

61-4-235C

23-62-261

OFFICE LOCATION—

DOWNSVIEW AVE.,
KEELE ST. — HIGHWAY 401
TORONTO, ONTARIO.



ONTARIO

DEPARTMENT OF HIGHWAYS

POSTAL ADDRESS—

DEPARTMENT OF HIGHWAYS,
PARLIAMENT BUILDINGS,
TORONTO 5, ONTARIO.

Bridge Division,
January 30, 1961.

MEMORANDUM TO:

Mr. L. Soderman,
Principal Soils &
Foundations Engr.,
Department of Highways,
Room 107, Lab. Bldg.,
Downsview, Ontario.

RE: W.P. 951-59,
Elgin St. Overpass,
Ottawa Queensway Br. #23,
District #9.

Herewith one copy of the preliminary foundation
investigation report B.A. 1176 for the above structure.

JFW:go

Joseph F. Hewson
F. I. Hewson,
Consultant Liaison Engineer.

Department of Highways

COPY

For the Information of

Mr. A. Stermac,
Principal Foundations Engineer
D.H.O. Room 107, Lab. Bldg.,
DOWNSVIEW, Ont.

Mr. A. Gray,
Grades Supervisor,
Road Design Office

R. Fitzgibbon

June 5, 1962.

W.P. 951-59
Elgin St. Bridge #23
Hwy. O.Q. - District #9

Attached please find 1 print of Preliminary
Plan drawing D-5068-P-1 of the above mentioned struc-
ture for your use.

Two additional prints are being mailed to the
Principal Foundation Engineer for soils confirmation.

RF/bm



R. Fitzgibbon,
Bridge Engineering Expediter.

c.c. A. Stermac

May 2nd, 1962

OTTAWA QUEENSWAY

BRIDGE NO. 23 AT ELSIN STREET

W.P. NO. 951-59

PRELIMINARY DRAWING NO. D5068-P1

Location

The proposed structure is to carry the Ottawa Queensway over Elgin Street approximately 500 feet west of the Rideau Canal.

Soils Report and Foundations

A soil report (BA-1176A), prepared by H.W. Golder and Associates Ltd., indicates bedrock at approximately 130 feet below ground surface. The bedrock is overlain by about 60 feet of compact to dense grey silt, 30 feet of stiff silty clay, 35 feet of stiff gray clay and 0 to 6 feet of fill respectively.

BA 1176
McRostie

BA 1177A
Golder

The above report recommends that the structure be founded in the upper portions of the clay stratum. Settlements of 2 inches at the centreline of the structure and one inch at the outer edges of the structure have been predicted. Also, the installation of settlement gauges and piezometers is recommended for the purpose of ascertaining the actual rate of settlement of the embankments and structure during and following construction.

Structure Type

A reinforced concrete solid deck rigid frame is proposed for the overpass structure. This type structure has been selected for the site because of its appearance and general usefulness. The solid deck, for the span involved, is still relatively economical compared to a T-girder deck and in addition is more suitable for the odd geometrics.

A longitudinal expansion joint, wide enough to permit the transverse differential settlement to take place, will be provided at the centreline of the structure.

An additional 6 inches in vertical clearance will be provided to allow for settlement of the structure with respect to Elgin Street.

Estimated Cost

Estimated Construction Cost = \$220,000.

MCROSTIE & ASSOCIATES LTD.

CONSULTING ENGINEERS
OTTAWA 1

CANADA

G. C. MCROSTIE, B.A.Sc., O.L.S., P. ENG., M.E.I.C.
ASSOCIATES
A. SETO, B. ENG., P. ENG., M.E.I.C.
G. L. GENEST, B. ENG., M. ENG., P. ENG.
W. J. MACLEAN, B.A., D.L.S., O.L.S.

393 BELL STREET
TELEPHONE CE. 2-5334

PRELIMINARY STAGE OF THE REPORT ON THE FOUNDATION INVESTIGATION FOR THE PROPOSED STRUCTURE AT ELGIN STREET AND THE QUEENSWAY

1. REASON OF REFERENCE

We were requested by the Ottawa Office of Be leuw, Cather & Company of Canada to carry out a preliminary investigation of the subsurface conditions at the site of a proposed structure to carry the Queensway over Elgin Street. A preliminary stage report on foundation conditions at this site, based on a pilot hole study, was to include recommendations on the type of foundation most suitable.

2. RECOMMENDATIONS

2.1 Foundation Type

Results of a meeting on August 24th, 1960, attended by Mr. Davis, Mr. Boderman and Mr. Marshall, indicate that an opened end abutment at the west side of the proposed structure at this site with an opened elevated structure continuing across Elgin Street are favored at this time. On the basis of the aforementioned and the pilot hole it appears that a footing type of foundation would be adequate if the structure can be made to resist or allow about 0.1 foot differential movements at right angles to the Queensway centerline. An opened end type of structure would produce differential settlements between the approach fill and abutment of the order of 0.2 to 0.6 feet. These predictions, made on the basis of settlement computations involving the study at Metcalfe Street, are justified by the similarity of the subsurface at both locations as revealed by the pilot holes and laboratory test results. Footings for this structure could lie at approximately elevation 213 on

the stiff highly plastic brownish gray clay crust determined in the pilot hole. However, an additional borehole is required to confirm the clay crust on the east side of the proposed structure, mainly because of the extensive length of these footings.

2.2 Soil Strengths

The pilot borehole indicates that a bearing capacity of 3000 to 5000 pounds per square foot may be assumed, for preliminary design purposes, for the clay soils at about elevation 213. It should be emphasized that this bearing capacity value may vary over the extensive length of the footings and because of the limitations of one borehole in this vicinity.

2.3 Soil Compressibilities

Laboratory consolidation tests on samples 1-4 and 1-6 of the compressible clay stratum indicate a probable preconsolidation pressure of 5.5 and 4.4 kips per square foot respectively. On the basis of settlement computations made in the preliminary study of the neighbouring Metcalfe Street structure and considering the pilot holes results from both areas, total settlements of the order of some tenths of a foot may be expected in the embankment on the west side of the structure. On the east side, where an opened elevated structure is contemplated differential settlements of the order of a few tenths of a foot might be estimated for preliminary design purposes on the basis of the afore-mentioned comparison. Detailed strength and consolidation data will necessarily be required by additional boring and testing to confirm and determine these predictions more accurately. The effects of these additional loads on neighbouring existing structure should be studied in the next stage of this investigation.

3. SITE INVESTIGATION

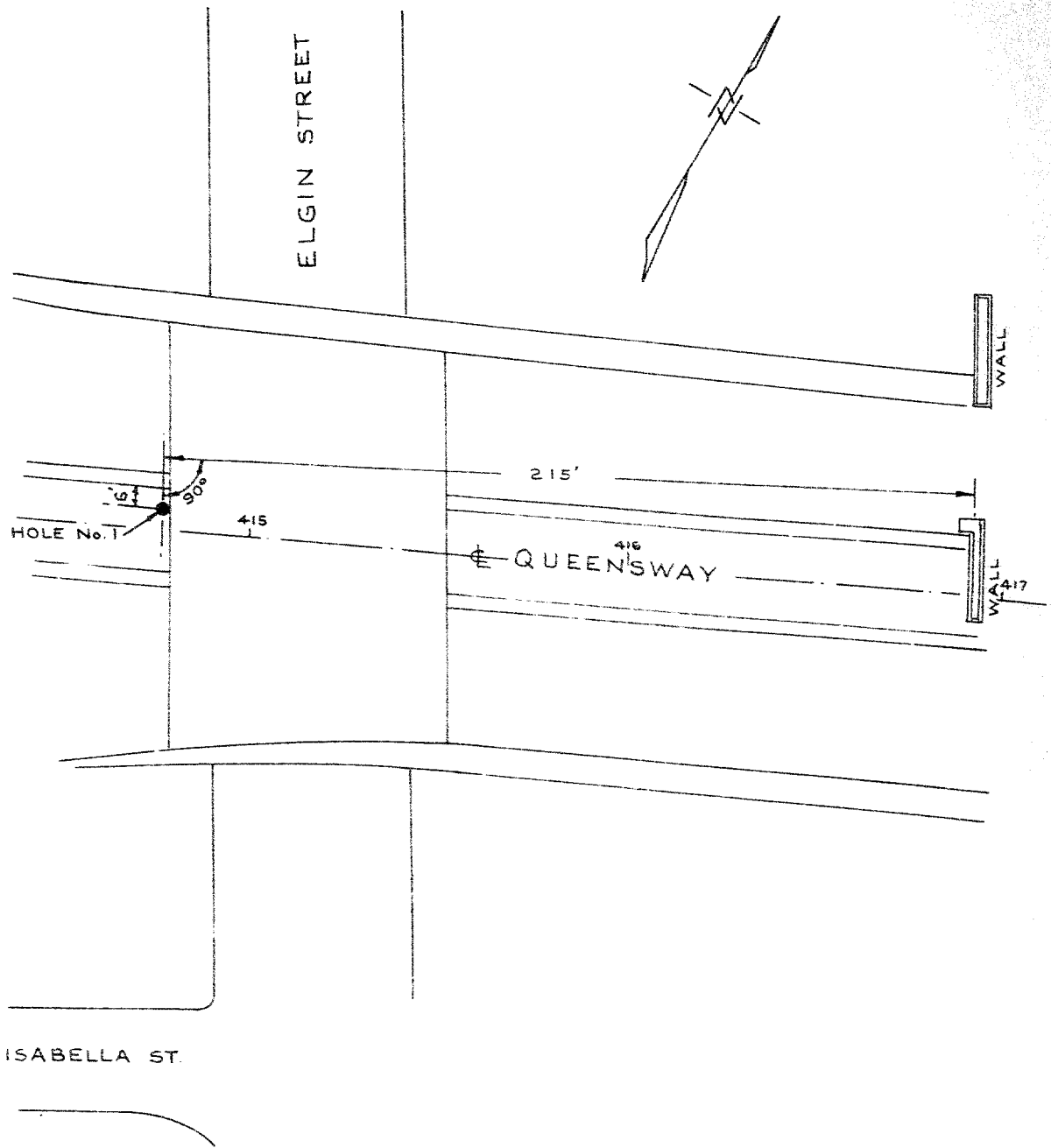
A pilot hole was made at the site with our test drilling rig in the location shown on Plate No. 1. Ten thin wall tube soil samples were recovered from cohesive soils at 5 foot intervals down to 50 feet below ground surface and at 10 foot intervals below 50 feet down to granular soils. Ten split barrel samples were taken in conjunction with standard penetration resistance tests at about 10 foot intervals in granular soils. All samples were brought to our laboratory for examination and classification. During the boring the groundwater level was observed and recorded.

Rock encountered at 141.6 feet below ground surface was diamond drilled and cores recovered for inspection and logging. The percentage of core recovery was determined to assist the evaluation of the structural properties of the rock. A careful watch was maintained during the drilling, for drops of drill rods and loss of drill water, to detect the presence of seams in the rock formation.

Two laboratory consolidation tests were made on samples 1-4 and 1-6 retrieved at depths of 20 feet and 30 feet respectively below ground surface. Classification tests were made on most samples and a number of unconfined compression tests along with small scale penetrometer tests were carried out to provide preliminary strength values of soils encountered. However, triaxial and field vane tests should be made to improve these strength results.

The subsurface profile as revealed by the pilot hole is shown on the accompanying Plate No. 2. The subsoil can be generalized as consisting of about 2 feet of fill underlain by about 8 feet of medium dense silty sand overlying approximately 52 feet of clay, and silt and clay mixture varying in consistency from stiff to medium soft with depth. Underlying this compressible layer is a silt and sand stratum about 74 feet thick increasing in density with depth, from loose to dense, overlying shale rock containing a few calcite partings.

The groundwater level was observed at 14 feet below ground surface from an overnight groundwater level reading. It could rise possibly to the underside of the sand layer in wetter seasons.



McROSTIE & ASSOCIATES LTD.
CONSULTING ENGINEERS
BOREHOLE LOCATIONS
ELGIN & QUEENSWAY

SCALE 1" = 40'

PLATE 1

McROSTIE & ASSOCIATES

CONSULTING ENGINEERS

OTTAWA CANADA

SOIL PROFILE AND SUMMARY

OF FIELD AND LABORATORY TESTS

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 100.00

DATE MAY 17, 1961

HOLE NO. 1

REMARKS

1. Soil profile from 0 to 100.00 ft. depth. The soil is a silty clay with some sand and gravel. The soil is generally loose to medium dense. The soil is generally light to medium brown in color. The soil is generally moist to dry. The soil is generally slightly to moderately compressible. The soil is generally slightly to moderately permeable. The soil is generally slightly to moderately erodible. The soil is generally slightly to moderately expansive. The soil is generally slightly to moderately shrinkable. The soil is generally slightly to moderately swellable. The soil is generally slightly to moderately collapsible. The soil is generally slightly to moderately consolidable. The soil is generally slightly to moderately overconsolidated. The soil is generally slightly to moderately underconsolidated. The soil is generally slightly to moderately normally consolidated. The soil is generally slightly to moderately preconsolidated. The soil is generally slightly to moderately overconsolidated. The soil is generally slightly to moderately underconsolidated. The soil is generally slightly to moderately normally consolidated. The soil is generally slightly to moderately preconsolidated.

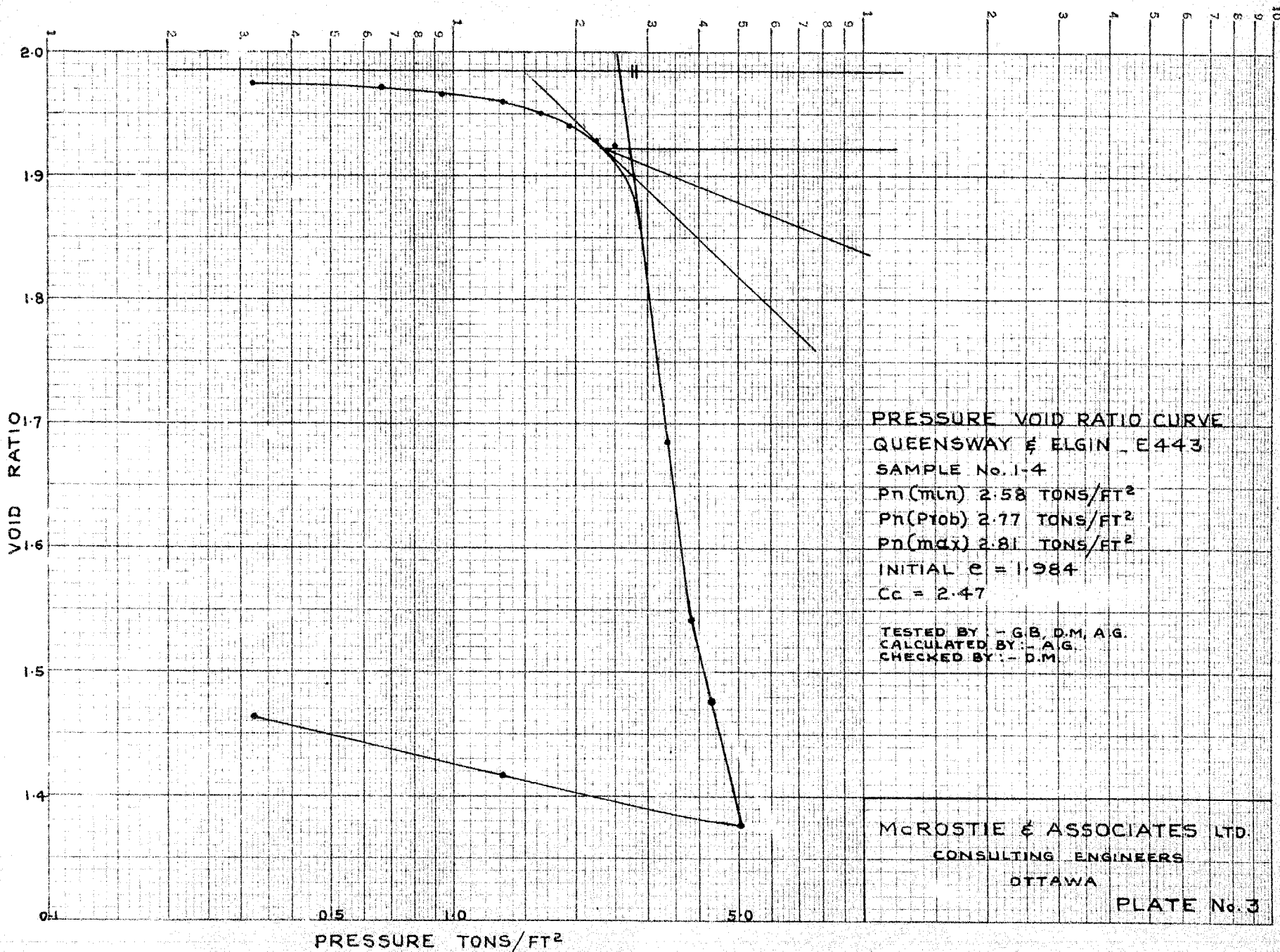
STANDARD PENETRATION TEST NUMBER	ELEVATION FEET	DESCRIPTION OF SOIL	ELEVATION FEET	PROBING OR VANE TEST	
				INCH HAMMER INCH DROP BLOWS PER FOOT OR IN KIPS PER SQ. FT.	NO. CASING INCH DIA. ROD SHEAR STRENGTH IN KIPS PER SQ. FT.
1.0	100.00	GRAVELLY SILTY SAND	99.50	10	0
2.0	99.50	SANDY SILTY SAND	99.00	15	0
3.0	99.00	SANDY SILTY SAND	98.50	20	0
4.0	98.50	SANDY SILTY SAND	98.00	25	0
5.0	98.00	SANDY SILTY SAND	97.50	30	0
6.0	97.50	SANDY SILTY SAND	97.00	35	0
7.0	97.00	SANDY SILTY SAND	96.50	40	0
8.0	96.50	SANDY SILTY SAND	96.00	45	0
9.0	96.00	SANDY SILTY SAND	95.50	50	0
10.0	95.50	SANDY SILTY SAND	95.00	55	0
11.0	95.00	SANDY SILTY SAND	94.50	60	0
12.0	94.50	SANDY SILTY SAND	94.00	65	0
13.0	94.00	SANDY SILTY SAND	93.50	70	0
14.0	93.50	SANDY SILTY SAND	93.00	75	0
15.0	93.00	SANDY SILTY SAND	92.50	80	0
16.0	92.50	SANDY SILTY SAND	92.00	85	0
17.0	92.00	SANDY SILTY SAND	91.50	90	0
18.0	91.50	SANDY SILTY SAND	91.00	95	0
19.0	91.00	SANDY SILTY SAND	90.50	100	0
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67.0	67.00	SANDY SILTY SAND	66.50	340	0
68.0	66.50	SANDY SILTY SAND	66.00	345	0
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92.0	54.50	SANDY SILTY SAND	54.00	465	0
93.0	54.00	SANDY SILTY SAND	53.50	470	0
94.0	53.50	SANDY SILTY SAND	53.00	475	0
95.0	53.00	SANDY SILTY SAND	52.50	480	0
96.0	52.50	SANDY SILTY SAND	52.00	485	0
97.0	52.00	SANDY SILTY SAND	51.50	490	0
98.0	51.50	SANDY SILTY SAND	51.00	495	0
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100.0	50.50	SANDY SILTY SAND	50.00	505	0

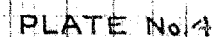
MEAN
CLAY
FIELD

WATER CONTENT
NATURAL 8
LIQUID LIMIT 8
PLASTIC LIMIT 4

PLATE

2





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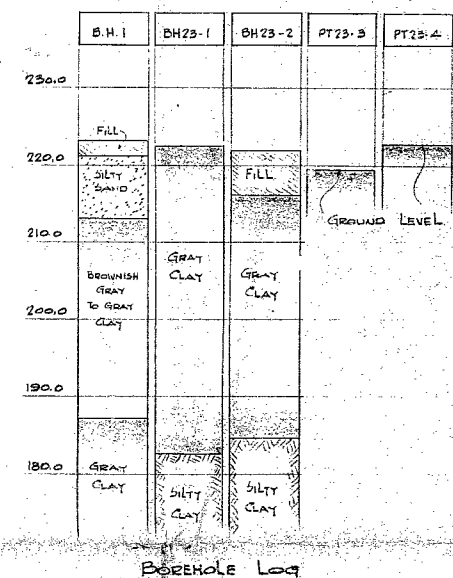
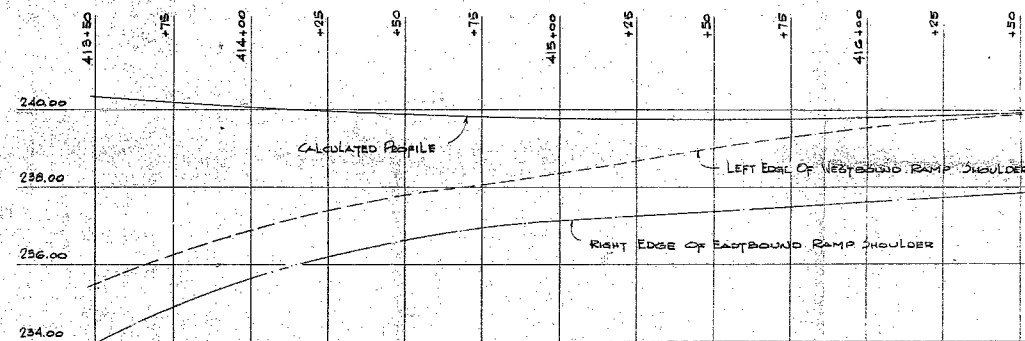
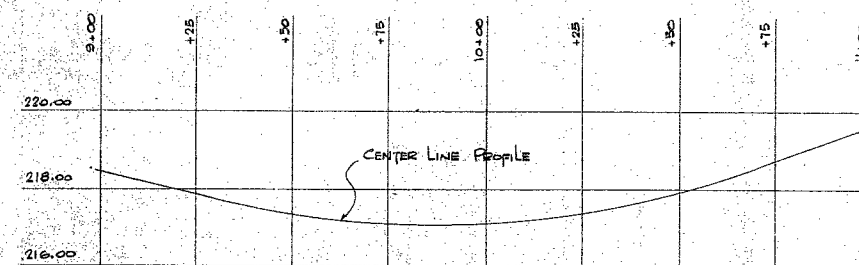
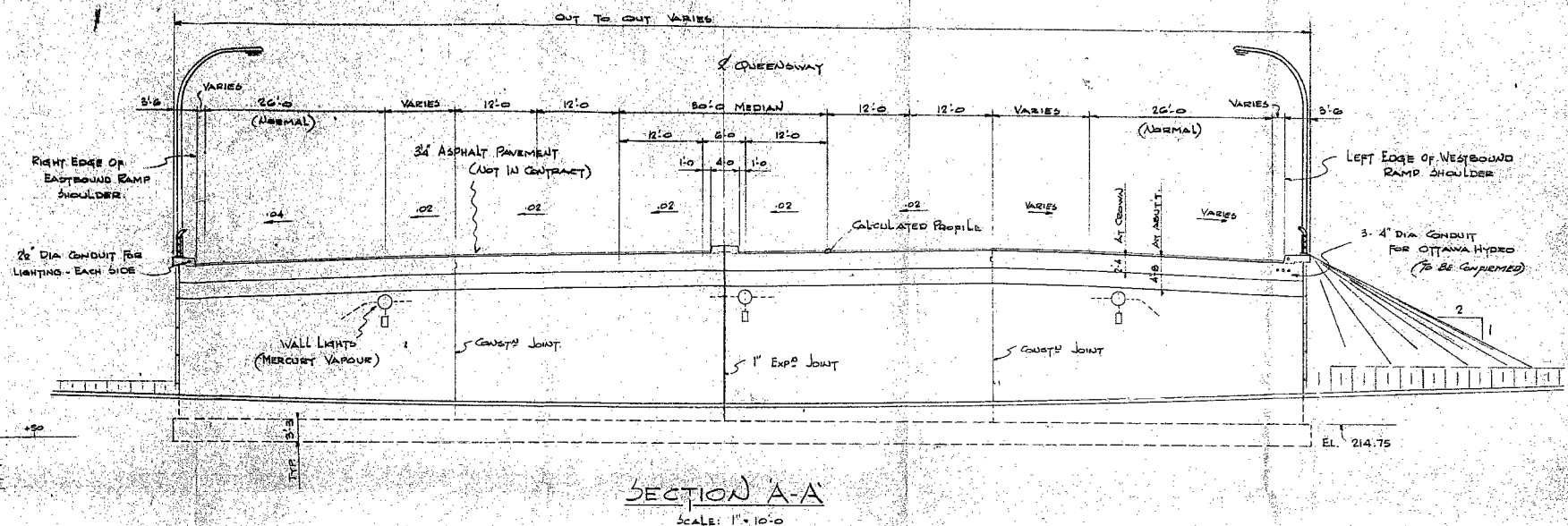
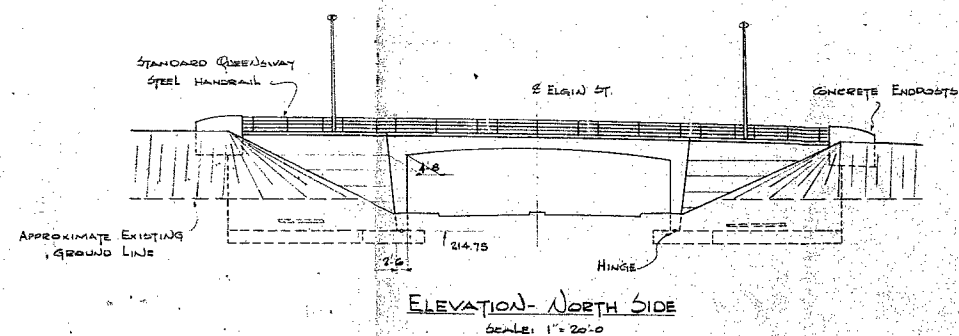
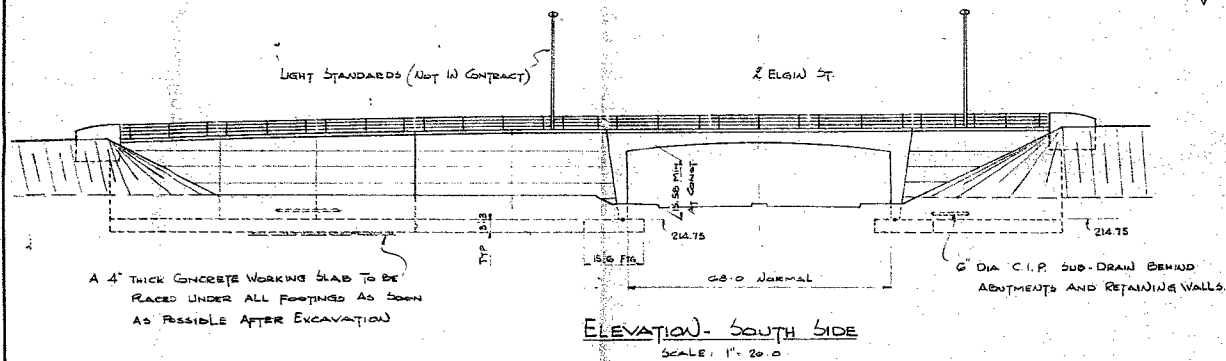
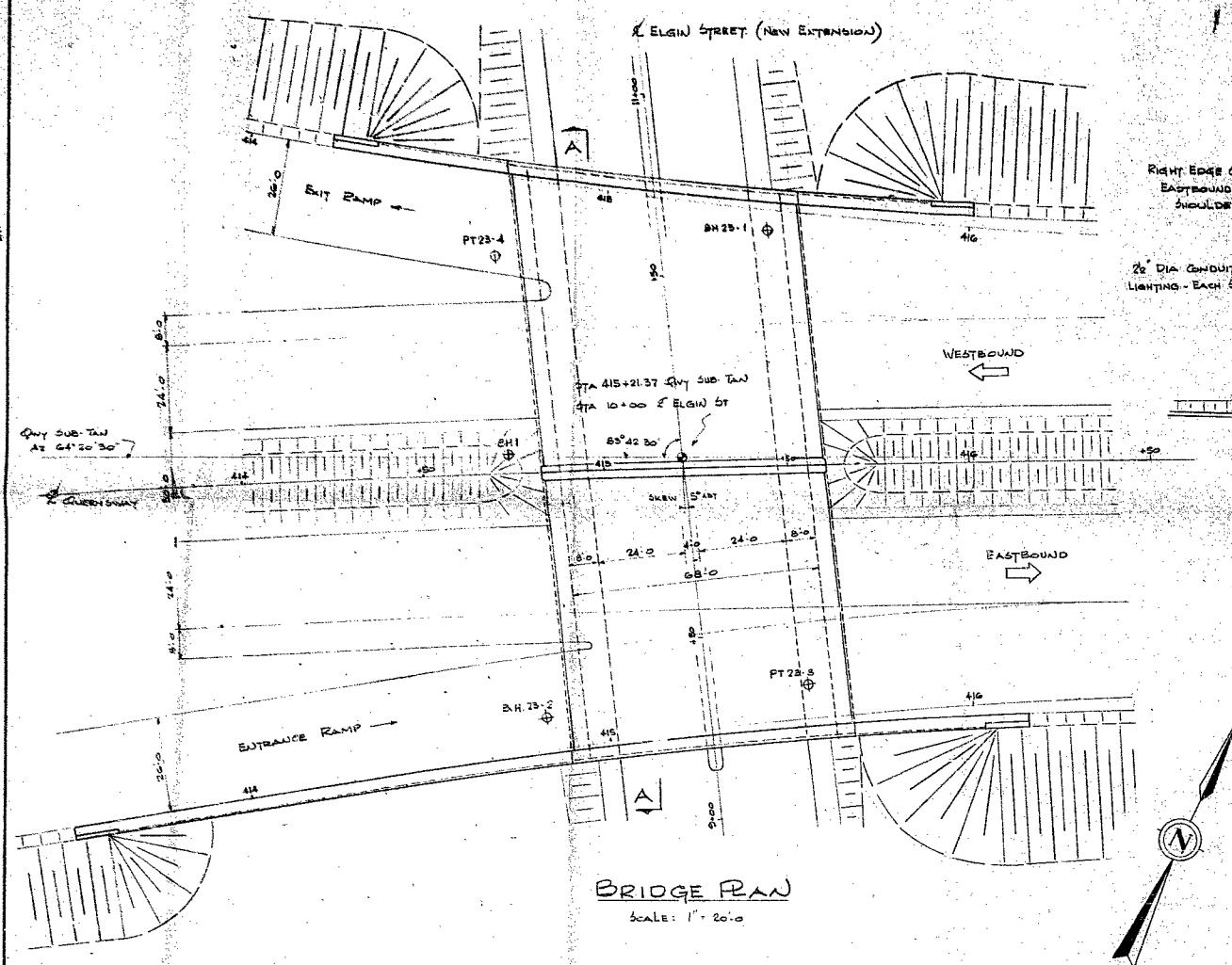
W.P. #951-59

QUEENSWAY

OTTAWA

ELGIN ST.

OVERPASS



NOTES:

DESIGN SPECIFICATIONS: A.A. S.H.O. SPECIFICATIONS FOR HIGHWAY BRIDGES. 1957

LIVE LOAD: H2O-51G-44

CONCRETE STRENGTH: 3000 P.S.I. THROUGHOUT.

REFER TO BA1176 FOR PRELIMINARY & BA1176A FOR FINAL SOIL REPORTS.

FOUNDATIONS: SPREAD FOOTINGS ON CLAY. (NET ALLOW BRG CAPACITY 3000 P.S.F.)

SUPERSTRUCTURE: R. C. RIGID FRAME

CONSTRUCTION OF THIS BRIDGE IS INCLUDED IN THE O'CONNOR ST. TO
RIDEAU CANAL GRADING CONTRACT.

PIEZOMETERS AND SETTLEMENT GAUGE TO BE INSTALLED NEAR WEST
ABUTMENT BEFORE BACKFILLING COMMENCES.

DISTRICT № 9
W. P. № 951-59

No	Revisions	By	Date
DEPARTMENT OF HIGHWAYS OF ONTARIO			
OTTAWA QUEENSWAY LIMITED-ACCESS HIGHWAY OTTAWA CANADA			
BRIDGE NO 23 AT ELGIN ST. PRELIMINARY PLAN			
DE LEEUW CATHIER & CO. OF CANADA, LIMITED Consulting Engineers <i>Leon Marshall</i>		DEPT. OF HIGHWAYS OF ONTARIO ----- Director of Planning & Design	
Designed by: G.S.S. Drawn by: R.T.	Date: MAY 2, 62 Scale: AS SHOWN	DWG. No. D506-PI Sheet 1 of 1	
Checked by:			