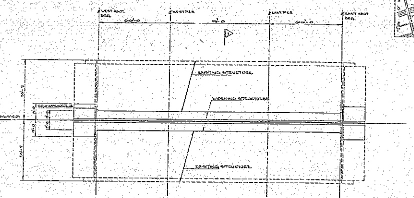
30M12-32

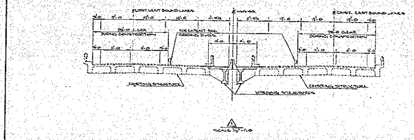
CONT No
WP No 34-73-03

HWY 401 CREDIT RIVER BRIDGE WIDENING
GENERAL LAYOUT

SHEET



PLAN



CONCRETE QUANTITIES	CU.YDS
FOUNDATIONS	36
ABUTMENTS	36
PIERS	15
DECK & DIAPHRAGMS	120
BARRIER WALL	36
APPROACH SLAB	36

LIST OF DRAWING

1. GENERAL LAYOUT
2. GENERAL ARRANGEMENT
3. STAGING AND SHORING DETAILS
4. EAST & WEST ABUTMENT DETAILS
5. PIER DETAILS
6. PRESTRESSED GIRDERS & BEARINGS
7. DECK DETAILS
8. CONCRETE BARRIER WALL (2'-8 HIGH)
9. 20FT. APPROACH SLAB
10. EXPANSION JOINT DETAILS
11. STANDARDS
12. AS CONSTRUCTED ELEV & DIM.

NOTES

- CLASS OF CONCRETE
  PRESTRESSED 5000 P.S.I.
  DECK & PIERS 4000 P.S.I.
  REMAINDER 3000 P.S.I.
- CLEAR COVER TO REINFORCEMENT
  DECK 2" TOP 1" BOTTOM
  FOOTINGS AND EARTH FACES 3"
  ELSEWHERE 2"
- THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITHIN A TOLERANCE OF 1/8".
- NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE DECK HAS BEEN PLACED.
- CONTRACTOR TO VERIFY EXISTING DIMENSIONS AND ELEVATIONS OF EXISTING STRUCTURES.

Consulting Engineers & Planners

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

REVISIONS		
DATE	BY	DESCRIPTION

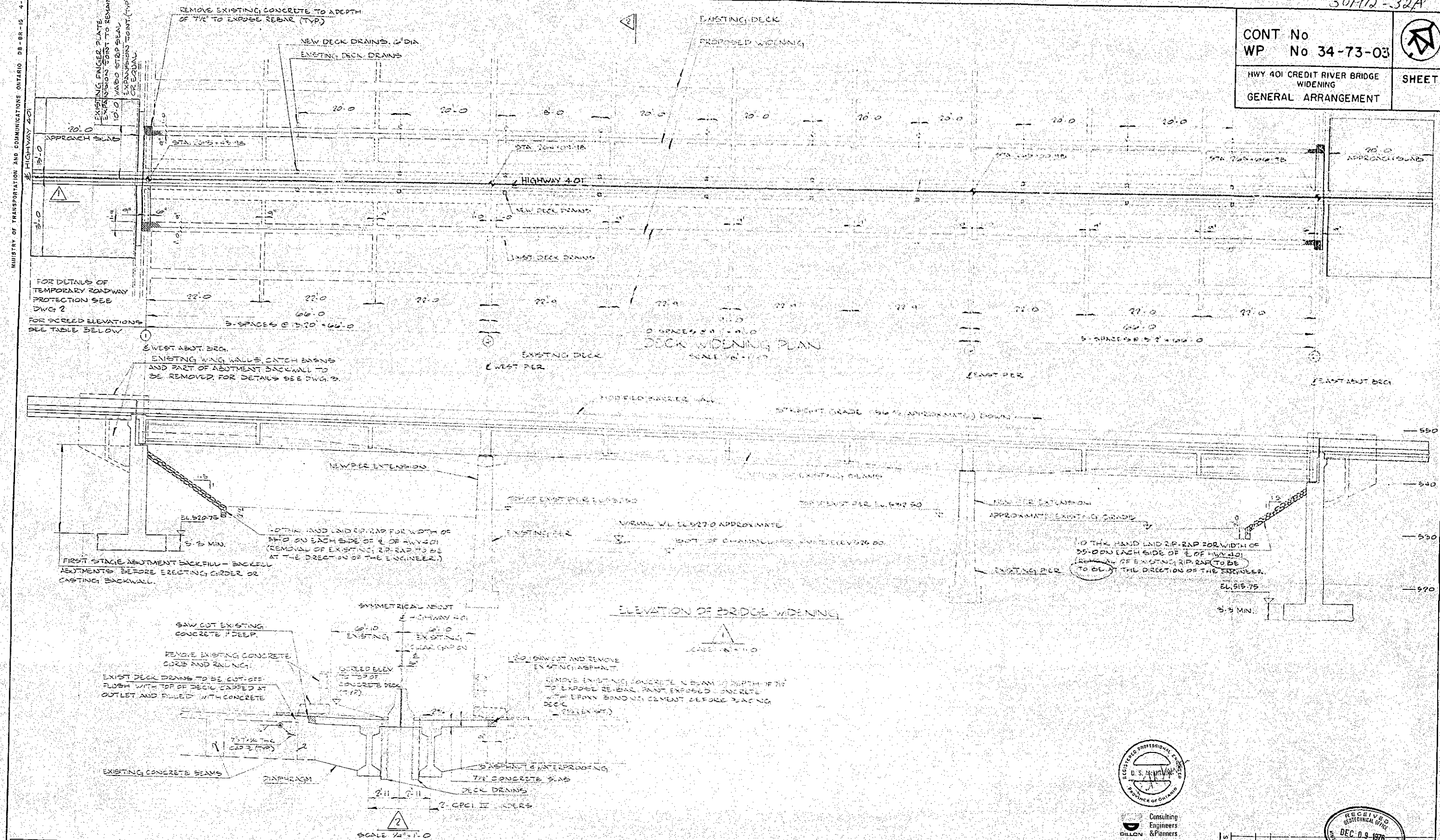
DESIGN | CHECK | LOADING | DATE
DRAWN | CHECK | SITE | DWG

30M12-32A

CONT No
WP No 34-73-03

HWY 401 CREDIT RIVER BRIDGE WIDENING
GENERAL ARRANGEMENT

SHEET



SCREED ELEVATIONS																				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
548.36	548.17	547.99	547.74	547.48	547.24	547.13	547.02	546.90	546.79	546.67	546.54	546.39	546.25	546.10	545.95	545.76	545.58	545.38	545.20	545.01

D. S. McKINNON
REGISTERED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

DILLON Consulting Engineers & Planners

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

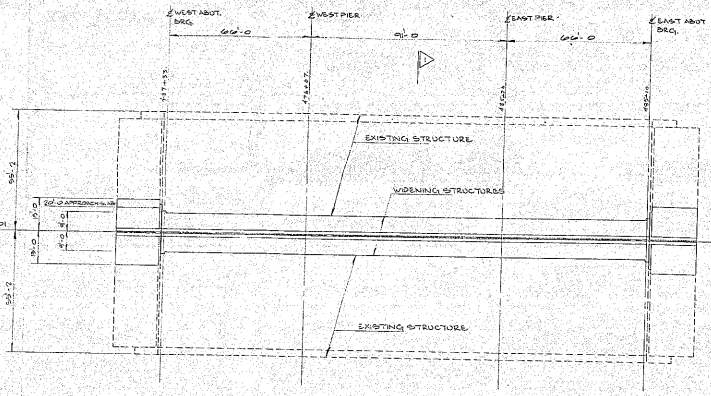
RECEIVED
GEOTECHNICAL OFFICE
DEC 0 9 1976
SOIL MECHANICS
MINISTRY OF TRANSPORTATION & COMMUNICATIONS

REVISIONS		
DATE	BY	DESCRIPTION

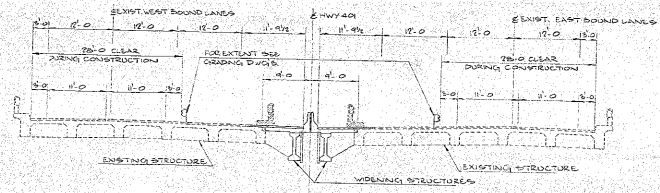
DESIGN D.S.M.	CHECK M.R.	LOADING HS 20-44	DATE OCT 76
DRAWING MAS	CHECK DSM	SITE No 24-128	DWG 2

30H12-32A

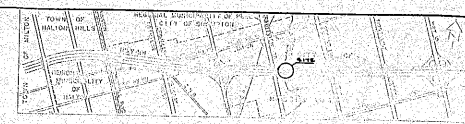
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS ONTARIO 13-28-15 4-76



PLAN
SCALE 1" = 20'-0



SCALE 1/8" = 1'-0



CONT No
WP No 34-73-03

HWY 401 CREDIT RIVER BRIDGE WIDENING
GENERAL LAYOUT

SHEET

CONCRETE QUANTITIES	CU. YDS
FOUNDATIONS	30
ABUTMENTS	85
PIERS	18
DECK & DIAPHRAGMS	170
BARRIER WALL	30
APPROACH SLAB	38

LIST OF DRAWINGS

1. GENERAL LAYOUT
2. GENERAL ARRANGEMENT
3. STAGING AND SHORING DETAILS
4. EAST & WEST ABUTMENT DETAILS
5. PIER DETAILS
6. PRESTRESSED GIRDERS & BEARINGS
7. DECK DETAILS
8. CONCRETE BARRIER WALL (2'-8 HIGH)
9. 20FT. APPROACH SLAB
10. EXPANSION JOINT DETAILS
11. STANDARDS
12. AS CONSTRUCTED ELEV & DIM.

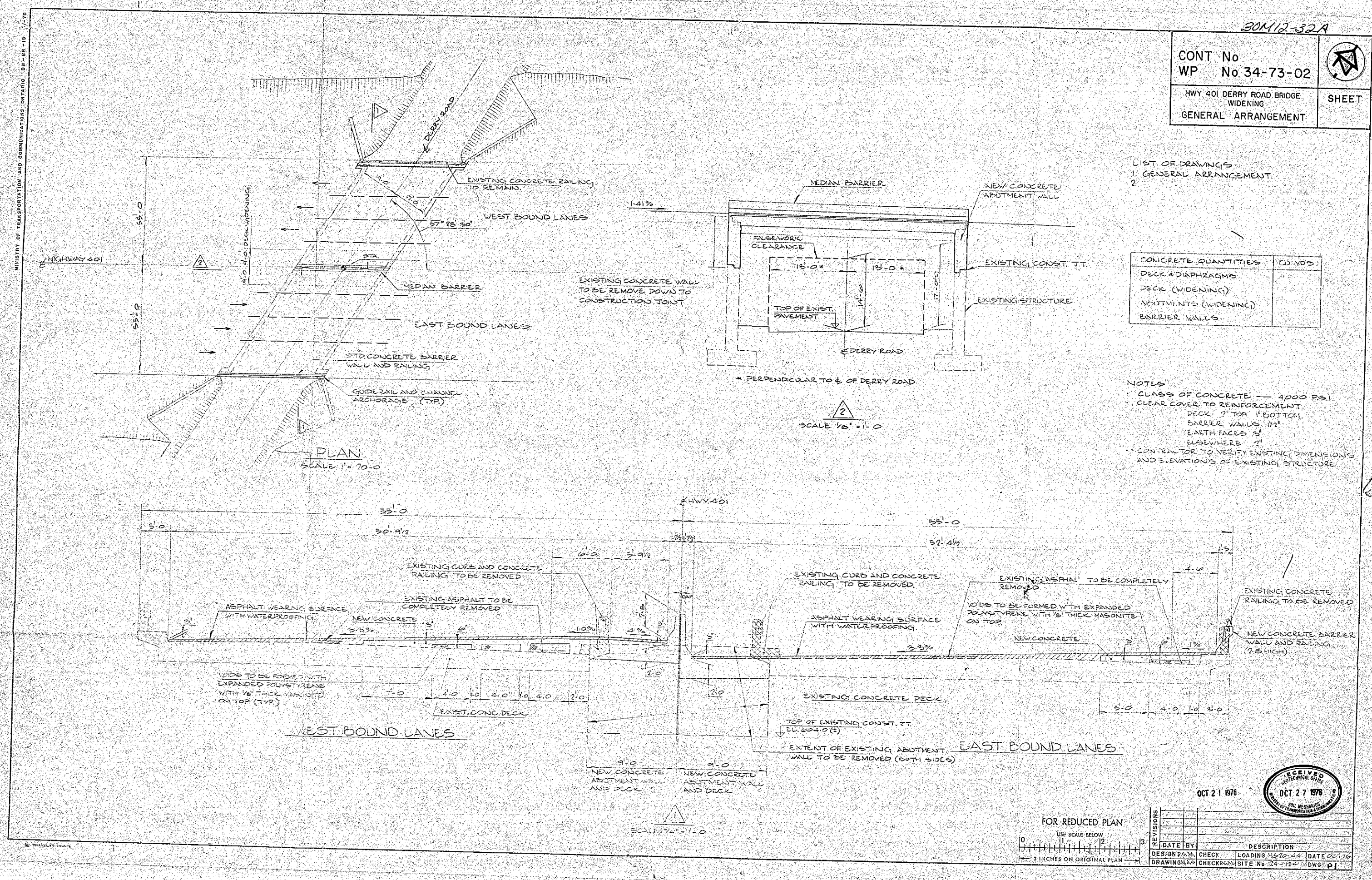
NOTES

1. CLASS OF CONCRETE
PRESTRESSED 5000 PSI.
DECK & PIERS 4000 PSI.
REMAINDER 3000 PSI.
2. CLEAR COVER TO REINFORCEMENT:
DECK 2" TOP 1" BOTTOM
FOOTINGS AND EARTH FACES 3"
ELSEWHERE 2"
3. THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITHIN A TOLERANCE OF 1/16".
4. NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE DECK HAS BEEN PLACED.
5. CONTRACTOR TO VERIFY EXISTING DIMENSIONS AND ELEVATIONS OF EXISTING STRUCTURES.

Consulting Engineers & Planners
DILLON
FOR REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

RECEIVED
DEC 09 1976

REVISIONS			
DATE	BY	DESCRIPTION	
DESIGN D.M.H.	CHECK H.E.	LOADING H-20-44	DATE OCT 76
DRAWN M.A.S.	CHECK E.A.	SITE No 30-135	DWG 1


30M12-32A
CONT No
WP No 34-73-02
HWY 401 DERRY ROAD BRIDGE WIDENING
GENERAL ARRANGEMENT
SHEET
LIST OF DRAWINGS
1. GENERAL ARRANGEMENT
2.
CONCRETE QUANTITIES | CU. YDS
DECK & DIAPHRAGMS
DECK (WIDENING)
ABUTMENTS (WIDENING)
BARRIER WALLS
NOTES
· CLASS OF CONCRETE — 4,000 P.S.I.
· CLEAR COVER TO REINFORCEMENT
DECK 2" TOP 1" BOTTOM
BARRIER WALLS 1½"
EARTH FACES 3"
ELSEWHERE 2"
· CONTRACTOR TO VERIFY EXISTING DIMENSIONS AND ELEVATIONS OF EXISTING STRUCTURE
DERRY ROAD
EXISTING CONCRETE RAILING TO REMAIN
WEST BOUND LANES
HIGHWAY 401
MEDIAN BARRIER
EAST BOUND LANES
STD. CONCRETE BARRIER WALL AND RAILING
GUIDE RAIL AND CHANNEL ANCHORAGE (TYP.)
PLAN
SCALE 1" = 20'-0
EXISTING CONCRETE WALL TO BE REMOVE DOWN TO CONSTRUCTION JOINT
NEW CONCRETE ABUTMENT WALL
FALSEWORK CLEARANCE
EXISTING CONST. JT.
EXISTING STRUCTURE
TOP OF EXIST. PAVEMENT
* PERPENDICULAR TO ℄ OF DERRY ROAD
SCALE 1/8" = 1'-0
EXISTING CURB AND CONCRETE RAILING TO BE REMOVED
EXISTING ASPHALT TO BE COMPLETELY REMOVED
ASPHALT WEARING SURFACE WITH WATERPROOFING
NEW CONCRETE
VOIDS TO BE FORMED WITH EXPANDED POLYSTYRENE WITH 1/8" THICK MASONITE ON TOP (TYP.)
EXIST. CONC. DECK
WEST BOUND LANES
EXISTING CONCRETE DECK
TOP OF EXISTING CONST. JT.
EXTENT OF EXISTING ABUTMENT WALL TO BE REMOVED (BOTH SIDES)
EAST BOUND LANES
EXISTING CONCRETE RAILING TO BE REMOVED
NEW CONCRETE BARRIER WALL AND RAILING
NEW CONCRETE ABUTMENT WALL AND DECK
SCALE 1/4" = 1'-0
OCT 21 1976
RECEIVED GEOTECHNICAL OFFICE OCT 27 1976 SOIL MECHANICS MINISTRY OF TRANSPORTATION & COMMUNICATIONS
FOR REDUCED PLAN
USE SCALE BELOW
3 INCHES ON ORIGINAL PLAN
REVISIONS
DATE BY DESCRIPTION
DESIGN D.S.M. CHECK LOADING HS20-44 DATE OCT 76
DRAWING M.M. CHECK D.S.M. SITE No 24-124 DWG P1

DOCUMENT MICROFILMING IDENTIFICATION

G.I.-30 SEPT. 1976

GEOCRES No. 30M12-32A

DIST. 6 REGION Central

W.P. No. 34-73-02103

CONT. No. 77-47

W. O. No.

STR. SITE No.

HWY. No.

LOCATION Derry Rd. and Credit River Bridge

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 4

REMARK ① documents to be unfolded before microfilming

② to be added to existing microfilm

Meeting of

Structural Review Committee

Time: 9:30 a.m., March 9th, 1977
Place: Boardroom B, West Building.
Attending: Messrs. A. E. McKim - Construction Branch
W. Hashizume - Construction Branch
M. Stoyanoff - Structural Office
W. McFarlane - Structural Office (part time)
W. Lin - Structural Office (part time)
V. Boehnke - Hydrology Section (part time)
E. Van Beilen - Structural Maintenance
B. Ly - Soil Mechanics Section

Projects Reviewed (a) Cavanville Creek Bridge,
Site 26-120, W.P. 91-72-08.

(b) Credit River Bridge Repairs,
Site 24-203, W.P. 30-76-01.

(c) Credit River Bridge Widening,
Site 24-128, W.P. 34-73-03.

(d) Derry Road Bridge Widening,
Site 24-124, W.P. 34-73-02.

The projects were presented by Messrs. McFarlane and Lin, Cavanville Creek by Mr. McFarlane and the rest by Mr. Lin.

The following items were brought up and discussed.

Cavanville Creek Bridge (W.P. 91-72-08)

Hydrology

The hydrological requirements were reviewed, and the design incorporates all the recommendations of the Hydrology Section.

Foundations

The pile lengths called for at the piers are to be reviewed by the designer to ensure that sufficient length is provided.

Structure

(a) A plan layout is to be added to the drawings for the expansion joint assembly providing dimensions for fabrication purposes.

..... 2

Mr. Derata

(b) The use of stabilized strand for the prestressed beams is to be identified on the drawings.

(c) Allowable alternative classes of expansion joint assembly should be shown on the drawings.

(d) The deck is to be machine finished.

Credit River Bridge Repairs (W.P. 30-76-01)

The detailed staging of the work was reviewed and in particular the concrete operation.

The committee felt there could be a problem in developing the required strength of concrete to permit traffic the next day after placing. It was also felt that the contractor would have to take some steps to ensure that the minimum temperature required for the proper curing of the concrete overnight is maintained. The committee concluded that as this control depended on ambient conditions at the time of construction the problem could be dealt with in the field prior to placing concrete, and the contractor paid for any extra requirements.

Credit River Bridge Widening (W.P. 34-73-03)

Temporary Roadway Protection

The possibility of an alternative scheme to the one shown on the drawings and the ramifications of approving the alternate scheme were discussed.

It was suggested that soil pressures might be identified on the design drawings which would provide some criteria to assist the contractor in ascertaining an alternate scheme and also provide the Ministry a gauge for determining the acceptability of alternate schemes.

Rip-Rap

The detail for rip-rap was reviewed and the Hydrology Section recommended the toe of the rip-rap be adjusted to provide more stability, that is, a horizontal toe be shown instead of the vertical toe.

Deck

Machine finish of the deck is not required.

..... 3

Derry Road Bridge Widening (W.P. 34-73-02)

Falsework

The construction clearance diagram indicates that the sidewalk under the structure may be blocked off during construction. Care should be taken to ensure that passageway is provided in the falsework.

Deck

Machine finish of the deck is not required.

Tender Items

(a) The tender item for granular backfill to bridge is to be modified to identify the type of granular required.

(b) The tender items for concrete in abutments and concrete in deck are to be replaced by one tender item "Concrete in Bridge" in accordance with current Ministry practice for this type of structure. Setting up two items may be construed by Contractors as a precedence for future work.

No other matters were brought up and the meeting adjourned at 11:55 a.m.

M. Stoyanoff,
Structural Contract Engineer.

MS/im

c.c. J. B. Wilkes
E. J. Orr
R. A. Dorton
C. S. Grebski
J. Keen
A. Radkowski
K. Bassi
G. Burkhardt
All attending meeting
File

Mr. G.C.E. Burkhardt
Regional Structural Planning Engineer
Central Region
3501 Dufferin Street, Downsview

Mr. W. Kulmatickas

Soil Mechanics Section
Geotechnical Office
West Building, Downsview

October 6, 1976

Widening of Hwy. 401
Credit River and Derry Road Bridges
W.P. 34-73-03 Site 24-128
W.P. 34-73-02 Site 24-124
District #6, Toronto

In response to your memorandum dated September 24, 1976, the above mentioned two structure sites were visited by Messrs. V. Korlu, W. Lin and M. Devata on September 30, 1976. Our comments, based on the site inspection of the structures, are as follows:

1. Credit River Bridge at Hwy. 401 (W.P. 34-73-03, Site 24-128)

The existing three span structure appears to be in a satisfactory condition without any visible signs of distress. The widening by means of bridging the gap in the median between the two structures can be carried out and for design purposes the data contained in our original foundation investigation report W.J. 56-F-6 may be used. In the area of the abutments after the completion of the preliminary design drawings, this Section may carry out additional subsurface investigation in order to assess the properties of the fill material, as well as the condition of the bedrock.

2. Derry Road Structure at Hwy. 401 (W.P. 34-73-02, Site 24-124)

The existing structure is a single span bridge with closed type abutments. The structure is supported on spread footings and the abutment walls in the median area are already extended to the underside of the deck. In our opinion there are no problems anticipated from the soil mechanics point of view since no new footing construction will be required. In view of this we suggest that no subsurface investigation will be required, however, this Section will review the design drawings and provide necessary comments at the appropriate time.

M. Devata
Supervising Engineer

MD/gs

cc: C.S. Grabski
W. Lin
Files
Record Services

Ontario Ministry of Transportation and Communications

Memorandum

To: Mr. M. R. Ernesaks,
Manager, Planning & Design,
Central Region, Toronto.

From: Structural Office,
West Building, Downsview.

Attention: Mr. George Celmins.

Date: March 1, 1977.

Our File Ref.

In Reply to

Subject:

Roadway Protection,
Credit River Bridge Widening,
W. P. 34-73-03, Site 24-128,
Highway 401, District 6.

A meeting was held on March 1st, 1977 at the Central Region offices. The following were present.

D. Thrasher
D. McDonald
I. Tremain
S. Dunham
W. Lin
R. Kunkel
G. Pearce

The contract documents for roadway protection during construction have been revised as follows:

A special SP has been added for the tender item Roadway Protection. The special SP shall read:

"Roadway Protection. Item No. 1

The contract price for the above tender item shall also include the earth excavation shown on the contract drawings. However, when excavation overlaps excavation required for placing granular backfill to bridge then payment will be made for backfill excavation as though no excavation were required for roadway protection."

WL/cf

W. Lin,
Regional Structural Design Engineer.

c.c. N. Zoltay
J. Wear
G. Burkhardt
A. McKim
H. Greenland
E. Van Beilen
C. Mirza.

Ministry of Transportation and Communications
Ontario

Memorandum

To: Mr. G.C.E. Burkhardt
Regional Structural Planning Engineer
Central Region
3501 Dufferin Street, Downsview

From: Soil Mechanics Section
Engineering Materials Office
West Building, Downsview

Attention:

Date: December 21, 1976

Our File Ref.

In Reply to

30 M12-32 A

Subject: Widening of Hwy. 401
Credit River Bridge
W.P. 34-73-03
Site 24-128
District #6, Toronto

It is proposed to widen the existing twin structures at the above-mentioned location by means of bridging the gap in the median between the E.B.L. and the W.B.L. structures. In order to assess the site condition, the above-mentioned site was visited by this Section, and the pertinent comments were submitted in a memo dated October 6, 1976 to your Section. In this, it was agreed that a subsurface investigation would be carried out in the median area of the abutments of the twin structure in order to assess the properties of the fill material as well as the recommendations for the foundation of the proposed widening. A subsurface investigation consisting of two boreholes was completed after the issue of the preliminary bridge design drawings.

The investigation revealed that the fill material in the median area was mainly composed of soft to firm clayey silt, sand and occasional gravel with random pockets or layers of organics. The thickness of the fill material was found to be 15 feet in the west approach and about 19 feet in the east approach. Beneath the fill material is the predominent deposit of glacial till consisting of a heterogeneous mixture of clayey silt, sand and gravel extending to a depth of at least 8 feet. On the west approach, the glacial till is underlain by shale bedrock at elevation 525.5, and generally in a weathered condition. No attempt was made to prove the sound bedrock surface. The water level was found to be within the fill material at approximate elevation 536.0 and the river water level at the time of investigation was at elevation 527.0. This indicated that the hydraulic gradient is towards the river.

Recommendations

The pier extensions can be founded on sound shale bedrock as indicated in our foundation report W.O. 56-F-6 submitted initially for the existing twin structures. An allowable load up to 10 t.s.f. may be used for design purposes.

The widening for the east and west abutments may be founded on spread footings located on sound shale bedrock using an allowable load of up to 10 t.s.f. The bedrock elevations shown in the foundation report W.O. 56-F-6 should be used. In the median area at the east and west approaches, the existing fill material should be removed and replaced with compacted granular backfill as per current M.T.C. standards.

.../2

The above-mentioned details were already incorporated on the final bridge drawings (#1, #2, and #3) submitted by the Structural Office dated December 8, 1976, and consequently, we have no comments pertaining to the final bridge drawings.

V. Korlu, P. Eng.
Project Engineer

For: M. Devata, P. Eng.
Supervising Engineer

MD/VK/jf
cc: R.S. Pillar
C.S. Grebski
B.J. Giroux
G.A. Wrong
M.R. Ernesaks
R.D. Gunter

R. Hore
Files

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

HIGHWAY ENGINEERING DIVISION - ENGINEERING MATERIALS OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 1

WP 34-73-03 LOCATION Sta. 488 + 51 C_L Med. Hwy 401 ORIGINATED BY V.K.

DIST 6 HWY 401 BORING DATE Nov. 29, 1976 COMPILED BY

DATUM Geodetic BOREHOLE TYPE 3¼" Hollow Stem Augers & Cone Test CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES 'N' VALUES	GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) SHEAR STRENGTH: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE	LIQUID LIMIT W_L / PLASTIC LIMIT W_P / WATER CONTENT W (W_P W W_L) WATER CONTENT %	UNIT WEIGHT γ	REMARKS % GR SA SI CL
547.5	Ground Level									
0.0	Clayey silt, some sand and gravel, trace of organics (Fill Material) Soft to stiff.		1	SS	7					
			2	SS	14					
			3	SS	8	540				
			4	SS	4					
533.5			5	SS	4					
14.0	Hed. Mix of clayey silt, sand and gravel (Glacial Till) Very stiff to hard.		6	SS	20	530				
525.5			7	SS	40					
22.0	Bedrock weathered shale.		8	SS	100/6"	520				
517.5										
30.0	End of borehole.					BH				

20
15 ◇ 5 % STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

HIGHWAY ENGINEERING DIVISION - ENGINEERING MATERIALS OFFICE SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 2

WP 34-73-03 LOCATION Sta. 485 + 04 C_L Med. Hwy 401 ORIGINATED BY V.K.

DIST 6 HWY 401 BORING DATE Nov. 29, 1976 COMPILED BY

DATUM Geodetic BOREHOLE TYPE 3¼" Hollow Stem Augers & Cone Test CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES	GROUND WATER ELEV
543.5	Ground Level					
0.0	Clayey silt, some sand and gravel, trace of organics. (Fill Material) Soft to stiff.		1	SS	8	540
			2	SS	12	
			3	SS	5	
531.0			4	SS	4	
12.8	Clayey silt, some sand and few gravel		5	SS	5	530
525.0			6	SS	3	
18.5	Hed. Mix of clayey silt, sand and gravel. (Glacial till) Hard.		7	SS	8	
516.5			8	SS	35	520
27.0	End of borehole Probable Bedrock					510

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

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

LIQUID LIMIT W_L PLASTIC LIMIT W_P WATER CONTENT W (W_P — W — W_L)

WATER CONTENT %

UNIT WEIGHT γ

REMARKS

% GR SA SI CL

20 15 10 5 % STRAIN AT FAILURE

OFFICE REPORT ON SOIL EXPLORATION

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.	DENSENESS	'N' BLOWS/FT.
VERY SOFT	0 - 250	VERY LOOSE	0 - 4
SOFT	250 - 500	LOOSE	4 - 10
FIRM	500 - 1000	COMPACT	10 - 30
STIFF	1000 - 2000	DENSE	30 - 50
VERY STIFF	2000 - 4000	VERY DENSE	> 50
HARD	> 4000		

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 "		

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

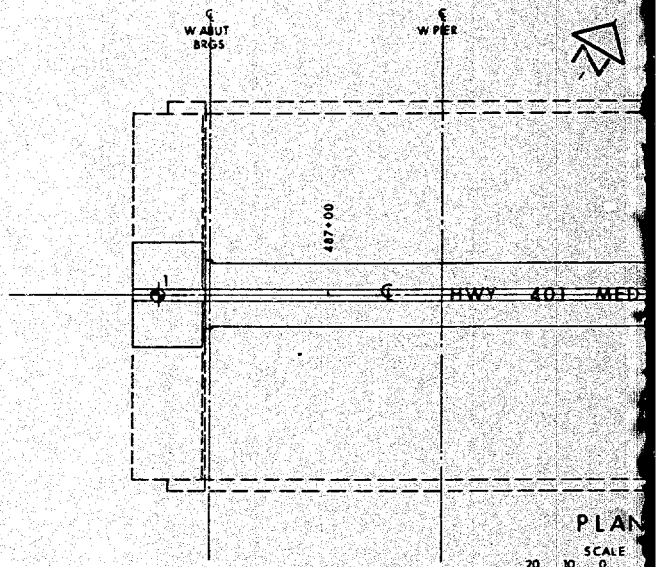
FOUNDATIONS

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

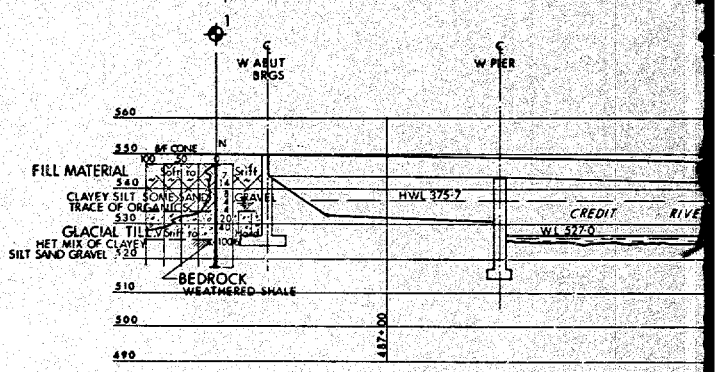
H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO 08-M1-308 10-76



PLAN

SCALE
20 10 0



PROFIL

SCALE
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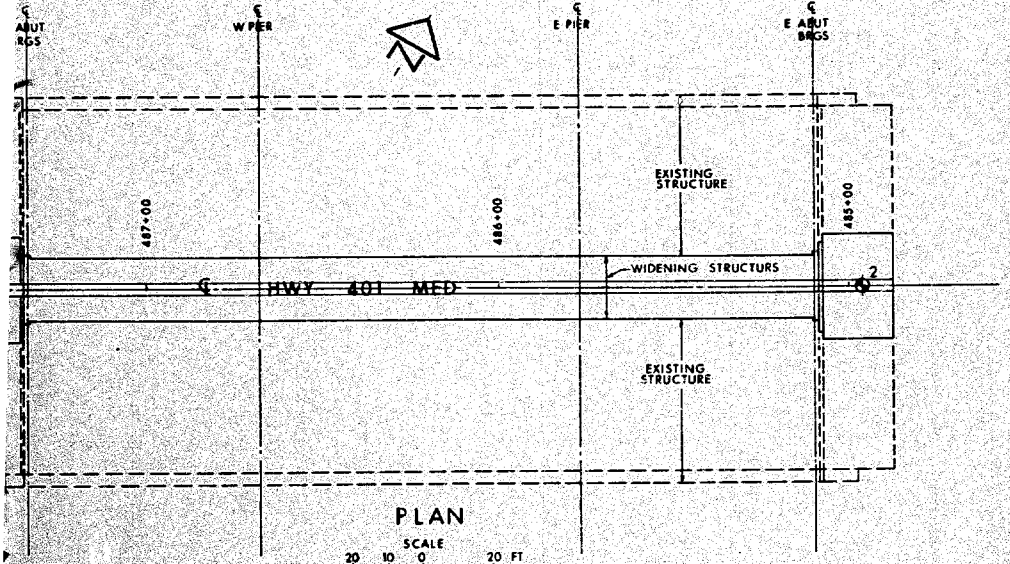
CONT No
WP No 34-73-03

HWY 401 CREDIT RIVER BRIDGE WIDENING

BORE HOLE LOCATIONS & SOIL STRATA

SHEET



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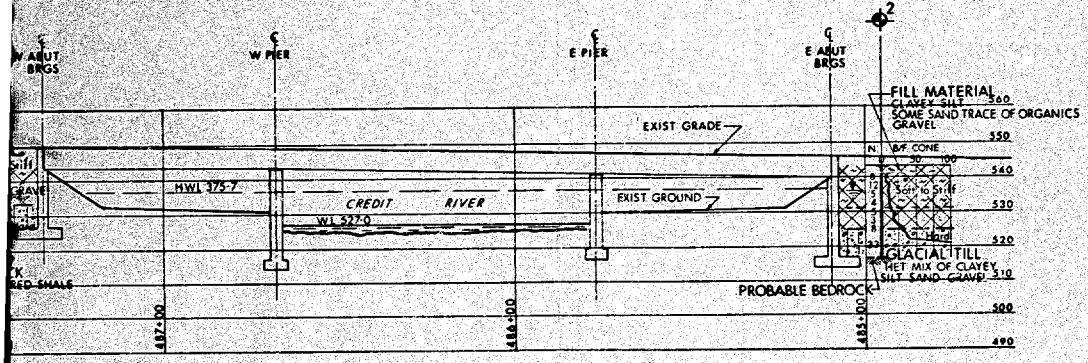

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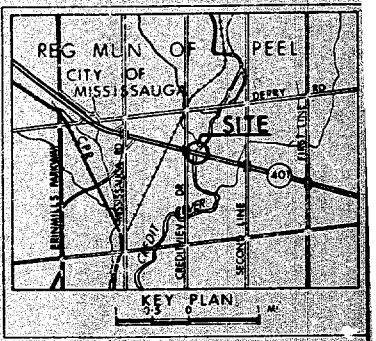

LEGEND

- Bore Hole
- Dynamic Cone Penetration Test (Core)
- Bore Hole & Cone
- 'N' Blows/ft (Std Pen Test 350 ft lbs energy)
- CONE Blows/ft (60° Cone, 350 ft lbs energy)
- W L at time of investigation NOV 1976

No	ELEVATION	STATION	OFFSET
1	547·5	488+51	℄
2	543·5	485+04	℄

-NOTE-

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

REVISIONS

DATE	BY	DESCRIPTION

HWY No 401		DIST 6
SUBMITTED CHECKED	DATE 16 12 76	SITE 74-128
DRAWN CHECKED	APPROVED	DWG 347303-A

Mr. G.C.E. Burkhardt
Regional Structural Planning Engineer
Central Region
3501 Dufferin Street, Downsview

Mr. W. Kulmatickas

Soil Mechanics Section
Geotechnical Office
West Building, Downsview

October 6, 1976

30M12-32 A

Widening of Hwy. 401
Credit River and Derry Road Bridges
W.P. 34-73-03 Site 24-128
W.P. 34-73-02 Site 24-124
District #6, Toronto

In response to your memorandum dated September 24, 1976, the above mentioned two structure sites were visited by Messrs. V. Korlu, W. Lin and M. Devata on September 30, 1976. Our comments, based on the site inspection of the structures, are as follows:

1. Credit River Bridge at Hwy. 401 (W.P. 34-73-03, Site 24-128)

   The existing three span structure appears to be in a satisfactory condition without any visible signs of distress. The widening by means of bridging the gap in the median between the two structures can be carried out and for design purposes the data contained in our original foundation investigation report W.J. 56-F-6 may be used. In the area of the abutments after the completion of the preliminary design drawings, this Section may carry out additional subsurface investigation in order to assess the properties of the fill material, as well as the condition of the bedrock.

2. Derry Road Structure at Hwy. 401 (W.P. 34-73-02, Site 24-124)

   The existing structure is a single span bridge with closed type abutments. The structure is supported on spread footings and the abutment walls in the median area are already extended to the underside ofthe deck. In our opinion there are no problems anticipated from the soil mechanics point of view since no new footing construction will be required. In view of this we suggest that no subsurface investigation will be required, however, this Section will review the design drawings and provide necessary comments at the appropriate time.

M. Devata
Supervising Engineer

MD/gs

cc: C.S. Grebski
W. Lin
Files
Record Services