

SASKATCHEWAN HIGHWAYS AND TRANSPORTATION

GEOLOGY OF THE KEELEY RIVER AND DUROCHER  
CREEK BRIDGE SITES

Report 0165-002

November 4, 1997



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November 4, 1997

Saskatchewan Highways and Transportation  
3130 - 8th Street East  
Saskatoon, Saskatchewan  
S7K 2H6

Attention: Mr. N.W. Richardson P. Eng.

Re: Geology of the Keeley River and Durocher bridge sites

Dear Mr. Richardson:

Enclosed please find three copies of the "Geology of the Keeley River and Durocher Creek bridge sites". If you have any queries, please contact me. Please be aware of the following erratum: Swan River-Mannville Formation should read "Swan River Formation-Mannville Group".

Sincerely yours,

*E.A. Christiansen*  
E.A. Christiansen P. Eng., P. Geol.  


ASSOCIATION OF PROFESSIONAL ENGINEERS OF SASKATCHEWAN		
<b>CERTIFICATE OF AUTHORIZATION</b>		
E.A. CHRISTIANSEN CONSULTING LTD.		
<b>NUMBER 505</b>		PERMISSION TO CONSULT HELD BY:
DISCIPLINE	SASK. REG. No.	SIGNATURE
<i>Geol.</i>		<i>EAC</i>

## SUMMARY

In cross section A-A', Paleozoic limestone, Swan River Formation-Mannville Group, Lower Colorado Group Ashville Formation, and Lea Park Formation and Upper Colorado Group subcrop at the bedrock surface. This surface is covered with a blanket of 8.5 to 175 m of Quaternary deposits. Deformed clays in the Swan River Formation-Mannville Group are bedrock at the Keeley River bridge site, and sands are the bedrock in the Durocher Creek bridge site. The bedrock is covered with up to 3.5 m of well graded till at both bridge sites. The overlying surficial stratified deposits at both sites show upward coarsening from clay and silt at the base to sand on top, suggesting a deltaic origin for these deposits.

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## 1. INTRODUCTION

In reply to your letter of January 20, 1997 (File EAC9701), the bore-hole cutting samples and cores from the STH Keeley River bridge Nos. 1 and 2 and the SHT Durocher Creek bridge Nos. 1 and 2 boreholes (Fig. 1, Table 1, Appendix A) were examined and described, and geologic logs where compiled utilizing these descriptions and the carbonate content of tills (Appendix B). In addition, Saskatchewan Highways and Transportation (SHT) field logs, geophysical logs, and laboratory analyses (Appendix B, Table 2) including natural water content, Atterberg limits, and mechanical analyses (Appendix B) were used to compile the geologic logs.

To provide a regional setting for the Keeley River and Durocher Creek bridge sites, the regional cross section A-A' (Drawing 0165-002-01) was constructed utilizing Saskatchewan Research Council (SRC) logs 1, 2, 4, 7) and map (Christiansen and Whitaker, 1974).

## 2. BEDROCK STRATIGRAPHY

In ascending order, the sediments in cross section A-A' (Drawing 0165-002-01) include Paleozoic rocks, Swan River-Mannville Formation, Lower Colorado Group Ashville Formation, and the Lea Park Formation and Upper Colorado Group.

### 2.1 Paleozoic rocks

In the Beauval borehole, 1 m of limestone was penetrated. The upper contact of the Paleozoic rocks rise to the northeast where, at LaRonge, they are exposed at the surface.

Table 1. Index of logs in cross section A-A'.

HOLE	NAME	LOCATION
1	SRC Jeannette Lake	NW-13-07-64-17-W3
2	SRC Barnett Ridge	NW-02-21-66-17-W3
3	CLARK Flotten Lake	04-22-66-17-W3
4	SRC Canoe Lake	NE-14-15-70-16-W3
5	SHT Keeley River bridge NO. 1	13.396.2 m on CL
6	SHT Durocher Creek bridge NO. 1	10.583.5 m on CL
7	SRC Beauval	NW-09-35-70-12-W3

Table 2. Laboratory analyses of sediments in the Keeley River and Durocher Creek bridge sites

## 2.2 Swan River-Mannville Formation

The Swan River-Mannville Formation is composed of 170-245 m of continental, deltaic, sand, silt, clay, and coal. the Formation rises the northeast to become the bedrock at Beauval (Drawing 0165-002-01). The contact between the Paleozoic rocks and the Swan River- Mannville Formation is an erosional unconformity.

## 2.3 Lower Colorado Group Ashville Formation

The Lower Colorado Group Ashville Formation, in ascending order, is composed of the Skull Creek, Newcastle, Westgate, and Belle Fourche members (Drawing 0165-002-01, log 3).

### 2.3.1 Skull Creek Member

The Skull Creek Member is composed of less than 1 to 35 m of gray, non-calcareous, marine clay. The contact between the Swan River- Mannville Formation and the Skull Creek Member of the Ashville Formation is conformable.

### 2.3.2 Newcastle Member

The Newcastle Member is composed of less than 1 to 16 m of sand and silt representing a more shoreward feature. The contact between the Skull Creek and Newcastle members is conformable.

### 2.3.3 Westgate Member

The Westgate Member is composed of less than 1 to 20 m of dark gray, noncalcareous, marine clay. The contact between the Newcastle and Westgate members is conformable.

#### 2.3.4 Belle Fourche Member

The Belle Fourche Member is composed of a lower unit of less than 1 to 23 m of sand and silt which includes the Fish scale zone and an upper unit of less than 1 to 34 m of dark gray, noncalcareous, marine clay. The contact between the Westgate and Belle Fourche members is conformable.

#### 2.4 Lea Park Formation and Upper Colorado Group

The Lea Park Formation and Upper Colorado Group is composed of less than 1 to 130 m of gray, noncalcareous, marine silt and clay comprising the Lower and Upper White speckled shales. Because the Upper White Speckled Shale cannot be detected in electric logs, the top of the Colorado Group cannot be determined in cross section A-A' (Drawing 0165-002-01, logs 2, 3), and consequently, the Upper Colorado Group is combined with the Lea Park Formation. The contact between the Ashville Formation and the Lea Park Formation and Upper Colorado Group is conformable.

#### 2.5 Bedrock surface

The Bedrock surface represents a major unconformity in cross section A-A' where the total relief is 330 m. The bedrock surface was formed by preglacial fluvial and glacial and glaciofluvial erosion.

### 3. QUATERNARY STRATIGRAPHY

The glacial deposits southwest of the Keeley River bridge site and between the Durocher Creek bridge site and Beauval (Fig. 1, Drawing 0165-002-01) are labelled Quaternary deposits, undifferentiated.

In these parts of the cross section, the Quaternary deposits are up to 175 and 30 m thick, respectively.

### 3.1 Keeley River bridge site

At the SHT Keeley River bridge No. 1 borehole (Fig. 1, Appendix A), the bedrock is overlain, in ascending order, by 3 m of slightly calcareous, dark gray till (Table 2), 1 m of noncalcareous, gray, sandy silt, and 6 m of medium/fine grained sand. At the SHT Keeley River bridge No. 2 borehole, the bedrock is overlain, in ascending order, by 2.5 m of slightly calcareous, dark gray till (Table 2), 5.5 m of interbedded very fine sand and silt, and 6 m of fine to medium grained sand.

### 3.2 Durocher Creek bridge site

At the SHT Durocher Creek bridge No. 1 borehole, the bedrock is overlain by 3 m of slightly calcareous, dark gray till (Table 2), 1 m of noncalcareous, gray and light gray, laminated clay and silt, and 4 m of very fine to medium grained sand and detrital peat. At the SHT Durocher Creek bridge No. 2 borehole, the bedrock, in ascending order, is overlain by 3.5 m of slightly calcareous dark gray till, 1 m of noncalcareous, light gray to white silt, 2.5 m of coarse/fine grained sand, and 2 m of peat.

### 3.3 Stratigraphic interpretation

The coarsening upward of the stratified sediments lying on till in the Keeley River and Durocher bridge sites suggests a deltaic origin for these deposits. The similarity of natural water content, Atterberg limits, mechanical analysis and carbonate content (Table 2) of tills in the Keeley River and Durocher Creek bridge sites suggest

that only one till is present in this area.

#### 4. GEOTECHNICAL CONSIDERATIONS

##### 4.1 Bedrock

The bedrock beneath till in the SHT Keeley River bridge boreholes Nos. 1 and 2 is composed of jointed and fractured clay of the Swan River-Mannville Formation which, presumably, was deformed by glacial shear. ( Appendix A). The bedrock in the Durocher bridge site, on the other hand, is sand of the Swan River-Mannville Formation which does not appear to be deformed.

##### 4.2 Till

The tills are very poorly sorted or very well graded. The mean sand silt, and clay content is 40, 33, and 27 percent, respectively (Table 2).

##### 4.3 Surficial stratified sediments

The surficial stratified sediments coarsen upward from clay and silt to sand. The finest sediment is anticipated to be on the till surface.

#### 5. LITERATURE CITED

Christiansen, E.A. and Whitaker, S.H. 1974. Geology and groundwater resources of the Waterhen River area (73-K), Saskatchewan. Saskatchewan Research Council, Geology Division, Map No.4.

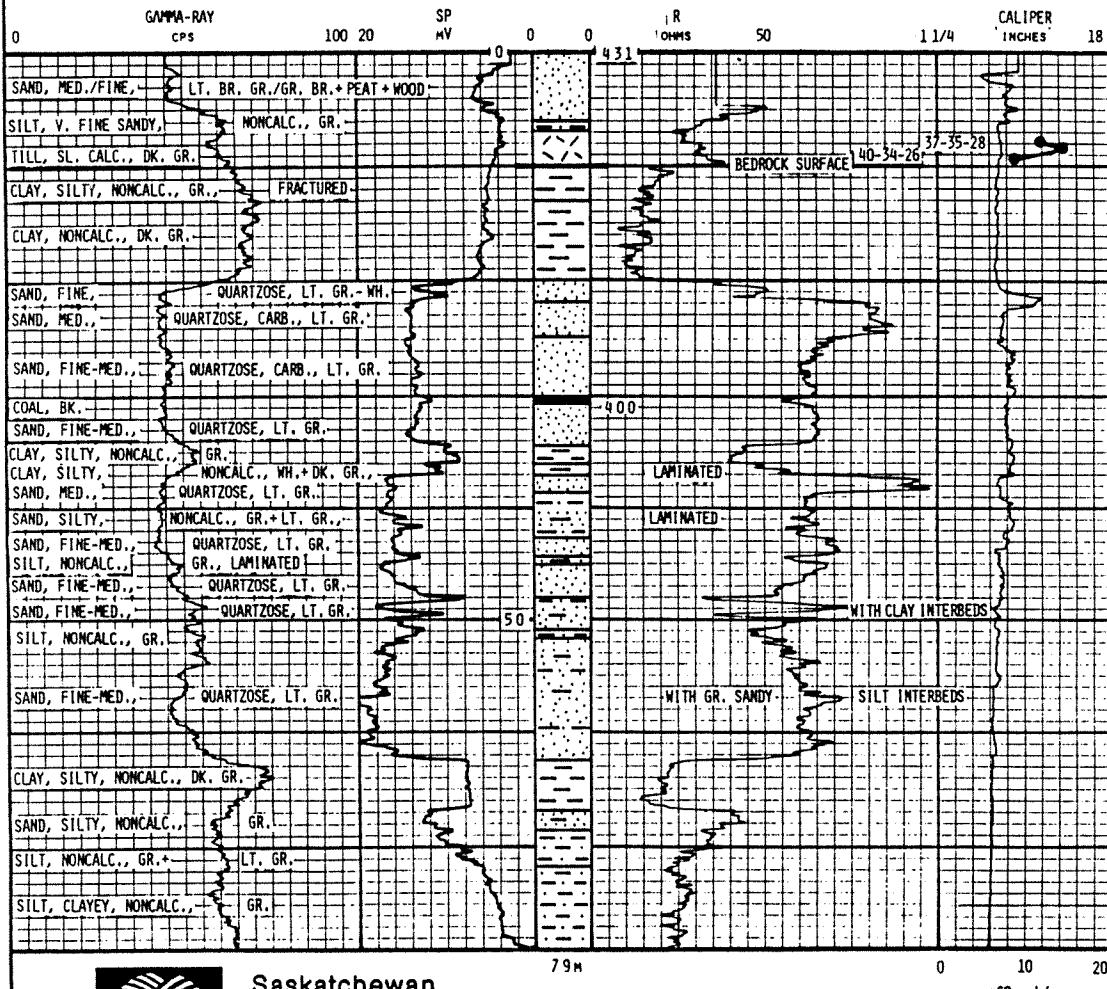


**Appendix A. Geologic logs from SHT Keeley River bridge Nos. 1 and 2  
and Durocher Creek bridge Nos. 1 and 2 boreholes.**

SHT 73-0/04 1997  
 KEELEY RIVER BRIDGE  
 NO.1  
 13.39 6.2M ON C.L.  
 BOREHOLE

BOREHOLE NO.	SHT. KEELEY R. 1	MTS.	73-0/04	PROJECT	KEELEY RIVER BRIDGE SITE		
LAND LOCATION				CONTROL SECTION	965-05		
UTM COORD.				STATION	13.396.2M OFFSET ON C.L.		
GRD. ELEV.	431.051 M	DEPTH	79.25 M	CUTTING SAMPLE INTERVAL	1.5M		
DATE DRILLED	MARCH 11	TO MARCH 11	1997	CORE SAMPLE INTERVAL	1.5M		
COND. WATER	450	MICROSIEMENS/CM AT 25°C		FROM	1.4-21.25 M		
COND. MUD	650	MICROSIEMENS/CM AT 25°C		CASING DEPTH			
SPECIFIC GRAVITY MUD				WATER OR MUD LEVEL			
SUPERVISOR	L. SINCLAIR			ABANDONMENT	POST IN HOLE		
ASS'T SUPERVISOR				BIT SIZE	4 3/4" WALMAC INTERVAL 0-79.25 M		
LOGGED BY	L. SINCLAIR			BIT SIZE			
INSTRUMENT	WIDCO 1500			BIT SIZE			
PROBE ELECTRIC				TYPE OF DRILL RIG	1250 FAILING		
PROBE GAMMA				DEPTH	SCALE	SPEED	
PROBE CALIPER				SP.	79 M	20 mV	15 M/MIN
DATE LOGGED	MARCH 11,	1997		RES.	79 M	50 OHMS	15 M/MIN
TIME OF LOGGING	1500 HRS. TO 1630 HRS			GAMMA	79 M	0-100 CPS	8 M/MIN
DRILL OPERATOR	M. MILLER			CAL	79 M	1 1/4-18"	15 M/MIN
CONTRACTOR				GAMMA TIME CONSTANT (T.C.)	5	SECONDS	
REMARKS	ASS'T OPERATOR M. MINCHUK			GEOLOGY BY	E.A. CHRISTIANSEN	12/04/97	

## CUTTING AND CORE DESCRIPTION



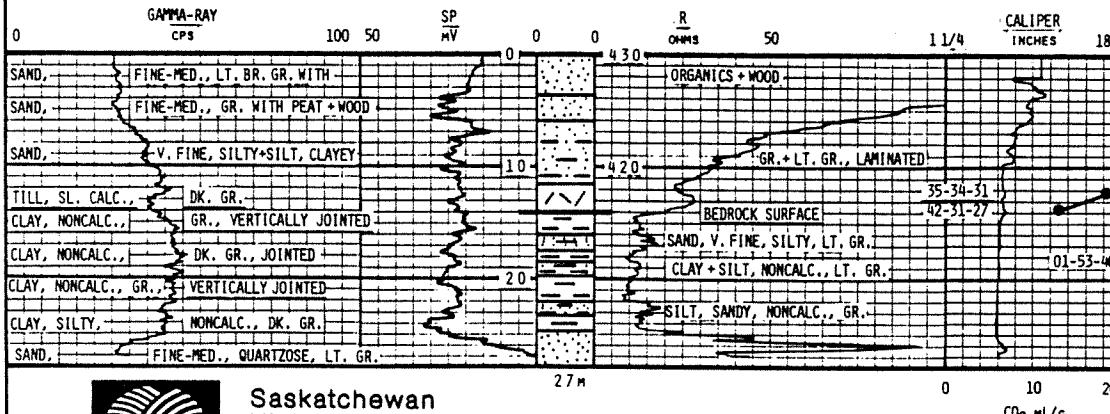
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50-30-20 = 50% SAND, 30% SILT, 20% CLAY

SHT 73-0/04 1997  
 KEELEY RIVER BRIDGE  
 NO.2  
 13.331.1 M ON C.L.  
 BOREHOLE

BOREHOLE NO.	SHT KEELEY R. 2	MTS 73-0/04	PROJECT	KEELEY RIVER BRIDGE SITE	
LAND LOCATION			CONTROL SECTION	965-05	
UTM COORD.			STATION	13.331.1 M OFFSET ON C.L.	
GRD. ELEV.	429.511 M	DEPTH	27.45 M		
DATE DRILLED	MARCH 12 TO MARCH 12, 1997	CUTTING SAMPLE INTERVAL	1.5 M		
COND. WATER	450	CORE SAMPLE INTERVAL	1.5 M		
COND. MUD	700	FROM	1.5-22.7 M		
SPECIFIC GRAVITY MUD		CASING DEPTH			
SUPERVISOR	L. SINCLAIR	CASING WALL THICKNESS			
ASST SUPERVISOR		WATER OR MUD LEVEL			
LOGGED BY	L. SINCLAIR	ABANDONMENT	POST IN HOLE		
INSTRUMENT	VIDCO 1500	BIT SIZE	4 3/4" WALMAC	INTERVAL 0-27.45 M	
PROBE ELECTRIC		BIT SIZE			
PROBE GAMMA		BIT SIZE			
PROBE CALIPER		TYPE OF DRILL RIG	1250 FAILING		
DATE LOGGED	MARCH 12 1997	DEPTH			
TIME OF LOGGING	1450 HRS TO 1600 HRS	SCALE			
DRILL OPERATOR	M. MILLER	SPEED			
CONTRACTOR		SP.	27 M	50 HV	15 M/MIN
REMARKS	ASS'T OPERATOR: M. MINCHUK	RES.	27 M	50 OHMS	15 M/MIN
		GAMMA	27 M	0-100 CPS	8 M/MIN
		CAL	27 M	1 1/4-18"	15 M/MIN
		GAMMA TIME CONSTANT (T.C.)	5	SECONDS	
		GEOLOGY BY	E.A. CHRISTIANSEN	12/04/97	

## CUTTING AND CORE DESCRIPTION



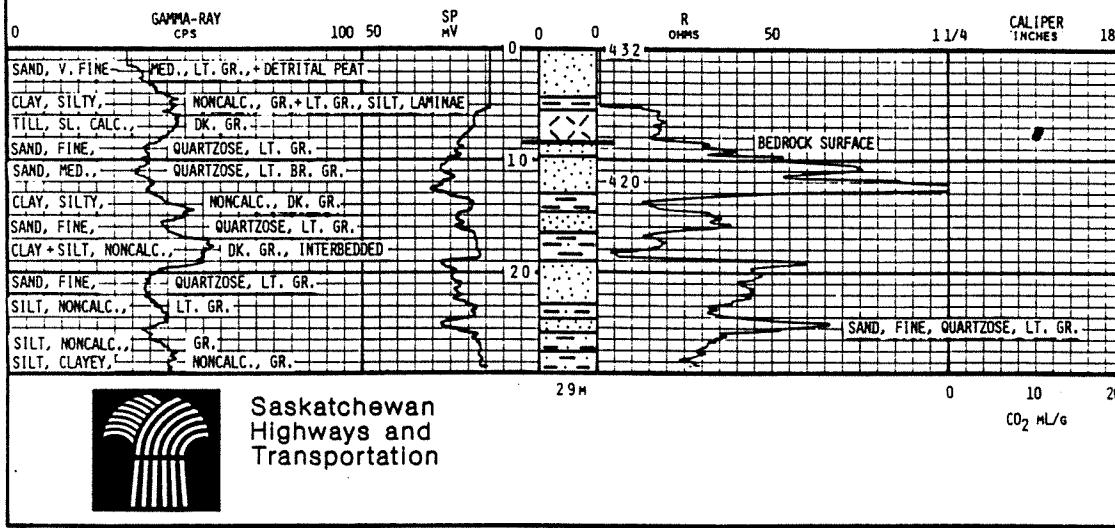
Saskatchewan  
 Highways and  
 Transportation

50-30-20 = 50% SAND, 30% SILT, 20% CLAY

SHT 73-0/04 1997  
 DUROCHER CR. BRIDGE  
 NO.1  
 10.583.5 M ON C.L.  
 BOREHOLE

BOREHOLE NO.	1	MTS 73-0/04	PROJECT	DUROCHER CREEK BRIDGE SITE
LAND LOCATION			CONTROL SECTION	965-05
UTM COORD.			STATION	10.583.5 M OFFSET ON C.L.
GRD. ELEV.	431.782 M	DEPTH 30.5 M	CUTTING SAMPLE INTERVAL	1.5 M
DATE DRILLED	MARCH 12 TO MARCH 13 1997		CORE SAMPLE INTERVAL	1.5 M
COND. WATER	450	MICROSIEMENS/CM AT 25°C	FROM	1.5-12.2 M
COND. MUD	650	MICROSIEMENS/CM AT 25°C	CASING DEPTH	5.15 M
SPECIFIC GRAVITY MUD			CASING WALL THICKNESS	
SUPERVISOR	L. SINCLAIR		WATER OR MUO LEVEL	
ASST SUPERVISOR			ABANDONMENT	POST IN HOLE
LOGGED BY	L. SINCLAIR		BIT SIZE	4 3/4" WALMAC INTERVAL 0-30.5 M
INSTRUMENT	WIDCO 1500		BIT SIZE	INTERVAL
PROBE ELECTRIC			BIT SIZE	INTERVAL
PROBE GAMMA			TYPE OF DRILL RIG	1250 FAILING
PROBE CALIPER			DEPTH	SCALE SPEED
DATE LOGGED	MARCH 13 1997		SP	28.5 M 50 MV 15 M/MIN
TIME OF LOGGING	1000 HRS TO 1100 HRS		RES	28.5 M 50 OHMS 15 M/MIN
DRILL OPERATOR	M. MILLER		GAMMA	29.0 M 0-100 CPS 8 M/MIN
CONTRACTOR			CAL	
REMARKS	ASS'T OPERATOR: M. MINCHUK			
				GAMMA TIME CONSTANT (T.C.) 5 SECONDS
				GEOLOGY BY E.A. CHRISTIANSEN 13/04/97

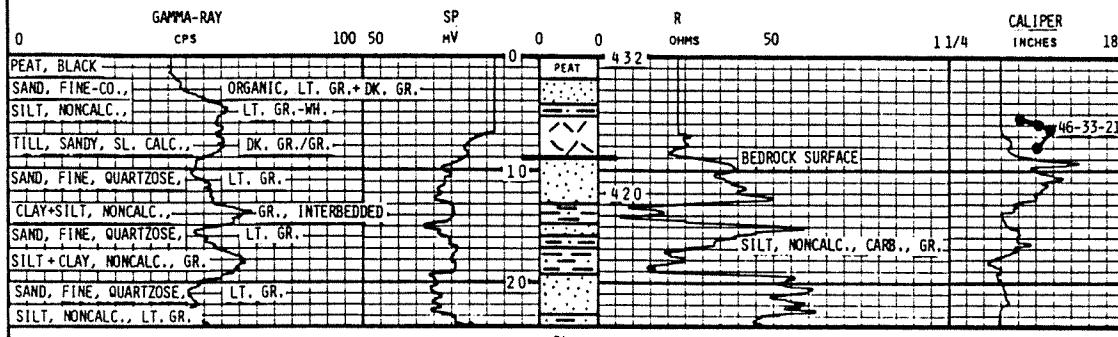
## CUTTING AND CORE DESCRIPTION



SHT 73-0/04 1997  
 DUROCHER CR. BRIDGE  
 NO.2  
 10.562.8 M ON C.L.  
 BOREHOLE

BOREHOLE NO.	2	MTS 73-0/04	PROJECT	DUROCHER CREEK BRIDGE SITE
LAND LOCATION			CONTROL SECTION	965-05
UTM COORD.			STATION	10.562.8 M
GRD. ELEV.	431.822 M	DEPTH	24.4 M	OFFSET
DATE DRILLED	MARCH 13	TO	MARCH 13	1997
COND. WATER	450	MICROSIEMENS/CM AT 25°C	CUTTING SAMPLE INTERVAL	1.5 M
COND. MUD	650	MICROSIEMENS/CM AT 25°C	CORE SAMPLE INTERVAL	1.5 M
SPECIFIC GRAVITY MUD			FROM	1.5-12.2 M
SUPERVISOR	L. SINCLAIR		CASING DEPTH	6.65 M
ASST SUPERVISOR			CASING WALL THICKNESS	
LOGGED BY	L. SINCLAIR		WATER OR MUD LEVEL	
INSTRUMENT	WIDCO 1500		ABANDONMENT	POST IN HOLE
PROBE ELECTRIC			BIT SIZE	4 3/4" WALMAC
PROBE GAMMA			INTERVAL	0-24.4 M
PROBE CALIPER			BIT SIZE	
DATE LOGGED	MARCH 13	1997	INTERVAL	
TIME OF LOGGING	1600 HRS TO	1730 HRS	BIT SIZE	
DRILL OPERATOR	R. MILLER		TYPE OF DRILL RIG	1250 FAILING
CONTRACTOR	ASS'T OPERATOR: M. MINCHUK		DEPTH	
REMARKS			SCALE	
			SPEED	
			SP	24 M 50 MV 15 M/MIN
			RES.	24 M 50 OHMS 15 M/MIN
			GAMMA	24 M 0-100 CPS. 8 M/MIN
			CAL	24 M 1 1/4"-18" 15 M/MIN
			GAMMA TIME CONSTANT (T.C.)	5 SECONDS
			GEOLOGY BY	E.A. CHRISTIANSEN 13/04/97

## CUTTING AND CORE DESCRIPTION



Saskatchewan  
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 Transportation

46-33-21 = 46% SAND, 33% SILT, 21% CLAY



**Appendix B. Laboratory analyses including carbonate content, natural water content, Atterberg limits, and mechanical analyses.**

Saskatchewan Research Council Geoanalytical Services  
 125-15 Innovation Blvd., Saskatoon, SK., S7N 2X8  
 Phone: 306-933-5426 Fax: 306-933-5656

SHT KEELEY RIVER NO.1

M152 CHRISTIANSEN APRIL 23 1997 (4) PG.1121 [B.R.DIG.]

- 1 %Ca BY ICP OT97.56
- 2 %Mg BY ICP
- 3 Wt% DOLOMITE=COL.2\*7.5852
- 4 Wt% CALCITE=(COL.1-(COL.2\*1.6486))\*2.4973
- 5 TOTAL Wt% CO<sub>3</sub> (COL.3+COL.4)
- 6 WT%DOLOMITE/Wt% CALCITE (COL.3/COL.4)
- 7 CO<sub>2</sub> FROM CALCITE=COL.4\*2.238
- 8 CO<sub>2</sub> FROM DOLOMITE=COL.3\*2.429
- 9 TOTAL CO<sub>2</sub>=COL.7+COL.8

	%Ca	%Mg	WT%DO	WT%CAL	C03TOT	D0/CAL	CO2CAL	CO2DOL	CO2TOT
--	-----	-----	-------	--------	--------	--------	--------	--------	--------

BR2	5.49	1.62	12.29	7.04	19.33	1.75	15.76	29.85	45.60
LS7 389 7.9	1.25	0.53	4.02	0.94	4.96	4.28	2.10	9.76	11.87
LS7 390 8.4	1.54	0.62	4.70	1.29	6.00	3.64	2.89	11.42	14.32
LS7 392 9.4	0.87	0.43	3.26	0.40	3.66	8.11	0.90	7.92	8.82

Saskatchewan Research Council Geoanalytical Services  
125-15 Innovation Blvd., Saskatoon, SK., S7N 2X8  
Phone:306-933-5426 Fax:306-933-5656

SHT KEELEY RIVER NO 2

M153 CHRISTIANSEN APRIL 23 1997 (3) PG.1122 [B.R.DIG.]

- 1 %Ca BY ICP OT97.56  
2 %Mg BY ICP  
3 Wt% DOLOMITE=COL.2\*7.5852  
4 Wt% CALCITE=(COL.1-(COL.2\*1.6486))\*2.4973  
5 TOTAL Wt% CO<sub>3</sub> (COL.3+COL.4)  
6 WT%DOLOMITE/Wt% CALCITE (COL.3/COL.4)  
7 CO<sub>2</sub> FROM CALCITE=COL.4\*2.238  
8 CO<sub>2</sub> FROM DOLOMITE=COL.3\*2.429  
9 TOTAL CO<sub>2</sub>=COL.7+COL.8

%Ca %Mg WT%DO WT%CAL CO<sub>3</sub>TOT D0/CAL CO<sub>2</sub>CAL CO<sub>2</sub>DOL CO<sub>2</sub>TOT

BR2	5.19	1.66	12.59	6.13	18.72	2.06	13.71	30.58	44.30
LS7 456 12.1	2.03	0.74	5.61	2.02	7.64	2.77	4.53	13.63	18.16
LS7 457 13.6	1.07	0.53	4.02	0.49	4.51	8.20	1.10	9.76	10.86

Saskatchewan Research Council Geoanalytical Services  
125-15 Innovation Blvd., Saskatoon, SK., S7N 2X8  
Phone: 306-933-5426 Fax: 306-933-5656

SHT DUROCHER CREEK NO 1

M154 CHRISTIANSEN APRIL 23 1997 (3) PG.1123 [B.R.DIG.]

- 1 %Ca BY ICP OT97.56
- 2 %Mg BY ICP
- 3 Wt% DOLOMITE=COL.2\*7.5852
- 4 Wt% CALCITE=(COL.1-(COL.2\*1.6486))\*2.4973
- 5 TOTAL Wt% CO<sub>3</sub> (COL.3+COL.4)
- 6 WT%DOLOMITE/Wt% CALCITE (COL.3/COL.4)
- 7 CO<sub>2</sub> FROM CALCITE=COL.4\*2.238
- 8 CO<sub>2</sub> FROM DOLOMITE=COL.3\*2.429
- 9 TOTAL CO<sub>2</sub>=COL.7+COL.8

%Ca %Mg WT%DO WT%CAL CO<sub>3</sub>TOT D0/CAL CO<sub>2</sub>CAL CO<sub>2</sub>DOL CO<sub>2</sub>TOT

BR2	5.15	1.64	12.44	6.11	18.55	2.04	13.67	30.22	43.89
LS7 477 7.4	1.09	0.46	3.49	0.83	4.32	4.21	1.85	8.48	10.33
LS7 478 7.7	1.02	0.47	3.57	0.61	4.18	5.82	1.37	8.66	10.03

Saskatchewan Research Council Geoanalytical Services  
125-15 Innovation Blvd., Saskatoon, SK., S7N 2X8  
Phone: 306-933-5426 Fax: 306-933-5656

SHT DUROCHER CREEK NO 2

M155 CHRISTIANSEN APRIL 23 1997 (5) PG.1124 [B.R.DIG.]

- 1 %Ca BY ICP OT97.56
- 2 %Mg BY ICP
- 3 Wt% DOLOMITE=COL.2\*7.5852
- 4 Wt% CALCITE=(COL.1-(COL.2\*1.6486))\*2.4973
- 5 TOTAL Wt% CO<sub>3</sub> (COL.3+COL.4)
- 6 WT%DOLOMITE/Wt% CALCITE (COL.3/COL.4)
- 7 CO<sub>2</sub> FROM CALCITE=COL.4\*2.238
- 8 CO<sub>2</sub> FROM DOLOMITE=COL.3\*2.429
- 9 TOTAL CO<sub>2</sub>=COL.7+COL.8

%Ca %Mg WT%DO WT%CAL CO<sub>3</sub>TOT D0/CAL CO<sub>2</sub>CAL CO<sub>2</sub>DOL CO<sub>2</sub>TOT

BR2	5.09	1.65	12.52	5.92	18.43	2.11	13.24	30.40	43.65
LS7 497 4.8	0.76	0.42	3.19	0.17	3.35	18.87	0.38	7.74	8.12
LS7 498 6.0	1.09	0.46	3.49	0.83	4.32	4.21	1.85	8.48	10.33
LS7 499 6.3	1.22	0.52	3.94	0.91	4.85	4.35	2.03	9.58	11.61
LS7 500 8.0	1.10	0.42	3.19	1.02	4.20	3.13	2.28	7.74	10.02

## Sheet1

## C.S. 965-02 Sample Testing

- per examination by NWR, April 3/97

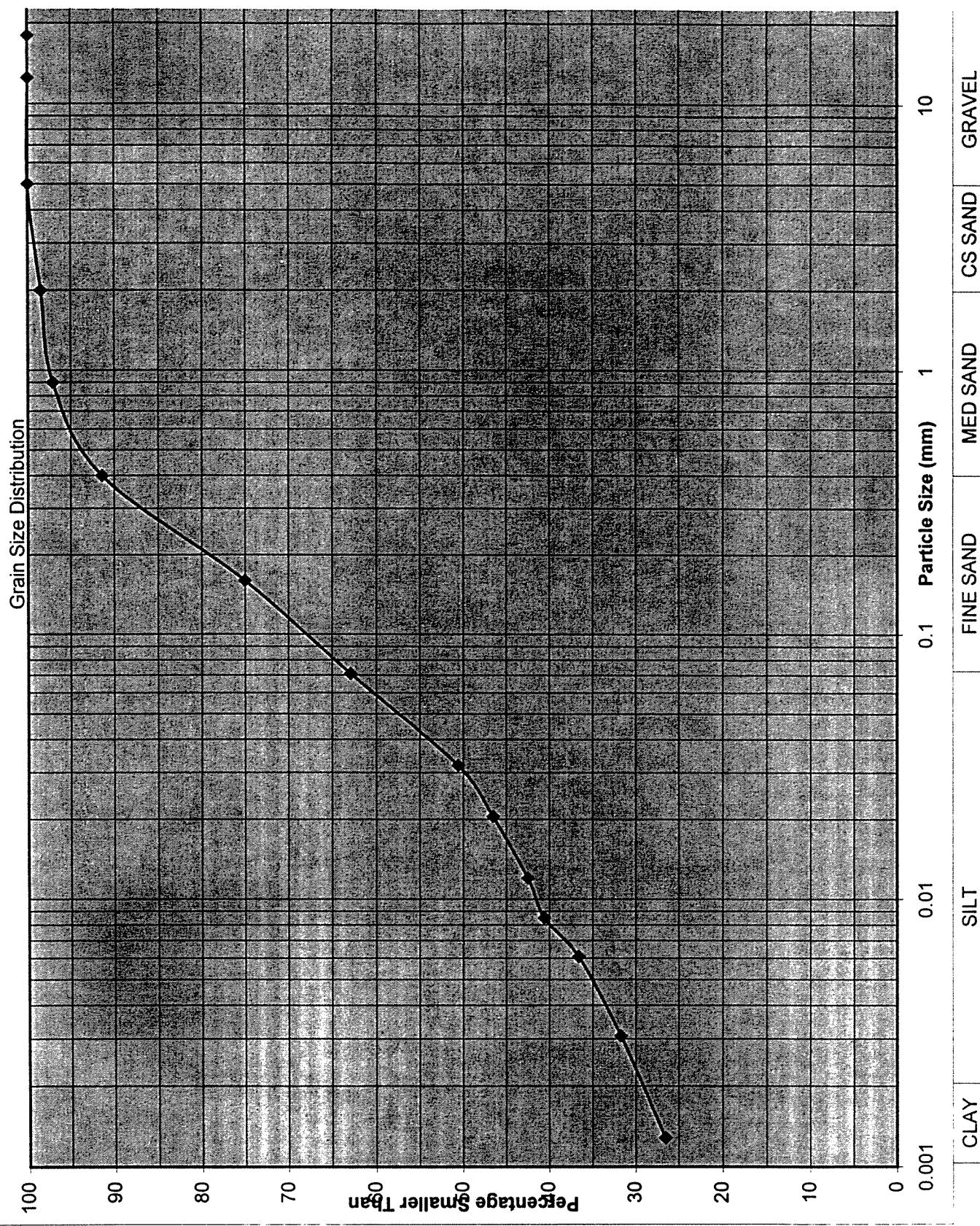
<b>SITE</b>	<b>Sample No.</b>	<b>Soil Type</b>	<b>Tests Designated</b>	<b>Comments</b>
<b>Keeley R.</b>				
BH 1	LS7-388	silty clay	Atterberg limits, moisture content	Consol. to EKS
	LS7-389	till	Atterberg limits, moisture content, hydrometer	Consol. to EKS
	LS7-390	till	Atterberg limits, moisture content	
	LS7-391	till	Atterberg limits, moisture content, hydrometer	
	LS7-393	silty clay	Atterberg limits, moisture content	
	LS7-395	silty clay	Atterberg limits, moisture content	
BH 2	LS7-452	silty clay	Atterberg limits, moisture content	
	LS7-454	silty clay	Atterberg limits, moisture content	
	LS7-456	till	Atterberg limits, moisture content	Consol. to EKS
	LS7-457	till, silty clay	Atterberg limits, moisture content, hydrometer	Consol. to EKS
	LS7-459	shale	Atterberg limits, moisture content	
	LS7-463	shale	Atterberg limits, moisture content	
<b>Durocher Cr.</b>				
BH 1	LS7-477	till	Atterberg limits, moisture content	
BH 2	LS7-498	till	Atterberg limits, moisture content, hydrometer	Consol. to EKS

NOTE: Samples had dried

Sheet1

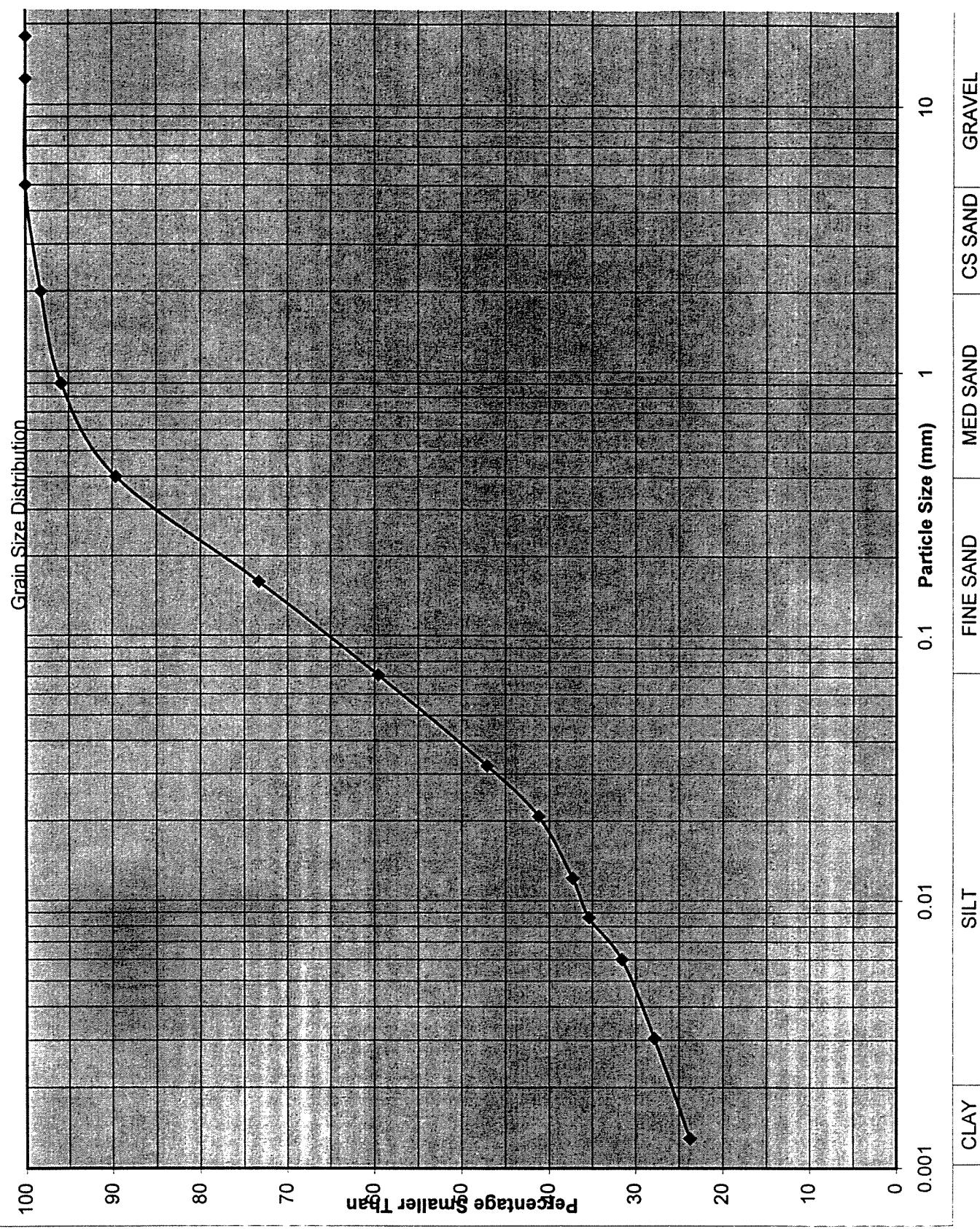
**Saskatchewan Highways & Transportation  
Saskatoon Testing Services Lab  
Mechanical Analysis**

Date	Apr-21-97			Total Wt Sample	113.4			
Control Section	965-05			Wt Passing 2.00mm	111.7			
Location	LS7-389			Air Dry Sample Wt.	49.4			
Depth				Wd	48.70			
Tested By	K. BRAY			W	49.44			
<b>Hydroscopic Moisture</b>				<b>Sieve</b> <b>Wt Passing</b> <b>% Passing</b>				
Tare No.	215			18.00 mm	100			
Wet wt & tare	4099			12.50 mm	100.0			
Dry wt & tare	4061			5.00 mm	1.7	100.0		
Wt water	38			2.00 mm	17.8	98.5		
Wt tare	1436			900 um	17.1	97.1		
Wt dry sample	2625			400 um	14.3	91.4		
% water	1.45			160 um	6.2	75.0		
				71 um	0.2	62.9		
<b>DETERMINATION OF SIZE AND PERCENTAGE OF SOIL IN SUSPENSION</b>								
TEMP C	HYDROMETER READINGS		MINUTES	CORRECTION COEFFICIENTS		GRAIN DIAMETER	% of TOTAL SAMPLE in SUSPENSION	
	ORIGINAL	CORRECTED FOR CALGON & TEMP		T	L			K
21.6	30.0	-5.0	25.0	2	11.4	0.01339	0.0319	50.6
21.6	28.0	-5.0	23.0	5	11.7	0.01339	0.0205	46.5
21.6	26.0	-5.0	21.0	15	12.0	0.01339	0.0120	42.5
21.8	25.0	-4.9	20.1	30	12.2	0.01336	0.0085	40.6
22.0	23.0	-4.9	18.1	60	12.5	0.01332	0.0061	36.6
22.4	20.5	-4.8	15.7	240	12.9	0.01326	0.0031	31.7
22.0	18.0	-4.9	13.1	1440	13.3	0.01332	0.0013	26.5
Correction for Calgon and Temp.				9.74				
Ave Blank Reading	4.9							
Ave. Temp Degree C	22							
Line Slope	-0.22							



**Saskatchewan Highways & Transportation  
Saskatoon Testing Services Lab  
Mechanical Analysis**

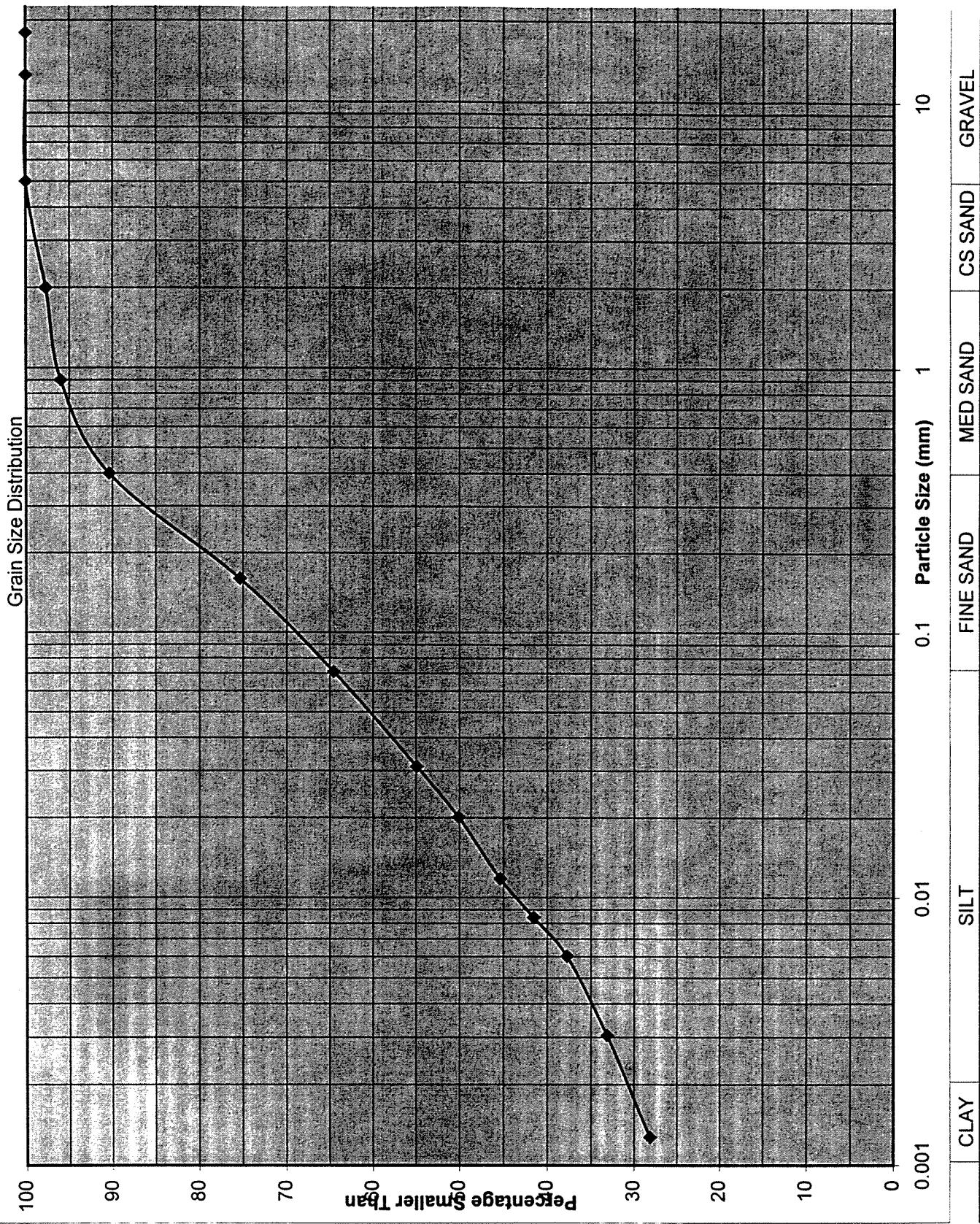
Date	Apr-21-97			Total Wt Sample	135.1			
Control Section	965-05			Wt Passing 2.00mm	132.7			
Location	LS7-391			Air Dry Sample Wt.	50.71			
Depth				Wd	50.07			
Tested By	K. BRAY			W	50.98			
<b>Hydroscopic Moisture</b>				<b>Sieve</b> <b>Wt Passing</b> <b>% Passing</b>				
Tare No.	214			18.00 mm	100			
Wet wt & tare	4704			12.50 mm	100.0			
Dry wt & tare	4666			5.00 mm	2.4	100.0		
Wt water	38			2.00 mm	20.3	98.2		
Wt tare	1693			900 um	19.1	95.9		
Wt dry sample	2973			400 um	15.9	89.6		
% water	1.28			160 um	7.6	73.3		
				71 um	0.6	59.6		
<b>DETERMINATION OF SIZE AND PERCENTAGE OF SOIL IN SUSPENSION</b>								
TEMP C	HYDROMETER READINGS			MINUTES	CORRECTION COEFFICIENTS		GRAIN DIAMETER	% of TOTAL SAMPLE in SUSPENSION
	ORIGINAL	CORRECTED FOR CALGON & TEMP			T	L		
21.6	29.0	-5.0	24.0	2	11.5	0.01339	0.0322	47.1
21.6	26.0	-5.0	21.0	5	12.0	0.01339	0.0208	41.2
21.6	24.0	-5.0	19.0	15	12.4	0.01339	0.0122	37.3
21.7	23.0	-5.0	18.0	30	12.5	0.01337	0.0086	35.4
22.0	21.0	-4.9	16.1	63	12.9	0.01332	0.0060	31.6
22.4	19.0	-4.8	14.2	250	13.2	0.01326	0.0030	27.8
22.0	17.0	-4.9	12.1	1440	13.5	0.01332	0.0013	23.7
Correction for Calgon and Temp.				9.74				
Ave Blank Reading	4.9							
Ave. Temp Degree C	22							
Line Slope	-0.22							



Saskatchewan Highways & Transportation  
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Mechanical Analysis

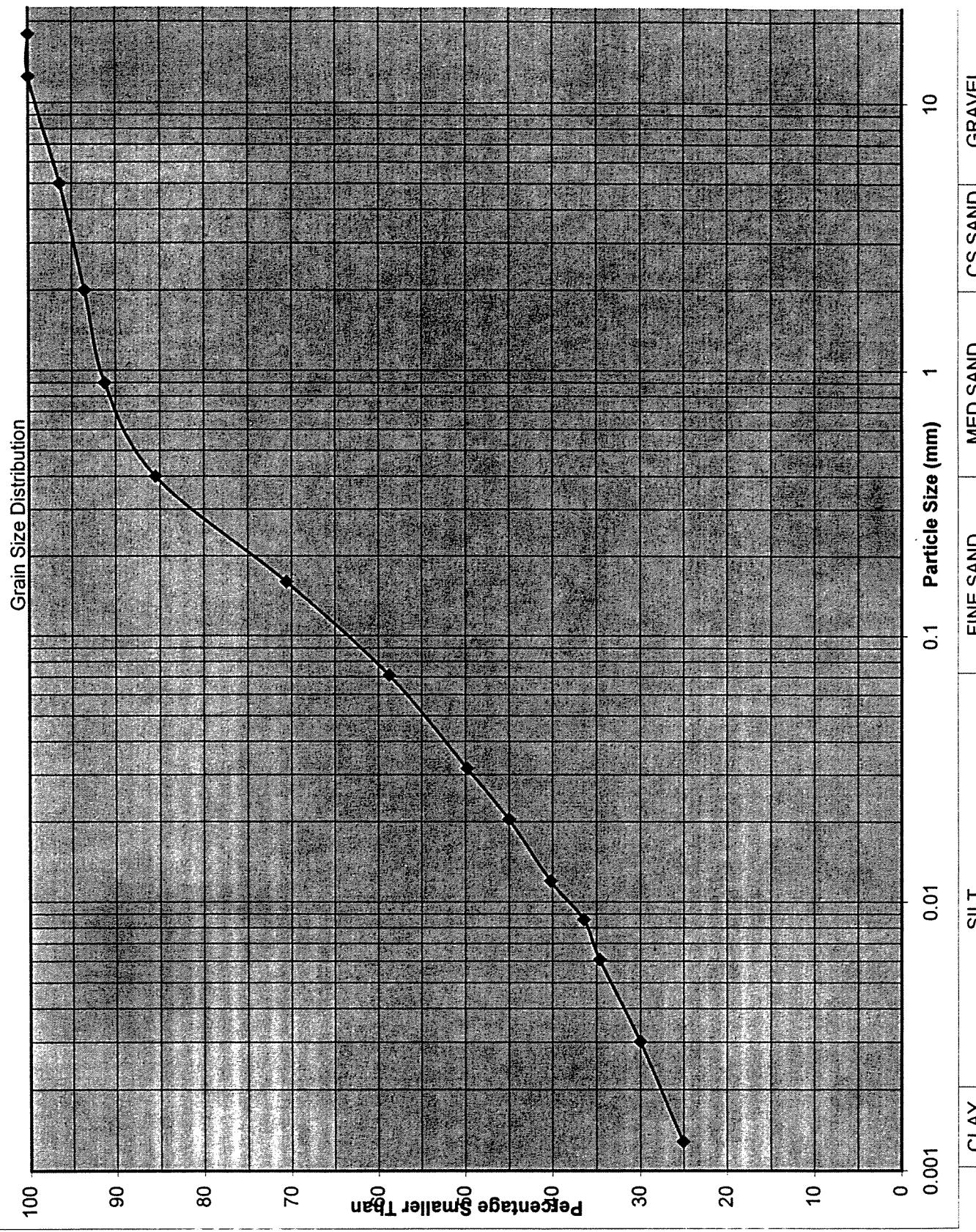
Date	Apr-21-97			Total Wt Sample	121.9			
Control Section	965-05			Wt Passing 2.00mm	119.1			
Location	LS7-456			Air Dry Sample Wt.	51.47			
Depth				Wd	50.69			
Tested By	K. BRAY			W	51.88			
<b>Hydroscopic Moisture</b>				<b>Sieve</b>	<b>Wt Passing</b>	<b>% Passing</b>		
Tare No.	101			18.00 mm		100		
Wet wt & tare	3917			12.50 mm		100.0		
Dry wt & tare	3883			5.00 mm	2.8	100.0		
Wt water	34			2.00 mm	17.4	97.7		
Wt tare	1669			900 um	16.5	96.0		
Wt dry sample	2214			400 um	13.6	90.4		
% water	1.54			160 um	5.8	75.3		
				71 um	0.2	64.6		
<b>DETERMINATION OF SIZE AND PERCENTAGE OF SOIL IN SUSPENSION</b>								
TEMP C	HYDROMETER READINGS			MINUTES	CORRECTION COEFFICIENTS		GRAIN DIAMETER	% of TOTAL SAMPLE in SUSPENSION
	ORIGINAL	CORRECTED FOR CALGON & TEMP	T		L	K		
21.5	33.5	-5.0	28.5	2	10.8	0.01340	0.0312	54.9
21.5	31.0	-5.0	26.0	5	11.2	0.01340	0.0201	50.1
21.7	28.5	-5.0	23.5	15	11.6	0.01337	0.0118	45.4
21.8	26.5	-4.9	21.6	30	12.0	0.01336	0.0084	41.5
22.0	24.5	-4.9	19.6	60	12.3	0.01332	0.0060	37.8
22.4	22.0	-4.8	17.2	240	12.7	0.01326	0.0030	33.1
22.0	19.5	-4.9	14.6	1440	13.1	0.01332	0.0013	28.1
Correction for Calgon and Temp.							9.74	
Ave Blank Reading	4.9							
Ave. Temp Degree C	22							
Line Slope	-0.22							

C.S. LOC'N	HOLE #	SAMPLE	GEOL.	DEPTH	% SAND	% SILT	% CLAY
965-05				0	35	34	31
DATE	Apr-21-97						



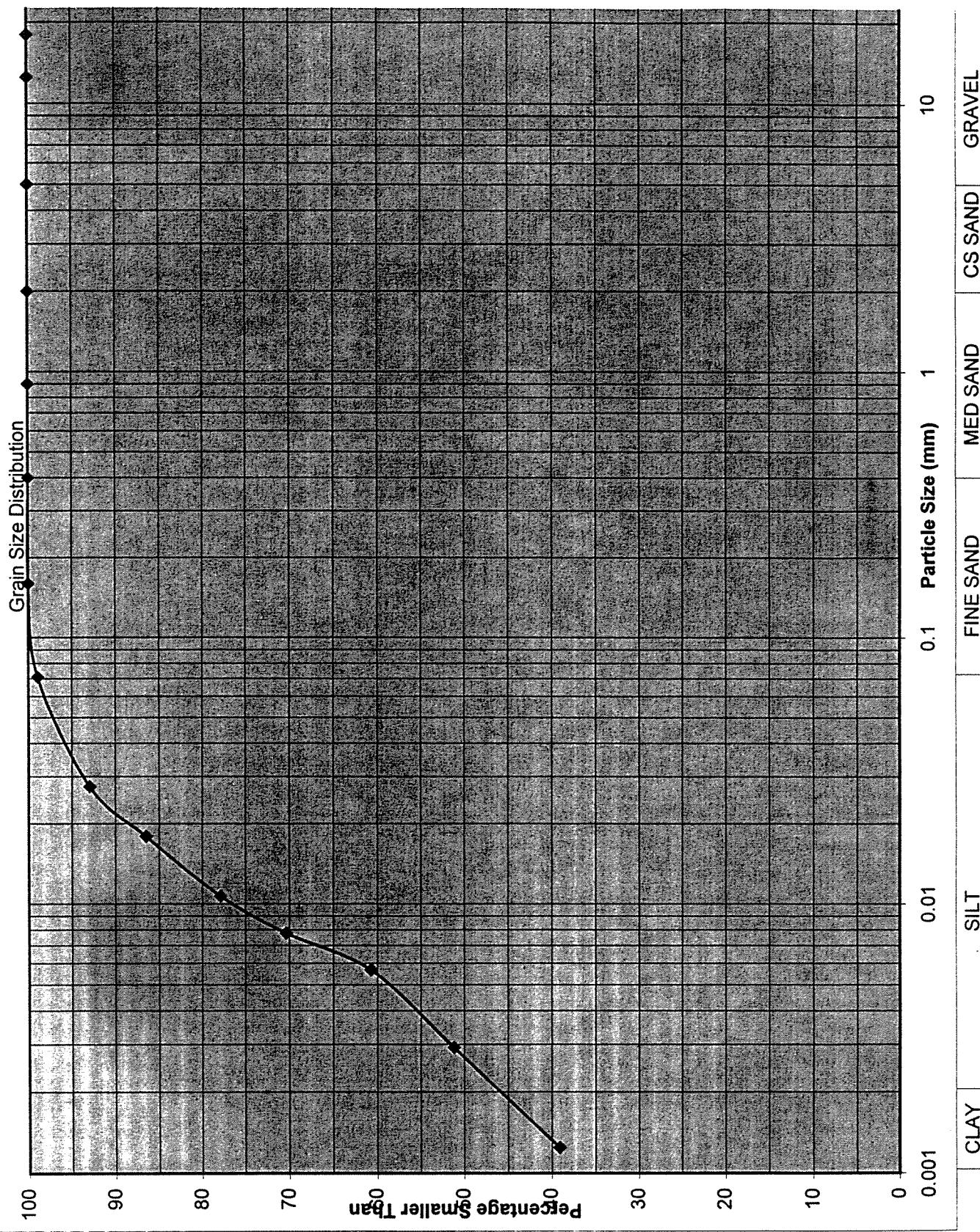
**Saskatchewan Highways & Transportation  
Saskatoon Testing Services Lab  
Mechanical Analysis**

Date	Apr-21-97			Total Wt Sample	137.9			
Control Section	965-05			Wt Passing 2.00mm	129			
Location	LS7-457			Air Dry Sample Wt.	49.57			
Depth				Wd	48.91			
Tested By	K. BRAY			W	52.28			
<b>Hydroscopic Moisture</b>				<b>Sieve Wt Passing % Passing</b>				
Tare No.	216			18.00 mm	100			
Wet wt & tare	4211			12.50 mm	8.9	100.0		
Dry wt & tare	4178			5.00 mm	3.9	96.4		
Wt water	33			2.00 mm	18.4	93.5		
Wt tare	1740			900 um	17.2	91.3		
Wt dry sample	2438			400 um	14.2	85.5		
% water	1.35			160 um	6.4	70.6		
				71 um	0.2	58.7		
(wash wt)								
<b>DETERMINATION OF SIZE AND PERCENTAGE OF SOIL IN SUSPENSION</b>								
TEMP C	HYDROMETER READINGS			MINUTES	CORRECTION COEFFICIENTS		GRAIN DIAMETER	% of TOTAL SAMPLE in SUSPENSION
	ORIGINAL	CORRECTED FOR CALGON & TEMP			T	L		
21.7	31.0	-5.0	26.0	2	11.2	0.01337	0.0317	49.8
21.7	28.5	-5.0	23.5	5	11.6	0.01337	0.0204	45.0
21.7	26.0	-5.0	21.0	15	12.0	0.01337	0.0120	40.2
21.8	24.0	-4.9	19.1	30	12.4	0.01336	0.0086	36.4
22.0	23.0	-4.9	18.1	60	12.5	0.01332	0.0061	34.6
22.4	20.5	-4.8	15.7	250	12.9	0.01326	0.0030	30.0
22.0	18.0	-4.9	13.1	1440	13.3	0.01332	0.0013	25.1
Correction for Calgon and Temp.				9.74				
Ave Blank Reading	4.9							
Ave. Temp Degree C	22							
Line Slope	-0.22							



**Saskatchewan Highways & Transportation  
Saskatoon Testing Services Lab  
Mechanical Analysis**

Date	Apr-21-97		Total Wt Sample	118.8					
Control Section	965-05		Wt Passing 2.00mm	118.8					
Location	LS7-463		Air Dry Sample Wt.	47.7					
Depth			Wd	46.27					
Tested By	K. BRAY		W	46.27					
<b>Hydroscopic Moisture</b>			<b>Sieve</b> <b>Wt Passing</b> <b>% Passing</b>						
Tare No.	102		18.00 mm	100					
Wet wt & tare	3527		12.50 mm	100.0					
Dry wt & tare	3472		5.00 mm	100.0					
Wt water	55		2.00 mm	0.6	100.0				
Wt tare	1689		900 um	100.0					
Wt dry sample	1783		400 um	100.0					
% water	3.08		160 um	0.6	100.0				
			71 um	0.1	98.9				
<b>DETERMINATION OF SIZE AND PERCENTAGE OF SOIL IN SUSPENSION</b>									
TEMP C	HYDROMETER READINGS			MINUTES T	CORRECTION COEFFICIENTS		GRAIN DIAMETER	% of TOTAL SAMPLE in SUSPENSION	
	ORIGINAL	CORRECTED FOR CALGON & TEMP			L	K			
21.6	48.0	-5.0	43.0	2	8.4	0.01339	0.0275	93.0	
21.6	45.0	-5.0	40.0	5	8.9	0.01339	0.0179	86.5	
21.7	41.0	-5.0	36.0	15	9.6	0.01337	0.0107	77.9	
21.8	37.5	-4.9	32.6	30	10.2	0.01336	0.0078	70.4	
22.0	33.0	-4.9	28.1	60	10.9	0.01332	0.0057	60.7	
22.4	28.5	-4.8	23.7	240	11.6	0.01326	0.0029	51.2	
22.0	23.0	-4.9	18.1	1440	12.5	0.01332	0.0012	39.1	
Correction for Calgon and Temp.						9.74			
Ave Blank Reading	4.9								
Ave. Temp Degree C	22								
Line Slope	-0.22								



**Saskatchewan Highways & Transportation  
Saskatoon Testing Services Lab  
Mechanical Analysis**

Date	Apr-21-97		Total Wt Sample	126.1				
Control Section	965-05		Wt Passing 2.00mm	121.7				
Location	LS7-498		Air Dry Sample Wt.	51.09				
Depth			Wd	50.63				
Tested By	K. BRAY		W	52.46				
<b>Hydroscopic Moisture</b>			<b>Sieve Wt Passing % Passing</b>					
Tare No.	100		18.00 mm	100				
Wet wt & tare	3558		12.50 mm	4.4 100.0				
Dry wt & tare	3541		5.00 mm	3.6 99.4				
Wt water	17		2.00 mm	22.8 96.5				
Wt tare	1683		900 um	21.3 93.7				
Wt dry sample	1858		400 um	17.5 86.4				
% water	0.91		160 um	7.9 68.1				
			71 um	0.4 53.8				
(wash wt)								
<b>DETERMINATION OF SIZE AND PERCENTAGE OF SOIL IN SUSPENSION</b>								
TEMP C	HYDROMETER READINGS			MINUTES	CORRECTION COEFFICIENTS		GRAIN DIAMETER	% of TOTAL SAMPLE in SUSPENSION
	ORIGINAL	CORRECTED FOR CALGON & TEMP			T	L		
21.6	27.5	-5.0	22.5	2	11.8	0.01339	0.0325	42.9
21.6	25.0	-5.0	20.0	5	12.2	0.01339	0.0209	38.1
21.6	22.0	-5.0	17.0	15	12.7	0.01339	0.0123	32.4
21.8	20.5	-4.9	15.6	30	12.9	0.01336	0.0088	29.7
21.9	19.0	-4.9	14.1	60	13.2	0.01334	0.0063	26.8
22.4	17.0	-4.8	12.2	240	13.5	0.01326	0.0031	23.2
22.0	14.0	-4.9	9.1	1440	14.0	0.01332	0.0013	17.3
Correction for Calgon and Temp.						9.74		
Ave Blank Reading	4.9							
Ave. Temp Degree C	22							
Line Slope	-0.22							

