

G.I.-30 SEPT. 1976

GEOCRES No. _____

DIST. 52 REGION _____

W.P. No. _____

CONT. No. _____

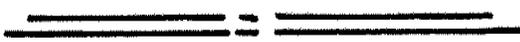
W. O. No. 95-11002

STR. SITE No. _____

HWY. No. 11

LOCATION Replacement & Redesign
of Shidway Muszora River

No of PAGES - Structure



OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. _____

REMARKS: _____

memorandum



To: Derek Barkley
Engineering Office
Planning and Design Section
Northern Region

Date: 95 06 22

From: Pavements and Foundations Section
Room 315, Central Building

Subject: Ontario Hydro Proposed Sluiceway Widening
Draper Township-Adjacent to Hwy 11/Muskoka River Structure
W.O. 95-11002
District 52, Huntsville

We refer to your memorandum dated 95 06 12 and the draft Legal Agreement attached regarding the proposed works. It appears that blasting methods will be employed for rock excavation. Presumably, KST (Ontario Hydro's consultant) has already considered other excavation methods and concluded that blasting will be required.

The draft Agreement has incorporated our recommendations given in the previous memorandum dated 95 05 16 and is generally considered sufficient from a foundation point of view. The following minor revisions are recommended:

- 1) Under item 7 (Pre-blast and Post-blast Survey), add ' The pre-blast survey shall be reviewed by MTO District Engineer prior to commencement of the blasting work'.
- 2) Item 8 shall be revised as follows:-
Protective Measures and Utility Clearance:
The Company agrees to carry out protective measures and utility clearance in accordance with OPSS 120.

We will comment on the technical details when the contract drawings and design document are available. Please note that our current review does not include the legal implications of the various clauses in the Agreement.

c.c. P. Stuart (Structural Section)


David Kwok, P. Eng.
Project Foundation Engineer
for
Tae Kim, P. Eng.
Senior Foundation Engineer

memorandum



To: Derek Barkley
Engineering Office
Planning and Design Section
Northern Region

Date: 95 05 16

From: Pavements and Foundations Section
Room 315, Central Building

Subject: Proposed Sluiceway Widening - Draper Township
Adjacent to Hwy 11/Muskoka River Structure
W.O. 95-11002
District 52, Huntsville

We refer to your memorandum dated 95 04 27 and the attached design package from Ontario Hydro's consultant KST Hydroelectric Engineers regarding the proposed sluiceway widening in the vicinity of the northbound structure of Hwy 11 at South Muskoka River.

On drawing no. 0004, the bridge under which most of the rock excavation will be carried out was hand-marked as Muskoka River Structure - Hwy 11. Based on our discussion with Dave Monaghan of KST, this structure is in fact a municipal bridge that belongs to Township of Bracebridge and we understand that a township engineer will review the design package and comment on the effects of the works on this bridge. Hwy 11 is in fact further west from the blasting area.

To clarify the above and get a better picture of the site conditions, a site visit was made on 95 05 09 with Neil Heidstra from KST. As observed on site, the proposed rock excavation is generally to the east of Hwy 11. However, the excavation on the south side of the sluiceway will extend close to the central pier of the Hwy 11 northbound structure. The existing pier rests on a massive rock bank with a concrete slab in front of it. It is not clear whether the slab is part of the footing. Mr. Heidstra suggested that it was probably there to support a logging chute in the old days. The pier links to a retaining wall to the east. The proposed rock excavation has a minimum distance of 7 ±m from the face of the retaining wall and pier, and only about 5 ±m from the concrete slab. The maximum depth of excavation is about 5 m in this area. On the north side of the sluiceway, the proposed rock excavation is 14 ±m from the abutment footing on plan. The depth of excavation is only about 1 to 2 m at this corner.

In order to visualize the problem in relation to the existing foundation, we have requested you to find out the original plans showing the foundation details of the north bound structure. Despite the efforts that you have made, we understand that the plans are not available in the region. We have also pursued the search in the

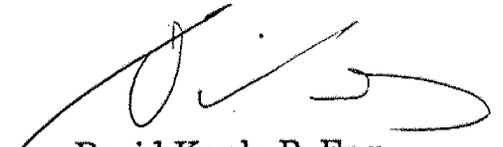
head office through Structural Office. The construction drawings could not be located. There is a set of shop drawings on the structural details of the bridge but it does not contain any information on the foundation of the structure. The design of the bridge was carried out in 1951.

Hwy 11 is a heavily used highway especially in the summer time, and it is obvious that any damage to the highway structure would be very undesirable. In general, blasting is not recommended within 15 m of the structure and consideration should be given to other methods such as chemical splitting. If blasting methods have to be used, the following should be noted:

1. It is understood that a blasting consultant will have to be employed by the contractor to design and supervise the entire blasting operation. However, this should not relieve the contractor of the responsibility for safety and satisfactory results. Contractor's liability to any damage to the existing structures should be clearly stipulated in the contract.
2. Controlled blasting in the form of pre-splitting or smooth blasting, etc, is required. Due to its close proximity to the existing structure, consideration should be given to drilling a line of relieve holes between the excavation and the existing footings to intercept the propagation of vibrations. These holes should be properly grouted after completion of blasting. The particle velocities induced by a particular instantaneous charge per delay is govern by the distance from the blast. Since the foundation details for the existing pier footing is not available, the distance from the blast used in the blast design should be taken as the distance to the edge of the concrete slab in front of the pier.
3. A blast design should be prepared by the contractor's blasting consultant based on the above recommendations and a test panel away from the structure should be selected for a trial blast. The design should be modified and improved based on the results of the trial blast, if necessary. OPSS 120 stipulates requirements for blast design, pre-blast survey, protective measures as well as utilities clearance. You may wish to check with J. Lynch of Corridor Management Office to see if he would be interested in reviewing the pre-blast and post-blast survey done within the MTO right-of-way.
4. The intensity of ground vibrations generated by blasting should be monitored by velocity seismographs. OPSS 515.07.03 restricts the maximum peak particle velocity to 50 mm per second in ground adjacent to buildings and structures. In this connection, item 4 of clause 3.8 at the top of page 10 of the Rock Removal specification from KST should be amended to read 'North and south abutments **and piers** of the northbound Hwy 11 road bridge.'

5. The existing structure and slopes should be carefully inspected after blasting for any possible damage. As observed on site, no adversely oriented rock joints are apparent under the existing conditions. However, new rock joint patterns may appear after rock removal. If the joint patterns are oriented in such a way that may affect the integrity of the founding base of the bridge pier, remedial measures in the form of rock bolting, etc, will be required. This should be carried out as part of the contract. Our office can provide technical support on the site inspection.

We believe that the above is sufficient for your present purpose. Should you require any further clarifications, please contact us. The design package is returned with this memorandum for your use. By copy of this memorandum, would Structural Section please comment on the effect of blasting from a structural point of view (stiffness of the structure to resist the vibrations, etc).



David Kwok, P. Eng.
Project Foundation Engineer
for
Tae Kim, P. Eng.
Senior Foundation Engineer

c.c. P. Stuart (Structural Section)

