

DOCUMENT IDENTIFICATION INFORMATION

GEOCRES No. 31C-139

DIST. 8 REGION EASTERN

W.P. No. 836-70-05

CONT. No. 78-07

W. O. No. _____

STR. SITE No. 7-112

HWY. No. 2

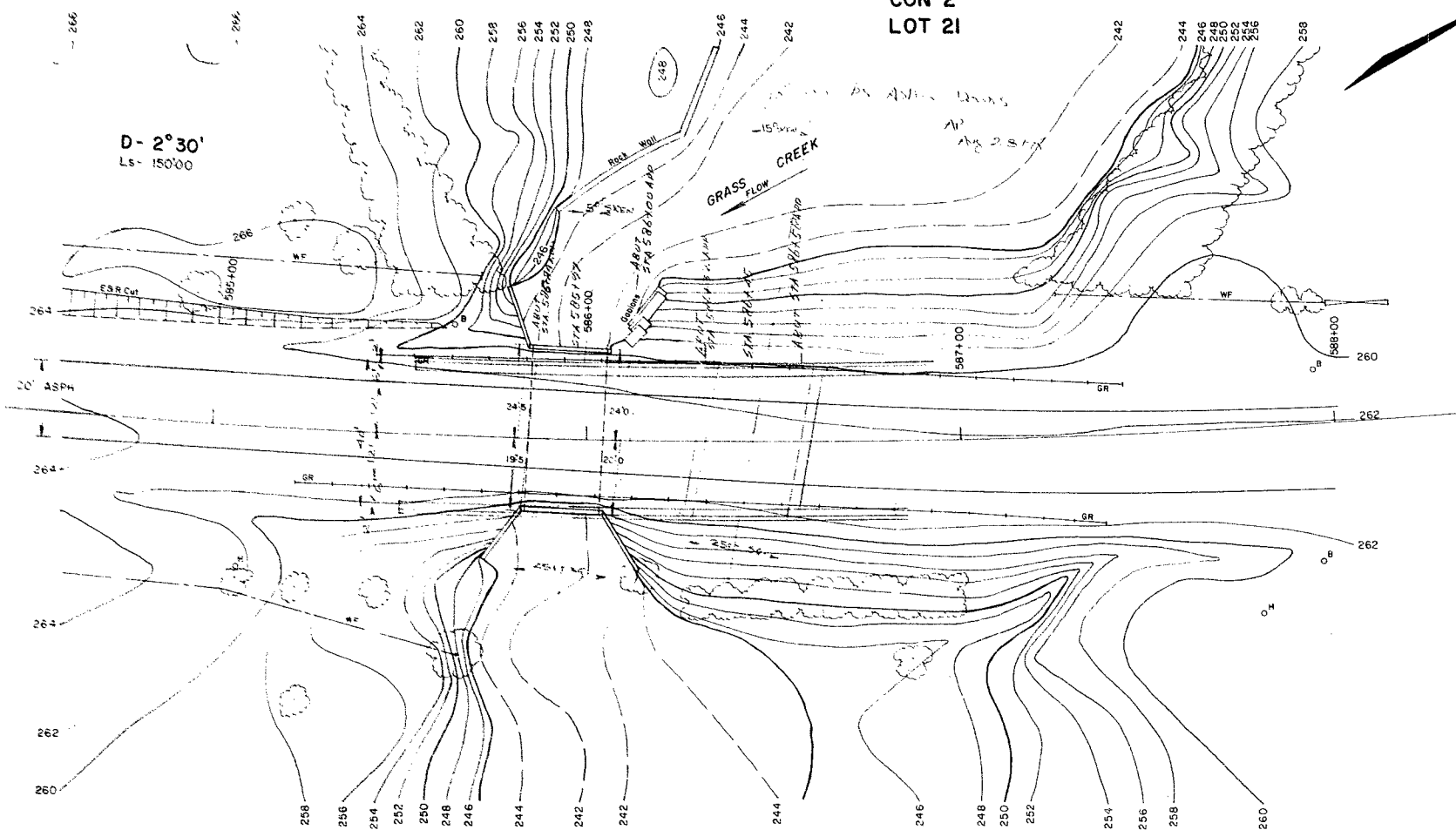
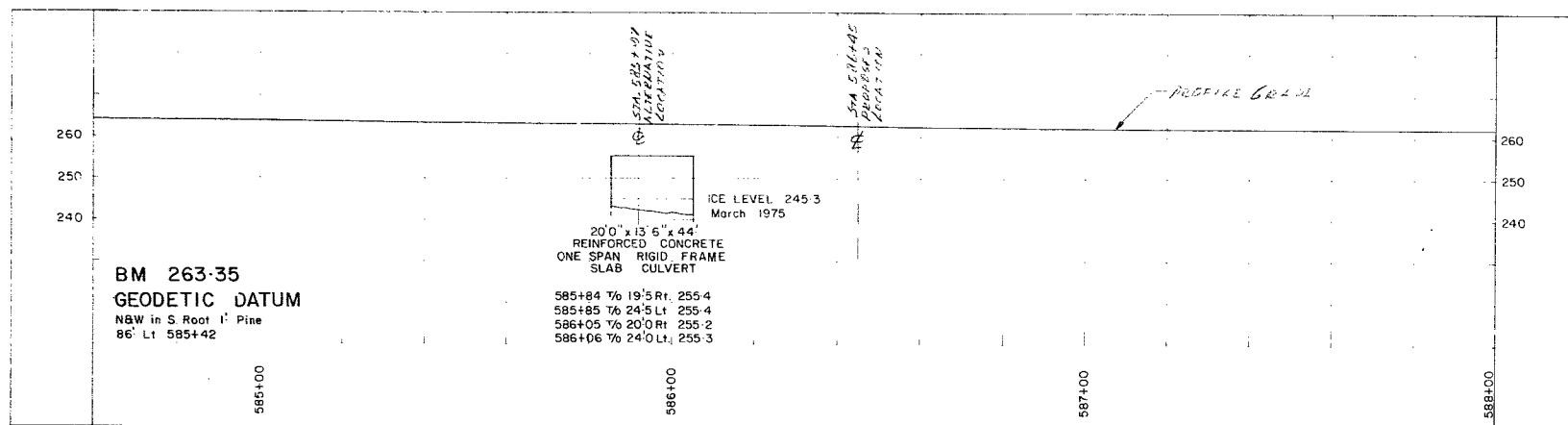
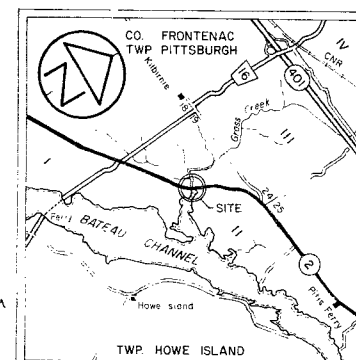
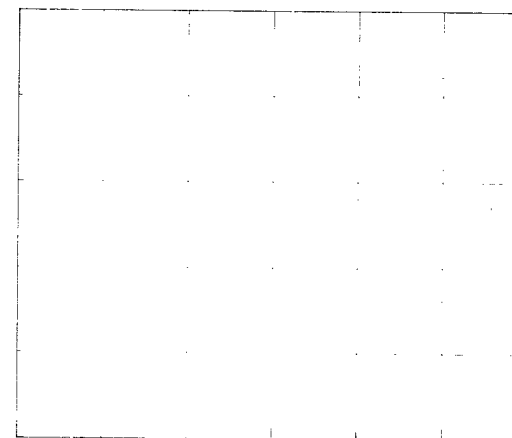
LOCATION PROPOSED STRUCTURE AT _____

THE CROSSING OF HWY 2 AND

GRASS CREEK, 1 MI. E OF COUNTY RD. 16

OVERLAY DRAWING TO BE INCLUDED WITH THE REPORT 3

REMARKS: _____

CO. FRONTENAC
TWP. PITTSBURGHCON 2
LOT 21PLAN
SCALE - 1 IN = 20 FT.PROFILE
SCALE - HOR 1 IN = 20 FT.
VERPLAN B-20-30
PROF C-20-2-GBM 68-U-336 EL. 259.414
Tablet set in Rock Outcrop 177' Rt. 585+57
Quad 44076 Line 245 GananoqueKEY PLAN
SCALE - 1 IN = 1 MI.WP. 836-70-02
STR. WP. 836-70-05

DATE	REVISIONS	BY	CH'KD
MAY 23 1975	SKETCH SHOWING PROPOSED LOCATION OF ALTERNATIVE LOCATION OF BRIDGE STRUCTURE AS SUBMITTED FOR FOUNDATION INVESTIGATION.		

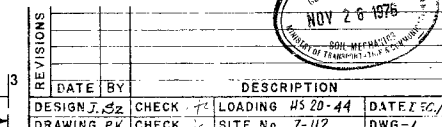
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO
DESIGN SERVICES BRANCH — ENGINEERING SURVEYS

BRIDGE SITE 31C-139

PROPOSED CROSSING
AT
GRASS CREEK
AND
KING'S HWY. 2 LINE 'C'LOT 21
TWP. PITTSBURGH
CON 2
CO. FRONTENAC

SCALE	DISTRICT	REGION
AS SHOWN	8 KINGSTON	EASTERN
WO 836-70-02	Date of Survey - MAR 1975	SITE No 7112
Survey - APRIL 1975	BY Chief of Party - M J SHEEDY Supervisor - G E COSTELLO	DRAWN BY Draftsman - DG BLAIR Supervisor - SJ CAMILLERI
CHECKED BY Draftsman - AA WITHERS Supervisor - SJ CAMILLERI	E-5261-1	

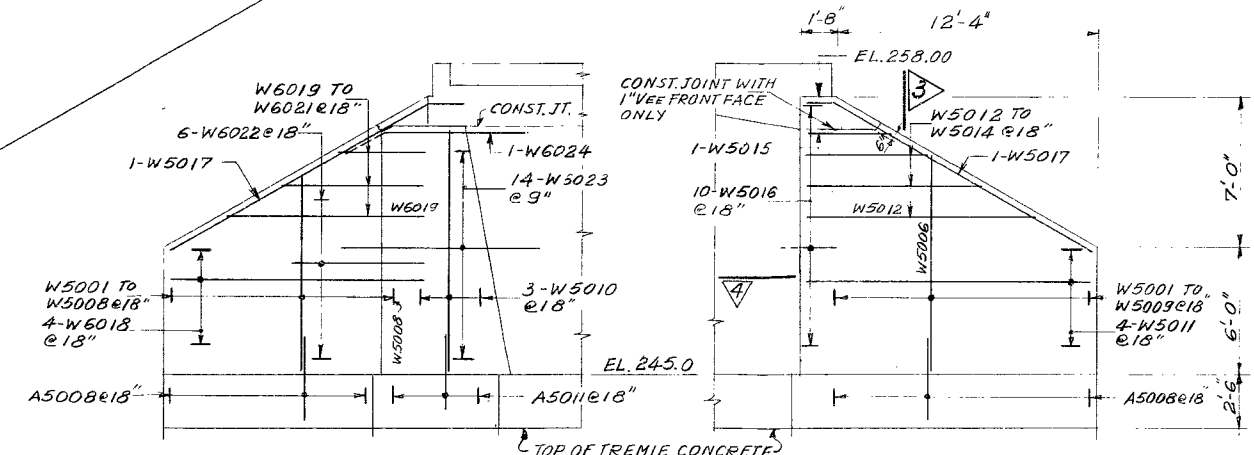
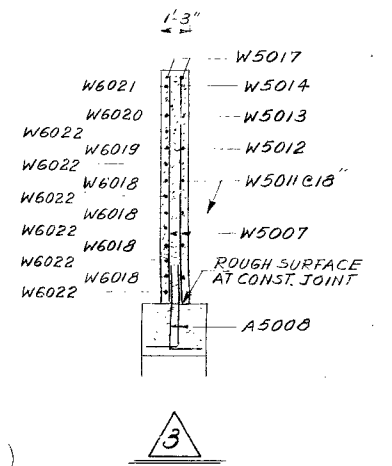
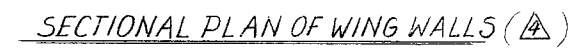
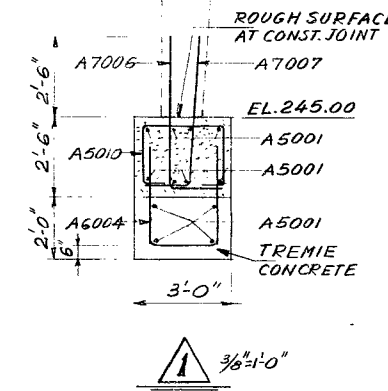
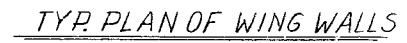
SOILS MECHANICS





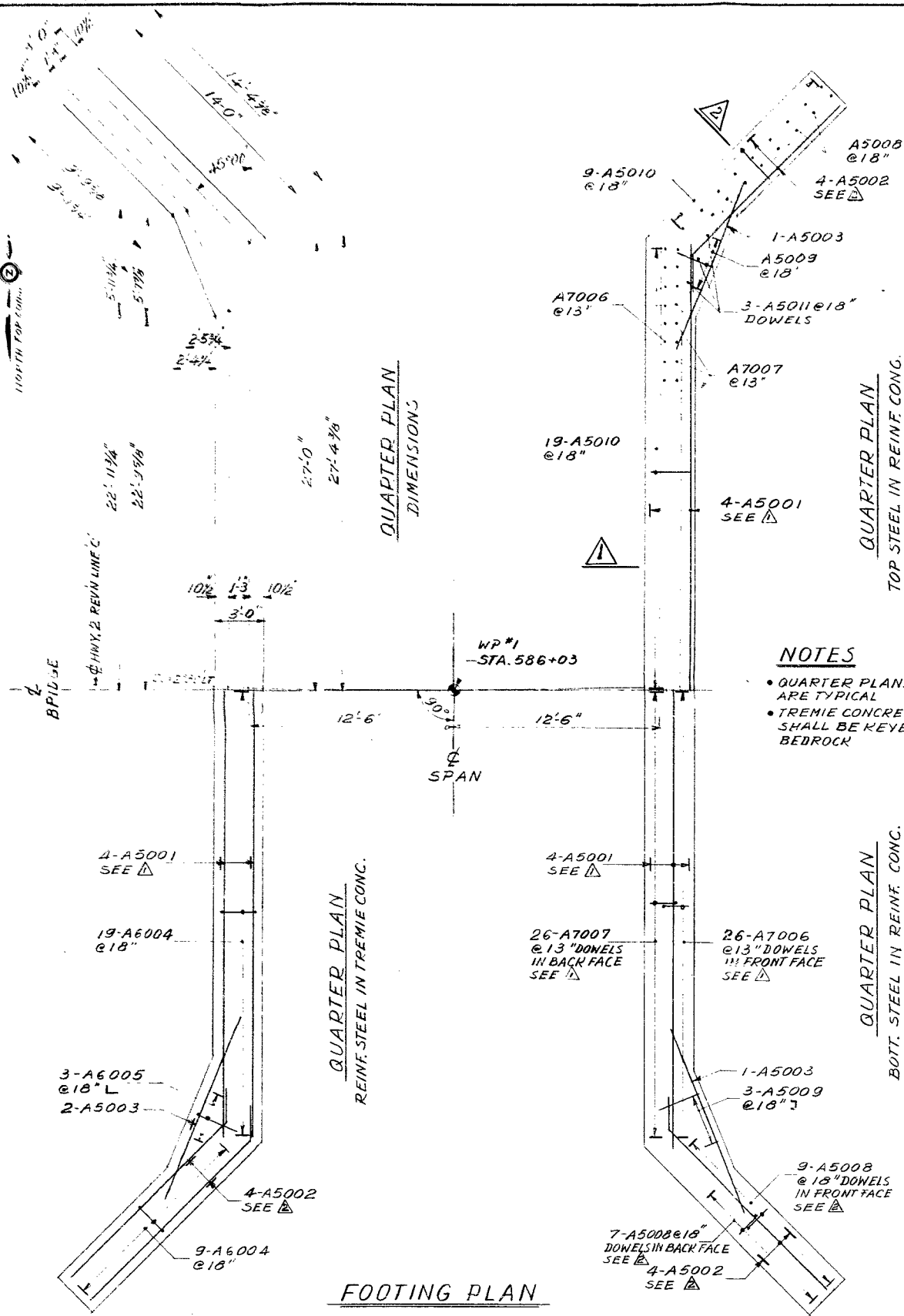
SHEET

DIMENSIONS AND REINFORCING
STEEL ARE SIMILAR FOR ALL FOUR
WING WALLS



BACK FACE FRONT FACE

ELEVATION OF WING WALLS

[illegible]

- QUARTER PLANS SHOWN ARE TYPICAL
- TREMIE CONCRETE FOOTINGS SHALL BE KEYED 6" INTO THE BEDROCK

QUARTER PLAN
TOP STEEL IN REINF. CONG.

QUARTER PLAN
BOTT. STEEL IN REINF. CONC.

SCALE:- $\frac{1}{4}" = 1'-0"$ OR AS NOTED

DOCUMENT MICROFILMING IDENTIFICATION

G-1-22 SEPT 1976

GEOCRES No. 31C-139

DIST 8 REGION Eastern

W.P. No. 836-70-05

CONT. No. 78-07

W. O. No. _____

STR. SITE No. 7-112

HWY. No. 2

LOCATION Proposed Structure at
The Crossing of Hwy 2 and
Grass Creek, 1 mi E of County Rd. 16

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 3

REMARKS: documents to be unfolded
before microfilming



Memorandum

To: Mr. R. W. Franks,
Manager, Construction,
Eastern Region, Kingston.

From: Structural Office,
West Building, Downsview.

Attention:

Date: 78 07 05

Our File Ref.

In Reply to

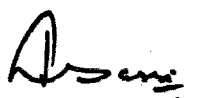
Subject: Contract 78-07,
Grass Creek Bridge, Site 7-112,
Highway 2, District 8, Kingston.

This will confirm the following instructions given to John Burleigh on the phone on 78 06 30 after being informed by him on 78 06 29 that the foundation excavation had revealed bedrock elevations substantially lower than those shown on the contract drawings.

1. Remove boulders at South end of East and West footings down to bedrock.
2. Excavate rock down to El. 238.00 at North end of East footing.
3. Eliminate tremie concrete shown on the drawings since the footing excavation was 'dry'.
4. Eliminate 6" key into bedrock since the bedrock surface was very rough.
5. Lower top of footing elevation to El. 240.50 and vary the depth of 3'-0" wide footing from 2'-6" to 5'-6". Place all reinforcement in footings as shown on drawing 7-112-3 (Sheet 78) except cut legs of bars A6004 when they extend above EL.240.00.
6. Item #5 results in an increase of 4'-6" in the height of the vertical walls of the structure. The attached sketches show the details and the additional concrete and reinforcing steel quantities for the extension.

If you have any questions please feel free to call.

KGB/cf
Attech.


K. G. Bassi,
Head, Eastern Section.

c.c. W. Hashizume
✓ M. Devata



FOUNDATION INVESTIGATION REPORT

For

Proposed Structure at the Crossing
of Hwy. 2 and Grass Creek
Frontenac Co., Twp. of Pittsburgh
District #8, Kingston
W.P. 836-70-05 Site No. 7-112

1. INTRODUCTION

It is proposed to replace the existing structure at the above crossing because of a) a shift in the horizontal alignment approximately 10 ft. to the south of the present alignment, and b) the poor condition of the existing structure. Mr. Tom Kingsland, Regional Structural Planning Engineer, Eastern Region, requested the Soil Mechanics Section in his memorandum dated May 22, 1975, to carry out a foundation investigation at two alternate locations of the structure, one at the location of the existing crossing and the other some 50 ft. northeast of it. Presented in this report are our findings from the field investigations, laboratory testing, and our recommendations pertaining to the foundations of the proposed alternatives and associated approaches.

2. SITE AND GEOLOGY

The site is located on Hwy. 2 between Kingston and Gananoque, one mile east of the junction of Hwy. 2 and County Rd. 16, in the Twp. of Pittsburgh, County of Frontenac.

In the immediate vicinity of the site, the terrain is rolling to gently undulating. Grass Creek Park lies south of Hwy. 2 and west of the present structure. The rest of the area is utilized mainly for residential purposes. Grass Creek meanders in this area, and flows in a north-south direction draining into Bateau Channel.

The existing single span, reinforced concrete rigid frame structure is 20 ft. wide, 13.5 ft. high, and 44 ft. long. According to available information, the structure is supported on spread footings (6'-7-1/2" X 42'-6") placed on bedrock at elevation 238.0 and was built in 1920.

The structure exhibits signs of deterioration, having badly weathered wingwalls (the northeast wingwall has been replaced by a gabion wall), exterior beams, slab faces, and the lower portions of the abutment walls. The concrete surface on the wingwalls and exterior beams has chipped off, and exposes the reinforcing steel.

Physiographically, the site is situated in the region known as the 'Leeds Knobs and Flats'. The soil type is Gananoque Clay. The bedrock formations underlying the area under investigation are of Precambrian and Paleozoic Ages. Ordovician limestones of the Black River and Trenton groups overlie the igneous and metamorphic rocks of the Precambrian age, but some Potsdam Sandstone is present in parts of Pittsburg Twp.

3. FIELD AND LABORATORY WORK

The field investigation consisted of seven boreholes. The boreholes were advanced using a skid mounted diamond drill. Disturbed samples were obtained using a 2-inch O.D. split-spoon sampler driven according to the specifications for the Standard Penetration Test, with a driving energy of 350 ft.lbs. per blow. Field vane tests were carried out to determine the in situ undrained shear strengths of the cohesive stratum.

The borehole locations and elevations were surveyed by personnel from the Kingston Regional Engineering Surveying Section. All elevations are referenced to the Geodetic Datum.

The locations of the boreholes are shown on Drawing No. 8367005-A. Also shown on this drawing are the inferred soil profiles across the site.

The samples were examined visually in the field and in the laboratory. Selected samples were analysed in the laboratory to determine the following soil properties:

- Liquid Limit
- Plastic Limit
- Moisture Content
- Grain-size Distribution

The results of the field and laboratory investigations are summarized on the Record of Borehole Sheets, Plasticity Chart, and Grain size Distribution curves.

4. SUBSOIL CONDITIONS

4.1 General

The boreholes were drilled through the existing roadway fill. In certain locations the fill material is underlain by bedrock, while in other locations a deposit of sand and gravel overlies bedrock.

The boundaries between the various layers as determined at the boring locations are shown on the accompanying Record of Borehole Sheets. The stratigraphical profiles inferred from this data, are shown on Drawing No. 8367005-A.

From ground surface downwards, the various soil types encountered are described below.

4.2 Fill Material

Roadway fill was placed for embankment construction. It was intersected in all boreholes. The upper 6-8 inches consists of sand and gravel used for subgrade purposes. However, in B.H. #7 the thickness of sand and gravel layer was 4 ft., and it was mixed with some silt and clay with traces of organics.

Except for the surficial sand and gravel layer, the remaining fill consists of a heterogeneous mixture of clayey silt to silty clay with varying amounts of sand and gravel, and traces of organics. The material is essentially cohesive in nature. The thickness of the fill varies from 7 ft. (B.H. #7) to 18.5 ft. (B.H. #2) extending to elevations varying from 244 to 253 ft. In situ vane tests indicate the consistency of the material to be firm to stiff. The Standard Penetration Tests show that the fill material was subjected to a moderate degree of compaction. Grain size distribution curves

performed on some samples within this layer are shown on Fig. 2.

The engineering properties of the cohesive portion of the fill as determined by the field and laboratory testing are as follows:

	<u>Range</u>	<u>Avg.</u>
Liquid Limit (WL%)	33-46	41
Plastic Limit (WP%)	20-30	25
Natural Moisture Content (W%)	13-28	24
Undrained Shear Strength (P.S.F.)		
Field Vanes	520-1920	Sensitivity: 2.2-3.0

The Atterberg Limit Tests, summarized above, are also plotted on the Plasticity Chart, Fig. 1. These results indicate that the material is of low to medium plasticity.

4.3 Sand and Gravel

This stratum was found in B.H.'s #1 and 5 beneath the fill and overlying the bedrock. It represents the original ground surface. The material consists of sand and gravel with traces of silt, clay and organics. The thickness of the stratum in both holes is 4.5 ft. Only one sample from this layer was recovered. The relative density of the material is estimated to be compact to dense.

4.4 Bedrock

Bedrock was proven by obtaining from 3.5 to 15.1 ft. of AXT size rock cores from six of the seven boreholes. The bedrock elevation varies from elev. 240.7 to 254.0 sloping in the southwest direction. In B.H.'s #5 and 7 a 1 ft. thick layer of boulders was encountered immediately above bedrock. Bedrock was exposed near the northwest corner of the existing structure.

Rock cores were examined by Mr. B. Glassford, Senior Geologist, M.T.C. and his report (Diamond Drill Record Sheets) are included in the Appendix.

The bedrock types encountered are variable and include quartzite, a classified metamorphic rock, basal conglomerate, and gneiss. The bedrock is badly to moderately fractured with weathered surfaces. Detailed descriptions of the rock cores are provided on the Diamond Drill Record Sheets.

5. GROUNDWATER CONDITIONS

Groundwater level observations were carried out during the time of the field investigation. The groundwater level in the open boreholes is at a depth of 15 to 17 ft. below the existing ground surface. The depth corresponds to elevations between 244 to 248.5 ft. The creek water level at the time of the investigation was 245.8. Water depths in the creek taken from the existing structure ranged from about 2 ft. at the sides to about 4 ft. under the center of the structure.

6. DISCUSSION AND RECOMMENDATIONS

6.1 General

It is proposed to construct a new structure to replace the existing one. The replacement was necessitated because of a 10 ft. southward shift of the alignment and the poor condition of the present structure, which is a 20 ft. span rigid frame reinforced concrete culvert. The new proposal calls for a single span bridge with a span of 25 ft.

Originally two alternate locations were suggested (i) at Sta. 585+97 i.e. very close to the existing culvert which is at Sta. 585+95 and (ii) Sta. 586+45 i.e. about 50 ft. northeast of it. The latter alternative could be shifted further 20-30 ft. northeast if the subsoil conditions were found more favourable at this location. A structure located to the northeast of the existing one would improve the hydraulic efficiency of the creek by straightening the direction of flow.

The subsoil conditions were immediately transmitted to Mr. Tom Kingsland verbally, as the field work progressed. Based on the field information it was tentatively decided between the Soil Mechanics Section and Structural Planning Office, that it would be preferable to locate the new structure at approximately the same place as the existing one. The reasons for this decision were:

- (i) a structure located further northeast would need a rock excavation, because of the higher rock surface,
 - (ii) the flow in the creek is relatively small and therefore hydraulic efficiency is not of paramount importance.
- The recommendations in the following subsections are primarily for the structure at Sta. 585+97, but they are equally applicable to other locations in the immediate vicinity.

The profile grade of Hwy. #2 will be unaltered (elev. 263 ft.).

The following three types of structures are discussed separately in the text below:

- (i) Spill through type abutments
- (ii) Closed abutments
- (iii) Arch type

6.2 Spill Through Type Abutments

The abutments may be supported on spread footings placed on well compacted granular material within the approach fills. If bouldery fill is placed in this area, then it should be sub-excavated within the footing area, and replaced with a suitable granular material at least 3 ft. thick. This pad should be compacted and footings placed on it. An allowable bearing pressure of 2.5 tons/sq. ft. may be used for design purposes.

As an alternative, the abutments may be constructed within the approach fills and supported on end-bearing piles driven to bedrock. The piles should be designed to carry maximum allowable load for the particular pile section chosen. No bouldery fill should be placed in the area through which piles are to be driven, and the largest grain size should be restricted to 3 inches.

6.3 Closed Type Abutments

The closed abutments should be founded on spread footings placed within the bedrock. The bedrock is fractured and sloping, therefore, it is recommended that the footings be keyed into bedrock. An allowable load of 5 tons/sq. ft. may be used for design purposes. It is reported that the existing structure is supported on spread footings placed on bedrock at approximate elevation 238 ft.

The coefficient of frictional resistance between bedrock and the base of the spread footings may be assumed to be 0.5. The rigid walls of the abutments should be designed using a coefficient of earth pressure at rest (K_0) of 0.5 for the granular fill material placed behind the walls. However, if some movement of the abutment walls is permitted, then a coefficient of earth pressure of 0.33 may be used for granular backfill. Backfill for the abutments consisting of free-draining granular material as per current M.T.C. standards should be carried out and provision for drainage from this material should be made to ensure that no excess hydrostatic or ice pressure builds up behind the walls.

A dewatering scheme will be required to pour concrete in the dry.

In case rock excavation is required, it will be necessary to use blasting operation prior to removal of rock, even though bedrock is fractured. Furthermore, if fractures are exposed in the excavation, they will permit water to seep into the excavation. In that case it may be necessary to pour a tremie concrete seal.

6.4 Arch Type Structure

The recommendations contained in Sub-Section 6.3 are applicable to the arch type structure also.

In the case of arch, backfill should be placed to the same level on both sides simultaneously. In addition, the stability of the arch should be checked for intermediate condition when no load is placed on the crown. In case instability is detected,

it will be necessary to load the top of the arch or take other precautionary measures to guard against the instability.

6.5 Approach Embankment

The horizontal alignment will be shifted as shown on Dwg. 8367005-A. The present vertical grade of about elev. 263 will be maintained. The creek bed is about elev. 240 to 242. No stability problems are anticipated for 2 horizontal to 1 vertical slopes. The portion of the new embankment should be 'keyed' into the existing embankment in accordance with current M.T.C. practices.

The subsoil, beneath the new portions of the approach embankments, will settle due to the imposed loading; this settlement will be in the order of 1 inch.

7. MISCELLANEOUS

The field work for this investigation was carried out during the period of July 28, 1975 to August 7, 1975, under the supervision of Mr. H. Shah, Project Engineer.

The equipment used for subsoil sampling was owned and operated by Atcost Drilling Co.

This report was written by Mr. H. Shah, Project Engineer, and was reviewed by Mr. M. Devata, Supervising Engineer.

H. Shah
for H. SHAH

M. Devata
M. DEVATA



August 1975

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 1

W.P. 836-70-05
DIST. 8 HWY. 2
DATUM Geodetic

LOCATION Sta. 585 + 59 15' Rt.
BOPING DATE July 28, 29, 1975
BOREHOLE TYPE Washboring, BX, BX, BX Casing, AXT Core

ORIGINATED BY
COMPILED BY GE
CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT ——— % PLASTIC LIMIT ——— % WATER CONTENT ——— %			UNIT WEIGHT Y	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	N' VALUES		20	40	60	80	100	W _p	W _L	W		
261.6	Ground Level															
0.0	Fill sand & grav.		1	SS	15											
	Het. mix. of clayey silt to silty clay, varying amounts of sand, grav. traces of organics. Firm to Stiff sand & grav. tr. orgs.		2	SS	22											
			3	SS	12											
			4	SS	8											
			5	SS	4											
246.6			6	SS	12											
15.0	Sand & grav., traces of silt, clay & organics.		7	SS	22											
242.1	Compact to Dense		8	AXT	60%											
19.5	Redrock* Fractured Quartzite		9	AXT	100%											
	Unclassified metamorphic rock		10	AXT	58%											
233.6			11	AXT	75%											
28.0	End of Borehole															
	*Note: Refer to Diamond Drill Record for detailed logging of the rock cores.															

RECORD OF BOREHOLE No 2

SOIL PROFILE		SAMPLES			GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT	LIQUID LIMIT PLASTIC LIMIT WATER CONTENT	UNIT WEIGHT γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE					
262.5	Ground Level								
	Fill								
	Het. mix. of clayey silt to silty clay, varying amounts of sand & gravel, occasional cobbles, trace of organics.		1	SS	6				
			2	SS	14				
			3	SS	14				
			4	SS	13				
			5	SS	13				
			6	SS	14				
244.0	Firm to Stiff								
18.5	Bedrock - Fractured Quartzite		7	AKT	82%				
	Basal Conglomerate								
233.5	Unclass. meta-sedimentary rock		8	AKT	100%				
29.0	End of Borehole								
	Note: Refer to Diamond Drill Record for detailed logging of rock cores.								
	Note: Hole caved in at 14' depth. Est. water level Elev. 248.5								

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 3

W.P. 836-70-05 LOCATION Sta. 586 + 76 20' Rt. ORIGINATED BY RS
 DIST. 8 HWY. 2 BORING DATE July 31, 1975 COMPILED BY CY
 DATUM Geodetic BOREHOLE TYPE Washboring, HX, HX, BX Casing & AXT Rock Core CHECKED BY _____

SOIL PROFILE			SAMPLES			GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT				LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w			UNIT WEIGHT γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	N° VALUES		20	40	60	80	w_p	w	w_L		
262.4	Ground Level														
0.0	Fill Het. mix. of clayey s. to silty clay, some s. traces of gravel, org.		1	SS	9	260									
254.0	Firm to Stiff		2	SS	27										
8.4	Bedrock* Fractured		3	CS											4 11 32 53
	Unclassified Metamorphic rock		4	AXT	100										
	Quartzite		5	AXT	90%	250									
			6	AXT	100%										
238.9	End of Borehole		7	AXT	95%	240									
23.5	*Note: Refer to Diamond Drill Record for detailed logging of rock cores.					230									

RECORD OF BOREHOLE No 4

SOIL PROFILE			SAMPLES			GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT	LQUID LIMIT — w_L PLASTIC LIMIT — w_p	UNIT WEIGHT γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	'N' VALUES		20 40 60 80 100	WATER CONTENT — w $w_p \quad w \quad w_L$		
262.6	Ground Level						SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL * LAB VANE	WATER CONTENT % 20 40 60		% GR.SA.SI.CL.
0.0	Fill Het.mix.of clayey si. to silty clay,varying amounts of grav.,some sand,trace of organic	X	1	SS	11	260				
252.8	Stiff	X	3	SS	5070		+ s3	10-1		
9.8	End of Borehole Probable Bedrock				bouncing					

OFFICE REPORT ON SOIL EXPLORATION

15 ²⁰ 5 % STRAIN AT FAILURE

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 5

W.P. 836-70-05 LOCATION Sta. 586 + 14 19' Lt. ORIGINATED BY ES
 DIST. 8 HWY. 2 BORING DATE August 6, 1975 COMPILED BY cy
 DATUM Geodetic BOREHOLE TYPE Washboring, HX, NX, BX Casing & AXT Core CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			UNIT WEIGHT γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	w_p	w	w_L		
260.9	Ground Level					ELEV.										
0.0	Fill ^{sand & grav.} Het. mix. of clayey si. to silty clay, varying amounts of sand, grav. traces of organics.		1	SS	6	260										0 4 49 47
			2	SS	16											
245.9	Firm to Stiff		3	SS	46	250										
15.0	Sand & grav., traces of silt, clay, orgs. Compact to Dense		4	SS	70%											
240.7	^{boulders}															
20.2	Bedrock* Fractured Quartzite		5	AXT	70%	240										
232.5			6	AXT	82%											
28.4	End of Borehole					230										
	*Note: Refer to Diamond Drill Record for detailed logging of the rock cores.															
	Note: Hole caved in at 16.9' depth. Est. water level elev. 244.0															

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 6

W.P. 836-70-05 LOCATION Sta. 586 + 34 18' Lt. ORIGINATED BY HS
DIST 8 HWY. 2 BORING DATE August 6, 1975 COMPILED BY OY
DATUM Geodetic BOREHOLE TYPE Washboring, HX, NX, BX Casing, AXT Core CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			UNIT WEIGHT γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	w_p	w	w_L		
260.4	Ground Level															
	Fill sand & gravel					260										
	Het. mix. of clayey sl. to silty clay, varying amounts of sand, grav. trace of organics.		1	SS	5											
			2	SS	6											
			3	CS	-											
248.4	Firm to Stiff					250										
12.0	Bedrock* Fractured Gneiss		4	AXT	93%											
243.4																
17.0	End of Borehole					240										
	*Note: Refer to Diamond Drill Record for detailed logging of rock core.															

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 7

W.P. 836-70-05 LOCATION Sta. 586 + 61 17' Lt. ORIGINATED BY HS
 DIST. 8 HWY. 2 BORING DATE August 7, 1975 COMPILED BY OY
 DATUM Geodetic BOREHOLE TYPE Washboring, HX, NX, BX Casing & AXT Core CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w			UNIT WEIGHT γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	w_p	w	w_L		
260.5	Ground Level															
0.0	Fill-Sand & gravel, some silt, some clay, trace orgs. Compact		1	SS	11	260										
256.5	Fill-Het. mix. of claye silt to silty clay var. Bnts. ss. & firm of org.		2	CS	-											
4.0			3	SS	7											
252.3	boulders		4	AXT	100%											
8.2	Bedrock		5	AXT	100%	250										
248.8	Quartzite		6													
11.7	End of Borehole															



HOLE NO. 1 SHEET NO. _____

900

PROPERTY LOCATION W.P. 836-70-05
Grasscreek and Hwy. 2 Crossing
between Kingston and Gananoque

LATITUDE _____

DEPARTURE _____

BEARING _____

TOTAL FOOTAGE: 28'0"

LOGGED BY

DATE OF EXAMINATION Aug. 12/75

B. K. Glassford



DIAMOND DRILL RECORD

HOLE NO. 2 SHEET NO. _____

DIP

90°

ELEV. COLLAR

DATUM

DATE STARTED

DATE COMPLETED

DRILLED BY

LOGGED BY

PROPERTY _____ W. P. 836-70-05
LOCATION _____ Grasscreek and Hwy. 2 Crossing
_____ between Kingston and Gananoque
LATITUDE _____
DEPARTURE _____
BEARING _____

TOTAL FOOTAGE 29'0"

[illegible]

DATE OF EXAMINATION Aug. 12/75

B. K. Glassford



Ministry of
Transportation
and
Communications

DIAMOND DRILL RECORD

HOLE NO. 3 SHEET NO.

DIF

PROPERTY W. P. 836-70-05
LOCATION Grasscreek and Hwy. 2 Crossing
between Kingston and Gananoque
LATITUDE _____
DEPARTURE _____
BEARING _____

90°

TOTAL FOOTAGE 23'7"

ELEV. COLLAR

DATUM

DATE STARTED

DATE COMPLETED

DRILLED BY

LOGGED BY

[illegible]

DATE OF EXAMINATION Aug. 12/75

B. K. Glassford



DIAMOND DRILL RECORD

HOLE NO. 5 SHEET NO.

DIP

90°

PROPERTY W. P. 836-70-05
LOCATION Grasscreek and Hwy. 2 Crossing
between Kingston and Gananoque
LATITUDE _____
DEPARTURE _____
BEARING _____

TOTAL FOOTAGE 28'5"

ELEV. COLLAR _____
 DATUM _____
 DATE STARTED _____
 DATE COMPLETED _____
 DRILLED BY _____
 LOGGED BY _____

[illegible]

DATE OF EXAMINATION Aug. 12/75

B. K. Glasford

HOLE NO. 6 SHEET NO.

90°

30	
TOTAL FOOTAGE	17'0"

ELEV. COLLAR _____
 DATUM _____
 DATE STARTED _____
 DATE COMPLETED _____
 DRILLD BY _____
 LOGGED BY _____

[illegible]

DATE OF EXAMINATION August 12, 1975

B. K. Glassford



DIAMOND DRILL RECORD

HOLE NO. 7 SHEET NO.

BIP

90°

PROPERTY _____ W P 836-70-05
LOCATION _____ Grasscreek and Hwy. 2 Crossing
_____ between Kingston and Ganarogue

LATITUDE _____
DEPARTURE _____
BEARING _____

TOTAL FOOTAGE 11'8"

ELEV. COLLAR _____
 DATUM _____
 DATE STARTED _____
 DATE COMPLETED _____
 DRILLED BY _____
 LOGGED BY _____

[illegible]

DATE OF EXAMINATION AUG. 12/75

B. K. Glassford

GRAIN SIZE DISTRIBUTION

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT

SAND

GRAVEL

Fine

Medium

Coarse

Fine

Coarse

MINISTRY SIEVE DESIGNATION

276 200 150 100 60 50 40 30 20 16 10 8 4 3/8 1/2 3/4 1 1 1/2 2 2 1/2 3"

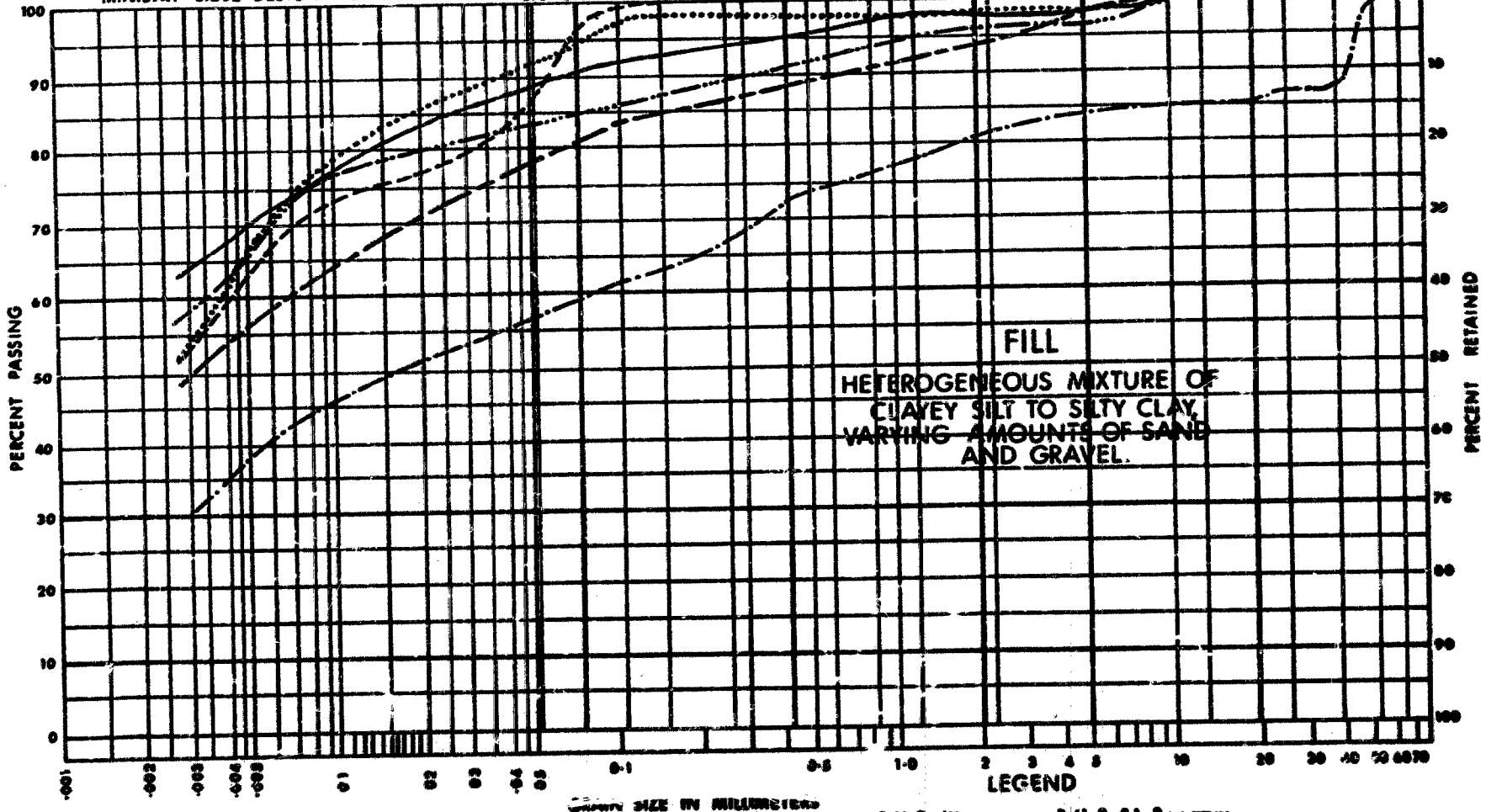


FIG. 1

W.P. 836-70-05

PLASTICITY CHART

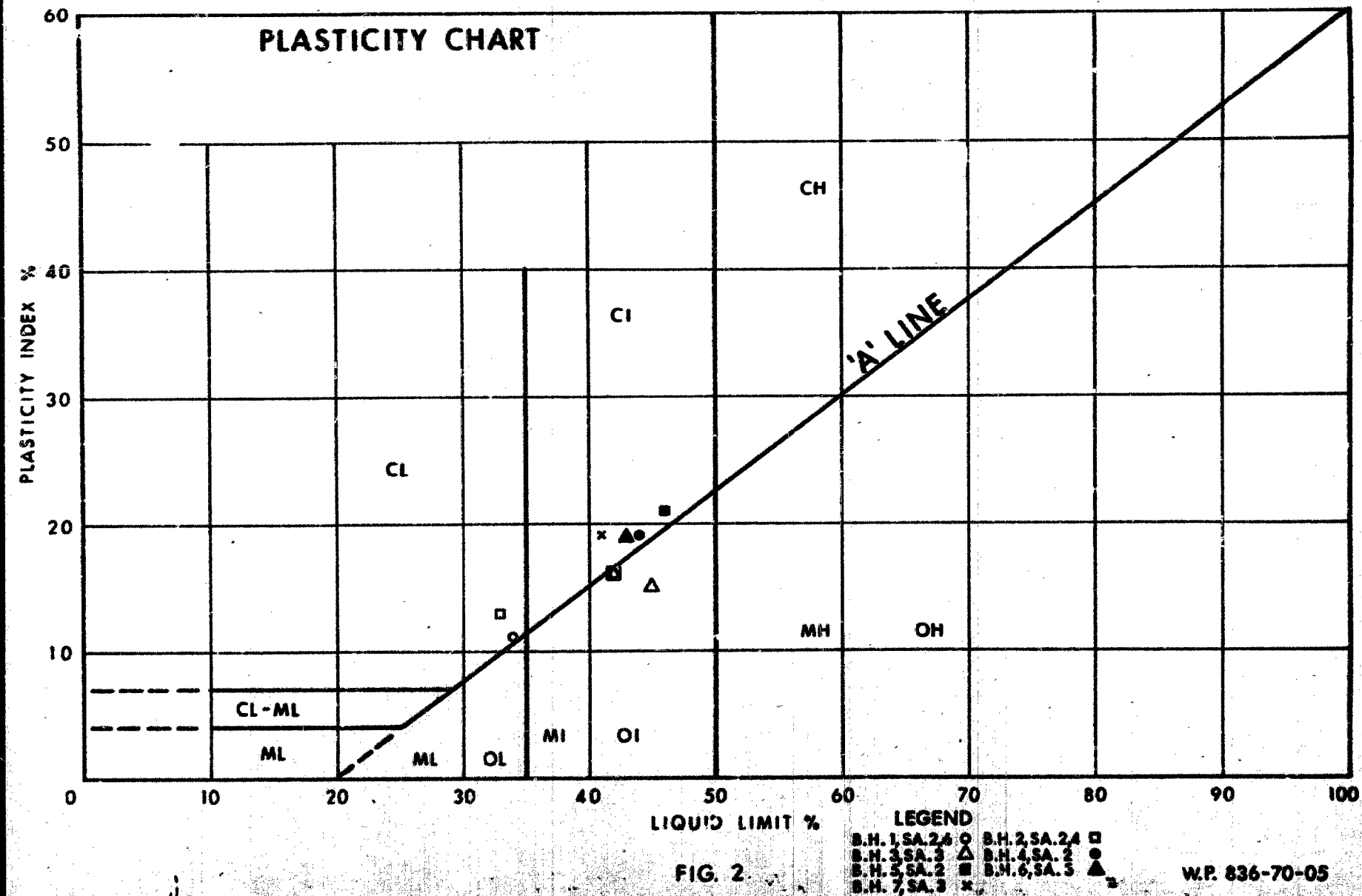
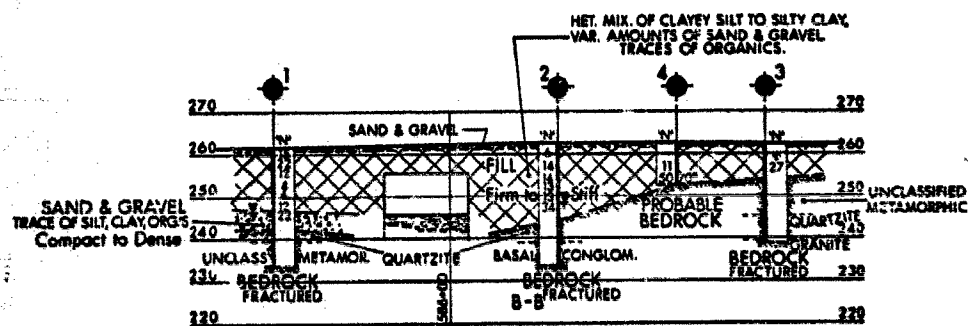
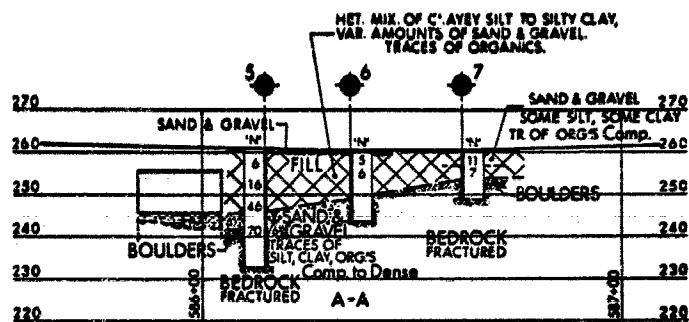
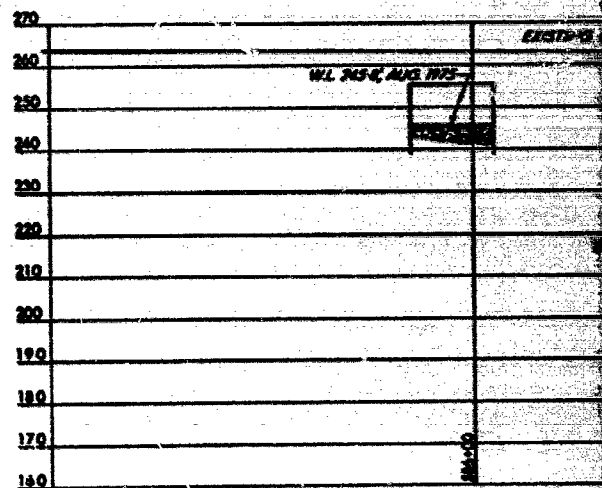
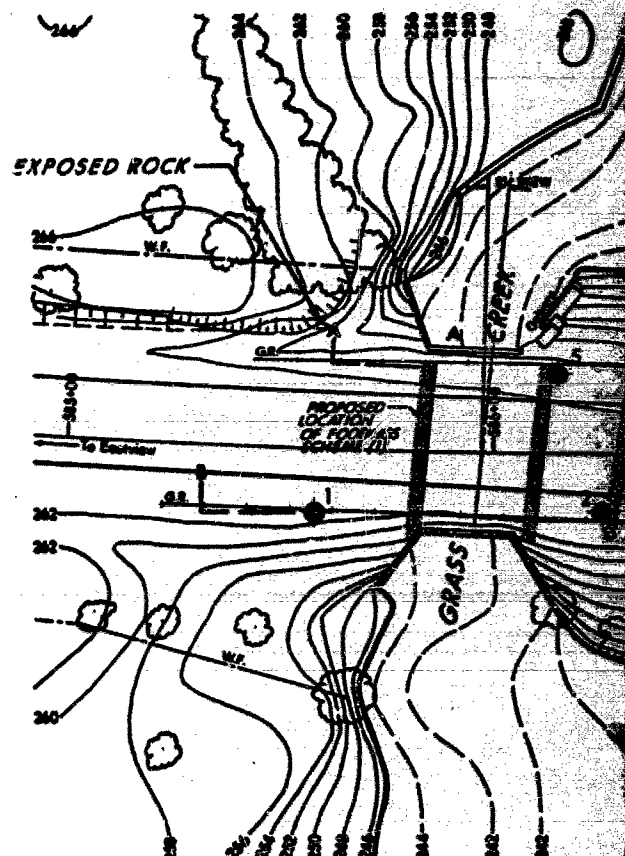


FIG. 2



SECTIONS

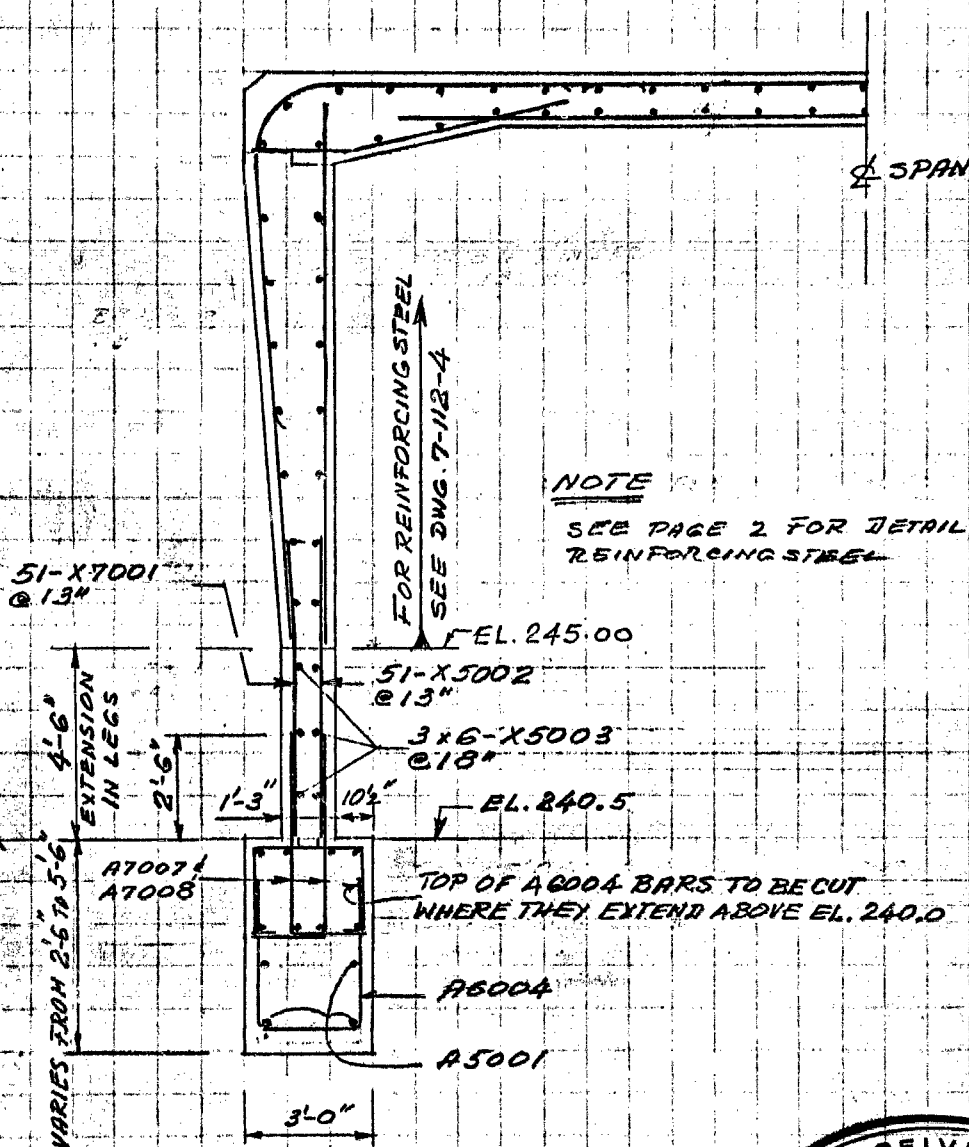
20 10 0 SCALE 20 40 FT.



GRASS CREEK BRIDGE

WP. 836-70-05 SITE 7-112

CONT. # 78-07



NOTE

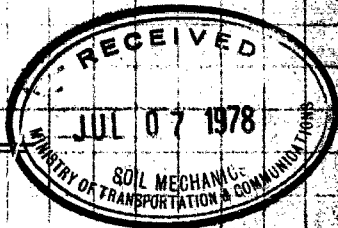
SEE PAGE 2 FOR DETAIL OF ADDITIONAL REINFORCING STEEL

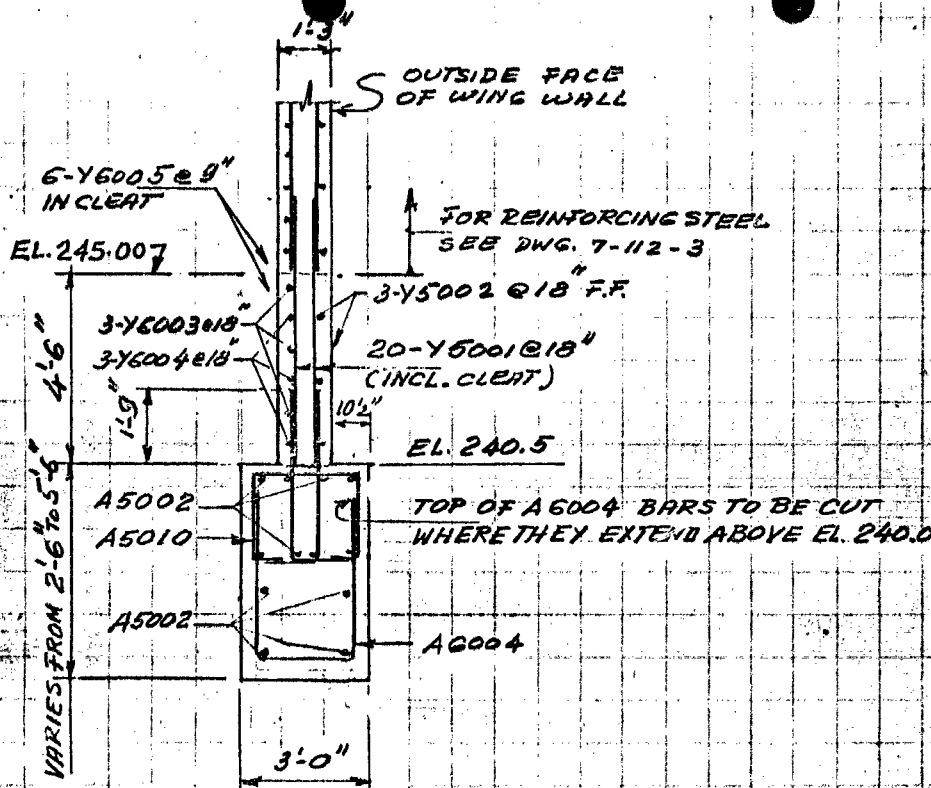
HALF SECTION OF FRAME

SCALE: 1/4" = 1'-0"

ADDITIONAL CONCRETE QUANTITIES

CONCRETE IN STRUCTURE 24.5 cu yd.





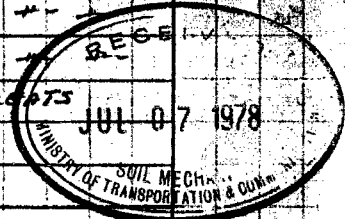
SECTION OF WING WALL TYP.

SCALE:- 1/4" = 1'-0"

REINFORCING STEEL TABLE - EXTRA REINF.

MARK	N°	SIZE	LENGTH	TYPE	LOCATION
X 7001	102	#7	7'-0"	4'-6" 2'-6" (bent)	VERT. BACK FACE OF ABUT.
X 5002	102	#5	7'-0"	STRAIGHT	11" FRONT 11" 11"
X 5003	36	#5	18'-10"	DO	HORIZ. EACH 11" 11"
X 5004	12	#5	3'-6"	1'-9" 1'-3/4"	11" ENDS OF ABUT.
Y5001	80	#5	6'-3"	STRAIGHT	VERT. BOTH FACE OF WINGW.
Y5002	12	#5	13'-6"	DO	HORIZ. FRONT FACE 11"
Y6003	12	#6	11'-9"	DO	11" BACK 11" 11"
Y6004	12	#6	6'-0"	DO	11" 11" 11"
Y6005	24	#6	10'-0"	DO	HORIZ. IN CLEATS

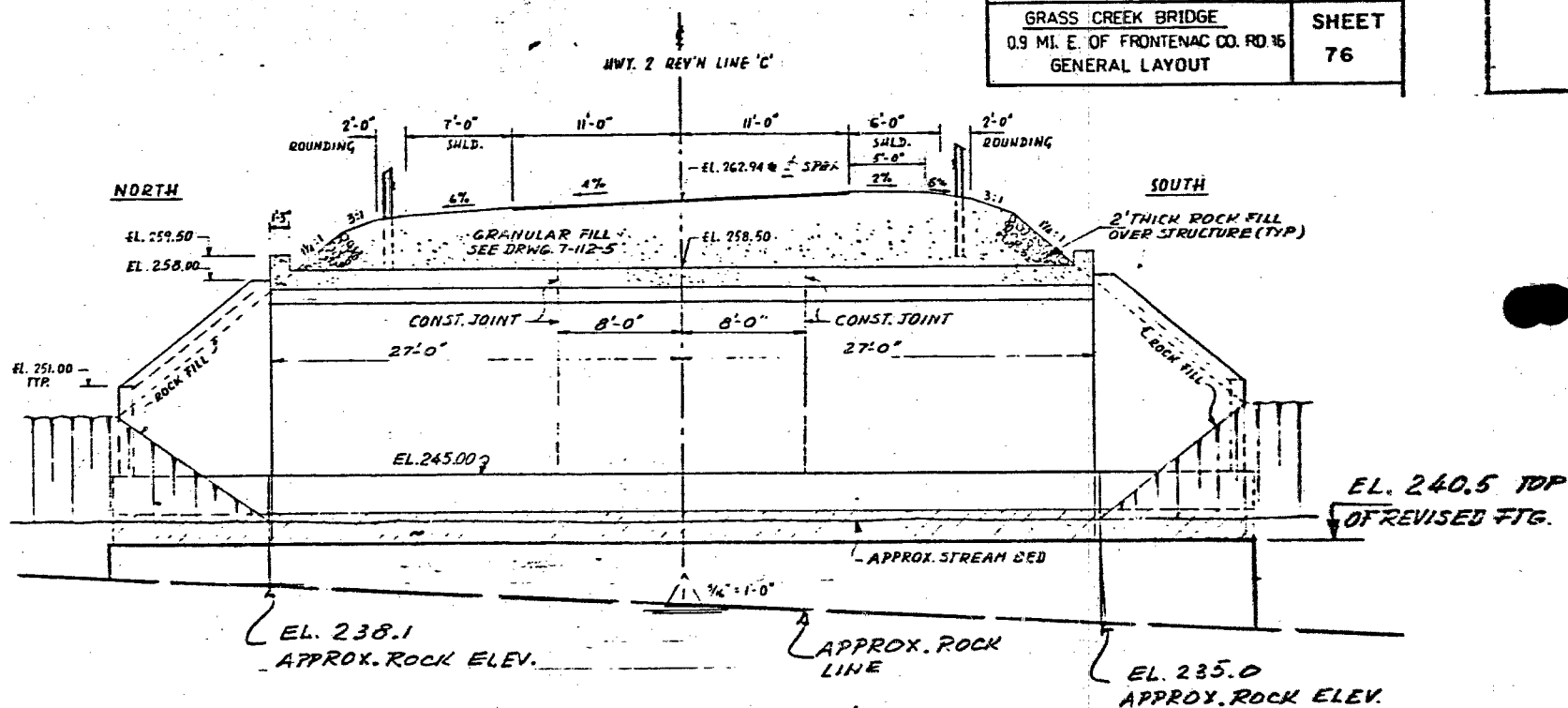
TOTAL WEIGHT OF REINF. STEEL = 4356 lbs



WP No 836-70-05



SHEET
76



(HALF SIZE PRINT)



DIST. 8

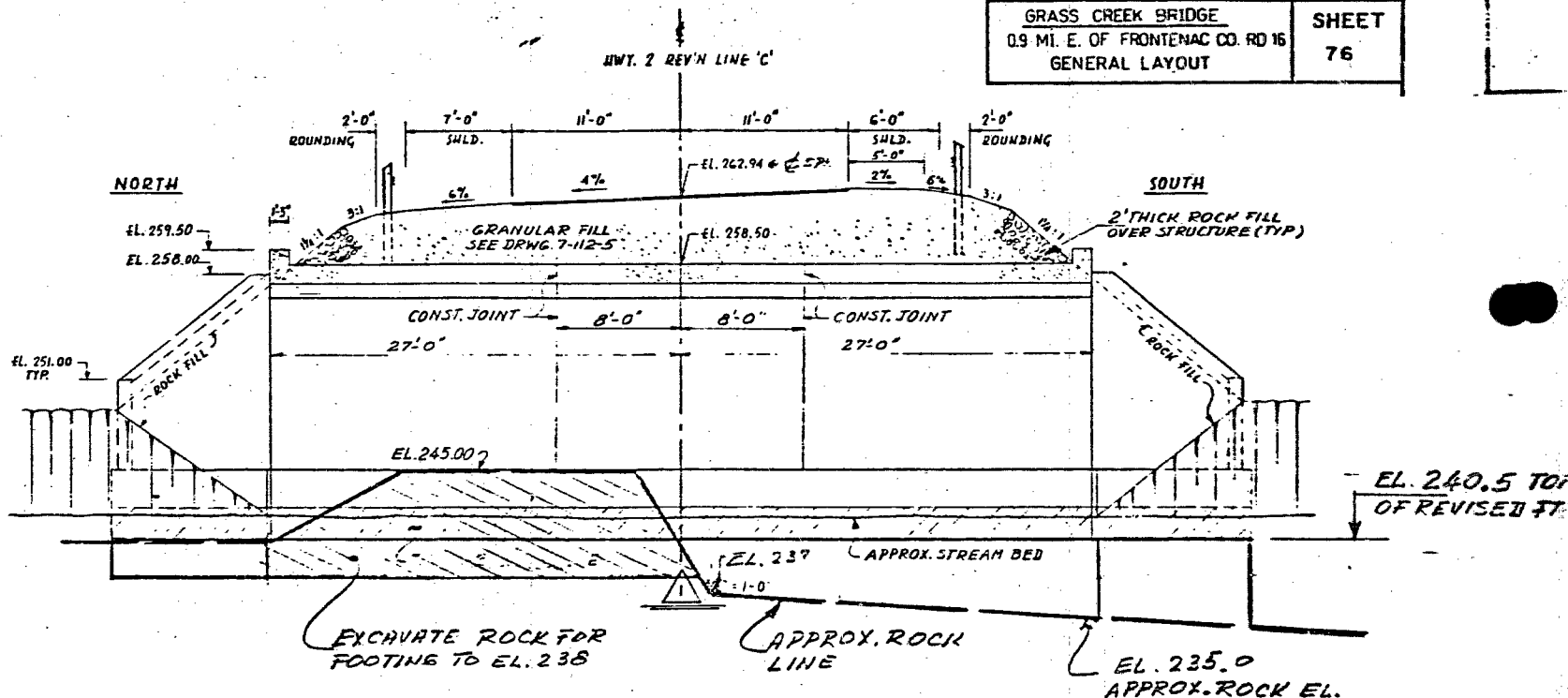
CONT No 78-07

WP No 836-70-05

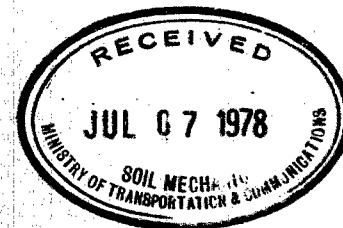


GRASS CREEK BRIDGE
0.9 MI. E. OF FRONTENAC CO. RD 16
GENERAL LAYOUT

SHEET
76



EAST ABUTMENT
(HALF SIZE PRINT)



SEND TO

C. MIRZA

M. Devata

DATE

Sept 3/75

SUBJECT

Report -

W.P. 836-70-05

Dist 8

MESSAGE

Please note following comments on report:

- 1) on page 7, an allowable load of 5 TSF is recommended for "keyed" ftgs on bedrock. Bedrock is a Quartzite. Surely we can do better than 5 TSF, or is the rock really all that bad?
- 2) Page 7, last para above 6.4: "Furthermore, if fractures are exposed in the excavation,". Why not say due to fractures, water seepage will occur?
- 3) Page 8: what other precautionary measures?
- 4) Please advise draftsman who assembled the report that our red file copy contains two page 5's!

REPLY

USE LOWER PORTION FOR REPLY

REPLY FROM

DATE