

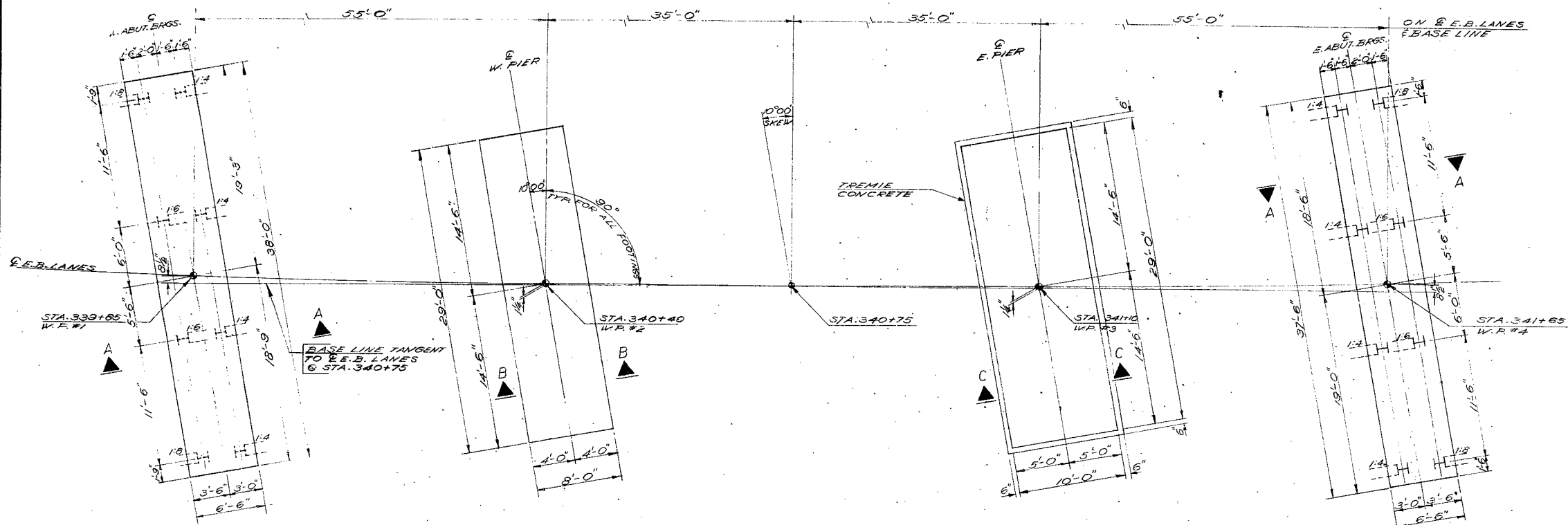
G.I.-30 SEPT. 1976

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 411-69
DIST. 17 REGION NORTHERN
W.P. No. 911-71-01
CONT. No. 72-210
W. O. No. 72-P-11
STR. SITE No. 46-281
HWY. No. 17
LOCATION SUDBURY BYPASS AND
JUNCTION CREEK

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. ~~3-2~~

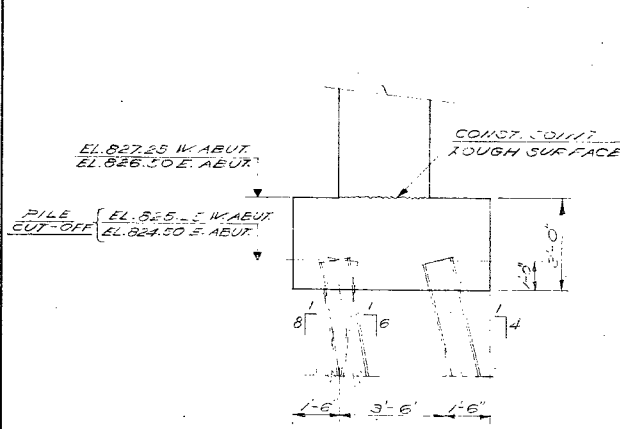
REMARKS: DRAWINGS ARE IDENTIFIED AS
421-69 BUT SHOULD BE 411-69



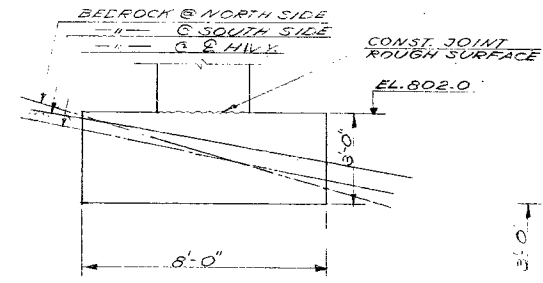
FOOTING LAYOUT
SCALE: $\frac{3}{16}'' = 1'-0''$

LIST OF HP12x53 STEELH-PILES

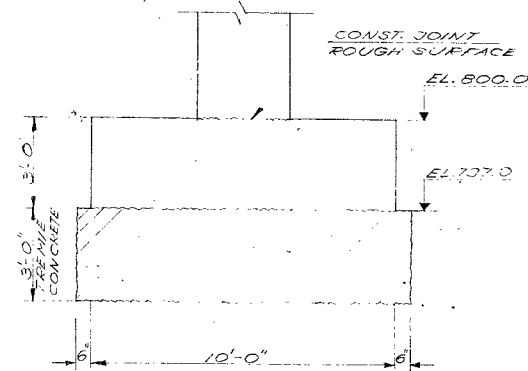
LOCATION	Nº OF PILES REQ'D.	LENGTH	REMARK
W. ABUTMENT	8	18 FT.	WITHOUT DRIVING SHOES
E. ABUTMENT	8	26 FT.	WITH DRIVING SHOES



SECTION A-A
SCALE: $\frac{3}{16}'' = 1'-0''$



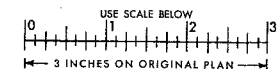
SECTION B-B
SCALE: $\frac{3}{16}'' = 1'-0''$



SECTION C-C
SCALE: $\frac{3}{16}'' = 1'-0''$



FOR REDUCED PLAN



REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

JUNCTION CREEK BRIDGE
APPROX 0.8 MI. EAST OF JCT. HWY#17
KING'S HIGHWAY No. SUDBURY S-W BYPASS DIST. No. 17
DIST. OF SUDBURY
TWP. OF WATERS LOT 2 CON. 5

FOOTING LAYOUT

APPROVED: [Signature] SITE No. 46-281 W.P. No. 911-71-03
CONTRACT No. []
DESIGN P.O.L. CHECK C.F.E. DRAWING R.SCH. CHECK P.O.L. DATE JUNE 1972 LOADING HS2044 No. 46-281-3

PRINT RECORD

No	FOR	DATE

72-F-11	911-71-01	SUDBURY BYPASS & JUNCTION CREEK	411-69
W.O.	W.P.	LOCATION	GEOCRES NO.

● DATA ON FILE IN SOIL MECHANICS SECTION

REFER TO: CONTRACT FILE No.72-212

REMARKS

GEOCRES INDEXING CARD FOR REPORTS NOT MICROFILMED

GI-20 AUG. 74

BLUPER IMPOSED DOCUMENT MAY
APPEAR AS MULTI-FEED ON FILM.

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

IN REPLY TO

Re: W. P. 911-71-31 Site 48-281
Junction Creek
Sudbury By Pass District # 17

Lincoln

c. c. - Mr. R. Murphy
- Mr. C. S. Grebski

Feb 26. Fri
Waco, Texas

REDUCTION OF BLOWS/FT. (FROM 24 TO 14)
ALL PILES ALREADY SPLICED (EXCEPT ONE)

STOP PILE DRIVING WHEN Blows/ft is 30+
(CONSIDERING 0.5" REBOUND)

DATE: JUNE 7/73

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. J. McAllister, (2)
Regional Bridge Planning Supervisor,
Northern Region,
North Bay, Ontario.

FROM: Foundations Office,
Design Services Branch,
Central Bldg., Downsview.

ATTENTION:

DATE: February 18, 1972.

OUR FILE REF.

IN REPLY TO

115 22 1972

SUBJECT:

41 [- 69

FOUNDATION INVESTIGATION REPORT
For
Proposed Structure
At the Crossing of Junction Creek
and Sudbury Bypass
Township of Waters, District of Sudbury
District No. 17 (Sudbury)
W.O. 72-11011 -- W.P. 911-71-01

Attached, we are forwarding to you our detailed foundation investigation report on the subsoil conditions existing at the above-mentioned site.

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

AGS/ao
Attach.

cc: Messrs. D. W. Farren
B. R. Davis
A. Rutka
H. McArthur
J. M. Childs
B. J. Giroux
R. Northwood
G. A. Wrong
B. A. Singh

A. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER.

Foundations Office
Documents

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 - 4.3) Boulders mixed with Gravel and Silty Sand.
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FOUNDATION INVESTIGATION REPORT
For
Proposed Structure
At the Crossing of Junction Creek
and Sudbury Bypass
Township of Waters District of Sudbury
District No.17 (Sudbury)
W.O. 72-11011 - W.P. 911-71-01

1. INTRODUCTION:

The Foundation Office was requested to carry out a subsurface investigation at the proposed crossing of the Sudbury Bypass and Junction Creek, in the Township of Waters, District of Sudbury. The request was contained in a memo from Mr. J.C. McAllister, Regional Bridge Planning Supervisor, dated January 4, 1972. An investigation was subsequently carried out by this office to determine the subsoil, bedrock and groundwater conditions at the site.

This report contains the factual results obtained from the investigation, together with recommendations pertaining to the foundations of the proposed structure as well as the stability and settlement considerations associated with the approach fills and cuts.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The area under investigation is located between Kelly Lake and Whitefish Lake Indian Reserve, some 2000 feet south-east

of Hwy. # 17, in the Township of Waters, District of Sudbury. A C.P.R. track runs parallel to the existing Hwy. #17 on the north side. The terrain in the area is generally undulating with valleys cut by creeks. The ground elevations in the immediate vicinity of the structure vary from 798 to 852. The area is generally barren with light brush cover. Junction Creek, at the proposed site, is about 15 feet wide and 4 feet deep. The water level in the creek at the time of field investigation was 796.6. The creek bottom was lined with cobbles and boulders up to 5 inches in size.

The bedrock of the area is of Precambrian age. They are partly mantled by unconsolidated Cenozoic deposits. The oldest rocks consist of metamorphosed mafic and silicic meta-volcanics, that were intruded by a granite pluton more than 2000 million years ago. * These are overlain by a succession of pelitic, quartzitic, and conglomeratic meta sediments. The older rocks were cut by gabbroic intrusions over 1800 millions years ago, by the nickel irruptive about 1720 million years ago, by trap and diabase dikes about 1100 million years ago, and by late granitic intrusions more than 1000 million Years ago.

The rocks were folded, faulted and metamorphosed during the Penokean Orogeny and were slightly affected by later metamorphic

*Card, K.D.

"Geology of Denison - Waters Area."
Ontario Dept. of Mines - Geological Report 60, 1968.

- 3 -

events in the Grenville province to the south.

3. FIELD AND LABORATORY WORK:

A total of ten sampled boreholes, three of which were accompanied by a dynamic cone penetration test, was carried out at the site during the course of the field investigation. The boreholes and cone penetration tests were advanced by means of a diamond drill rig adapted for soil sampling purposes.

Samples were obtained at required depths in a 2-inch O.D. split-spoon sampler which was hammered into the soil. The method of driving the split-spoon sampler conformed to the specification for the Standard Penetration Test. The same method was used to advance the dynamic cone penetrations tests.

During sampling and drilling operations, detailed logs of the borings were made; these logs contain a record of the drilling and sampling techniques used together with the soil types encountered.

The locations and elevations of all the boreholes are shown on Drawing No. 72-11011A, together with the estimated stratigraphical profile and sections across the site. Surveying at the site was carried out by the personnel from Geocon Ltd., Consulting Engineers, Sudbury, Ontario. The elevations given in this report are referenced to a geodetic datum.

All samples were subjected to a careful visual examination in the field and subsequently in the laboratory. Following this examination, laboratory testing was carried out

on selected representative samples to determine the following physical properties of the overburden:

Natural Moisture Content

Atterberg Limits

Grain-size Distribution

The results of this testing are plotted on the Record of Borehole sheets and on Figure No. 1, all contained in the Appendix of this report.

4. SUBSOIL AND BEDROCK CONDITIONS:

4.1) General:

The subsoil at this site can be divided into two types. Firstly, on the west side of the river, some 100 feet from the creek channel, there is a granular deposit which is composed of sandy silt to silt, with a trace of gravel; this deposit extends to a depth of at least 37 feet. The second type of material was encountered at the east side of the creek. It also probably exists below the creek bed. This deposit is composed of boulders up to 18 inches in size mixed with gravel and silty sand. The thickness of this material was found to vary from a fraction of a foot to as much as 33 feet.

The aforementioned overburden deposits where they exist, or a thin topsoil cover elsewhere, are underlain by sound diorite bedrock.

The boundaries of the various deposits are shown on the accompanying borelog sheets. The inferred stratigraphical profile along the centre line of the proposed structure, together

with various sections, are plotted on Drawing No.72-11011A.

The various soil and bedrock types encountered are summarized in the sub-sections to follow.

4.2) Sandy Silt to Silt, trace of Gravel:

On the west side of the creek some 100 feet from the creek channel is a topographically high area composed of sandy silt to silt. B.H.#1 put down in this area, revealed that the depth of this deposit extends at least 37 feet below the existing ground surface. Grain-size distribution curves obtained on samples of the granular subsoil, are plotted on Figure #1.

Standard Penetration Testing carried out within this deposit, gave 'N' values which ranged from 11 blows/ft. to 100 blows for 4 inches. Based on these values it is estimated that the relative density of the deposit ranges from compact to very dense.

4.3) Boulders mixed with Gravel and Silty Sand:

From ground surface downward on the east side of the creek and probably below the creek bed itself is a stratum consisting of boulders (up to 18" in size) mixed with gravel and silty sand (refer to B.H.S.# 6, 7 and 9.) The presence of cobbles and boulders in the extremely dense silt and sand matrix made drilling and sampling very difficult. In all instances the boreholes had to be cased to their full depth by running the casing and cleaning with the core barrel. The core samples obtained indicated that boulders were of various geological types, e.g. syenites, diorites, granites and gneisses.

4.4) Diorite bedrock:

Bedrock is present immediately beneath the overburden deposits where they are present, or a thin topsoil cover elsewhere; the bedrock was proven in 7 of the boreholes by obtaining up to 14 feet of BX or AXT size rock core samples.

Over the site the bedrock surface was found to vary between elevations 812 and 773, which corresponds to depths below ground surface of from a fraction of a foot to 33 feet. The boring programme would appear to indicate that the surface of the bedrock decreases in elevation in an easterly direction.

The bedrock is composed of a light grey diorite which is in a sound state as evidenced by the high percentage of core recovery.

The bedrock core samples and bouldery stratum were examined by Mr. K.W. Ingham, Geologist, Department of Transportation and Communications. Mr. Ingham presented the result of his examinations in a memo to this office, dated February 17, 1972, which is appended to this report.

5. GROUNDWATER CONDITIONS:

Groundwater level observations were carried out during the period of the investigation, in the open boreholes. The observations are presented on the individual borelog sheets, as well as on Drawing No. 72-11011A. The results indicate that the groundwater level varies between elevation 797 and 810. These water levels correspond to depths below ground surface of from 1 to 11 feet. This pattern was interrupted in B.H.s. # 10 and 11 where the boreholes were found to be dry. This is explained by

the fact that these boreholes did not penetrate below the prevailing groundwater level.

6. DISCUSSIONS AND RECOMMENDATIONS:

6.1) General:

It is proposed to construct a structure at the crossing of Junction Creek and the New Sudbury Bypass, southwest of the City of Sudbury, in the Township of Waters, District of Sudbury. The proposal calls for a 3-span structure (40' - 60' - 40') having a width of 40 feet. The profile grade of Sudbury Bypass in the vicinity of the structure is at elevation 834. The approach fills will have maximum heights of about 29 feet in the transverse direction and 37 feet in the longitudinal direction.

The subsoil on the east side of the creek at the site consists of very densely packed boulders and gravel with silty sand matrix underlain by dioritic bedrock. West side of the creek the overburden mainly consists of a deposit of compact to very dense sandy silt to silt, with trace of gravel. The water level in the creek at the time of field investigation was at elevation 797.

6.2) Structure Foundations:

6.2.1) West pier: (Refer B.H.s. #4 and 5.)

At this location bedrock is encountered immediately below the ground surface. The west pier, therefore, can be supported on a spread footing founded directly on sound bedrock, using a safe allowable load of up to 20 tons/sq. ft.

6.2.2) East Pier: (Refer B.H s. # 6 and 7).

At this location the overburden deposit consists of a very dense matrix of silty sand, gravel and boulders. Such deposits can provide adequate bearing capacity for spread footing type of support. Consequently, the proposed east pier can be supported on spread footing, as high as possible within the bouldery deposit. The footing location should, however, comply with the hydrological as well as the local frost protection requirements. A safe allowable load of 3.5 tons/ft.² can be used for design purposes.

In view of the pervious nature of the subsoil major dewatering problems can be anticipated if footing excavations are located below the prevailing creek or groundwater levels. It should be noted that a dewatering scheme incorporating steel sheet piling will be extremely difficult to advance the sheeting through the bouldery overburden stratum. In this case, it may be necessary to drive the sheeting as far as practically possible, then remove the boulders or other obstacles under water from beneath the sheeting and continue driving to the next obstruction where this process will be repeated. Using this method it may be possible to reach the footing formation level. At this stage, a proper water-tight seal of tremie concrete under water may be necessary to prevent inflow of water from the base of the foundation soil.

6.2.3) East Abutment: (Refer B.H. #9)

The east abutment 'perched' within the fill can be supported on end bearing piles driven to practical refusal within the bouldery stratum. It is estimated that the piles will meet refusal at approximate elevation 800.

The allowable load would be dependent on the pile section chosen; for example 12HP74 steel H-piles may be designed using a maximum allowable load of 95 tons per pile.

No bouldery or rock fill should be used in areas where piles are to be driven.

6.2.4) West Abutment: (Refer B.H.s. #2 & 3).

Since sound bedrock is located at a relatively shallow depth below ground surface it may be desirable to locate the west abutment directly on sound bedrock surface. The abutment supported on spread footing bearing on bedrock can be designed using an allowable load of up to 20 tons/ft².

For design purposes the following values may be used:

Coefficient of earth pressure at rest	$K_0 = 0.5$ (rigid wall).
Coefficient of active earth pressure	$K_a = 0.33$ (some movement at the top of wall permitted).
Sliding resistance between the base of the footing and the bedrock surface	$\tan \phi = 0.8$

.....10

Alternatively the east and west abutments may be supported on spread footings placed within the approach fills. The fill material below the tops of the footings should consist of well compacted G.B.C. class 'A' material and should extend for a horizontal distance of at least 10 ft. from the footing edges in the plane of the footing tops. This portion of the fill should be built with side slopes of 2:1. The remainder of the fill should be completed to about profile grade for a distance of 50 feet behind the abutments before re-excavating for the abutment footings. A design load of 2 t.s.f. may be used for the abutment foundations.

The differential settlements between the abutments and piers for any combinations of the aforementioned schemes will be negligible.

6.3) Approach Embankments:

No stability problems are anticipated provided standard 2:1 slopes are adopted. Settlement will be elastic in nature and negligible in magnitude.

The creek banks and the approaches should be protected by rip-rap within the influence of the water-course due to the scouring action of the creek.

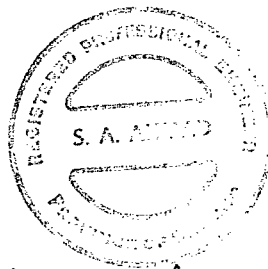
7. MISCELLANEOUS:

The field work was performed during the period of January 30 to February 9, 1972 under the supervision of Mr. T. Van Dyke, Technician, Geocon Ltd., Consulting Engineers, Sudbury.

Equipment was owned and operated by Canadian Longyear Ltd., North Bay, Ontario.

This report was prepared by Mr. S. A. Ahmad, Project Foundation Engineer.

This project was carried out under the general supervision of Mr. M. Devata, who also reviewed this report.



S. A. Ahmad

S. A. Ahmad, P. Eng.

M. Devata

M. Devata, P. Eng.

APPENDIX I

FOUNDATION SECTION

CHECKED BY *AK*

[illegible]

[illegible]

FOUNDATION SECTION

JOB 72-11011 LOCATION Sta. 339. + 90 o/s 20' Rt. ORIGINATED BY TV
W.P. 911-71 BORING DATE Jan. 20 - 24, 1972 COMPILED BY GP
DATUM Geodetic BOREHOLE TYPE BX Rock Core CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION BLOWS / FOOT	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 %				
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE						
811.6	Ground Level		1	CS	-								
1.0	Sandy Topsoil		2	BX	100%	810							
	Bedrock diorite		3	BX	100%								
	Sound		4	RC	100%								
	Grey		5	RC	100%								
800.9			6	BX	100%	800							
10.7	End of Borehole												
						790							

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

JOB 72-11011 LOCATION Sta. 340 + 30 o/s 20' Lt.ORIGINATED BY TVW.P. 911-71 BORING DATE Jan. 21, 1972COMPILED BY GPDATUM Geodetic BOREHOLE TYPE AXT & BX Rock CoreCHECKED BY SK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w w_p — w — w_L WATER CONTENT %				BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE										
799.6	Ground Level		1	AXT	85%	790										GR. SA. SI. CL.	
0.0	Bedrock diorite		2	RC	100%												WL frozen at surface Jan.22/72
			3	BX	100%												
			4	RC	100%												
	Sound		5	RC	100%												
			6	RC	100%												
787.3	Grey		7	BX	100%												
12.3	End of Borehole					780											

WL frozen
at surface
Jan. 22/72

DEPARTMENT OF HIGHWAYS- ONTARIO

MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 5

FOUNDATION SECTION

JOB 72-11011

LOCATION Sta. 340 + 30 o/s 20' Rt.

ORIGINATED BY TV

W.P. 911-71

BORING DATE Jan. 24, 1972

COMPILED BY GP

DATUM Geodetic

BOREHOLE TYPE BX Rock Core

CHECKED BY *AK*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT ——— w_L				BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					PLASTIC LIMIT ——— w_p					
						SHEAR STRENGTH P.S.F.					WATER CONTENT ——— w						

FOUNDATION SECTION

CHECKED BY AK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— W_L		BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	PLASTIC LIMIT ——— W_P	WATER CONTENT ——— W		
798.7	Ground Level											
0.0	Boulders(up to 12") mixed with gravel and silty sand.		1	CS	-	790						797.2 Jan. 22/72
	Very Dense Grey		2	BX	25%							
788.5			3	BXL	15%							
10.2	Bedrock diorite		4	BXL	100%	780						
	Sound Grey		5	AXT	100%							
778.5			6	AXT	100%							
20.2	End of Borehole					770						

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 7

FOUNDATION SECTION

JOB 72-11011 LOCATION Sta. 340 + 90 20' Rt. ORIGINATED BY TV
 W.P. 911-71 BORING DATE Feb. 8 & 9, 1972 COMPILED BY GP
 DATUM Geodetic BOREHOLE TYPE Washboring-BX Casing CHECKED BY SR

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		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. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE		WATER CONTENT % w_p — w — w_L			
797.8	Ground Level											
0.0	Boulders (up to 18" in size) mixed with gravel & silty sand.		1	RC	70%	790						GR, SA, SI, CL ▽ 796.8 Feb. 9/72
	Very Dense		2	RC	29%							
785.8	Grey					780						
12.0	Bedrock diorite		3	RC	58%							
	Sound		4	BX	97%							
	Grey		5	BX	100%							
771.8			6	BX	100%							
26.0	End of Borehole					770						

FOUNDATION SECTION

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE	LIQUID LIMIT ——— W _L	BULK DENSITY	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	PLASTIC LIMIT ——— W _P			WATER CONTENT ——— W
							20 40 60 80 100				
SHEAR STRENGTH P.S.F.							W _P ——— W ——— W _L				
○ UNCONFINED + FIELD VANE							WATER CONTENT %				
● QUICK TRIAXIAL x LAB. VANE							10 30 30				
305.8	Ground Level										
0.0	Boulders(up to 18" in size) mixed with gravel & silty sand.		1	SS	75%	"					
			2	RC	60%						
			3	BX	55%	800					
	Very Dense		4	BX	16%						
			5	BX	40%	790					
	Brown to Grey		6	BX	32%						
			7	RC	60%						
			8	RC	100%						
			9	BX	62%	780					
			10	BY	0%						
			11	AXT	69%						
772.5				12	AXT	0%					
33.0	Bedrock (diorite)		13	AXT	100%						
			14	AXT	100%	770					
	Sound Grey		15	AXT	100%						
765.6											
40.2	End of Borehole					760					

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 10

FOUNDATION SECTION

JOB 72-11011 LOCATION Sta. 341 + 80 Ø ORIGINATED BY TV
 W.P. 911-71 BORING DATE Jan. 29, 1972 COMPILED BY GP
 DATUM Geodetic BOREHOLE TYPE BX Casing, Washboring & AXT Rock Core CHECKED BY SLC

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — w_L		BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	PLASTIC LIMIT — w_p	WATER CONTENT — w		
808.2	Ground Level											
0.0	Boulders (up to 9" in size) mixed with gravel & silty sand.		1	SS	42							
803.1			2	AXT	60%							
5.3	End of Borehole					800						

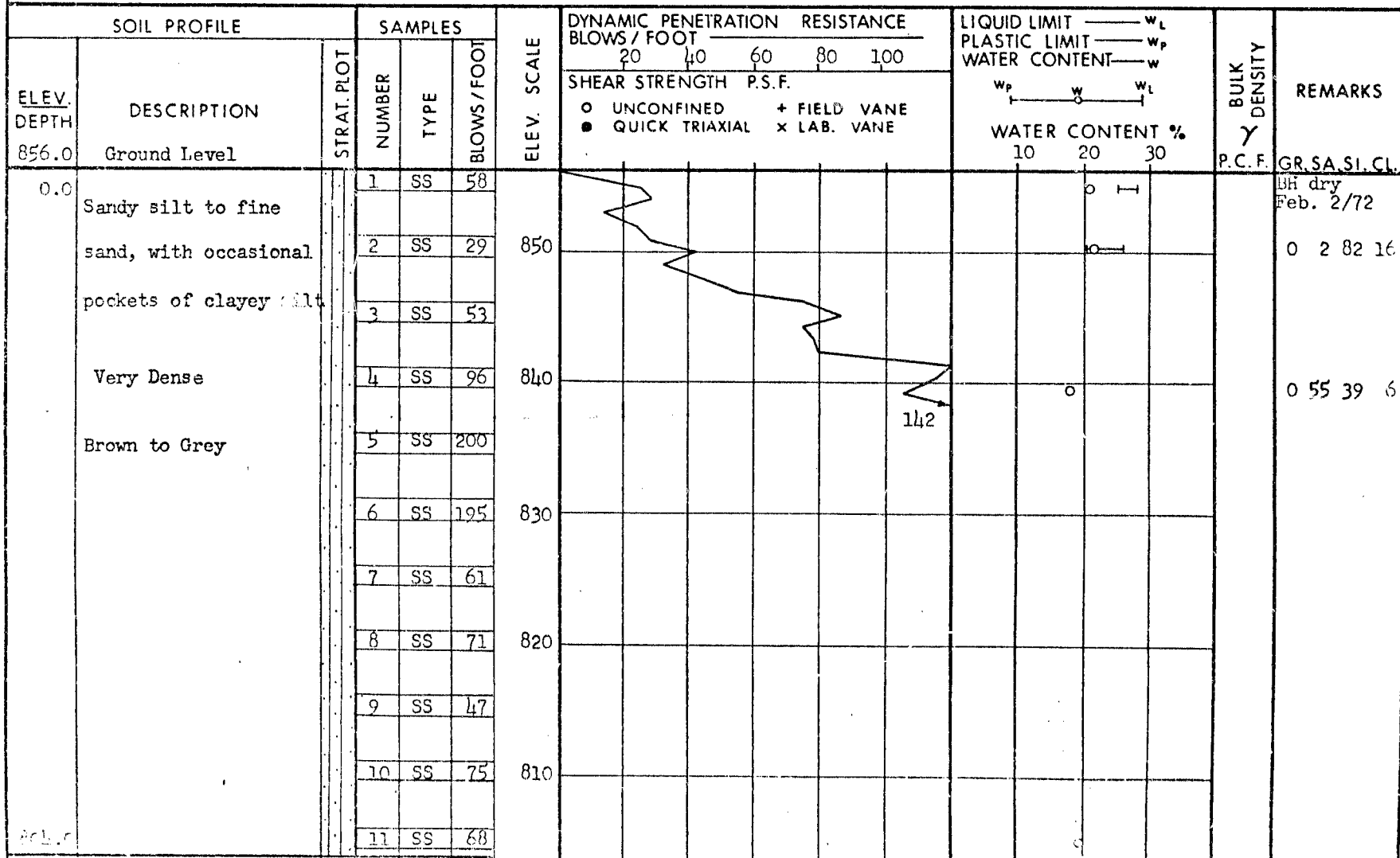
REMARKS

Hole dry

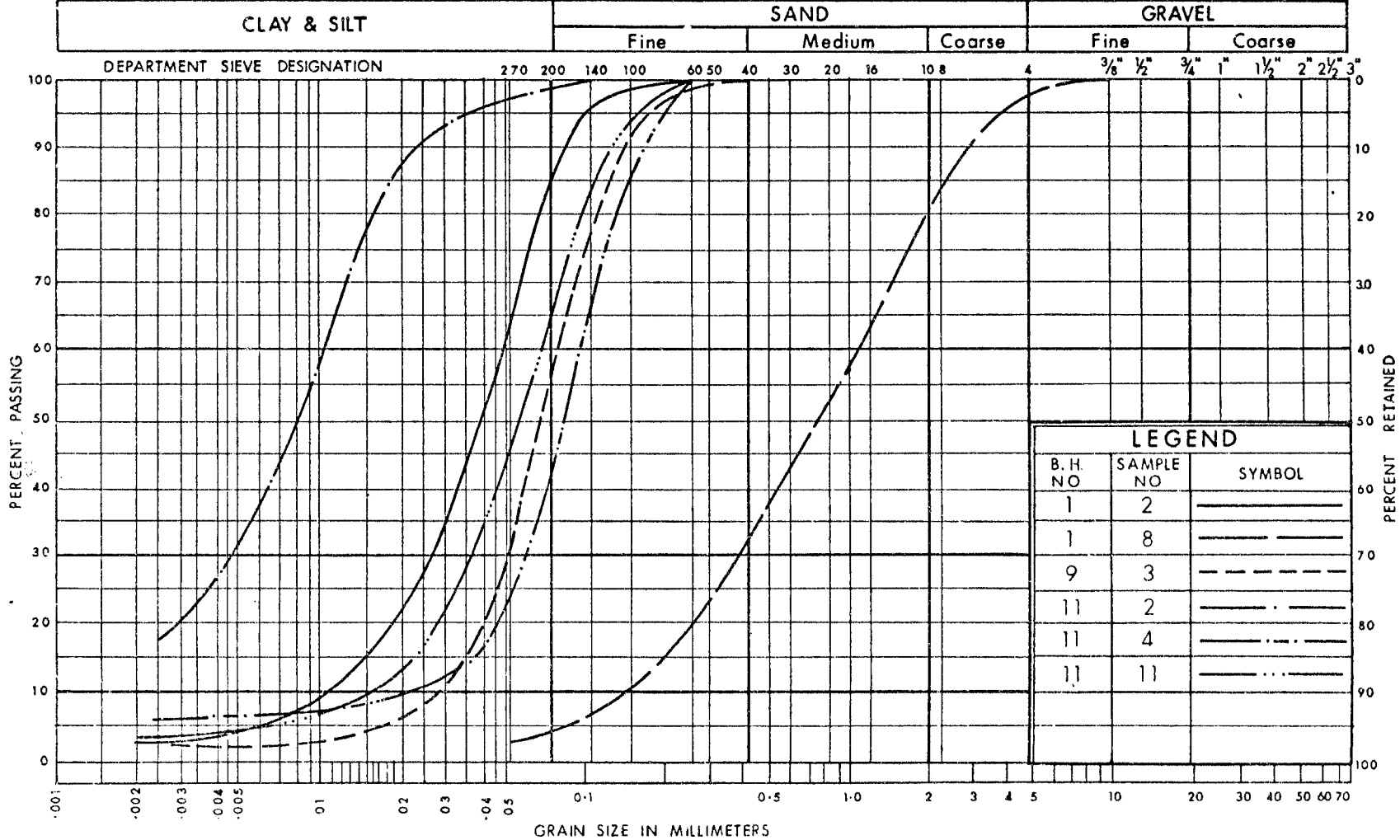
RECORD OF BOREHOLE No. 11

FOUNDATION SECTION

JOB 72-11011 LOCATION Sta. 322 + 30 o/s 15' Lt. ORIGINATED BY TV
W.P. 911-71 BORING DATE Jan. 31 - Feb. 2, 1972 COMPILED BY GP
DATUM Geodetic BOREHOLE TYPE BX Casing, Washboring, Cone Test CHECKED BY SR



UNIFIED SOIL CLASSIFICATION SYSTEM



APPENDIX II

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. M. Devata,
Sup. Foundation Engineer.

FROM: K. W. Ingham

ATTENTION:

DATE: February 15, 1972

OUR FILE REF.

IN REPLY TO

SUBJECT:

Foundation Investigation 72-11011;
Highway 17 - Sudbury By-Pass

A brief description is given below for the six boreholes in which rock cores were recovered at this site, together with the bedrock elevation in each case.

In general, the bedrock was found to be sound from the top.

Hole No. 2

Bedrock at 810.2

0 - 12.5 Grey quartz micro-diorite with prominent sulphide mineralization, two conspicuous sets of fracture planes, approximately vertical and at 45° - closed with abundant sulphide minerals.

Hole No. 3

Bedrock at 811.6

0 - 10.7 Grey quartz micro-diorite, similar to Hole No. 2.

Hole No. 4

Bedrock at 799.6

0 - 0.3 Pink fine-grained syenite, possibly dyke or flat boulder.

0.3 - 12.3 Grey quartz micro-diorite, two sets of closed fracture planes as in holes 2 and 3, 0.3 to 0.7 broken core due to vertical fractures.

Hole No. 5

Bedrock at 805.1

0 - 12.0 Grey quartz micro-diorite, two sets of closed fracture planes as in holes 2, 3 and 4 plus frequent horizontal fractures in the upper 6.0 ft., broken core at 1.8, 4.1, 5.0, 6.5 and 8.0 due to vertical fractures, evidence of shearing along vertical fractures.

Hole No. 6

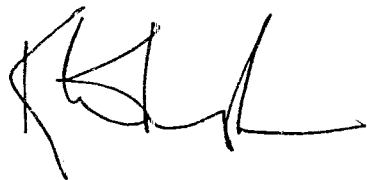
Bedrock at 788.2

- 0 - 10.5 Diorite boulders.
- 10.5 - 20.2 Grey quartz micro-diorite, two sets of closed fracture planes as in hole 2 plus frequent horizontal fractures in the upper 2.9 ft.

Hole No. 9

Bedrock at 772.8

- 0 - 33.0 Diorite, gabbro syenite and granite boulders.
- 33.0 - 40.2 Grey quartz micro-diorite, two sets of closed fracture planes as in hole 2, core broken in the upper 2.0 ft. due to vertical fracture.



K. W. Ingham,
Geologist.

KWI:mv

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

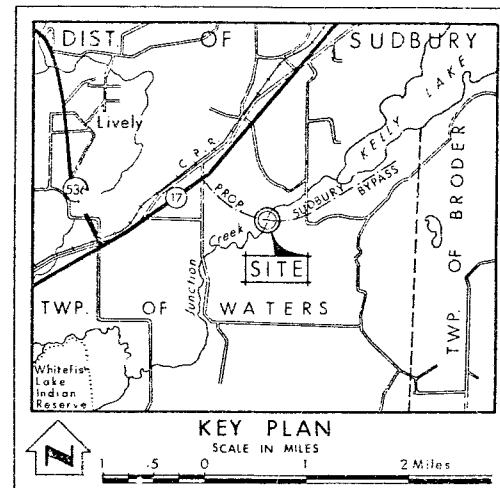
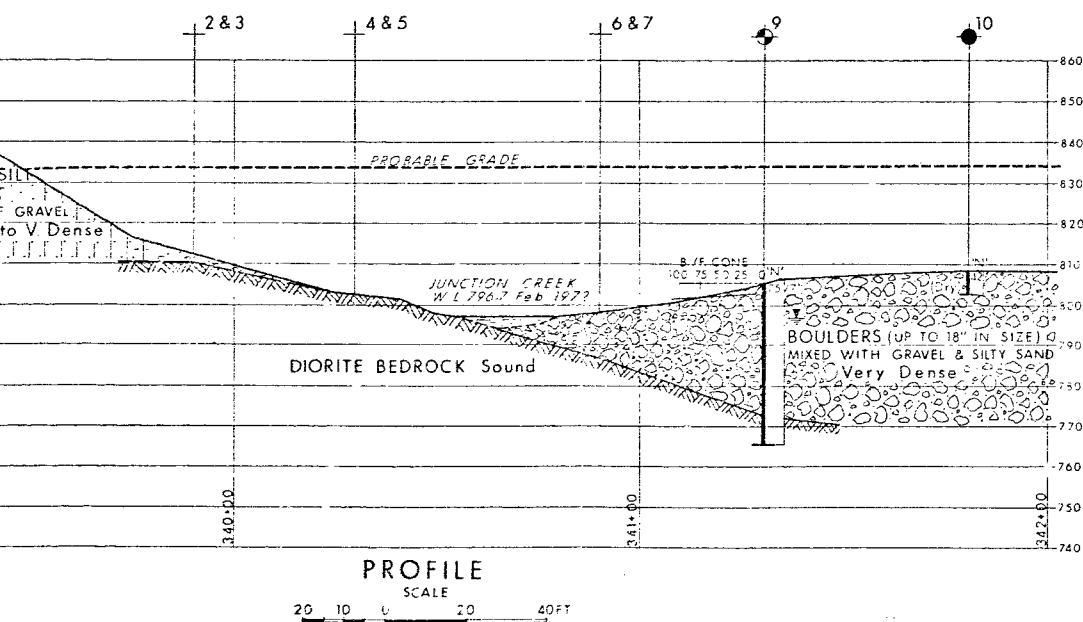
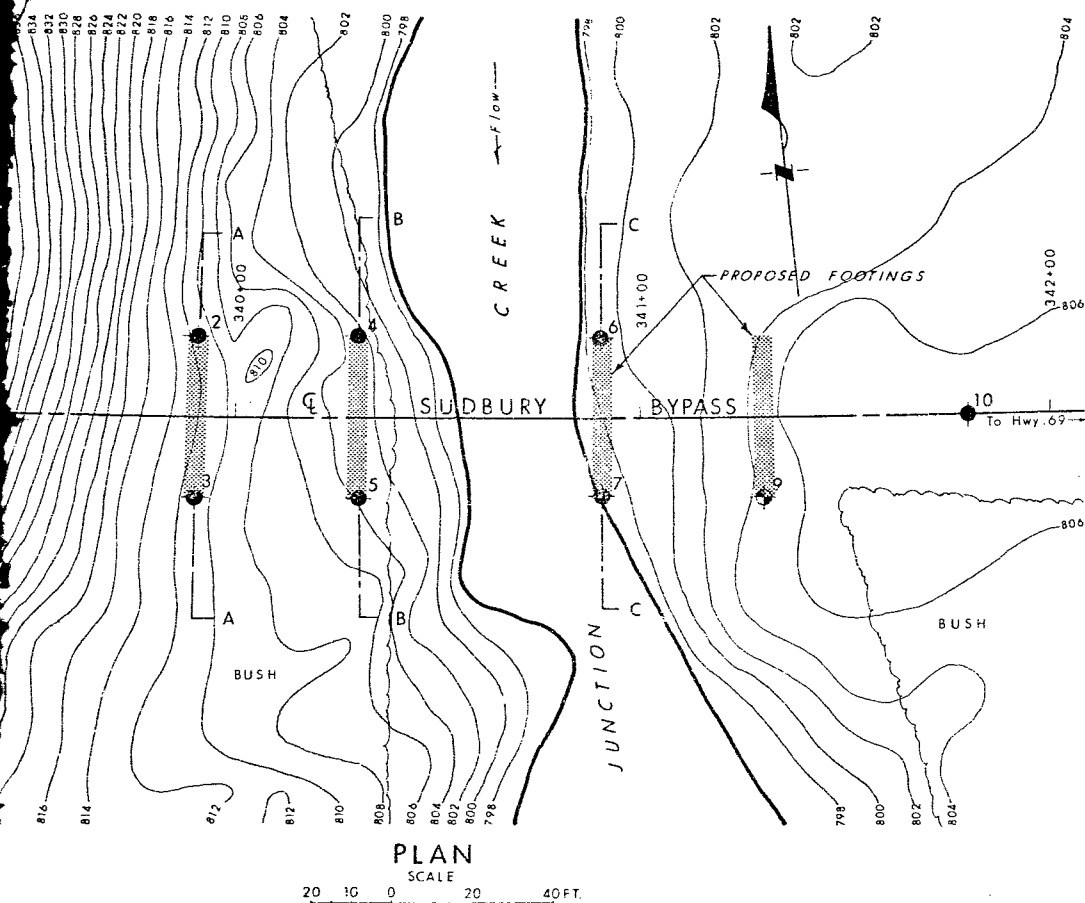
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

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



LEGEND			
	Bore Hole		
	Cone Penetration Test		
	Bore Hole & Cone Test		
	Water Levels established at time of field investigation.		
	Jan. & Feb. 1972		

— 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.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION & COMMUNICATIONS
DESIGN SERVICES BRANCH — FOUNDATION OFFICE

JUNCTION CREEK

HIGHWAY NO. Prop. SUDDBURY BYPASS DIST. NO. 17
Dist. of SUDDBURY
TWP. WATERS LOT. CON.

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD. M. D. CHECKED	K.P. NO. 911-71	DRAWING NO.
DRAWN & CHECKED	JOB NO. 72-11011	72-11011A
DATE Feb. 15, 1972	SITE NO.	BRIDGE DRAWING NO.
APPROVED <i>W. J. M. J.</i>	CONT. NO.	

A. Stermac

**Structural Office,
West Bldg., Downsview.**

MAY 9, 1972.

Re: Junction Creek Bridge,
Approx. 0.8 Mi. East of Jct. Hwy. #17,
W.P. 911-71-03, Site 46-281,
Sudbury S-W Bypass, District #17.

The estimated cost of the proposed structure is \$140,000.00, which includes tender, materials, engineering and sundry construction.

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

**C.S. Grebski,
Structural Design Engineer.**

CAG:er
Attach.

**C.C. A. McKim
B. Davis
A. Stearns (2)
J. Anderson
R. Murphy**

FOUNDATIONS OFFICE

REVIEW OF DESIGN DRAWINGS:

W.P. 911-71-01.....

W.O. 72-1101.....

Foundation Report By :

.....S. AHMAD.....

Review of Design Drawings By:

...S.AHMAD.....

Design Drawing No.'s:

...46-281-P1.....

1. Does footing design comply with our report or subsequent memos?
2. If answer to 1. is No, is present design acceptable?
3. Has sufficient field work been done?
4. Are estimated pile lengths shown on Drawings correct? If not, make a new list.
5. If excavation of unsuitable soil is recommended, is this shown on Drawings?
6. Are approaches designed in accordance with our report? Check slopes and berm lengths.
7. Do you anticipate any construction problems? i.e., dewatering, stability of temporary slopes or excavations.
8. Summarize your comments; on separate sheet if necessary.

No. W. ADUT DIFFERENT
BUT OK.

Yes

YES.

N/A PRELIMINARY
PLANS.

N/A.

No. LONGITUDINAL
SLOPES ARE SHOWN
AT: $1\frac{3}{4} : 1$.

DEWATERING MAY
BE A PROBLEM.

We have reviewed the preliminary Drawings No. — for the above structure and submit the following comments:

The design is provided a slope of $1\frac{3}{4} : 1$ in the longitudinal direction instead of $2 : 1$ at the approaches. The approaches will be stable provided that ~~the~~ underways ~~of the slopes will be~~ governed by the type of fill material and in ~~which~~ ^{is} prevented by ~~the~~ ^{the} scour action of the river. It should be noted that the stability of the embankments will be governed by the type of fill material used for construction.

Drawings Received May 10th 1972

Reviewed ... May ... 1972 ...

Signed Arthur C. Thomas.....

Mr. C. S. Grebski,
Structural Design Engineer,
Design Services Branch,
West Bldg., Downsview.

700 102

Foundations Office,
Design Services Branch,
Central Bldg., Downsview.

May 17, 1972.

Junction Creek Bridge
Approx. 0.8 Mi. East of Jct. Hwy. #47
W.P. 911-71-03; Site 46-281
Sudbury, S-W Bypass, District #17

72-11-011

We have reviewed the preliminary Drawing 46-281-P1 for the above structure and submit the following comments.

The designer has incorporated a slope of 1-3/4:1 in the longitudinal direction instead of 2:1 at the approaches. The approaches will be stable provided that undermining of the toe by the scour action of the river, is prevented. It should be noted that the stability of the embankments will be governed by the type of fill material used for fill construction.

S. A. Ahmad

S. A. Ahmad,
Project Foundations Engineer,
M. Devata,
Supervising Foundations Eng.

SAA/ao

For:

cc: J. McAllister
R. Northwood
Foundations Files
Documents

MEMORANDUM

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

FROM: C.S. Grebski
Structural Design Engineer
Structural Office - West Bldg.

ATTENTION:

DATE: July 12, 1972

OUR FILE REF.

IN REPLY TO

SUBJECT: Junction Creek Bridge
(approx. 0.8 mi. East of Jct. Hwy. 17
W.P. 911-71-03 Site 46-281
Hwy. - Sudbury S-W ByPass District 17

72-11-011

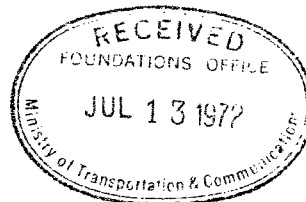
Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.

CSG/hvh
Encls.

f. Walone Lini
C.S. Grebski
Structural Design Engineer

cc Foundation Office



No comments.
M. Durata
July 21/72

FOUNDATIONS OFFICE

REVIEW OF DESIGN DRAWINGS:

W.P. 911-71-03.....

W.O. 72-11011.....

Foundations Report by: ..S. AHMAD.....

Review of Design Drawings by: ..S. AHMAD.....

Design Drawing No.'s: ..46-281-1.....

..46-281-3.....

1. Does footing design comply with our report or subsequent memos? No
WEST ABOUT ON
PILES.
2. If answer to 1. is 'No', is present design acceptable? YES.
3. Has sufficient field work been done?
4. Are estimated pile lengths shown on Drawings correct? YES.
If not, make a new list.
5. If excavation of unstuitable soil is recommended, is this shown on drawings? N/A.
6. Are approaches designed in accordance with our report? No.
Check slopes and berm lengths. LONGITUDINAL SLOPES
SHOWN AS 1 3/4'.
7. Do you anticipate any construction problems?
i.e. dewatering, stability of temporary slopes or excavations. YES. DEWATERING
OF EAST PIER.
8. Summarize your comments; on separate sheet is necessary.

No Comments

Drawings Received July 13 1977..

Reviewed July 18 1977..

Signed *S. Shum S. Shumad..*

*Designs B.O.
5 Dec 72
d/r*

Mr. J. C. Flook, (2)
Construction Engineer,
District #17,
Sudbury, Ontario.

128
Foundations Office,
Design Services Branch,
West Bldg., Downsview.

July 18, 1973.

*Inspection of Footing Excavation,
East Pier, Site #46-281
Junction Creek and Sudbury Bypass
W.O. 72-11011, W.P. 911-71-01, Cont. 72-212*

The Foundations Office was requested to inspect the east pier footing excavation for the above project.

The inspection became necessary since the piles driven at the east abutment location penetrated to the bedrock surface which is beyond the originally estimated refusal level. The excavation base was inspected by the writer immediately upon exposure and the following observations were made:

- 1) The subsoil at the foundation level consists of a grey coloured, very dense glacial till material containing mainly sand and gravel, some silt, trace of clay and frequent boulders (up to 24" in size).
- 2) The north side of the excavation at foundation level appeared to contain more sand and silt sizes than at other locations and found to be somewhat less dense. It was agreed with District personnel that this portion be excavated and replaced with tremie concrete.
- 3) Seepage into the excavation was negligible.


If we can be of any further assistance on this project, please contact this Office.

PP/ao

c.c. J. M. Crannie
C. S. Grebski
A. E. McKim

Foundations Files /
Documents

For:


P. Payer,
Senior Foundations Engineer,
M. Devata,
Supervising Foundations Engineer.

MEMORANDUM

TO: Mr. A. Stermac,
Principal Foundation Engineer,
Downsview.

FROM: Bridge Planning,
North Bay.

ATTENTION:

DATE: 4 January 1972

OUR FILE REF.

IN REPLY TO

SUBJECT:

Re: W. P. 911-71-01 Site 46-281
Junction Creek
Sudbury By Pass District # 17

A foundation investigation is required at the site of the above crossing.

Attached is a copy of the preliminary site plan for the crossing showing the location of boreholes required to adequately cover the proposed structure. This is estimated to be a three span 40'/60'/40' structure with an approximate grade line as shown.

Also enclosed is a print of a 200' scale plan of the alignment together with related profile. The Senior Soils Engineer suspects that there may be slope stability problems in the cut between sta. 117+00 and 127+00 and requests that you put a hole down in this cut at about sta. 122+00 during your investigation.

As soon as numbered plans are available, copies will be forwarded to you.

JCMcA/bn
encl.

c. c. - Mr. R. Murphy
- Mr. C. S. Grebski

J. C. McAllister
J. C. McAllister,
Regional Bridge
Planning Supervisor.

FEB 23. 1972
UNCONDITIONAL

GEOCON

DESIGN BRIEF

DESIGNED BY R J WisemanDATE DEC 29, 1972

CHECKED BY _____

PAGE 1 OF 5PROJECT NO. TS113 SHORT TITLE DIC Job 72-11011, SITE 46-2811DESIGN SUBJECT SITE CONDITIONS REF. DWGS. _____

PLATE I, EAST BANK OF JUNCTION CREEK
LOOKING TO SOUTH, DRILLING ON BH9

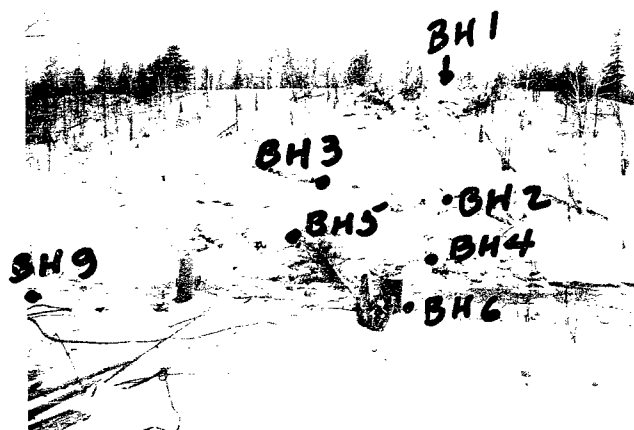


PLATE II LOOKING WEST ALONG PROPOSED & FROM
VICINITY OF BH10

GEOCON

DESIGN BRIEF

DESIGNED BY _____

DATE _____

CHECKED BY _____

PAGE 2 OF 5

PROJECT NO. _____ SHORT TITLE _____

DESIGN SUBJECT SITE CONDITIONS REF. DWGS. _____

PLATE III LOOKING EAST ALONG PROPOSED CREEK FROM
BOREHOLE 1

GENERAL DESCRIPTION:

AT THE TIME OF THE INVESTIGATION THE
WIDTH OF JUNCTION CREEK AT THE PROPOSED
BRIDGE LOCATION WAS IN THE ORDER OF 15 FEET
WITH THE WATER LEVEL @ EL. 796.6 GEODETIC.
THE CENTER CHANNEL DEPTH WAS ABOUT 3' AND
THE CREEK BOTTOM WAS LINED WITH COBBLES &

GEOCON

DESIGN BRIEF

DESIGNED BY _____

DATE JAN 29, 72

CHECKED BY _____

PAGE 3 OF 5

PROJECT NO. _____ SHORT TITLE _____

DESIGN SUBJECT _____ REF. DWGS. _____

BOULDERS TO 3' SIZE.

THE WEST BANK OF THE ~~RIVER~~^{CREEK} SLOPES UPWARDS, AWAY FROM THE CREEK AT ABOUT 2 feet IN 10 feet HORIZONTAL FOR A DISTANCE OF ~80'. FROM ~80' WEST OF THE CREEK TO 130' THE SLOPE IS STEEPER AT ABOUT 6 feet IN 10 feet HORIZONTAL. BOREHOLE 1 WAS PUT DOWN AT THE CREST OF THIS STEEPER SLOPE. BOREHOLES 2, 3, 4, 5 PUT DOWN ON THE LOWER SLOPE ENCOUNTERED BEDROCK AT ABOUT 6" TO 2' BELOW GROUND SURFACE.

THE EAST BANK SLOPES UPWARDS AWAY FROM THE CREEK AT ABOUT 2 feet IN 10 feet HORIZONTAL. BEDROCK BECOMES PROGRESSIVELY DEEPER TOWARDS THE EAST, AND WAS ENCOUNTERED AT 10.3' IN BOREHOLE 6 AND 33.0' AT BOREHOLE 9. OVERBURDEN ON THE EAST BANK

GEOCON**DESIGN BRIEF**

DESIGNED BY _____

DATE JAN 29, 72

CHECKED BY _____

PAGE 4 OF 5

PROJECT NO. _____ SHORT TITLE _____

DESIGN SUBJECT _____ REF. DWGS. _____

CONSISTS OF GRAVEL, COBBLES, AND Boulders WITH
SAND & SILT. CASING HAD TO BE RAMMED
THROUGH THIS OVERBURDEN AS IT COULD NOT BE
DRIVEN. SPLIT SPOON SAMPLES COULD NOT BE
OBTAINED FROM THIS STRATUM

NO INDICATIONS OF SCOUR WERE OBSERVED
ALONG THE CREEK SHORELINES.

WATER LEVELS IN THE BOREHOLES REMAINED
AT ABOUT CREEK LEVEL, I.E. 796.6 GEODETIC

GEOCON

DESIGN BRIEF

DESIGNED BY RJWDATE JAN 29, 72

CHECKED BY _____

PAGE 5 OF 5PROJECT NO. T5113 SHORT TITLE DTC JOB 72-11011, SITE 46-2811DESIGN SUBJECT LEVELING RESULTS REF. DWGS. _____

STATION	BS	HI	FS	IS	ELEVATION	REMARKS
BM	1.85					BENCHMARK, X ON BEDROCK
	1.85	812.13			810.28	114.4 RT, STA 340+28
BH 3				1.49		
				1.49	810.64	
BH 2				2.40		
				2.40	809.73	
BH 4				12.52	799	
				12.52	809.61	
BH 5				7.08		
				7.08	805.05	
BH 6				13.43		
				13.43	798.70	
BH 9				6.21	805.82	
				6.21		
BH 10				3.77		
				3.77	808.31	
CREEK WATER SURFACE				15.57		
				15.57	796.56	
TP 1	13.40		0.65			TURNING POINT, STUMP
	13.40	824.88	0.65		811.48	
TP 2	12.30		1.71			TURNING POINT, COBBLE ON SLOPE
	12.30		1.71		823.17	
TP 3	12.57		1.83			TURNING POINT, ROCK ON SLOPE
	12.57	846.21	1.83		833.64	
TP 4	9.92	851.08	1.08			TURNING POINT, STUMP ON SLOPE
	9.92		1.08		845.13	
BH 1			5.74			
			5.74		849.31	

SURVEY CARRIED OUT JAN 29, 72

INST: RJW

, LEVEL WIND N3 - 65222

ROD: TU

ROD #1



VISUAL CLASSIFICATION SHEET

PROJECT _____ SITE _____ BOREHOLE No. 11 GROUND ELEVATION _____

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
															CLAYEY SILT	CL
																CL
															FINE SAND	SP
															FINE SAND	SP

NOTES:— VISUAL CLASSIFICATION MUST BY CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:—

2 10.63

FINE

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT _____ SITE _____ BOREHOLE No. 9 GROUND ELEVATION _____

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
															FINE SAND	

NOTES:— VISUAL CLASSIFICATION MUST BY CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:—

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT _____ SITE _____ BOREHOLE No. _____ GROUND ELEVATION _____

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
	</															

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REMARKS:—

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT _____ SITE _____ BOREHOLE No. _____ GROUND ELEVATION _____

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										

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REMARKS:—

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
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REMARKS:—

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
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PROJECT _____ SITE _____ BOREHOLE No. _____ GROUND ELEVATION _____

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REMARKS:—

General Layout
Footings "