

Mr. A. M. Teye,
Bridge Engineer.
Materials & Research Section.

December 30, 1960.

Attention: Mr. F. I. Hewson.

Re: Humber River Bridge at Bolton,
Highway No. 50, District No. 6,
W.P. 35-60.

File Loading Tests:

Static load tests on two Class 'A' untreated timber piles driven in the area of the North abutment of the above proposed structure have been completed. The load-settlement and time-settlement curves obtained from the tests are attached to this memo. Our comments pertaining to the proposed pile design are as follows:-

(1) The maximum safe permissible load per pile is considered to be 35 tons. Piles loaded to this capacity should be of the size and type tested and should be driven to a tip elevation 660.0', or below.

(2) The settlement of the pile group proposed should not exceed 1 1/2 inches with the individual piles carrying the maximum permissible load of 35 tons.

(3) The test piles were driven by means of a hammer with a rated energy of 12 ft. kips per blow. The resistance to driving recorded for the last foot of penetration of the test piles was 4 blows/inch. A required minimum driving resistance of 4 blows/inch should be specified in the piling contract in addition to the maximum tip elevation noted in Item (1) above.

cont'd. /2 ...

Dewatering Problem:

In conjunction with the analyses of test pile results, the Foundation Section have carried out further analyses of the soil type at and below the proposed footing founding elevation. This has led us to conclude that the recommendation contained in the Soils report prepared by Bacey, MacCallum and Associates, pertaining to the effectiveness of dewatering excavations by well points, is not based upon fact and, in reality, is not a practicable engineering solution. The particle size distribution of the soil is such that the dewatering could only be carried out using electro-osmosis, or stabilized by freezing.

This finding has resulted in a detailed review of the proposed footing design and the following problems appear to us to make this design impracticable:-

(1) The elevation of the underside of the proposed pile cap is in the order of 6 to 8 feet below the proposed bed of the River Diversion and some 12 to 13 feet below normal river level - (which can be assumed to be ground water level). Due to the fine-grained soil type, a stable footing excavation in the dry to the depth required, cannot be guaranteed. Theoretically, "piping", or a "quicking" condition can be predicted. The conditions contributing to piping will be further augmented by the driving of displacement type piles into the soil below the footing elevation.

(2) The following alternative construction procedures have been considered: (a) making the footing excavation without pumping the water out as excavation proceeds and then driving the piles through the flooded excavation to cut-off elevation; or (b) driving the piles from ground elevation to cut-off elevation by means of a follower, and then making the excavation in the wet. In both methods, tremie concrete would be necessary and even then, a stable excavation bottom cannot be guaranteed. No simple remedial or corrective measure can be adopted should this condition occur.

In view of the foregoing comments, it is our opinion that the footing design should be revised. The obvious alternative appears to be to drive interlocking steel sheet piling around the footing perimeter and then to remove the material from within the enclosure to footing elevation. Footings bearing directly upon the silty subsoil, can be designed using an allowable contact pressure of 3 tons/sq.ft. if the above procedure is followed. Sheet piling should penetrate to a depth of 8 to 10 feet below the footing founding elevation. The sheet piling should be left in place.

If, during excavation, quicking should develop, the enclosure can be flooded and excavation carried out under water. A tremie seal would then be required prior to dewatering.

The foregoing comments have been discussed with Mr. T. Gregg of Messrs. Morrison, Hershfield, Millman & Huggins, and include suggestions put forward by him. A preliminary comparison of cost of timber piles vs. steel sheet piling indicate that the sheet piling and simple spread footing design is slightly less expensive.

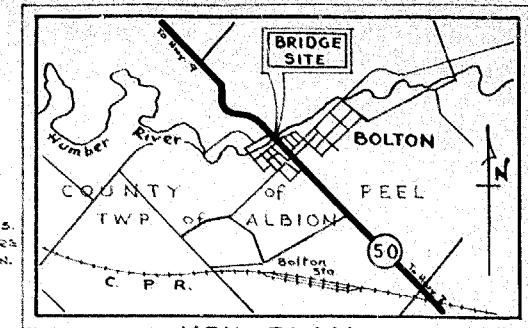
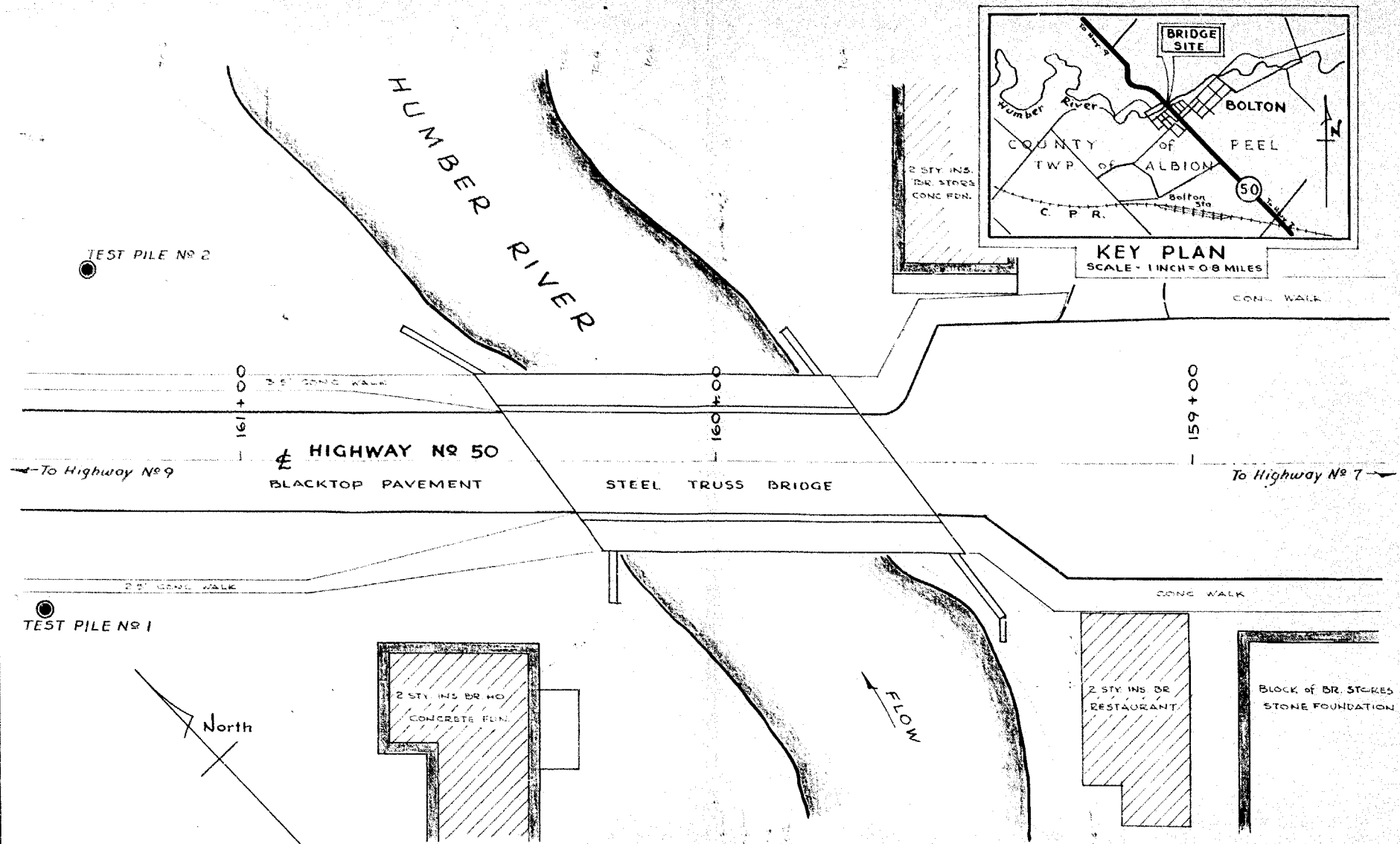
We would appreciate if you could give consideration to the above alternative design and authorize Mr. Gregg to complete his design on this basis.

L. G. Soderman

L. G. Soderman,
PRINCIPAL FOUNDATION ENGINEER

LGS/MdeF
Attach.

cc: Foundations Office
Gen. Files.



KEY PLAN
SCALE - 1 INCH = 0.8 MILES

TEST PILE No 2

161+00
3.5' CONC. WALK
4 HIGHWAY No 50
BLACKTOP PAVEMENT

STEEL TRUSS BRIDGE

CONC. WALK

To Highway No 7

TEST PILE No 1

North

2 STY. INS. DR. HO.
CONCRETE FDN.

FLOW

2 STY. INS. DR.
RESTAURANT

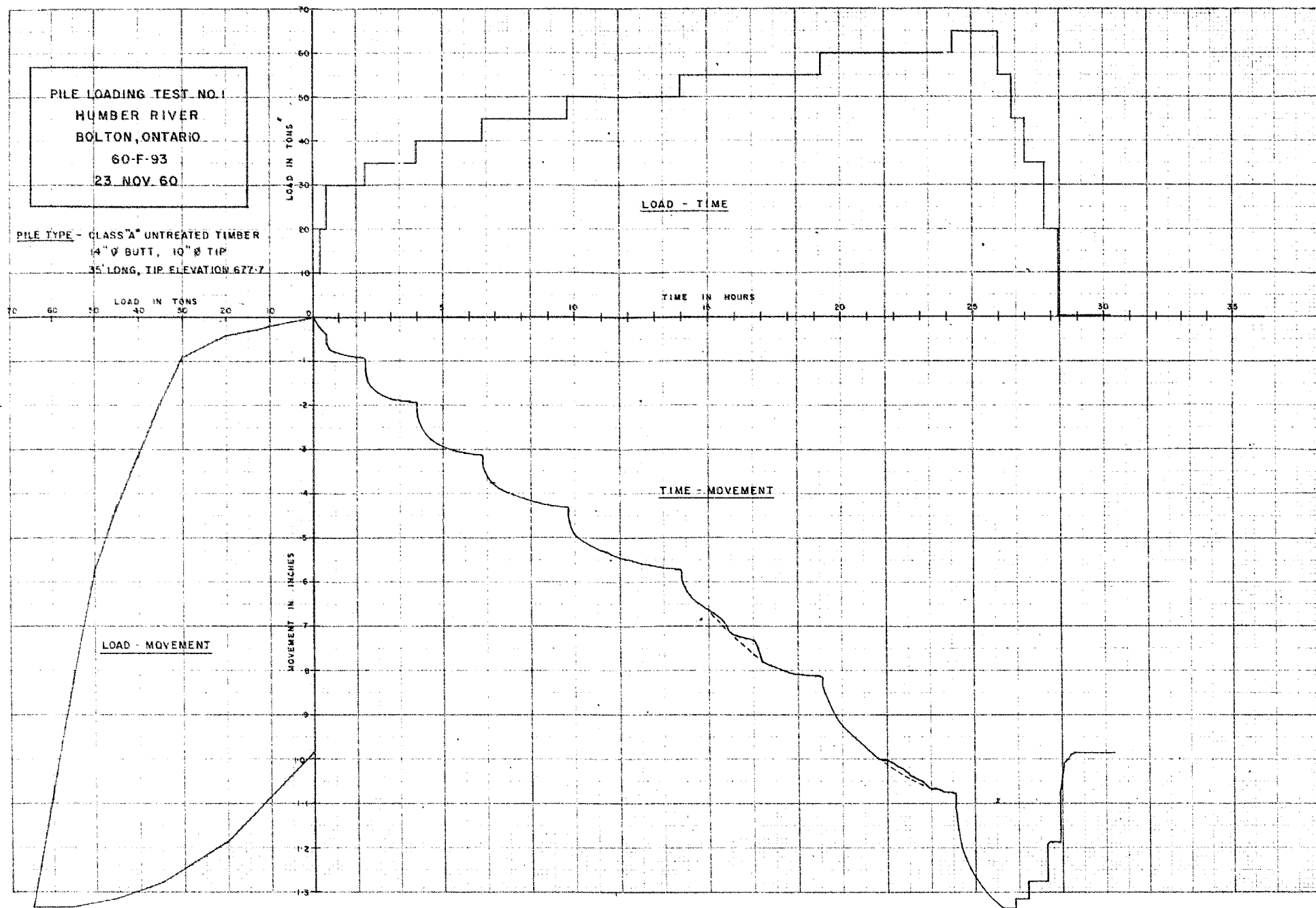
BLOCK OF DR. STOKES
STONE FOUNDATION

Ref Plan - E-3775-1 (M&R 6-83)

ORIGINATED L. SODERMAN	DEPARTMENT OF HIGHWAYS - ONTARIO	SCALE 1 inch = 20 feet
DRAWN H. D. REED	MATERIALS & RESEARCH SECTION	W.P. NO. 35-60
CHECKED L 95	PILE TEST LOCATIONS HUMBER RIVER - BOLTON, ONTARIO	JOB NO. 60-F-93
APPROVED L 95		DWG. NO. 60-F-93A
DATE 28 Dec 1960		

PILE LOADING TEST NO. 1
HUMBER RIVER
BOLTON, ONTARIO
60-F-93
23 NOV. 60

PILE TYPE - CLASS "A" UNTREATED TIMBER
14" Ø BUTT, 10" Ø TIP
35' LONG, TIP ELEVATION 672.7



PILE LOADING TEST NO. 2
HUMBER RIVER
BOLTON, ONTARIO
60-F-93
26 NOV. 60

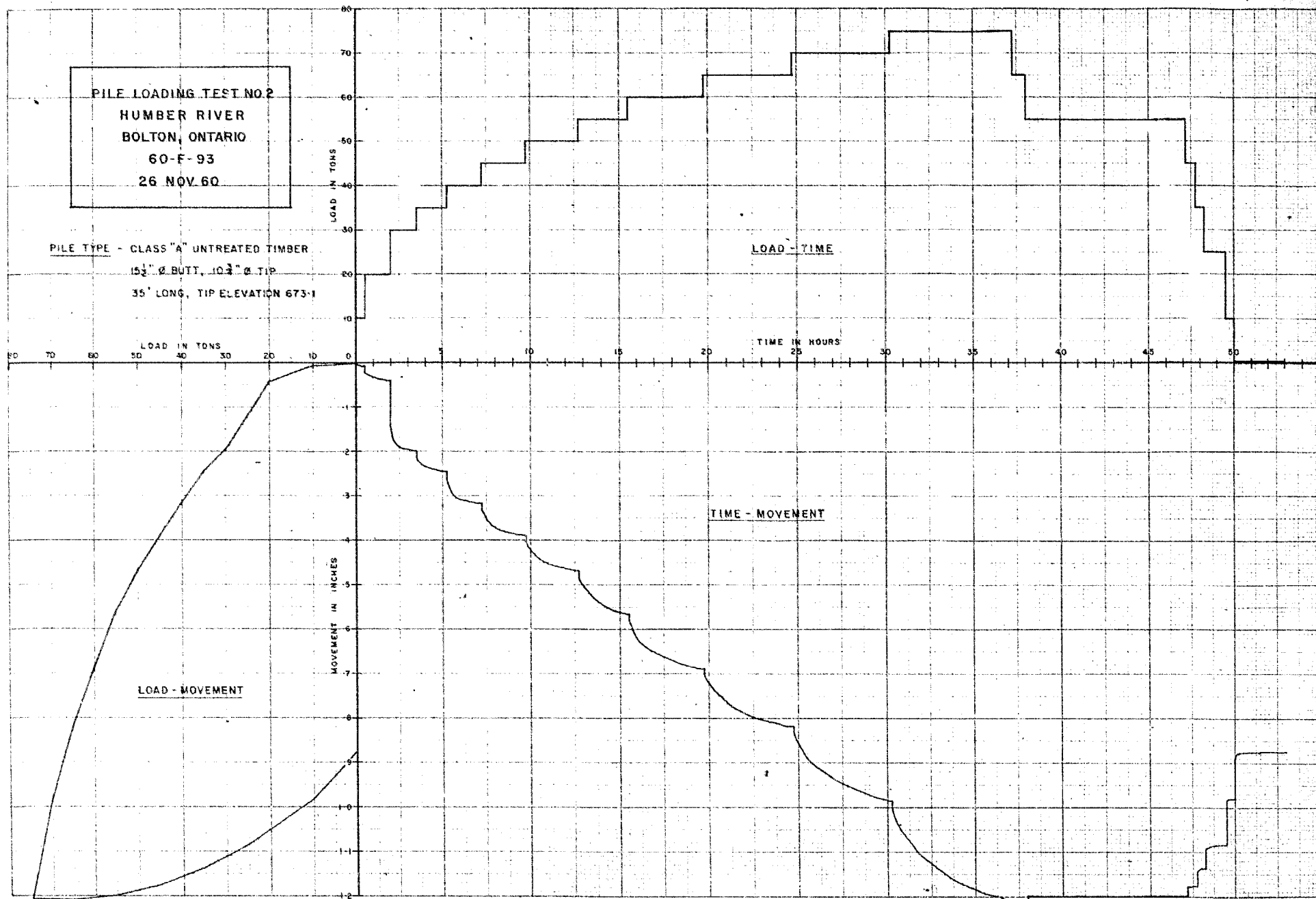
PILE TYPE - CLASS "A" UNTREATED TIMBER
15 1/2" Ø BUTT, 10 3/4" Ø TIP
35' LONG, TIP ELEVATION 673.1

LOAD - TIME

TIME IN HOURS

TIME - MOVEMENT

LOAD - MOVEMENT



December 5, 1962

Bridge Design Office,
Department of Highways, Ontario,
Parliament Buildings,
TORONTO 2, Ontario.

Attn: Mr. F. I. Hewson, P.Eng.
Consultant Liaison Engineer

Re: Contract #62-70
Humber River Bridge at Bolton
Hwy #50, District #6

Gentlemen:

This letter is to place on record a site visit made by the writer on Sunday, December 2, 1962. On that occasion he was attempting to find a fog free golf course, missed the detour signs and almost ended up in the "future" Humber River. You might say it was an unofficial visit.

From what could be seen the general area of the new bridge has been excavated to around Elev. 702.00 as per the prescribed construction procedure. The sheet piling for the cofferdam has been driven for both the south west and south east wing walls. It is possible that the complete sheeting has been driven for the complete south cofferdam, but excavation to Elev. 702.00 (approx.) had not been completed in the immediate area of the south abutment, so no sheeting was visible in this area.

Excavation of material within the cofferdam for the S.W. wing wall has been started and it appears that timber bracing is being placed in accordance with our instructions. The cofferdam was flooded and the water level in the cofferdam appeared to be the same as the Humber River. The material being excavated is piled beside the cofferdam and appears to be a very soft silty material, blue-grey in colour. The material is almost in a liquid state but excavation under water may account for this.


Excavation has started within the sheeting around the S.E. wing wall and again the excavated material has been placed beside the cofferdam and appears to be the very soft blue-grey silt as for the other wing wall. This cofferdam is also flooded, the south end of the sheeting being almost in the present Humber River. No timber bracing is in evidence in this excavation and the steel sheet piling looks a bit precarious, especially on the south face of the cofferdam where the top of the sheeting appears to lean in a foot or more.

We realise that the sheet piling is temporary and that minor irregularities of the top of the cofferdams are of no consequence. Nevertheless, we feel that timber bracing should be installed from the point of view of safety alone.

Also, from the apparent construction methods being used we assume that a tremie seal will be placed, before attempting to dewater the cofferdams and place footing concrete, etc.

Yours very truly,

MORRISON, HERSHFIELD, MILLMAN AND HUGGINS, LIMITED


J. T. Gregg, P.Eng.
Chief Engineer

JTG:md

60-147

cc: Bruce Davis
Tony Stermac ✓

DEC 7 10 09 AM 1962

SPECIAL PROVISIONS

NUMBER RIVER BRIDGE AT BOLTON

PILE LOAD TEST

HIGHWAY # 50, DISTRICT # 5, S.P. 35 - 60

1. GENERAL

Timber piles shall be driven and load tested statically. In general, the load tests shall be carried out as specified in the National Building Code of Canada, Appendix 4.2.C.

2. PILING

The following piling will be supplied by the Department to the point designated in the material list at the end of the tender.

3 pieces 12 BP 53 "H" Piles - each 23 feet long

2 pieces "Class A" Timber Piles - each 35 feet long.

The Contractor shall be responsible for checking the piling on delivery, and reporting any shortages or errors, and for the storage, handling, moving, and proper care of the piling until it is placed in the work.

3. SUPPLY ALL EQUIPMENT FOR DRIVING TEST PILES

The lump sum price bid for this item shall include the cost of supplying and maintaining at the site all equipment necessary to drive the test piles required by the Engineer.

The equipment supplied shall be capable of handling the pile lengths supplied as indicated in these Special Provisions, as well as the pile hammer.

The pile hammer shall be a steam or diesel operated hammer capable of delivering a blow at normal energy with an energy of not less than 10,000 ft. lbs. The hammer must be in good condition.

The use of air hammers will not be allowed.

The type and characteristics of the hammer shall be approved by the Engineer.

4. DRIVE TIMBER PILES

Under this item and for the unit price bid the Contractor shall drive timber piles in the locations shown on the drawing. Payment for this item will be made for the number of lineal feet of piling remaining in the ground below cut off elevation.

The Contractor shall notify the Materials and Research Section of the Department, in writing, three days prior to when driving commences.

All piles not driven shall remain the property of the Department.

Pile butts must be protected during driving by an approved driving head as recommended by the hammer manufacturer. Piles must be driven so that their slope varies not more than $1/8$ " per foot from the vertical.

Piles must be driven so that their tips are at or below elevation 680.0 ft. Then, if driving resistance increases uniformly with penetration as driving continues, driving shall stop when a resistance of 50 blows per foot is maintained over a distance of 5 feet.

The second timber pile will be load tested only if the two piles do not develop similar driving resistance.

5. CONSTRUCT AND FILL LOADING BOX

Under this item and for the lump sum price bid, the Contractor shall build a wooden platform and box and shall load it with sand to provide a dead load reaction against which to jack. The dead load reaction is to be at least 100 tons. He shall supply all necessary equipment, labour and materials. The loading box shall be built as shown on the drawing.

The Department will supply three 12 BF53# steel "H" piles for needle beams, as well as loading jacks, gauges and other instruments. All other equipment and materials must be supplied by the Contractor.

The loading box must be built and ready for loading before driving commences in order that the first test pile may be test loaded immediately after it has been driven.

Under this item the Contractor shall:

Build temporary supporting cribs at the pile to be tested, including such excavation or granular fill needed to provide a level, dry and compact working area. The area under the supporting cribs must be capable of sustaining a load of 2000 lbs. per sq. foot, without undue settlement, and the supporting cribs must be large enough that they do not impose more than this unit loading on the soil.

Place the three needle beams in position and temporarily support them.

Place the timber floor of the loading box and build the loading box upon it.

Evenly and uniformly load the box with sand to give a total dead weight of 100 tons.

Cut off the top of the pile to provide 1'-6" space between top of the pile and underside of needle beams.

Place steel bearing plates, steel fill plates, and jack and bring all to a snug bearing.

The Contractor shall provide enough steel fill plates to take up a space of 2" above and 2" below the jack.

Place timber reference beams and supports for reference beams. Supports for beams must be placed at least 8 feet beyond the nearest timber crib to avoid disturbance during jacking.

Place gauges and other instruments supplied by the Department, as directed by the Engineer.

The Contractor shall supply and hang tarpaulins on the loading platform to form a reasonably weather-tight enclosure beneath the platform and heat the enclosure continuously with a forced air oil burner.

While the loading test is being performed, the Contractor must maintain the platform, box, cribs, jacks, needle beams and reference beams in their proper position and in good condition.

6. PROVIDE LABOUR DURING TESTING

After the loading box has been placed and filled, and after the jack and gauges are in position, the Engineer, may require the assistance of one or more labourers. This will be while load is being applied to or removed from a pile.

6. PROVIDE LABOUR DURING TESTING Cont'd.

Under this item and for the unit price bid, the Contractor shall supply at the site semi-skilled workmen as required by the Engineer. The unit price bid also shall include the supplying of any necessary hand tools. Payment will be made only for that time during which the labourer or labourers are required by the Engineer to be at the site.

7. UNLOAD AND DISMANTLE LOADING BOX

Under this item and for the unit price bid, the Contractor shall unload and dismantle the loading box and dismantle the loading platform, needle beams, timber cribs, reference beams and enclosure. A pile test may be required at more than one location so unloading and dismantling may have to be done more than once.

8. RE-ERECT AND FILL LOADING BOX

Under this item and for the unit price bid, the Contractor shall re-erect the wooden cribs, loading box, needle beams, jacks and reference beams, as well as the weather-tight enclosure. He also shall re-fill the box with sand. This re-erection shall be done over additional test piles which may be ordered driven by the Engineer.

All work shall be carried out as specified under the item "Construct and Fill Loading Box".

ESTIMATE

PILE LOADING TEST ONLY

DISTRICT	D.4.
No. 6	No.

CONTRACT No. PROJECT No. W.P. No. 35-60

% Ordinary
% Capital } Expenditure

District No. 6 - TORONTO Contractor Contract X

Work of PILE LOADING TEST By Day Labour

O {	King's Hwy. No. 50	Location HUNTER RIVER BRIDGE AT BOURTON	Class	Length miles	Pavement	Width	Base
	Development Rd. No.						
	Secondary Rd. No.						

Township AIBION COUNTY PEEBLES

Plan Sta. To Sta. Profile Sta. To Sta.

D 4724 - A

TENDER

ITEM No.	SPEC. No.	ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL
1.	9 S.P.	SUPPLY ALL EQUIPMENT FOR DRIVING TEST PILES	L.S.			2,000.00
2.	9 S.P.	DRIVE TIMBER PILES	L.F.	66	1.00	66.00
3.	S.P.	CONSTRUCT AND FILL LOADING BOX	L.S.			3,500.00
4.	S.P.	PROVIDE LABOUR DURING TESTING	MAN HOUR	100	2.50	250.00
5.	S.P.	UNLOAD AND DISMANTLE LOADING BOX	EACH TIME	2	350.00	700.00
6.	S.P.	RE-ERECT AND FILL LOADING BOX	EACH TIME	1	1,000.00	1,000.00
ALL PRICES ARE EXCLUSIVE OF SALES TAX						
COPIES TO:						
1. BRIDGE OFFICE						
2. CONTRACT OFFICE						
3. CONTRACT OFFICE						
4. CONTRACT OFFICE						
5. CONTRACT OFFICE						
6. SOILS LABORATORY						
7. DISTRICT						
8. SCHEDULING						
9. CONSULTANT						

Total Estimated Tender \$ 7,516.00

MATERIALS SUPPLIED BY D.H.O. TO CONTRACTOR

ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL
MATERIALS AS FOLLOWS:	L.S.			450.00
STEEL "H" PILES				
"CLASS A" TIMBER PILES				
NOTE: FUNDS HAVE BEEN APPLIED FOR THE ADVANCE ORDERING OF STEEL "H", PILES AND "CLASS A" TIMBER PILES AS FOLLOWS: TOTAL ESTIMATE \$450.00				
FOR INFORMATION AS TO F.O.B. POINT FOR ABOVE ADVANCE ORDERED MATERIALS, SUPPLIED BY D.H.O., PLEASE CONTACT K.C. HOWE, BRIDGE DESIGN SECTION, AT LEAST ONE WEEK BEFORE INFORMATION IS REQUIRED FOR TENDER PURPOSES.				

Total Estimated Material \$ 450.00

ESTIMATED COSTS

Estimated Tender \$ 7,510.00
 Estimated Material \$ 450.00
 Estimated Engineering \$ 600.00
 Estimated Sundry Construction \$ 224.00
 TOTAL ESTIMATED COST \$ 8,784.00

RECOMMENDED FOR APPROVAL

Contract Control Eng. _____
 Construction Eng. _____
 Assistance Eng. _____
 Design Engineer _____

CERTIFICATION

Dated at TORONTO
 this _____ day of OCTOBER
 A.D. 19 60

BRIDGE ENGINEER

FUNDS AVAILABLE

Financial Comptroller _____
 APPROVED
 Chief Engineer or
 Manager of Operations _____

**DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT**

SANDRY CONSTRUCTION

[illegible]

Total Estimated Sundry Construction

\$ 224.00

DETAIL OF SUNDRY MATERIAL

[illegible]

Total Estimated Sundry Materials

* Carry to Above

#60-F-93

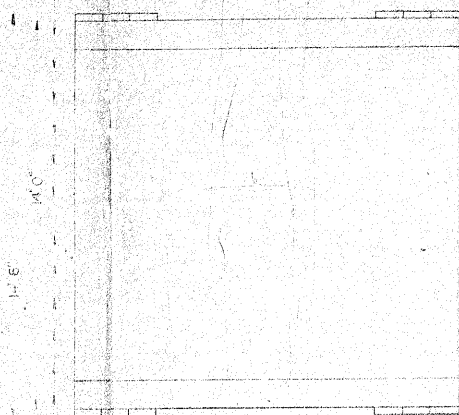
W.P.# 35-60

Hwy. #50

HUMBER R.B.R.

AT BOLTON

6-12" TIMBERS
OR EQUAL @ 14" O.C.

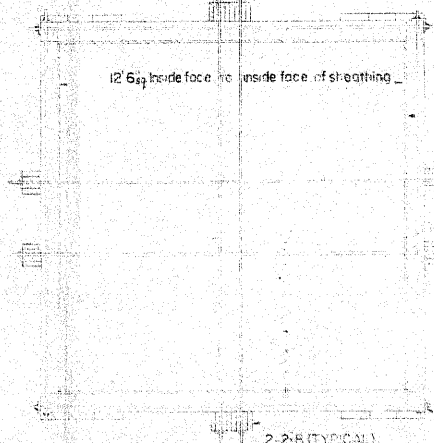


FLOOR FRAMING PLAN

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

6-12" TIMBERS
OR EQUAL @ 14" O.C.

NOTE: ALL TIE RODS ARE 3/4"



FLOOR PLAN

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

4-2x8 (TYPICAL)

3-12" EPS (BY OTHERS)
40'-2'-3'-4" R.

1" SHEATHING OR
EQUIV.

12" 6" 14" O.C.

12" 12" CONTINUOUS
12" 12" 14" O.C. MAX.

12" TIMBER PILE

22'-5'-5'-5/8"
BOLTED TO PILE

CROSS SECTION

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

DOUBLE 2x8 WALES
(TYPICAL)
4-2x8 (TYPICAL)

1/2" (TYPICAL)
5/8" x 8" (TYPICAL)

5-5'-5/8" (TYPICAL)

2-2x8 (TYPICAL)

SAND FILL

1'-5"-1'-6"-2'-0"
1'-5"-2'-0"
9'-0"

JACK (BY OTHERS)
6-12" 16" O.C. LG.
WOOD BEAMS
14'-2'-1'-2"

HUBER RIVER
11/1/50, BOLD
LEGEND

EXISTING BRIDGE

LOCATION
SCALE

BOREHOLE 1
70.0
GROUND SURFACE
BROWN, LOOSE
SANDY SILT WITH
OCCASIONAL GRAVEL
P.C.U.
696.0
MEDIUM DENSE
GRAVEL WITH
TRACES OF
SAND & SILT
695.5
MEDIUM DENSE TO
VERY DENSE GREY
SILT WITH TRACES
OF FINE SAND &
SILTY CLAY
695.0
END OF BORING

631.0

VERY FINE
SANDS &
FINE
CLAY

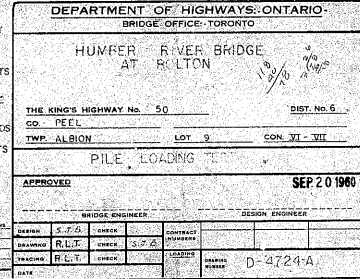
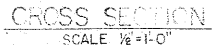
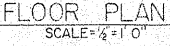
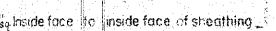
598.5

END OF BORING

REVISION	DATE	BY	DESCRIPTION

SOME DEFECTS IN NEGATIVE DUE
TO CONDITION OF ORIGINAL DOCUMENTS

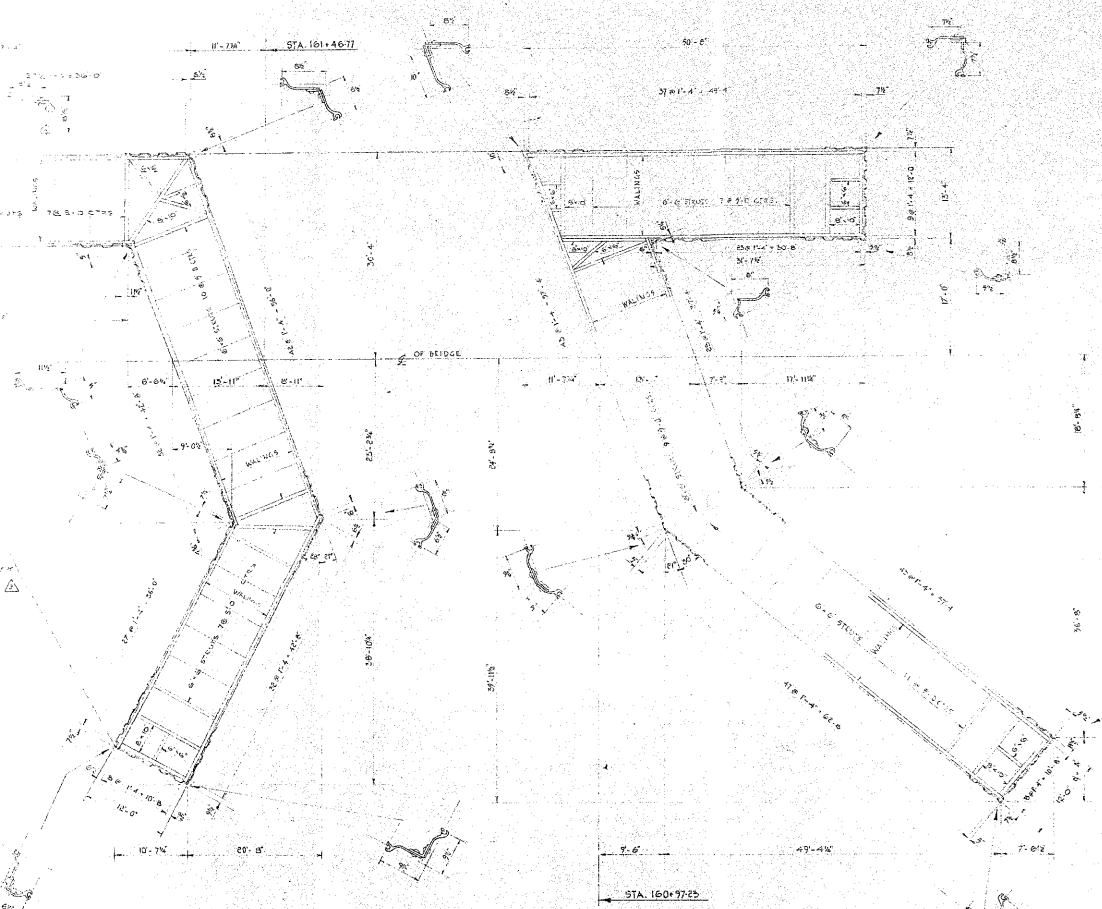
D. FARRIN
 (331) will call as soon
 as job is awarded



REVISIONS		DESIGN <i>S.T.B.</i> CHECK		CONTRACT NUMBER	
		DRAWING <i>R.L.T.</i> CHECK <i>S.T.B.</i>			
		TRACING <i>R.L.T.</i> CHECK		LOADING	
				DESIGN NUMBER <i>D-4724-A</i>	
DATE	BY	DESCRIPTION		DATE	

SOME DEFECTS IN NEGATIVE DUE

TO CONDITION OF ORIGINAL DOCUMENTS



PILING PLAN
SCALE 1/4"=1'-0"

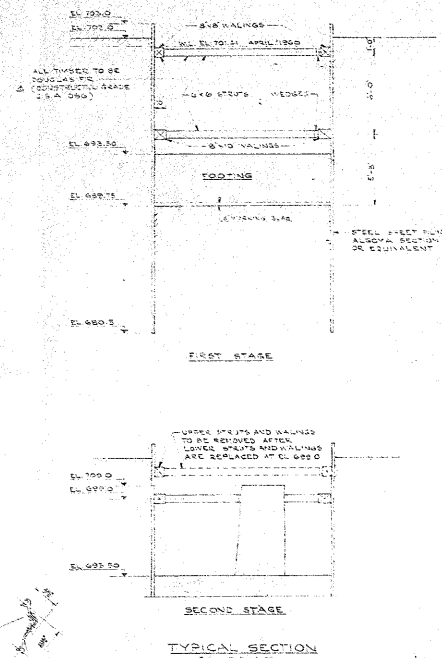
SHEET PILING REQUESTS

STANDARD SECTIONS	455
STANDARD COHESION CONNECTIONS	4
FINGERED CUT	1
INTERLOCKS REVERSED	2
ORIGINAL CORNER CONNECTIONS	13

NOTE: LENGTH OF STEEL SHEET PILING SHOWN ON PLAN IS MIN LENGTH REQUIRED.

PRINT RECORD

NO.	FOR	DATE
1	FOR	12-27
2	FOR	12-27
3	FOR	12-27



- SUGGESTED PROCEDURE**
1. Excavate general area of footings from existing ground to elevation 700.0.
 2. Drive sheet piling as indicated on the drawings. Minimum tip elevation 650.0.
 3. Excavate to one foot below top strut and place and wedge top walings and struts.
 4. Excavate within cofferdam to one foot below bottom strut elev.
 5. Install cofferdam if necessary, taking care not to disturb the underlying material, and place and wedge bottom walings and struts.
 6. Excavate to elevation 692.75 and install cofferdam.
 7. Install cofferdam to elevation 699.75 and place 3" concrete working slab immediately on excavation proceeds.
 8. Place reinforcing steel and footing concrete to elev. 693.9.
 9. Remove lower struts and walings and construct retaining wall to underside of top struts, elev. 700.
 10. Install lower walings and struts at elev. 699.0 when wall has gained sufficient strength (14 days), install lower struts to soil as required. Then remove upper struts and walings.
 11. Proceed to construct walls above elevation 700' in normal manner.
 12. Remove struts and walings and soil and remove from site all sheeting.
 13. Should a quick condition exist in the excavation when time #1 is in operation the contractor shall excavate under water to elev. 693.9 and place a 3'-0" trench concrete wall. The contractor shall then excavate the cofferdam and construct as above, respecting the trench slab.
 14. Any proposed deviation from this procedure shall be approved in writing by the Engineer before construction commences.

- NOTES TO CONTRACTOR**
1. THE CONTRACTOR SHALL SUPPLY AND DRIVE ALL SHEET PILING REQUIRED FOR THE TEMPORARY COFFERDAMS, INCLUDING ALL WALING AND STRUT.
 2. THE LAYOUT OF THE COFFERDAMS IS LEFT TO THE DISCRETION OF THE CONTRACTOR BUT ANY QUANTITIES FOR EXCAVATION AND CONCRETE FOR FOOTINGS SHALL BE AS SHOWN ON THE CONTRACT DRAWINGS.
 3. IF A QUICK CONDITION OCCURS IN ANY EXCAVATED ELEVATION AS DESCRIBED IN THE CONSTRUCTION PROCEDURE, THE EXCAVATION SHALL BE SUPPLIED BY THE CONTRACTOR WITH ALL MATERIALS AND EQUIPMENT NECESSARY TO COMPLETE THE WORK. THE MINIMUM ELEVATION OF THE TOP OF THE EXCAVATION SHALL BE 700.0 FT. AND THE TOP SHALL BE DRIVEN TO A MINIMUM OF 15 FT. BELOW THE TOP OF FOOTINGS, ELEV. 692.75.
 4. THE SHEET PILING MAY BE PULLED AND RECOVERED BY THE CONTRACTOR WHEN THE CONSTRUCTION OF THE FOOTINGS AND WING WALLS HAS RECEIVED A MINIMUM ELEVATION OF 700.0 FT. IF THE CONTRACTOR elects TO LEAVE THE SHEET PILING IN PLACE HE SHALL CUT OFF THE TOP AND TRIM TO ELEV. 692.75.

NOTES

1. Contractor to supply steel sheet piling.
2. Piling to be driven with a hammer developing not less than 10,000 ft.-lb. or energy per blow.



DATE: 12-27-60		BY: J.T.G.	
CHECKED: J.T.G.		APPROVED: J.T.G.	
DESIGNED: J.T.G.		DRAWN: J.T.G.	
CALCULATED: J.T.G.		INCHES: 1/4"	
SCALE: 1/4"=1'-0"		SHEET: 1 OF 1	
PROJECT: HUBER BRIDGE		LOCATION: AT BOLTON	
CLIENT: DEPARTMENT OF HIGHWAYS - ONTARIO		BRIDGE OFFICE: TORONTO	
ENGINEER: MORRISON, HERSHFIELD, MILLMAN & HUGGINS, LTD.		CONSULTING ENGINEERS	
THE KING'S HIGHWAY NO. 50		DIST. NO. 8	
CD. REEL		CON. VI & VII	
TWP. ALBION		LOT 8	
LAYOUT OF FOOTINGS AND STEEL SHEET PILING		APPROVED: J.T.G.	
DESIGNED: J.T.G.		DRAWN: J.T.G.	
CHECKED: J.T.G.		INCHES: 1/4"	
SCALE: 1/4"=1'-0"		SHEET: 1 OF 1	
PROJECT: HUBER BRIDGE		LOCATION: AT BOLTON	
CLIENT: DEPARTMENT OF HIGHWAYS - ONTARIO		BRIDGE OFFICE: TORONTO	
ENGINEER: MORRISON, HERSHFIELD, MILLMAN & HUGGINS, LTD.		CONSULTING ENGINEERS	
THE KING'S HIGHWAY NO. 50		DIST. NO. 8	
CD. REEL		CON. VI & VII	
TWP. ALBION		LOT 8	
LAYOUT OF FOOTINGS AND STEEL SHEET PILING		APPROVED: J.T.G.	
DESIGNED: J.T.G.		DRAWN: J.T.G.	
CHECKED: J.T.G.		INCHES: 1/4"	
SCALE: 1/4"=1'-0"		SHEET: 1 OF 1	
PROJECT: HUBER BRIDGE		LOCATION: AT BOLTON	
CLIENT: DEPARTMENT OF HIGHWAYS - ONTARIO		BRIDGE OFFICE: TORONTO	
ENGINEER: MORRISON, HERSHFIELD, MILLMAN & HUGGINS, LTD.		CONSULTING ENGINEERS	
THE KING'S HIGHWAY NO. 50		DIST. NO. 8	
CD. REEL		CON. VI & VII	
TWP. ALBION		LOT 8	
LAYOUT OF FOOTINGS AND STEEL SHEET PILING		APPROVED: J.T.G.	
DESIGNED: J.T.G.		DRAWN: J.T.G.	
CHECKED: J.T.G.		INCHES: 1/4"	
SCALE: 1/4"=1'-0"		SHEET: 1 OF 1	
PROJECT: HUBER BRIDGE		LOCATION: AT BOLTON	
CLIENT: DEPARTMENT OF HIGHWAYS - ONTARIO		BRIDGE OFFICE: TORONTO	
ENGINEER: MORRISON, HERSHFIELD, MILLMAN & HUGGINS, LTD.		CONSULTING ENGINEERS	
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