DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 30M14-191A

DIST. 6 REGION

W.P. No. 260-86-01/A

CONT. No. 89-106

W. O. No.

STR. SITE No. 37-206R

HWY. No. 401

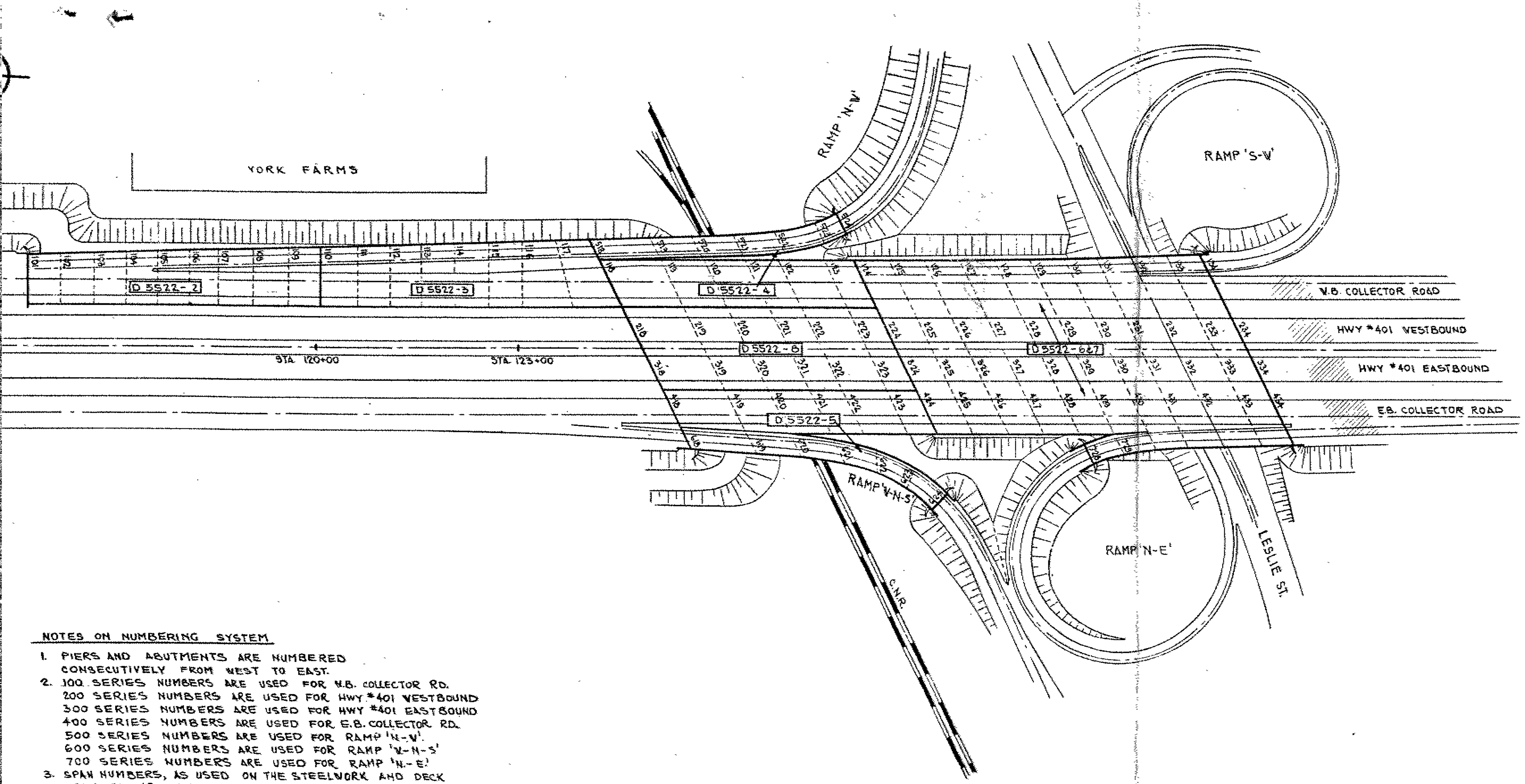
LOCATION Structure Widening
Leslie St. & C.W.R. Overpass

No of PHASES -

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.

REMARKS:

G.I.-30 SEPT. 1976



GENERAL NOTES

NOTE TO ENGINEER

CONSTRUCTION MUST NOT BE COMMENCED ON THIS STRUCTURE UNTIL MONUMENTS TO FIX CONTROL POINTS HAVE BEEN ERECTED AND CHECKED BY THE ENGINEER.

NOTE TO GENERAL CONTRACTOR

STRUCTURE TO BE BUILT IN ACCORDANCE WITH THE LATEST ISSUE OF D.H.O. FORM #9 AND THE SPECIAL PROVISIONS, EXTRA COPIES OF WHICH MAY BE OBTAINED FROM THE ENGINEER.

CONCRETE

CONCRETE IN CAISSONS, FOUNDATIONS, ABUTMENTS AND PIERS TO HAVE A MINIMUM STRENGTH OF 3000 P.S.I. AT 28 DAYS. CONCRETE IN DECK TO HAVE A MINIMUM STRENGTH OF 4000 P.S.I. AT 28 DAYS. ADMIXTURES SUPPLIED BY THE CONTRACTOR TO BE ADDED TO THE CONCRETE AS DIRECTED BY THE ENGINEER. ALL EXPOSED EDGES TO HAVE A 1" CHAMFER, EXCEPT AS NOTED. ALL CONSTRUCTION JOINTS MUST BE APPROVED BY THE ENGINEER.

COVER TO REINFORCING STEEL

CLEAR COVER TO REINFORCING STEEL TO BE AS FOLLOWS, EXCEPT AS NOTED: SURFACES IN CONTACT WITH EARTH OR FILL 3", DECK SLAB 1", PARAPETS 1½" AND ALL OTHER SURFACES 2".

BEARING SEATS

THE BRIDGE SEATS ARE TO BE FINISHED DEAD LEVEL TO THE SPECIFIED ELEVATION WITH A TOLERANCE OF ± ⅛". NO CONCRETE IS TO BE PLACED ABOVE THE BRIDGE SEAT ELEVATION UNTIL AFTER THE CONCRETE IN THE DECK HAS BEEN PLACED. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT THE FINAL DECK ELEVATIONS ARE CORRECT.

BORING DATA

THE COMPLETE SOILS INVESTIGATION REPORTS MAY BE EXAMINED AT THE D.H.O. BRIDGE OFFICE, DOWNSVIEW. THE DEPARTMENT DOES NOT GUARANTEE THE ACCURACY OF THESE REPORTS, OR THE SOILS INFORMATION ON THESE DRAWINGS.

HOLES FOR ANCHOR BOLTS

THE CONTRACTOR SHALL SEAL ALL HOLES FOR ANCHOR BOLTS AGAINST THE ENTRANCE OF WATER.

NOTES ON NUMBERING SYSTEM

1. PIERS AND ABUTMENTS ARE NUMBERED CONSECUTIVELY FROM WEST TO EAST.
2. 100 SERIES NUMBERS ARE USED FOR W.B. COLLECTOR RD.
   200 SERIES NUMBERS ARE USED FOR HWY #401 WESTBOUND
   300 SERIES NUMBERS ARE USED FOR HWY #401 EASTBOUND
   400 SERIES NUMBERS ARE USED FOR E.B. COLLECTOR RD.
   500 SERIES NUMBERS ARE USED FOR RAMP 'N-W'.
   600 SERIES NUMBERS ARE USED FOR RAMP 'W-N-S'
   700 SERIES NUMBERS ARE USED FOR RAMP 'N-E'
3. SPAN NUMBERS, AS USED ON THE STEELWORK AND DECK DRAWINGS, ARE DERIVED FROM THE PIER OR ABUTMENT NUMBER AT THE WEST END OF THE SPAN.

GENERAL LAYOUT PLAN

SCALE 1" = 100'

DRAWING NUMBERS SHOWN ON PLAN ARE THE GENERAL ARRANGEMENT DRAWINGS FOR THE AREAS INDICATED.

DWG. No.	TITLE	DWG. No.	TITLE	DWG. No.	TITLE	DWG. No.	TITLE
		-73	REINFORCING STEEL SCHEDULE - PIERS 125 TO 130	-49	DECK DETAILS - SPANS 101 TO 115	-25	PIERS 620 & 621
		-72	REINFORCING STEEL SCHEDULE - PIERS 119 TO 124	-48	KEY PLAN & BOULEVARD DETAILS - SPANS 101 TO 117	-24	PIERS 520 & 521
		-71	REINFORCING STEEL SCHEDULE - PIERS 116 TO 118 & 518	-47	STEEL DETAILS - EXISTING C.N.R. BRIDGE	-23	PIERS 519, 522 & 523
		-70	REINFORCING STEEL SCHEDULE - PIERS 109 TO 115	-46	MISCELLANEOUS STEEL DETAILS	-22	PIERS 420 & 421
		-69	REINFORCING STEEL SCHEDULE - PIERS 102 TO 108	-45	STEEL DETAILS - CONTINUOUS SPANS	-21	PIERS 419 & 422 TO 429
	ELECTRICAL DRAWINGS	-68	REINFORCING STEEL SCHEDULE - ABUT. 134, 234, 334 & 434	-44	STEEL DETAILS - SIMPLE SPANS	-20	PIERS 120 & 121
D 5522-91	REINFORCING STEEL SCHEDULE - APPROACH SLABS	-67	REINFORCING STEEL SCHEDULE - ABUT. 524 & 624	-43	FRAMING PLAN - SPANS EAST OF PIERS 124, 224, 324 & 424	-19	PIERS 119 & 122 TO 126
-90	APPROACH SLABS - EAST	-66	REINFORCING STEEL SCHEDULE - ABUT. 218, 318, 418 & 618	-42	FRAMING PLAN - SPANS 418 TO 423 & 618 TO 623	-18	ABUTMENTS 418 & 618 - DETAILS
-89	APPROACH SLABS - RAMPS	-65	REINFORCING STEEL SCHEDULE - ABUT. 101 & 728	-41	FRAMING PLAN - SPANS 118 TO 123 & 518 TO 523	-17	ABUTMENTS 218 & 318 - DETAILS
-88	APPROACH SLABS - WEST	-64	CONCRETE SLOPE PAVING	-40	FRAMING PLAN - SPANS 101 TO 117	-16	PIERS 116 TO 118 & 518
-87	R./S. SCHEDULE - DECK SPANS 430 TO 433, 728, 729 & MISCELLANEOUS	-63	DETAILS OF PARAPET RAILING	-39	ABUTMENT 434 - DETAILS	-15	PIERS 111 TO 115
-86	R./S. SCHEDULE - DECK SPANS 124 TO 133, 224 TO 233, 324 TO 333 & 424 TO 429	-62	PARAPET RAILING LAYOUT	-38	ABUTMENTS 234 & 334 - DETAILS	-14	PIERS 102 TO 110
-85	R./S. SCHEDULE - DECK SPANS 518 TO 523 & 618 TO 623	-61	DECK DETAILS - SCREED ELEVATIONS II	-37	ABUTMENT 134 - DETAILS	-13	ABUTMENT 101 - DETAILS
-84	R./S. SCHEDULE - DECK SPANS 118 TO 123, 418 TO 423 & EXIST. C.N.R. BRIDGE	-60	DECK DETAILS - SCREED ELEVATIONS I	-36	PIERS 431 TO 433	-12	FOUNDATION LAYOUT - SHEET 4
-83	REINFORCING STEEL SCHEDULE - DECK SPANS 101 TO 117	-59	DECK DETAILS - SPANS 430 TO 433, 728 & 729	-35	PIERS 231 TO 233 & 331 TO 333	-11	FOUNDATION LAYOUT - SHEET 3
-82	REINFORCING STEEL SCHEDULE - PIERS 619 TO 623	-58	DECK DETAILS - SPANS 424 TO 429	-34	PIERS 131 TO 133	-10	FOUNDATION LAYOUT - SHEET 2
-81	REINFORCING STEEL SCHEDULE - PIERS 519 TO 523	-57	DECK DETAILS - SPANS 324 TO 333	-33	PIERS 225 TO 230 & 325 TO 330	-9	FOUNDATION LAYOUT - SHEET 1
-80	REINFORCING STEEL SCHEDULE - PIERS 431 TO 433 & 729	-56	DECK DETAILS - SPANS 224 TO 233	-32	PIERS 430 & 729	-8	WIDENING OF EXISTING C.N.R. BRIDGE
-79	REINFORCING STEEL SCHEDULE - PIERS 425 TO 430	-55	DECK DETAILS - SPANS 124 TO 133	-31	ABUTMENT 728 - DETAILS	-7	GENERAL ARRANGEMENT - SHEET 6
-78	REINFORCING STEEL SCHEDULE - PIERS 420 & 421	-54	DECK DETAILS - SPANS 618 TO 623	-30	PIERS 127 TO 130	-6	GENERAL ARRANGEMENT - SHEET 5
-77	REINFORCING STEEL SCHEDULE - PIERS 419 & 422 TO 424	-53	DECK DETAILS - SPANS 418 TO 423	-29	ABUTMENT 624 - DETAILS	-5	GENERAL ARRANGEMENT - SHEET 4
-76	REINFORCING STEEL SCHEDULE - PIERS 231 TO 233, 331 & 332	-52	DECK DETAILS - SPANS 118 TO 123	-28	ABUTMENT 524 - DETAILS	-4	GENERAL ARRANGEMENT - SHEET 3
-75	REINFORCING STEEL SCHEDULE - PIERS 224 TO 230, 324 TO 330 & 333	-51	DECK DETAILS - SPANS 518 TO 523	-27	PIERS 224 & 324	-3	GENERAL ARRANGEMENT - SHEET 2
D 5522-74	REINFORCING STEEL SCHEDULE - PIERS 131 TO 133	D 5522-50	DECK DETAILS - SPANS 116 & 117	D5522-26	PIERS 619, 622 & 623	D 5522-2	GENERAL ARRANGEMENT - SHEET 1

REFERENCE DRAWINGS (CONT.) — REFERENCE DRAWINGS (CONT.) — REFERENCE DRAWINGS (CONT.) — REFERENCE DRAWINGS

REVISIONS		
DATE	BY	DESCRIPTION

REGISTERED PROFESSIONAL ENGINEER — CIVIL — R. TEMPLE — PROVINCE OF ONTARIO

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

FOUNDATION OF CANADA ENGINEERING CORPORATION LIMITED

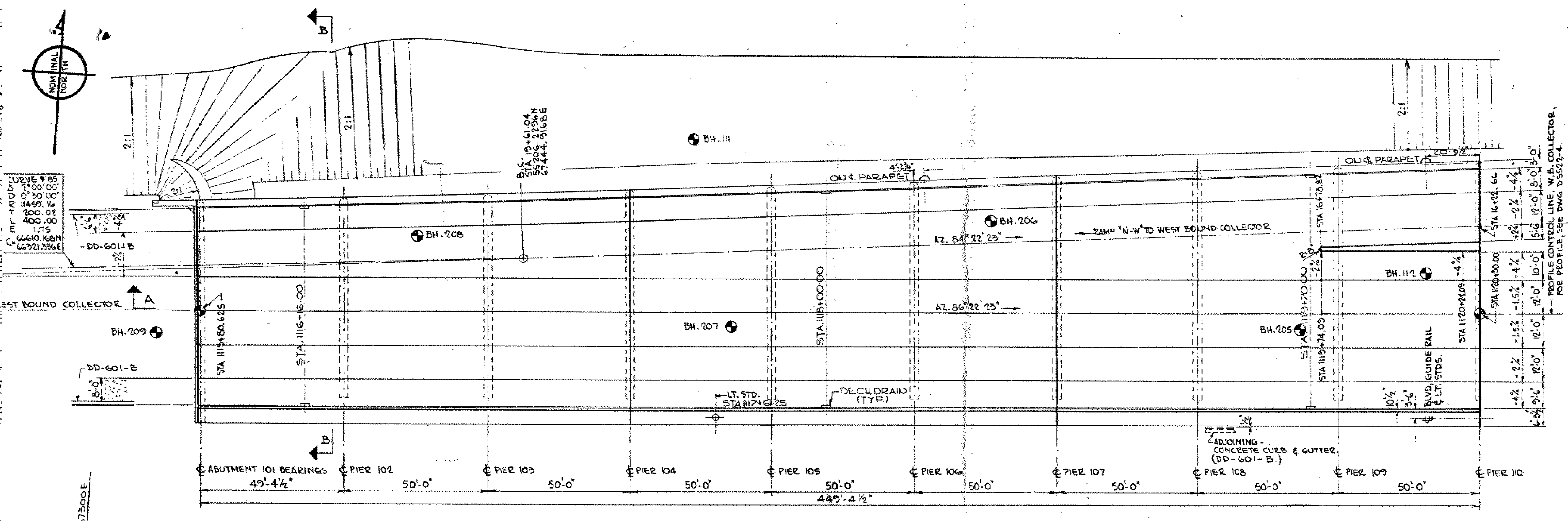
LESLIE ST. & C.N.R. TRESTLE

KING'S HIGHWAY No. 401 — DIST. No. 6
CO. YORK — TORONTO BY-PASS
TWP. NORTH YORK — LOT — CON.

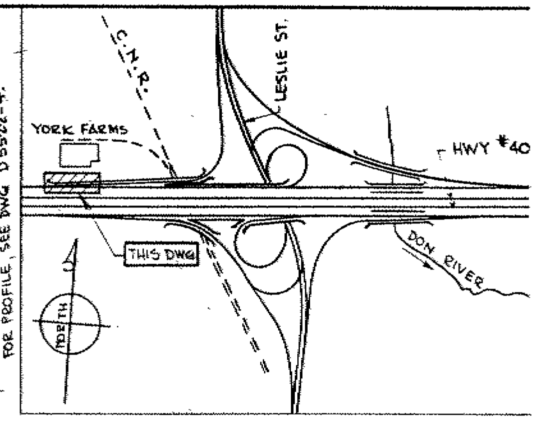
GENERAL LAYOUT

APPROVED [signature] BRIDGE ENGINEER

DESIGN	R.T.	CHECK	A.G.L.	SITE No. 37-206	W.P. No. 266-61
DRAWING	A.E.S.	CHECK	J.C.H.	CONTRACT Nos.	65-205
DATE	JAN. 1965	LOADING	H20-S16	DRAWING No.	D 5522-1

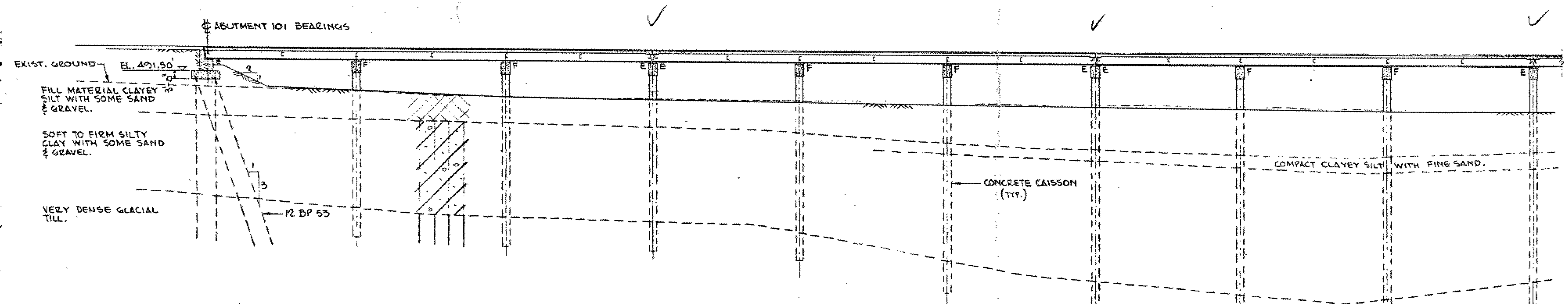


PLAN
SCALE 1" = 20'

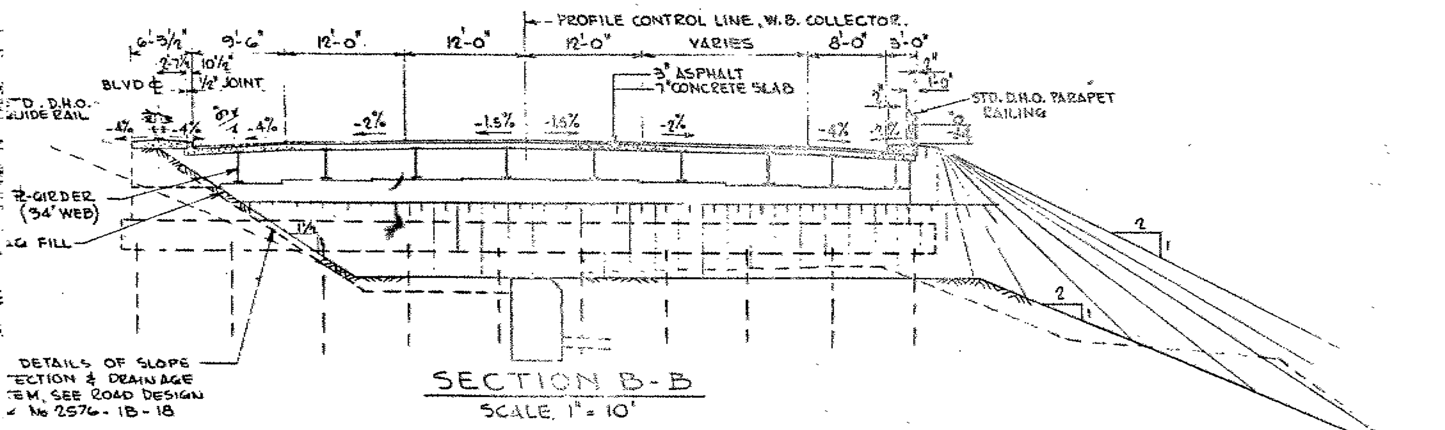


KEY PLAN

279



LONGITUDINAL SECTION A-A
SCALE 1" = 20'



SECTION B-B
SCALE 1" = 10'

REGISTERED PROFESSIONAL ENGINEER
CIVIL
R. TEMPLE
PROVINCE OF ONTARIO

REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

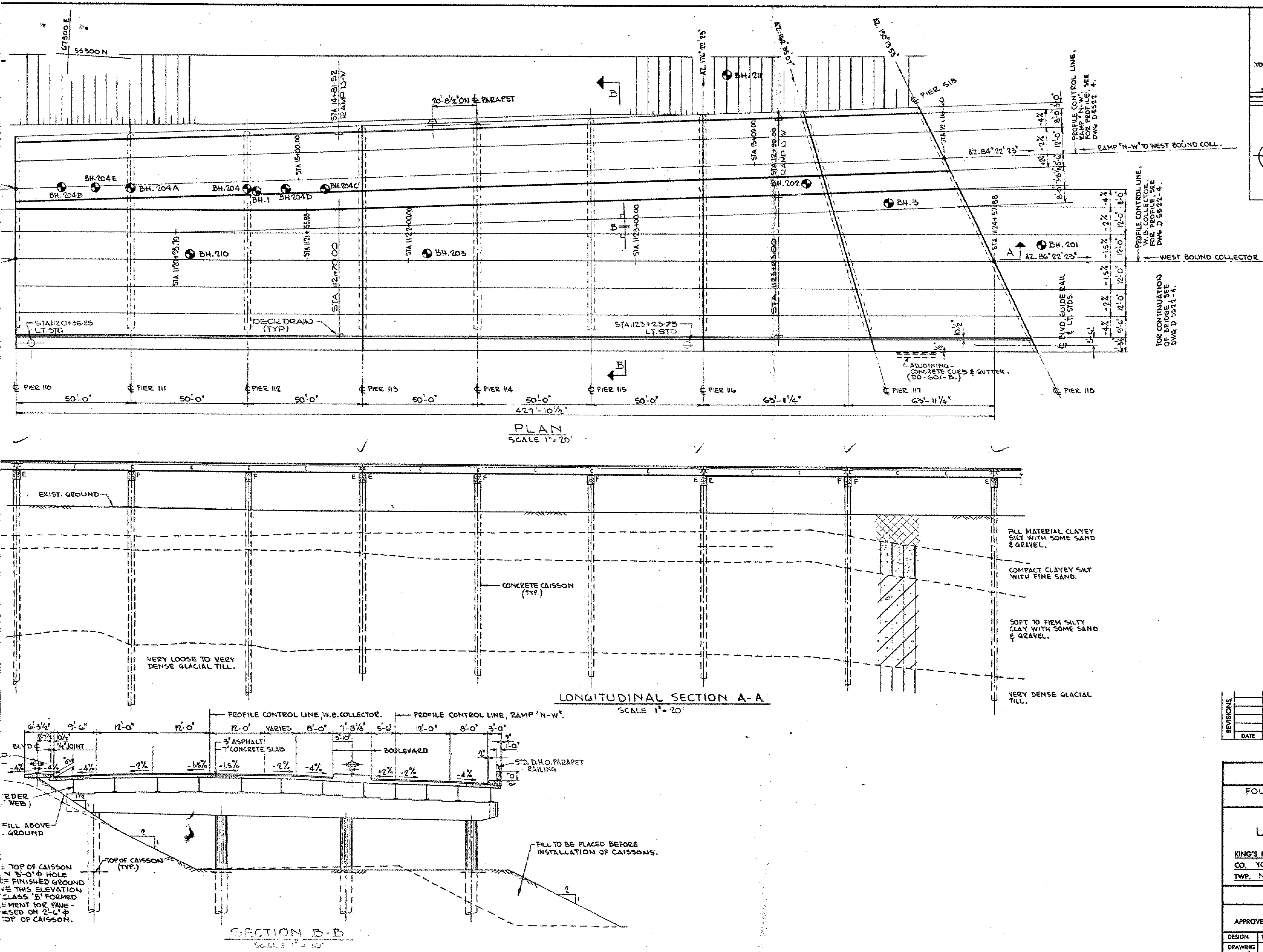
FOUNDATION OF CANADA ENGINEERING CORPORATION LIMITED

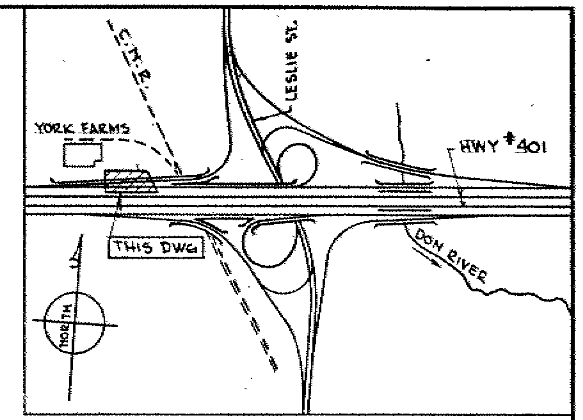
LESLIE ST. & C.N.R. TRESTLE

KING'S HIGHWAY No. 401		DIST. No. 6	
CO. YORK		TORONTO BY-PASS	
TWP. NORTH YORK	LOT	CON.	

GENERAL ARRANGEMENT - SHEET 1

APPROVED	BRIDGE ENGINEER			SITE No. 37-206	W.P. No. 266-[illegible]
DESIGN	P.L.E.	CHECK	B.T.P.	CONTRACT Nos.	65-[illegible]
DRAWING	V.W.	CHECK	A.G.L.	DRAWING No.	D 5522-2
DATE	JAN.1965	LOADING	H20-S16		





KEY PLAN

280

CIVIL
R. TEMPLE

REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

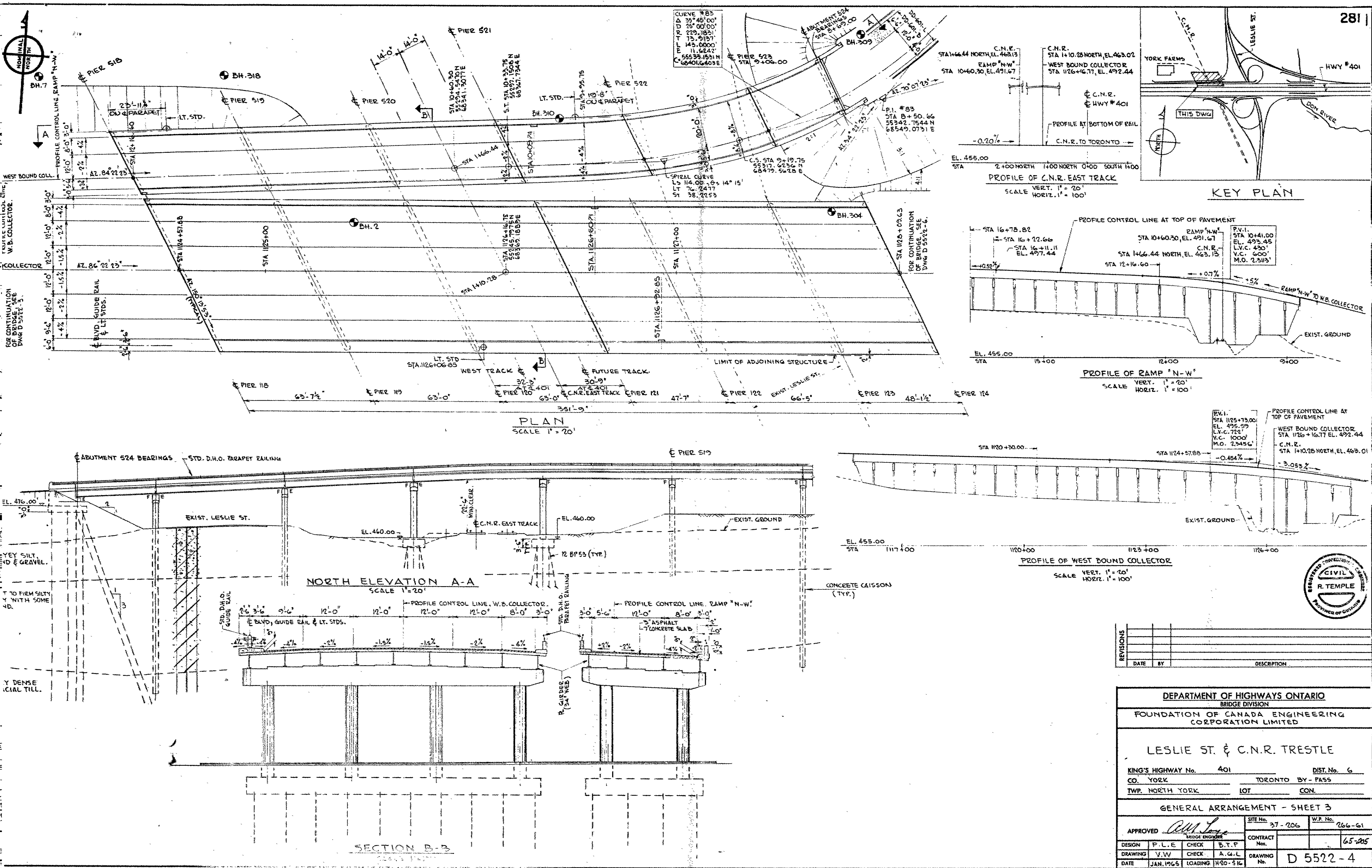
FOUNDATION OF CANADA ENGINEERING CORPORATION LIMITED

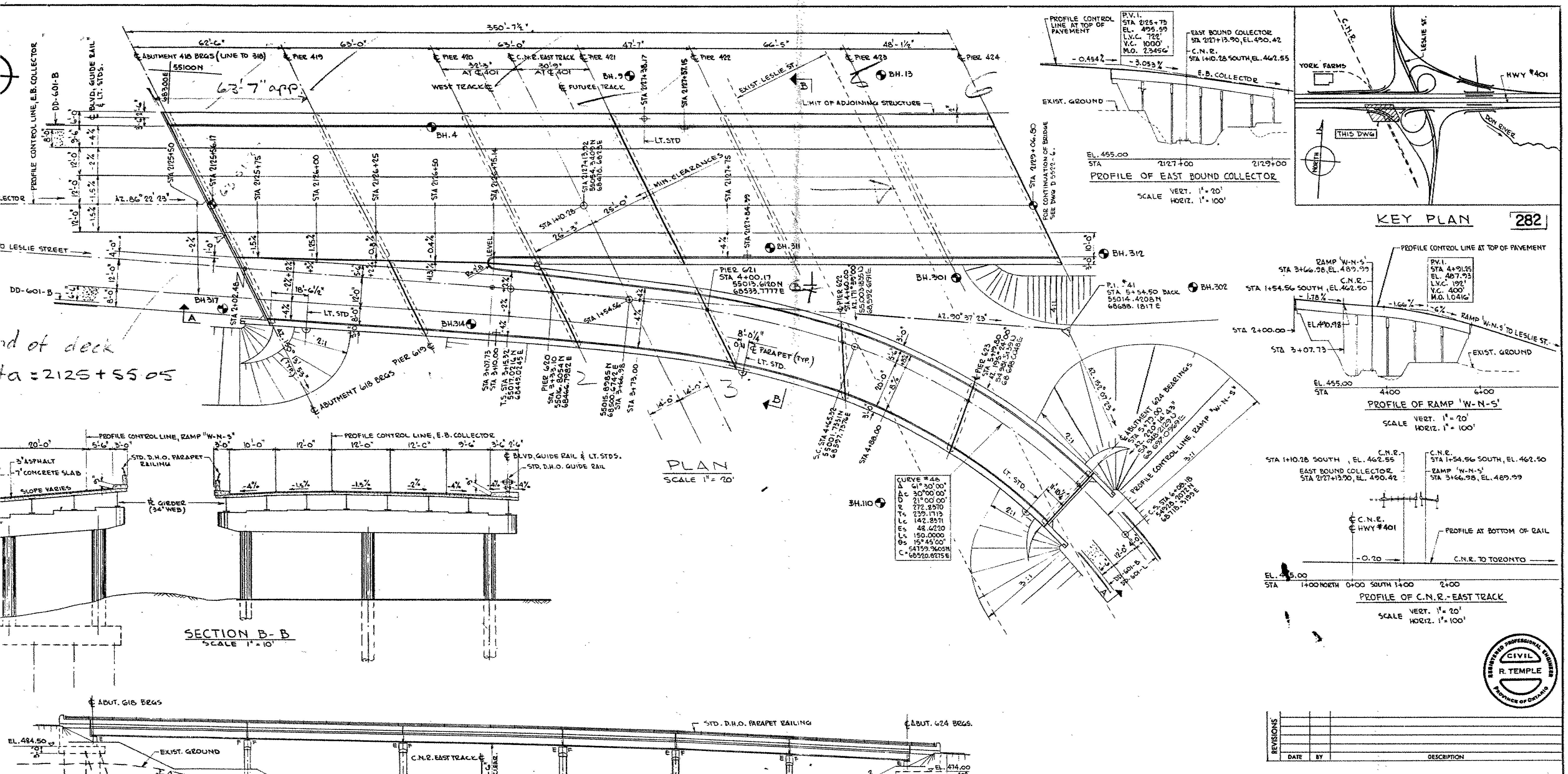
LESLIE ST. & C.N.R. TRESTLE

KING'S HIGHWAY No. 401 DIST. No. 6
CO. YORK TORONTO BY-PASS
TWP. NORTH YORK LOT CON.

GENERAL ARRANGEMENT - SHEET 2

				SITE No. 37-206	W.P. No. 266-61
APPROVED		BRIDGE ENGINEER		CONTRACT Nos.	65-305
DESIGN	P.L.E.	CHECK	B.T.P.		
DRAWING	V.W	CHECK	A.G.L.	DRAWING No.	D 5522-3
DATE	JAN. 1965	LOADING	H20-S16		


281
PLAN
SCALE 1" = 20'
NORTH ELEVATION A-A
SCALE 1" = 20'
SECTION B-B
PROFILE OF C.N.R. EAST TRACK
SCALE VERT. 1" = 20' HORIZ. 1" = 100'
KEY PLAN
YORK FARMS
LESLIE ST.
C.N.R.
HWY #401
DON RIVER
THIS DWG
PROFILE OF RAMP 'N-W'
SCALE VERT. 1" = 20' HORIZ. 1" = 100'
PROFILE OF WEST BOUND COLLECTOR
SCALE VERT. 1" = 20' HORIZ. 1" = 100'
ABUTMENT 524 BEARINGS
STD. D.H.O. PARAPET RAILING
EXIST. LESLIE ST.
C.N.R. EAST TRACK
EXIST. GROUND
CONCRETE CAISSON (TYP.)
12 BP53 (TYP.)
PROFILE CONTROL LINE, W.B. COLLECTOR
PROFILE CONTROL LINE, RAMP "N-W"
3" ASPHALT
7" CONCRETE SLAB
CURVE #83
Δ 35° 45' 00"
D 25° 00' 00"
R 229.1831'
T 73.9137'
L 143.0000'
E 11.6242'
C 55539.1531 N
68401.6403 E
SPIRAL CURVE
LS 114.00, Θs 14° 15'
LT 76.2477
ST 38.2253
P.I. #83
STA 8+50.66
55342.7544 N
68549.0731 E
FOR CONTINUATION OF BRIDGE, SEE DWG D 5522-3.
FOR CONTINUATION OF BRIDGE, SEE DWG D 5522-6.
LIMIT OF ADJOINING STRUCTURE
WEST TRACK
FUTURE TRACK
REVISIONS
DATE
BY
DESCRIPTION
R. TEMPLE
CIVIL
DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION
FOUNDATION OF CANADA ENGINEERING CORPORATION LIMITED
LESLIE ST. & C.N.R. TRESTLE
KING'S HIGHWAY No. 401
DIST. No. 6
CO. YORK
TORONTO BY-PASS
TWP. NORTH YORK
LOT
CON.
GENERAL ARRANGEMENT - SHEET 3
APPROVED
BRIDGE ENGINEER
SITE No. 37-206
W.P. No. 266-61
CONTRACT No. 65-205
DESIGN P.L.E
CHECK B.T.P
DRAWING V.W
CHECK A.G.L
DATE JAN. 1965
LOADING H20-S16
DRAWING No. D 5522-4



REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

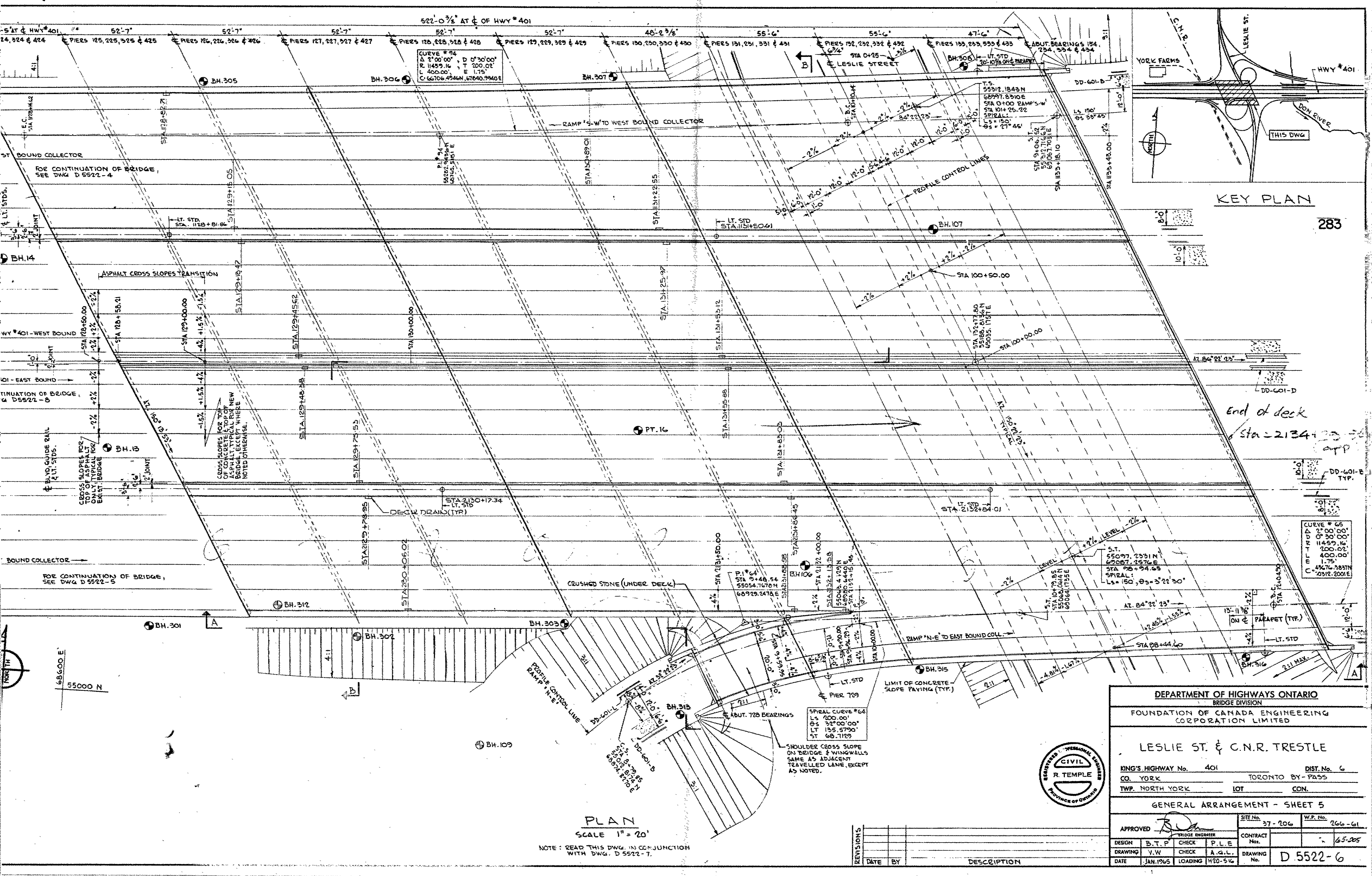
FOUNDATION OF CANADA ENGINEERING CORPORATION LIMITED

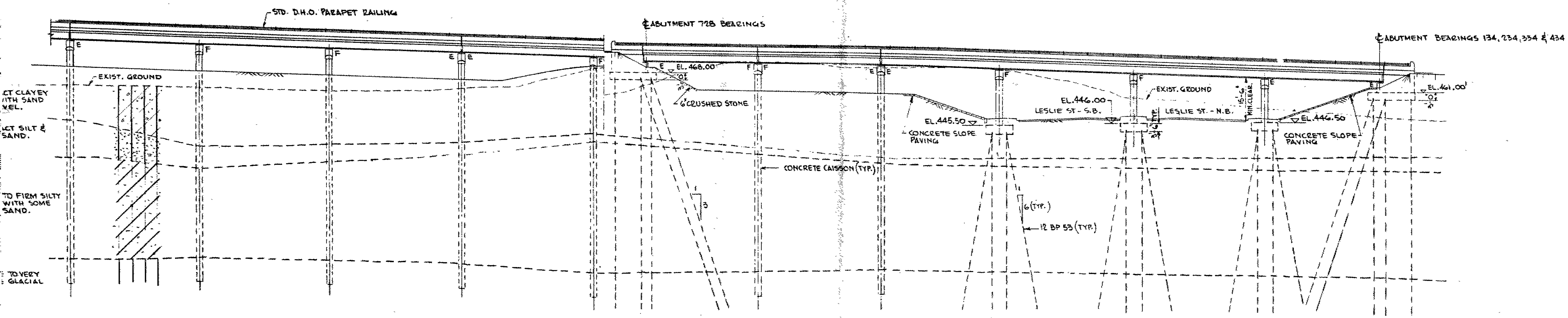
LESLIE ST. & C.N.R. TRESTLE

KING'S HIGHWAY No. 401 — DIST. No. 6
CO. YORK — TORONTO BY-PASS
TWP. NORTH YORK — LOT — CON.

GENERAL ARRANGEMENT - SHEET 4

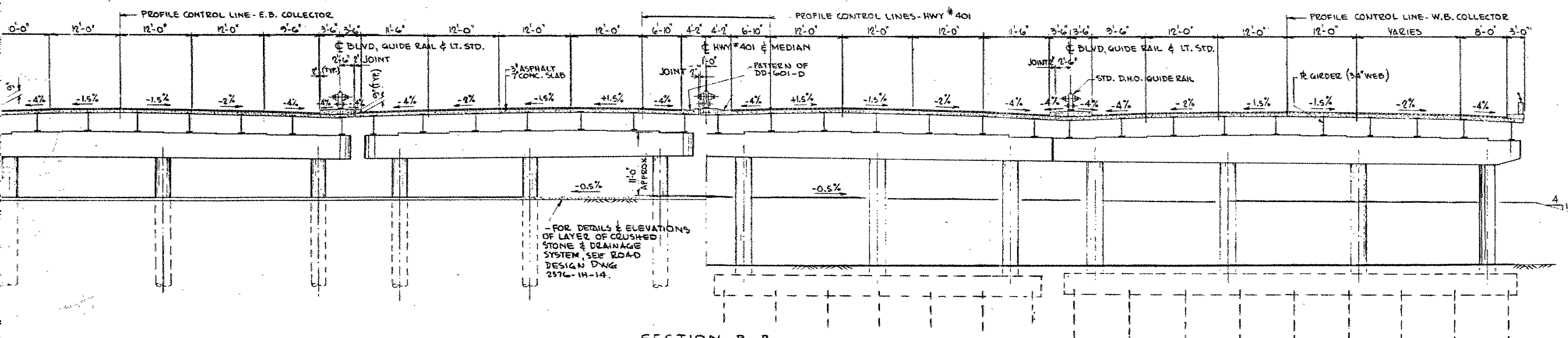
APPROVED	BRIDGE ENGINEER	SITE No. 37-206		W.P. No. 266-61	
DESIGN	P.L.E	CHECK	B.T.P	CONTRACT Nos.	65-205
DRAWING	V.W	CHECK	A.G.L	DRAWING No.	D 5522-5
DATE	JAN. 1965	LOADING	H20-S16		


522'-0 3/8" AT ℄ OF HWY #401
℄ PIERS 125, 225, 325 & 425
℄ PIERS 126, 226, 326 & 426
℄ PIERS 127, 227, 327 & 427
℄ PIERS 128, 228, 328 & 428
℄ PIERS 129, 229, 329 & 429
℄ PIERS 130, 230, 330 & 430
℄ PIERS 131, 231, 331 & 431
℄ PIERS 132, 232, 332 & 432
℄ PIERS 133, 233, 333 & 433
℄ ABUT. BEARINGS 134, 234, 334 & 434
℄ LESLIE STREET
RAMP 'S-W' TO WEST BOUND COLLECTOR
PROFILE CONTROL LINES
FOR CONTINUATION OF BRIDGE, SEE DWG D5522-4
ASPHALT CROSS SLOPES TRANSITION
HWY #401 - WEST BOUND
401 - EAST BOUND
BOUND COLLECTOR
FOR CONTINUATION OF BRIDGE, SEE DWG D5522-5
CROSS SLOPES FOR TOP OF CONCRETE & TOP OF ASPHALT, TYPICAL FOR NEW BRIDGE, EXCEPT WHERE NOTED OTHERWISE.
DECK DRAIN (TYP)
CRUSHED STONE (UNDER DECK)
RAMP 'N-E' TO EAST BOUND COLL.
LIMIT OF CONCRETE SLOPE PAVING (TYP.)
ABUT. 728 BEARINGS
PIER 729
SHOULDER CROSS SLOPE ON BRIDGE & WINGWALLS SAME AS ADJACENT TRAVELLED LANE, EXCEPT AS NOTED.
PROFILE CONTROL LINE RAMP 'N-E'
BH.305
BH.306
BH.307
BH.308
BH.107
BH.14
BH.13
PT.16
BH.312
BH.301
BH.302
BH.303
BH.313
BH.109
BH.106
BH.315
BH.316
End of deck
Sta = 2134+ app
KEY PLAN
YORK FARMS
LESLIE ST.
HWY #401
DON RIVER
THIS DWG
C.N.R.
283
PLAN
SCALE 1" = 20'
NOTE: READ THIS DWG. IN CONJUNCTION WITH DWG. D5522-7.
DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION
FOUNDATION OF CANADA ENGINEERING CORPORATION LIMITED
LESLIE ST. & C.N.R. TRESTLE
KING'S HIGHWAY No. 401
DIST. No. 6
CO. YORK
TORONTO BY-PASS
TWP. NORTH YORK
GENERAL ARRANGEMENT - SHEET 5
SITE No. 37-206
W.P. No. 266-61
CONTRACT Nos. 65-205
APPROVED BRIDGE ENGINEER
DESIGN B.T.P
CHECK P.L.E
DRAWING V.W
CHECK A.G.L.
DATE JAN.1965
LOADING H20-S16
DRAWING No. D 5522-6
R. TEMPLE
CIVIL
REVISIONS
DATE
BY
DESCRIPTION



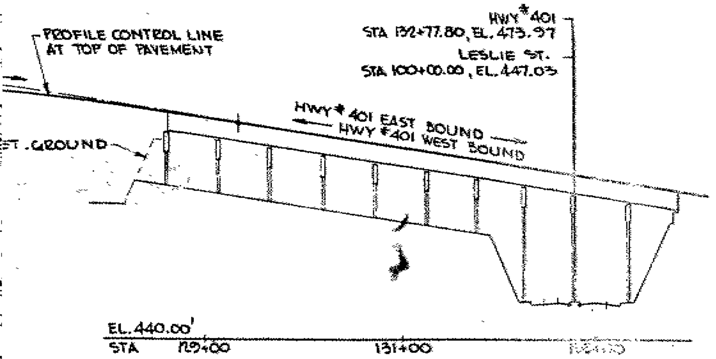
SOUTH ELEVATION A-A

SCALE 1" = 20'



SECTION B-B

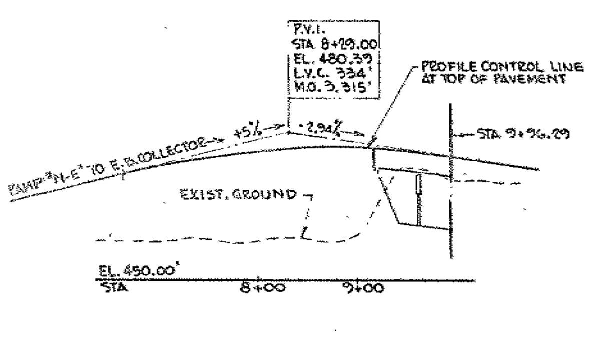
SCALE 1" = 10'



PROFILE OF HWY #401

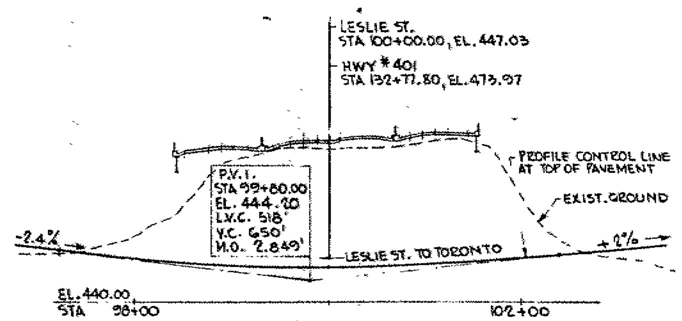
(PROFILES OF COLLECTOR ROADS SIMILAR TO HWY #401, EXCEPT P.V.I. EL. = 0.10' HIGHER.)

SCALE VERT. 1" = 20' HORIZ. 1" = 100'



PROFILE OF RAMP "N-E"

SCALE VERT. 1" = 20' HORIZ. 1" = 100'



PROFILE OF LESLIE STREET

SCALE VERT. 1" = 20' HORIZ. 1" = 100'

NOTE: READ THIS DWG. IN CONJUNCTION WITH DWG. D5522-6.

REGISTERED PROFESSIONAL ENGINEER — CIVIL — R. TEMPLE — PROVINCE OF ONTARIO

REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO

BRIDGE DIVISION

FOUNDATION OF CANADA ENGINEERING CORPORATION LIMITED

LESLIE ST. & C.N.R. TRESTLE

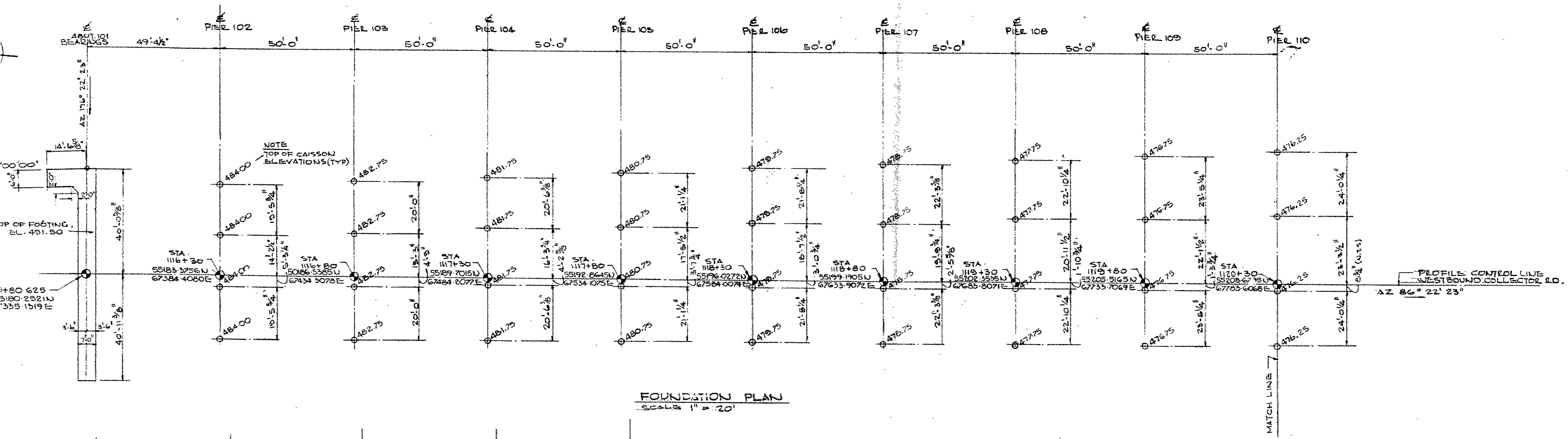
KING'S HIGHWAY No. 401 — DIST. No. 6

CO. YORK — TORONTO BY-PASS

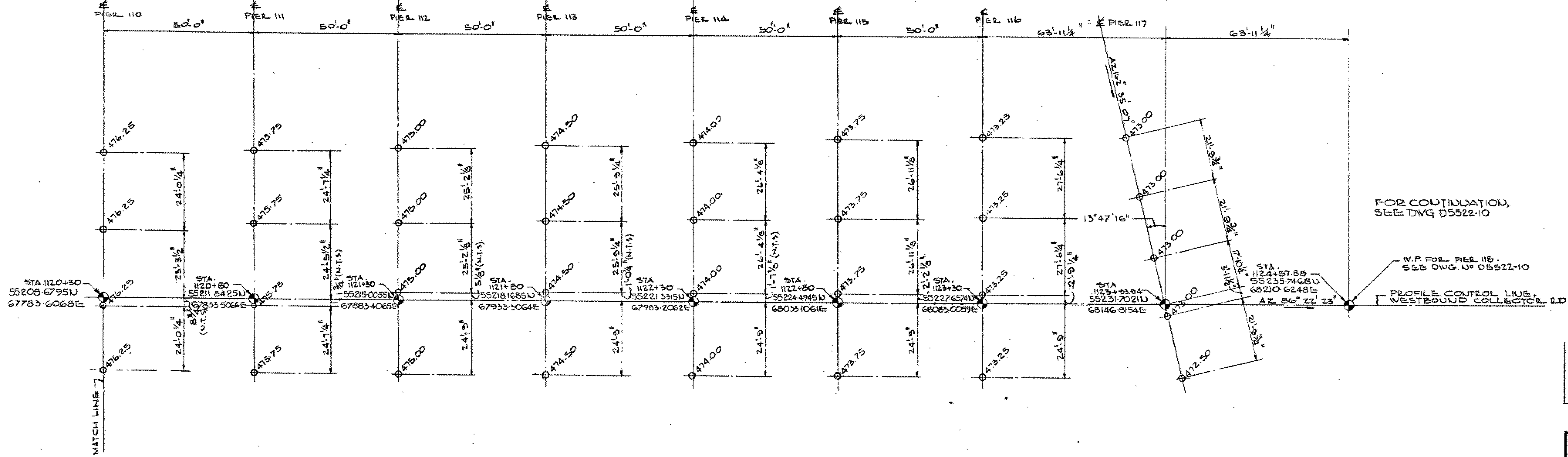
TWP. NORTH YORK — LOT — CON.

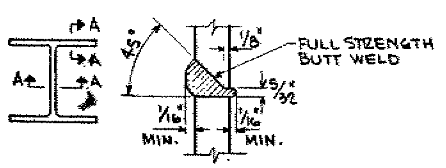
GENERAL ARRANGEMENT - SHEET 6

APPROVED	BRIDGE ENGINEER			SITE No. 37-206	W.P. No. 266-61
DESIGN	B.T.P	CHECK	P.L.E	CONTRACT Nos.	65-205
DRAWING	V.W	CHECK	A.G.L.	DRAWING No.	D 5522-7
DATE	JAN. 1965	LOADING	H20-S16		



FOUNDATION PLAN
SCALE 1" = 20'





SECTION A-A

DETAIL OF H PILE SPLICE
NOT TO SCALE

FOUNDATION PLAN
SCALE 1" = 20'

NOTE:
FOR GENERAL NOTES, SEE DWG D5522-1
DETAIL OF CAISSONS, SEE DWG D5522-10

DWG No	TITLE
D5522-16	PIERS 116 TO 118 & 518
D5522-15	PIERS 111 TO 115
D5522-14	PIERS 102 TO 110
D5522-13	ABUTMENT 101 - DETAILS
D5522-10	FOUNDATION LAYOUT - SHEET 2
D5522-3	GENERAL ARRANGEMENT - SHEET 2
D5522-2	GENERAL ARRANGEMENT - SHEET 1
D5522-1	GENERAL LAYOUT

REFERENCE DRAWINGS

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

FOUNDATION OF CANADA ENGINEERING CORPORATION LIMITED

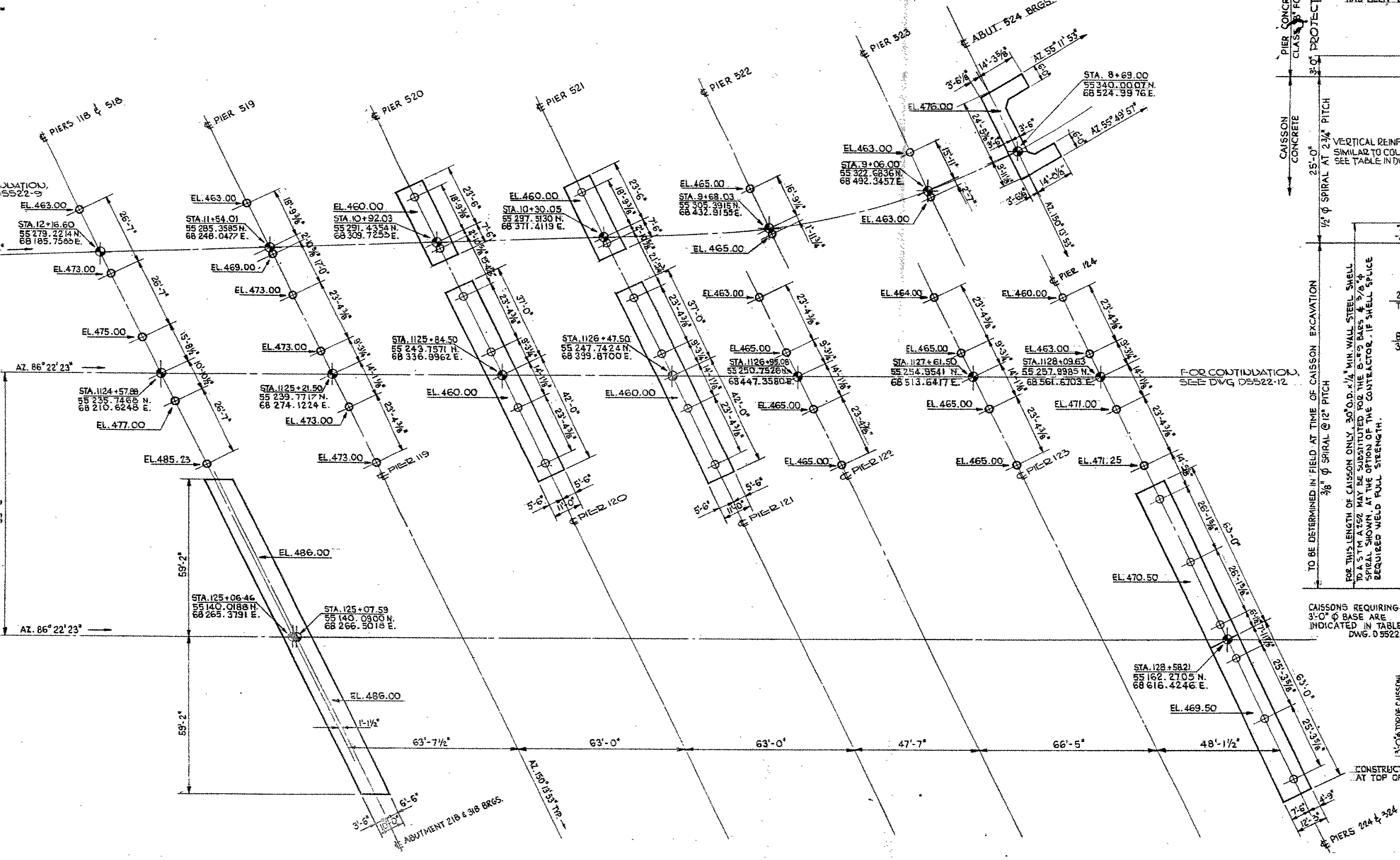
LESLIE ST. & C.N.R. TRESTLE

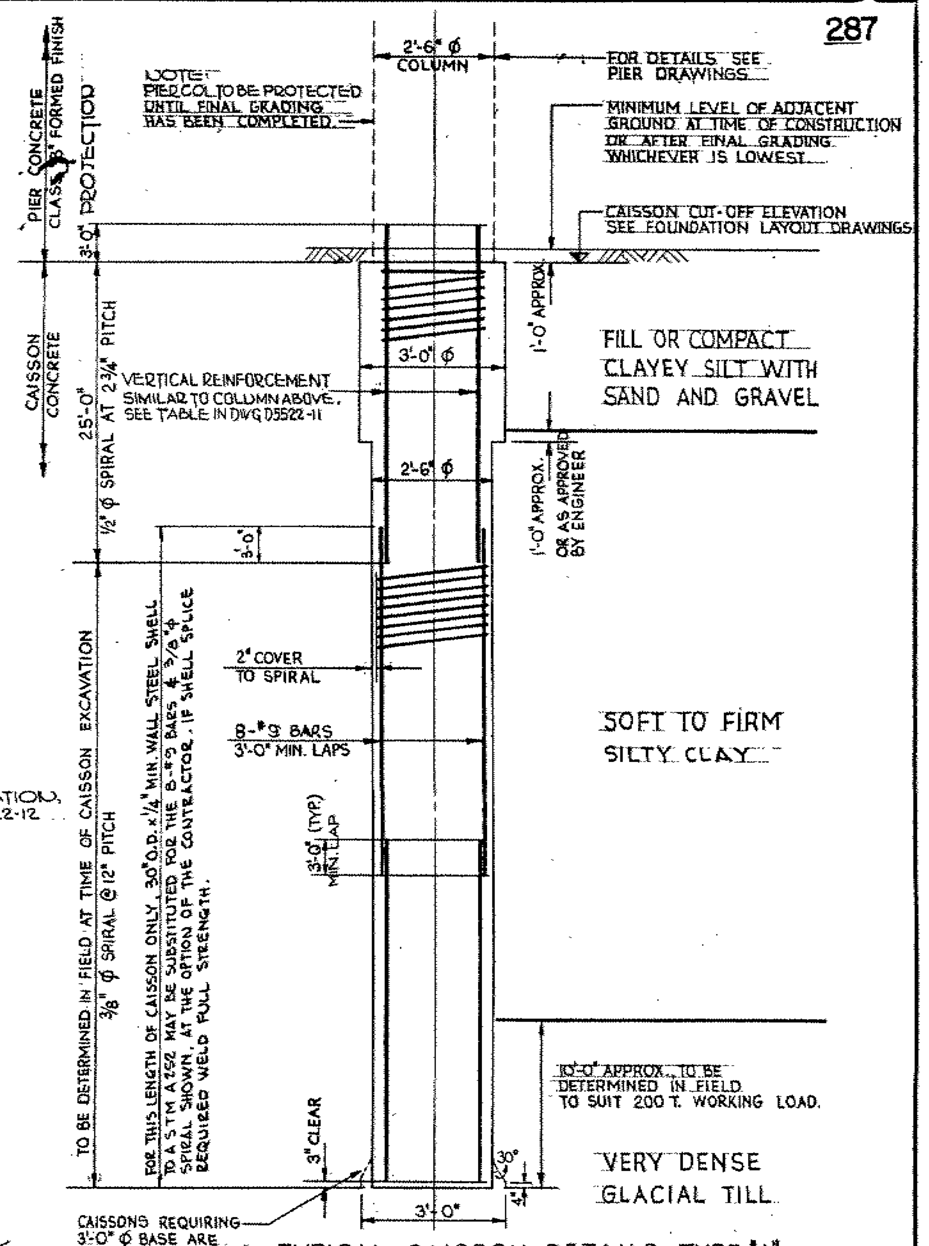
KING'S HIGHWAY No. 401 DIST. No. 6.
CO. YORK TORONTO BY-PASS.
TWP. NORTH YORK LOT CON.

FOUNDATION LAYOUT - SHEET 1

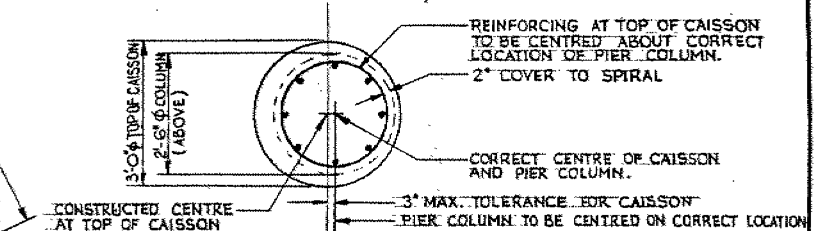
APPROVED [signature] BRIDGE ENGINEER

DESIGN	J.C.H.	CHECK	A.G.L.	SITE No.	37-206
DRAWING	H.B.W./V.A.T.	CHECK	V.W.	W.P. No.	266-61
DATE	JAN. 1965	LOADING	H20-S16	CONTRACT Nos.	65-205
				DRAWING No.	D5522-9





TYPICAL CAISSON DETAILS TYPE "A"
(CAISSON TYPE 'B' SEE DWG D5522-11)
HORIZ. SCALE: ½"=1'-0"



TYPICAL PLAN AT TOP OF CAISSON TYPE "A"
SCALE ~ ½" = 1'-0"

FOUNDATION LAYOUT
SCALE : 1" = 20'-0"

NOTES:
FOR GENERAL NOTES, SEE DWG D5522-1
ALL ELEVATIONS ARE TAKEN TO TOP OF FOUNDATION OR CAISSON RESPECTIVELY

DWG. No:	TITLE
D5522-28	ABUTMENT 524 - DETAILS
D5522-27	PIERS 224 & 324
D5522-24	PIERS 520 & 521
D5522-23	PIERS 519, 522 & 523
D5522-20	PIERS 120 & 121
D5522-19	PIERS 119 & 122 TO 126
D5522-17	ABUTMENTS 218 & 318 - DETAILS
D5522-16	PIERS 116 TO 118 & 518
D5522-11	FOUNDATION LAYOUT - SHEET 3
D5522-4	GENERAL ARRANGEMENT - SHEET 3
D5522-1	GENERAL LAYOUT

REFERENCE DRAWINGS

REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

FOUNDATION OF CANADA ENGINEERING CORPORATION LIMITED

LESLIE ST. & C.N.R. TRESTLE

KING'S HIGHWAY No. 401 DIST. No. 6
CO. YORK TORONTO BY-PASS
TWP. NORTH YORK LOT CON.

FOUNDATION LAYOUT - SHEET 2

APPROVED [signature] BRIDGE ENGINEER
SITE No. 37-206 W.P. No. 266-61
CONTRACT No. 65-205

DES'N	J.C.H.	CHECK	AGL./S.T.
DRAWING	S.A.	CHECK	AGL./V.V.
DATE	JAN. 1965	LOADING	H20-S16

DRAWING No. D 5522 - 10

RAL NOTES, SEE DWG. D 5522-1
TIONS ARE TAKEN TO TOP OF FOUNDATION OR
RESPECTIVELY
F CAISSONS, SEE DWG. D 5522-10

FOUNDATION LAYOUT

SCALE - 1" = 20'-0"

DWG. No:	TITLE
D 5522-39	ABUTMENT 434 - DETAILS
-38	ABUTMENTS 234 & 334 - DETAILS
-37	ABUTMENT 134 - DETAILS
-36	PIERS 431 TO 433
-35	PIERS 231 TO 233 & 331 TO 333
-34	PIERS 131 TO 133
-33	PIERS 225 TO 230 & 325 TO 330
-32	PIERS 430 & 729
-31	ABUTMENT 728 - DETAILS
-30	PIERS 127 TO 130
-21	PIERS 419 & 422 TO 429
-19	PIERS 119 & 122 TO 126
-10	FOUNDATION LAYOUT - SHEET 2
-7	GENERAL ARRANGEMENT - SHEET 6
-6	GENERAL ARRANGEMENT - SHEET 5
D 5522-1	GENERAL LAYOUT

REFERENCE DRAWINGS

REVISIONS — DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

FOUNDATION OF CANADA ENGINEERING CORPORATION LIMITED

LESLIE ST. & C.N.R. TRESTLE

KING'S HIGHWAY No. 401 — DIST. No. 6
CO. YORK — TORONTO BY-PASS
TWP. NORTH YORK — LOT — CON.

FOUNDATION LAYOUT - SHEET 4

APPROVED — BRIDGE ENGINEER

DESIGN	J.C.H.	CHECK	A.G.L./S.T.	SITE No.	37-206
DRAWING	S.A.	CHECK	A.G.L./V.W.	W.P. No.	266-61
DATE	JAN. 1965	LOADING	H20-S16	CONTRACT Nos.	65-205
				DRAWING No.	D 5522- 12

FILE

CONT 89-106

Ministry of Transportation

Ontario

FOUNDATION DESIGN SECTION

foundation investigation and design report

R

CONT 89-106

ENGINEERING MATERIALS OFFICE
FOUNDATION DESIGN SECTION

WP 260-86-01/A DIST 6

HWY 401 STR SITE 37-206 R

Structure Widening
Leslie Street & C.N.R. Overpass

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GEOCRES 30M14-191 A DATE FEB 21 1990

FOUNDATION INVESTIGATION REPORT
For
Structure Widening
Leslie Street & CNR Overpass
Hwy 401, W.B. Collector Lanes
W.P. 260-86-01/A, Site No. 37-206R
District 6, Toronto

INTRODUCTION

This report presents the results of the foundation investigation for the proposed bridge widening at the above captioned site.

This report applies from Station 25+000 to Station 25+310 Highway 401 chaninage (Based on 1974 readjustment).

SITE DESCRIPTION

The site is located on Hwy. 401, on the west side of Leslie Street, where it overpasses CNR tracks and Leslie Street, in the city of Toronto.

The construction of the highway and interchange has changed the original topography of this area.

The area for the proposed construction lies within the physiographic region known as the South Slope (Reference: Champman and Putnam, 'The Physiography of Southern Ontario; 3rd Edition, 1984).

The bridge which supports westbound collector lanes is about 270m long and consists of 17 spans. The bridge was constructed in 1965. The bridge is supported on caissons which were founded on dense to very dense sandy silt to silty sand glacial till. Some of the caissons are probably up to 15m long (Ref. Contract dwg. No. D5522-5, Site No. 37-206, WP 266-61, 1965 01).

The selection of bridge instead of an embankment for the construction of westbound collector lane was generally due to concerns with slope stability and specifically to a slope failure at this site which took place in 1953. In 1953 the original interchange for the C.N.R. and Leslie Street overpass was constructed. When the fill attained the maximum height of 9.8m, a failure of the northern slope of the western approach embankement occured. The slopes were then stabilized by adding berms. Similar berms were also added to all other slopes constructed at the site which were over 7.6m high (Ref. Subsurface Investigation Report by H.Q. Golder & Associates Ltd, 1962. Golder's Project No. 6205).

The northern side of the embankment which supports Hwy. 401 WB core lanes is exposed under the bridge. The exposed embankment (under the bridge) slopes at 1.5H to 1V. The ground surface under the bridge, extending from the toe of the embankment towards north is almost flat. The ground then slopes down at 2H to 1V towards the north into a drainage ditch and then rises up.

INVESTIGATION PROCEDURES

The foundation investigation for this project was carried out between 88 05 26 and 88 06 09, and comprised of drilling five sampled boreholes accompanied with Dynamic Cone Penetration tests in three boreholes.

The boreholes were advanced to a maximum depth of 32.0 m below the existing ground level (El. 151.7 m) using continuous flight solid and hollow stem augers.

The boreholes have been identified as 1-1, 1-2, 1-3, 1-4 and 1-5. The boreholes extended to depths ranging from 18.6 to 32.0m. All boreholes were terminated in overburden. Survey details were provided by the Central Region Surveys and Plans Section. The elevations given in this report are geodetic. It is understood that an arbitrary benchmark has been used for the purposes of contract drawings. Therefore, the elevations shown in the contract drawings will be relative and adjustment should be made to compare data.

The sampling program consisted of split spoon samples collected at 0.8m to 3.0 m intervals. They provided Standard Penetration Test (N) values for assessment of the in situ state of compaction of the non-cohesive materials, and for an indication of shear strengths of cohesive materials. These samples also provided material for identification purposes.

The laboratory tesing program for representative samples consisted of:

- grain size analyses
- natural moisture content determinations, and
- Atterberg Limit determinations

SUBSURFACE CONDITIONS

The Record of Borehole Sheets in the Appendix illustrate the subsurface conditions at the borehole locations. The locations and elevations of the boreholes, along with stratigraphical profiles based on the borehole data are shown on Drawing No. 2608601-A.

The underlying soil at the site for proposed bridge widening consists of the following generalized layers, in sequence, from the surface down:

Elevation (m) From	Elevation (m) To	Material
152.3	139.2	Sandy Silt (Fill) Loose to Very Dense
148.3	125.5	Clayey Silt to Silty Clay (Lacustrine) Firm to Hard
137.1	Undetermined	Sandy Silt to Silty Sand (Glacial Till) Dense to Very Dense

Following are detailed descriptions of the soil strata encountered.

Sandy Silt (Fill)

This generally non-cohesive material is fill and probably was placed for the existing Hwy 401 west bound construction. It has zones of slightly cohesive material.

This material was encountered in all boreholes. The thickness of the fill ranged from 4.0m to 11.6m.

Based on the results of Standard Penetration Tests (N - values 8 to 60 blows /15 cm), the material is in a loose to very dense state.

The fill material contains irregular layers of clayey silt and sand. Typical properties of the cohesive material matrix within the fill material, as determined by laboratory tests, are summarized as follows:

	Range	Average
Water Content (w)	9.0 - 16.0%	11.0%
Plastic Limit (wP)	12.0 - 14.0%	12.6%
Liquid Limit (wL)	16.0 - 22.0%	17.7%

Figure 1 illustrates a typical plasticity range for this material.

Figure 2 illustrates a typical grain size distribution envelope for this material.

Clayey Silt to Silty Clay

Underlying the fill material, there is a cohesive soil that has been described as clayey silt to silty clay. This material is frequently varved and contains layers of silty sand to sandy silt material up to 3 m thick. Traces of gravel, silt and occasional boulders were encountered in this stratum.

This material is a lacustrine deposit of Lake Iroquois.

The upper elevation of this stratum ranges from 148.3m to 139.2 m. The thickness of this layer ranges from 11.2m to 15.6m (average thickness about 13 m).

Based on Standard Penetration Test (N-values 5 to 39 blows/30 cm), the material is in a firm to hard state but generally firm.

Typical properties of the material, as determined by laboratory tests of representative samples from the boreholes, are summarized as follows:

	Range	Average
Water Content (w)	10.0 - 37.0%	16.4%
Plastic Limit (wP)	10.0 - 20.0%	13.9%
Liquid Limit (wL)	14.0 - 50.0%	24.8%

Figure 3 illustrates a typical plasticity range for this material.

Figure 4 illustrates a typical grain size distribution envelope for this material.

Sandy Silt to Silty Sand

This mainly non-cohesive (with slightly cohesive layers) stratum is a heterogeneous mixture of sandy silt to silty sand and some clay. Occasional zones of clayey silt and occasional boulders were also encountered within this stratum. This stratum is a glacial till which is underlying the lacustrine deposit. All boreholes were terminated in this material without fully penetrating the stratum.

Based on Standard Penetration Tests (N - values 33 blows/30 cm to 100 blows/23 cm) this material is in dense to very dense state.

This stratum lies at depths ranging from 15.2 m to 25.3 m below ground surface (below elevations 137.1 m to 125.5m).

Typical properties of the material, as determined by laboratory tests of representative samples from the boreholes, are summarized as follows:

	Range	Average
Water Content (w)	7.0 - 16.0%	11.2%
Plastic Limit (wP)	11.0 - 15.0%	13.2%
Liquid Limit (wL)	16.0 - 31.0%	21.0%

Figure 5 illustrates a typical plasticity range for this material.

Figure 6 illustrates a typical grain size distribution envelope for this material.

Groundwater

The groundwater was measured in open boreholes and also in piezometer installations. The record of groundwater condition is show below in Table 1.

TABLE 1

Record of Groundwater Condition, 88-06-10

Borehole	Depth (m)	Elevation (m)
1-1	3.4	147.4
1-2	12.2	139.1
1-3	2.1	149.6
1-4	8.5	143.5
1-5	5.3	147.0

The great variation in the groundwater elevation (139.1m to 149.6m) in a short distance, particularly in the proximity of an embankment suggest that this is a perched water condition.

It should be noted that groundwater levels are subject to seasonal fluctuations and may therefore vary from what shown in this report.

DISCUSSION

It is proposed to widen the existing bridge at Leslie Street/CNR overpass to add a collector lane on the south side of the existing WB collector lanes. The subject bridge supports WB collector lanes.

The existing bridge is about 270m long and consists of 17 spans. The construction of bridge took place in around 1965. The bridge was constructed on caissons which were founded on dense to very dense sandy silt to silty sand glacial till. Some of the existing caissons are probably up to 15m long (Ref. Contract dwg. No. D5522-5, Site No. 37-206, WP 266-61, 1965 01).

The original interchange for the C.N.R. and Leslie Street overpass was constructed in 1953. When the fill for the construction of approach embankment reached to a maximum height of 9.8m, a failure of the northern slope of the western approach embankement occured. The slopes were then stabilized by adding berms. Similar berms were also added to all other slopes constructed at the site which were over 7.6m high (Ref. Subsurface Investigation Report by H.Q. Golder & Associates Ltd, 1962. Golder's Project No. 6205).

Due to the slope failure in 1953, at the C.N.R. and Leslie Street interchange, a bridge was constructed in 1965 to support the westbound collector lanes instead of building an embankment.

RECOMMENDATIONS

Structure Foundations

It is proposed to construct a longitudinal beam (oriented east-west) to widen the bridge. This widening may be constructed on deep foundations.

The proposed structure may be supported on caissons or steel H-piles founded at least 2.5m below sandy silt to silty sand stratum. (The top elevation of sandy silt to silty sand stratum ranges from 125.5m to 137.1m). The pile tip should be at or below elevations shown in Table 2.

TABLE 2

Station Limits (m)	Founding Elevation (m)	Average Depth below Ground Surface (m)
25+000 to 25+050	132.0	20.4
25+050 to 25+090	130.0	22.0
25+090 to 25+120	128.0	24.0
25+120 to 25+170	121.0 *	30.8 *
25+170 to 25+310	123.0	28.0

* The pile tip elevation within station 25+120 to 25+170 may be lower than as shown in the table. The actual depth of pile will be determined during pile installation.

All steel H-piles should be reinforced with standard driving shoes.

For the purposes of the O.H.B.D.C. the suggested design parameters are as follows;

<u>For 0.9m (36 inch) diameter caissons:</u>

Factored Capacity at ULS	=	3,000 kN/caisson
Bearing Capacity at SLS Type II	=	2,000 kN/caisson
Factored Lateral Capacity at ULS	=	300 kN/caisson
Lateral Capacity at SLS Type II	=	200 kN/caisson

<u>For 1.1m (42 inch) diameter caissons:</u>

Factored Capacity at ULS	=	3,500 kN/caisson
Bearing Capacity at SLS Type II	=	2,300 kN/caisson
Factored Lateral Capacity at ULS	=	340 kN/caisson
Lateral Capacity at SLS Type II	=	230 kN/caisson

<u>For 1.2m (48 inch) diameter caissons:</u>

Factored Capacity at ULS	=	4,000 kN/caisson
Bearing Capacity at SLS Type II	=	2,650 kN/caisson
Factored Lateral Capacity at ULS	=	400 kN/caisson
Lateral Capacity at SLS Type II	=	270 kN/caisson

The horizontal component of battered caisson can be applied to resit lateral forces. Battered caissons can be intalled at angles up to 1H:5V.

For Steel 'H' piles 310 X 110:

Factored Capacity at ULS = 1650 kN/pile
Bearing capacity at SLS Type II = 1150 kN/pile
Ultimate Pile Capacity (for Hiley Formula) = 3450 kN/pile

The horizontal component of battered piles may be used for resistance to lateral forces.

Pile driving in the field should be controlled by employing the Hiley Dynamic Pile Driving Formula as per MTO Standards SS 103-10 or SS 103-11.

When the pile tip reaches elevations shown in Table 2, Hiley Dynamic Pile Driving Formula should be used to determine the final founding elevations.

Stability of Slope and Settlement

During the initial subsurface investigation by H.Q. Golder & Associates Ltd in 1962 (Golder's Project No. 6205) stability analyses were carried out and measures were taken to further stabilize the slopes.

Since there will be no change to the grade of Hwy 401, or any change in the ground geometry below the existing bridge, no deep-seated stability problems or settlements are anticipated.

Construction Concerns

Dewatering and the presence of boulders are concerns that require consideration in the installation of caissons. The contractor should be instructed to maintain the stability of the soil in the sides and bases of the caisson excavation.

Shoring may be required to protect the adjacent pavement in order to carry out excavation to construct the pile caps. This may be achieved be constructing a temporary wall with either interlocking sheet piling, or soldier piles with timber lagging and reinforced with the use of rakers or anchors.

The following parameters should be used for design of shoring:

Material	ϕ	γ	Ka
Sandy Silt (Fill)	30	21.0 kN/m3	0.33
Clayey Silt (Native)	28	20.5 kN/m3	0.32

The 'active' condition should be assumed for the calculation of the lateral pressure.

MISCELLANEOUS

The field work for this project was carried out under the supervision of M. Schnarr, Engineering Student.

The equipment used was owned and operated by Master Soil Investigation Ltd.

The report was written by Ken Ahmad, Foundations Engineer, reviewed by D. Dundas, Senior Foundations Engineer and approved by M. Devata, Chief Foundations Engineer.

LICENSED PROFESSIONAL ENGINEER
K. AHMAD
90 02 16
PROVINCE OF ONTARIO

Ken Ahmad, P. Eng.
Foundations Engineer

M. S. Devata, P. Eng.
Chief Foundations Engineer

APPENDIX

EXPLANATION OF TERMS USED IN REPORT

N VALUE: THE STANDARD PENETRATION TEST (SPT) N VALUE IS THE NUMBER OF BLOWS REQUIRED TO CAUSE A STANDARD 51mm O.D SPLIT BARREL SAMPLER TO PENETRATE 0.3m INTO UNDISTURBED GROUND IN A BOREHOLE WHEN DRIVEN BY A HAMMER WITH A MASS OF 63.5kg, FALLING FREELY A DISTANCE OF 0.76m FOR PENETRATIONS OF LESS THAN 0.3m N VALUES ARE INDICATED AS THE NUMBER OF BLOWS FOR THE PENETRATION ACHIEVED AVERAGE N VALUE IS DENOTED THUS $\bar{N}$.

DYNAMIC CONE PENETRATION TEST: CONTINUOUS PENETRATION OF A CONICAL STEEL POINT (51mm O.D 60° CONE ANGLE) DRIVEN BY 475 J IMPACT ENERGY ON 'A' SIZE DRILL RODS. THE RESISTANCE TO CONE PENETRATION IS MEASURED AS THE NUMBER OF BLOWS FOR EACH 0.3m ADVANCE OF THE CONICAL POINT INTO THE UNDISTURBED GROUND.

SOILS ARE DESCRIBED BY THEIR COMPOSITION AND CONSISTENCY OR DENSENESS.

CONSISTENCY: COHESIVE SOILS ARE DESCRIBED ON THE BASIS OF THEIR UNDRAINED SHEAR STRENGTH (c_u) AS FOLLOWS:

c_u (kPa)	0 - 12	12 - 25	25 - 50	50 - 100	100 - 200	>200
	VERY SOFT	*SOFT*	*FIRM*	*STIFF*	*VERY STIFF*	*HARD*

DENSENESS: COHESIONLESS SOILS ARE DESCRIBED ON THE BASIS OF DENSENESS AS INDICATED BY SPT N VALUES AS FOLLOWS:

N (BLOWS/0.3m)	0 - 5	5 - 10	10 - 30	30 - 50	>50
	VERY LOOSE	*LOOSE*	*COMPACT*	*DENSE*	*VERY DENSE*

ROCKS ARE DESCRIBED BY THEIR COMPOSITION AND STRUCTURAL FEATURES AND / OR STRENGTH.

RECOVERY: SUM OF ALL RECOVERED ROCK CORE PIECES FROM A CORING RUN EXPRESSED AS A PERCENT OF THE TOTAL LENGTH OF THE CORING RUN.

MODIFIED RECOVERY: SUM OF THOSE INTACT CORE PIECES, 100mm+ IN LENGTH EXPRESSED AS A PERCENT OF THE LENGTH OF THE CORING RUN. THE ROCK QUALITY DESIGNATION (R Q D), FOR MODIFIED RECOVERY, IS:

R Q D (%)	0 - 25	25 - 50	50 - 75	75 - 90	90 - 100
	VERY POOR	*POOR*	*FAIR*	*GOOD*	*EXCELLENT*

JOINTING AND BEDDING:

SPACING	50mm	50 - 300mm	0.3m - 1m	1m - 3m	>3m
JOINTING	*VERY CLOSE*	*CLOSE*	*MOD. CLOSE*	*WIDE*	*VERY WIDE*
BEDDING	*VERY THIN*	*THIN*	*MEDIUM*	*THICK*	*VERY THICK*

ABBREVIATIONS AND SYMBOLS

FIELD SAMPLING

S S	SPLIT SPOON	T P	THINWALL PISTON
W S	WASH SAMPLE	O S	OSTERBERG SAMPLE
S T	SLOTTED TUBE SAMPLE	R C	ROCK CORE
B S	BLOCK SAMPLE	P H	T W ADVANCED HYDRAULICALLY
C S	CHUNK SAMPLE	P M	T W ADVANCED MANUALLY
T W	THINWALL OPEN	F S	FOIL SAMPLE

STRESS AND STRAIN

u_w	kPa	PORE WATER PRESSURE
r_u	1	PORE PRESSURE RATIO
σ	kPa	TOTAL NORMAL STRESS
σ'	kPa	EFFECTIVE NORMAL STRESS
τ	kPa	SHEAR STRESS
$\sigma_1, \sigma_2, \sigma_3$	kPa	PRINCIPAL STRESSES
ϵ	%	LINEAR STRAIN
$\epsilon_1, \epsilon_2, \epsilon_3$	%	PRINCIPAL STRAINS
E	kPa	MODULUS OF LINEAR DEFORMATION
G	kPa	MODULUS OF SHEAR DEFORMATION
μ	1	COEFFICIENT OF FRICTION

MECHANICAL PROPERTIES OF SOIL

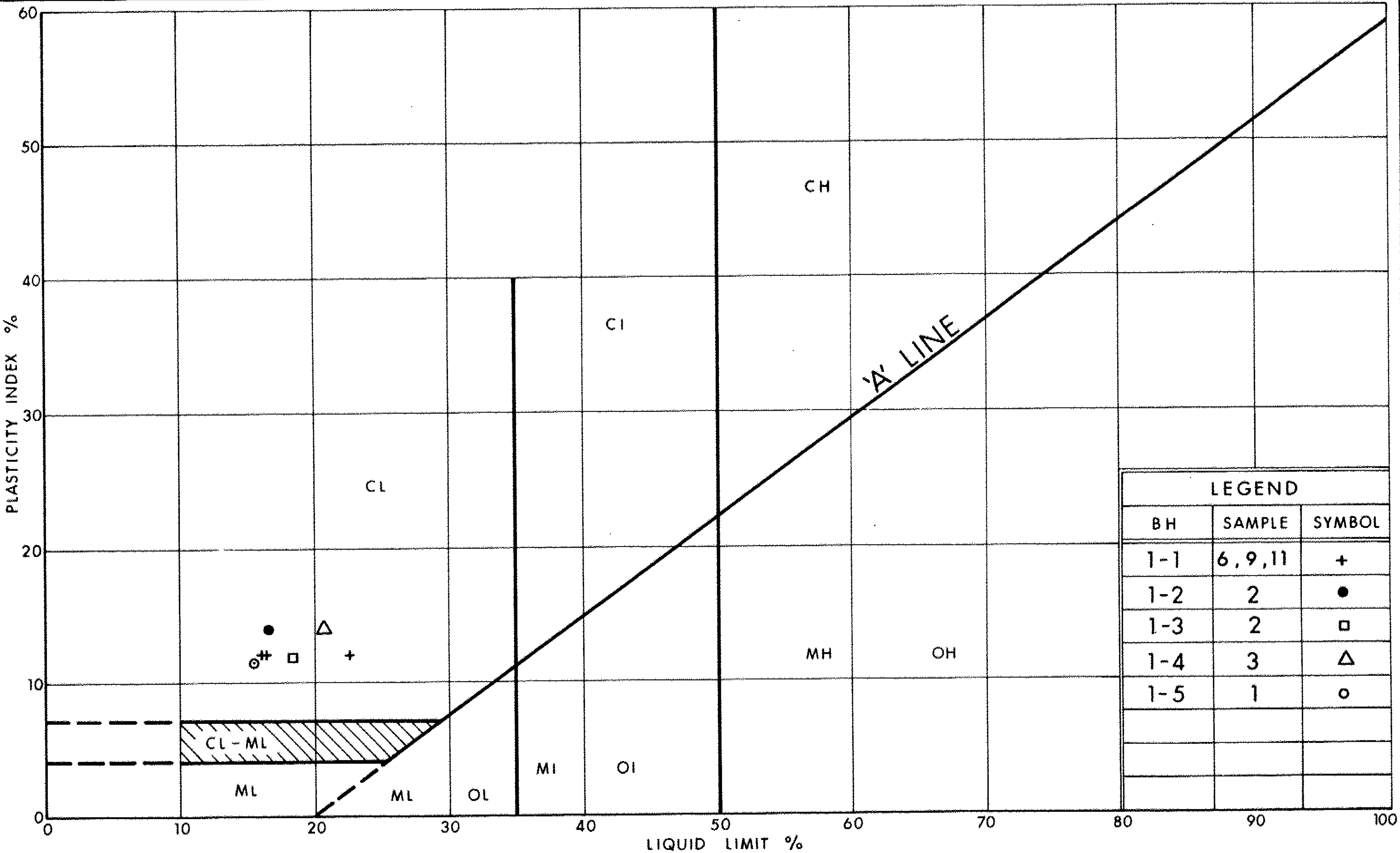
m_v	kPa^{-1}	COEFFICIENT OF VOLUME CHANGE
C_c	1	COMPRESSION INDEX
C_s	1	SWELLING INDEX
C_α	1	RATE OF SECONDARY CONSOLIDATION
c_v	m^2/s	COEFFICIENT OF CONSOLIDATION
H	m	DRAINAGE PATH
T_v	1	TIME FACTOR
U	%	DEGREE OF CONSOLIDATION
σ'_{vo}	kPa	EFFECTIVE OVERBURDEN PRESSURE
σ'_p	kPa	PRECONSOLIDATION PRESSURE
τ_f	kPa	SHEAR STRENGTH
c'	kPa	EFFECTIVE COHESION INTERCEPT
ϕ'	-°	EFFECTIVE ANGLE OF INTERNAL FRICTION
c_u	kPa	APPARENT COHESION INTERCEPT
ϕ_u	-°	APPARENT ANGLE OF INTERNAL FRICTION
τ_R	kPa	RESIDUAL SHEAR STRENGTH
τ_r	kPa	REMOULDED SHEAR STRENGTH
S_t	1	SENSITIVITY $= \frac{c_u}{\tau_r}$

PHYSICAL PROPERTIES OF SOIL

ρ_s	kg/m^3	DENSITY OF SOLID PARTICLES
γ_s	kN/m^3	UNIT WEIGHT OF SOLID PARTICLES
ρ_w	kg/m^3	DENSITY OF WATER
γ_w	kN/m^3	UNIT WEIGHT OF WATER
ρ	kg/m^3	DENSITY OF SOIL
γ	kN/m^3	UNIT WEIGHT OF SOIL
ρ_d	kg/m^3	DENSITY OF DRY SOIL
γ_d	kN/m^3	UNIT WEIGHT OF DRY SOIL
ρ_{sat}	kg/m^3	DENSITY OF SATURATED SOIL
γ_{sat}	kN/m^3	UNIT WEIGHT OF SATURATED SOIL
ρ'	kg/m^3	DENSITY OF SUBMERGED SOIL
γ'	kN/m^3	UNIT WEIGHT OF SUBMERGED SOIL

e	1,%	VOID RATIO
n	1,%	POROSITY
w	1,%	WATER CONTENT
S_r	%	DEGREE OF SATURATION
w_L	%	LIQUID LIMIT
w_p	%	PLASTIC LIMIT
w_s	%	SHRINKAGE LIMIT
I_p	%	PLASTICITY INDEX $= w_L - w_p$
I_L	1	LIQUIDITY INDEX $= \frac{w - w_p}{I_p}$
I_C	1	CONSISTENCY INDEX $= \frac{w_L - w}{I_p}$
e_{max}	1,%	VOID RATIO IN LOOSEST STATE

e_{min}	1,%	VOID RATIO IN DENSEST STATE
I_D	1	DENSITY INDEX $= \frac{e_{max} - e}{e_{max} - e_{min}}$
D	mm	GRAIN DIAMETER
D_n	mm	n PERCENT - DIAMETER
C_u	1	UNIFORMITY COEFFICIENT
h	m	HYDRAULIC HEAD OR POTENTIAL
q	m^3/s	RATE OF DISCHARGE
v	m/s	DISCHARGE VELOCITY
i	1	HYDRAULIC GRADIENT
k	m/s	HYDRAULIC CONDUCTIVITY
j	kN/m^3	SEEPAGE FORCE



LEGEND		
BH	SAMPLE	SYMBOL
1-1	6, 9, 11	+
1-2	2	●
1-3	2	□
1-4	3	△
1-5	1	o

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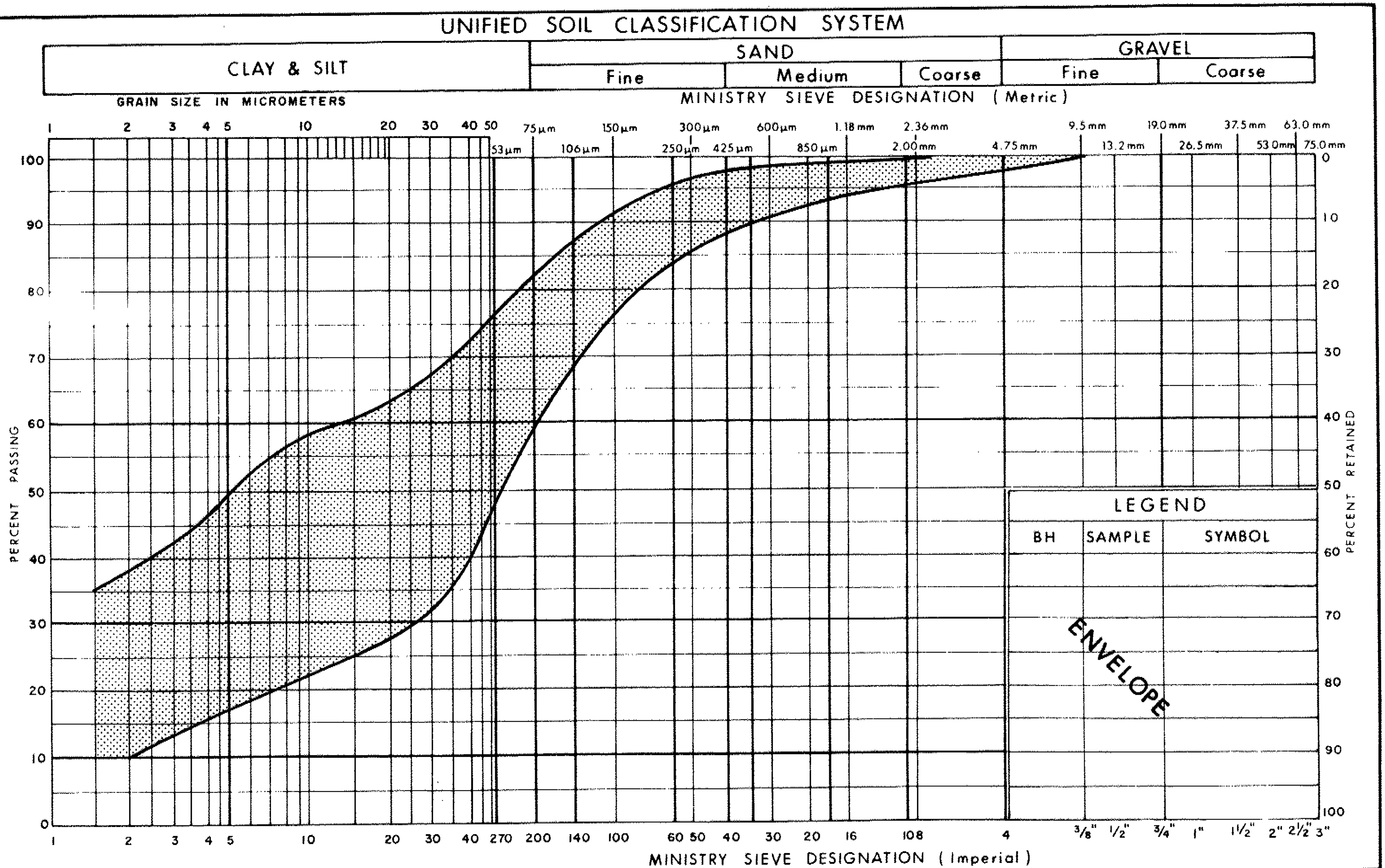
PLASTICITY CHART
SANDY SILT (FILL)
(ONLY FINE PORTION TESTED)

FIG No 1
W P 260-86-01/A

78 12 M



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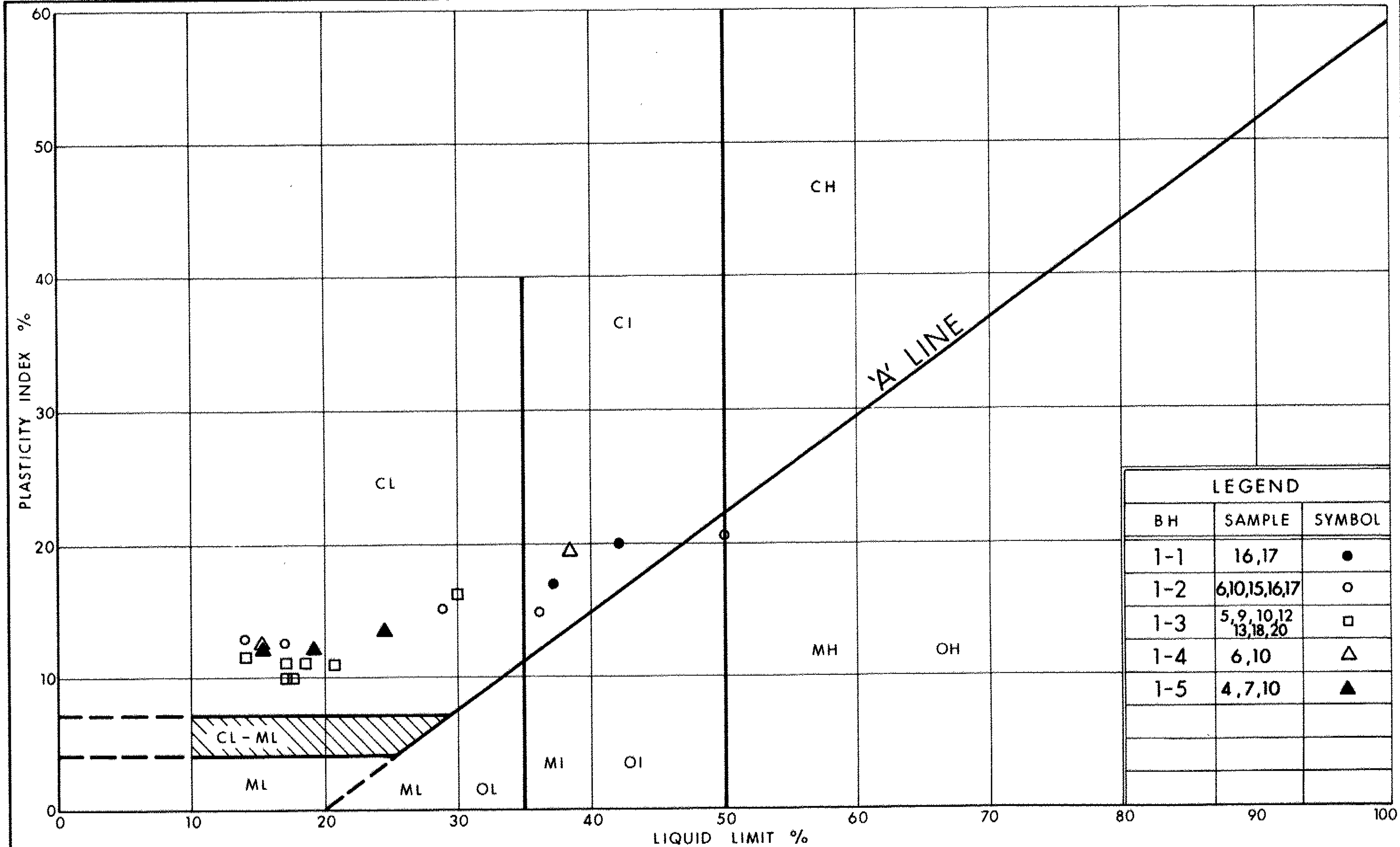
GRAIN SIZE DISTRIBUTION
SANDY SILT (FILL)

FIG No 2

W P 260-86-01/A



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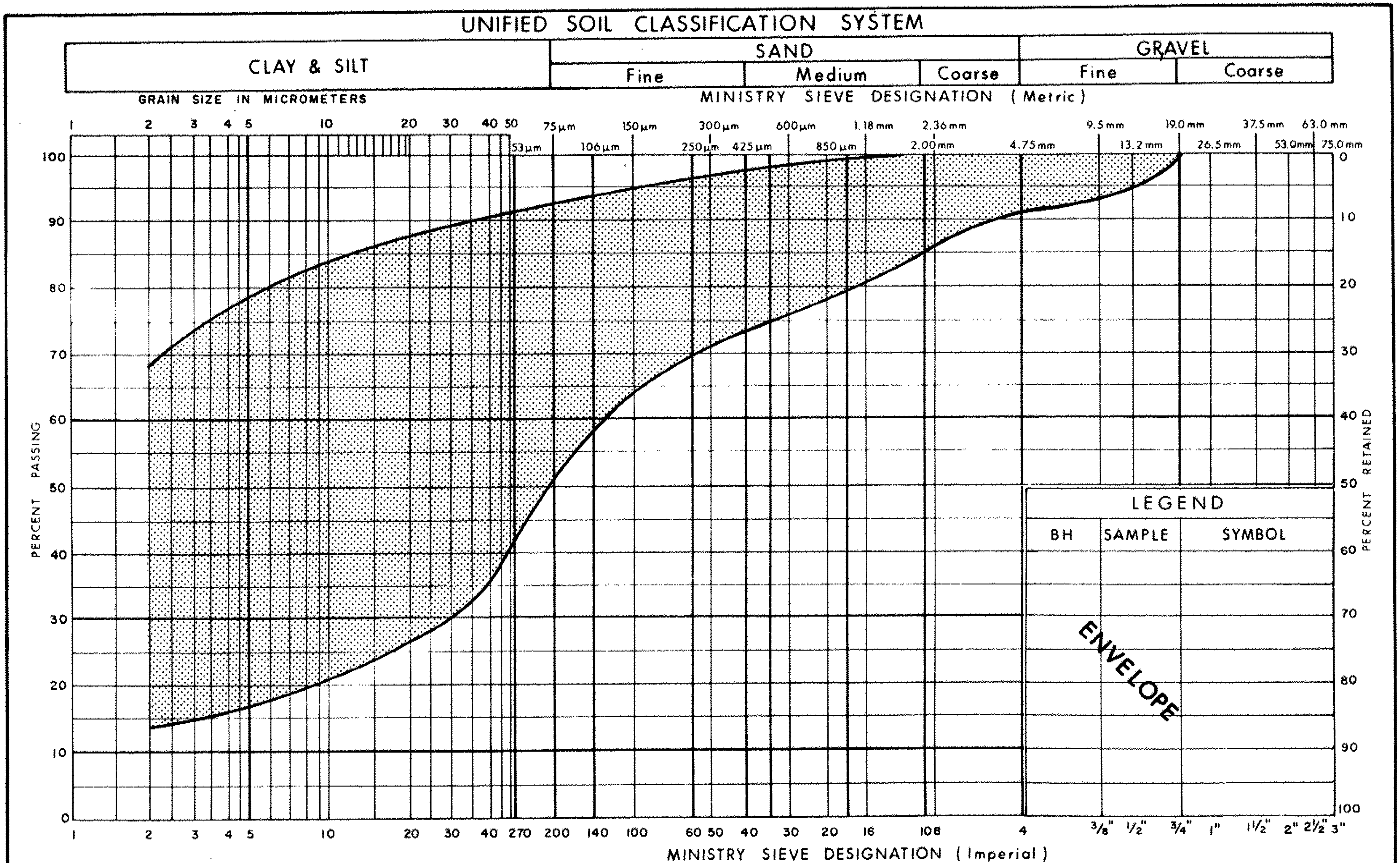
PLASTICITY CHART
CLAYEY SILT TO SILTY CLAY

FIG No 3
W P 260-86-01/A

78 12 M



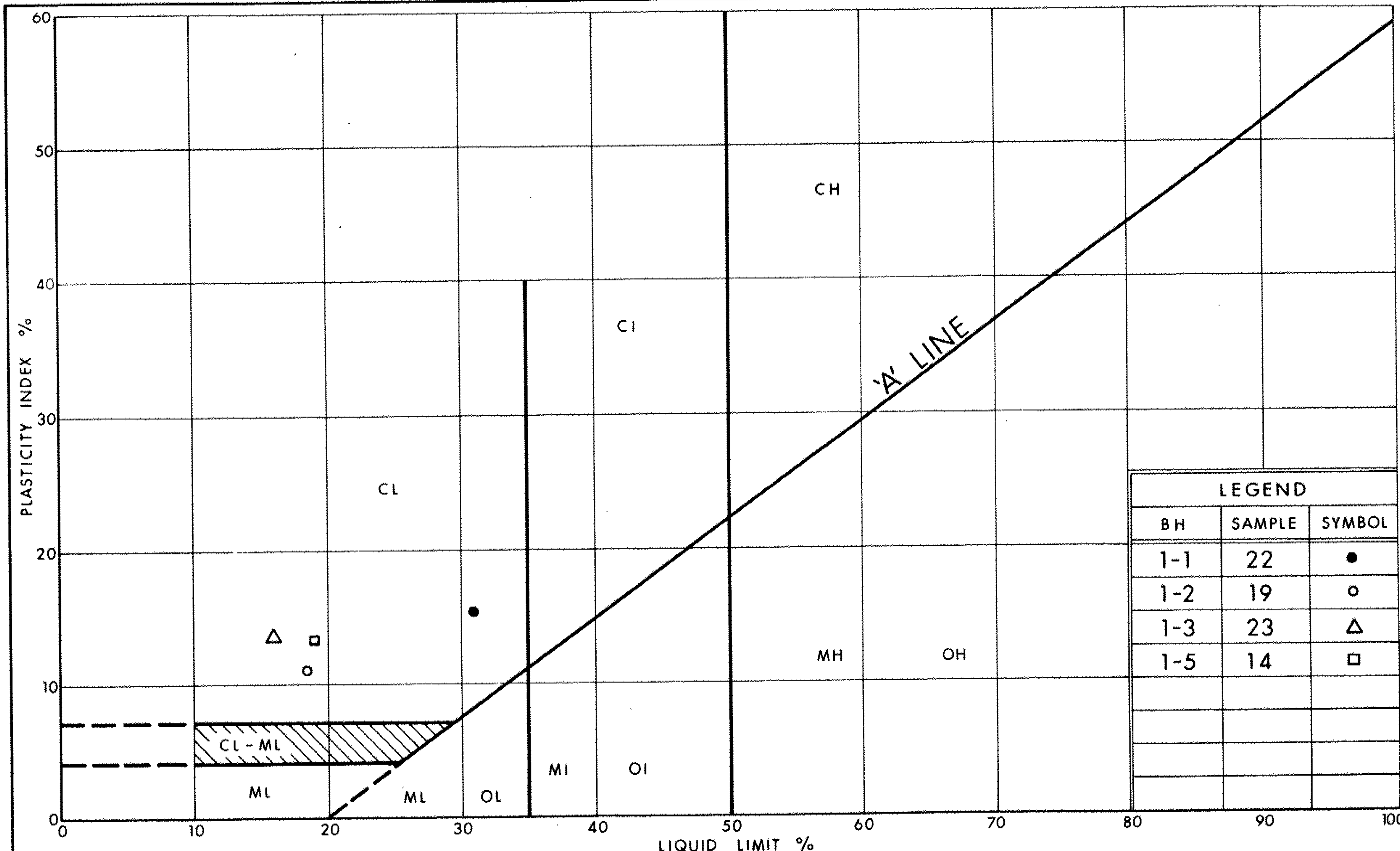
Ministry of Transportation
Ontario

GRAIN SIZE DISTRIBUTION
CLAYEY SILT TO SILTY CLAY
(SOME SAND, TRACE GRAVEL)

FIG No 4

W P 260-86-01/A

Oct 75, FF-S-21



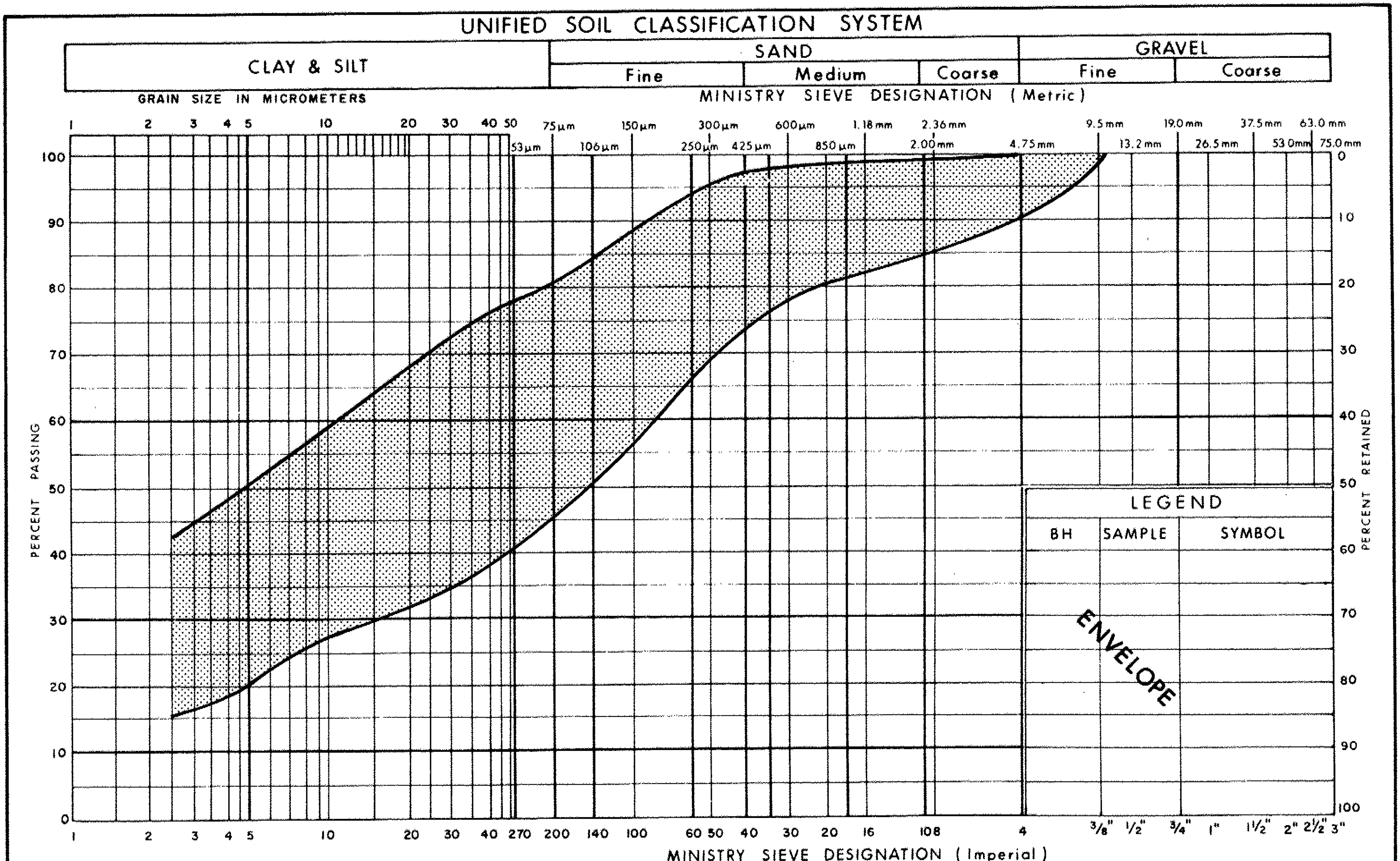
Ministry of Transportation
Ontario

PLASTICITY CHART
SANDY SILT TO SILTY SAND
SOME CLAY

FIG No 5

W P 260-86-01/A

78 12 M



Ministry of Transportation
Ontario

GRAIN SIZE DISTRIBUTION
SANDY SILT TO SILTY SAND
SOME CLAY

FIG No 6
W P 260-86-01/A

RECORD OF BOREHOLE No 1-1

1 OF 1 METRIC

W.P. 260-86-01/A
LOCATION Co-ords. N 4 847 154.1; E 315 554.4
ORIGINATED BY MS

DIST 6 HWY 401
BOREHOLE TYPE Solid Stem Auger, Cone Test
COMPILED BY KA

DATUM Geodetic
DATE 88 05 26-27
CHECKED BY DD

SOIL PROFILE

ELEV / DEPTH	DESCRIPTION
150.8	Ground Surface
0.0	Asphalt
	Sand, Some Gravel
	Sandy Silt with Irregular Layers of Clayey Silt and Sand Loose to Dense (Fill)
139.2 / 11.6	Trace Organics
	Silty Sand Compact to Dense
	Clayey Silt (CL) to Silty Clay (CI) Frequently Varved (1 cm) Some Sand, Trace Gravel Occ. Silt, Sand Zones and Boulders Firm to Very Stiff
125.5 / 25.3	Heterogeneous Mixture Sandy Silt to Silty Sand Some Clay, Trace Gravel Occ. Clayey Silt Zones Occ. Boulders Very Dense
123.1 / 27.7	End of Borehole
	• W.L. Recorded on 88-06-10

SAMPLES

NUMBER	TYPE	'N' VALUES	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
1	SS	32	
2	SS	16	
3	SS	6	
4	SS	8	
5	TW	PH	
6	SS	8	2 36 50 12
7	SS	14	
8	SS	19	
9	SS	37	2 33 43 22
10	SS	14	
11	SS	18	2 32 46 20
12	SS	14	
13	SS	24	
14	SS	31	
15	SS	15	22 64 9 5
16	SS	9	0 11 29 60
17	SS	5	2 11 30 57
18	TW	PH	
19	SS	13	
20	SS	6	
21	SS	100	
22	SS	60 /15cm	3 22 37 38

GROUND WATER CONDITIONS: water level (▼•) at approx. elev. 147.5

ELEVATION SCALE: 148, 146, 144, 142, 140, 138, 136, 134, 132, 130, 128, 126, 124

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH kPa: o UNCONFINED; + FIELD VANE; • QUICK TRIAXIAL; × LAB VANE — 20 40 60 80 100

Field vane values plotted: +2 (approx. elev. 148), >100 + (approx. elev. 146.5), +2 (approx. elev. 133.5), +1 (approx. elev. 132)

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30 (value 42 noted at approx. elev. 134)

UNIT WEIGHT γ kN/m³

$^{+3}, ^{\times 5}$: Numbers refer to Sensitivity

15 ◇ 5 (20 above, 10 below) (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 1-2   1 OF 1   METRIC

W.P. 260-86-01/A   LOCATION Co-ords. N 4 847 150.0; E 315 488.8   ORIGINATED BY MS

DIST 6   HWY 401   BOREHOLE TYPE Hollow Stem Auger   COMPILED BY KA

DATUM Geodetic   DATE 88 05 30-31   CHECKED BY DD

ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	'N' VALUES	ELEVATION SCALE	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
151.3	Ground Surface					
0.0	Asphalt					
	Sand, Some Gravel	1	SS	24	150	
	Sandy Silt with Irregular Layers of Clayey Silt and Sand Compact (Fill)	2	SS	22	148	1 40 50 9
		3	SS	11	146	
		4	SS	26	144	
142.5		5	SS	13		
8.8	Trace Organics	6	SS	22	142	2 34 43 21
		7	SS	25	140	
	Silty Sand Compact	8	SS	21		
		9	SS	35	138	
	Clayey Silt (CL) to Silty Clay (CI) Frequently Varved (1 cm) Some Sand, Trace Gravel Occ. Silt, Sand Zones and Boulders Firm to Hard	10	SS	18		1 7 33 59
		11	SS	8	136	
		12	TW	PH		
		13	TW	*		
		14	SS	5	134	
	Silt Loose	15	SS	9		3 36 46 15
		16	SS	6	132	20 32 36 12
		17	SS	13	130	0 8 25 67
128.7						
22.5	Heterogeneous Mixture Sandy Silt to Silty Sand Some Clay, Trace Gravel Occ. Clayey Silt Zones Occ. Boulders Very Dense	18	SS	52	128 / 126	
123.6		19	SS	60/10cm	124	10 44 32 14
27.7	End of Borehole W.L. on 88-06-10					

Ground water: piezometer P1 installed at approx. elev. 139–140 (water level 139.1). Water content at sample 17 exceeds plot: 56.

* GROUND WATER CONDITIONS

PIEZO. NO.	GROUND WATER ELEVATION (Metres)
1	139.1

* TW sunk by its own weight

Column headings: SOIL PROFILE (ELEV DEPTH, DESCRIPTION, STRAT PLOT); SAMPLES (NUMBER, TYPE, 'N' VALUES); GROUND WATER CONDITIONS; ELEVATION SCALE; DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100; SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100; PLASTIC LIMIT w_p, NATURAL MOISTURE CONTENT w, LIQUID LIMIT w_L, WATER CONTENT (%) 10 20 30; UNIT WEIGHT γ kN/m³; REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

$+^3$, $\times^5$: Numbers refer to Sensitivity   20 / 15 ◇ 5 / 10 (%) STRAIN AT FAILURE

Ministry of Transportation Ontario

RECORD OF BOREHOLE No 1-3

METRIC

W.P. 260-86-01/A LOCATION Co-ords. N 4 847 145.9; E 315 420.7 ORIGINATED BY MS

DIST 6 HWY 401 BOREHOLE TYPE Hollow Stem Auger, Cone Test COMPILED BY KA

DATUM Geodetic DATE 88 06 01-02-03 CHECKED BY DD

SOIL PROFILE

ELEV / DEPTH	DESCRIPTION
151.7	Ground Surface
0.0	Asphalt
	Sand, Some Gravel
	Sandy Silt with Irregular Layers of Clayey Silt and Sand Compact to Dense (Fill)
144.4 / 7.3	Trace Organics
	Clayey Silt (CL) to Silty Clay (CI) Frequently Varved (1 cm) Some Sand, Trace Gravel Occ. Silt, Sand Zones and Boulders
	Sandy Silt Loose to Compact
128.8 / 22.9	Heterogeneous Mixture Sandy Silt to Silty Sand Some Clay, Trace Gravel Occ. Clayey Silt Zones Occ. Boulders Dense to Very Dense

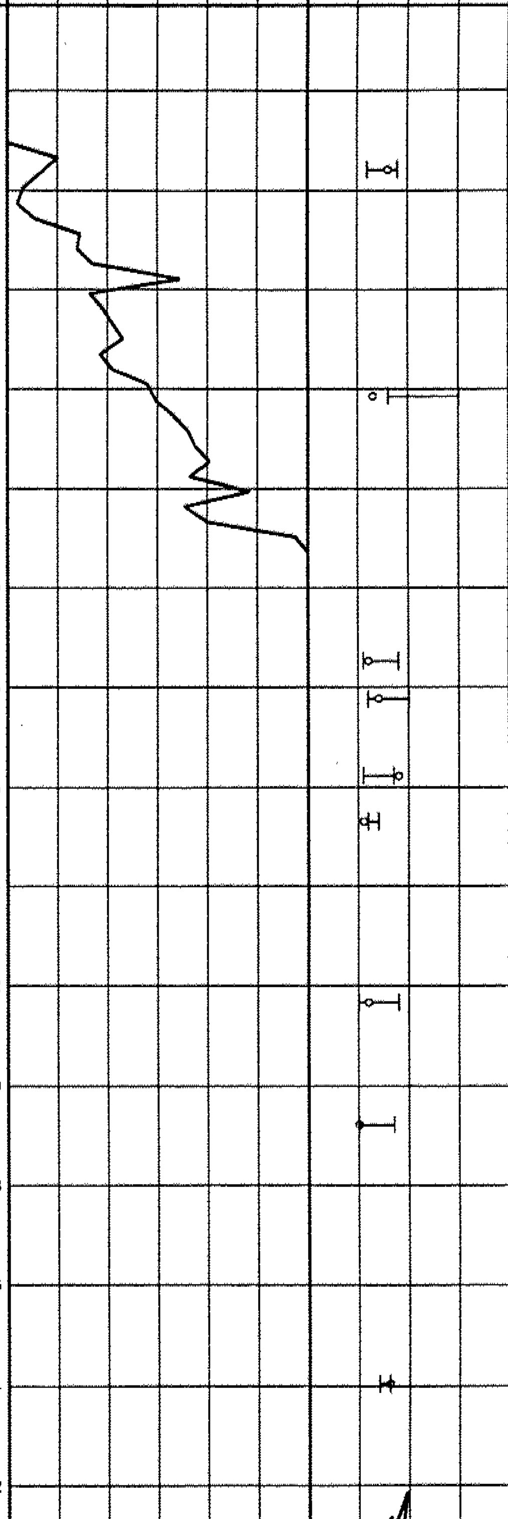
SAMPLES

NUMBER	TYPE	'N' VALUES	GROUND WATER CONDITIONS	GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
1	SS	37		
2	SS	14		0 18 45 37
3	SS	35		
4	SS	34		
5	SS	23		0 32 43 25
6	SS	36		
7	SS	39		
8	SS	14		
9	SS	19		2 31 45 22
10	SS	11		3 33 40 24
11	SS	8		
12	SS	6	P1	1 25 50 24
13	SS	13		6 38 44 12
14	SS	14		
15	SS	11		
16	SS	9		
17	SS	8		
18	SS	5		10 18 63 9
19	SS	8		
20	TW	PH		1 32 53 14
21	SS	33		
22	SS	57		
23	SS	100	/25cm	1 20 72 7
24	SS	25		

ELEVATION SCALE: 150, 148, 146, 144, 142, 140, 138, 136, 134, 132, 130, 128, 126, 124, 122

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100

SHEAR STRENGTH kPa: o UNCONFINED + FIELD VANE; • QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100



PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L — WATER CONTENT (%) 10 20 30

UNIT WEIGHT γ kN/m^3

REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Continued

$+^3$, $\times^5$: Numbers refer to Sensitivity

20 / 15 ◇ 5 / 10 (%) STRAIN AT FAILURE

Continued

Ministry of Transportation Ontario

Foundation Design

RECORD OF BOREHOLE No 1-3   2 OF 2   METRIC

W.P. 260-86-01/A   LOCATION Co-ords. N 4 847 145.9; E 315 420.7   ORIGINATED BY MS

DIST 6   HWY 401   BOREHOLE TYPE Hollow Stem Auger, Cone Test   COMPILED BY KA

DATUM Geodetic   DATE 88 06 01-02-03   CHECKED BY DD

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) 20 40 60 80 100	PLASTIC LIMIT w_P, NATURAL MOISTURE CONTENT w, LIQUID LIMIT w_L / WATER CONTENT (%) 10 20 30	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
30.5	Continued ***		25	SS	70						
119.7							120				
32.0	End of Borehole										

*** Heterogeneous Mixture
Sandy Silt to Silty Sand
Some Clay, Trace Gravel
Occ. Clayey Silt Zones
Occ. Boulders
Very Dense

W.L. Recorded on 88-06-10

* GROUND WATER CONDITIONS

PIEZO. NO.	GROUND WATER ELEVATION (Metres)
1	149.6

$+^3$, $\times^5$: Numbers refer to Sensitivity   20 / 15 ○ 5 / 10 (%) STRAIN AT FAILURE

Ministry of Transportation Ontario

Foundation Design

RECORD OF BOREHOLE No 1-4   1 OF 1   METRIC

W.P. 260-86-01/A   LOCATION Co-ords. N 4 847 141.3; E 315 354.3   ORIGINATED BY MS

DIST 6   HWY 401   BOREHOLE TYPE Hollow Stem Auger   COMPILED BY KA

DATUM Geodetic   DATE 88 06 06-08   CHECKED BY DD

ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	'N' VALUES	GROUND WATER CONDITIONS	WATER CONTENT	GR	SA	SI	CL
152.0	Ground Surface									
0.0	Asphalt									
	Sand, Some Gravel	1	SS	60	/15cm					
	Sandy Silt with Irregular Layers of Clayey Silt and Sand Compact to Very Dense (Fill)	2	SS	24						
		3	SS	20			3	36	41	20
145.9 / 6.1	Trace Organics	4	SS	17						
		5	SS	19	▼*					
	Clayey Silt (CL) to Silty Clay (CI) Frequently Varved (1 cm) Some Sand, Trace Gravel Occ. Silt, Sand Zones and Boulders Firm to Hard	6	SS	31			4	13	36	47
		7	SS	17						
		8	SS	14						
	Sandy Silt, Compact	9	SS	16						
		10	SS	23			6	39	44	11
		11	SS	15						
		12	SS	17						
		13	SS	8						
133.7	Sandy Silt, Compact	14	SS	25						
18.3	Heterogeneous Mixture Sandy Silt to Silty Sand Some Clay, Trace Gravel Occ. Clayey Silt Zones Occ. Boulders Very Dense	15	SS	55						
		16	SS	100	/23cm					
		17	SS	60	/10cm					
129.0		18	SS	75	/15cm					
23.0	End of Borehole									

* W.L. Recorded on 88-06-10

Column headings: SOIL PROFILE; STRAT PLOT; SAMPLES; ELEVATION SCALE (150, 148, 146, 144, 142, 140, 138, 136, 134, 132, 130); DYNAMIC CONE PENETRATION RESISTANCE PLOT (20, 40, 60, 80, 100); SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20, 40, 60, 80, 100); PLASTIC LIMIT w_P, NATURAL MOISTURE CONTENT w, LIQUID LIMIT w_L; WATER CONTENT (%) (10, 20, 30); UNIT WEIGHT γ kN/m³; REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

$+^3$, $\times^5$: Numbers refer to Sensitivity   20 / 15◇5 / 10 (%) STRAIN AT FAILURE

Ministry of Transportation Ontario

Foundation Design

RECORD OF BOREHOLE No 1-5

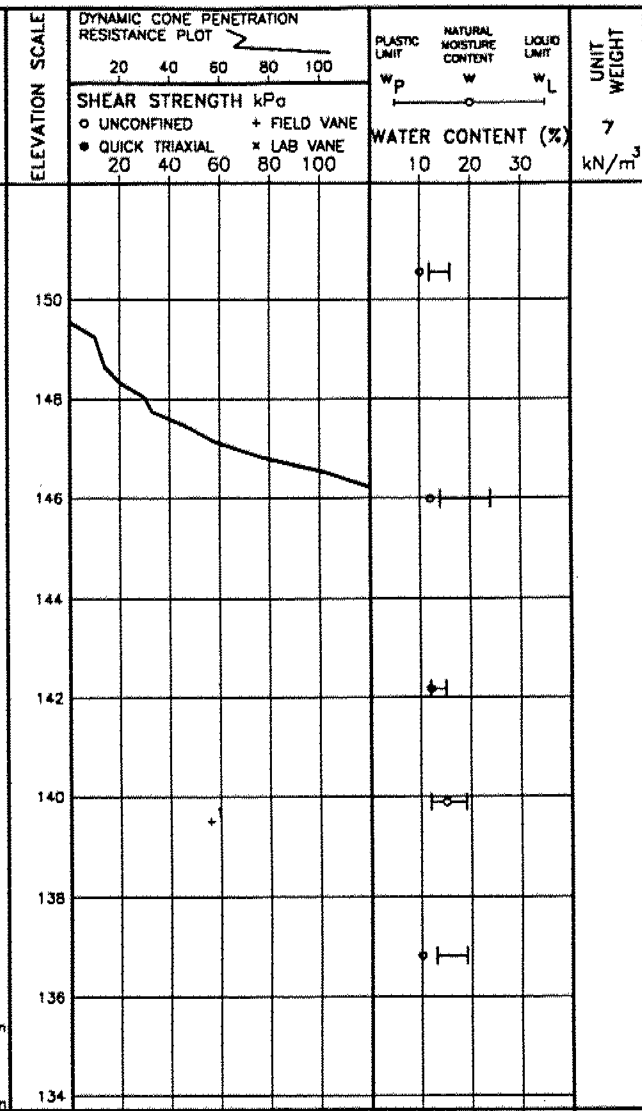
1 OF 1 METRIC

W.P. 260-86-01/A LOCATION Co-ords. N 4 847 137.2; E 315 290.6 ORIGINATED BY MS

DIST 6 HWY 401 BOREHOLE TYPE Hollow Stem Auger, Cone Test COMPILED BY KA

DATUM Geodetic DATE 88 06 09 CHECKED BY DD

ELEV / DEPTH	SOIL PROFILE – DESCRIPTION	SAMPLE NUMBER	TYPE	'N' VALUES	GROUND WATER CONDITIONS	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
152.3	Ground Surface					
0.0	Asphalt					
	Sand, Some Gravel					
	Sandy Silt with Irregular Layers of Clayey Silt and Sand Compact (Fill)	1	SS	34		1 37 44 18
148.3		2	SS	15		
4.0	Trace Organics	3	SS	14	▼*	
		4	SS	28		5 29 45 21
		5	SS	13		
	Sandy Silt Compact	6	SS	10		
		7	SS	12		7 40 42 11
		8	SS	120	/0cm	
	Clayey Silt (CL) to Silty Clay (CI) Frequently Varved (1 cm) Some Sand, Trace Gravel Occ. Silt, Sand Zones and Boulders Stiff to Hard	9	SS	12		
		10	SS	5		1 30 49 20
		11	TW	**		
		12	TW	**		
137.1		13	SS	38		
15.2	Heterogeneous Mixture Sandy Silt to Silty Sand Some Clay, Trace Gravel Occ. Clayey Silt Zones Occ. Boulders Very Dense	14	SS	73		7 13 63 17
		15	SS	60	/10cm	
133.7		16	SS	60	/15cm	
18.6	End of Borehole					



* W.L. recorded on 88-06-10

** TW sank by its own weight

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ◇ 5 / 10 (%) STRAIN AT FAILURE

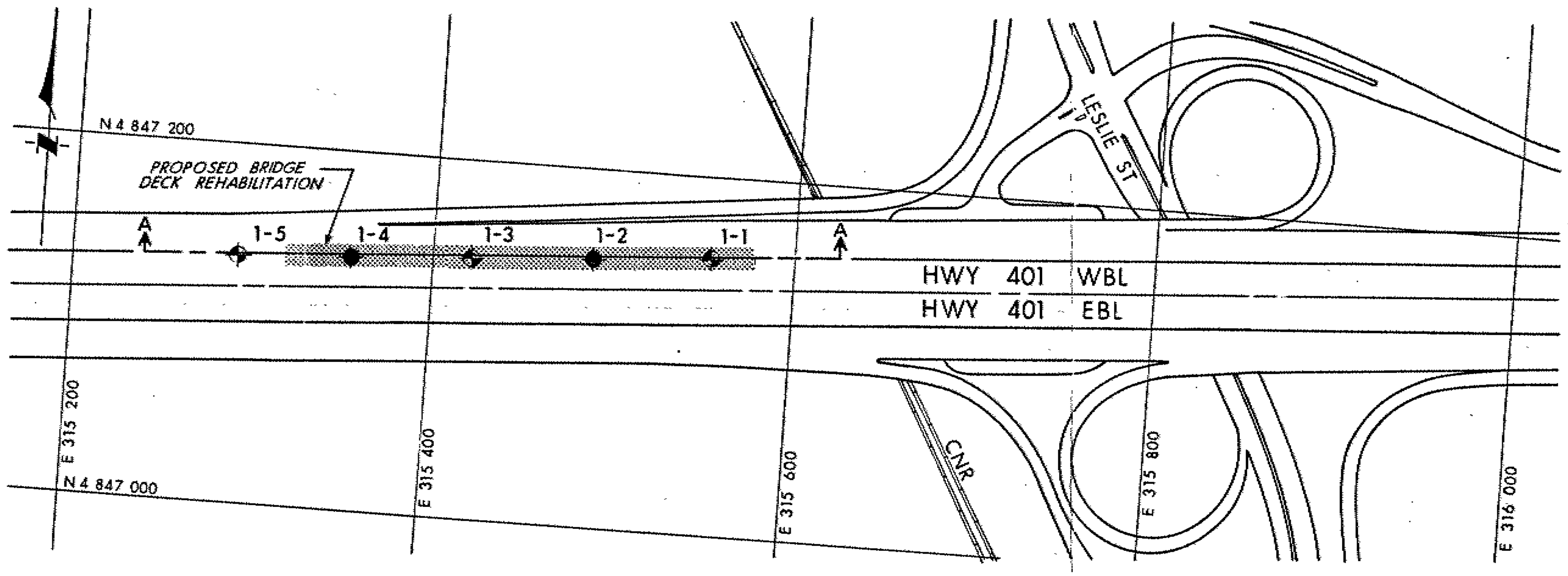
METRIC

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

CONT No
WP No 260-86-01/A

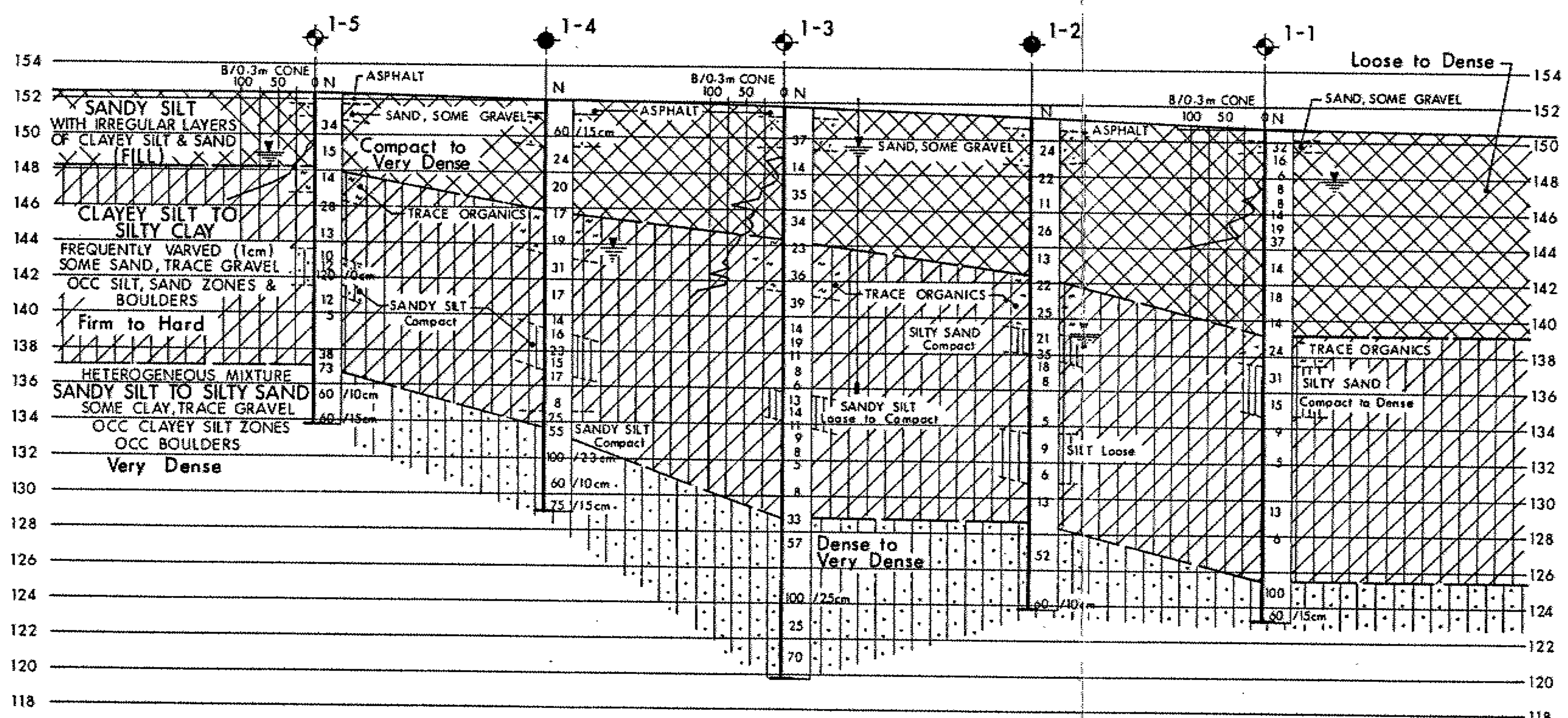
LESLIE ST & CNR OVERPASS
HWY 401 WB COLLECTOR LANES
BORE HOLE LOCATIONS & SOIL STRATA

SHEET



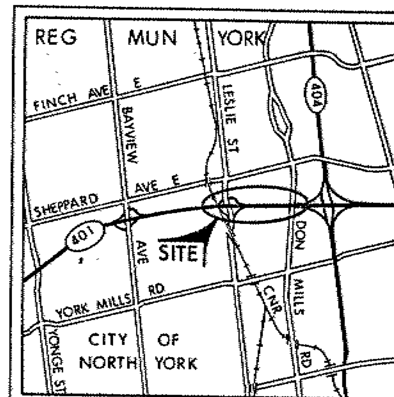
PLAN

SCALE
40m 20 0 40m



SECTION A-A

SCALE
40m 20 0 40m Hor
4m 2 0 4m Vert



KEY PLAN
SCALE
1km 0 1km

LEGEND

- Bore Hole
- Dynamic Cone Penetration Test (Cone)
- Bore Hole & Cone
- N Blows/0.3m (Std Pen Test, 475 J/blow)
- CONE Blows/0.3m (60° Cone, 475 J/blow)
- W L at time of investigation 88 05 and 88 06
- W L in Piezometer
- Piezometer

No	ELEVATION	CO-ORDINATES NORTH	EAST
1-1	150.8	4 847 154.1	315 554.4
1-2	151.3	4 847 150.0	315 488.8
1-3	151.7	4 847 145.9	315 420.7
1-4	152.0	4 847 141.3	315 354.3
1-5	152.3	4 847 137.2	315 290.6

NOTE

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

NOTE: The complete foundation investigation and design report for this project and other related documents may be examined at the Engineering Materials Office, Downsview. Information contained in this report and related documents is specifically excluded in accordance with the conditions of Section 102-2 of Form 100

REV.	DATE	BY	DESCRIPTION

Geocres No 30M14-191 A

HWY No 401			DIST 6
SUBM'D DD	CHECKED	DATE 88 09 01	SITE 37-206R
DRAWN DT	CHECKED	APPROVED	DWG 2608601-A

memo

To: File

Dec. 19/90

Re: Cont
Leslie /401

→ On Dec. 11, Augustine Liu of CR Structural Section advised that Birmingham had too light a hammer to achieve pile capacity.

→ On Dec. 12, Heather Glass of MW Construction asked for comment on 9:1 mix water/bentonite. I told her the mix should be gel-like & 3:1 or 4:1 would be a good start & that it should be tested in a jar first.

→ On Dec. 12 I spoke to Mark Jolink of Birmingham with Heather since the contractor wanted to dump the 9:1 mix in holes. We agreed it could be done & that Mark should investigate getting a stiffer mix.

→ On Dec. 12 Mark Jolink asked if change to Hiley ultimate capacity in contract was after tender. I said yes.

– On Dec. 13 Mark Jolink advised the slurry had set up overnight. I suggested getting slightly stiffer mix.

– on Dec 18 Russ Middleton advised that the piles 10, 11, 12 were not setting up

Pile	design depth	present depth	blows
10	29.3	35	?
11	28.4	29	2/"
12	28.4	37	5/"

- On Dec. 15, I looked into soil stratigraphy and report & noted that there had been some concern about inadequate pile lengths stated for this specific area but that Struct. Section preference to not change contract.

I recommended to Russ that they drive up to 4 m more length to try to obtain their ultimate.

D. Dundas.

memo

To: File

Dec. 14/90

Re: Forks St. Bridge /401
WP 260-86-01
Contract 89-106

On Dec. 3 Alton Zeppa of Cole Sherman called to discuss detail to allow movement of top of piles. I discussed with Harley who agreed that since we had not made the design we should leave it to C.C. Sherman & ask them to investigate alternative detail such as flexible connection in deck. I also told Stan bentonite would not stand & that granular in annular space would not isolate the pile to allow movement.

On Dec. 3 George Al-Bayy of the Struct. Office called re: the detail. I explained to George that we had no input on design since we had no review & in my opinion it is only a psychological detail & that probably no annular space would be OK but that we didn't want to relieve Cole Sherman of their responsibility.

George + I agreed that if the concern was to prevent freezing of bentonite the 4' elongated annular pile would prevent penetration of frost.

On Dec. 5 - Heather [illegible] of Construction called. I explained history of annular space problem to her. I told her that 1" of styrofoam = 1' of frost cover but that in our opinion some heat transfer could go through pile.

I told her the agreement was not for bentonite but I expected 4 parts H_2O to 1 part bentonite would be good stuff.

She asked for our reco in writing. I told her I would only respond if she sent memo requesting it.

D. Dundas

memorandum

Ontario

To: Russ Middleton
Construction Office
Central Region

Date: 1990 11 13

FROM: Foundation Design Section
Room 315, Central Building

RE: Contract 89-106
W.P. 260-86-01
Leslie Street and CNR Overpass
Hwy. 401, District 6, Toronto

Further to our telephone conversations of Nov. 8/90 and Nov. 14/90:

1) Regarding the costs for lightweight slag from National Slag;

- Unprocessed Litex is in the order of $18/tonne FOB, while 3/8" Structural Coarse is in the order of $25/tonne FOB. Delivery costs are estimated at 7 cents to 10 cents per tonne per km.

2) Regarding your inquiry about the contractor's proposal to delete the bentonite backfill in the upper 2 m of the annular space around piles #3, 4, 7, 8, 11, 12, 15, 16 and 19 as detailed on Sheet 572 of the Contract Drawings;

- Due to scheduling constraints, the Foundation Design Section did not participate in any formal review of the design for this project. Consequently, we were not aware of bentonite detail. We contacted Stan Lepper of Cole Sherman who explained that the purpose of the bentonite is to provide flexibility of the piles at the expansion joints. Hence, we recommend that the bentonite detail should remain in the design.

- During our review of Sheet 572, we have noted an error in the Pile Driving Notes. The Foundation Report recommends that an ultimate capacity of 3450 kN not 1650 kN should be assumed for control of pile driving with the Hiley Formula. This was discussed with Cole Sherman and the Central Region,Structural Section, and we recommend that this charge should be made as it is critical to pile capacity (i.e. change 1650 kN to 3450 kN on pile driving note 1 on Sheet 572).

If there are any questions, please call.

D. Dundas

D. Dundas, P. Eng.
Sr. Foundation Engineer

DD/jb

cc: V. Boehnke
S. Lepper

7540-1478 (Rev. 10/89)

(RETAIN THIS COPY FOR FOLLOW-UP)

7540-1021

SEND TO Russ Middleton
Construction Office

FROM Foundation Design Section

DEPT.

DATE Aug. 22/80

SUBJECT Cont. 89-106, WP 260-86-01 Leslie St / 401

Further to our telephone conversation of Aug 22/80 we understand that National Slag is unable to supply the 3/8" Structural lightweight slag we recommended as backfill to the ballast walls.

In this case the National Slag unprocessed slag can be used.

D. Dundas
Sr. Foundation Engineer.

REPLY

REPLY FROM

REPLY DATE

MEMORANDUM

To: Russ Middleton
Construction Office
Central Region

Date: 90 08 16

From: Foundation Design Section
Room 315, Central Building

Re: Contract 89-106
WP 260-86-01, Site 37-206R
Leslie Street and CNR Overpass
Hwy. 401, Dist. 6, Toronto

Further to our discussion of 90 08 16, in consideration of the movements at

- the ballast wall of the east abutment of the ramp from Leslie Street to 401 WB
- the ballast wall at the west abutment of the 401 WB collector bridge
- the 4 or 5 piers nearest the west abutment of the 401 WB collector bridge

we recommend that as part of the remedial measures that lightweight fill should be used as backfill to both ballast walls in order to reduce overturning moments and earth pressures acting on the walls.

The lightweight fill should be 3/8" Structural Coarse available from National Slag in Hamilton. Quantities can be estimated by assuming unit weights of 12 kN/cu. metre for the lightweight material vs 20.5 kN/cu. metre for Granular A.

If there are any questions, please advise.

D. Dundas

D. Dundas, P. Eng.
Sr. Foundation Engineer

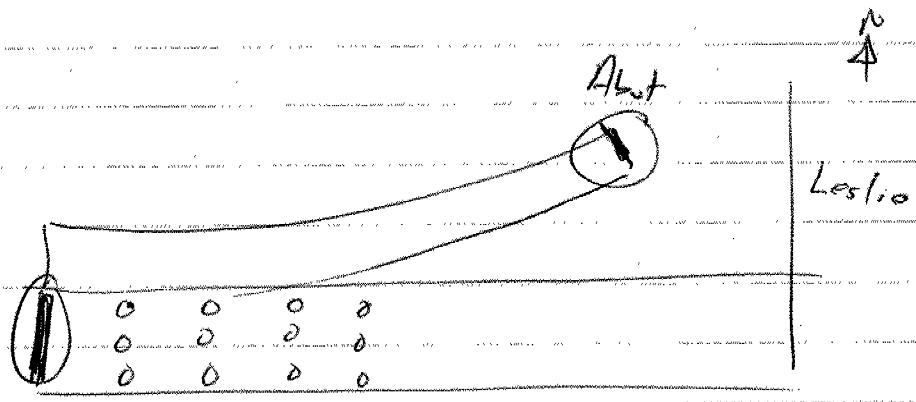
memo

To: File Aug. 16/90

Re: Cont. 89-106
WP 260-86-01
Leslie/401

On Aug. 13/90 Augustine Liu and Bob Bassalon advised that there was movement of a number of piers and ballast walls at ramp to WB collector.

Namely



- Ballast walls at west abut of collector bridge and east abut of ramp had overturned
- Deck of Bridge had moved E ~ 6"
- Piers nearest abut had moved east approx. 6" to 4" with the greatest effect at West pier and reducing effect over next 3 or 4 piers then no movement

The site was inspected.
The consensus was that the movement was probably not recent although this is not certain.
The Struct. Section will investigate inspection reports in order to determine when movement occurred.

The consensus was that the deck was dragging tops of piers along since the abut had not moved but the deck and piers had.

In FDS opinion there are a number of possible failure mechanisms or movement mechanisms

1) slope instability creep driven by geometry of slope behind abut.
2) earth pressure on ballast wall
3) lateral pressure due to expansion of pavement acting on deck

FDS recommended that
a) there is no immediate danger
b) the movements should be monitored
c) lightweight fill should be used as backfill to new ballast wall
(This was recommended as minimal cost prudent measure that would not hurt and may help if a) or b) are causes

Russ Middleton was advised that lightweight slag from National Slag (3/8" Structural Coarse) should be used behind abutment ballast walls as backfill and that a conversion of 80 pcf for lightwgt slag vs. 130 for Gran. A. could be used to calculate volume.

I mentioned to Russ that Structural Sect may give recs about relief joint in approach to West abut.

D. [illegible]

memo

To: File

June 7/90

Re: Cont 89-106
WP 260-86-01/A
Leslie Bridge @ 401

Stan Lepper of Cole Sherman called. Cole Sherman are representing Structural Section. They need to replace ballast wall at west abut. Hence they need shoring to stage construction for excavation 7' deep and 12' long. The shoring would be longitudinal to 401.

I referred him to BH-1-5.
I suggested that fill is Sandy Silt 0-4m with $\phi = 30°$ and this is underlain by clay with c = 1000 psf.

D. Dundas
Sr. Fdn Eng.

MEMORANDUM

To: V. Boehnke
Head, Structural Section
Central Region

Date: 1990 02 22

Attn: P. Roy

From: Foundation Design Section
Room 315, Central Building

Re: Leslie Street and C.N.R. Overpass
W.P. 260-86-01/A
Hwy 401
Dist. 6, Toronto

Enclosed please find addendum to the Foundation Investigation and Design Report, W.P. 260-86-01/A dated 1990 02 21. The attached replaces page 8 of the said report.

Please note revised design parameters for caissons.

Ken Ahmad, P. Eng.
Foundation Engineer

For

D.H. Dundas, P. Eng.
Sr. Foundation Engineer

c.c.

K.G. Bassi

R.P. Northwood

TABLE 2

Station Limits (m)	Founding Elevation (m)	Average Depth below Ground Surface (m)
25+000 to 25+050	132.0	20.4
25+050 to 25+090	130.0	22.0
25+090 to 25+120	128.0	24.0
25+120 to 25+170	121.0 *	30.8 *
25+170 to 25+310	123.0	28.0

* The pile tip elevation within station 25+120 to 25+170 may be lower than as shown in the table. The actual depth of pile will be determined during pile installation.

All steel H-piles should be reinforced with standard driving shoes.

For the purposes of the O.H.B.D.C. the suggested design parameters are as follows;

For 0.9m (36 inch) diameter caissons:

Factored Capacity at ULS	=	3,000 kN/caisson
Bearing Capacity at SLS Type II	=	2,000 kN/caisson
Factored Lateral Capacity at ULS	=	300 kN/caisson
Lateral Capacity at SLS Type II	=	200 kN/caisson

For 1.1m (42 inch) diameter caissons:

Factored Capacity at ULS	=	4,400 kN/caisson **
Bearing Capacity at SLS Type II	=	2,900 kN/caisson **
Factored Lateral Capacity at ULS	=	340 kN/caisson
Lateral Capacity at SLS Type II	=	230 kN/caisson

For 1.2m (48 inch) diameter caissons:

Factored Capacity at ULS	=	5,300 kN/caisson **
Bearing Capacity at SLS Type II	=	3,500 kN/caisson **
Factored Lateral Capacity at ULS	=	400 kN/caisson
Lateral Capacity at SLS Type II	=	270 kN/caisson

** Revised Design Parameters, Dated 1990 02 22

401 / Leslie (11:10 a.m.)

1990 02 21

W.P. 260-86-01 /A.

Record of Telephone Conversation.

Mr. P. Roy of Structural Engineer, central Region called at 11:10 a.m. and asked few things mentioned in our memo to him dated 1990 02 16 which are as follows:

He asked if the pile lengths shown on drawing S24 should be changed. I told him it was upto him. In our meeting on 1990 02 15 he had decided not to make any changes as the final depth of pile would be determined by the Hiley formula anyways.

I told him that even he shows the new pile length based on ~~a~~ some informations given in Table 2 in our ~~Geote~~ foundation report (particularly b/w stations 25+120 and 25+170) the length might not be correct. The pile might have to be driven ~~a~~ it is ~~so~~ thought necessary based on Hiley formula.

He told ~~to~~ me he wouldn't change the pile lengths shown on the drawing. The note put on the drawing to use Hiley Formula will be enough.

memorandum

Ontario

To: V. Boehnke
Head, Structural Section
Central Region

Date: 1990 02 16

Attn: P. Roy

From: Foundation Design Section
Room 315, Central Building

Re: Leslie Street and C.N.R. Overpass
F.T.M.S. Signs
W.P. 260-86-01 and W.P. 66-85-01
Hwy. 401, WB Collector Lanes
District 6, Toronto

This will confirm that we reviewed the contract drawings for structural widening at Leslie Street and CNR Overpass (Site 37-206R) and discussed few items with you in our meeting at our office dated 1990 02 15.

The following matters were discussed:

There was a discrepancy in the ultimate pile capacity shown on Drawing No. S24. The correct ultimate pile capacity is 3450 kN/pile and not 1650 kN/pile as shown on the drawing. It was agreed that this would be corrected.

We enquired if any shoring was required to carry out the proposed work. We understand that the excavation will be only 1.2 m deep below the existing road level and the traffic will be outside a slope of 1H:1V from the base of the excavation. Therefore, there will be no need of shoring.

We advised that the expected length of the piles as shown on Drawing S 24 may not be sufficient, particularly between station 25 + 120 and station 25 + 170 (pile locations 7 to 10). Piles may required to be driven deeper. However, it was agreed not to make any changes on the drawing and therefore the actual pile length will be determined at the time of pile driving by the Hiley Formula.

There was an inconsistency on the elevation shown on the drawings and that shown on the foundation log sheets. The foundation borehole logs show geodetic elevations. We were told that the elevation shown on the drawings were relative and a note will be put on the drawing regarding this matter.

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It was agreed that the caisson depths for four F.T.M.S. sign foundations (our No. F.T.M.S. 2, Project No. W.P. 66-85-01 and F.T.M.S. 8, 9 and 10, Project No. W.P. 260-86-01) will be 6 m below frost penetration depth of 1.2 m.

K. Ahmad, P. Eng.
Foundation Engineer

for

D. Dundas, P. Eng.
Sr. Foundation Engineer

KA/mmj

memorandum

Ontario

To: G.C.E. Burkhardt
Head, Structural Section
Central Region

Date: 1989 01 27

Atten: P. Roy

From: Foundation Design Section
Room 315, Central Building

RE: Leslie Street and C.N.R. Overpass
W.P. 260-86-01
Hwy. 401 WB Collector Lanes
District 6, Toronto

As requested, we have reviewed the concerns of your Environmental Unit concerning vibrations induced by pile driving operations at this site and offer the following comments.

In view of the proximity of the existing bridge foundations, the effects of vibrations were carefully considered at the time the recommendations were provided. In our opinion, the vibrations will not adversely affect the nearby residential and commercial buildings.

If there are any questions, please advise.

D.H. Dundas

D.H. Dundas, P. Eng.
Sr. Foundation Engineer

for

M. Devata, P. Eng.
Chief Foundation Engineer

DHD/MD/mmj

7540-1318 (10/78)