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DIST. 2 REGION

W.P. No. 41-66-09

CONT. No. 77-61

W. O. No.

STR. SITE No. 19-543

HWY. No. 402

LOCATION Townline Rd. Underpass

No. of Pages -

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.

REMARKS:

Ministry of Transportation and Communications
Ontario

Memorandum

40 I 14 - 86
GEOCRES No.

To: Mr. A. P. Watt (2)
Regional Structural Planning Engr.
Southwestern Region
London

From: Soil Mechanics Section
Geotechnical Office
West Building, Downsview

Attention:

Date: April 22, 1975

MAY - 1 1975

Our File Ref. W.P. 41-66-09

In Reply to

Subject:

FOUNDATION INVESTIGATION REPORT
for
Townline Road Underpass, Hwy. 402
Twp. of Delaware, Dist. 2, London
W.P. 41-66-09 Site 19-543

Attached we are forwarding to you our detailed foundation investigation report on the subsoil conditions existing at the above-mentioned site.

We believe that the factual data and recommendations contained therein will prove adequate for your design requirements. Should additional information be required, please do not hesitate to contact our Office.

K. G. Selby

K. G. SELBY
Supervising Engineer.

c.c. E. J. Orr
B. R. Davis
A. Wittenberg
L. E. Walker
B. J. Giroux
J. R. Roy
G. A. Wrong
P. Lewycky

Files
Record Services

J. Anderson) memo only
A. Crowley)

TABLE OF CONTENTS

FOUNDATION INVESTIGATION REPORT

for

Townline Road Underpass, Hwy. 402
Twp. of Delaware, Dist. 2, London
W.P. 41-66-09 Site 19-543

1. INTRODUCTION

A request for a foundation investigation at the abovementioned site was received from Mr. A. P. Watt, Regional Structural Planning Engineer, Southwestern Region, London.

A field investigation was subsequently carried out by the Soil Mechanics Section to determine the subsoil conditions existing at the site. This report contains the results of our field and laboratory investigations, together with our recommendations relating to the design of the proposed structure foundations.

2. DESCRIPTION OF THE SITE

The site of the proposed underpass is at the boundary of Delaware and Westminster Townships, 1.9 miles west of Hwy. 4. At this point it is proposed that an existing gravel road pass over Hwy. 402. The area surrounding this crossing is gently rolling cultivated farmland.

Physiographically, the site is located in an area referred to as the Mount Elgin Ridges.

3. FIELD AND LABORATORY INVESTIGATION PROCEDURES

Field work consisted of three sampled boreholes advanced employing 2-3/4 inch hollow stem augers, as well as three dynamic cone penetration tests.

Disturbed samples were obtained using a 2-inch O.D. split-spoon sampler driven according to the specifications for the Standard Penetration Test. 'Undisturbed' samples were recovered using 2-inch I.D. shelby tubes

advanced into the soil hydraulically. Field vane tests were attempted, however, none failed under a value in excess of 2200 lbs. per sq. ft.

All boreholes were surveyed in the field by personnel from London Region Engineering Surveys Section. The locations and elevations of the boreholes are shown on Drawing No.416609-A which accompanies this report.

All samples were visually examined and classified at the site as well as in the laboratory. Following this inspection, laboratory tests were carried out on selected representative samples to determine the following physical properties:

Atterberg Limits
Natural Moisture Content
Grain-size Distribution
Undrained Shear Strength

The test results are summarized on the Record of Borehole sheets contained in the appendix of this report.

4. SUBSOIL CONDITIONS

Subsoil at this site consists of a deposit of silty clay to clayey silt which extends from immediately below the ground surface to a depth in excess of 100 ft.

The deposit may be divided into three zones according to strength characteristics. The upper zone with a thickness of approximately 15 ft. represents the desiccated crust. It is brown in colour and apart from the upper 3 to 5 ft., which is affected by frost action, has a consistency of very stiff to hard. Based on Standard Penetration Test results, which range from 20 to 69, and on unconfined compression tests, it is estimated that the undrained shear strength of this layer varies with depth from in excess of 10,000 p.s.f. to 3,000 p.s.f.

The second zone, found from approximately 15 to 35 ft. below the ground surface has a stiff to very stiff consistency. Standard Penetration 'N' values range from 12 to over 20 blows per foot. Based on these values, and on field vane tests, the undrained shear strength of the soil is estimated to be in excess of 2000 p.s.f.

The third and deepest zone penetrated extends from a depth of approximately 35 ft. to over 100 ft. Standard Penetration 'N' values for this zone range from 40 to in excess of 60 blows per foot, indicating a hard consistency.

5. DISCUSSION AND RECOMMENDATIONS

(5.1) General

It is proposed to construct a two span structure to carry the township road over Hwy. 402. This will involve embankment heights of approximately 22 ft. and 2 spans, each of which will be 99 ft. in length.

(5.2) Structure Foundations

CENTER PIER -

It is recommended that the center pier be supported on a spread footing type foundation at approximate elevation 815.0. A net safe bearing pressure of 4 tons per sq. ft. may be used for design purposes. Resistance to sliding may be determined using a design value of 2000 p.s.f. adhesion.

PERCHED ABUTMENTS ON SHORT PILES -

The abutments may be constructed within the approach fills supported on steel tube piles (12-3/4" X ¼") driven to elevation 812.0. The piles must not be driven below this elevation as the undrained shear strength decreases with depth. A safe load of 25 tons per pile should be assumed for design purposes. Any horizontal loading should be resisted by battered piles.

PERCHED ABUTMENTS ON COMPACTED FILL -

As an alternative, the abutments may be supported on spread footings placed on well compacted G.B.C. Class 'A'. A net safe design load of 2.5 t.s.f. may be assumed. For calculations of sliding resistances, a friction coefficient of 0.6

may be assumed to apply between the footing and G.B.C. Class 'A'. A detailed construction scheme is outlined on Fig. 1 of the appendix.

SETTLEMENTS -

Long term settlements of 3 inches at the abutments and 1½ inches under the center pier are anticipated. Any bridge design should therefore have the ability to tolerate the resulting differential settlements. To minimize these differential settlements between the abutments and the center pier footings, it is recommended that the approach embankments be built in advance of the structure by as long a period as possible.

DEWATERING -

No dewatering problems are anticipated during excavations for footings due to the relatively impervious nature of the subsoil.

(5.3) Approach Embankments

No stability problems are anticipated with 22 ft. embankment fills if 2:1 slopes are employed. Care, however, should be taken that no material exceeding 3" grain size is placed in the fills through which piles have to be driven.

(5.4) Frost Protection

All pile caps or spread footings should be protected against frost action by a minimum 4 ft. of cover.

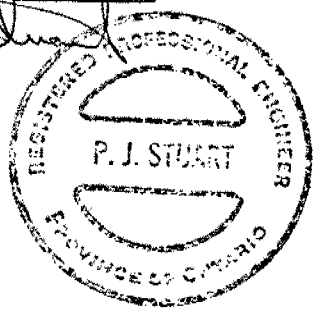
6. MISCELLANEOUS

The field work on the project was carried out March 19th and 20th, 1975 under the supervision of Mr. P. J. Stuart, Project Foundation Engineer, who also prepared this report.

The equipment used was owned and operated by P.V.K. Drilling.

This report was reviewed by Mr. K. G. Selby, Supervising Foundation Engineer.

P. J. STUART
Project Engineer



K. G. SELBY
Supervising Engineer

April 1975

APPENDIX

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS - ONTARIO

ENGINEERING SERVICES BRANCH - GEOTECHNICAL OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 1

W.P. 41-66-09 LOCATION CO-ORDS. 15,583,926N; 1,313,810E. ORIGINATED BY PJS

DIST. 2 HWY. 402 BORING DATE MARCH 19, 1975 COMPILED BY PJS

DATUM GEODETIC BOREHOLE TYPE 2 3/4" HOLLOW STEM AUGER CHECKED BY

ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	TYPE	'N' VALUES	GROUND WATER ELEV.
820.1	GROUND LEVEL					
0.0			1	SS	27	
	Silty		2	SS	69	
	Clay to		3	SS	47	810
	Clayey Silt		4	SS	32	
			5	SS	19	
			6	SS	16	800
	Trace of Sand		7	SS	12	
						790
			8	SS	26	
						780
	Stiff					
	to		9	SS	68	
	Hard					770
			10	SS	56	760
						750
			11	SS	44	
						740
			12	SS	39	
						730
721.1			13	SS	46	
99.0	End of Borehole					
NOTE:	Water level not established					

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE

LIQUID LIMIT w_L
PLASTIC LIMIT w_P
WATER CONTENT w
w_P w w_L
WATER CONTENT %
10 20 30

UNIT WEIGHT γ

REMARKS	% GR.	SA.	SI.	CL.
	0	6	54	40
	0	5	49	46
	0	14	51	35
	8	10	50	32
	0	9	45	46

20
15 ◇ 5 % STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

ENGINEERING SERVICES BRANCH - GEOTECHNICAL OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 2

W.P. 41-66-09 LOCATION CO-ORDS. 15,583,829N; 1,313,845E. ORIGINATED BY PJS

DIST. 2 HWY. 402 BORING DATE March 20, 1975 COMPILED BY PJS

DATUM GEODETIC BOREHOLE TYPE 2 3/4" HOLLOW STEM AUGER 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	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES	ELEV.	20 40 60 80 100 SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 600 1200 1800 2400 3000	W_P W W_L WATER CONTENT % 10 20 30	γ P.C.F.	% GR. SA. SI. CL.
819.8	GROUND LEVEL									
0.0	Silty Clay to Clayey Silt Trace of Sand		1	SS	26					
			2	SS	60					0 5 51 44
			3	SS	66		100/5"			
			4	SS	57	810				
			5	SS	39					0 8 52 40
			6	SS	23					
	Stiff to Hard		7	TW	PH				131	
						800				
			8	TW	PH				129	0 5 54 41
790.8			9	TW	PH				128	
29.0	End of Borehole									

NOTE: Water level not established

OFFICE REPORT ON SOIL EXPLORATION

20
15 ◇ 5 % STRAIN AT FAILURE
10

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

ENGINEERING SERVICES BRANCH – GEOTECHNICAL OFFICE – SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 3

W.P. 41-66-09 LOCATION CO-ORDS. 15,583,734N; 1,313,881E. ORIGINATED BY PJS

DIST. 2 HWY. 402 BORING DATE MARCH 20, 1975 COMPILED BY PJS

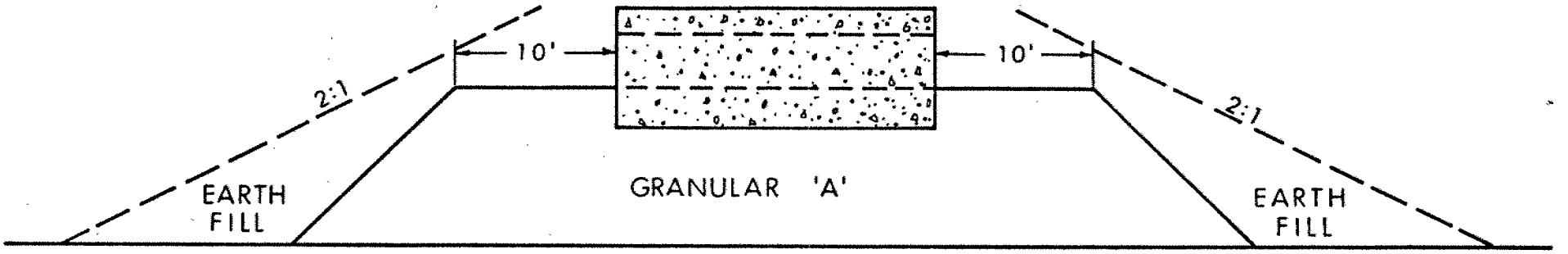
DATUM GEODETIC BOREHOLE TYPE 2 3/4" HOLLOW STEM AUGER CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC CONE PENETRATION RESISTANCE PLOT	LIQUID LIMIT W_L / PLASTIC LIMIT W_P / WATER CONTENT W	UNIT WEIGHT	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES	ELEV.	20 40 60 80 100 SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	W_P W W_L WATER CONTENT % 10 20 30	γ P.C.F	% GR. SA. SI. CL.
817.8	GROUND LEVEL									
0.0	Silty Clay to Clayey Silt		1	SS	45	810				
			2	SS	59					
	Trace of Sand		3	SS	37					0 5 51 44
			4	SS	23					
	Stiff to Hard		5	SS	15	800				
			6	SS	24					0 5 54 41
			7	SS	13	790				
778.8			8	SS	27	780				0 7 55 38
39.0	End of Borehole									
	NOTE: WATER LEVEL NOT ESTABLISHED									

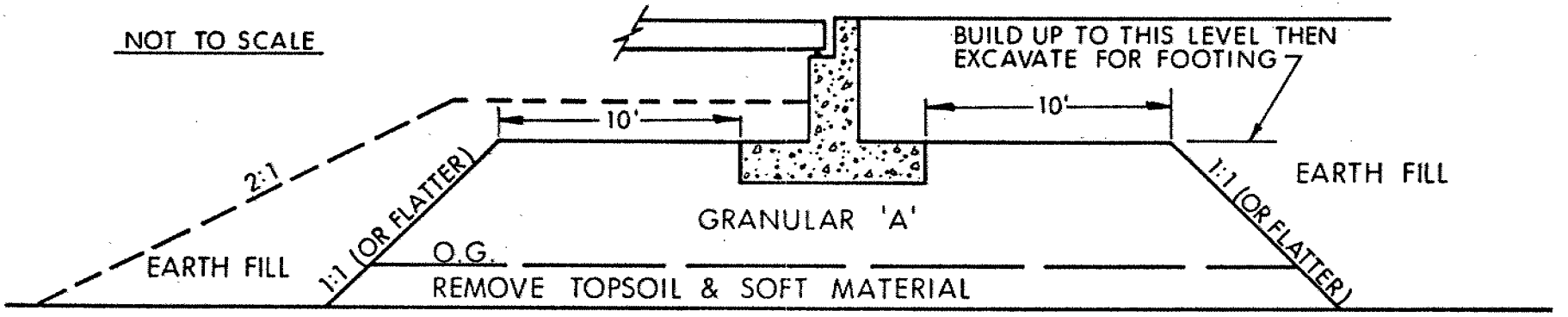
OFFICE REPORT ON SOIL EXPLORATION

20
15 ⊹ 5 % STRAIN AT FAILURE
10

ABUTMENT ON COMPACTED FILL SHOWING GRANULAR 'A' CORE



X - SECTION



LONGITUDINAL SECTION

NOTES

1 - REMOVE TOPSOIL &/OR SOFT SUBSOIL UNDER AREA OF COMPACTED GRANULAR 'A'.

2 - PLACE GRANULAR 'A' TO TOP OF FOOTING LEVEL, COMPACTED ACCORDING TO CURRENT M.T.C. STANDARDS.

3 - EXCAVATE COMPACTED GRANULAR 'A' MATERIAL FOR FOOTING.

FIG. 1

W.P. 41-66-09

FF-A-24(a) (Rev. Jan. 73)

ABBREVIATIONS & SYMBOLS USED IN THIS REPORT

PENETRATION RESISTANCE

'N' = STANDARD PENETRATION RESISTANCE : - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE : - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

DESCRIPTION OF SOIL

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

CONSISTENCY	c LB./SQ.FT.
VERY SOFT	0 - 250
SOFT	250 - 500
FIRM	500 - 1000
STIFF	1000 - 2000
VERY STIFF	2000 - 4000
HARD	> 4000

DENSENESS	'N' BLOWS / FT.
VERY LOOSE	0 - 4
LOOSE	4 - 10
COMPACT	10 - 30
DENSE	30 - 50
VERY DENSE	> 50

TERMS TO BE USED IN DESCRIBING SOILS :-

TRACE < 10% , SOME 10-25% , WITH 25-40% , > 40% SILTY, SANDY, GRAVELLY, CLAYEY ETC.

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.T.	SLOTTED TUBE SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE

P.H. SAMPLE ADVANCED HYDRAULICALLY

P.M. SAMPLE ADVANCED MANUALLY

SOIL TESTS

U	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
UU	UNCONSOLIDATED UNDRAINED TRIAXIAL	F.V.	FIELD VANE
CIU	CONSOLIDATED ISOTROPIC UNDRAINED TRIAXIAL	C	CONSOLIDATION
CID	" " DRAINED "	S	SENSITIVITY
CAU	" ANISOTROPIC UNDRAINED "		
CAD	" " DRAINED "		

FF-A-24(b) (Rev. Jan. 73)

ABBREVIATIONS & SYMBOLS USED IN THIS REPORT

SOIL PROPERTIES

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_s	UNIT WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
S_r	DEGREE OF SATURATION
w_L	LIQUID LIMIT
w_P	PLASTIC LIMIT
I_P	PLASTICITY INDEX
w_S	SHRINKAGE LIMIT
I_L	LIQUIDITY INDEX $= \frac{w - w_P}{I_P}$
I_C	CONSISTENCY INDEX $= \frac{w_L - w}{I_P}$
e_{max}	VOID RATIO IN LOOSEST STATE
e_{min}	VOID RATIO IN DENSEST STATE
I_D	DENSITY INDEX $= \frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY D_r IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
m_v	COEFFICIENT OF VOLUME CHANGE $= \frac{-\Delta e}{(1+e)\Delta\sigma'}$
c_v	COEFFICIENT OF CONSOLIDATION
C_c	COMPRESSION INDEX $= \frac{\Delta e}{\Delta \log_{10} \sigma'}$
T_v	TIME FACTOR $= \frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF EFFECTIVE STRESS $\tau_f = c' + \sigma' \tan \phi'$
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF TOTAL STRESS $\tau_f = c_u + \sigma \tan \phi$
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

π	= 3·1416
e	BASE OF NATURAL LOGARITHMS 2·7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ε	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNGS MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

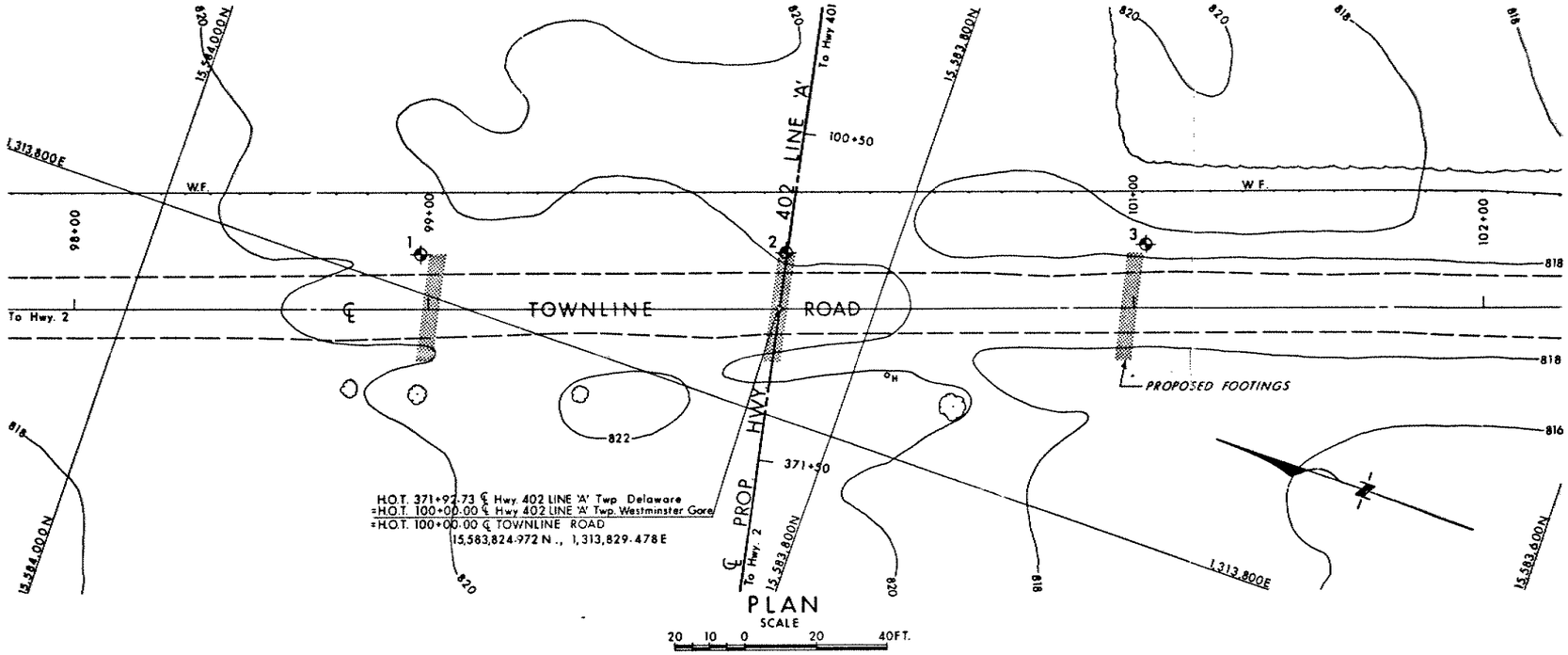
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_o	COEFFICIENT OF EARTH PRESSURE AT REST

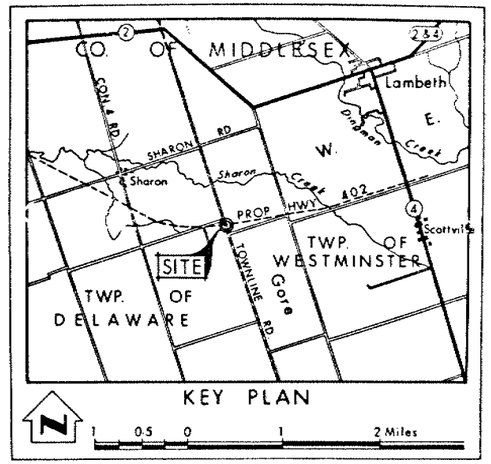
FOUNDATIONS

B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY. DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL





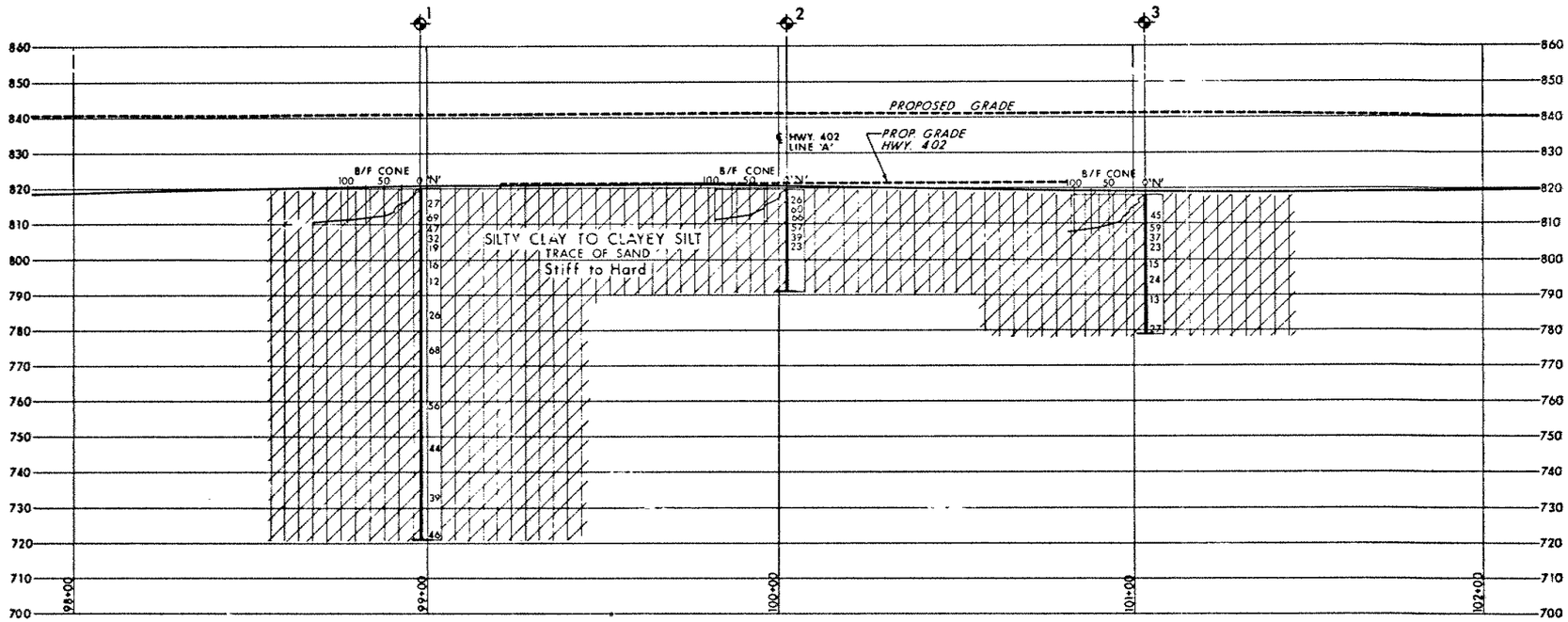
LEGEND

- Bore Hole
- Dynamic Cone Penetration Resistance Test
- Bore Hole & Cone Test
- Water Levels established at time of field investigation.
- Water Levels NOT established at time of field investigation.

NO.	ELEVATION	CO-ORDINATES NORTH	CO-ORDINATES EAST
1	820.1	15,583,926	1,313,810
2	819.8	15,583,829	1,313,845
3	817.8	15,583,734	1,313,881

NOTE: FOR CONTRACT DOCUMENT
The complete foundation investigation report for this structure may be examined at the Structural Office and Foundations Office, Downsview, and at the LONDON District Office.

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



℄ PROFILE TOWNLINE RD.

SCALE
20 10 0 20 40FT.

REF. NO E-5372-1, June 1974

REVISIONS			
	DATE	BY	DESCRIPTION

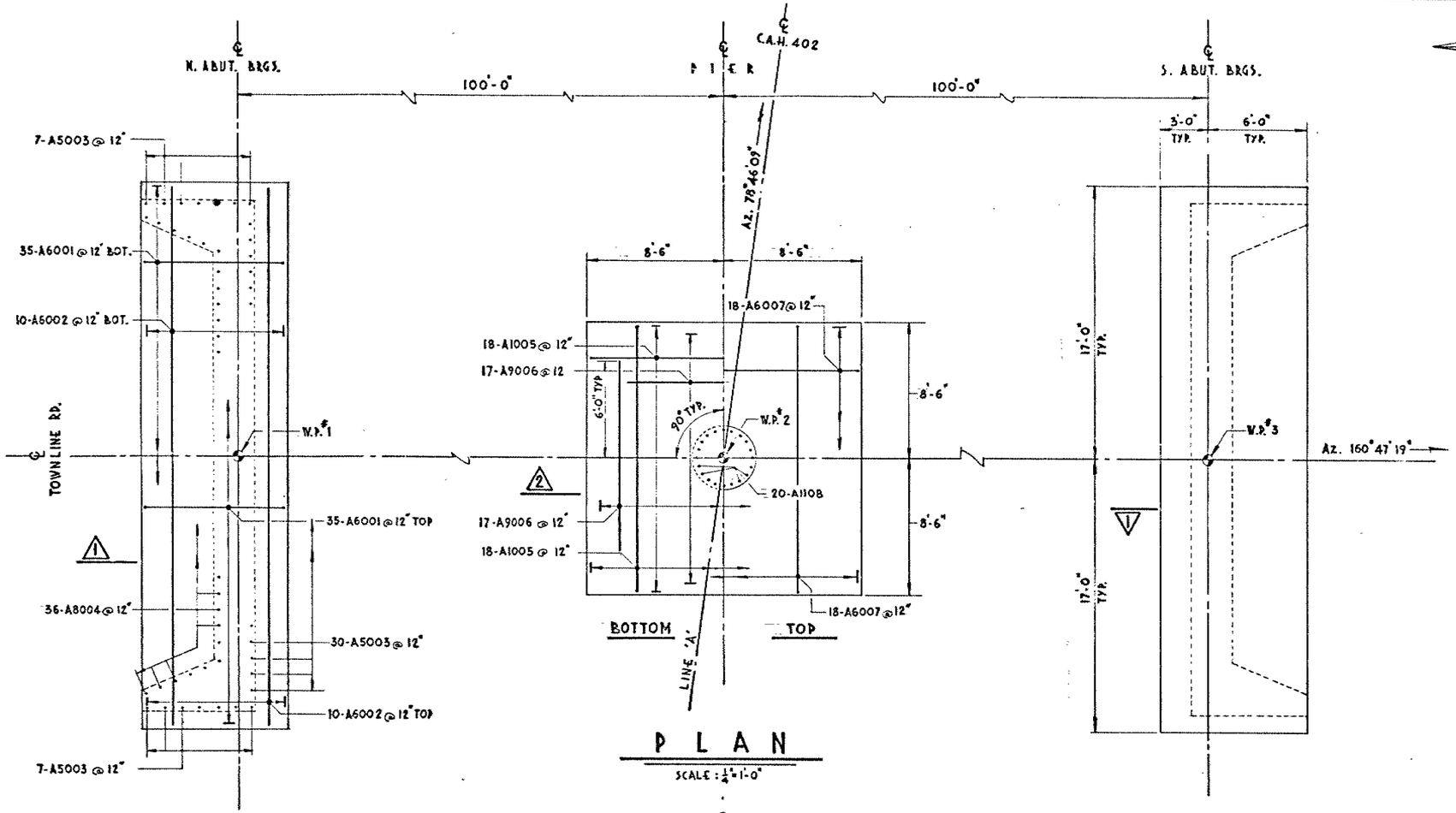
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

TOWNLINE ROAD

HIGHWAY NO Prop. 402 LINE 'A' DIST NO 2
CO MIDDLESEX TWP. DELAWARE
TWP WESTMINSTER Gore LOT 13 & 9 CON IV

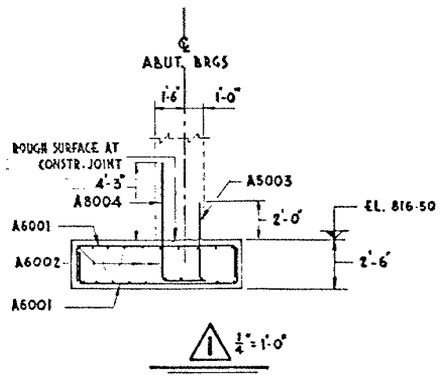
BORE HOLE LOCATIONS & SOIL STRATA

SUBMITTED	CHECKED	W.P. NO 41-66-09	DRAWING NO 416609-A
DRAWN	CHECKED	W.O. NO	
DATE April 24, 1975		SITE NO 19-543	BRIDGE DRAWING NO
APPROVED		CONT NO	



PLAN

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



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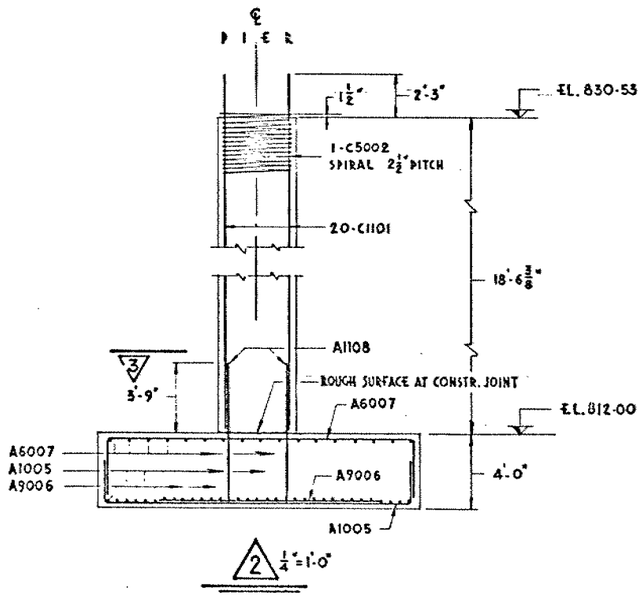
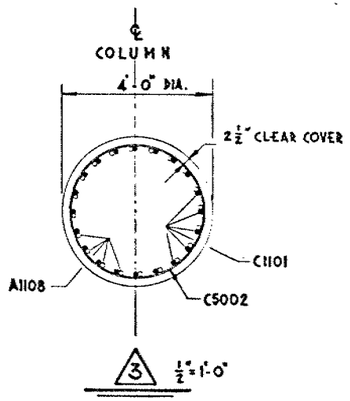


2 1/4"=1'-0"



3 1/2"=1'-0"

WORKING POINT DATA

W.P.#	STATION	CO-ORDINATES
1	H.O.T 99+00.00 TOWNLINE RD.	N. 15,583,919·403 E. 1,313,796·573
2	H.O.T. 100+00.00 TOWNLINE RD. = H.O.T. 100+00.00 LINE 'A' TWP. WESTMINSTER = H.O.T. 371+92.73 LINE 'A' TWP. DELAWARE	N. 15,583,824·972 E. 1,313,829·478
3	H.O.T. 101+00.00 TOWNLINE RD.	N. 15,583,730·541 E. 1,313,862·385

NORTH FOR CONSTRUCTION

CONT No
WP No 41-66-03

TOWNLINE RD. U'PASS
1·9 Miles West of Hwy. 4
FOUNDATION LAYOUT, PIER & REINF.

SHEET

TO BE USED FOR ESTIMATING PURPOSES ONLY

DATE JAN 2 0 1976

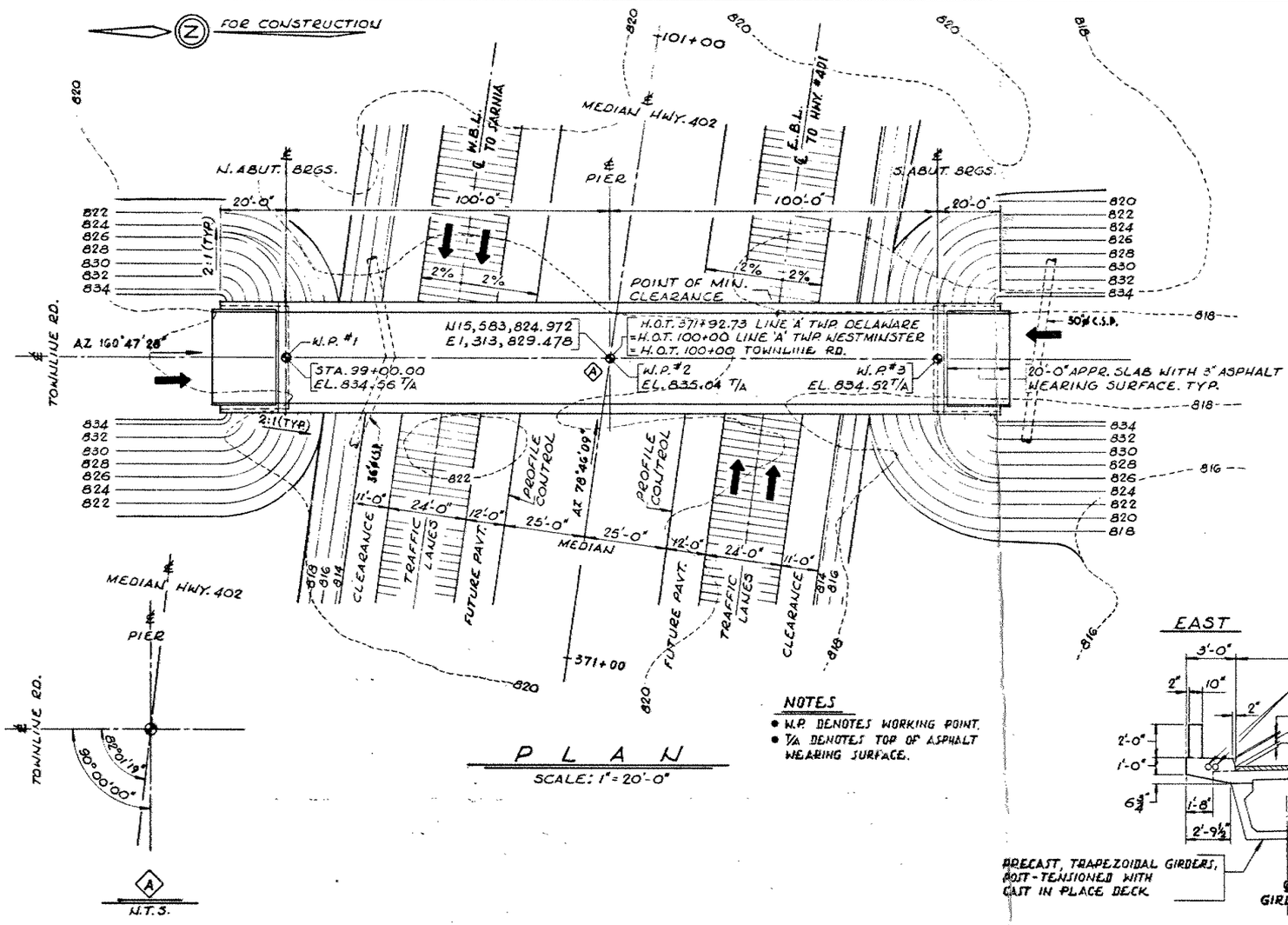
R. M. H. KAN

FOR REDUCED PLAN
USE SCALE BELOW
3 INCHES ON ORIGINAL PLAN

REVISIONS		
DATE	BY	DESCRIPTION

DESIGN R. K. | CHECK | LOADING H S 20-44 | DATE
DRAWING G.C. | CHECK | SITE No 19-543 | DWG 3

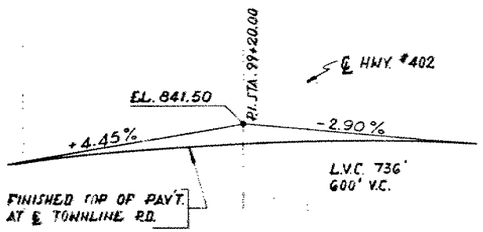
FOR CONSTRUCTION



PLAN

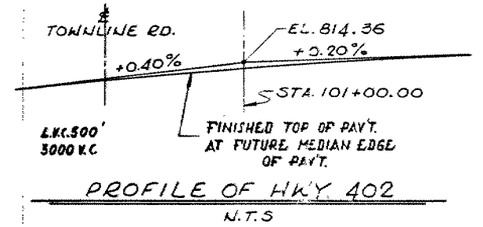
SCALE: 1" = 20'-0"

NOTES
- W.P. DENOTES WORKING POINT.
- T/A DENOTES TOP OF ASPHALT WEARING SURFACE.



PROFILE OF TOWNLINE RD.

N.T.S.



PROFILE OF HWY 402

N.T.S

NOTES

CLASS OF CONCRETE

DECK, CURBS, PARAPET WALLS & PIER COLUMN	4000 P.S.I.
PRECAST GIRDERS	6000 P.S.I.
REMAINDER	3000 P.S.I.

CLEAR COVER ON REINF. STEEL

FOOTINGS, ABUTMENTS & WINGWALLS	3"
COLUMN	2½"
PRECAST GIRDERS	1"

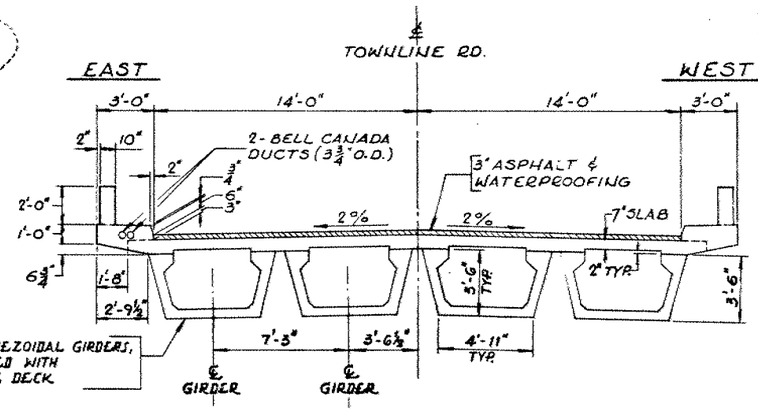
DECK — TOP 2", BOT. 1½"
CURBS — 2", PARAPET WALLS — 1½"
UNLESS NOTED OTHERWISE

CONSTRUCTION NOTES

THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF ⅛"±
NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN DECK HAS BEEN PLACED, STRESSED & GROUTED.

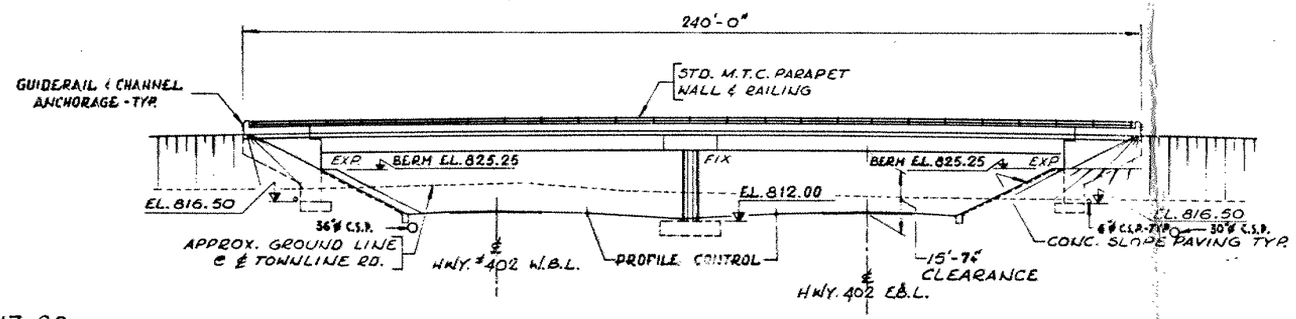
REINF. STEEL GRADE

DECK SLAB TRANSVERSE	60
PRECAST GIRDERS	40
REMAINDER	50



TYP. DECK SECTION

SCALE: ¼" = 1'-0"



ELEVATION

SCALE: 1" = 20'-0"

B.M. 817.20

GEODETIC DATUM

U. & W. IN NORTH ROOT 1.5 MAPLE WEST OF TOWNLINE RD.
25' RT. 96+26 ℄ TOWNLINE RD.

LIST OF DRAWINGS

DWG. 1	GENERAL PLAN
2	BORE HOLE LOCATIONS & SOIL STRATA
3	FOUNDATION LAYOUT, PIER & REINF.
4	ABUTMENTS & BEARINGS
5	GIRDERS & CABLE DETAILS
6	GIRDER REINFORCEMENT
7	DECK DETAILS & TRANSVERSE CABLES
8	DECK REINFORCEMENT
9	PARAPET WALL DETAILS (2'-0" HIGH)
10	STEEL PARAPET RAILING (DOUBLE TUBE)
11	20 FT. APPROACH SLAB (CURB OR S. WALK)
12	DETAILS OF CONC. SLOPE PAVING
13	STANDARD DETAILS I
14	STANDARD DETAILS II
DWG 15	AS CONSTRUCTED ELEV. & DIM.

LIST OF CONC. QUANTITIES

CONCRETE QUANTITIES ARE LISTED BELOW FOR THE APPROPRIATE CONCRETE LUMP SUM TENDER ITEMS:

1. CONCRETE IN PIER, ABUTMENTS AND WINGWALLS	4000 P.S.I.	16	cu. yds.
	3000 P.S.I.	150	
2. CONCRETE IN DECK		281	
3. CONCRETE IN PARAPET WALLS		31	
4. CONCRETE IN APPROACH SLABS		38	
5. CONCRETE IN SLOPE PAVING		36	cu. yds.

FOR REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

DIST. 2
CONT No
WP No 41-66-09

TOWNLINE RD U'PASS
1.9 miles west of hwy 4
GENERAL PLAN

SHEET

REVISIONS	DATE	BY	DESCRIPTION

DESIGN		CHECK HKJ	LOADING	DATE JAN/76	
DRAWING		CHECK RK	SITE No 19-545	DWG	1

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS ONTARIO 88-BR-19 4-76

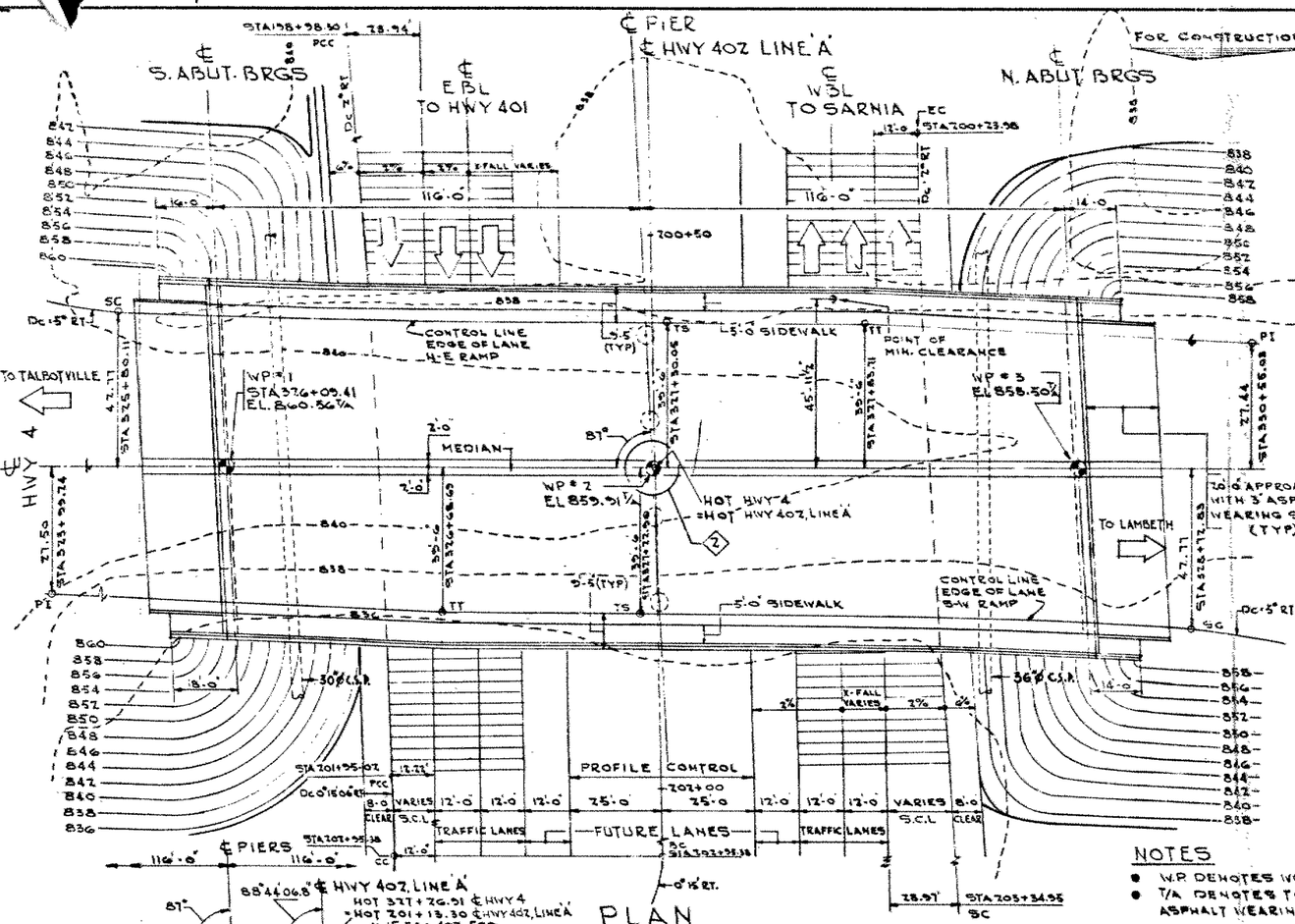
DIST. 2
CONT No
WP No 41-66-08

HIGHWAY 4 INTERCHANGE
UNDERPASS
GENERAL PLAN

SHEET

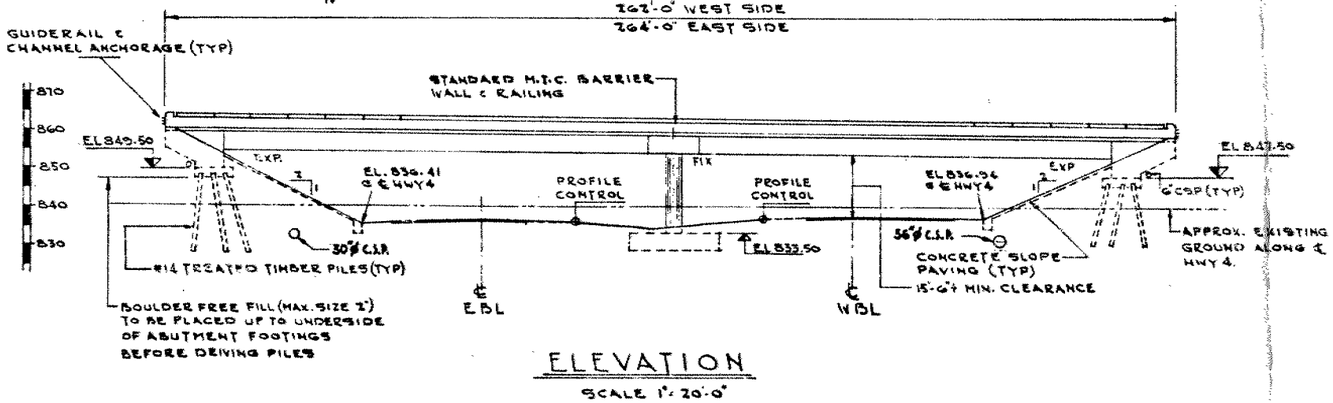
Giffels Giffels, Davis & Jorgensen Limited Consulting Engineers

FOR CONSTRUCTION



PLAN
SCALE 1" = 20'-0"

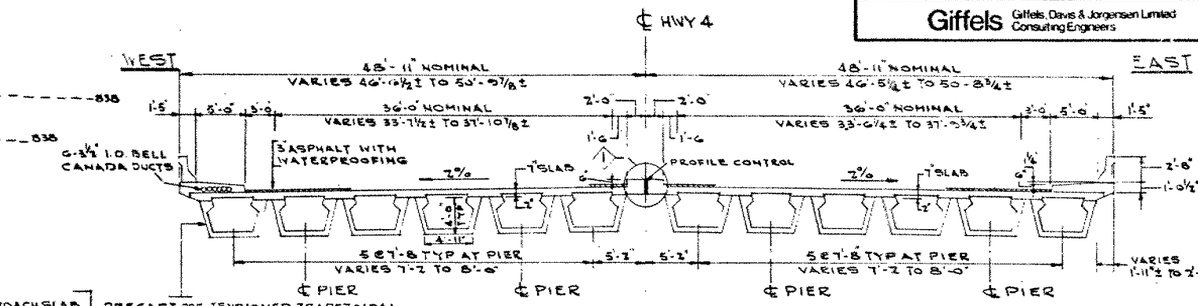
NOTES
- W.P. DENOTES WORKING POINTS
- T/A DENOTES TOP OF ASPHALT WEARING SURFACE.



ELEVATION
SCALE 1" = 20'-0"

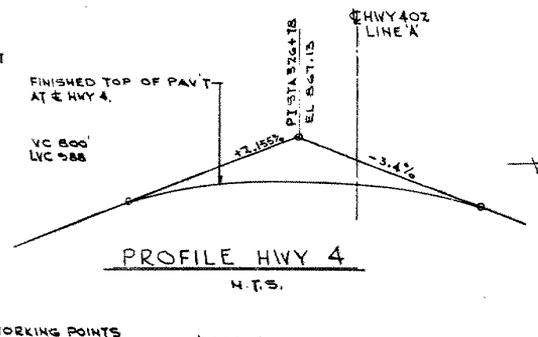
REFERENCE BENCH MARK

BM 847.63
GEODETIC DATUM
NEW IN E ROOT 1'-5 MAPLE
268.0 LT 375+13.

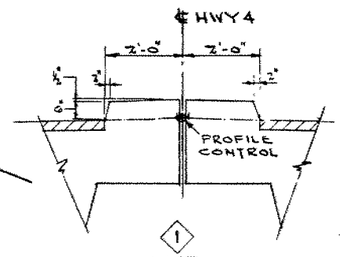


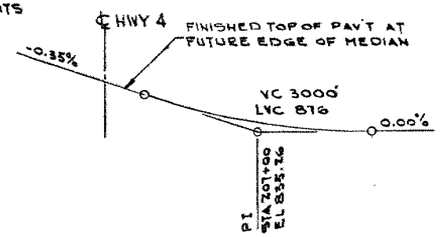
TYPICAL CROSS SECTION

SCALE ⅛" = 1'-0"

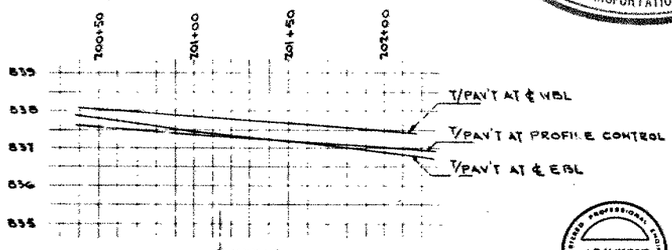


PROFILE HWY 4
N.T.S.





PROFILE HWY 402
NTS



HWY 402 PROFILE CONTROL
SCALE: HOR 1"=40'
VERT 1"=20'

RECEIVED
GEOTECHNICAL OFFICE
DEC 29 1976
SOIL MECHANICS
MINISTRY OF TRANSPORTATION & COMMUNICATIONS

J. R. McWHINNIE PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

FOR REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

NOTES

CLASS OF CONCRETE

DECKS, SIDEWALKS, CURBS, BARRIER WALLS AND PIER COLUMNS	4000 PSI.
PRECAST GIRDERS	6000 PSI.
REMAINDER	3000 PSI.

REINFORCING STEEL

DECK SLAB TRANSVERSE BARS AND PIER COLUMN VERTICAL BARS	GRADE 60
PRECAST GIRDERS	GRADE 40
REMAINDER	GRADE 50

CLEAR COVER TO REINF. STEEL

FOOTINGS, ABUTMENTS, WING WALLS,	3"
PIER COLUMNS	2½"
PRECAST GIRDERS	1"
DECK TOP, CURBS, SIDEWALKS	2"
DECK BOTTOM, BARRIER WALLS UNLESS OTHERWISE NOTED	1½"

CONSTRUCTION NOTES

THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS TO THE SPECIFIED ELEVATIONS WITHIN A TOLERANCE OF ⅛" ±.

NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE DECK CONCRETE HAS BEEN PLACED, STRESSED & GROUTED.

CONCRETE QUANTITIES

CONCRETE QUANTITIES ARE LISTED BELOW FOR THE APPROPRIATE CONCRETE LUMP SUM TENDER ITEMS.

CONCRETE IN PIERS, ABUTMENTS, WING WALLS 3000 PSI.	218 CU.YDS.
4000 PSI	35 CU.YDS.
PRESTRESSED CONCRETE BRIDGE DECK (INCL. CURBS & SIDEWALKS)	1064 CU.YDS.
CONCRETE IN BARRIER WALLS	46 CU.YDS.
CONCRETE IN APPROACH SLABS	112 CU.YDS.
CONCRETE IN SLOPE PAVING	112 CU.YDS.

LIST OF DRAWINGS

1. GENERAL PLAN
2. BORE HOLE LOCATIONS AND SOIL STRATA
3. FOUNDATION LAYOUT & PIERS
4. SOUTH ABUTMENT & BEARINGS
5. NORTH ABUTMENT & BEARINGS
6. GIRDER LAYOUT & ELEVATION
7. GIRDER REINFORCEMENT
8. DECK DETAILS TRANSVERSE CABLE DET
9. SCREED EL'S, LONG.T. CABLE ORDINATES
10. DECK REINF. & DETAILS
11. DECK & PIER CAP REINF. DETAILS.
12. END BLOCK REINF & DETAILS
13. CONC. BARRIER WALL DETAILS
14. STEEL PARAPET RAILING.
15. 20FT. APPROACH SLAB.
16. DETAILS OF CONC. SLOPE PAVING
17. AS CONSTRUCTED ELEV. & DIM.
18. STANDARD DETAILS I
19. STANDARD DETAILS II
20. STANDARD DETAILS III

REVISIONS	DATE	BY	DESCRIPTION

DESIGN R.W.S. CHECK — LOADING HS 20-44 DATE Aug/76
DRAWING A.M. CHECK — SITE No 19-544 DWG 1

Mr. C.S. Grebski
Structural Design Engineer
Structural Office
West Building, Downsview

Soil Mechanics Section
Geotechnical Office
West Building, Downsview

February 2, 1976

Townline Road Underpass
W.P. 41-66-09, Site 19-543

A review of the final bridge drawings 1 and 3 for this site shows the design to be adequate from a foundation standpoint.

P. Stuart
Project Engineer

For: K.G. Selby
Supervising Engineer

cc: A.P. Watt
J.G. Forester
A. Wittenberg
Files
Record Services

Ministry of Transportation and Communications
Ontario

Memorandum

To: Mr. A. P. Watt,
Reg. Structural Planning Engineer,
Southwestern Region,
London, Ontario.

From: Structural Office,

Attention:

Date: August 6, 1975.

Our File Ref.

In Reply to

Subject: Townline Road Underpass,
W. P. 41-66-09, Site 19-543,
Highway 402, District 2.

Attached herewith are prints of the Preliminary Bridge Plan Drawing 19-543-P1 for the above mentioned structure.

The estimated cost of the proposed structure is $ 264,000.00 which includes tender, materials, engineering and sundry construction.

Any comments or revisions you may have should be submitted at your earliest convenience.

W. Lin,

WL/CSG/cf
Enc.

for: C. S. Grebski,
Structural Design Engineer.

c.c. B. R. Davis
W. D. Birch
A. E. McKim
J. Keen
K. Bassi
M. Stoyanoff
C. Mirza
J. Anderson
A. Crowley
S. Edwards

RECEIVED
GEOTECHNICAL OFFICE
AUG 6 1975
SOIL MECHANICS
MINISTRY OF TRANSPORTATION & COMMUNICATIONS

No Comment
Aug 14/75

Ministry of Transportation and Communications
Ontario

Memorandum

To: Mr. K.G. Selby,
Supervising Engineer,
Soil Mechanics Section,
Geotechnical Office.
Attention: West Building, Downsview.

From: Structural Office,
West Building,
Downsview, Ontario.

Date: July 24, 1975.

Our File Ref.

In Reply to

Subject: Townline Road Underpass
Town of Delaware
W.P. 41-66-09, Site 19-543
Hwy. #402, District #2

This will confirm our discussion at your office regarding the bearing capacity for the above structure.

Due to the change of Townline Road profile grade, it is recommended by your office that the substructure can be supported by spread type foundation.

Abutment footings at EL.814.00, a design load of 4 tons per sq. ft. and pier footing at or above EL.808.00, a design load of 3.5 tons per sq. ft. may be assumed.

R. Kan

R. Kan,
Structural Project Engineer.

RK/ac

c.c. K. Bassi
A. Watt