

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Bldg.

From: Bridge Division,
Downsview, Ontario.

Attention: Mr. A. Barsvary

Date: June 22nd, 1967.

Our File Ref.

In Reply To

SUBJECT: Foundation Investigations,
Contract No. 6 Red
Contract No. 7 Yellow
Contract No. 9 Green
Contract No. 10 Orange
Contract No. 11
Highway #401/27/Richview Interchange,
District #6.

Following is the most up to date breakdown of the structures involved in each of the above contracts, together with information regarding the status of each individual structure:

Contract No. 6 (Red) Foundation investigation report received.

Contract No. 7 (Yellow) A general preliminary report was submitted for the structures involved at the latter end of 1966. Since that time certain structures have been moved from the "green" contract to the "yellow" contract. Following is a list of the structures now in this yellow contract.

W.P. 372-65 Bridge #1 Preliminary information in report of 8th February 1967.

W.P. 373-65 Bridge #2 Previously intended to be included in Contract #8. Preliminaries for Bridge #1 and #2 will be available shortly.

W.P. 374-65 Bridge #3 Preliminary information in report of 8 February 67. Preliminary bridge plans will not be available for approximately 6 weeks.
W.P. 375-65 Bridge #4
W.P. 376-65 Bridge #5
W.P. 377-65 Bridge #6
W.P. 378-65 Bridge #7
W.P. 379-65 Bridge #8
W.P. 380-65 Bridge #9

RE: Foundation Investigations,
District #6.

W.P. 386-65 Bridge #15

Previously intended to be in the "green" contract. Site plan and preliminary bridge plan have been forwarded to you.

W.P. 389-65 Bridge #18

Preliminary information in report of 8th February 67. Preliminary bridge plan and site plan have been forwarded to you.

W.P. 390-65 Bridge #20

Same as Bridge #18.

W.P. 393-65 Bridge #23

Preliminary bridge plan forwarded to you 6th June 1967.

Contract No. 9 (Green)

W.P. 384-65 Bridge #13

Preliminary information in report of 8th February 67. Preliminary bridge plan forwarded to you 6th June 1967.

W.P. 388-65 Bridge #17

Site plan for this structure was forwarded to you on 12th May 1967. An approximate footing layout is shown on the attached 100' scale plan.

W.P. 395-65 Bridge #25

Boring layout is shown on the attached 100' scale plan. Site plan will be forwarded when available.

W.P. 394-65 Bridge #24

W.P. 265-66 Bridge #70

W.P. 36-67 Bridge #74

Site plans showing pier and abutment footing layout are attached. Also shown on 100' scale plan.

W.P. 396-65 Bridge #26

Rough preliminary plan (D-6240-P) is attached. Footing locations are also shown on attached 100' scale plan. Site plan will be forwarded when available.

W.P. 397-65 Bridge #27

Probable location of piers and abutments is shown on attached 100' scale plan. Site plans will be forwarded when available.

W.P. 400-65 Bridge #30

Probable location of piers and abutments marked on attached 100' scale plan. Site plan will be forwarded when available.

W.P. 133-66 Bridge #68

Print of site plan showing probable footing locations is attached.

RE: Foundation Investigations,
District #6.

Contract No. 10 (Orange)

W.P. 381-65 Bridge #10

No information available yet.

W.P. 382-65 Bridge #11

No information available yet.

W.P. 383-65 Bridge #12

Attached is a pre-preliminary plan which can only be used to locate footings.

W.P. 116-66 Bridge #67

North end carrying Richview Expressway in this contract. Site plans will be forwarded when available.

Contract No. 11

W.P. 391-65 Bridge #21

Foundation investigation received 24th May 1967.

W.P. 279-65 Bridge #61

Foundation investigation requested 12th June 1967.

Contract No. 6 Red

W.P. 399-65 Bridge #29

Contract No. 7 Yellow

W.P. 372-65 Bridge #1

W.P. 386-65 Bridge #15

W.P. 373-65 Bridge #2

W.P. 389-65 Bridge #18

W.P. 374-65 Bridge #3

W.P. 390-65 Bridge #20

W.P. 375-65 Bridge #4

W.P. 393-65 Bridge #23

W.P. 376-65 Bridge #5

W.P. 377-65 Bridge #6

W.P. 378-65 Bridge #7

W.P. 379-65 Bridge #8

W.P. 380-65 Bridge #9

Contract No. 9 Green

W.P. 384-65 Bridge #13

W.P. 394-65 Bridge #24

W.P. 388-65 Bridge #17

W.P. 395-65 Bridge #25

W.P. 396-65 Bridge #26

W.P. 265-66 Bridge #70

W.P. 397-65 Bridge #27

W.P. 36 -67 Bridge #74

W.P. 400-65 Bridge #30

W.P. 133-66 Bridge #68

RE: Foundation Investigations,
District #6.

Contract No. 10 Orange

W.P. 381-65 Bridge #10
W.P. 382-65 Bridge #11
W.P. 383-65 Bridge #12
W.P. 116-66 Bridge #67

Contract No. 11

W.P. 391-65 Bridge #21
W.P. 279-65 Bridge #61

Copies of the contract breakdown attached, have been forwarded to Mr. R. Strain and Mr. W. Katarynczuk for confirmation. It is expected that new contract schedules will be issued shortly.

J. C. McAllister

JCMCA/im

J. C. McAllister,
for W. S. Melinyshyn,
Regional Bridge Location Engineer.

cc. R. Strain
R. Forrest
A. Crowley

alp

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

June 22, 1967

67-F-15

Bridge #13 -- W.P. 384-65 -- Site #37-811,
Hwy's #401 & #27 -- District #6 (Toronto)

We have reviewed the revised Preliminary Bridge
Plan Drawing D-6231-P for the above structure.

We have no further comments.

KGS/MdeP

K. G. Selby

K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McCombie
W. S. Melinyshyn

Foundations Files
Gen. Files

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Eng.,
Room 107, Lab. Building.

FROM: Bridge Division,
Downsview, Ontario.

DATE: June 28, 1967.

OUR FILE REF.

IN REPLY TO

SUBJECT: W. P. 383-65, Bridge #2,
Hwy. #401/27, Interchange,
District #6.

As you requested I am attaching a print of site plan 3214-8A-2 showing suggested borehole layout to cover any possible type of structure which may be used.

JCMcA/md
Attach.
cc. R. Strain,
A Crowley.

J. C. McAllister
J. C. McAllister,
for W. Melinyshyn,
Regional Bridge Location Engineer.

Plan with the surveyor.

MEMORANDUM

To: Mr. A. G. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building.

FROM: Bridge Division,
Downsview, Ontario

Attention: Mr. A. Barsvary

DATE: June 28th, 1967

OUR FILE REF.

IN REPLY TO

SUBJECT:

Bridge No. 25, W.P. 395-65, Site No. 37-819, Richview Expressway,
W.B. over Highway 401, District 6
Bridge No. 26, W.P. 396-65, Site No. 37-820, Highway No. 27 S.B.
over Highway 401 and Richview Expressway, District 6,
Bridge No. 27, W.P. 397-65, Site No. 37-821, Ramp W-N over
Highway 401, and #27 S.B. District 6

Attached, for your information, are copies of bridge
site plans #3214-9A-25-1 & 2, #3214-9A-26-1, 2, 3 and
#3214-9A-27-1, 2, 3, 4 for the above listed structures.

Regarding your request for a final date a few days
ago, the foundation report should be available between
September 1 and 15, 1967.

RDT/pr
Attach.

cc. A. Crowley

J.C. McAllister
J.C. McAllister,
for W. S. Melinyshyn,
Regional Bridge Location Engineer.

401 & Keele Street

July 18, 1967

Johnston Drilling Co. Ltd.
377 Munster Ave.
Toronto, Ontario

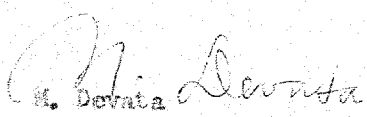
Dear Sirs:

This is to confirm our request of June 28, 1967 for the supply of a Penn Drill together with all necessary equipment, as specified under the terms of our Contract Agreement, at Highway #27, Toronto, Ontario.

This project bears Job Number 67-P-15.

Yours truly,

MD:mt


M. Devata
Supervising Foundation Engineer
for: A. G. Stermac
Principal Foundation Engineer

Department of Highways Ontario

Copy for the information of
Mr. A. Stermac,
Principal Foundation Engineer

67-F-15

Mr. W. Melinysky,
Reg. Bridge Location Engineer,
Central Region,
Administration Building

Bridge Division,
Downsview, Ontario

July 20, 1967

Bridge No. 17
Hwy. No. 27 N.B. over Richview Expressway
W.P. 388-65, Site No. 37-813
401/27 Interchange, District No. 6

Attached herewith are prints of the Preliminary Bridge Plan Drawing D-6233-P for the above-mentioned structure.

The estimated cost of the proposed structure is \$530,000. This cost includes tender, materials, engineering and sundry construction.

Any comments or revisions you may have should be submitted within three weeks.

CSC:rd

C.B. Grebski,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac
R. Forrest
E. Cross

This bridge belongs to the green contract. No report is available yet.

25 JULY 67

A.K.B.

401 & Keele Street
Downsview, Ontario

July 27, 1967

Master Soil Investigation
104 Kenhar Drive
Weston, Ontario

Dear Sirs:

This is to confirm our request of July 3, 1967 for the supply of a Diamond Core Drill together with all necessary equipment, as specified under the terms of our Contract Agreement, at Hwy. #27, Toronto, Ontario, on July 5, 1967.

This project bears Job Number 67-F-15.

Yours truly,

AGS:mt

A. G. Stern
A. G. Stern
Principal Foundation Engineer

cc: R. Konings
Foundation Files / 10
General File

28

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

August 15, 1967

Bridge #17,
Hwy. #27, N.B. over Richview Exp'y.,
W.P. 388-65, Site #37-813, W.J. 67-P-15,
District #6 (Toronto).

We have reviewed Preliminary Bridge Plan No. D-6233-P for the above structure: our comments are as follows:

(1) Spread footings, assuming a design pressure of 4 t.s.f., should be founded at or below El. 484.0 and should have a minimum cover of 4.0 ft. for frost protection.

(2) South Abutment -- 12 BP 53 steel H-piles should achieve a design capacity of 70 Tons/pile if driven to approximate El. 455.0 - 480.0.

North Abutment -- 12 BP 53 steel H-piles should achieve a design capacity of 70 Tons/pile if driven to approximate El. 465.0 - 470.0.

We were unable to check the above requirements, since your plan showed no elevations.

KGS/WdeP

cc: Messrs. S. McCombie
W. S. Melnyshyn

Foundations Files
Gen. Files

H. G. Selby
K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Sternac,
PRINCIPAL FOUNDATION ENGR.

MEMORANDUM

TO: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107,
Lab. Building.

FROM: Bridge Division,
Downsview, Ontario.

DATE: September 28th, 1967.

Attention: Mr. A. Barsvary.

OUR FILE REF.

IN REPLY TO

SUBJECT:

Bridge #30,
Hwy. 27 over Renforth Drive,
W.P. 400-65, Site 37-823,
Hwy. 401 and 27, Dist. 6.

Attached, for your information, please find a copy of bridge site plan #3214-9A-30 received from the Consultant for the design of the above structure.

MB/cew
Attach.

J. C. McAllister
J. C. McAllister,
for W. S. Melinyshyn,
Regional Bridge Location Engineer.

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

~~Mr. W. Melingshyn,~~
Reg. Bridge Location Engineer,
Central Region,
Administration Building

Bridge Division,
Downsview, Ontario

January 18, 1968

Bridge No. 27
Ramp W-E over Hwy. 401 & 27 S.B.
W.P. 397-65, Site 37-821
401 and 27 Interchange, District 6

Attached herewith are prints of the Preliminary Bridge Plan Drawing D6241-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$1,100,000. This cost includes tender, materials, engineering and sundry construction.

Any comments or revisions you may have should be submitted within three weeks.

CSG:rd

C.S. Grebski,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac (2)
J. Anderson

No comments:

Don 24th 1968

A. L. Gully

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. M. Melnychuk,
Reg. Bridge Location Engineer,
Central Region,
Administration Building

Bridge Division,
Downsview, Ontario

January 18, 1968

Bridge No. 26

Hwy. 27 S.R. over Hwy. 401 & Richview Expy.

U.F. 396-65, Site 37-820

401 and 27 Interchange, District 6

Attached herewith are prints of the Preliminary Bridge Plan Drawing B-6740-F1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$1,250,000. This cost includes tender, materials, engineering and sundry construction.

Any comments or revisions you may have should be submitted within three weeks.

CSS:rd

C.S. Grebaki,
Bridge Design Engineer

Attach.

c.c. S. McConchie
A. Stermac (2)
J. Anderson

No comments :-

JAN. 24th 1968

12. L. Gully

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. Sternac,
Principal Foundation Engineer,
Room 107, Lab. Bldg.

FROM: Bridge Division,
Downsview, Ontario.

DATE: January 31st, 1968.

Our File Ref.

IN REPLY TO

SUBJECT: W.P. 133-66, Bridge No. 68,
 Hwy. No. 401/27 Interchange,
District No. 6.

Attached are two prints of preliminary plans
D-6246-1 for the above structure.

Any comments or revisions should be submitted as
soon as possible.

JCMCA/co
Attach.

J. C. McAllister
J. C. McAllister,
for W. Melnyshyn,
Regional Bridge Location Engineer.

c.c. C. Grebski

Jan 31st 1968

No Comments

W. H. Smith

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. W. Malinshyn,
Reg. Bridge Location Engineer,
Central Region,
Administration Building

Bridge Division,
Donmerview, Ontario

January 31, 1968

Bridge No. 70
Ramp E.N. (Richview) over 401
W.P. 255-66, Site 37-827
401/27 Interchange, District 6

Attached herewith are prints of the Preliminary Bridge Plan
Drawing D-6247-F for the above-mentioned structure.

The estimated cost of the proposed structure is \$363,000.
This cost includes tender, materials, engineering and sundry
construction.

Any comments or revisions you may have should be submitted
within three weeks.

CSG:rd

C.S. Grebaki,
Bridge Design Engineer

Attach.

S.S. S. McCombie
A. Stermac (2)
J. Anderson

Letter sent Feb. 7th 1968

10.4.84

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. W. Melnyshyn,
Reg. Bridge Location Engineer,
Central Region,
Administration Building

Bridge Division,
Downsview, Ontario

January 31, 1968

Bridge No. 25
Richview Expy. W.B. Over 401
W.P. 395-65, Site 37-819
401/27 Interchange, District 6

Attached herewith are prints of the Preliminary Bridge Plan
Drawing D-6239-F for the above-mentioned structure.

The estimated cost of the proposed structure is \$496,000.
This cost includes tender, materials, engineering and sundry
construction.

Any comments or revisions you may have should be submitted
within three weeks.

CSG:rd

C.S. Grebski,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac (2)
J. Anderson

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. W. Melinyshyn,
Reg. Bridge Location Engineer,
Central Region,
Administration Building

Bridge Division,
Downsview, Ontario

January 31, 1968

Bridge No. 24
Hwy. #27 H.B. over Hwy. #401
W.P. 394-65, Site 37-318
401/27 Interchange, District 6

Attached herewith are prints of the Preliminary Bridge Plan
Drawing B-6235-P for the above-mentioned structure.

The estimated cost of the proposed structure is \$861,000.
This cost includes tender, materials, engineering and sundr
construction.

Any comments or revisions you may have should be submitted
within three weeks.

CSG:rd

C.S. Grehski,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac (2)
J. Anderson

Letter sent Feb. 7th 1968

12.1.3-19

Department of Highways Ontario
Copy for the information of
Mr. A. Stermac

Mr. W. Melinszyn,
Eng. Bridge Location Engineer,
Central Region,
Administration Building

Bridge Division,
Downsview, Ontario

January 31, 1968

Bridge No. 74
Ramp Renforth Dr.
Hwy. 401 E. over Hwy. 401
W.P. 36-67, Site 37-828
401/27 Interchange, District 6

Attached herewith are prints of the Preliminary Bridge Plan
Drawing D-6248-1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$247,000.
This cost includes tender, materials, engineering and sundry
construction.

Any comments or revisions you may have should be submitted
within three weeks.

CSG:rd

C.S. Grebski,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac (2)
J. Anderson

Letter sent Feb. 7th 1968

re. 3-11

ASD

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

February 7, 1968

Bridges #24, #70, & #74 of the Hwy's. #401, #27 and
Richview Expressway Interchange - District #6 -
W.P. 394-65, W.P. 265-66 and W.P. 36-67, W.J. 67-F-15.

We have reviewed your preliminary design of Bridges
#24, #70 and #74 of the proposed Hwy's. #401, #27 and Richview
Expressway Interchange.

We notice that the abutments of the above bridges are
designed on spread footings; however, the elevations of these
footings are not marked.

In our Foundation Report #67-F-15, it is recommended
that spread footings for the abutments should be five ft. below
existing ground level or lower, ensuring a minimum cover of four
ft. for frost prevention.

We suggest that you review the elevations of the abutment
footings to ensure that they comply with our recommendations.

K. G. Selby

KGS/kdeP

K. G. Selby,
SUPERVISING FOUNDATION ENGINEER
For:
A. C. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. S. McCombie
W. S. Melinyshyn

Foundations Files ✓
Gen. Files

ABJ

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

February 7, 1968

Bridge #5 of Hwy's. #401, #27 & Richview Expressway
Interchange - W.P. 395-65, W.J. 67-F-15, District 6.

We have reviewed your preliminary bridge plan for
Bridge #25 of the above proposed interchange.

We note that the abutments are designed on spread
footings. According to your drawing, the base elevation
of the East abutment is around el. 510 ft.

In our Foundation Report #67-F-15, we recommend that
the spread footing of the East abutment of Bridge #25 be
placed at or below el. 506 ft.

We suggest that you lower the footing of the East
abutment to comply with the recommendations.

K. G. Selby

KGS/MdeF

K. G. Selby,
SUPERVISING FOUNDATION ENGINEER
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. S. McCombie
W. S. Melinyshyn

Foundations Files ✓
Gen. Files

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

~~Mr. H. Melingshyn,~~
 Reg. Bridge Location Engineer,
 Central Region,
 Administration Building

Bridge Division,
 Downsview, Ontario

February 12, 1968

Bridge No. 30
 Hwy. 27 over Renforth Drive,
 W.P. 400-65, Site 37-823
401 & 27 Interchange, District 6

Attached herewith are prints of the Preliminary Bridge
 Plan Drawing B5243-P for the above-mentioned structure.

The estimated cost of the proposed structure is \$480,000.
 This cost includes tender, materials, engineering and sundry
 construction.

Any comments or revisions you may have should be submitted
 within three weeks.

C36:rd

C.S. Grebaki,
 Bridge Design Engineer

Attach.

c.c. S. McCombie
 A. Stermac (2)
 J. Anderson

Feb. 28th 1968

No comments

M. L. Sullivan

A. K. Bursuway

Department of Highways Ontario

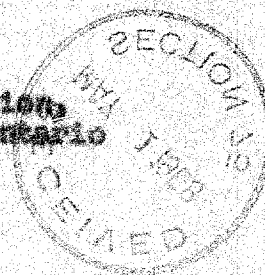
Copy for the information of

Mr. A. Stermac

Mr. W. Melnychyn,
Reg. Bridge Location Engineer,
Central Region,
Administration Building

Bridge Division,
Downsview, Ontario

May 1, 1968



Bridge No. 13
W.P. 384-65, site 37-811
Highway 401/27 Interchange
District No. 6

67-F-15

Attached herewith are prints of the revised Preliminary Bridge Plan Drawing B-6231-P2 for the above-mentioned structure.

The estimated cost of the proposed structure is \$606,000. This cost includes tender, materials, engineering and sundry construction.

Any comments or revisions you may have should be submitted within three weeks.

CSG:rd

C.S. Gretskei,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac (2)
J. Anderson

No Comments
mdg 7/68 AKB

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Mr. K. G. Bassi,
Regional Bridge
Project Engineer

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

June 25, 1968

W.P. 396-65 -- Bridge #26
W.P. 397-65 -- Bridge #27
Hwy's. 401 & 27 Interchange
District No. 6 (Toronto)
-- W.J. 67-F-15 --

Following our review of Preliminary Plans D 6240-P1 and D 6241-P1 for the above mentioned structures, we are revising foundation recommendations given in our Report 67-F-15. Our revisions include various alternative methods which we believe will enable you to select the most economical type of foundation. The following recommendations apply, in general, to both structures.

Spread Footings on Sound Bedrock:

Where the future finished ground level is such that the remaining overburden is reasonably shallow, the structure may be supported on spread footings placed on the sound shale bedrock. A design pressure of 15 t.s.f. may be assumed in this case.

Spread Footings in Overburden:

In the very hard clayey silt stratum which overlies much of the bedrock, a spread footing type foundation may be constructed assuming a design pressure of 7.5 t.s.f. at a minimum depth of 6 feet below finished ground level. In some cases granular strata may have to be excavated to reach this layer, and dewatering schemes will be necessary to ensure that footings are poured on dry undisturbed ground which is an essential requirement of this recommendation.

Piled Foundations:

Where practicable, the structure may be supported on steel H-piles and bearing on the bedrock or within the hard clayey silt layers overlying bedrock. Previous experience has shown that

cont'd. /2 ...

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

2.

Attn: Mr. K. G. Bassi,
Regional Bridge Project Engr.

June 25, 1968

Filed Foundations: (cont'd.) ...

driving H-piles through this type of overburden is extremely difficult and in consequence, the pile lengths are difficult to estimate accurately. Sufficient lengths to penetrate the hard zone ($N' > 100$ blows/ft.), about 5 feet should be provided. The maximum allowable loads for the particular pile section adopted may be assumed for design purposes.

As an alternative to steel H-piles and possibly, also to spread footings, it is strongly recommended that a foundation incorporating cast-in-place concrete caissons be considered. We have been in touch with Western Caissons Limited, who have provided us with an estimate for the installation of various sizes of caissons. This estimate is self-explanatory, and a copy is attached for your information. It appears that a considerable saving might be effected using this type of foundation, particularly in view of the large pier loadings on the two structures (3,000 tons - Bridge 26, 2,000 tons - Bridge 27). Insofar as the design loads on the caissons are concerned, we believe that the loading tests, which we will be carrying out in the near future, will supply us with the necessary information. Furthermore, a detailed account of the installation procedures can be prepared and made available to contractors at the time of bidding. As soon as the loading tests are completed, we will provide you with detailed recommendations.

K. G. Selby

KGS/WdeP
Attach.

K. G. Selby,
SUPERVISING FOUNDATION ENGINEER
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Foundations Files
Gen. Files

af

Mr. G. K. Hunter,
Regional Road Design Engr.,
Central Region (Toronto).

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

Attention: Mr. R. Vokes,
Special Projects
Co-Ordinator.

June 27, 1968

File Load Test for Bridges 26 and 27,
Highways 401 and 27 Interchange,
District No. 6 (Toronto).

67-F-15

Would you please confirm that the site chosen for pile tests, which is within the triangular area defined by Co-ordinates 867, 685N & 976, 195 E, 867, 915 N & 976, 270 E, 867, 815 N & 976, 410 E, is suitable insofar as future construction is concerned. Six concrete caissons ranging from 24 inches to 36 inches in diameter and about 30 ft. long, below present ground level, will be installed. Since the future finished ground level in that area is about el. 510. We will arrange to have the caissons cut off at about el. 508 when the testing is finished. We are most anxious to start work on this project and would appreciate an early reply.

K. G. Selby

ZGS/maef

K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. K. G. Bassi
G. Metcalfe
Foundations Files ✓
Gen. Files

110
401 & Keels Street
Downsview, Ontario

August 21, 1968

Master Soil Investigation
104 Kenhar Drive
Weston, Ontario

Dear Sirs:

This is to confirm our request of July 2, 1968 for the supply of a Diamond Drill and Pennsylvania type auger together with all necessary equipment, as specified under the terms of our Contract Agreement, at Hwy. 401 & Airport Road, Toronto, on July 3, 1968.

This project bears Job Number 67-F-15.

Yours truly,

E. G. Selby
E. G. Selby
Supervising Foundation Engineer
for: H. G. Stermac
Principal Foundation Engineer

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building

FROM: Bridge Division,
Downsview, Ontario

ATTENTION:

DATE: August 20, 1968

OUR FILE REF:

IN REPLY TO

SUBJECT: Bridge No. 25
Richview Expressway W.B.
over Highway 401
W.P. 395-65, Site 37-819
401/27 Interchange, District 6

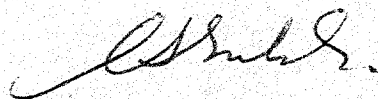
67-F-15

Attached herewith we are submitting the final bridge
drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.

CSG:rd

Attach.



C.S. Grebski,
Bridge Design Engineer

NO COMMENTS

AUG 23/68

A.H.B.



MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building

FROM: Bridge Division,
Downsview, Ontario

ATTENTION:

DATE: August 29, 1968

OUR FILE REF:

IN REPLY TO

SUBJECT: Bridge No. 13
Brown's Line over Richview Expressway
W.P. 384-65, Site 37-811
Hwys. 401 & 27, District No. 6

67-F-15

~~67-F-15~~

~~66-F-102~~

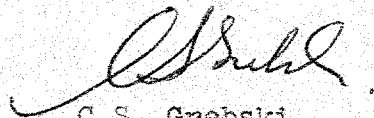
Attached herewith we are submitting the final bridge
drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.

CSG:rd

Attach.

c.c. Foundation Section



C.S. Grebski,
Bridge Design Engineer

ags

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

September 9, 1968

Your Memo -- Aug. 29/68

-- BRIDGE No. 13 --
Brown's Line over Richview Expressway
W.P. 384-65 -- W.J. 67-F-15
Highways #401 & #27 - District No. 6

We have reviewed your final bridge drawings for Bridge #13. We note that all footings are designed to be supported on 12 BP 53 steel H-piles, driven to el. 440 ft. In our Foundation Report #66-F-102 (page 8), it was suggested that footings within the creek valley be supported on piles driven to approx. el. 440 ft. It was, however, also pointed out, that at the location of the south abutment - situated on the slope of the high ground - additional information would be necessary to determine the type of footings to be adopted. From borehole #18, drilled near the west corner of the south abutment - assuming piled foundations - it appears that at this location refusal of the H-piles will be reached around el. 460 feet. At the east corner of the south abutment refusal will probably be obtained at lower elevations. It is postulated, therefore, that between the corners of the south abutment, refusal will vary between el. 460 and 440 ft. For a more exact prediction of pile lengths, additional boreholes would be necessary. It should be borne in mind that if pile lengths are supplied as shown in the drawings, cut-offs of up to 20 feet in length may be expected at the south abutment.

KGS/ndeF

K.L. Selby
K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Sternac,
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McCombie
W. S. Melnyshyn
Foundations Files
Gen. Files

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building

From: Bridge Division,
Downsview, Ontario

ATTENTION:

DATE: September 3, 1968

OUR FILE REF:

IN REPLY TO

SUBJECT: Bridge No. 68
Mimico Creek at Brown's Line
W.P. 133-66, Site 37-826
401/27 Interchange, Dist. 6

67-F-15

Attached herewith we are submitting the final
bridge drawings which show the foundation design for
this structure.

Kindly give us your comments at your earliest
convenience.



C.S. Grebski,
Bridge Design Engineer

CSG:rd

Attach.

c.c. Foundation Section

NO COMMENTS

A.K.B. 

9. SEPT/68.

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building

From: Bridge Division,
Downsview, Ontario

ATTENTION:

DATE: September 9, 1968

OUR FILE REF:

IN REPLY TO

SUBJECT: W.P. 265-66, Site 37-827
Bridge No. 70
Ramp E-N (Richview) over Hwy. 401
401/27 Interchange, District 6

67-15

Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.



C.S. Grebski,
Bridge Design Engineer

CSG:rd

Attach.

c.c. Foundation Section

SEPT. 16 / 1968

NO COMMENTS.

A.L.B.



MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building

FROM: Bridge Division,
Downsview, Ontario

ATTENTION:

DATE: October 7, 1968

OUR FILE REF:

IN REPLY TO


SUBJECT: Bridge No. 74
Ramp Renforth Drive,
Hwy. 401 E over Hwy. 401
W.P. 36-67, Site 37-828
401/27 Interchange, Dist. 6

67-F-15

Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.

CSG:rd


C.S. Grebski,
Bridge Design Engineer

Attach.

c.c. Foundation Section

67-F-15

8. OCT. 68

NO COMMENTS

A.R.B.

(H.L.B.)

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building

FROM: Bridge Division,
Downsview, Ontario

ATTENTION:

DATE: November 5, 1968

OUR FILE REF:

IN REPLY TO

SUBJECT: Bridge No. 17
Hwy. 27 N.B. over Richview Expwy.
W.P. 388-65, Site 37-813
401/27 Interchange, District 6

67-F-15

Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.

CSG:rd

Attach.

c.c. Foundation Section

C.S. Grebski
C.S. Grebski,
Bridge Design Engineer

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

FROM: Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

ATTENTION:

DATE: November 14, 1968

OUR FILE REF:

IN REPLY TO

SUBJECT:

-- BRIDGE #17 --
Highway 27, N.B. over Richview Expressway
W.P. 388-65 - Site 37-813 - W.J. 67-P-15
Hwy. 401/27 Interchange, Dist.6 (Toronto)

We have reviewed the final bridge drawings D-6233-1, 2, 3 and 6 for the above mentioned structure. We suggest that you make the following revisions with respect to pile lengths supplied:

DRAWING D-6233-6 -- RETAINING WALLS

PILE DATA		
Location	No.	Length
Panel 'A'	11	27'-0"
Panel 'B'	6	30'-0"
Panel 'C'	8	34'-0"
Panel 'E'	9	35'-0"
Panel 'F'	6	28'-0"
Design Load 50 Tons - Type 10 BP @ 42		

DRAWING D-6233-3 -- FOOTING DETAILS

PILE DATA		
Location	No.	Length
East Abutment	21	32'-0"
West Abutment	21	27'-0"
Design Load 70 Tons - Type 12 BP @ 53		

We have no other comments.

KGS/MdeF

cc: Messrs. S. McCombie
W. S. Melinyshyn
Foundations Files
Gen. Files

K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

~~Mr. W. Hollingshyn,~~
Reg. Bridge Location Engineer,
Central Region, Admin. Bldg.

Bridge Division,
Downsview, Ontario

November 22, 1968

Bridge No. 30
Hwy. No. 27 over Hanforth Drive
W.P. 400-65-03, Site 37-823
Hwy. 401 & 27, District No. 6

L7-F-15

Attached herewith are prints of the Preliminary Bridge Plan
Drawing B-6243-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$410,000.
This cost includes tender, materials, engineering and sundry
construction.

Any comments or revisions you may have should be submitted
within three weeks.

CSG:rd

C.S. Grebaki,
Bridge Design Engineer

Attach.

C.C. S. McCombie
A. Stermac (2)
J. Anderson

NO BH AROUND .
NEAREST BH APPR. 6m FT FROM
PROPOSED LOCATION OF BRIDGE
(LOCATION IS SHIFTED NORTHWARD
APPR 6m-7m FT FROM PREVIOUS DESIGN .)
25 NOV 68 D K B .

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building

FROM: Bridge Office,
Downsview, Ontario

ATTENTION:

DATE: December 16, 1968

OUR FILE REF.

IN REPLY TO

SUBJECT: Bridge No. 24
Hwy. #27 N.B. over Hwy. 401
W.P. 394-65, Site 37-818
Hwys. 401 & 27, District 6

67-F-15

Attached herewith we are submitting the final
bridge drawings which show the foundation design for
this structure.

Kindly give us your comments at your earliest
convenience.

J. K.

CSG:rd

for C.S. Grebski,
Bridge Design Engineer

Attach.

c.c. Foundation Section

17. Dec. 68.

NO COMMENTS.

A. K. B.

(Signature)

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building

FROM: Bridge Office,
Downsview, Ontario

ATTENTION:

DATE: December 17, 1968

OUR FILE REF.

IN REPLY TO

SUBJECT: Bridge No. 27
Ramp W-N over Hwy. 401 & Hwy. 27 S.B.
W.P. 397-65, Site 37-821
Hwys. 401 & 27, District No. 6

67-F-15

Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.

CSG:rd

Attach.

c.c. Foundation Section

J. Ken
for C.S. Grebski,
Bridge Design Engineer

14. DEC/68

NO COMMENTS

A-L-B

WSP

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Office,
Admin. Bldg.

Foundation Section,
Materials & Testing Office,
Room 107, Lab. Bldg.

December 19, 1968

-- BRIDGE #27 --

Ramp W.-N. over Hwy. 401 & Hwy. 27 S.B.
W.P. 397-65, Site 37-821, W.J. 67-F-15
Hwys. 401 & 27, District #6 (Toronto)

We have reviewed the final bridge drawings for the above mentioned structure and note that the designer has followed recommendations contained in our report and subsequent memos. Whilst the use of H-piles to support some of the piers is entirely satisfactory from an engineering viewpoint, it is our opinion that some saving could be effected by using the recommended alternative concrete caissons.

KGS/MacF

K. G. Selby
K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McCombie
W. S. Melinyshyn

Foundations Files
Gen. Files

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building

From: Bridge Office,
Downsview, Ontario

ATTENTION:

DATE: January 3, 1969

OUR FILE REF.

IN REPLY TO

SUBJECT: Bridge No. 26
Hwy. #27 S.B. over Hwy. 401
and Richview Expressway
Hwys. 401 & 27, District 6
W.P. 396-65, Site 37-820

62-F-15

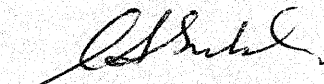
Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.

CSG:rd

Attach.

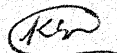
c.c. Foundation Section


C.S. Grebski,
Bridge Design Engineer

JAN. 7/69

NO COMMENTS

4.4.3



Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. W. Melinyshyn,
Reg. Bridge Location Engineer,
Central Region,
Admin. Building

C.S. Grebaki

April 10, 1969

Bridge No. 30
Hwy. No. 27 over Renforth Drive
W.P. 400-65-03, Site 37-823
Hwy. 401 & 27, District 6

67-F-15

Attached herewith are prints of the revised Preliminary Bridge Plan Drawing D-6243-P1 for the above-mentioned structure.

The estimated cost of the proposed structure will remain the same as previously submitted.

Any comments or revisions you may have should be submitted within three weeks.

CSG:rd

C.S. Grebaki,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac (2)
J. Anderson

WE HAVE NO COMMENTS PROVIDED THE BASE OF THE
FOOTINGS IS AT OR BELOW EL. 510 FT & THE DESIGN
LOAD ON THE FOOTINGS DOES NOT EXCEED 35 TSP.

K.G.S.

Department of Highways Ontario

Copy for the information of

Foundation Section

Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building

C.S. Grebski,
Bridge Office

October 22, 1969

Bridge No. 30
Hwy. No. 27 over Renforth Drive,
W.P. 400-65-03, Site 37-823
Hwys. 401 & 27, District No. 6

67-F-15

Attached herewith we are submitting the final
bridge drawings which show the foundation design for
this structure.

Kindly give us your comments at your earliest
convenience.

CSG:rd

C.S. Grebski,
Bridge Design Engineer

Attach.

c.c. Foundation Section

No comments

Kel. Gully
Oct 31st 1969

NOTES OF CONFERENCE

PROGRESS MEETING

HIGHWAY 401 - HIGHWAY 27 INTERCHANGE
W.P. 201-62-3 & 4

DATE: March 3, 1970

PLACE: FENCO, Toronto Office

PRESENT: Messrs: W.C. Friedmann - Department of Highways
R. Strain Ontario
M. Robinson
D. Smith
W. Melinyshyn

Z. Mekinda - Foundation of Canada
R.S. Adachi Engineering Corp. Ltd.

PURPOSE OF MEETING - To review revisions to Highway 401 -
Highway 27 Interchange, Green
Contract.

PROCEEDINGS:

Action
By

The following points were discussed and agreed on:

1. A plan will be submitted to Mr. T. Kovich for
pavement design for Richview Side Road exten- FENCO
sion. DHO
2. Minimum sewers will be provided for the above
project wherever cost sharing will be required
with Metro. As plans become available a DHO
meeting will be arranged with Metro to discuss
further details with regards to sewers, aban-
doning of Willowridge Drive which at present
connects to Richview Side Road, and the proposed
cross-section for Richview Side Road extension.

PROCEEDINGS (continued)

Action
By

3. The property plan will be re-issued indicating the additional property required between Mimico Creek and Martin Grove Road, viz., the Red School-house and the additional easement from H.E.P.C.
4. FENCO to provide the Department with construction estimates from the east limit of Mimico Creek to Martin Grove Road. This area in question would require cost sharing with Metro. Roads and Traffic. FENCO
5. The proposed structures across Mimico Creek were discussed and the Department agreed that structure 67 should be redesigned to allow for structure carrying Richview Side Road extension - to be designed as a culvert; (structure 67A) and the structure carrying relocated Richview Side Road traffic as a one span structure spanning Mimico Creek diversion (structure 67B).
6. It was pointed out that it would probably be more economical to continue the concrete lined channel throughout the project rather than transitioning to a rip-rap lined channel beyond culvert 67. Since rip-rap lined channel would require a greater channel section a longer span would be required for structure 67B. This would off-set the small additional cost of the concrete lining.

It was agreed that free board can be reduced from three feet to a minimum of one foot. DHO hand rails and side walks on the south side will be provided.
7. It was also agreed that centre median footings for the proposed Bridge No. 9 (Ramp 'N-E' Local along Brown's line) originally included in the Green Contract, will be deleted.

FENCO

MEMORANDUM

Telephone: 248-3446

TO: Mr. A.G. Stermac,
Principal Foundation Engineer,
Materials & Testing,
Lab Building.

FROM: H.G. Kunzelmann,
Toronto Regional Road Design.

ATTENTION:

DATE: May 15, 1970.

OUR FILE REF.

IN REPLY TO

SUBJECT: Re: W.P. 201-62-03,
Hwy. 401 & Hwy. 27 Interchange,
"Green Job",
District 6, Toronto.

67-F-15

Enclosed please find one complete set of contract drawings and documents.

This is for your use and information. The Regional Review will be held on May 27/70 in the District 6 Boardroom.

H.G. Kunzelmann

H.G. Kunzelmann
Asst. Projects Co-Ordinator
For:
W.C. Friedmann
Expressway Consultant Control Engineer

HGK/GB
Encl.

*File lengths & numbers checked
& found OK. A.K.B.*

NOTES OF CONFERENCE

March 3, 1970

Page 3

PROCEEDINGS (continued)

Action

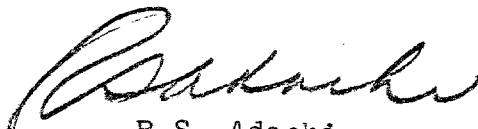
By

8. It was agreed that plans would be issued to all the Utility companies concerned after the meeting with Metro.

FENCO

9. New work project numbers would be required for the bridges.

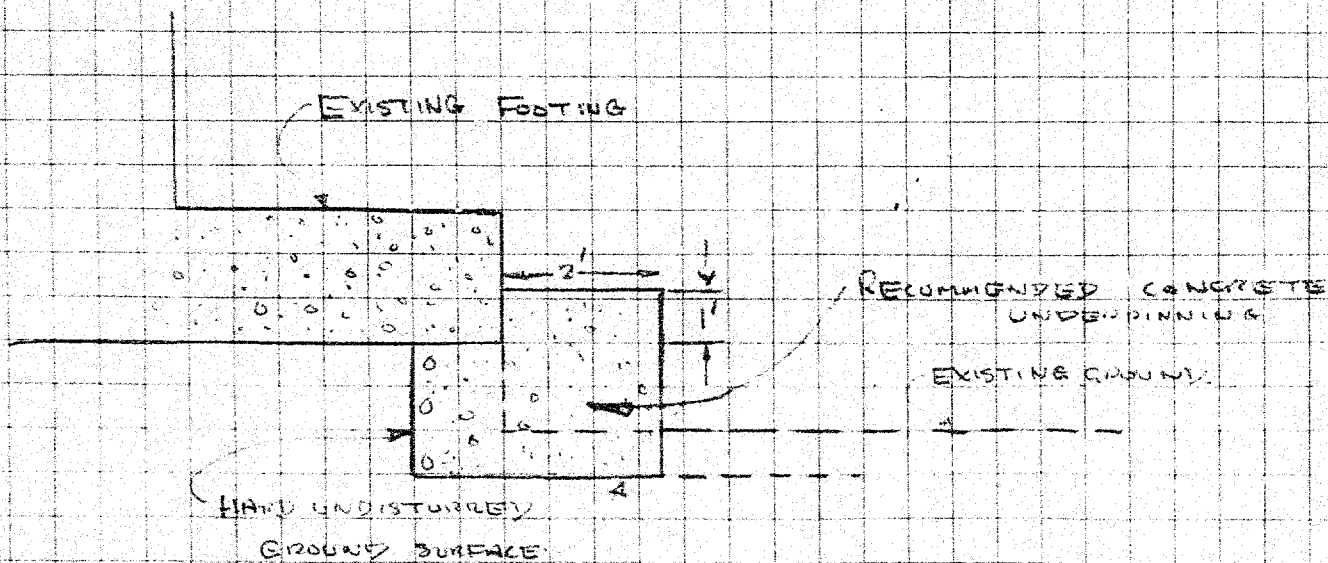
DHO



R.S. Adachi
Secretary of the Meeting

RSA/bhw
3214-120

FENCO

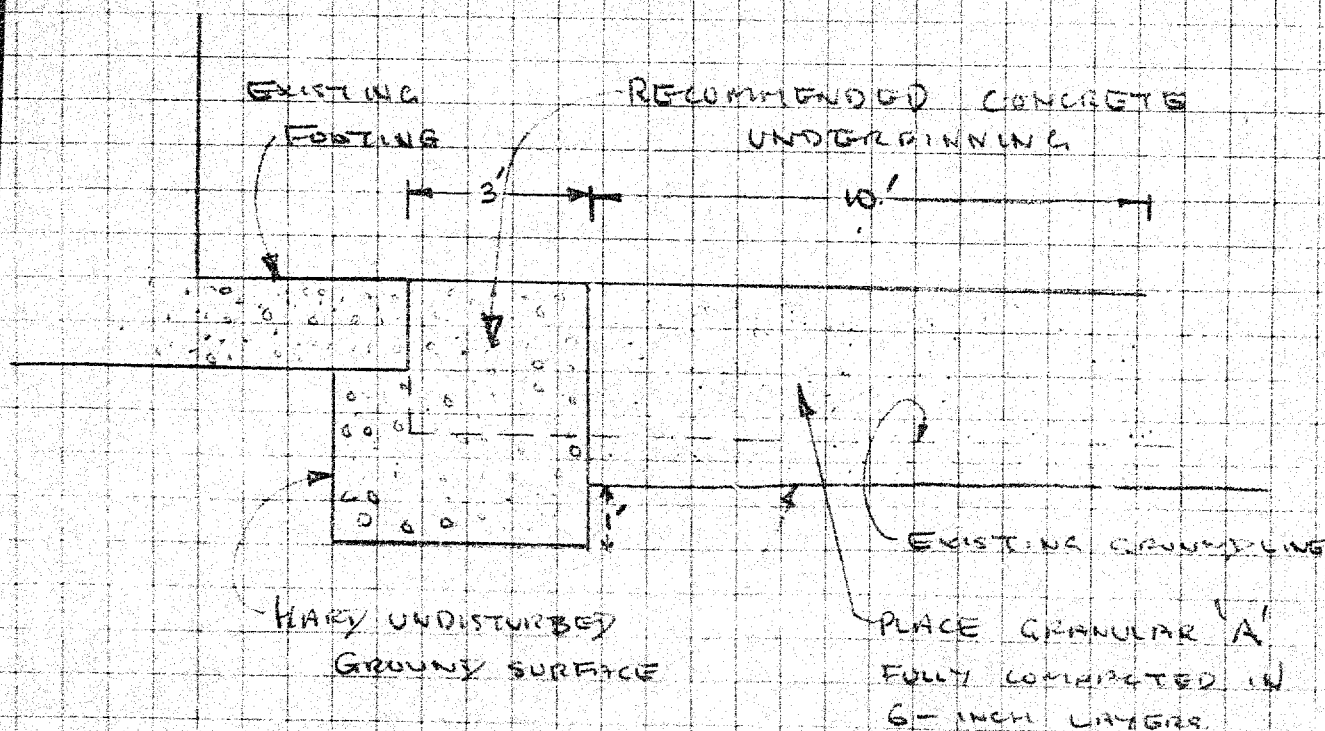


CONSTRUCTION SEQUENCE

- (1) REMOVE SOFTENED SOIL ALONG FOOTING LENGTHS OF NOT MORE THAN 5 FT. STAGGERED.
- (2) FORM AND PLACE CONCRETE UNDERPINNING.
- (3) REMOVE SOFTENED SOIL ALONG REMAINING 5 FT. LENGTHS OF FOOTING.
- (4) FORM AND PLACE CONCRETE UNDERPINNING.
- (5) REPLACE SOFT SOIL IN FRONT OF ABUTMENTS WITH SUITABLE EARTH FILL.

CC. R. FRANKS
C. BASSI
P. McWATT

12.1.5.11
April 20th 1973

CONSTRUCTION SEQUENCE

- (1) REMOVE SOFTENED SOIL ALONG FOOTING LENGTHS OF NOT MORE THAN 5 FT. STAGGERED
- (2) FORM AND PLACE CONCRETE UNDERPINNING
- (3) REMOVE SOFTENED SOIL ALONG REMAINING 5 FT. LENGTHS OF FOOTING
- (4) FORM AND PLACE CONCRETE UNDERPINNING
- (5) EXCAVATE SOFT SOIL IN FRONT OF FOOTING AND PLACE GRANULAR

R. FINNICKS
C. BASSI
P. McWATT

K. C. Smith APRIL 20TH 1971

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

RE: LIGHTING
PROJECT NO. 100-101-027
(Footings, R.F. McCullough)

AKS

Department of Highways Ontario
Copy for the information of
Mr. K. Selby.

~~Mr. D. Aspinwall,~~
Project Design Engineer,
Regional Road Design Office,
CENTRAL REGION.

D. McCune.

April 29, 1971.

67-F-15

Lighting Poles at Highway 401-27
Contract #70-129
District #6.

Attached are two copies of a sketch showing footing requirements for 50' lighting poles at the above interchange where shale is encountered at a depth of less than 10 feet from the surface.

This sketch should provide the District Staff with sufficient information to have the footings constructed.

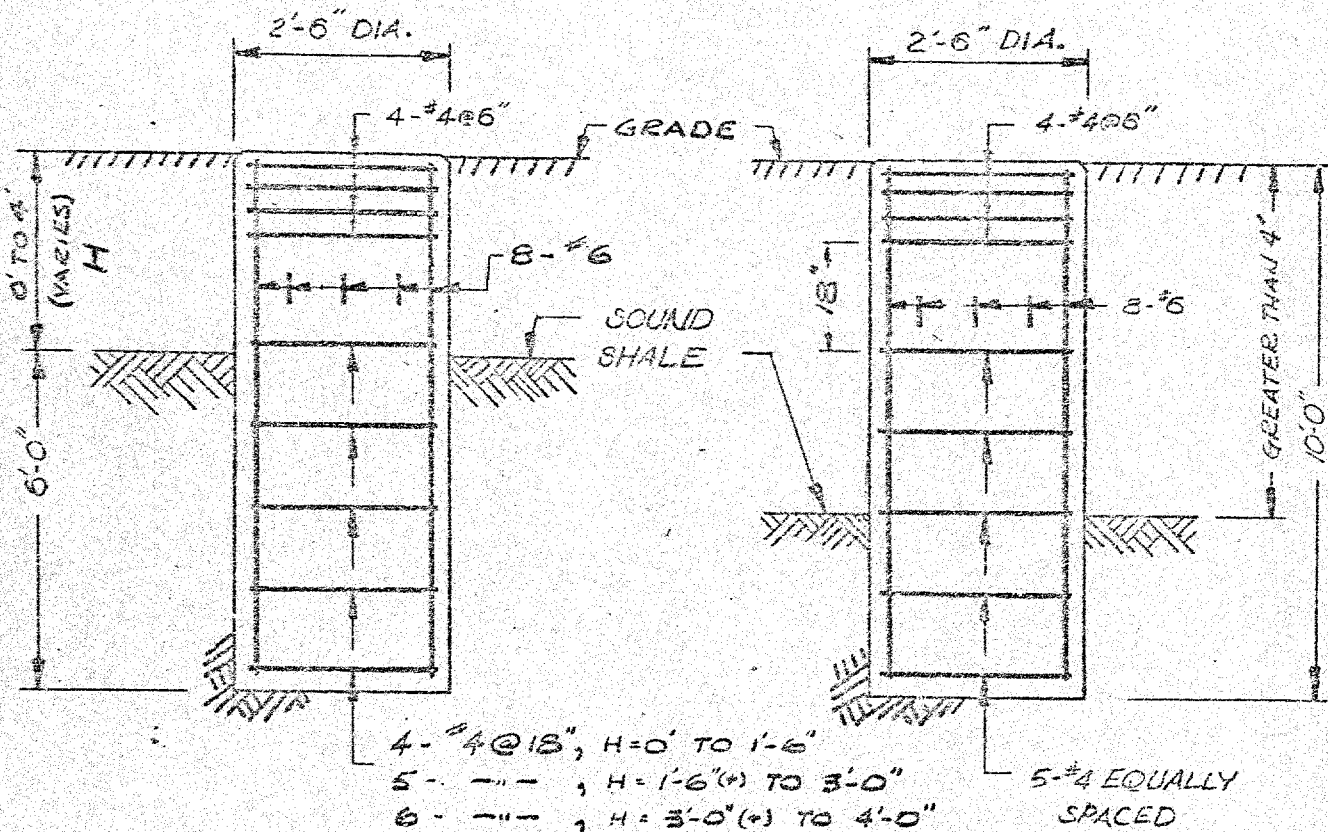
We have been assured by the Foundation Section that the shale in this area can be augered and they are in agreement with the proposed sketch.

D. McCune,
Bridge Standards Engineer.

DM/mh
cc: K. Selby,
V. McCullough.

ROCK 4' OR LESS
BELOW GRADE

ROCK MORE THAN
4' BELOW GRADE



NOTES:-

- ALL FOOTINGS TO BE PLACED IN AUGERED HOLES.
- ALL CONCRETE TO BE PLACED AGAINST UNDISTURBED EARTH OR SHALE.
- WHERE DEPTH OF FOOTING IS LESS THAN 10', VERTICAL REINFORCEMENT TO BE CUT IN FIELD TO SUIT.
- FOR PURPOSES OF ESTABLISHING REQUIRED FOOTING DEPTH, THE ENGINEER SHALL DETERMINE WHERE SHALE IS ENCOUNTERED.
- #4 BARS SHOWN ARE IDENTICAL TO THOSE SHOWN ON BD 88-1. ALL OTHER DETAILS SHALL BE AS SHOWN ON BD 88-1.

DEPARTMENT OF HIGHWAYS ONTARIO
MEMORANDUM

cc: GEN FILES 23-10-129
W.P. 201-62-3

Mr. B. R. Davis,
Bridge Engineer,
Bridge Division,
Admin. Bldg.

FROM: Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

Attention: Mr. S. McCombie

DATE: August 14, 1967

SEP - 8 1967

OUR FILE REF.

IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT
At the Site of the Proposed
Hwy. #401, #27 and Richview
Expressway Interchange
District #6 (Toronto)
Contract #9 (Green)
W.J. 67-F-15 -- W.P. 201-62-3

Attached, we are forwarding to you, our detailed foundation investigation report on the subsoil conditions existing at the above structure site, for Bridges #17, #25, #24, #70, #74, #26, #27, #30, and #68.

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

AGS/MdeF
Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
G. K. Hunter (2)
F. Allen
W. S. Melinyshyn
T. J. Kovich
B. A. Singh
Foundations Files
Gen. Files ✓

A. G. Sternac
A. G. Sternac
PRINCIPAL FOUNDATION ENGINEER

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1. INTRODUCTION.
 2. DESCRIPTION OF THE SITE AND FIELD INVESTIGATION.
 3. GENERAL SOIL CONDITIONS:
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 - 3.2) Bedrock.
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 4. DISCUSSION AND RECOMMENDATIONS:
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 - ✓ 4.2) BRIDGE #17 - (W.P. 388-65)
 - ✓ 4.3) BRIDGE #25 - (W.P. 395-65)
 - ✓ 4.4) BRIDGE #24 - (W.P. 394-65)
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 - 4.5) ✓ BRIDGE #26 - (W.P. 396-65)✓
 - 4.6) ✓ BRIDGE #27 - (W.P. 397-65)✓
 - 4.7) BRIDGE #30 - (W.P. 400-65)✓
 - 4.8) BRIDGE #68 - (W.P. 133-66)✓
 5. SUMMARY.
 6. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION REPORT
At the Site of the Proposed
Hwy. #401, #27 and Richview
Expressway Interchange
District #6 (Toronto)
Contract #9 (Green)
W.J. 67-F-15 -- W.P. 201-62-3

1. INTRODUCTION:

A foundation investigation was requested by Mr. W. S. Melinyshyn, Regional Bridge Location Engineer, for some ten bridges at the site of the proposed Hwy. #401, #27 and Richview expressway interchange. These structures belong to Contract #9 (Green).

The memo calling for the foundation investigation, was dated November 24, 1966. In a later memo, dated June 22, 1967, we were advised that certain structures had been moved from the "Green" contract to the "Yellow" contract and vice versa. According to the above information, Bridge #13 belongs now to the "Green" contract. In our foundation investigations for the "Yellow" contract, numbered 66-F-102 (submitted on the 8th of February 1967), recommendations for Bridge #13 were already included. Moreover, our comments concerning the preliminary bridge plan were also forwarded on the 7th of June 1967. In view of these facts, Bridge #13 will not be discussed in the report again.

Several foundation investigations were already carried out at this general area in connection with the proposed interchange. A number of boreholes, drilled previously for other projects, are utilized in this report. All these borings are marked on the plans and profiles with the appropriate job numbers in brackets.

1. INTRODUCTION: (cont'd.) ...

The recent field investigation as well as the laboratory test program, were carried out by the Foundation Section. The boreholes were located and surveyed by personnel of the construction staff of District #6.

Presented in this report are the results of the investigation, together with the recommendations pertaining to the foundations.

2. DESCRIPTION OF THE SITE AND FIELD INVESTIGATION:

The site under investigation contains the existing Hwy. #401, #27 and Airport Rd. interchanges; also, some residential, industrial and farming areas. (See Drawing #67-F-15A.)

Geologically, the terrain belongs to the physiographic region known as the "South Slope", consisting of ground moraines with irregular knolls and hollows.

Some 27 sampled boreholes were carried out during the field work, using continuous flight augers within the overburden and proving the bedrock by means of diamond core drilling at certain locations. Split-spoon soil samples were taken at regular intervals, performing standard penetration tests by conventional methods. Values of the penetration tests (blows/ft.), together with the laboratory test results, are plotted on the attached borelog sheets.

3. GENERAL SOIL CONDITIONS:

3.1) Overburden:

The overburden within the area investigated, may be divided into two main bodies. The upper layers appear to be of glacio-fluvial and/or lacustrine deposits, consisting of sandy and clayey silts, sands and gravels. The lower strata were observed to be glacial tills of hard consistency, containing grey clays and silts with increasing amounts of embedded shale fragments.

cont'd. /3 ...

3. GENERAL SOIL CONDITIONS: (cont'd.) ...

3.2) Bedrock:

Shale bedrock was proved in several boreholes some 20 - 30 ft. below ground level. The bedrock was identified to belong to the Dundas formation, having a greenish-grey colour. It is rather soft with well defined horizontal seams and a flaky texture. Some embedded thin layers of limestone were evident.

3.3) Groundwater:

The groundwater level was established in almost all of the borings, at relatively shallow depths. The water level generally lies within the upper 10 ft., except at those areas where artificial drainage depresses the water level. It is believed that the coarse-grained soil layers carry a fairly large amount of groundwater.

4. DISCUSSION AND RECOMMENDATIONS:

4.1) General:

(a) Subsoil at the site is generally hard and very dense with a high shear strength. Spread footings, just below the depth of frost penetration, can be recommended in most cases.

(b) Alternative piled foundations are also discussed for the individual structures, where applicable. Piled foundations for spill-through type abutments appear to be the most economical.

(c) The recommended safe loads on piles should be checked during pile driving by means of the Hiley formula (D.H.O. Standards #DD-1218 and 1219).

(d) The sand, silty sand and sandy silt layers are susceptible to conditions of unbalanced hydrostatic head. For the excavations within these layers, special dewatering techniques will be required, such as driving interlocking sheet piles around the perimeter of the excavations. The sheet piles should be driven to

cont'd. /4 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

4.1) General: (cont'd.) ...

(d) (cont'd.) ...

a distance below the bottom of the excavations equal to the head of water above it, in order to prevent the excavation bottom from "boiling".

(e) No stability problems are foreseen for the approach fills within the whole area, provided that they are built with side slopes of 2 horizontal to 1 vertical.

(f) In the following sections, a brief description of the soils and recommendations are given for the individual structures.

4.2) BRIDGE #17 - (W.P. 388-65) -

(a) Soil Conditions:

Borehole #2 was drilled at the site of the proposed structure during the present field work. Two other boreholes (B.H.'s #7 and #20 from Job No. 67-F-35 and 66-F-102, respectively), were also used for the soil profile.

Clayey silt deposits form the uppermost layer, containing traces of gravel. At the lower elevations, the soil has a fair amount of sand, indicated by a correspondingly smaller plasticity ($I_p = 3 - 5\%$). The consistency of the top 3 - 4 ft. layer may be considered to be very stiff; otherwise, it is hard, with penetration 'N' values of 30 to above 100 blows per ft. No bedrock was encountered within the investigated 35 - 45 ft. depth.

The locations and elevations of the boreholes, together with the stratigraphical profile, are shown on Drawing #67-F-15B.

cont'd. /5 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

4.2) BRIDGE #17 - (W.P. 388-65) - (cont'd.) ...

(b) Recommendations:

A four-span structure is proposed at this crossing. The design grade of Richview expressway at the crossing - according to the bridge site plan - will be around El. 481 - 484 ft., some 10 - 20 ft. deeper than the existing ground surface. At or below these elevations, the hard subsoil exhibits sufficient strength to support the bridge on spread footings. Footings placed at four ft. below finished grade will develop safe bearing capacities of up to 4 t.s.f. The spill-through type abutments may also be founded on steel piles, with the pile caps formed within the approach fills. It is estimated that either 12 BP at 53 steel H-piles or 12-3/4" x 1/4" steel tubes driven to approx. El. 465 - 470 ft. at the north abutment, and around El. 455 - 460 ft. at the south abutment, will support loads of 70 Ton/pile.

It is felt that no special dewatering problems will arise in the footing excavations, and open pumping from sumps will effectively drain the water away without inducing "quick" conditions.

4.3) BRIDGE #25 - (W.P. 395-65) -

(a) Soil Conditions:

Three boreholes, numbered 30, 32, and 33, were drilled for this structure. Below a 6 - 8 ft. thick sandy and clayey silt deposit, a layer of very dense sand with gravel stratum was found. This layer is rather coarse-grained and water bearing; the thickness varies from 4 to 13 ft. Hard clayey silt (glacial till) underlies the sands, with numerous embedded shale fragments. The glacial till is followed by shale bedrock between El. 490 and 488 ft. The upper portion of the bedrock is weathered and fissured.

The locations and elevations of the borings as well as the soil profile, are shown on Drawing #67-F-15C.

cont'd. /6

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

4.3) BRIDGE #25 - (W.P. 395-65) - (cont'd.) ...

(b) Recommendations:

The proposal calls for a four-span bridge with spill-through type abutments. The top of the pavement of Hwy. #401 below Bridge #25 is designed to be around El. 496 - 497 ft., some 19 - 20 ft. deeper than the existing ground level. The top of the approach fills, therefore, will be only 4 - 7 ft. higher than the present ground. The subsoil at or below the proposed grade of Hwy. #401 exhibits very high bearing capacities, thus spread footings are recommended some 4 ft. below finished grade, with allowable design loads of 4 t.s.f.

It is believed that piled foundations for the perched abutments will not be necessary, since spread footings may be placed as high as El. 510 ft. at the location of the west abutment and around El. 506 ft. at the east abutment. Safe loads of 4 t.s.f. may also be placed on spread footings of the abutments at the suggested elevations.

The silty sand and sand layer carries a large amount of groundwater. For the excavations within this layer, a dewatering scheme will likely be required.

- 4.4) BRIDGE #24 - (W.P. 394-65) -
BRIDGE #70 - (W.P. 265-66) -
BRIDGE #74 - (W.P. 36-67) -

(a) Soil Conditions:

Since Bridges #24, #70, and #74 will be located right beside each other, the soil descriptions and recommendations concerning all three, are combined here.

Some six boreholes were carried out at the locations of the proposed abutments and piers. The numbers of the borings are: 22, 23, 24, 26, 27, and 28. A clayey silt layer with some sand and

cont'd. /7 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

- 4.4) BRIDGE #24 - (W.P. 394-65) -
BRIDGE #70 - (W.P. 265-66) -
BRIDGE #74 - (W.P. 36-67) - (cont'd.) ...

(a) Soil Conditions: (cont'd.) ...

traces of gravel was found to be the surficial stratum in most of the boreholes. At the location of the proposed west abutment, however, the uppermost layer was identified to be fine to coarse sand with gravel. This coarse-grained, pervious layer was observed to underlie the surficial clayey silts in holes #27, 26, and 22. A bluish-grey clayey silt with some sand and gravel (glacial till) follows the sands, containing numerous fragments of shale. The consistency of the cohesive deposits was found to be hard, the granular deposits having "very dense" relative densities. Shale bedrock of the Dundas formation was proved by diamond drilling at four borehole locations, the upper surface of which ranges between El. 493 ft. and 496 ft.

The locations and elevations of the boreholes with the stratigraphical cross sections, may be seen on Drawing #67-F-15D.

(b) Recommendations:

Bridges #24, 70, and 74, are designed to be four-span structures, with the grade of proposed Hwy. #401 at the crossing being around El. 491 - 496 ft., some 8 - 10 ft. lower than the existing ground level. The subsoil exhibits high shear strength, so that spread footings for all the structures may be placed at 4 ft. below finished ground. The base of the spread footings for perched abutments may be as high as 5 ft. below existing ground, ensuring, of course, the 4-ft. cover for frost protection. Design loads up to 4 t.s.f. are recommended on spread footings.

Perched abutments may also be supported on piles, with the pile caps being formed within the approach fills. Steel H-piles

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

- 4.4) BRIDGE #24 - (W.P. 394-65) -
BRIDGE #70 - (W.P. 265-66) -
BRIDGE #74 - (W.P. 36-67) - (cont'd.) ...

(b) Recommendations: (cont'd.) ...

appear to be the most practical choice, driven to sound bedrock, around El. 470 ft. at the east abutments, and around El. 490 ft. at the west. Loads equal to the structural strength of the piles may be assumed for such piles.

For the excavations within the granular sand and gravel deposit, appropriate dewatering schemes will be necessary.

4.5) BRIDGE #26 - (W.P. 396-65) -

(a) Soil Conditions:

Four boreholes, numbered 3 to 6 inclusive, were carried out recently for Bridge #26. Borehole #13 (W.J. 67-F-35) drilled earlier in the vicinity of the proposed east abutment, was also utilized for the soil stratigraphy.

Mainly granular sandy silt, silty sand and gravelly sand deposits were identified at the east end of the proposed structure. Dense to very dense relative densities were recorded within these layers, corresponding to penetration 'N' values of 40 - 70 blows/ft. The rest of the boreholes revealed clayey silt with some sand and gravel layers with slight to occasionally medium plasticity. The uppermost portion of the clayey silt was found to have a stiff to very stiff consistency; otherwise, it was hard. The layer of the overburden just overlying the bedrock, contains numerous shale fragments. Bedrock was proved at four locations, the upper surface having been established around El. 483 ft. at the west abutment and around El. 499 ft. at the east.

The locations and elevations of the borings and the soil profile, are shown on Drawing #67-F-15E.

cont'd. /9 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

4.5) BRIDGE #26 - (W.P. 396-65) - (cont'd.) ...

(b) Recommendations:

It is proposed to construct a five-span structure for this crossing. The design elevations of the top of pavements of Hwy. #401, Richview expressway Westbound and Ramp S.-W. at the crossing, will be between 499 and 504 ft. Due to the favourable soil conditions, the construction of spread footings for the piers is feasible at some four ft. below finished ground. Assuming the bottom of footings to be around El. 498 - 500 ft., up to 4 t.s.f. design loads may be used on the footings. At the locations of the east piers, the bedrock was found to be around El. 498 - 495 ft. At these locations the piers may be supported on sound bedrock. Up to 10 t.s.f. design pressures may be assumed for such footings.

At the east abutment location, the approach fill will be very low. For a spill-through type abutment, spread footings may be placed as high as El. 512 ft. with a design load of up to 4 t.s.f. The abutment may also be founded on steel H-piles, driven to bedrock, around El. 495 - 499 ft.

For the perched type west abutment, piled foundations appear to be the practical solution, with the pile caps being constructed within the some 15-ft. high approach fill. Piles should be driven to sound rock around El. 485 - 482 ft. Steel H-piles are recommended for both abutments. Loads equal to the structural strength of the piles may be assumed on piles driven to bedrock.

No major dewatering problems are foreseen for the excavations.

4.6) BRIDGE #27 - (W.P. 397-65) -

(a) Soil Conditions:

Clayey silt to silt soils with some sand and traces of gravel, form the surficial layer along this long bridge. At the

cont'd. /10 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

4.6) BRIDGE #27 - (W.P. 397-65) - (cont'd.) ...

(a) Soil Conditions: (cont'd.) ...

south end of the proposed structure, the consistency of the materials is generally hard. Towards the north, stiff and very stiff clayey silts were encountered. The thickness of this layer varies from 5 to 40 ft., the latter being at the existing Airport Road embankment. Underlying the clayey silt, a 10-ft. thick deposit of coarse to fine gravel and sand was found at the south side of the investigated line. This layer is a free-draining stratum, with a very dense relative density. The shale bedrock was overlain at each borehole location by grey clayey silt (glacial till) containing a large amount of shale fragments. The glacial till is very hard, with penetration resistances of 100 blows per 1 - 2 inches. Shale bedrock was proved in several boreholes around El. 493 - 495 ft. beneath the south side of the proposed bridge, around El. 482 ft. at borehole #9, and again at El. 494 ft. at the north end.

The locations and elevations of the boreholes, also, the soil profile, projected to the control line of Bridge #27, are shown on Drawing #67-F-15F.

(b) Recommendations:

Bridge #27 is proposed to be a 10-span structure of some 1400 ft. length. The south half of the bridge will cross Hwy. #401 and Richview expressway. The finished grade of these highways is designed to be around El. 504 - 506 ft. The design grade of Hwy. #27, N.B., beneath the north side of the bridge, is estimated to be between El. 526 - 532 ft.

From the soil conditions, it appears that the south half of the structure can be supported on spread footings, whereas piled foundations will probably be more economical for the north half of the proposed bridge. Perched abutments may be supported on piles,

cont'd. /11 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

4.6) BRIDGE #27 - (W.P. 397-65) - (cont'd.) ...

(b) Recommendations: (cont'd.) ...

building the pile caps within the approach fills. Recommendations as to the elevations and safe loads of the spread and pile foundations, are tabulated below. (For the numbering of piers, see plan on Drawing #67-F-15F.) The highest elevations where the spread footings may be placed, are given without consideration of the design grades. A distance of four ft. between finished grade and the base of footings should nevertheless, be provided for frost protection.

Footings For	Spread Footings at or below El. (ft.) with Allowable Bearing Capacities of		Or, 12 BP at 53 Steel H-Piles driven to approx. El. (ft.).
	4 t.s.f.	2 t.s.f.	Design Load of 70 T/Pile
N. Abut.	-	-	490 - 494
Pier #1	500	512	492 - 494
" #2	497	510	483 - 485
" #3	498	508	480 - 485
" #4	498	508	480 - 485
" #5	496	498	480 - 483
" #6	500	-	-
" #7	504	-	-
" #8	504	-	-
" #9	510	-	-
S. Abut.	515	-	495 - 496

For the footing excavations within the gravel and sand layer, a dewatering scheme will be necessary in order to prevent the excavation bottom from becoming "quick".

cont'd. /12 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

4.7) BRIDGE #30 - (W.P. 400-65) -

(a) Soil Conditions:

Some six boreholes were placed at the location of proposed Bridge #30. The boreholes were numbered 11, 12, 13, 14, 16, and 17. The overburden was found to consist of clayey silt and sandy silt deposits with traces of gravel, followed by grey clayey silt (glacial till) with numerous fragments of shale. Within the uppermost 5 - 10 ft. layer, the stratum occasionally exhibits stiff to very stiff consistencies; otherwise, the material can be considered to be hard and very dense. Generally, slight plasticity was observed within the upper cohesive layers, the plasticity indices ranging from 5% to 10%. The glacial till, however, has medium plasticity. All the boreholes were terminated within the overburden, but it is believed that some of the holes approached or reached the upper surface of the shale bedrock.

The locations and elevations of the borings, together with the stratigraphical cross sections, are plotted on Drawing #67-F-15G.

(b) Recommendations:

Bridge #30 is proposed to be a two-span structure, to carry new Hwy. #27 over the proposed Renforth Drive. No details as to the design finished grades or the type of structure are yet available; nevertheless, it is assumed that the grade of Renforth Drive will be around the existing general ground level.

Soil conditions were found to be favourable for spread footings at shallow depths. Footings may be placed at or below El. 520 ft. The east 50 - 60 ft. section of the south abutment footing should, however, be lowered to El. 515 ft. in view of the soft uppermost layers.

Safe loads of 4 t.s.f. may be assumed on footings at the above elevations, for design purposes. A minimum of four ft. cover above the base of footings should, of course, be provided for frost protection.

cont'd. /13 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

4.7) BRIDGE #30 - (W.P. 400-65) - (cont'd.) ...

(b) Recommendations: (cont'd.) ...

Excavations within the silt and sandy silt strata may become unstable due to unbalanced hydrostatic head. In such cases, special dewatering techniques will be necessary.

4.8) BRIDGE #68 - (W.P. 133-66) -

(a) Soil Conditions:

Boreholes #18 and #19 were carried out at the site of this crossing. The upper 6 - 9 ft. of silty sand and clayey silt was observed to be slightly contaminated with organic matter. Underlying the organic material, clayey silts and sandy silts were found with gravel and occasional boulders. In borehole #19 (upstream), compact and hard deposits were observed, while in hole #18 (downstream), the overburden was somewhat looser having firm to compact relative densities. The lower densities were probably caused by scour, the effect of which may be detected down to approx. El. 452 - 455 ft.

Shale bedrock was encountered at each borehole around El. 447 - 448 ft. The bedrock was proved by diamond drilling, yielding 60 - 100% recovery.

Groundwater level was established in borehole #18 at El. 466.5 ft., somewhat higher than creek level.

The locations and elevations of the borings as well as the soil profile, may be seen on Drawing #67-F-15H.

(b) Recommendations:

The proposal calls for a rigid frame box structure with a 40-ft. wide span at the Brown's Line and Mimico Creek crossing.

cont'd. /14 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

4.8) BRIDGE #68 - (W.P. 133-66) - (cont'd.) ...

(b) Recommendations: (cont'd.) ...

The creek bottom at the crossing is designed to be around El. 459 ft. Spread footings, some 4 ft. below finished creek bottom, will carry safe loads of up to 3.5 t.s.f. Footings, however, should not be placed higher than El. 458 ft. at the upstream side and El. 455 ft. downstream. The actual elevation of the footings is also dependent upon the depth of scour. The Hydrology Section should be consulted, concerning the penetration of scour.

Due to the permeable nature of the granular deposits, it is expected that large quantities of water will enter the excavations. A dewatering scheme will, therefore, be necessary.

5. SUMMARY:

5.1) A foundation investigation at the locations of some 9 bridges, is reported. The bridges, numbered 17, 25, 24, 70, 74, 26, 27, 30, and 68, belong to Contract #9 (Green), which is one of the several contracts covering the proposed Hwy. #401, Hwy. #27 and Richview expressway interchange.

5.2) The generally hard and very dense soils favour spread footings, with allowable bearing pressures of up to 4 t.s.f. For some footings, however, piled foundations appear to be more economical. Perched abutments may also be supported on piles, with the pile caps being constructed within the approach fills. The use of steel H-piles is recommended.

5.3) For general remarks and recommendations concerning all the structures, your attention is called to Section (4.1), while detailed discussions and recommendations are given under the sections dealing with the individual structures.

cont'd. /15 ...

6. MISCELLANEOUS:

The field investigation, carried out during the period June 27 - July 24, 1967, was supervised by Messrs. K. A. Liljefors and B. R. Gray, Project Foundation Engineers.

Equipment used was owned and operated by Canadian Longyear Ltd., F. E. Johnston Ltd., Dominion Soil Investigation Ltd., and Master Soil Investigations Ltd.

The entire project was under the supervision of Mr. A. K. Barsvary, Senior Foundation Engineer, who also prepared this report. The report was reviewed by Mr. K. G. Selby, Supervising Foundation Engineer.

August 1967

APPENDIX I

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 2

FOUNDATION SECTION

67-F-15

JOB 57-1-13 LOCATION 868,480 N, 979,054 E.

W. P. 388-65

BORING DATE June 29, 1967

ORIGINATED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

COMPILED BY BRG

CHECKED BY

[illegible]

RECORD OF BOREHOLE NO. 3

MATERIALS & TESTING DIVISION

FOUNDATION SECTION

LOCATION 867,710 N; 976,949 E.

ORIGINATED BY KAL

W.P. 396-65

BORING DATE July 5, 1967

COMPILED BY BRG

DATUM Geodetic1

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY AKB ✓

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-42-F-15

W.P. 396-65

DATUM Geodetic

LOCATION 867,708 N; 976,733 E.

BORING DATE June 29, 1967

BOREHOLE TYPE Cont. Flight Auger

RECORD OF BOREHOLE NO. 4

FOUNDATION SECTION

ORIGINATED BY BRG

COMPILED BY BRG

CHECKED BY AKB *[Signature]*

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO.5

FOUNDATION SECTION

JOB 67-F-15

LOCATION 867,830 N; 976,652 E.

ORIGINATED BY BRG

W. P. 396-65

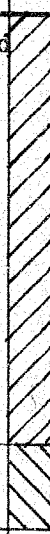
BORING DATE July 12, 13, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY AKB *AKB*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT ——— WL PLASTIC LIMIT ——— WP WATER CONTENT ——— W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.	<div style="text-align: center;"> WP ——— W ——— WL ----- 10 20 30 </div> WATER CONTENT %				
516.7	Ground Level											
0.0	Clayey silt with sand and trace of gravel.		1	SS	12	510						
	Stiff to Hard.		2	SS	55							
			3	SS	23	500						
			4	SS	52							
			5	SS	100	495"						
492.7			6	SS	168	488"						
24.0	Clayey silt with fragments of shale		7	SS	100	493"						
488.3			8	SS	100	491"						
28.4	End of Borehole											

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-F-15

LOCATION 867,833 N; 976,506 E

W. P. 396-65

BORING DATE July 19, 20, 1967

DATUM Geometric

BOREHOLE TYPE Cont. Flight Auger

FOUNDATION SECTION

ORIGINATED BY KAL

COMPILED BY BG

CHECKED BY A.K.B.

RECORD OF BOREHOLE NO. 6

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-F-15

LOCATION 868,025 N; 976,546 E.

W.P. 397-65

BORING DATE August 4, 1967

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

FOUNDATION SECTION

ORIGINATED BY BRG

COMPILED BY BRG

CHECKED BY

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W		BULK DENSITY P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	SHEAR STRENGTH P.S.F.		WATER CONTENT % WP W WL				
537.5	Ground Level											
0.0	(Fill)											
	Clayey silt with some sand and traces of gravel.		1	SS	8	530						
	Pockets of sand.		2	SS	15							
	Stiff to very stiff.		3	SS	28	520						
			4	SS	26							
			5	SS	9	510						
	Brown		6	SS	29							
	Grey		7	SS	13	500						
	Hard	8	SS	33								
493.5												
44.0	Clayey silt with shale fragments grey. Hard.		9	SS	100/1"	490						
			10	SS	100/1.5"							
482.0												
55.5	End of Borehole											

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 7

FOUNDATION SECTION

JOB 67-F-15

LOCATION 867,559 N; 976,480 E.

ORIGINATED BY KAL

W. P. 397-65

BORING DATE July 19, 20, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 8

FOUNDATION SECTION

JOB <u>67-F-15</u>	LOCATION <u>867.688 N; 976.524 E</u>	ORIGINATED BY <u>BRG</u>
W.P. <u>397-65</u>	BORING DATE <u>July 13, 1967</u>	COMPILED BY <u>BRG</u>
DATUM <u>Geodetic</u>	BOREHOLE TYPE <u>Cont. Flight Auger</u>	CHECKED BY <u>JR</u>

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT ——— WL PLASTIC LIMIT ——— WP WATER CONTENT ——— W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				WATER CONTENT %				
											<div><div>wp</div><div>W</div><div>WL</div></div>				
515.6	Ground Level														
0.0	Clayey silt with some sand and traces of gravel.		1	SS	12	510									512.6
	Stiff to hard.		2	SS	37										
			3	SS	25	500									
			4	SS	71										
495.6			5	SS	100										
20.0	Clayey silt with shale fragment		6	SS	108 2/3"										
489.8	Pedrock		7	SS	100 2/3"	490									
25.8	End of Borehole		8	SS	100 2/3"										

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 9

FOUNDATION SECTION

JOB 67-F-15

LOCATION 868,274 N; 976,484 E.

ORIGINATED BY BRG

W.P. 397-65



BORING DATE August 31, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — WL PLASTIC LIMIT — wp WATER CONTENT — w wp — w — WL				BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				WATER CONTENT %					
523.0	Ground Level															
0.0	Clayey silt with sand and traces of gravel.		1	SS	25	520									502.5	
			2	SS	18											
	Some organic		3	SS	12	510										
			4	SS	39											
	Stiff to hard.		5	SS	18	500										
			6	SS	60/0											
494.0																
29.0	Clayey silt with shale fragments. Grey.		7	SS	100/1"	490										
	Hard.		8	SS	100/1"											
483.0	Bedrock			9	SS	100/0"										
40.0	End of Borehole															

502.5

FOUNDATION SECTION

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT ——— WL PLASTIC LIMIT ——— wp WATER CONTENT ——— w			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.	w _p	w	w _L		
518.3	Ground Level											
0.0	Clayey silt with some sand and traces of gravel.		1	SS	21	510 500						
	Very stiff to hard.		2	SS	29							
			3	SS	25							
			4	SS	40							
494.3	Shale fragments		5	SS	58							
24.0			6	SS	100/2"	490						
	Shale Bedrock		7	SS	100/0"							
			8	RC1 BX	90% Rec							
483.3												
35.0	End of Borehole											

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-F-15

W. P. 400-65

DATUM Geodetic

RECORD OF BOREHOLE NO. 12

LOCATION Co-ord. 869,218 N; 975,617 E.

BORING DATE July 11, 12, 1967

BOREHOLE TYPE Cont. Flight Auger

FOUNDATION SECTION

ORIGINATED BY BEG

COMPILED BY _____ BRG

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 13

FOUNDATION SECTION

JOB 67-F-15 LOCATION Co-ord. 869,486 N.; 975,743 E.
W.P. 400-65 BORING DATE July 14, 1967
DATUM Geodetic BOREHOLE TYPE Cont. Flight AugerORIGINATED BY BRG
COMPILED BY BRG
CHECKED BY HL

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				w_p — w — w_L WATER CONTENT % 10 20 30				
523.0	Ground Level														
0.0	Clayey silt with traces of sand and gravel. Hard.		1	SS	40	520									Gr.O, Sa.3, Si.96, Cl.1
514.0			2	SS	69										
9.0	Sandy silt with traces of gravel. Very dense.		3	SS	84										
			4	SS	100	510									
			5	SS	177	10"									
503.5															
501.5	Clayey silt with shale fragments.		6	SS	81										
21.5	End of Borehole					500									

DEPARTMENT OF HIGHWAYS - ONTARIO		RECORD OF BOREHOLE NO. 13 (67-F-35)		FOUNDATION SECTION	
MATERIALS & TESTING DIVISION					
JOB	67-F-15	LOCATION	867,690 N; 977,214 E.	ORIGINATED BY	AKB
W.P.	396-65	BORING DATE	April 26, 27, 1967	COMPILED BY	AKB
DATUM	Geodetic	BOREHOLE TYPE	Cont. Flight Auger	CHECKED BY	<i>SP</i>

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 14

FOUNDATION SECTION

JOB 67-F-15

LOCATION Co-ord. 869,262 N; 975,695 E.

ORIGINATED BY KAL

W. P. 400-65

BORING DATE July 20, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT ——— WL PLASTIC LIMIT ——— WP WATER CONTENT ——— W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				WATER CONTENT %				
											wp w WL 10 20 30				
534.7	Ground Level														
0.0	Clayey silt with some sand and traces of gravel.					530									
	Very stiff to hard.		1	SS	27										
			2	SS	21										
			3	SS	87										
			4	SS	30		520								
			5	SS	75										
510.7			6	SS	100/6"										
24.0	Grey clay silt with shale fragments.		7	SS	50		510								
503.2	Hard.														
31.5	End of Borehole		8	SS	80										

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 15 (67-F-35)

FOUNDATION SECTION

JOB 67-F-15

LOCATION 867,352 N: 976,435 E.

ORIGINATED BY AP

W. P. 397-65

BORING DATE April 26, 1967

COMPILED BY AKB

DATUM Geodetic

BOREHOLE TYPE Washboring EX Casing

CHECKED BY AK

[illegible]

FOUNDATION SECTION

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT ——— w _L PLASTIC LIMIT ——— w _p WATER CONTENT ——— w			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.	w _p	w	w _L		
521.7	Ground Level											
0.0	Clayey silt, traces of sand & gravel. Stiff to hard. Brown.		1	SS	10	520						
			2	SS	hh							
			3	SS	49							
508.7			4	SS	85	510						
13.0	Clayey silt with shale fragments.		5	SS	109							
	Grey Hard											
500.2			6	SS	91							
21.5	End of Borehole					500						

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-15

LOCATION 867,209 N; 976,165 E.

W. P. 397-65

BORING DATE April 27, 1967

DATUM Geodetic

BOREHOLE TYPE Washboring BX Casing

FOUNDATION SECTION

ORIGINATED BY AP

COMPILED BY AKB

CHECKED BY

[illegible]

MATERIALS & TESTING DIVISION

FOUNDATION SECTION

LOCATION Co-ord. 868,952 N; 975,643 E.

ORIGINATED BY KAL

W. P. 400-65

BORING DATE July 19, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 18

FOUNDATION SECTION

JOB 67-F-15

LOCATION Co-ord. 871,290 N; 979,170 E.

ORIGINATED BY KAL

W. P. 133-66

BORING DATE July 4, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 19

FOUNDATION SECTION

JOB 67-F-15

LOCATION Co-ord. 871,244 N; 979,003 E.

ORIGINATED BY KAL

W. P. 133 -66

BORING DATE June 29, 30, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Drove NX Casing & Washout

CHECKED BY

[illegible]

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100 SHEAR STRENGTH P.S.F.	LIQUID LIMIT ——— WL PLASTIC LIMIT ——— WP WATER CONTENT ——— W WP ——— W ——— WL WATER CONTENT % 10 20 30	BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT					
492.5	Ground Level									
0.0	Clayey silt with sand					490				491.1 Dec. 20/66
	Stiff to very stiff		1	SS	24					
482.5										
10.0			2	SS	36	480				
	Clayey silt with sand.		3	SS	80					
	(Glacial Till)		4	SS	100/6"	470				
	Hard		5	SS	100/5"					Gr. 7, Sa. 36 Si. 43, Cl. 14
			6	SS	100/5"					
30.9	Silty sand, trace of clay & gravel.				460					
	Very dense - damp		7	SS	100/5"					Gr. 8, Sa. 46 Si. 36, Cl. 10
35.4	End of Borehole									
						450				

MATERIALS & TESTING DIVISION

FOUNDATION SECTION

JOB 67-F-15

LOCATION Co-ord 868,332 N; 978,164 E

ORIGINATED BY BRG

W. P. 394-65

BORING DATE July 5, 6, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-F-15

LOCATION Co-ord. 868,505 N; 978,377 E.

ORIGINATED BY Kal

W.P. 265-66

BORING DATE July 12, 14, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT ——— WL PLASTIC LIMIT ——— WP WATER CONTENT ——— W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				Wp ——— W ——— WL 10 ——— 20 ——— 30 WATER CONTENT %				
498.6	Ground Level														
0.0	Clayey silt with sand traces of gravel. Seams of sand.					490									
	Hard		1	SS	49										
			2	SS	130										
			3	SS	123										
			4	SS	130		76"								
482.1			5	SS	100	73"	480								
16.5	Weathered shale														
	Bedrock		6	RC1	65%										
474.0				BXL	Rec										
24.6	End of Borehole														

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 26

FOUNDATION SECTION

JOB 67-F-15

LOCATION Co-ord 868,295 N; 978,004 E.

ORIGINATED BY KAL

W. P. 394-65

BORING DATE July 12, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 27

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 67-F-15

LOCATION Co-ord. 868,309 N; 977,917 E.

ORIGINATED BY KAL

W. P. 394-65

BORING DATE July 10, 11, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

[illegible]

MATERIALS & TESTING DIVISION

FOUNDATION SECTION

JOE 67-F-15

LOCATION Co-ord. 868,158 N; 977,542 E.

ORIGINATED BY KAL

W.P. 394-65

BORING DATE July 12, 19, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-F-15

LOCATION Co-ord 868,113 N; 977,951 E

W. P. 395-65

BORING DATE July 6, 1967

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

FOUNDATION SECTION

BRC

ORIGINATED BY

COMPILED BY BRG

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 32

FOUNDATION SECTION

JOB 67-F-15

LOCATION 868,090 N; 977,685 E.

ORIGINATED BY KAL

W.P. 395-65


BORING DATE July 10, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT				WATER CONTENT %					
							SHEAR STRENGTH P.S.F.				wp — w — WL					
517.2	Ground Level															
0.0	Sandy silt to silty sand.					510								Gr. 37, Sa. 52 Si. & Cl. 11		
511.0	Very dense.		1	SS	94											
6.2	Sand with gravel becoming gravel with some sand.		2	SS	100/6"											
	Very dense	3	SS	100/6"												
497.7						500										
19.5	Clayey silt with shale fragments	4	SS	100/4"												
		5	SS	100/4 1/2"												
491.1			6	SS	120/2"											
26.1	End of Borehole															

Gr. 37, Sa. 52
Si. & Cl. 11

FOUNDATION SECTION

JOB _____ 67-F-15

LOCATION 868,065 N; 977,436 E.

ORIGINATED BY KAL

W. P. _____ 395-65

BORING DATE July 5, 7, 10, 1967

COMPILED BY BRC

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

[illegible]

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' :- 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 :-

<u>CONSISTENCY</u>	<u>'N' BLOWS/FT.</u>	<u>c LB./ SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS 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
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
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
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 (YOUNG'S 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_0	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

WP-384-65
Re: B. #12 - B. #13
LINE OVER
BROWNVIEW
EXPRESSWAY

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

September 9, 1968

Your Memo -- Aug. 29/68

-- BRIDGE No. 13 --
Brown's Line over Richview Expressway
W.P. 384-65 -- W.J. 67-F-15
Highways #401 & #27 - District No. 6

We have reviewed your final bridge drawings for Bridge #13. We note that all footings are designed to be supported on 12 BP 53 steel H-piles, driven to el. 440 ft. In our Foundation Report #66-F-102 (page 8), it was suggested that footings within the creek valley be supported on piles driven to approx. el. 440 ft. It was, however, also pointed out, that at the location of the south abutment - situated on the slope of the high ground - additional information would be necessary to determine the type of footings to be adopted. From borehole #13, drilled near the west corner of the south abutment - assuming piled foundations - it appears that at this location refusal of the H-piles will be reached around el. 460 feet. At the east corner of the south abutment refusal will probably be obtained at lower elevations. It is postulated, therefore, that between the corners of the south abutment, refusal will vary between el. 460 and 440 ft. For a more exact prediction of pile lengths, additional boreholes would be necessary. It should be borne in mind that if pile lengths are supplied as shown in the drawings, cut-offs of up to 20 feet in length may be expected at the south abutment.

KGS/mdeF

K. G. Selby
K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McCombie
W. S. Melinyshyn
Foundations Files
Gen. Files

OK

cc: Gen. Files

W.P. 397-65

Re Bridge #27

Revised Final

Dr. Drawing

Ramp 1-Mount

401 & Hwy 405

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Office,
Admin. Bldg.

Foundation Section,
Materials & Testing Office,
Room 107, Lab. Bldg.

December 19, 1968

-- BRIDGE #27 --

Ramp W.-N. over Hwy. 401 & Hwy. 27 S.B.
W.P. 397-65, Site 37-821, W.J. 67-P-15
Hwys. 401 & 27, District #6 (Toronto)

We have reviewed the final bridge drawings for the above mentioned structure and note that the designer has followed recommendations contained in our report and subsequent memos. Whilst the use of H-piles to support some of the piers is entirely satisfactory from an engineering viewpoint, it is our opinion that some saving could be effected by using the recommended alternative concrete caissons.

KGS/mdeF

L. G. Selby
K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Sternas,
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McCombie
W. S. Melnyshyn

Foundations Files
Gen. Files ✓

cel

cc: Gen. File
DEPARTMENT OF HIGHWAYS ONTARIO
MEMORANDUM

W-137-65
Re. Hwy 27, N.B. over
Richview Expressway
Bridge #17

To: Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

FROM: Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

ATTENTION:

DATE: November 14, 1968

OUR FILE REF:

IN REPLY TO

SUBJECT:

-- BRIDGE #17 --
Highway 27, N.B. over Richview Expressway
W.P. 388-65 - Site 37-813 - W.J. 67-P-15
Hwy. 401/27 Interchange, Dist. 6 (Toronto)

We have reviewed the final bridge drawings
D-6233-1, 2, 3 and 6 for the above mentioned structure.
We suggest that you make the following revisions with
respect to pile lengths supplied:

DRAWING D-6233-6 -- RETAINING WALLS

PILE DATA		
Location	No.	Length
Panel 'A'	21	27'-0"
Panel 'B'	6	30'-0"
Panel 'C'	8	34'-0"
Panel 'E'	9	35'-0"
Panel 'F'	6	28'-0"
Design Load 50 Tons - Type 10 BP @ 42		

DRAWING D-6233-3 -- FOOTING DETAILS

PILE DATA		
Location	No.	Length
East Abutment	21	32'-0"
West Abutment	21	27'-0"
Design Load 70 Tons - Type 12 BP @ 53		

We have no other comments.

KGS/mdeF

cc: Messrs. S. McCombie
W. S. Melinyshyn
Foundations Files
Gen. Files

K. G. Selby
K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

Mr. K. G. Bassi,
Regional Bridge
Project Engineer

June 25, 1968

W.P. 396-65 -- Bridge #26
W.P. 397-65 -- Bridge #27
Hwy's. 401 & 27 Interchange
District No. 6 (Toronto)
-- W.J. 67-F-15 --

Following our review of Preliminary Plans D 6240-P1 and D 6241-P1 for the above mentioned structures, we are revising foundation recommendations given in our Report 67-F-15. Our revisions include various alternative methods which we believe will enable you to select the most economical type of foundation. The following recommendations apply, in general, to both structures.

Spread Footings on Sound Bedrock:

Where the future finished ground level is such that the remaining overburden is reasonably shallow, the structure may be supported on spread footings placed on the sound shale bedrock. A design pressure of 15 t.s.f. may be assumed in this case.

Spread Footings in Overburden:

In the very hard clayey silt stratum which overlies much of the bedrock, a spread footing type foundation may be constructed assuming a design pressure of 7.5 t.s.f. at a minimum depth of 6 feet below finished ground level. In some cases granular strata may have to be excavated to reach this layer, and dewatering schemes will be necessary to ensure that footings are poured on dry undisturbed ground which is an essential requirement of this recommendation.

Piled Foundations:

Where practicable, the structure may be supported on steel H-piles and bearing on the bedrock or within the hard clayey silt layers overlying bedrock. Previous experience has shown that

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

2.

Attn: Mr. K. G. Bassi,
Regional Bridge Project Engr.

June 25, 1968

Filed Foundations: (cont'd.) ...

driving H-piles through this type of overburden is extremely difficult and in consequence, the pile lengths are difficult to estimate accurately. Sufficient lengths to penetrate the hard zone ('N' > 100 blows/ft.), about 5 feet should be provided. The maximum allowable loads for the particular pile section adopted may be assumed for design purposes.

As an alternative to steel H-piles and possibly, also to spread footings, it is strongly recommended that a foundation incorporating cast-in-place concrete caissons be considered. We have been in touch with Western Caissons Limited, who have provided us with an estimate for the installation of various sizes of caissons. This estimate is self-explanatory, and a copy is attached for your information. It appears that a considerable saving might be effected using this type of foundation, particularly in view of the large pier loadings on the two structures (3,000 tons - Bridge 26, 2,000 tons - Bridge 27). Insofar as the design loads on the caissons are concerned, we believe that the loading tests, which we will be carrying out in the near future, will supply us with the necessary information. Furthermore, a detailed account of the installation procedures can be prepared and made available to contractors at the time of bidding. As soon as the loading tests are completed, we will provide you with detailed recommendations.

KGS/WdeP
Attach.

cc: Foundations Files
Gen. Files

K. G. Selby
K. G. Selby,
SUPERVISING FOUNDATION ENGINEER
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

W.P. 395-65.

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

February 7, 1968

Bridge plan
#5 of
Hwy 401
Richview
Expressway

Bridge #5 of Hwy's. #401, #27 & Richview Expressway
Interchange - W.P. 395-65, W.J. 67-F-15, District 6.

We have reviewed your preliminary bridge plan for
Bridge #25 of the above proposed interchange.

We note that the abutments are designed on spread
footings. According to your drawing, the base elevation
of the East abutment is around el. 510 ft.

In our Foundation Report #67-F-15, we recommend that
the spread footing of the East abutment of Bridge #25 be
placed at or below el. 506 ft.

We suggest that you lower the footing of the East
abutment to comply with the recommendations.

KGS/mdeP

cc: Messrs. S. McCombie
W. S. Melinyshyn

Foundations Files
Gen. Files ✓

K. G. Selby
K. G. Selby,
SUPERVISING FOUNDATION ENGINEER
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

ak

S.P. 394-65

Richview Expressway
Interchange
Sheet 6.

Mr. J. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

February 7, 1968

Bridges #24, #70, & #74 of the Hwy's. #401, #27 and
Richview Expressway Interchange - District #6 -
W.P. 394-65, W.P. 265-66 and W.P. 36-67, W.J. 67-P-15.

We have reviewed your preliminary design of Bridges
#24, #70 and #74 of the proposed Hwy's. #401, #27 and Richview
Expressway Interchange.

We notice that the abutments of the above bridges are
designed on spread footings; however, the elevations of these
footings are not marked.

In our Foundation Report #67-P-15, it is recommended
that spread footings for the abutments should be five ft. below
existing ground level or lower, ensuring a minimum cover of four
ft. for frost prevention.

We suggest that you review the elevations of the abutment
footings to ensure that they comply with our recommendations.

KGS/kdeP

cc: Messrs. S. McCombie
W. S. Melnyshyn

Foundations Files
Gen. Files ✓

K. G. Selby
K. G. Selby,
SUPERVISING FOUNDATION ENGINEER
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

AR

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

August 15, 1967

Bridge #17,
Hwy. #27, N.B. over Richview Exp'y.,
W.P. 388-65, Site #37-813, W.J. 67-P-15,
District #6 (Toronto).

We have reviewed Preliminary Bridge Plan No. D-6233-P for the above structure: our comments are as follows:

(1) Spread footings, assuming a design pressure of 4 t.s.f., should be founded at or below El. 484.0 and should have a minimum cover of 4.0 ft. for frost protection.

(2) South Abutment -- 12 BP 53 steel H-piles should achieve a design capacity of 70 Tons/pile if driven to approximate El. 455.0 - 480.0.

North Abutment -- 12 BP 53 steel H-piles should achieve a design capacity of 70 Tons/pile if driven to approximate El. 465.0 - 470.0.

We were unable to check the above requirements, since your plan showed no elevations.

KGS/KdeP

cc: Messrs. S. McCombie
W. S. Melinyshyn

Foundations Files
Gen. Files

K. G. Selby
K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

cc: C. Files

W.P. 384-65

*Re: Bridge Drawing
(New Solina)*

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

June 22, 1967

Bridge #13 -- W.P. 384-65 -- Site #37-811,
Hwy's #401 & #27 -- District #6 (Toronto)

We have reviewed the revised Preliminary Bridge
Plan Drawing D-6231-P for the above structure.

We have no further comments.

KGS/MdeF

K. G. Selby
K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McCombie
W. S. Melnyshyn

Foundations Files
Gen. Files

MEMORANDUM

To: Mr. A. Starnas,
Principal Foundation Engineer,
Room 107, Lab. Building.

From: Bridge Division,
Downsview, Ontario.

DATE: November 24th, 1966.

OUR FILE REF.

IN REPLY TO

SUBJECT:

W.P. 201-62-3, C.D.C.B. Pav.,
Hwy. 401, 27, Richview Expressway
Interchange,
District #6.

Contract #9.

This will confirm my request for foundation investigation at the structures within the above grading project Contract #9 (Green).

There are approximately nine (9) structures involved in this project with a foundation date of 1st. August 1967. As 100' scale plans, marked to show the extent of the structures can be expected next week: it might be advisable to consider giving a final report on the date required; rather than the preliminary/confirmatory type discussed recently.

JCMcA/cew
cc A. Crowley

J. C. McAllister
J. C. McAllister,
for W. S. Melinyshyn,
Regional Bridge Location Engineer.

HIGHWAY 27 IMPROVEMENT

67-F-15

Contract 9 (Green)

W.P. 201-62-3	GDGB & Pav.		Highway's 27, 401 & Richview Expressway Interchange.
W.P. 383-65	Struct.	1	Br. #12 Ramp from old Highway 27 S. Ed. to Richview Expressway E. Bd. over Richview Expressway & old Highway 27.
W.P. 386-65	Struct.	2	✓ Br. #15-Ramp from New Highway 27 N. Bd. to Highway 401 E. Bd. over Richview Expressway
W.P. 388-65	Struct.	3	✓ Br. #17 - New Highway 27 N. Bd. over Richview Expressway.
W.P. 394-65	Struct.	4	Br. #24 New Highway 27 N. Bd. over Highway 401.
W.P. 395-65	Struct.	5	Br. #25 - Richview Expressway W. Bd. over Highway 401.
W.P. 396-65	Struct.	6	Br. #26 - New Highway 27 S. Bd. over Highway 401 & Richview Sideroad.
W.P. 397-65	Struct.	7	Br. #27 - Ramp from Highway 401 E. Bd. to New Highway 27 N. Bd. over Highway 401 and New Highway 27.
W.P. 400-65	Struct.	8	Br. #30 - New Highway 27 over Renforth Drive
W.P. 265-66	Struct.	9	Br. #70 - Ramp from W. Bd. Richview Expressway to N. Bd. New Hwy. 27 over Hwy. 401.

Pre-Engineering Schedule

Struct. Geometrics	July 19 to August 30, 1967
Prelim. Prop. Request	October 18, 1967
FOUND Soils Report	AUG - 1, 1967 September 13, 1967
Final Prop. Request	January 17, 1968
Bridge Design (Consultants)	February 28, 1968
Bridge Office - Comp. D-4 and Plans	April 10, 1968

continued.....

Consultants - Comp.
D-4 and Plans

May 22, 1968

Regional R. D. O.

July 3, 1968

Head Office R. D. O.

August 14, 1968

Prop. Acquired

Jan. 1, 1969

Adv.

February 12, 1969

Award

April 2, 1969.

Program

Start Construction	April 21/69	Expend. 1969	3,000,000
Comp. Construction	December 1/71	Expend. 1970	5,000,000
		Expend. 1971	<u>3,771,000</u>
		Total	11,771,000

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Lab. Bldg.

FROM: Bridge Division,
Downsview, Ontario.

Atten.: Mr. A. Barsvary

DATE: May 12, 1967.

OUR FILE REF.

IN REPLY TO

SUBJECT: RE: W.P. 388-65,
Bridge #17

Attached for your information is a print
of the site plan received from the consultant
for the design of the above structure.

J. C. McAllister

J. C. McAllister,
for W. Melinyshyn,
Regional Bridge Location Engineer.

JCMcA/es
Encl.

c.c. A. Crowley

from mt

Mr. W. S. Melinyshyn
Regional Bridge Location
Engineer
Admin. Building

Foundation Section
Lab. Building
Room 107

May 16, 1967

Hwy. #401, 27 & Richview Expressway Interchange
W.P. 201-62-3 ----- District 6

In your memo dated November 24, 1966 you requested foundation investigation for some nine structures (green contract) at the site of Hwy. #401, 27 and Richview Expressway Interchange.

The deadline for the foundation reports was suggested by you as the 1st of August 1967.

Since even for a preliminary investigation of such a magnitude a minimum of two months period is necessary for completion of the report, we would urgently need the plan showing the locations of the proposed piers and abutments, and preferably the design finished grades.

If they are not available by the end of May 1967, we would suggest that the due date be postponed.

AGS:mt

A. G. Stermac
A. G. Stermac
Principal Foundation Engineer

cc: A.K. Barsvary ✓
Foundation Files
General Files

Department of Highways Ontario

67-F-15
CGVT. # 9

Copy for the information of

Mr. A. Stermac, Principal Foundation Engineer,
Room 107, Lab. Building

Mr. W. Melinayshyn,
Reg. Bridge Location Engineer,
Central Region,
Administration Building

Bridge Division,
Downsview, Ontario

June 16, 1967

Bridge #13
W.P. 384-65, Site No. 37-811
Highways 401 & 27, District 6

Attached herewith are prints of the revised Preliminary Bridge Plan Drawing D-6231-P for the above-mentioned structure.

The estimated cost of the proposed structure is \$530,000. This cost includes tender, materials, engineering and sundry construction.

Any comments or revisions you may have should be submitted within three weeks.

CSG:rd

Attach.

c.c. S. McCombie
A. Stermac
R. Forrest
E. Cross

C.S. Grebski,
Bridge Design Engineer

~~Letter~~

No new comments.

June 27th '67

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac, Principal Foundation Engineer,
Room 107, Lab. Building

Mr. W. Melnyshyn,
Reg. Bridge Location Engineer,
Central Region,
Administration Building

Bridge Division,
Downsview, Ontario

June 8, 1967

Bridge #13
Highways 401 & 27, District 6
W.P. 384-65, Site No. 37-811

Attached herewith are prints of the revised Preliminary
Bridge Plan Drawing D-6231-P for the above-mentioned structure.

The only revision was the addition of the number of lanes
on the roadways. We have noted the comments of Mr. Stermac in
his memo of June 7, 1967, and will revise the final plans
accordingly.

The estimated cost of the proposed structure is \$530,000.
This cost includes tender, materials, engineering and sundry
construction.

Any comments or revisions you may have should be submitted
within three weeks.

CSG:rd

C.S. Grebaki,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac
R. Forrest
E. Cross

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac, Principal Foundation Engineer,
Room 107, Lab. Building

Mr. W. Melirysyn,
Reg. Bridge Location Engineer,
Administration Building

Bridge Division,
Downsview, Ontario

June 1, 1967

Bridge No. 13
W.P. 384-65, Site 37-811
Highways 401 & 27, District 6

Attached herewith are prints of the Preliminary Bridge Plan
Drawing D-6231-F for the above-mentioned structure.

The estimated cost of the proposed structure will be sub-
mitted later.

The grade of the upper road can be lowered 2'-3" as no
traffic maintenance is required at this bridge.

Any comments or revisions you may have should be submitted
within three weeks.

CSG:rd

C.S. Grebaki,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac
E. Cross
R. Forrest

Letter sent on June 7th 1967
No comments about form error
to in drawing deckside profile.

H. L. Sully

#67-F-15

W.P. #201-62-3

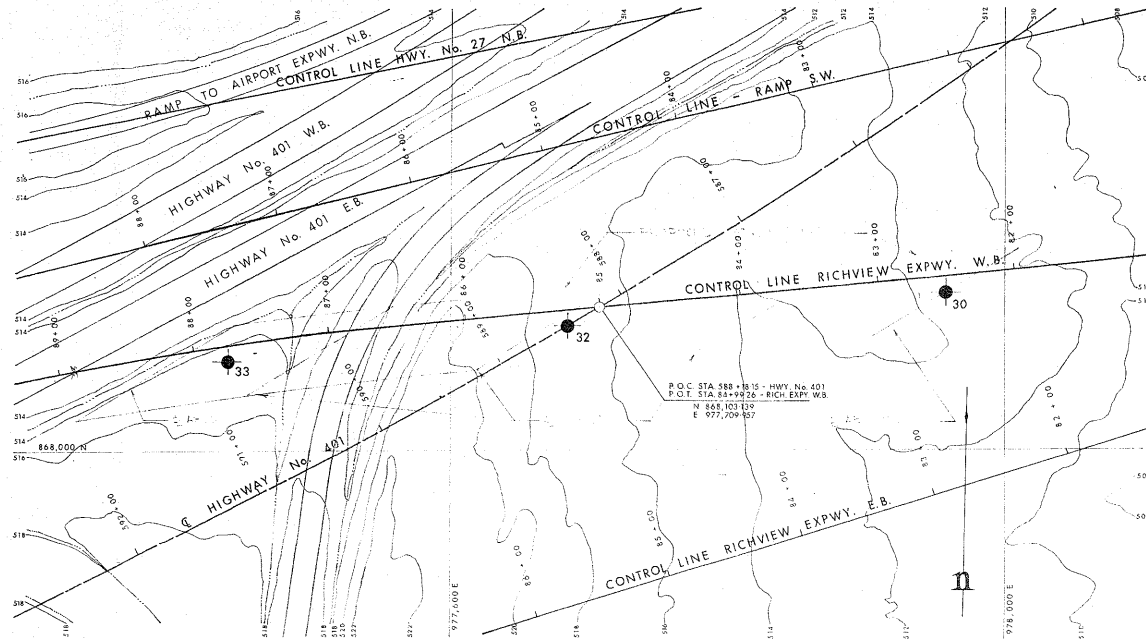
W.P. #266-65

Hwy. #401; #27

RICHVIEW

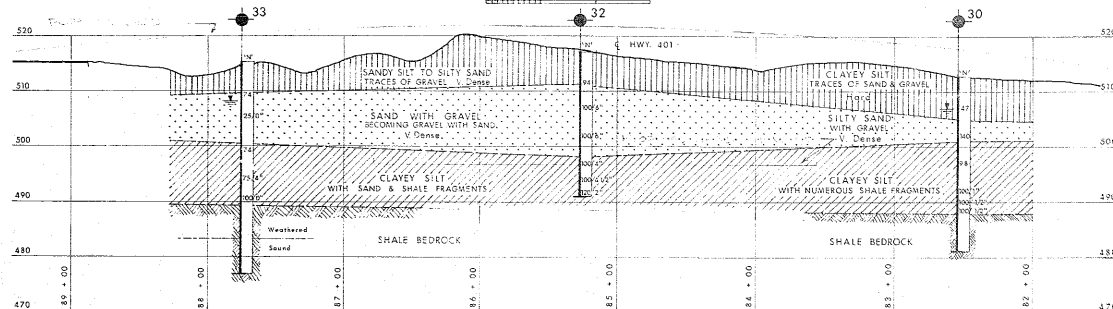
EXPRESSWAY

INTERCHANGE



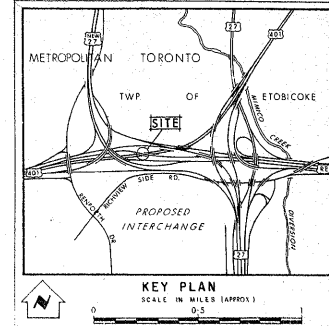
PLAN

SCALE 1" = 40 FT.



PROFILE RICHVIEW EXPWY. W.B.

HORIZ. SCALE 1" = 40 FT.
VERT. SCALE 1" = 10 FT.



LEGEND

- Bore Hole
- ⊕ Cone Penetration Hole
- ⊕ Bore & Cone Penetration Hole
- Water Levels established at time of field investigation, July 1967

NO.	ELEVATION	CO-ORDINATES NORTH	EAST
30	512.9	868,113	977,957
32	517.2	868,000	977,685
33	513.3	868,005	977,436

NOTE

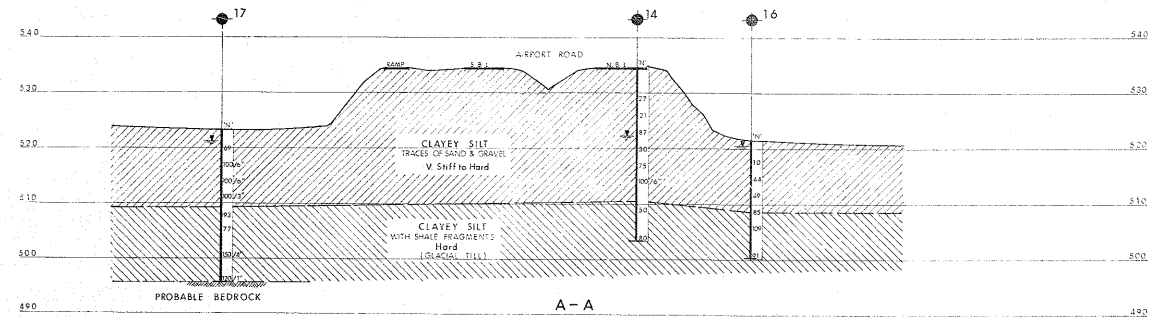
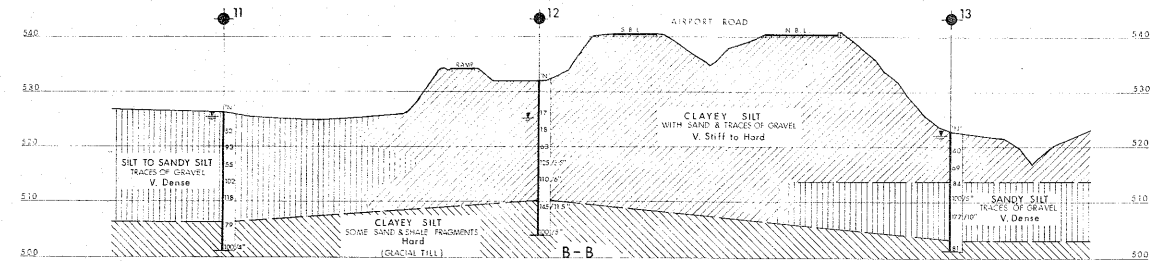
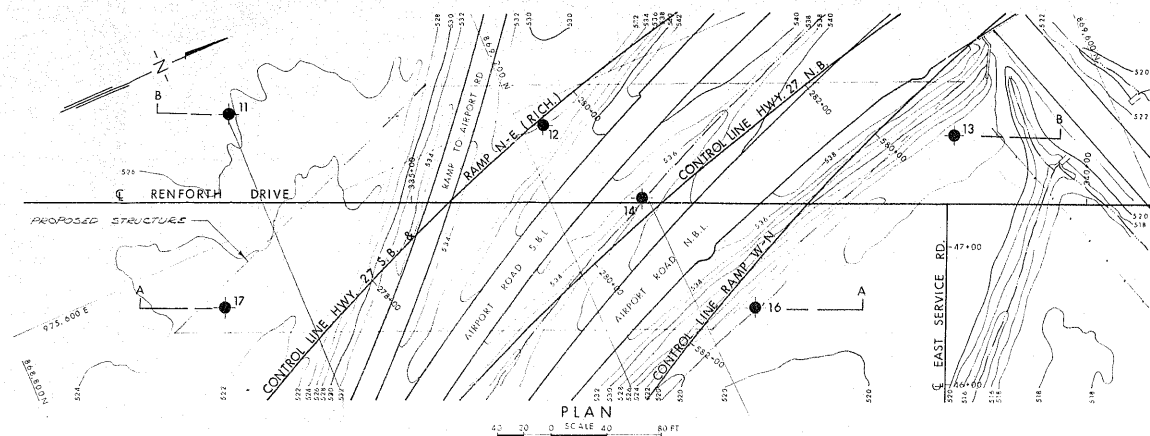
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

DATE	BY	DESCRIPTION

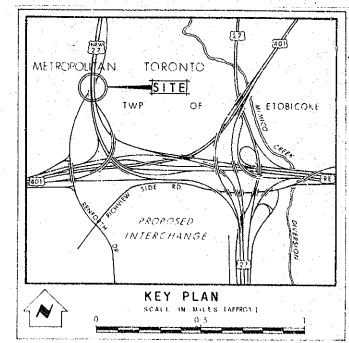
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION - FOUNDATION SECTION

BRIDGE No. 25
RICHVIEW EXPRESSWAY W.B. OVER HIGHWAY 401
KING'S HIGHWAY NO. 401 & 27 INTERCHANGE DIST. NO. 1
CO. YORK METRO TORONTO
TWP. ETOBICOKE LOT CON.

BORE HOLE LOCATIONS & SOIL STRATA			
SUBMD. A.B.	CHECKED 1/5	W.P. NO. 395-05	TEST DRAWING NO.
DRAWN P.G.O.	CHECKED 1/5	JOB NO. 67-F-15	67-F-15C
DATE AUGUST 10, 1967	SITE NO.	BRIDGE DRAWING NO.	
APPROVED 1/5	DATE		



VERT. 10 5 0 SCALE 10 20 40 80 FT.
HORIZ. 40 20 0



LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation, JULY 1967		
NO.	ELEVATION	CO. - RODS	FEET
11	525.3	8+9.213	975.515
12	527.0	8+9.218	975.617
13	527.0	8+9.246	975.743
14	524.7	8+9.247	975.695
16	527.7	8+9.305	975.803
17	523.2	8+9.352	975.643

NOTE
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION - FOUNDATION SECTION

BRIDGE No 30
CONTROL LINE HWY 27 N.B. & S.B. RAMP N.E. (RICH) & RAMP W.N. OVER RENFORTH DRIVE

KING'S HIGHWAY NO. 401 & 27 INTERCHANGE DIST. NO. 6
CO. YORK METROPOLITAN TORONTO
TWP. ETOBICOKE LOT CON.

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD. A B CHECKED 15 SEP NO. 400-65 DIST. DRAWING NO. 67-F-15 G
DRAWN S.O. CHECKED 208 NO. 67-F-15
DATE 5 SEPT 1967 SITE NO. BRIDGE DRAWING NO.
APPROVED [Signature] [Signature] [Signature]

