	Tps (wet @ 0)
200 - 1.2	Br Si(y) Cl (Stiff)
1.2	NFP Cob

Station 10+150 9.5 Lt D-550

0 - 50	Tps
50 - 550	Br F-M Sa & Gr
550	NFP Prob BR

Station 10+150 9.0 Rt D-900

0 - 300	Br F-M Sa & Gr (wet @ 300)
300 - 1.6	Gry Si(y) Cl (stiff)

Station 10+150 4.5 Lt

0 - 170	Asph
170 - 270	Cr Gr & Sa
270 - 750	Br F-M Sa Tr Gr Si
750	NFP Sh Rk

Station 10+152 3.9 Rt

0	- 90	Asph
90	- 340	Cr Gr & Sa
340	- 1.0	Br F-M Sa Tr Gr (moist @ 900)
1.0		NFP Sh Rk

Station 10+160 9.5 Lt D-600

0	- 50	Tps
50	- 700	Br F-M Sa & Gr
700		NFP Prob BR

Station 10+160 9.0 Rt D-900

0	- 50	Tps
50	- 300	Br F-M Sa & Gr (wet @ 300)
300	- 1.6	Gry Si(y) Cl (stiff)

Station 10+161 4.0 Lt

0	- 130	Asph
130	- 260	Cr Gr & Sa
260	- 600	Br F-M Sa Tr Gr Si
600		NFP Sh Rk

Station 10+162 3.9 Rt

0	- 70	Asph
70	- 230	Cr Gr & Sa
230	- 1.1	Br F-M Sa Tr Gr Si
1.1		NFP RF

Station 10+166 3.8 Rt

0	- 70	Asph
70	- 350	Cr Gr & Sa
350	- 700	Br F-M Sa Tr Gr Si
700		NFP RF

Station 10+169 4.0 Lt

0	- 90	Asph
90	- 180	Cr Gr & Sa
180	- 400	Br F-M Sa Tr Gr Si
400		NFP RF

Station 10+170 9.0 Rt D-800

0	- 50	Tps
50	- 400	Br F-M Sa & Gr (wet @ 200)
400	- 2.0	Gry Si(y) Cl (stiff)
2.0		NFP Stiff Cl

Station 10+170 9.5 Lt D-650

0	- 50	Tps
50	- 700	Br F-M Sa & Gr
700		NFP Prob BR

Station 10+171 3.8 Rt

0	- 40	Asph
40	- 300	Cr Gr & Sa
300	- 700	Br F-M Sa Tr Gr Si
700		NFP RF

Station 10+173 4.0 Lt

0	- 130	Asph
130	- 220	Cr Gr & Sa
220	- 400	Br F-M Sa Tr Gr Si
400		NFP RF

Station 10+175 3.8 Rt

0	- 30	Asph
30	- 360	Cr Gr & Sa
360	- 600	Br F-M Sa Tr Gr Si
600		NFP RF

Station 10+180 9.5 Lt D-1.3

0	- 100	Tps
100	- 900	Br F-M Sa & Gr (wet @ 300)
900	- 1.5	Gry Si(y) Cl

Station 10+180 9.5 Lt D-800

0	- 50	Tps
50	- 1.4	Br F-M Sa & Gr (wet @ 300)
1.4		NFP Cob

Station 10+180 9.0 Rt D-800

0	- 150	Tps
150	- 300	Br F-M Sa &Gr (wet @ 300)
300	- 1.8	Gry Di(y) Cl
1.8		NFP Stiff Cl

Station 10+183 3.8 Lt

0	- 30	Asph
30	- 200	Cr Gr & Sa
200	- 400	Br F-M Sa Tr Gr Si
400		NFP RF

Station 10+185 3.8 Rt

0	- 60	Asph
60	- 290	Cr Gr & Sa
290	- 500	Br F-M Sa Tr Gr Si
500		NFP RF

Station 10+195 3.8 Rt

0	- 40	Asph
40	- 300	Cr Gr & Sa
300	- 500	Br F-M Sa Tr Gr Si
500		NFP RF

Station 10+210 9.0 Rt D-850

0	- 150	Tps
150	- 850	Br F-M Sa & Gr (wet @ 250)
850	- 2.0	Gry Si(y) Cl (stiff)

Station 10+217 3.6 Lt

0	- 240	Asph
240	- 340	Cr Sa & Gr
340	- 500	Br F-M Sa Tr Gr Si
500		NFP RF

Station 10+234 3.5 Rt

0	- 70	Asph
70	- 210	Cr Sa & Gr
210	- 400	Br F-M Sa Tr Gr
400		NFP RF

Station 10+237 18.0 Rt D-1.5

0	- 200	Br F-M Sa Tr Gr Si (wet @ 0)
200	- 1.0	Br Si(y) Cl (Soft)
1.0	- 2.0	Gry Si(y) Cl (Stiff)

Station 10+264 3.8 Lt

0	- 150	Asph
150	- 500	Cr Sa & Gr
500	- 1.0	Br F-M Sa Tr Gr Si
1.0	- 1.2	Blk Org M (F Fib)
1.7	- 2.0	Gry Si(y) Cl (stiff) (moist @ 2.0)

Station 10+264 3.8 Lt @ 1.5

WL	73
WP	26
PI	47

Station 10+280 12.0 Rt D-1.2

0	- 300	Tps (wet @ 300)
300	- 3.0	Gry Si(y) Cl (stiff)
3.0		NFP Stiff Cl

Station 10+292 3.8 Lt

0	- 70	Asph
70	- 300	Cr Gr & Sa
300	- 1.3	Br F-M Sa Tr Gr Si
1.3	- 2.0	Gry Si(y) Cl (stiff)

Station 10+310 8.5 Lt D-300

0	- 50	Tps
50	- 1.0	Gry F-M Sa Tr Gr Si Cl (wet @ 300)
1.0		NFP Cob

Station 10+310 10.0 Lt D-900

0	- 300	Tps (wet @ 0)
300	- 3.0	Gry Si(y) Cl (stiff)

Station 10+310 3.6 Lt

0	- 110	Asph
110	- 440	Cr Gr & Sa
440	- 2.2	Br F-M Sa Tr Gr Si Occ Cob (water seeping @ 1.4)
2.2	- 2.4	Blk Org M (F Fib)
2.4	- 6.0	Gry Si(y) Cl (stiff)
6.0	- 15.2	Gry Si(y) Cl (soft)

Station 10+325 9.0 Rt

0	- 50	Cr Sa & Gr
50	- 400	Br F-M Sa Tr Gr Si
400		NFP RF

Station 10+333 3.8 Rt

0	- 50	Asph
50	- 240	Cr Gr & Sa
240	- 2.0	Br F-M Sa Tr Gr Si (water @900)

Station 10+340 10.0 Rt D-1.0

0	- 250	Tps (wet @ 0)
250	- 3.0	Gry Si(y) (stiff)

Station 10+350 9.0 Lt

0	- 50	Cr Sa & Gr
50	- 700	Br F-M Sa Tr Gr Si Occ Cob
700		NFP RF

Station 10+366 3.6 Lt

0	- 70	Asph
70	- 180	Cr Gr & Sa
180	- 1.0	Br F-M Sa Tr Gr Si (wet @ 900)
1.0		NFP RF

Station 10+370 11.0 Lt D-1.2

0	- 50	Tps (wet @ 0)
50	- 400	Blk Org M (F Fib)
400	- 3.0	Gry Si(y) Cl (stiff)

Station 10+375 9.5 Rt

0	- 50	Cr Sa & Gr
50	- 1.5	Br F-M Sa Tr Gr Si (wet @ 500)
1.5		NFP RF

Station 10+398 13.0 Rt D-1.85

0	- 1.2	Br Si(y) Cl Soft (wet @ 0)
1.2	- 2.2	Gry Si(y) Cl (Stiff)

Station 10+398 13.5 Lt D-2.0

0	- 1.0	Br Si(y) Cl (Soft) (wet @ 0)
1.0	- 2.6	Gry Si(y) Cl (Stiff)

Station 10+400 10.0 Rt D-1.2

0	- 1.5	Br F-M Sa & Gr (wet @ 0)
1.5	- 3.0	Gry Si(y) Cl (stiff)

Station 10+404 3.7 Rt

0	- 50	Asph
50	- 210	Cr Gr & Sa
210	- 1.0	Br F-M Sa Tr Gr Si (moist @ 1.0)

1.0	NFP RF

Station 10+405 9.0 Lt

0 - 70	Cr Sa & Gr
70 - 700	Br F-M Sa Tr Gr Occ Cob
700	NFP RF

Station 10+423 3.6 Lt

0 - 90	Asph
90 - 400	Cr Gr & Sa
400 - 1.7	Br F-M Sa Tr Gr Si (wet @ 900)
1.7	NFP RF

Station 10+425 9.0 Rt

0 - 20	Cr Sa & Gr
20 - 1.5	Br F-M Sa Tr Gr Si Occ Cob (wet @ 700)
1.5	NFP RF

Station 10+430 15.0 Lt D-1.4

0 - 300	Tps (wet @ 0)
300 - 700	Br f-M Sa & Gr
700 - 3.0	Gry Si(y) Cl (stiff)

Station 10+450 3.7 Rt

0 - 180	Asph
180 - 450	Cr Gr & Sa
450 - 1.0	Br F-M Sa Tr Gr Si
1.0	NFP RF

Station 10+460 12.0 Rt S-1.0

0 - 300	Tps
300 - 2.0	Gry Si(y) Cl (stiff)

Station 10+475 9.5 Rt

0 - 20	Cr Sa & Gr
20 - 600	Br F-M Sa Tr Gr Si Occ Cob
600	NFP RF

Station 10+475 3.6 Lt

0 - 180	Asph
180 - 450	Cr Gr & Sa
450 - 1.0	Br F-M Sa Tr Gr Si
1.0	NFP RF

Station 10+490 15.0 Lt D-1.6

0 - 300	Tps Tr Sa & Gr
300 - 800	Gry Si(y) Cl (wet @ 400)
800	NFP Cob

Station 10+500 3.7 Rt

0 - 50	Asph
50 - 330	Cr Gr & Sa
330 - 1.0	Br F-M Sa Tr Gr Si (wet @ 1.0)
1.0 - 1.4	Br F-M Sa Tr Gr with Si(y) Cl
1.4	NFP Poss BR

Station 10+500 3.7 Rt @ 1.3

Passing 4.75mm	96.3
Passing 75 μm	40.3
FMC	29.3
MSFH	
Group Symbol	SC

Station 10+520 10.0 Rt D-2.0

0 - 600	Br F-M Sa & Gr (wet @ 0)
600	NFP Poss BR

Station 10+525 3.6 Lt

0 - 50	Asph
50 - 140	Cr Gr & Sa
140 - 240	Asph
240 - 400	Cr Gr & Sa
400 - 500	Br F-M Sa Tr Gr Si
500	NFP RF

Station 10+550 3.7 Rt

0 - 60	Asph
60 - 190	Cr Gr & Sa
190 - 350	Br F-M Sa Tr Gr Si Bld Cob
350	NFP RF

Station 10+550 13.0 Lt D-1.6

0 - 300	Tps (wet @ 300)
300 - 500	Blk Org M (F Fib)
500 - 3.0	Gry Si(y) Cl

Station 10+575 9.5 Lt

0 - 50	Cr Sa & Gr
50 - 700	Br F-M Sa Tr Gr Si Occ Cob
700	NFP RF

Station 10+575 3.6 Lt

0 - 160	Asph
160 - 500	Cr Gr & Sa
500 - 1.1	Br F-M Sa Tr Gr Si Occ Cob
1.1	NFP RF

Station 10+580 10.0 Rt D-1.3

0 - 350	Blk Org M (F Fib) (wet @ 0)
350 - 500	Br F-M Sa & Gr
500	NFP Poss BR

Station 10+600 3.7 Rt

0 - 50	Asph
50 - 90	Cr Gr & Sa
90 - 110	Asph
110 - 450	Cr Gr & Sa
450 - 1.2	Br F-M Sa Tr Gr Si Occ Cob

1.2	NFP RF
Station 10+600 3.7 Rt @ 100	
Passing 4.75mm	67.6
Passing 75 μm	7.3
% Crush	91.5
LSFH	
Group Symbol	SW
Station 10+600 3.7 Rt @ 500	
Passing 4.75mm	65.1
Passing 75 μm	12.7
FMC	7.0
LSFH	
Group Symbol	SW

Station 10+610 12.0 Lt D-1.0

0 - 300	Tps (wet @ 300)
300 - 500	Blk Org M (F Fib)
500 - 2.0	Gry Si(y) Cl (stiff)

Station 10+625 7.0 Lt

0 - 800	Br F-M Sa Tr Gr Si Occ Cob
800	NFP RF

Station 10+625 3.6 Lt

0 - 100	Asph
100 - 450	Cr Gr & Sa
450 - 1.1	Br F-M Sa Tr Gr Si Occ Cob
1.1	NFP RF

Station 10+640 13.0 Rt D-1.0

0 - 500	Blk Org M (F Fib) (wet @ 0)
500 - 2.0	Gry Si(y) Cl (stiff)

Station 10+650 3.7 Rt

0 - 50	Asph
50 - 80	Cr Gr & Sa
80 - 130	Asph
130 - 520	Cr Gr & Sa
520 - 1.1	Br F-M Sa Tr Gr Si Occ Cob
1.1	NFP RF

Station 10+670 11.0 Rt D-1.0

0 - 300	Tps (wet @ 300)
300 - 2.0	Gry Si(y) Cl (stiff)

Station 10+675 3.6 Lt

0 - 110	Asph
110 - 140	Cr Gr & Sa
140 - 280	Asph
280 - 510	Cr Gr & Sa
510 - 900	Br F-M Sa Tr Gr Si Occ Cob
900	NFP RF

Station 10+675 7.0 Rt

0 - 700	Br F-M Sa Tr Gr Si Occ Cob
700	NFP RF

Station 10+700 6.5 Rt

0 - 600	Br F-M Sa Tr Gr Si Occ Cob
600	NFP RF

Station 10+700 3.7 Rt

0 - 160	Asph
160 - 400	Cr Gr & Sa
400 - 600	Br F-M Sa Tr Gr Si Occ Cob
600	NFP RF

Station 10+700 10.0 Rt D-1.5

0 - 300	Tps
300 - 1.8	Gry Si(y) Cl (stiff) (wet @ 700)

Station 10+725 5.6 Lt

0 - 150	Asph
150 - 380	Cr Gr & Sa
380 - 600	Br F-M Sa Tr Gr Si
600	NFP RF

Station 10+730 12.0 Lt D-1.8

0 - 300	Tps
300 - 2.0	Gry Si(y) Cl (stiff)

Station 10+750 3.7 Rt

0 - 200	Asph
200 - 500	Cr Gr & Sa
500 - 1.1	Br F-M Sa Tr Gr Si
1.1	NFP RF

Station 10+750 11.0 Rt D-2.0

0 - 300	Tps
300 - 2.0	Gry Si(y) Cl (stiff) (wet @ 600)

Station 10+775 3.6 Lt

0 - 180	Asph
180 - 520	Cr Gr & Sa
520 - 1.1	Br F-M Sa Tr Gr Si
1.1	NFP RF

Station 10+800 3.7 Rt

0 - 100	Asph
100 - 500	Cr Gr & Sa
500 - 900	Br F-M Sa Tr Gr Si
900	NFP RF

Station 10+825 3.6 Lt

0 - 50	Asph
50 - 120	Cr Gr & Sa
120 - 180	Asph
180 - 210	Cr Gr & Sa

210 - 500	Asph
500 - 750	Cr Gr & Sa
750 - 1.3	Br F-M Sa Tr Gr Si
1.3	NFP RF

Station 10+844 3.7 Rt

0 - 120	Asph
120 - 650	Cr Gr & Sa
650 - 1.2	Br F-M Sa Tr Gr Si
1.2	NFP RF

Station 10+850 14.0 Lt D-5.0

0 - 250	Tps
250 - 1.0	Br Si(y) Cl (Soft) (moist)
1.0 - 2.1	Gry Si(y) Cl (Stiff)

Station 10+850 18.0 Rt D-5.0

0 - 300	Tps (wet @ 0)
300 - 1.0	Blk Org M (F Fib)
1.0 - 2.0	Gry Br Si(y) Cl
2.0 - 2.3	Gry Si(y) Cl (Stiff)

Station 10+858 3.8 Lt

0 - 70	Asph
70 - 500	Cr Gr & Sa
500 - 800	Br F-M Sa Tr Gr Si
800	NFP RF

Station 10+874 3.7 Rt

0 - 120	Asph
120 - 450	Cr Gr & Sa
450 - 900	Br F-M Sa Tr Gr Si
900	NFP RF

Station 10+890 3.8 Lt

0 - 200	Asph
200 - 500	Cr Gr & Sa
500 - 700	Br F-M SaTr Gr Si
700	NFP RF

Station 10+910 3.6 Rt

0 - 120	Asph
120 - 360	Cr Gr & Sa
360 - 500	Br F-M Sa Tr Gr Si
500	NFP RF

Station 10+926 15.0 Lt D-1.7

0 - 300	Tps (wet @ 0)
300 - 1.1	Br Si(y) Cl (Soft)
1.1	NFP Cob

Station 10+926 20.0 Rt D-2.8

0 - 400	Br Si(y) Cl Tr RF (wet @ 0)
400 - 1.5	Br Gry Si(y) Cl (Stiff)
1.5	NFP Poss BR

Station 10+933 3.8 Lt

0 - 200	Asph
200 - 300	Cr Gr & Sa
300 - 500	Br F-M Sa Tr Gr Si Occ Cob
500	NFP RF

Station 10+955 3.6 Rt

0 - 130	Asph
130 - 350	Cr Gr & Sa
350 - 500	Br F-M Sa Tr Gr Si Occ Cob
500	NFP Sh Rk

Station 10+975 3.6 Rt

0 - 100	Asph
100 - 230	Cr Gr & Sa
230 - 800	Br F-M Sa Tr Gr Si Occ Cob
800	NFP Sh Rk

Station 11+200 19.0 Rt D-6.0

0 - 1.2	Br Si(y) Cl Tr Sa (wet @ 0)
1.2	NFP Cob

Station 11+200 3.7 Lt

0 - 130	Asph
130 - 280	Cr Gr & Sa
280 - 500	Br F-M Sa Tr Gr Si Cob
500	NFP RF

Station 11+200 3.7 Lt @ 100

Passing 4.75mm	63.4
Passing 75 μm	8.2
% Crush	96.3
LSFH	
Group Symbol	SW

Station 11+200 3.7 Lt @ 500

Passing 4.75mm	66.6
Passing 75 μm	5.9
FMC	3.6
LSFH	
Group Symbol	SW

Station 11+218 3.7 Rt

0 - 180	Asph
180 - 340	Cr Gr & Sa
340 - 1.0	Br F-M Sa Tr Gr Si Occ Cob
1.0	NFP RF

Station 11+229 3.7 Lt

0 - 150	Asph
150 - 350	Cr Gr & Sa
350 - 900	Br F-M Sa Tr Gr Si Occ Cob
900	NFP RF

Station 11+240 3.7 Rt

0 - 50	Asph
50 - 320	Cr Gr & Sa
320 - 850	Br F-M Sa Tr Gr Si Occ Cob
850	NFP RF

Station 11+275 9.5 Lt D-1.2

0 - 200	Tps Tr Sa & Gr
200 - 900	Gry Si(y) Cl (stiff) (wet @ 600)
900	NFP Poss BR

Station 11+285 8.5 Lt D-800

0 - 50	Tps
50 - 300	Br F-M Sa & Gr
300	NFP Prob BR

Station 11+295 8.0 Lt D-700

0 - 50	Tps
50 - 350	Br F-M Sa & Gr
350	NFP Prob BR

Station 11+300 3.7 Lt

0 - 110	Asph
110 - 220	Cr Gr & Sa
220 - 900	Br F-M Sa Tr Gr Si Occ Cob
900	NFP Bld

Station 11+300 8.0 Lt D-700

0 - 50	Tps
50 - 800	Br Gry Si(y) Sa Tr Cl
800	NFP Prob BR

Station 11+315 3.6 Rt

0 - 110	Asph
110 - 250	Cr Gr & Sa
250 - 800	Br F-M Sa Tr Gr Si Occ Cob
800	NFP RF

Station 11+315 3.7 Lt

0 - 150	Asph
150 - 340	Cr Gr & Sa
340 - 1.0	Br F-M Sa Tr Gr Si Occ Cob
1.0 - 1.5	Br Si(y) Cl (moist @ 1.5)
1.5	NFP Poss BR

Station 11+315 3.7 Lt @ 1.5

Passing 4.75mm	93.9
Passing 75 μm	80.9
FMC	17.9
Group Symbol	CH
HSFH	
WL	30
WP	17
PI	13

Station 11+330 3.7 Lt

0 - 140	Asph
140 - 340	Cr Gr & Sa
340 - 700	Br F-M Sa Tr Gr Si Occ Cob
700	NFP Sh Rk

Station 11+348 3.7 Lt

0 - 120	Asph
120 - 250	Cr Gr & Sa
250 - 1.0	Br F-M Sa Tr Gr Si Occ Cob
1.0	NFP Sh Rk

Station 11+363 3.7 Lt

0 - 60	Asph
60 - 90	Cr Gr & Sa
90 - 1.0	Br F-M Sa Tr Gr Si Occ Cob
1.0	NFP Sh Rk

Station 11+378 3.7 Lt

0 - 120	Asph
120 - 460	Cr Gr & Sa
460 - 600	Br F-M Sa Tr Gr Si Occ Cob
600	NFP Sh Rk

Station 11+378 3.7 Rt

0 - 90	Asph
90 - 380	Cr Gr & Sa
380 - 700	Br F-M Sa Tr Gr Si Occ Cob
700	NFP RF

Station 11+393 3.7 Lt

0 - 180	Asph
180 - 360	Cr Gr & Sa
360 - 700	Br F-M Sa Tr Gr Si Occ Cob
700	NFP Sh Rk

Station 11+400 28.0 Rt D-8.0

0 - 700	Br F-M Sa Tr Gr Si Occ Cob (wet @ 100)
700 - 1.5	Br Gry Si(y) Cl (Stiff)

Station 11+425 3.6 Rt

0 - 100	Asph
100 - 120	Cr Gr & Sa
120 - 150	Asph
150 - 550	Cr Gr & Sa
550 - 1.0	Br F-M Sa Tr Gr Si Occ Cob
1.0	NFP RF

Station 11+475 3.7 Lt

0 - 80	Asph
80 - 420	Cr Gr & Sa
420 - 700	Br F-M Sa Tr Gr Si Occ Cob
700	NFP Cob

Station 11+475 9.5 Rt D-1.2

0	- 50	Tps
50	- 700	Br F-M Si(y) Sa Tr Gr
700		NFP Cob

Station 11+485 8.0 Rt D-1.0

0	- 50	Tps
50	- 800	Br Si(y) Cl (stiff)
800		NFP Cob

Station 11+500 5.0 Rt

0	- 400	Cr Gr & Sa
400	- 600	Br F-M Sa Tr Gr Si
600		NFP Poss BR

Station 11+500 8.0 Rt D-700

0	- 50	Tps
50	- 600	Br F-M Sa Tr Si Gr Cl
600		NFP Prob BR

Station 11+510 8.0 Rt D-800

0	- 50	Tps
50	- 650	Br F-M Sa & Gr
650		NFP Prob BR

Station 11+520 8.0 Rt D-950

0	- 30	Tps
30	- 300	Br F-M Sa & Gr
300		NFP Prob BR

Station 11+530 8.0 Rt D-900

0	- 50	Tps
50	- 500	Br F-M Sa & Gr
500		NFP Prob BR

Station 11+540 8.0 Rt D-1.1

0	- 50	Tps
50	- 400	Br F-M Sa & Gr
400		NFP Prob BR

Station 11+550 3.7 Lt

0	- 100	Asph
100	- 380	Cr Gr & Sa
380	- 400	Br F-M Sa Tr Gr Si
400		NFP Sh Rk

Station 11+550 8.0 Rt D-1.1

0	- 50	Tps
50	- 500	Br F-M Sa & Gr
500		NFP Prob BR

Station 11+560 8.0 Rt D-950

0	- 300	Br F-M Sa & Gr
300		NFP Prob BR

Station 11+570 8.0 Rt D-900

0	- 250	Br F-M Sa & Gr
250		NFP Prob BR

Station 11+580 8.0 Rt D-1.0

0	- 500	Br F-M Sa & Gr
500		NFP Poss BR

Station 11+600 3.8 Rt

0	- 140	Asph
140	- 360	Cr Gr & Sa
360	- 600	Br F-M Sa Tr Gr Si
600		NFP RF

Station 11+650 3.7 Lt

0	- 80	Asph
80	- 380	Cr Gr & Sa
380	- 900	Br F-M Sa Tr Gr Si
900		NFP RF

Station 11+700 20.0 Rt D-8.0

0	- 1.0	Blk Org M (F Fib) Tr Sa Gr (wet @ 0)
1.0	- 2.0	Br Gry Si(y) Cl (Stiff)

Station 11+700 3.7 Rt

0	- 250	Asph
250	- 500	Cr Gr & Sa
500	- 800	Br F-M Sa Tr Gr Si
800		NFP RF

Station 11+720 15.0 Rt D-8.0

0	- 1.0	Blk Org M (F Fib) Tr Sa Gr
1.0	- 2.0	Br Gry Si(y) Cl (Stiff)

Station 11+720 15.0 Lt D-6.0

0	- 1.0	Blk Org M (F Fib) (wet @ 0)
1.0		NFP RF

Station 11+750 3.7 Lt

0	- 90	Asph
90	- 240	Cr Gr & Sa
240	- 280	Asph
280	- 500	Cr Gr & Sa
500	- 1.0	Br F-M Sa Tr Gr Si Occ Cob
1.0		NFP RF

Station 11+800 3.8 Rt

0	- 190	Asph
190	- 530	Cr Gr & Sa
530	- 1.0	Br F-M Sa Tr Gr Si Occ Cob
1.0		NFP RF

Station 11+800 18.0 Lt D-7.5

0	- 100	Tps

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100	- 300	Blk Org M (F Fib)
300	- 1.0	Gry Si(y) Cl (Soft) (wet @ 300)
1.0	- 1.5	Gry Si(y) Sa Tr Gr
1.5		NFP Cob

Station 11+850 3.7 Lt

0	- 120	Asph
120	- 370	Cr Gr & Sa
370	- 700	Br F-M Sa Tr Gr Si Occ Cob
700		NFP RF

Township of Kirkup - Hwy 17 Re-alignment

Station 9+610 8.0 Lt D-400

0 - 700	Br F-M Sa & Gr
700 - 1.4	Br Si(y) Cl (Stiff) (wet @ 1.0)
1.4	NFP Cob

Station 9+650 30.0 Lt D-1.0

0 - 60	Tps (wet @ 0)
60 - 1.4	Br Si(y) Cl (firm)

Station 9+650 5.3 Lt D-0

0 - 40	Asph
40 - 400	Cr Gr & Sa
400 - 1.2	Br F-M Sa Tr Gr Si
1.2 - 2.1	Gry Si(y) Cl (moist @ 2.0)

Station 9+650 5.3 Lt @ 1.5

Passing 4.75mm	100.0
Passing 75 μm	93.1
FMC	39.5
HSFH	
Group Symbol	CH
WL	82
WP	31
PI	51

Station 9+665 8.0 Lt D-700

0 - 700	Br F-M Sa Tr Gr Si Occ RF
700 - 1.0	Br Si(y) Cl (Stiff)

Station 9+675 1.5 Lt D-0

0 - 70	Asph
70 - 300	Cr Gr & Sa
300 - 1.1	Br F-M Sa Tr Gr Si
1.1	NFP RF

Station 9+700 ℄ D-0

0	BR

Station 9+705 1.0 Lt D+2.5

0 - 60	Asph
60 - 300	Cr Gr & Sa
300 - 600	Br F-M Sa Tr Gr Si
600	NFP RF

Station 9+710 30.0 Lt D-4.0

0 - 200	Tps (wet @ 200)
200 - 1.5	Br Si(y) Cl (firm)

Station 9+720 8.0 Lt D-300

0 - 1.0	Br F-M Sa Tr Gr Si
1.0	NFP RF

Station 9+725 30.0 Lt D-3.0

0 - 100	Tps
100 - 1.3	Br Si(y) Cl (wet @ 300)
1.3	NFP Cob

Station 9+735 4.0 Rt D+2.3

0 - 40	Asph
40 - 250	Cr Gr & Sa
250 - 400	Br F-M Sa Tr Gr Si
400	NFP RF

Station 9+750 30.0 Lt D-1.6

0 - 100	Tps
100 - 400	Br F-M Sa Tr Gr Si
400	NFP Bld

Station 9+757 5.5 Rt D-1.0

0 - 70	Asph
70 - 320	Cr Gr & Sa
320 - 900	Br F-M Sa Tr Gr Si
900	NFP Sh Rk

Station 9+760 ℄ D-0

0 - 50	Tps
50 - 600	Br F-M Sa Tr Gr Si
600	NFP Sh Rk

Station 9+770 ℄ D-0

0	BR

Station 9+770 30.0 Lt D+3.6

0 - 300	Tps Tr Sa
300	NFP Prob BR

Station 9+775 8.0 Lt D+3.5

0	BR

Station 9+780 30.0 Lt D+2.0

0 - 600	Br F-M Sa Tr Gr
600	NFP Prob BR

Station 9+780 ℄ D-0

0	BR

Station 9+784 9.0 Rt D-10.0

0 - 100	Asph
100 - 300	Cr Sa & Gr
300 - 600	Br F-M Sa Tr Gr Si
600	NFP Poss BR

Station 9+790 30.0 Lt D+2.0

0	BR

Station 9+800 30.0 Lt D+3.3

0	BR

Station 9+800 ℄ D-0

0	BR

Station 9+810 ℄ D-0

0 BR

Station 9+814 9.0 Rt D-12.0
0 - 100 Cr Sa & Gr
100 - 450 Br F-M Sa Tr Gr Si
450 NFP Sh Rk

Station 9+820 ℄ D-0
0 - 300 Tps
300 NFP Prob BR

Station 9+820 30.0 Lt D+2.7
0 - 100 Tps
100 - 450 Br F-M Sa Tr Gr Si Occ Bld Cob
450 NFP Prob BR

Station 9+825 8.0 Lt D+2.7
0 BR

Station 9+830 ℄ D-0
0 - 200 Tps
200 NFP BR

Station 9+840 30.0 Lt D+6.0
0 - 300 Tps
300 NFP BR

Station 9+840 ℄ D-0
0 BR

Station 9+844 9.0 Rt D-9.0
0 - 300 Cr Sa & Gr
300 NFP Sh Rk

Station 9+850 ℄ D-0
0 - 200 Tps
200 NFP BR

Station 9+860 30.0 Lt D+4.8
0 BR

Station 9+860 ℄ D-0
0 - 50 Tps
50 - 500 Br F-M Sa Tr Si Gr
500 NFP BR

Station 9+870 ℄ D-0
0 - 50 Tps
50 - 700 Br F-M Sa Tr Gr Si
700 NFP Prob BR

Station 9+870 8.0 Lt D+8.0
0 BR

Station 9+874 9.0 Rt D-6.0
0 - 100 Cr Sa & Gr
100 - 650 Br F-M Sa Tr Gr Si
650 NFP Sh Rk

Station 9+880 ℄ D-0
0 - 50 Tps
50 - 400 Br F-M Sa & Gr
400 NFP Prob BR

Station 9+880 30.0 Lt D+3.5
0 BR

Station 9+890 ℄ D-0
0 - 50 Tps
50 - 700 Br F-M Sa & Gr
700 NFP Prob BR

Station 9+900 ℄ Lt D-0
0 - 400 Br F-M Sa Tr Gr Si Cl
400 NFP Cob

Station 9+900 ℄ D-0
0 - 700 Br F-M Sa & Gr Occ Cob
700 NFP Poss BR

Station 9+900 30.0 Lt D+5.3
0 Bld on surface

Station 9+900 15.0 Lt D+4.0
0 Bld and Cob (up to 1.5m dia)

Station 9+904 9.0 Rt D-7.0
0 - 200 Cr Sa & Gr
200 - 650 Br F-M Sa Tr Gr Si
650 NFP Sh Rk

Station 9+910 ℄ D-0
0 - 50 Tps
50 - 800 Br Si(y) Cl Tr Sa Gr (wet @ 200)
800 NFP Poss BR

Station 9+915 8.0 Lt D+2.0
0 - 100 Tps
100 - 300 Br F-M Sa Tr Gr Si Occ Cob/Bld
300 NFP Bld

Station 9+920 ℄ D-0
0 - 50 Tps
50 - 700 Br Si(y) Cl Tr Sa Gr (wet @ 200)
700 NFP Poss BR

Station 9+920 30.0 Lt D+6.0
0 Bld on surface

Station 9+930 ℄ D-0

0 - 50 Tps
50 - 1.3 Br Si(y) Cl (wet @ 1.0)
1.3 NFP Poss BR

Station 9+934 9.0 Rt D-3.0
0 - 300 Cr Sa & Gr
300 - 700 Br F-M Sa Tr Gr Si Occ Cob (wet @ 600)
700 NFP Sh Rk

Station 9+940 3.0 Lt D+4.0
0 - 50 Tps
50 - 1.2 Br Si Tr Sa Gr Occ Cob
1.2 NFP Cob

Station 9+940 ℄ D-0
0 - 50 Tps
50 - 1.7 Br Si(y) Cl (moist @ 1.5)
1.7 NFP Poss BR

Station 9+950 15.0 Rt D-600
0 - 60 Tps (wet @ 0)
60 - 700 Br F-M Sa & Gr
700 NFP RF

Station 9+950 ℄ D-0
0 - 50 Tps
50 - 2.0 Br Si(y) Cl (firm) (wet @ 2.0)
2.0 NFP Cob

Station 9+950 ℄ D-0
0 - 60 Tps
60 - 2.5 Br Si(y) Cl (Stiff)
2.5 NFP Prob BR

Station 9+950 15.0 Lt D+3.0
0 - 60 Tps
60 - 400 Br F-M Sa Tr Gr Si Cl
400 NFP Prob BR

Station 9+964 9.0 Rt D-1.5
0 - 200 Cr Sa & Gr
200 - 650 Br F-M Sa Tr Gr Si Occ Cob
650 NFP Cob

Station 9+980 8.0 Lt D+900
0 - 80 Tps
80 - 600 Br Si(y) Cl (Stiff)
600 - 900 Br Gry F-M Sa & Gr
900 NFP Cob

Station 9+980 30.0 Lt D+1.8
0 - 50 Tps
50 - 1.0 Br Si(y) Cl
1.0 NFP Cob

Station 9+980 ℄ D-0
0 - 50 Tps
50 - 1.5 Br Si(y) Cl (moist @ 1.5)
1.5 NFP Cob

Station 9+994 9.0 Rt D+600
0 - 300 Cr Sa & Gr
300 NFP RF

Station 10+000 ℄ D-0
0 - 100 Tps
100 - 2.5 Br Gry Si(y) (Stiff)
2.5 NFP Powered Out

Station 10+000 15.0 Lt D+1.5
0 - 100 Tps
100 - 600 Br F-M Sa Tr Gr Si Occ Cob
600 - 2.3 Gry Si(y) Cl (Stiff) (wet @ 600)
2.3 NFP Cob

Station 10+005 20.0 Rt D+1.2
0 - 130 Asph
130 - 320 Cr Gr & Sa
320 - 600 Br F-M Sa Tr Gr Si
600 NFP RF

Station 10+010 ℄ D-0
0 - 200 Tps
200 - 1.5 Br Si(y) Cl
1.5 NFP Cob

Station 10+020 8.0 Lt D+700
0 - 500 Blk Org M (F Fib) (wet @ 0)
500 - 1.5 Gry Si(y) Cl (Stiff)

Station 10+024 9.0 Rt D-600
0 - 100 Cr Sa & Gr
100 - 600 Br F-M Sa Tr Gr Si
600 NFP RF

Station 10+025 20.0 Rt D+1.0
0 - 70 Asph
70 - 300 Cr Gr & Sa
300 - 600 Br F-M Sa Tr Si Occ Cob
600 NFP RF

Station 10+040 ℄ D-0
0 - 100 Tps
100 - 1.4 Br F-M Sa Tr Gr Si (wet @ 600)
1.4 NFP Cob

Station 10+040 30.0 Lt D-2.6
0 - 100 Tps (wet @ 0)
100 - 1.5 Br Si(y) Cl (firm)
1.5 NFP Cob

Station 10+040 15.0 Rt D+1.1

0	- 110	Asph
110	- 400	Cr Gr & Sa
400	- 700	Br F-M Sa Tr Gr Si
700		NFP Sh Rk

Station 10+050 ℄ Lt D-0

0	- 100	Tps
100	- 2.7	Br Gry Si(y) Cl (Stiff) (wet @ 400)

Station 10+050 15.0 Lt D+600

0	- 100	Tps
100	- 2.0	Br Si(y) Cl (Soft)
2.0	- 2.7	Gry Si(y) Cl (Stiff)

Station 10+054 9.0 Rt D-1.8

0	- 250	Cr Sa & Gr
250	- 650	Br F-M Sa Tr Si Gr
650		NFP RF

Station 10+055 11.0 Rt D+1.2

0	- 120	Asph
120	- 320	Cr Gr & Sa
320	- 800	Br F-M Sa Tr Gr Si
800		NFP Sh Rk

Station 10+060 8.0 Rt D+2.0

0	- 300	Tps Tr Sa Gr (wet @ 0)
300	- 1.0	Br Si(y) Cl (Soft)
1.0	- 1.5	Gry Si(y) Cl (Stiff)

Station 10+070 ℄ D-0

0	- 600	Tps Tr Sa Gr
600	- 1.5	Br Si(y) Cl
1.5		NFP Poss BR

Station 10+080 30.0 Lt D+2.5

0	- 100	Tps
100	- 700	Br Si(y) Cl
700		NFP Poss BR

Station 10+084 9.0 Rt D-6.1

0	- 200	Cr Sa & Gr
200	- 700	Br F-M Sa & Gr
700		NFP RF

Station 10+090 30.0 Lt D+5.4

0	- 50	Tps
50	- 500	Br F-M Sa & Gr
500		NFP Poss BR

Station 10+100 ℄ D-100

0	- 100	Cr Sa & Gr
100	- 950	Br F-M Sa Tr Si Occ Cob
950		NFP

Station 10+100 9.0 Rt D-0

0	- 250	Cr Sa & Gr
250	- 700	Br F-M Sa Tr Gr
700		NFP Poss BR

Station 10+100 ℄ D-0

0	- 200	Cr Sa
200	- 700	Br F-M Sa Tr Gr Si
700		NFP RF

Station 10+100 30.0 Lt D-+-5.0

0	- 60	Tps
60	- 600	Br F-M Sa & Gr
600		NFP Poss BR

Station 10+100 8.0 Rt D+300

0	Asph

Station 10+100 15.0 Lt D+6.0

0	- 100	Tps
100	- 1.0	Br Si(y) Cl (Stiff)
1.0	- 1.8	Gry Si(y) Cl (Stiff)
1.8		NFP Cob

Station 10+100 8.0 Lt D+500

0	- 270	Cr Gr & Sa
270	- 600	Br F-M Sa Tr Gr Si Occ Cob
600		NFP Cob

Station 10+110 30.0 Lt D+5.7

0	- 50	Tps
50	- 700	Br F-M Sa & Gr
700		NFP Prob BR

Station 10+120 30.0 Lt D+6.3

0	- 50	Tps
50	- 1.2	Br F-M Sa & Gr
1.2		NFP Prob BR

Station 10+130 30.0 Lt D+5.0

0	- 50	Tps
50	- 500	Br F-M Sa & Gr
500		NFP Prob BR

Station 10+130 9.0 Rt D-0

0	- 150	Cr Sa &Gr
150	- 700	Br F-M Sa Tr Gr Si
700		NFP Sh Rk

Station 10+140 30.0 Lt D+4.9

0	- 50	Tps
50	- 500	Br Si(y) Cl
500		NFP Prob BR

Station 10+148 8.0 Rt D-200

0	- 70	Cr Sa & Gr
70	- 500	Br F-M Sa Tr Gr Si Occ Cob
500		NFP Prob BR

Station 10+150 30.0 Lt D+4.5

0	- 1.0	Br Si(y) Cl Tr Sa
1.0		NFP Prob BR

Station 10+160 30.0 Lt D+3.0

0	- 50	Tps
50	- 1.2	Br Si(y) Cl
1.2		NFP Poss BR

Station 10+160 9.0 Rt D-250

0	- 150	Cr Sa & Gr
150	- 600	Br F-M Sa Tr Gr Si
600		NFP Sh Rk

Station 10+170 30.0 Lt D+1.9

0	- 100	Tps
100	- 700	Br Si(y) Cl Tr Sa
700		NFP Prob BR

Station 10+180 30.0 Lt D-700

0	- 50	Tps
50	- 1.0	Br Si(y) Cl Tr Sa (wet @ 1.0)
1.0	- 1.5	Br F-M Sa & Gr
1.5		NFP Cob

Station 10+190 8.0 Rt D-250

0	- 100	Cr Sa & Gr
100	- 500	Br F-M Sa Tr Gr Si Occ Cob
500		NFP RF

Station 10+210 30.0 Lt D+1.0

0	- 100	Tps
100	- 1.5	Br Si(y) Cl Tr Sa

Station 10+235 8.0 Rt D-350

0	- 50	Cr Sa & Gr
50	- 800	Br F-M Sa Tr Gr Si Occ Cob
800		NFP RF

Station 10+300 8.0 Rt D-250

0	- 800	Br F-M Sa Tr Gr Si Occ Cob (wet @ 400)
800		NFP RF

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Station17+110 9.0 Lt D-0

0	Asph

Station 16+925 9.0 Lt D-800

0 - 50	Tps (wet @ 0)
50 - 600	Br F-M Sa & Gr
600	NFP Prob BR

Station 16+925 9.0 Rt D-800

0 - 300	Tps
300	NFP RF

Station 16+950 10.0 Lt D-6.0

0 - 100	Tps
100 - 600	Br F-M Sa & Gr (wet @ 300)
600	NFP Poss BR

Station 16+950 3.0 Lt D-0

0 - 40	Asph
40 - 400	Cr Sa & Gr
400 - 1.0	Br F-M Sa Tr Gr Si
1.0	NFP RF

Station 16+950 30.0 Rt D-4.8

0 - 600	Blk Org M (F Fib) (wet @ 0)
600 - 1.2	Br Si(y) Cl
1.2	NFP RF

Station 16+980 9.0 Lt D-5.2

0 - 300	Tps (wet @ 0)
300 - 5.0	Gry Si(y) Cl (soft)
5.0 - 5.3	Gry Si(y) Cl (Stiff)

Station 16+980 12.0 Rt D-5.0

0 - 300	Blk Org M (F Fib) (wet @ 0)
300 - 1.2	Br Si(y) Cl (Stiff)

Station 16+980 1.0 Rt D+100

0 - 50	Asph
50 - 130	Cr Sa & Gr
130 - 180	Asph
180 - 480	Cr Sa & Gr
480 - 2.0	Br F-M Sa Tr Gr Si RF

Station 16+980 18.0 Lt D-4.0

0 - 200	Tps
200 - 1.0	Br Si(y) Cl (wet @ 300)
1.0 - 2.0	Gry Si(y) Cl (Stiff)

Station 16+995 18.0 Lt D-4.5

0 - 250	Tps
250 - 1.3	Gry Si(y) Cl (Soft) (wet @ 300)
1.3 - 2.1	Gry Si(y) Cl (Stiff)

Station 17+000 19.0 Rt D-3.0

0 - 100	Tps
100 - 1.0	Br F-M Sa Tr Gr Si Occ Cob
1.0 - 2.0	Gry Si(y) Cl (Stiff)

Station 17+010 20.0 Lt D-2.7

0 - 100	Tps
100 - 1.0	Br F-M Sa Tr Gr Si Occ Cob
1.0	NFP Cob

Station 17+010 2.0 Rt D+400

0 - 60	Asph
60 - 240	Cr Sa & Gr
240 - 1.0	Br F-M Sa Tr Gr Si
1.0	NFP RF

Station 17+010 15.0 Rt D-3.0

0 - 300	Tps Tr Sa & Gr
300 - 1.0	Br Si(y) Cl
1.0	NFP Cob

Station 17+025 21.0 Lt D-5.4

0 - 2.0	Blk Org M (F Fib) Tr Sa Gr (wet @ 0)
2.0 - 3.6	Gry Si(y) Cl (Soft)
3.6	NFP Poss BR

Station 17+025 15.0 Lt D-5.5

0 - 2.0	Gry Si(y) Cl (soft) (wet @ 0)
2.0 - 2.5	Gry Si(y) Cl (Stiff)

Station 17+035 2.0 Rt D+300

0 - 90	Asph
90 - 270	Cr Sa & Gr
270 - 800	Br F-M Sa Tr Gr Si Occ Cob
800	NFP RF

Station 17+040 20.0 Lt D-2.5

0 - 60	Tps
60 - 1.2	Br F-M Si(y) Sa Tr Gr Si
1.2	NFP Cob

Station 17+040 25.0 Rt D-5.0

0 - 800	Br F-M Sa Tr Gr Si
800	NFP Cob

Station 17+055 20.0 Rt D-2.8

0 - 50	Tps
50 - 1.0	Br F-M Sa & Gr
1.0	NFP Cob

Station 17+055 15.0 Lt D-4.5

0 - 300	Tps
300 - 1.0	Br Si(y) Cl (Stiff)
1.0	NFP Cob

Station 17+065 1.0 Rt D+100

0 - 50 Asph
50 - 300 Cr Sa & Gr
300 - 700 Br F-M Sa Tr Gr Si Occ Cob
700 NFP RF

Station 17+080 59.0 Rt D+5.0
0 BR

Station 17+080 9.0 Lt D-3.0
0 - 50 Tps
50 - 700 Br Si(y) Cl Tr Sa
700 NFP Cob

Station 17+080 10.0 Rt D-2.4
0 - 50 Tps
50 - 600 Br F-M Sa Tr Si Gr (wet @ 600)
600 NFP Cob

Station 17+080 25.0 Rt D-5.0
0 - 100 Tps
100 - 750 Br Gry Si(y) Cl (Stiff)
750 NFP Cob

Station 17+082 8.0 Lt D-2.1
0 RF

Station 17+100 14.0 Rt D-3.0
0 - 300 Blk Org M (F Fib) (wet @ 0)
300 - 600 Br F-M Sa Tr Gr Si Occ Cob
600 NFP Cob

Station 17+105 3.5 Rt D-0
0 - 30 Asph
30 - 270 Cr Sa & Gr
270 - 1.5 Br F-M Sa Tr Gr Si Occ Cob
1.5 NFP RF

Station 17+110 9.0 Rt D-3.2
0 - 50 Tps (wet @ 0)
50 - 600 Br F-M Sa Tr Gr Si
600 NFP Cob

Station 17+110 59.0 Rt D-1.8
0 - 100 Tps
100 NFP Bld Cob

Station 17+135 3.0 Lt D+2.0
0 - 50 Tps
50 - 400 Br F-M Sa Tr Gr Si Occ Cob
400 NFP RF

Station 17+140 59.0 Rt D-1.7
0 - 60 Tps
60 - 600 Br F-M Sa Tr Gr Si Occ Cob
600 NFP Cob

Station 17+140 9.0 Rt D-3.2
0 - 50 Tps
50 - 1.0 Br F-M Sa Tr Gr Si Occ Cob
1.0 NFP Cob

Station 17+145 15.0 Lt D+100
0 Asph

Station 17+165 4.0 Rt D-0
0 - 100 Cr Sa & Gr
100 - 1.5 Br F-M Sa Tr Gr Si Occ Cob
1.5 Gry Si(y) Cl Tr Sa

Station 17+165 9.0 Lt D-200
0 - 1.5 Br F-M Sa Tr Si Gr
1.5 - 2.0 Gry Si(y) Cl (moist @ 2.0)

Station 17+165 ℄ D-0
0 Asph

Station 17+170 59.0 Rt D+1.8
0 BR

Station 17+170 9.0 Rt D-1.7
0 - 50 Tps
50 - 1.0 Br F-M Sa Tr Gr Si
1.0 NFP Cob

Station 17+180 ℄ Lt D-0
0 - 50 Tps
50 - 400 Br F-M Sa & Gr
400 NFP RF or Cob

Station 17+195 9.0 Lt D-1.5
0 - 400 Br F-M Sa Tr Sa Tr Si
400 NFP Cob

Station 17+195 ℄ D-1.5
0 - 400 Br F-M Sa Tr Gr Si Occ Cob
400 NFP Cob

Station 17+200 59.0 Rt D-600
0 - 700 Br F-M Sa Tr Gr Si
700 NFP RF

Station 17+200 9.0 Rt D+1.4
0 - 50 Tps
50 - 600 Br F-M Sa Tr Si Occ Cob
600 NFP Prob RF

Station 17+205 20.0 Lt D-100
0 - 50 Asph
50 - 700 Br F Sa & Gr
700 NFP RF

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Station 17+217 6.0 Lt D-0.0

0	- 700	Br F-M Sa & Gr
700		NFP Cob

Station 17+230 59.0 Rt D+1.0

0	- 50	Tps
50	- 600	Br F-M Sa Tr Gr Si
600		NFP Cob

Station 17+230 ℄ Rt D-0

0	- 700	Br F-M Sa Tr Gr Si Occ Cob
700		NFP RF

Station 17+230 9.0 Lt D-0

0	- 800	Br F-M Sa Tr Gr Si
800		NFP RF

Station 17+230 ℄ D-0

0	- 650	Br F-M Sa Tr Gr Si
650		NFP Cob

Station 17+235 10.0 Lt D-600

0	- 100	Tps
100	- 300	Br F-M Sa & Gr
300	- 1.2	Br Gry Si(y) Cl (Stiff)
1.2		NFP Cob

Station 17+240 8.0 Rt D-1.0

0	- 100	Tps
10	- 800	Br Si(y) Cl Tr Sa (wet @ 200)
800		NFP RF

Station 17+240 50.0 Lt D-100

0	Asph

Township of Kirkup - Hwy 71 Re-alignment

Station 17+217 6.0 Lt D-0.0

0	- 700	Br F-M Sa & Gr
700		NFP Cob

Station 17+230 59.0 Rt D+1.0

0	- 50	Tps
50	- 600	Br F-M Sa Tr Gr Si
600		NFP Cob

Station 17+230 ℄ Rt D-0

0	- 700	Br F-M Sa Tr Gr Si Occ Cob
700		NFP RF

Station 17+230 9.0 Lt D-0

0	- 800	Br F-M Sa Tr Gr Si
800		NFP RF

Station 17+230 ℄ D-0

0	- 650	Br F-M Sa Tr Gr Si
650		NFP Cob

Station 17+235 10.0 Lt D-600

0	- 100	Tps
100	- 300	Br F-M Sa & Gr
300	- 1.2	Br Gry Si(y) Cl (Stiff)
1.2		NFP Cob

Station 17+240 8.0 Rt D-1.0

0	- 100	Tps
10	- 800	Br Si(y) Cl Tr Sa (wet @ 200)
800		NFP RF

Station 17+240 50.0 Lt D-100

0	Asph

SUBGRADE CHECK FIELD SHEET

DATE _____ PAGE No. _____

W. P. No. TG 99102 TOWNSHIP KIRKUP

STA 10+160 9.5 m (Lt) Rt D = 600 m

Depth	Description	Sample #
0 - 50	TDS	
50 - 700	BR F-M SA+GR	
- 700	NFP PROB BR	
-		
-		
-		

Ditch Depth = _____ Wet @ _____

STA 10+160 9.5 m Lt (Rt) D = 900 m

Depth	Description	Sample #
0 - 50	TDS	
50 - 300	BR F-M SA+GR	
300 - 1.6	GRY SI; CL (STIFF)	
-		
-		
-		

Ditch Depth = _____ Wet @ 300

STA 10+161 4.0 m (Lt) Rt D = _____ m

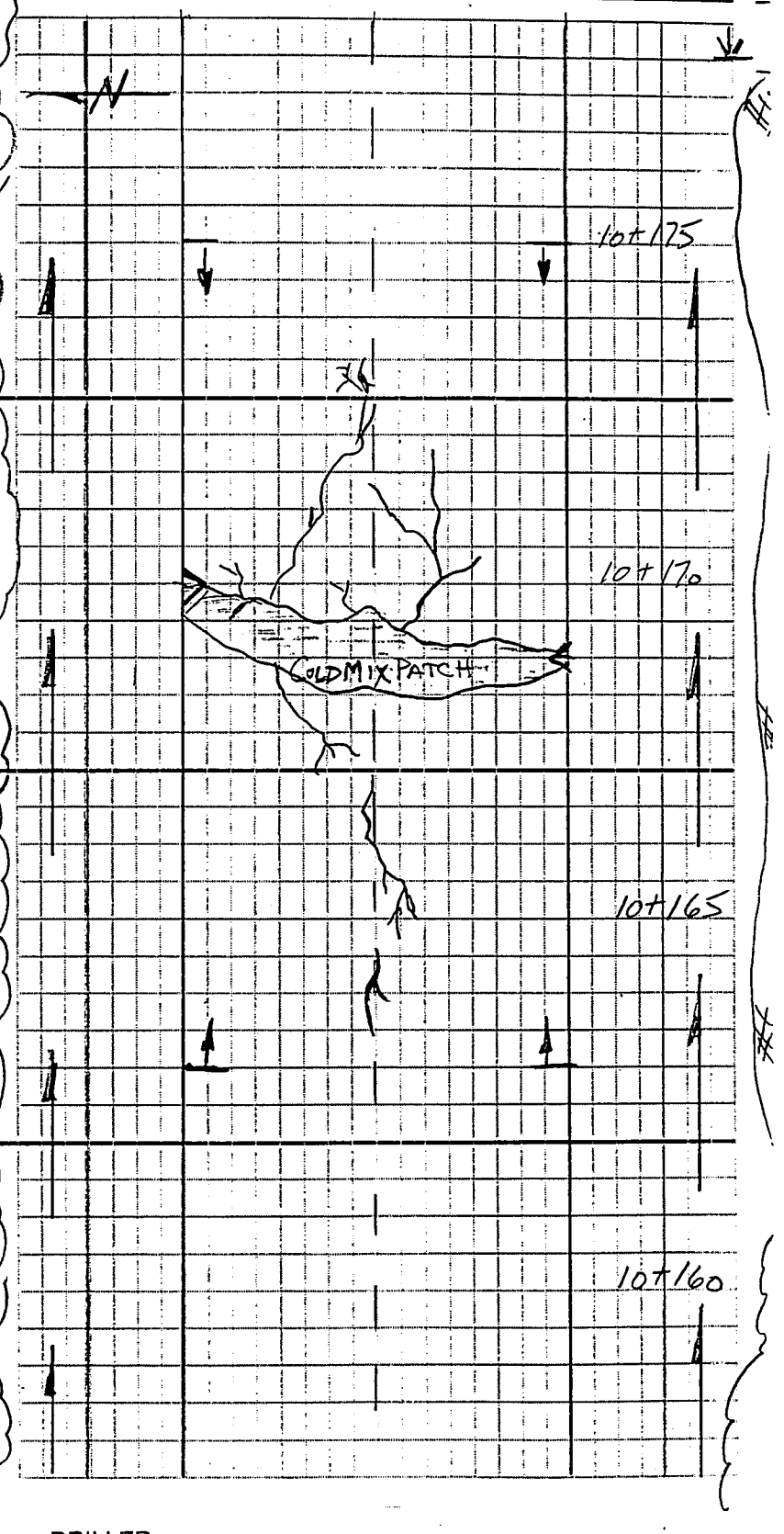
Depth	Description	Sample #
0 - 70	ASPH	
70 - 230	CI GR + SA	
230 - 1.1	BR F-M SA TR GR SI	
- 1.1	NFP RF	
-		
-		

Ditch Depth = _____ Wet @ _____

STA 10+166 3.8 m Lt (Rt) D = _____ m

Depth	Description	Sample #
0 - 70	ASPH	
70 - 350	GR GR + SA	
350 - 700	BR F-M SA TR GR SI	
- 700	NFP - RF.	
-		
-		

Ditch Depth = _____ Wet @ _____



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SUBGRADE CHECK FIELD SHEET

DATE _____ PAGE No. _____

W. P. No. T69.102 TOWNSHIP KIRKUP

STA 10+169 4.0 m (Lt) Rt D = ____ m

Depth	Description	Sample #
0 - 90	ASPH	
90 - 180	CR GR & SA	
180 - 400	BR F-M SA TR GR SI	
____ - 400	NFP RF	
____ - ____		
____ - ____		

Ditch Depth = _____ Wet @ _____

STA 10+170 9.5 m (Lt) Rt D = 650 m

Depth	Description	Sample #
0 - 50	TPS	
50 - 700	BR F-M SA + GR	
____ - 700	NFP - PROB BR	
____ - ____		
____ - ____		
____ - ____		

Ditch Depth = _____ Wet @ _____

STA 10+170 9.0 m Lt (Rt) D = 800 m

Depth	Description	Sample #
0 - 50	TPS	
50 - 400	BR F-M SA + GR	
400 - 2.0	GRY SI (Y) CL (STIFF)	
____ - 2.0	NFP STIFF CL	
____ - ____		
____ - ____		

Ditch Depth = _____ Wet @ 200

STA 10+171 3.8 m Lt (Rt) D = ____ m

Depth	Description	Sample #
0 - 40	ASPH	
40 - 300	CR GR & SA	
300 - 700	BR F-M SA TR GR SI	
____ - 700	NFP - RF	
____ - ____		
____ - ____		

Ditch Depth = _____ Wet @ _____

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SUBGRADE CHECK FIELD SHEET

DATE _____ PAGE No. _____

W. P. No. TC-99102 TOWNSHIP KREUD

STA 10+173 4.0 m (Lt) Rt D = ____ m

Depth	Description	Sample #
0 - 130	ASDA	
130 - 220	CR GR + SA	
220 - 400	RR F-M SA TR GR SI	
____ - 400	NFD RE.	
____ - ____		
____ - ____		

Ditch Depth = _____ Wet @ _____

STA 10+175 3.8 m Lt (Rt) D = ____ m

Depth	Description	Sample #
0 - 30	ASDA	
30 - 360	CR GR + SA	
360 - 600	RR F-M SA TR GR SI	
____ - 600	NFD - RE	
____ - ____		
____ - ____		

Ditch Depth = _____ Wet @ _____

STA _____ _____ m Lt Rt D = ____ m

Depth	Description	Sample #
0 - ____		
____ - ____		
____ - ____		
____ - ____		
____ - ____		
____ - ____		

Ditch Depth = _____ Wet @ _____

STA _____ _____ m Lt Rt D = ____ m

Depth	Description	Sample #
0 - ____		
____ - ____		
____ - ____		
____ - ____		
____ - ____		
____ - ____		

Ditch Depth = _____ Wet @ _____

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APPENDIX 'C'

MTO PROVIDED BOREHOLE LOGS

75-105 - TRUCK CLIMBING LANE CONSTRUCTION - NO BORE HOLES

PATCH THESE BORE HOLES FROM FALL 1997

Station 0+010 18.0 Rt &, D-3.2
0 - 100 Tps
100 - 9.0 Org (F Fib, soft) (wet @ 300)
9.0 NFP Poss BR

Station 0+010 23.0 Rt &, D-3.2
0 - 100 Tps
100 - 7.7 Org (F Fib, soft) (wet @ 300)
7.7 - 8.3 Gry Sa Tr Gr
8.3 NFP Poss BR

Station 0+010 15.0 Rt &, D-3.2
0 - 100 Tps
100 - 200 Org (F Fib)
200 NFP RF

Station 0+010 9.5 Rt &, D-0
0 - 100 Asph
100 - 400 Cr Gr
400 - 850 Br F to Co Sa some Gr Occ Cob
850 - 2.4 Br Sa & RF with Gr (very loose)
2.4 NFP RF

Station 0+025 9.5 Rt &, D-0
0 - 90 Asph
90 - 300 Cr Gr
300 - 750 Br F to Co Sa some Gr Occ Cob
750 NFP RF

Station 0+025 25.0 Rt &, D-3.1
0 - 150 Tps (wet @ 100)
150 - 6.3 Org (F Fib, soft)
6.3 NFP Poss BR

Station 0+025 20.0 Rt &, D-2.7
0 - 100 Tps
100 - 6.8 Org (F Fib Occ Wd Fib) (wet @ 500)
6.8 NFP Poss BR

Station 0+025 15.0 Rt &, D-3.2
0 - 150 Wat
150 - 350 Org
350 NFP RF

Station 0+040 20.0 Rt &, D-2.0
0 - 250 Tps
250 - 2.0 Org
2.0 NFP Prob RF

Station 0+040 15.0 Rt &, D-3.0
0 - 250 Tps
250 - 500 Org (F Fib, soft)
500 NFP RF

Station 0+043 9.5 Rt &, D-0
0 - 90 Asph
90 - 200 Cr Gr
200 - 800 Br F to Co Sa some Gr Occ Cob
800 - 2.1 Br Sa & RF with Gr
2.1 NFP RF

Station 0+045 20.0 Rt &, D-1.5
0 - 250 Tps
250 - 6.3 Org Occ Cob Occ RF (wet @ 1.0)
6.3 NFP Poss BR

Station 0+045 25.0 Rt &, D-2.8
0 - 100 Tps (wet @ 50)
100 - 4.0 Org (F Fib)
4.0 - 4.5 Gry Sa
4.5 NFP Prob BR

APPENDIX 'D'

ASPHALT CORE DATA, LAB RESULTS AND MIX VERIFICATION

ASPHALT CORES FIELD SHEET

W.P. No.: 767-91-001
Highway 17
Township of Kirkup

Date Sampled: July 21 - 23, 1999
DST Reference No.: TG99102

Core #	Station	Offset (m)	Thickness			Road Width (m)	Lane Width (m)	Core Diameter (mm)	Remarks (incl. patch lengths, entrances, widenings, etc.)
			Surface (mm)	Binder (mm)	Total (mm)				
68	18+396	2.7 m RT	120 mm		120 mm	12.4	6.3 m	60 mm	New pavement Start of Contract
1	18+518	2.6 m LT	55 mm	45 mm	100 mm	11.2	6.0 m	150 mm	110 mm Base
2	18+524	4.9 m LT	62 mm		62 mm	11.2	6.0 m	60 mm	Paved Shoulder
3	18+691	2.1 m LT	70 mm	45 mm	115 mm	11.2	6.0 m	60 mm	
7	07+675	2.1 m LT	140 mm		140 mm	11.2	6.0 m	60 mm	
4	07+704	2.6 m RT	45 mm	255 mm	300 mm	11.3	6.3 m	60 mm	Patch 7+686 to 7-711
5	07+713	1.2 m LT	290 mm		290 mm	11.3	6.1 m	60 mm	Old patch 7+711 to 7+721
6	07+724	2.4 m LT	220 mm		220 mm	11.3	6.1 m	60 mm	
8	07+751	1.9 m LT	50 mm	45 mm	95 mm	11.2	6.1 m	60 mm	
10	07+791	2.1 m RT	60 mm	60 mm	120 mm	11.3	6.2 m	150 mm	145 mm Base
9	07+812	5.1 m RT	55 mm		55 mm	11.3	6.2 m	60 mm	Paved shoulder
11	07+973	1.2 m RT	103 mm		103 mm	11.3	6.1 m	60 mm	
12	08+112	2.8 m RT	40 mm	100 mm	140 mm	11.2	6.1 m	60 mm	Patch 8+078 to 8+155
14	08+280	1.7 m LT	40 mm	67 mm	107 mm	11.3	6.1 m	150 mm	110 Base
13	08+285	4.5 m LT	52 mm		52 mm	11.3	6.1 m	60 mm	Paved Shoulder
15	08+480	0.7 m RT	50 mm	50 mm	100 mm	11.2	6.2 m	60 mm	
16	08+534	1.1 m RT	45 mm	55 mm	100 mm	11.3	6.2 m	150 mm	120 mm Base
17	08+768	1.6 m RT	50 mm	47 mm	97 mm	11.3	6.1 m	60 mm	

ASPHALT CORES FIELD SHEET

W.P. No.: 767-91-001
Highway 17
Township of Kirkup

Date Sampled: July 21 - 23, 1999
DST Reference No.: TG99102

Core #	Station	Offset (m)	Thickness			Road Width (m)	Lane Width (m)	Core Diameter (mm)	Remarks (incl. patch lengths, entrances, widenings, etc.)
			Surface (mm)	Binder (mm)	Total (mm)				
18	08+784	4.6 m RT	54 mm		54 mm	11.3	6.1 m	60 mm	Paved Shoulder
19	09+078	0.3 m LT	55 mm	45 mm	100 mm	11.2	6.0 m	150 mm	115 mm Base
20	09+203	1.0 m LT	50 mm	45 mm	95 mm	11.3	6.2 m	60 mm	
21	09+209	5.3 m LT	40 mm		40 mm	11.3	6.1 m	60 mm	Paved Shoulder
22	09+347	2.2 m RT	40 mm	60 mm	100 mm	11.2	6.2 m	150 mm	110 mm Granular
24	09+511	7.4 m RT	175 mm		175 mm			60 mm	Paved Entrance
25	09+512	15.4 m RT	85 mm		85 mm			60 mm	Paved Entrance
23	09+552	2.4 m LT	110 mm		110 mm	11.3	6.1 m	60 mm	
34	09+934	4.9 m RT	50 mm	70 mm	120 mm			60 mm	New pavement Right turn lane to Hwy 71
35	09+946	9.6 m RT	60 mm	60 mm	120 mm	4.7	4.7 m	60 mm	Old pavement right turn lane to Hwy 71
36	09+986	22 m RT	80 mm		80 mm	4.7	4.7	60 mm	New pavement Right turn lane to Hwy 71
37	09+996	26.3 m RT	35 mm		35 mm	7.8 m	3.6 m	60 mm	East bound entrance and exit to Hwy 71 (old pavement)
38	10+000	7.4 m RT	74 mm		74 mm			60 mm	East bound entrance and exit to Hwy 71 (New pavement)
39	10+027	1.4 m LT	30 mm	80 mm	110 mm	10.7	3.3 m	60 mm	Left turn lane WBL
40	10+074	1.8 m LT	100 mm		100 mm	10.6	3.3 m	60 mm	Left turn lane WBL
26	10+201	1.2 m LT	80 mm	70 mm	150 mm	7.5	3.7m	150 mm	100 mm Base
27	10+235	1.8 m RT	65 mm	100 mm	165 mm	7.5	3.8	60 mm	Patch 10+209 to 10+350
28	10+266	1.7 m LT	240 mm		240 mm	7.5	3.7 m	60 mm	

ASPHALT CORES FIELD SHEET

W.P. No.: 767-91-001
Highway 17
Township of Kirkup

Date Sampled: July 21 - 23, 1999
DST Reference No.: TG99102

Core #	Station	Offset (m)	Thickness			Road Width (m)	Lane Width (m)	Core Diameter (mm)	Remarks (incl. patch lengths, entrances, widenings, etc.)
			Surface (mm)	Binder (mm)	Total (mm)				
29	10+298	1.4 m RT	55 mm	80 mm	135 mm	7.5	3.8 m	60 mm	10+201 to 10+298
30	10+387	2.4 m LT	30 mm	38 mm	68 mm	7.5	3.7 m	60 mm	
31	10+409	0.4 m LT	50 mm	75 mm	125 mm	7.5	3.8 m	60 mm	Patch at 10+399 to 10+589
41	10+502	1.3 m RT	50 mm	180 mm	230 mm	7.6	3.9 m	60 mm	Patch 10+399 to 10+589
32	10+551	2.4 m RT	42 mm	113 mm	155 mm	7.5	3.7 m	60 mm	
33	10+596	1.8 m RT	55 mm	75 mm	240 mm	7.5	3.7 m	150 mm	100 mm Base, additional course 90 mm
42	10+626	1.9 m LT	45 mm	85 mm	130 mm	7.5	3.5 m	60 mm	
43	10+843	2.6 m RT	102 mm		102 mm	7.7	3.6 m	60 mm	Patch 10+826 to 10+886
45	10+881	1.8 m LT	70 mm	50 mm	120 mm	7.7	3.7 m	60 mm	Patch 10+826 to 10+886
44	10+888	1.2 m LT	30 mm	160 mm	190 mm	7.6	3.7 m	60 mm	Old patch 10+886 to 10+962
46	10+964	0.6 m RT	70 mm	68 mm	138 mm	7.6	3.7 m	60 mm	
47	10+998	0.5 m LT	37 mm	93 mm	130 mm	7.7	3.7 m	150 mm	140 mm Base
48	11+184	1.2 m RT	70 mm	55 mm	125 mm	7.7	3.6 m	60 mm	
50	11+211	2.5 m LT	19 mm	91 mm	110 mm	7.7	3.7 m	60 mm	
49	11+224	1.3 m LT	50 mm	130 mm	180 mm	7.7	3.7 m	60 mm	Patch 11+215 to 11+250
51	11+254	2.5 m RT	40 mm	105 mm	145 mm	7.7	3.7 m	60 mm	
52	11+389	1.1 m RT	50 mm	90 mm	140 mm	7.6	3.7 m	150 mm	110 mm Base

ASPHALT CORES FIELD SHEET

W.P. No.: 767-91-001
Highway 17
Township of Kirkup

Date Sampled: July 21 - 23, 1999
DST Reference No.: TG99102

Core #	Station	Offset (m)	Thickness			Road Width (m)	Lane Width (m)	Core Diameter (mm)	Remarks (incl. patch lengths, entrances, widenings, etc.)
			Surface (mm)	Binder (mm)	Total (mm)				
53	11+595	1.3 m LT	80 mm	125 mm	205 mm	7.6	3.8 m	60 mm	Patch 11+401 to 10+010
54	11+830	0.7 m LT	80 mm	172 mm	252 mm	7.6	4.0 m	150 mm	Patch 11+401 to 10+010

ASPHALT CORES FIELD SHEET

W.P. No.: 767-91-001
Highway 17
Township of Haycock

Date Sampled: July 21 - 23, 1999
DST Reference No.: TG99102

Core #	Station	Offset (m)	Thickness			Road Width (m)	Lane Width (m)	Core Diameter (mm)	Remarks (incl. patch lengths, entrances, widenings, etc.)
			Surface (mm)	Binder (mm)	Total				
55	10 + 001	2.4 m RT	50 mm	120 mm	170 mm	8.9	4.5 m	60 mm	Patch 11 + 401 to 10 + 010
58	10 + 016	1.4 m LT	60 mm	110 mm	170 mm	8.9	4.4 m	60 mm	
56	10 + 020	4.0 m RT	68 mm		68 mm	8.9	4.5 m	60 mm	Asphalt curb and gutter
57	10 + 039	4.0 m LT	65 mm		65 mm	8.9	4.4 m	60 mm	Asphalt curb and gutter
59	10 + 045	2.6 m RT	40 mm	99 mm	139 mm	8.9	4.5 m	60 mm	
60	10 + 112	2.5 m RT	70 mm	61 mm	131 mm	8.9	4.5 m	150 mm	115 mm Base
61	10 + 174	2.3 m RT	50 mm	50 mm	225 mm	8.9	4.5 m	60 mm	New pavement

ASPHALT CORES FIELD SHEET

W.P. No.: 767-91-001
Highway 71
Township of Kirkup

Date Sampled: July 21 - 23, 1999
DST Reference No.: TG99102

Core #	Station	Offset (m)	Thickness			Road Width (m)	Lane Width (m)	Core Diameter (mm)	Remarks (incl. patch lengths, entrances, widenings, etc.)
			Surface (mm)	Binder (mm)	Total				
66	15+275	2.5 m RT	42 mm		42 mm	9.9	4.9 m	60 mm	Monument Site
65	15+369	2.5 m RT	35 mm		35 mm	9.9	4.9 m	60 mm	Monument Site
62	16+950	1.5 m RT	25 mm	43 mm	68 mm	9.8	4.8 m	60 mm	Patch on Rt Lane only 16+925 to 16+961
63	16+964	1.4 m LT	50 mm		50 mm	9.8	5.0 m	150 mm	170 mm Base
64	17+120	2.5 m RT	42 mm		42 mm	9.7	4.9 m	60 mm	

ASPHALT CORES FIELD SHEET

W.P. No.: 767-91-001
Kenora By Pass, Highway 17A
Township of Kirkup

Date Sampled: July 21 - 23, 1999
DST Reference No.: TG99102

Core #	Station	Offset (m)	Thickness			Road Width (m)	Lane Width (m)	Core Diameter (mm)	Remarks (incl. patch lengths, entrances, widenings, etc.)
			Surface (mm)	Binder (mm)	Total (mm)				
83	16+390	2.7 m RT	40 mm	70 mm	110 mm	14.8	3.7 mm	100 mm	Cold Mix Patch under Asphalt
75	16+394	5.8 m LT	100 mm		100 mm	14.8	3.7 mm	60 mm	Patch 16+400 to 16+482
78	16+398	1.6 m LT	104 mm		104 mm	14.8	3.7 mm	100 mm	Patch 16+400 to 16+482
76	16+419	5.7 m LT	60 mm	132 mm	192 mm	14.8	3.7 mm	60 mm	Patch 16+400 to 16+482
79	16+435	1.1 m LT	70 mm	80 mm	150 mm	14.8	3.7 mm	100 mm	Cold Mix Patch under Asphalt
82	16+465	2.3 m RT	30 mm	90 mm	120 mm	14.8	3.7 mm	100mm	Cold Mix Patch under Asphalt
81	16+484	1.8 m RT	50 mm	40 mm	90 mm	14.8	3.7 mm	100 mm	Cold Mix Patch under Asphalt
80	16+484	1.8 m LT	65 mm	35 mm	100 mm	14.8	3.7 mm	100 mm	Patch 16+400 to 16+ 482
77	16+485	4.8 m LT	80 mm		80 mm	14.8	3.7 mm	100 mm	Cold Mix Patch under Asphalt
71	17+540	2.4 m LT	85 mm		85 mm	13.9	3.8 m	60 mm	Patch WBL 17+545 to 17+600 LT
74	17+542	6.6 m LT	25 mm	35 mm	60 mm	13.9	3.7 m	60 mm	Patch WBL 17+545 To 17+600 LT
73	17+556	6.0 m LT	50mm	93 mm	143 mm	13.9	3.7 m	60 mm	Patch WBL 17+545 to 17+600 LT
70	17+580	1.9 m LT	30 mm	87 mm	117 mm	13.9	3.8 m	60 mm	Patch WBL 17+545 to 17+600 LT
72	17+601	5.8 m LT	98 mm		98 mm	13.9	3.7 m	60 mm	Patch WBL 17+545 to 17+600 LT
69	17+606	1.5 m LT	90 mm		90 mm	13.9	3.8 m	60 mm	Patch WBL 17+545 to 17+600 LT

ASPHALT CORES FIELD SHEET

W.P. No.: 767-91-001
Township of Coyle
Highway 17 (5.6 km east of Jct 17/71)

Date Sampled: July 21 - 23, 1999
DST Reference No.: TG99102

Core #	Station	Offset (m)	Thickness			Road Width (m)	Lane Width (m)	Core Diameter (mm)	Remarks (incl. patch lengths, entrances, widenings, etc.)
			Surface (mm)	Binder (mm)	Total (mm)				
84	9+998	5.1 m RT	60 mm	50 mm	110 mm	15.3	3.5 m	100 mm	Outside patch
85	10+035	6.0 m RT	55 mm	257 mm	312 mm	15.3	3.5 m	100 mm	Patch EBL 10+000 to 10+070
87	10+064	5.1 m RT	50 mm	125 mm	175 mm	15.3	3.5 m	100 mm	
86	10+074	5.7 m RT	55 mm	55 mm	110 mm	15.3	3.5 m	100 mm	Outside Patch

West End of Patch = 10+000 with chainage increasing easterly.

DST Consulting Engineers
605 Hewitson Street
Thunder Bay, Ontario, P7B 5V5
Phone: 807-623-2929
Fax: 807-623-1792

SHEET

W. P. No.: 767-91-00

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

ASPHALT CORE ANALYSIS

	LOCATION		CORE DATA		EXTRACTION TEST RESULTS			LAB DATA	
	STATION	OFFSET (m)	HOT MIX DEPTH (mm)	DEPTH TESTED (mm)	% A C	% RET. 4.75 mm	% PASS 75 um	LAB #	BRD
KIRKUP	18+518	2.6 LT	100	50	5.58	34.3	5.8	1	2.406
	7+791	2.1 RT	120	50	5.46	38.5	4.7	10	2.381
	8+534	1.1 RT	100	50	4.99	38.3	5.2	16	2.384
	9+347	2.2 RT	100	50	5.31	40.0	5.0	22	2.357
	10+201	1.2 LT	150	50	4.99	37.4	5.2	26	2.404
	10+596	1.8 RT	130	50	5.67	39.2	4.8	33	2.396
	11+389	1.1 RT	140	50	5.21	50.8	3.6	52	2.370
HAYCOCK	10+112	2.5 RT	131	50	5.63	23.6	5.1	60	2.356
	Averages		121	50	5.36	37.8	4.9		2.382

BITUMINOUS MIX DESIGN REPORT

WP #	767-91-00	HOT MIX TYPE	RHM 20/80
HWY:	17/71	LOCATION:	KENORA
LABORATORY	DST CONSULTING ENGINEERS INC.	JOB MIX FORMULA #:	
LAB MIX NO:	TRIAL MIX #1	DATE SAMPLE REC:	
		DATE COMPLETED:	SEPT 99

TEST DATA CERTIFIED BY: _____

JOB MIX FORMULA - GRADATION PERCENT PASSING*													
% A.C	26.5	19.0	16.0	13.2	9.5	6.7	4.75	2.36	1.18	600	300	150	75
5.2	100.0	100.0	98.9	91.6	71.6		54.0	47.7	39.1	25.6	12.6	5.2	1.9

MARSHALL	REQUIRED	RESULTS			BRD	ABS		
% VOIDS	3.5-4.5	4.3	%CA #1	37.1	2.641		Gb	2.649
FLOW (min)	8	9.8	%CA #2				RAP AC	5.4
STABILITY (min)	8900	8925	% FA #1	36.5	2.659		RAP PEN	
% VMA (min)	15.0	15.6	% FA #2	6.4	2.635		BRD	2.359
			% FA #3				MRD	2.466
			%RAP	20%	2.655		MRD (SD)	

ASPHALT CEMENT	
SUPPLIER	PENETRATION
Huskey	PGAC 52-34

ADDITIVE		
SUPPLIER	TYPE	AS % of AC

AGG. TYPE	SOURCE / INVENTORY NO.
COARSE AGG. #1	WILLARDLAKE
COARSE AGG. #2	
FINE AGG. #1	WILLARDLAKE

AGG. TYPE	SOURCE / INVENTORY N
FINE AGG. #2	WILLARD LAKE
FINE AGG. #3	
RAP	RAP - Contract Limits

AGG. TYPE	AGGREGATE GRADATION - PERCENT PASSING												
	26.5	19.0	16.0	13.2	9.5	6.7	4.75	2.36	1.18	600	300	150	75
CA #1	100.0	100.0	97.3	80.7	34.2		2.9	2.3	1.6	1.3	1.0	0.6	0.2
CA #2													
FA #1	100.0	100.0	100.0	100.0	100.0		96.6	90.4	75.7	47.0	20.1	6.6	1.6
FA #2	100.0	100.0	100.0	99.9	98.9		82.2	56.6	41.0	29.7	19.2	9.8	3.5
FA #3													
RAP	100.0	100.0	99.6	93.9	80.3		62.2	51.3	42.4	30.5	18.5	9.8	4.9

* FINES RETURNED TO THE MIX:0.5% COLLECTION SYSTEM:

75 BPS HANDHAMMER@140'C-RECOMPACTION@145'C

No SSD Correction Necessary

NB Aggregate gradations taken from Contract 98-230 mix

REVIEWED BY: _____ DATE: _____

APPENDIX 'E'

LIFE CYCLE COST ANALYSES

W.P. 767-91-00, Longbow Corners

OPTION 1
MILL, PULVERIZE, PAVE WITH 130 mm 20/80 RHM

LIFE CYCLE COST ANALYSIS

ANALYSIS PERIOD	30 YEARS
DISCOUNT RATE	6 %

ACTION	COST	YEAR	PRESENT WORTH
RECONSTRUCTION	$121,555	0	$121,555
ROUT & SEAL	$2,000	5	$1,495
ROUT & SEAL	$2,000	7	$1,330
PATCHING	$3,000	11	$1,580
RESURFACE	$50,000	17	$18,568
ROUT & SEAL	$2,000	21	$588
ROUT & SEAL	$2,000	24	$494
PATCHING	$4,000	28	$783
RESIDUAL	($21,450)	30	($3,735)
SALVAGE	($15,000)	30	($2,612)
		TOTAL	**$140,047**

UNIT RATES

Recycled Hot Mix	$40/tonne
Virgin Hot Mix	$45/tonne
Cold-In-Place-Recyclin	$8/m^2
Milling	$10/tonne
Pulverizing	$0.60/m^2

NB Costs provided include pavement materials only

W.P. 767-91-00, Longbow Corners

OPTION 2
PULVERIZE, PAVE WITH 130 mm HL4

LIFE CYCLE COST ANALYSIS

ANALYSIS PERIOD 30 YEARS
DISCOUNT RATE 6 %

ACTION	COST	YEAR	PRESENT WORTH
RECONSTRUCTION	$126,580	0	$126,580
ROUT & SEAL	$2,000	5	$1,495
ROUT & SEAL	$2,000	7	$1,330
PATCHING	$3,000	12	$1,491
RESURFACE	$50,000	18	$17,517
ROUT & SEAL	$2,000	22	$555
ROUT & SEAL	$2,000	25	$466
PATCHING	$4,000	30	$696
RESIDUAL	($35,150)	30	($6,120)
SALVAGE	($15,000)	30	($2,612)
		TOTAL	**$141,399**

OPTION 3
COLD-IN-PLACE RECYCLING w/ 40 mm HL4
WITH 130 mm HL4 on REALIGNMENT

LIFE CYCLE COST ANALYSIS

ANALYSIS PERIOD 30 YEARS
DISCOUNT RATE 6 %

ACTION	COST	YEAR	PRESENT WORTH
RECONSTRUCTION	$108,085	0	$108,085
ROUT & SEAL	$2,000	3	$1,679
ROUT & SEAL	$2,000	6	$1,410
PATCHING	$4,000	9	$2,368
RESURFACE	$50,000	13	$23,442
ROUT & SEAL	$2,000	16	$787
ROUT & SEAL	$2,000	19	$661
PATCHING	$5,000	22	$1,388
RECONSTRUCTION	$108,085	26	$23,758
ROUT & SEAL	$2,000	29	$369
RESIDUAL	($74,825)	30	($13,028)
SALVAGE	($5,000)	30	($871)
		TOTAL	**$150,048**

APPENDIX 'F'

PAVEMENT STRUCTURE TREATMENT CHART

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
Highway 17A Kenora Bypass Township of Kirkup			
Settlement 2.1 km west of By Pass Connection	Severe slip failure, full width patch 16+400 to 16+490, WBL guiderail leaning outward, thick asphalt (192 mm)	Recommend flattening left foreslope with rockfill. Slope is to be flattened as much as possible without blocking off stream at toe. Environmental consultation required to determine extent of base of slope flattening. This area is to be monitored during construction for any movement. This treatment may not improve the condition of the embankment. Details provided in letter of September 21, 1999 (attached) Mill pavement to allow for a minimum of 50 mm Hotmix. Patch from 16+400 to 16+482	Numerous possible causes of distortion. Foundation investigation required to isolate cause. Environmental concerns with creek at toe impacting construction of toe berm. Pedo holes show up to 3 m of organics over bedrock at toe of embankment. Historical data indicates a sidehill embankment constructed against a steep slope. Existing asphalt too thick to pulverize. Pavement being simply patched in anticipation of future settlements.

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
Settlement 1.0 km west of By Pass Connection	Moderate slip failure (17+550 to 17+858), patch WBL driving and passing lane, WBL guiderail leaning outward	Recommend construction of rockfill berm Lt. Rockfill berm to be 1/3 height of embankment high and 2/3 height of embankment wide. Details provided in letter of September 21, 1999 (attached). Provide outlet of existing asphalt swale at 17+550 Lt. The swale along the slip failure is to be removed. Mill pavement to allow for minimum 50 mm Hotmix. Patch to extent of slip 1/3 height and 2/3 high width	Pedo holes indicate up to 2.5 m of soft clay at toe of embankment. Historical data indicates drag line was used to excavate soft material and was not all excavated. Crescent shaped crack in pavement indicates possible shear failure of underlying soft material. Rockfill berm will cause additional settlement of road. No environmental concerns were expressed over the construction of a rock berm. Drainage improvements will reduce shoulder washouts. Pavement being simply resurfaced in anticipation of future settlements
Highway 17 Township of Kirkup			
Snowplow Turnaround	Upgrading of SPTA at 10+030 to 10+070 Lt to truck layby	Provide minimum 300 mm granulars over rockfill. Chink rockfill as per OPSS 206.	
18+400	Limit of resurfacing	Provide 5 m step joint to adjacent contract.	
18+525 to 18+675 Lt and Rt	Poor drainage	Provide rock ditch cleanout. Allow 40 m line drilling Lt and 40 m Rt.	Rock knobs and vegetation in ditch.
Township of Kirkup 18+700 = 7+671.6 Township of Kirkup			

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
7+686 to 7+724	Asphalt thicker than 150 mm (220 - 300 mm)	Mill total 160 mm prior to pulverizing.	Asphalt too thick to pulverize.
7+687 to 7+750	Patch, guiderail Lt pushed out	Excavate full section to rockfill. For design purposes assume 1.8 m. Reinstate platform with rockfill with 1.5:1 foreslopes and 300 mm granulars including 150 mm Granular 'A'. Chink rockfill as per OPSS 206. Install steam pipe for centreline culvert at base of embankment.	Earthfill over rockfill embankment. Earthfill cannot stand at 1.5:1 slope. Patching has been completed without reinstating shoulders. Edge of asphalt has no support. Culvert at base of fill is apparently straight, therefore unlikely a settlement problem. Alternative to excavate and replace only the shoulders results in majority of platform being excavated. Widening rockfill embankment from bottom results in difficult construction including problems with compaction. Patrol noted culvert icing problems.
7+750 to 7+850 Lt and Rt	Poor drainage	Provide rock ditch cleanout. Allow 40 m line drilling.	Rock knobs and vegetation in ditch. Ditch minimum 1.0 m deep. Ponding at end of culvert at 7+850 Rt.
7+850 to 8+130 Lt	Severe transverse cracks, potholes, slight ravelling and meandering cracks, patch (8+075 to 8+160)	Provide rock and earth ditching for minimum 450 mm granulars.	Water probably entering road due to poor ditching. Ditch thick with vegetation. Ditch bottom and backslope granular sealed.

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
8+100 to 8+200 Rt	Patch (8+075 to 8+160)	Provide rock and earth ditching for 750 mm granulars.	Existing ditch 800 mm deep. Foreslope thick with vegetation. Bullrushes in ditch. Ponding 8+125 to 8+200 Rt. Ditching will improve drainage of pocket of silty clay native at 1.0 m depth.
8+215 to 8+220 Lt	Potholes, slight meandering cracks	Provide 5 m line drilling.	Rock knob in ditch causing water to enter into road. Ditch depth at 1.0 m.
8+305 to 8+360	Moderate wheel track rutting, mainly WBL, ravelling and flushing throughout	Provide 50 mm lift of Granular 'A' to improve profile.	Asphalt problem rather than base problem. Base is thicker than 150 mm. Will be rectified during paving.
8+425 to 8+435	SI-mod distortion and wheel track rutting over centreline culvert	Provide 50 mm lift of Granular 'A'.	Culvert not sagging. Possible poor compaction of culvert backfill. Grade raise will provide additional compaction.
8+435 to 8+530 Rt	Poor drainage	Provide rock ditch cleanout. Allow 25 m line drilling.	Grasses and granulars in ditch.
8+435 to 8+550 Lt	Poor drainage	Provide rock ditch cleanout. Allow 25 m line drilling.	Grasses and granulars in ditch.
8+640 to 8+720 Rt	Poor drainage	Provide rock ditch cleanout. Allow 20 m line drilling.	Rock knobs and granulars in ditch.
8+665 to 8+715 Lt	Poor drainage	Provide rock ditch cleanout. Allow 10 m line drilling.	Rock knobs and granulars in ditch.

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
8+730 Rt	Ponding	Cleanout existing offtake ditch.	Offtake ditch will drain pond. Alternative to deepen ditch results in rock ditching.
8+740 to 8+800 Rt	New Snowplow Turnaround	Strip topsoil. Provide 750 mm granulars including 150 mm Granular 'A'. Install entrance culvert or provide ditching for 750 mm granulars around the SPTA.	
8+765 to 8+825 Lt	Poor drainage, ponding, severe transverse crack	Provide rock and earth ditch cleanout. Allow 25 m line drilling.	Ponding.
8+780 to 8+825 Rt	Poor drainage	Provide rock and earth ditch cleanout. Allow 10 m line drilling.	Grasses and granulars in ditch.
8+825 Rt	Existing Snowplow Turnaround	Ditch through existing snowplow turnaround entrance as per standard detail and remove culvert.	New SPTA being constructed.
8+850 to 8+950 Lt	Poor drainage	Provide rock ditch cleanout. Allow 50 m line drilling.	Existing ditch narrow with rock knobs. Rock cut very fragmented up to 2.0 m in height. Rock ditching alternative expensive.
8+850 to 9+350 Rt	Sinkholes, cold mix patches	Provide rock ditch cleanout and line drilling with extra shatter.	Probable water into road. Existing ditch narrow with rock knobs. Rock cut very fragmented up to 2.0 m in height. Rock ditching alternative expensive.

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
9+511 Rt	Paved entrance with asphalt thicker than 150 mm (175 mm).	General pavement strategy will reduce asphalt thickness to allow pulverizing. No additional treatment required. Design to review if Ministry is required to replace with 175 mm asphalt.	
9+600	**Realignment starts**		
9+675 to 9+744	Fill Lt	Excavate existing ditch to firm bottom. Where traveled portion of road crosses exposed subgrade, excavate and waste topsoil. For design purposes assume average depth of topsoil of 150 mm. Provide minimum 300 mm granulars over rockfill. Chink rockfill as per OPSS 206. Provide ditching for minimum 750 mm granulars Rt and 300 mm Lt.	
9+744	Transition (rockfill to rockcut)	Provide transition treatment as per OPSD 205.020 with t = 1.5 m.	
9+744 to 9+925	Rock Cut	Excavate and waste overburden. Provide minimum 300 mm granulars over 300 mm shatter. Provide ditching for 300 mm granulars Lt and Rt. Provide extra shatter from bottom of existing Lt ditch across platform to new ditch Lt.	

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
9+925 to 9+950	Rock Cut Lt, Fill Rt	Excavate and waste overburden Lt. Excavate existing ditch to firm bottom. Provide minimum 300 mm granulars over 300 mm shatter Lt and 300 mm granulars over rockfill Rt. Provide transverse transition as per OPSD 205.02 (rockfill to rockcut). Chink rockfill as per OPSS 206. Provide extra shatter from bottom of existing Lt ditch across platform to new ditch Lt.	10+038 new Hwy 17/71 intersection
9+950	Transition Lt, rock cut to earth cut	Provide transition treatment as per OPSD 205.05 with t = 1.5, d_e=750 mm, dr=300 mm, Y = 8 m.	
9+950 to 10+100	Earth Cut Lt, Fill Rt	Excavate to provide for minimum 750 mm granulars. Excavate existing ditch to firm bottom. Provide ditching for 750 mm granulars Lt. Provide minimum 300 mm granulars over rockfill Rt. Chink rockfill as per OPSS 206. If into existing roadbed, excavate roadbed to bottom of rockfill Rt to allow drainage. Provide ditching for bottom of rockfill Rt.	
10+100 to 10+200	Earth Cut Lt	Excavate to provide for minimum 750 mm granulars. Excavate existing ditch to firm bottom. Provide ditching for 750 mm granulars.	
10+238	**Realignment ends**	Chainage equation 10+238 = 10+253Ahd	

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
10+075 to 10+275	Slight frost heave (10+170), patch	Provide ditching for 900 mm granulars 10+075 to 10+200 Lt then ditch cleanout to 10+275. Provide ditching for 900 mm granulars 10+150 to 10+200 Rt then ditch cleanout to 10+275.	Poor transition and ditching. No frost susceptible material to excavate found. Ponding.
10+201 to 10+298	Asphalt thicker than 150 mm (150 to 240 mm)	Mill total 100 mm prior to pulverizing.	Asphalt too thick to pulverize.
10+253 to 10+275	Poor drainage	Ditch through entrance/pulloff Rt.	Reducing drainage of roadbed.
10+300 to 10+700 Lt and Rt	Poor drainage	Provide stripping of foreslope.	Excessive vegetation growth on foreslope preventing roadbed drainage.
10+300 to 10+399	Patch, settlement area	Foundation investigation required for widening, berms or thick grade raise. Maximum 500 mm lift of Granular 'A' may be provided to improve profile. Design to set profile grade. Settlements will continue. There is an inherent risk of deformations during construction.	500 mm lift required to restore profile grade. Over minimum 15.0m of organics and/or soft clay.
10+400 to 10+600 Rt	S-mod wheel track ruts, moderate midlane cracks	Provide rock and earth ditch cleanout.	Grasses and granulars in ditch.
10+502 to 10+626	Patch, asphalt thicker than 150 mm (155 - 240 mm)	Mill total 100 mm prior to pulverizing.	Asphalt too thick to pulverize.
10+550 to 10+600	Sl-mod wheel track ruts, moderate midlane cracks	Provide 100 mm lift of Granular 'A'.	Possible poor transverse transition from rock to swamp. Not cost effective to excavate.

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
10+550 to 10+725 Lt and Rt	Poor roadbed drainage	Strip foreslope as per standard.	Thick vegetation on foreslope.
10+600 to 10+700	Settlement area	Foundation investigation required for widening, berms or thick grade raise. Maximum 500 mm lift of Granular 'A' may be provided to improve profile. Design to set profile grade. Settlements will continue. There is an inherent risk of deformations during construction.	Previous foundation report on different alignment through this swamp indicates deep organics and/or soft clays. Pedo investigation encountered rockfill and stiff clay cap.
10+715 Lt	Entrance	Ditch through entrance as per standard detail.	Blocking drainage.
10+825 to 10+885	Patch	Slope flattening being completed here. Grade foreslope of earthfill to 2:1. Excavate organics to firm bottom as per OPSD 203.03 under slope flattening.	Earthfill over rockfill embankment. Earthfill cannot stand at 1.5:1 slope. Patching has been completed without reinstating shoulders. Edge of asphalt has no support.
10+881 to 10+962	Patch, asphalt thicker than 150 mm (190 mm)	General pavement strategy will reduce thickness to allow for pulverizing. No additional treatment.	
10+920 Lt	Entrance	Ditch through entrance as per standard detail.	Blocking drainage. Ponding at 10+940 at end of centreline culvert.
10+940 to 11+015 Rt	Poor drainage	Provide rock ditch cleanout. No line drilling to be completed.	Grasses and granulars in ditch. No line drilling based on discussions during site meeting and recommendations from rock hazard specialist.

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
10+955 to 11+045 Lt	Poor drainage	Provide rock ditch cleanout. Allow 25 m of line drilling. This recommendation is dependent on rock hazard specialist recommendations.	Grasses and granulars in ditch. Rock hazard specialist may recommend blasting cut.
11+125 to 11+175 Lt	Poor drainage	Provide ditch cleanout. Allow for 25 m of line drilling.	Existing ditch depth 300 mm. High spot in profile, not a lot of water in ditch. No poor pavement performance.
11+215 to 11+250	Older patch, performing well, slight transverse cracks	No additional treatment.	
11+285 to 11+300 Lt	Sl-mod midlane and meandering cracks	Provide rock ditching for 450 mm granulars.	Existing ditch depth 400 mm with rock knobs.
11+300 to 11+420 Lt	Moderate wheel track rutting, severe meandering transverse cracks, patch	Provide rock ditch cleanout. Allow 20 m line drilling.	Grasses and granulars in ditch with rock knobs.
11+300 to 11+400 Lt	Cobbles on shoulder	Excavate shoulder from edge of existing pavement to edge of rounding for 150 mm prior to pulverizing.	Pit run used to restore shoulder. Do not want pit run material blended into roadbed during pulverizing. Cobbles may damage pulverizer. Fully paved shoulder being added.

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
11+350 to 11+425 Rt	Cobbles on shoulder	Excavate shoulder from edge of existing pavement to edge of rounding for 150 mm prior to pulverizing.	Pit run used to restore shoulder. Do not want pit run material blended into roadbed during pulverizing. Cobbles may damage pulverizer. Fully paved shoulder being added.
11+401 to 10+010 Haycock	Asphalt thicker than 150 mm (170 to 252 mm)	Mill total 110 mm prior to pulverizing.	Asphalt too thick to pulverize.
11+475 to 11+575 Rt	Patch	Provide rock and earth ditching for 300 mm in rock and 600 mm in earth. Ensure positive drainage.	Poor drainage. Water diverted into road.
11+475 to 11+640 Lt	Patch (newer, performing well), poor drainage	Provide rock and earth ditch cleanout. Allow 30 m line drilling.	Grasses and granulars in ditch with rock knobs.
Highway 17 Township of Haycock 11+874 Kirkup= 10+000 Haycock			
10+015 Rt	Entrance	Ditch through entrance as per standard detail.	Blocking drainage.
10+015 to 10+200 Rt	Poor drainage	Provide rock and earth ditch cleanout. Allow 40 m line drilling.	Grasses and granulars in ditch with rock knobs.
10+200	End of contract	Provide 5 m step joint to adjacent contract.	

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
Highway 17 Township of Coyle			
5.6 km east of Jct 17 & 71	Settlement of eastbound passing lane, patch, approximately 50 m in length	Excavate paved shoulder and passing lane Rt from centreline at 1:1 based on OPSD 203.020. Excavate organics under shoulder and lane to firm bottom (approx 7 m). Backfill with rock fill and provide 300 mm granulars over rockfill including 150 mm Granular 'A'.Chink rockfill as per OPSS 206. Excavation to be completed in short sections and backfilled immediately. There is an inherent risk of distortions during construction. Platform should be monitored during construction.	Organics not excavated when passing lane or road widening constructed.
Highway 71 Township of Kirkup			
15+275 Rt	**Beginning of proposed monument site**		
15+300 to 15+350	Fill	Provide minimum 300 mm granulars over rockfill. Chink rockfill as per OPSS 206. If monument site extends past the offset of the old highway, excavate organics to firm bottom as per OPSD 203.010	
15+350	**End of proposed monument site**		
17+100	New snowplow turnaround Rt (fill)	Provide minimum 300 mm granulars over rockfill. Chink rockfill as per OPSS 206.	

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
16+900	**Realignment begins**		
16+900 to 16+910	Rock cut Lt	Excavate and waste overburden. Excavate existing ditch to firm bottom. Provide minimum 300 mm granulars over 300 mm shatter.	
16+910 to 16+925	On existing alignment		
16+925 to 17+100	Fill Lt	Displace soft clay and organics subgrade (up to 5 m). Provide minimum 300 mm granulars over rockfill. Transition bottom of granulars at 3:1 to existing granular depth. Chink rockfill as per OPSS 206. There will be some future maintenance at this location. Should be carried out early in contract to allow for settlement and regrading.	This area was not excavated (peat displaced/ridden) during last widening. Environmental concerns to excavation of organics.
17+100 to 17+125	On existing alignment		
17+125 to 17+175	Fill Rt	Provide minimum 300 mm granulars over rockfill. Transition bottom of granulars to 3:1 to existing granular depth. Chink rockfill as per OPSS 206.	
17+175 to 17+200	Earth cut	Excavate to provide for minimum 150 mm new Granular 'A' and 600 mm new Granular 'B'. Provide ditching Lt and Rt for 750 mm granulars.	On existing monument site

LOCATION	PERFORMANCE FEATURE	TREATMENT	RATIONALE/CAUSE
17+200 to 17+250	Earth cut	Excavate to provide for minimum 750 mm granulars including 150 mm of Granular 'A'. Provide ditching Lt and Rt for 750 mm granulars.	
17+250	Transition earth cut to rockfill	Provide transition treatment which ensures drainage of cross section. Use 10:1 taper, ensure subgrade drainage maintained.	
17+250 to 17+265	Fill	Excavate topsoil (for design purposes assume 150 mm). Excavate existing ditch to firm bottom. Provide minimum 300 mm granulars over rockfill. Chink rockfill as per OPSS 206. Provide ditching Lt and Rt for 750 mm granulars.	Ditching to match adjacent section.
17+265	**Realignment ends**		