

62-F-131

W.P.# 266-59-3

Hwy. # 400 E

C.N.R. OVERPASS

Mr. C. Fraser,
District Engineer,
Toronto.

Mr. A. G. Stermac,
Principal Foundation Engr.,
Foundation Section,
Materials & Research Division.
April 23, 1963

Attention: Mr. H. Gilbert,
Dist. Const. Engr.

**D.H.C. FOUNDATION INVESTIGATION REPORT --
Hwy. 400 and C.N.R. Overpass, Dist. 6,
Contract ~~60-98~~, W.P. 266-59-3, W.J. 62-F-131.
Settlement Settlements**

60-237

Attached to this memo, we are sending you the report dealing with the above-mentioned subject. The report contains all the factual data collected during the investigation, as well as the interpretation and pertinent recommendations.

We believe that the investigation has clarified and established the reasons for the present condition. We are also of the opinion that when the recommended remedial measures are carried out, the maintenance of the road will be minor.

Should you require additional information, please feel free to call on our Office.

AGS/M207
Attach.

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

cc: Mr. T. J. Korish

Foundations Office
Gen. Files

FOUNDATION INVESTIGATION

Embankment instability on Hwy. 400 at Hwy. 101 crossing,
Just North of Teesla Ave., Station 12+50 to 13+40.
Contract 62-37, S.R. 260-19, S.R. 62-151
District 8, Toronto.

Considerable settlements and signs of slope instability were observed on the approach embankments to the Hwy. 400 - Hwy. 101 overpass structure. The paving of the present road was carried out during May and June, 1962, and already in August of the same year, the first signs of movements were observed. According to the information collected by this Section, movements on the shoulder of the northbound lane were noticed first. The guide rail moved and subsequently, the pavement subsided and cracked. In November, 1962, the pavement and the guide rail were repaired, but soon afterwards, due to further movements, cracks and displacements appeared again.

At this time, the Foundation Section was requested to carry out an investigation with the object of establishing the reasons for instability and recommend the necessary remedial measures.

According to the obtained information, the approach embankment and structure were built in stages, the first being the construction of the approach fill to a distance of approx. 150 ft. from the structure. The bridge was built next, Stage No. 2, followed by Stage No. 3 - placement of the remainder of the fill. Stage No. 3 was carried out during November and December, 1961. Stage No. 4, carried out in December 1961, was the placement of the granular backfill behind the abutments of the structure.

While the building of the bridge, Stage 2, was under way, the remaining portion of the approach embankment, Stage 3, was stockpiled on the already finished embankment.

It is on the portion of the embankment placed in Stage 3, where the settlements have occurred and where the signs of slope instability are most clearly visible.

The field investigation carried out by this Section, consisted of ten boreholes and three piezometers, the locations of which are shown on Drawing No. 62-W-131A. The individual borehole logs are given in the appendix to this report. The soil stratification, as inferred from the individual borings, is presented on the above-mentioned drawing.

The three piezometers were installed for the detection of possible ground water within the embankment. However, neither in the piezometers nor in any of the boreholes, was any trace of ground water registered.

The investigation revealed a number of important and significant facts. It was found that the density of the fill is rather erratic, ranging from loose to dense, that the natural water content of the clayey silt fill material is at or below the plastic limit, and also, that the undrained shear strength is generally in excess of 1,000 p.s.f. It was also found that the original organic topsoil layer was not removed prior to fill construction.

On the basis of the above-mentioned findings and facts, it can be concluded that the observed fill movements are basically settlements resulting from inadequate fill compaction. This

conclusion is further substantiated by the information that most of the fill placement during Stage No. 3 was carried out by pushing the material from the stockpile into the empty space that had to be filled. Movements were first noticed and were largest on the shoulder of the northbound lane. This can be explained by the partially unconfined and unrestrained condition of the fill on the slope side and also by the easier access that the water has to the fill on the shoulder.

If a clay soil when compacted, is in a very dry condition - i.e., the water content is much below the Proctor optimum, large settlements will occur when moisture penetrates into such soils and tends to saturate them.

It appears that in this particular case, both factors - insufficient compaction and the very dry soil conditions, were contributing to and causing the resulting settlements.

Shear strength values generally in excess of 1,000 p.s.f. point to the fact that movements could not be attributed to lack of strength.

The best, but rather radical remedial measure would be to remove and recompact the fill material. However, we believe that such a radical measure is not warranted and would recommend that only the approach embankment slopes be repaired - i.e., recompacted and shaped, and the shoulders be brought up to original level. We also believe that the greatest part of the settlements has already taken place, but some more can still be expected and therefore, the pavement, as well as the shoulders, will have to be maintained.

The field work was carried out by Mr. B. M. Ghadiali,
Project Foundation Engineer.

RECORD OF BOREHOLE NO. 1

FOUNDATION SECTION

DATE 6-7-1962 LOCATION Sta. 13+66 and 66' to right of E. Hvy. 400 ORIGINATED BY B.H.G.
 D.P. 260-19-1 BORING DATE Nov. 26, 1962 COMPILED BY B.H.G.
 CATION G.S.C. BOREHOLE TYPE Pennsylvania Auger CHECKED BY _____

SOIL PROFILE		SAMPLES			ELEV. SCALE	STANDARD PENETRATION RESISTANCE BLOWS / FOOT	SHEAR STRENGTH, P.S.F.	LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W		BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	START NUMBER	TYPE	BLOWS / FOOT				WATER CONTENT % 15 30 45			
630	Gravelly silt.										
	Fill Material.	1	SS	11							
	(Silt, clayey silt with some sand and fine gravel).	2	SS	7	630						
	Looks to compact.	3	SS	4							
	Pr. grey.	4	SS	16	625						
		5	SS	16							
		6	SS	17							
		7	SS	24	620						
615	Organic material.	8	SS	17							
	Fill	9	SS	22	615						
	(Clayey silt, sand and gravel).	10	SS	37							
	Dense.				610						
	Br. grey.										
		11	SS	37	605						
600	End of borehole.	12	SS	34	600						

DEPARTMENT OF HIGHWAYS - DATARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO 1

FOUNDATION SECTION

JOB 62-F-131 LOCATION Sta. 13+68 and 64' to right of R. Hwy. 400 ORIGINATED BY B.H.G.
W P 266-59-3 BORING DATE Nov. 26, 1962. COMPILED BY B.H.G.
DATUM G.S.C. BOREHOLE TYPE Pennsylvania Auger CHECKED BY _____

SOIL PROFILE		SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— % PLASTIC LIMIT ——— % WATER CONTENT ——— %		BULK DENSITY P.C.F.	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	WL	WP		
61.4	Groundlevel										
	Fill Material.		1	SS	11			—			
	(Silt, clayey silt with some sand and fine gravel).		2	SS	7	630		o			
	Loose to compact.		3	SS	4			—			
	Br. grey.		4	SS	14			o			
			5	SS	16	625		—			
			6	SS	17			o			
			7	SS	26	630		—			
61.9	Aggregate Material.		8	SS	17			o			
15.6	Till		9	SS	22			—			
	(Clayey silt, sand and gravel).		10	SS	37	615		o			
	Dense.										
	Br. grey.					610					
			11	SS	37			—			
						605					
32.5			12	SS	34			—			
31.6	End of borehole.					600					

LOG # 62-P-131 LOCATION Sta. 13+27 and 63' to right of S. Hy. 400 ORIGINATED BY R.M.G.
 W.P. # 256-58-3 BORING DATE Nov. 27, 1962 COMPILED BY R.M.G.
 SATUR. G.S.G. BOREHOLE TYPE Pennsylvania Ascar CHECKED BY _____

SOIL PROFILE		SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — PL		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	NUMBER	TYPE		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	PLASTIC LIMIT — PP	WATER CONTENT — W		
								WATER CONTENT % 15 30 45		
62.5	<u>Tunnel</u>									
62.9	Fill Material.	1	SS	9						
	(Silt, clayey silt with some sand and fine gravel).	2	SS	18						
	Loose to Dense.	3	SS	15	630					144
	Br. gray to gray.	4	SS	20						
		5	SS	5	625					
		6	SS	10						
		7	SS	14	620					
61.7	<u>Organic root material</u>									
61.5	Fill	8	SS	33	615					
	(Clayey silt, sand and gravel).	9	SS	39						
	Dense.				610					
	Br. gray.	10	SS	40						
					605					
602.5		11	SS	51						
61.0	End of borehole.				600					

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 2

SECTION SECTION

JOB 62-P-131

LOCATION Stn. 13+27 and 63' to right of E. Hwy. 400

ORIGINATED BY B.M.C.

W.P. 266-59-3

BORING DATE Nov. 27, 1962.

COMPILED BY B.M.C.

DATUM G.S.C.

BOREHOLE TYPE Pennsylvania Auger

CHECKED BY

ELEV DEPTH	SOIL PROFILE DESCRIPTION	STRAT. PL. / NUMBER	SAMPLES		ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT SHEAR STRENGTH σ_v	PLASTICITY WATER CONTENT %	PLASTICITY WATER CONTENT %	REMARKS
			TYPE	BLOWS / FOOT					
635	Topsoil								
0.9	Fill Material. (Silt, clayey silt with some sand and fine gravel). Loose to Dense. Br. gray to gray.	1	SS	9					
		2	SS	14					
		3	SS	15	630				
		4	SS	20					
		5	SS	5	625				
		6	SS	10					
		7	SS	14	620				
817	Organic rock material								
18.6	Fill (Clayey silt, sand and gravel). Dense. Br. gray.	8	SS	33	615				
		9	SS	39					
		10	SS	40	610				
23.5		11	SS	51	605				
31.6	End of borehole.				600				

DEPARTMENT OF THE ARMY
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 3

LOG NO. 54-F-231 LOCATION Str. 13750 and T1' to right of E. Hwy. 400
W.D. 250-29-3 BORING DATE Nov. 27, 1954.
DATUM U.S.C. BOREHOLE TYPE Pennsylvania Auger

DRILLER B.A.G.
SUPERVISOR S.H.G.
CHECKED BY

ELEV. DEPTH	SOIL PROFILE DESCRIPTION	START PLUS	SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	SHEAR STRENGTH P.S.F.	UNCONF. COMP. TEST 400 800 1200 1600 2000	REMARKS
			NUMBER	TYPE					
63.4	Fill Material (Silt, clayey silt with some sand and fine gravel). Loose to compact Br. grey		1	Ts P					
			2	TW P					
			3	Ts P	630				
			4	TW P					
			5	TW P					136
			6	TW P	625				
			7	Ts P					139
			8	TW P					
			9	Ts P	620	4150			141
			10	SS 18					
61.8	Organic Material								
16.6	Till (Clayey silt and fine sand). Dense Brown				615				
			11	SS 32					
					610				
607.8			12	SS 32					
20.3	End of borehole.								

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

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

CLASSIFIED BY 3.4.0

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 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724 2725 2726 2727 2728 2729 2730 2731 2732 2733 2734 2735 2736 2737 2738 2739 2740 2741 2742 2743 2744 2745 2746 2747 2748 2749 2750 2751 2752 2753 2754 2755 2756 2757 2758 2759 2760 2761 2762 2763 2764 2765 2766 2767 2768 2769 2770 2771 2772 2773 2774 2775 2776 2777 2778 2779 2780 2781 2782 2783 2784 2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796 2797 2798 2799 2800 2801 2802 2803 2804 2805 2806 2807 2808 2809 2810 2811 2812 2813 2814 2815 2816 2817 2818

RECEIVED

SOIL PROFILE		SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLWS / FOOT	LIQUID LIMIT — % PLASTIC LIMIT — % WATER CONTENT — % *p — a — L	BULK DENSITY Y P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAIT PLOT	NUMBER	TYPE					
0.0	Topsoil		1	SS	4				
0.9	Fill Material. (Silt, clayey silt with some sand and fine gravel). Loose to compact. Brown.		2	SS	10	630			
			3	SS	4				
			4	FW	F		0	0 — 1	136
			5	FW	F	625			
			6	SS	18				
			7	SS	19				
			8	SS	17	620			
			9	SS	26	615			
13.4	Original topsoil								
25.6	Fill (Clayey silt and sandy silt). V. denser. Brown and grey.		10	SS	33	610			
27.0	End of borehole.					605			

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO 5

FOUNDATION SECTION

JOB 62-P-131

LOCATION Sta. 12+40 and 72' to right of E. Hwy. 400

ORIGINATED BY B.M.G.

W.P. 266-59-1

BORING DATE Nov. 29, 1962.

COMPILED BY B.M.G.

DATUM G.S.C.

BOREHOLE TYPE Pennsylvania Auger

CHECKED BY

ELEV DEPTH	SOIL PROFILE DESCRIPTION	STRAT PLOT	SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT SHEAR STRENGTH P S F	LIQUID LIMIT % PLASTIC LIMIT % WATER CONTENT % WATER CONTENT %	BULK DENSITY P C F	REMARKS
			NUMBER	TYPE	FLOWS / FOOT					
634.16	Fill Material. (Clayey silt, silty clay with some sand and fine gravel). Firm and dense. Brown to br. grey.		1	SS	16	630			133	
			2	SS	9					
			3	SS	12					
			4	SS	16	625				
			5	SS	16					
			6	SS	25					
			7	SS	24	620				
			8	SS	36					
611.2	Organic material.		9	SS	11	610				
61.6	Fill					610				
607.7	(Clayey silt, silt, sand and gravel). Dense to v. dense.		10	SS	57					
60.6	End of borehole.					605				

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 6

FOUNDATION SECTION

JOB 62-P-131 LOCATION Sta. 14+02 and at E. Int. 400 ORIGINATED BY B.M.G.
W.P. 256-59-8 BORING DATE Nov. 29, 1962 COMPILED BY B.M.G.
DATUM G.S.C. BOREHOLE TYPE Pennsylvania Auger CHECKED BY _____

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — %		SOLIDS DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUM. CP	TYPE		BLOWS / FOOT	SHEAR STRENGTH P S F	PLASTIC LIMIT — %	WATER CONTENT — %		
626.8	Groundlevel										
	Fill Material. (Silty sand and gravel) Very dense to dense. Brown.		1	SS	52	635			0		
			2	SS	54				0		
			3	SS	45				0		
			4	SS	42	630			0		
			5	SS	47	625			0		
			6	SS	26	620			0		
624.8	Clayey silt-sand.										
623.0	End of borehole.					615					

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 7

FOUNDATION SECTION

JOB 62-P-131 LOCATION Sta. 13+48 and at E. Int. 400 ORIGINATED BY B.H.G.
 S.P. 266-29-3 BORING DATE Nov. 29, 1962 COMPILED BY B.H.G.
 DATUM O.S.C. BOREHOLE TYPE Pennsylvania Auger CHECKED BY _____

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — %		SOIL WATER CONTENT %	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	PLASTIC LIMIT — %	WATER CONTENT — %		
655	Fill Material. (Silty sand and gravel). Dense to v. dense. Brown.		1	SS	21	630						
			2	SS	39							
			3	SS	30							
			4	SS	29							
			5	SS	32	625						
625	Fill Material. (Clayey silt-sand-gravel). Loose to compact. Brown and gray.		6	SS	28	620						
			7	SS	6							
619.5	Brown and gray.		8	SS	11	615						
615.6	End of borehole.											

Abstract

09-07-13

LOCATION Sta. 13420 and 68' to left of E. Hwy. 400

SECRET

205-59-3

Nov. 30, 1962.

COMPLETED BY _____ DATE _____

DATE 6-5-68

SCREW TYPE Phillips #1

RESEARCH

SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		PLASTIC LIMIT — % WATER CONTENT — %		MOISTURE DENSITY PCF	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	BLOWS / FOOT	SHEAR STRENGTH, P.S.F. Field Vane Test Residual Test	WATER CONTENT %			
						400 800 1200 1600 2000	15 30 45			
0.0	Topsoil		1	SS	4					
1.0	Fill Material. (Clayey silt with some sand and fine gravel). Loose to compact. Brown to br. grey.		2	SS	4	630				
			3	SS	7					140
			4	SS	5					
			5	SS	7	625	X			138
			6	SS	9					
			7	SS	6	620				
			8	SS	6					
						615				
11.4	Till		9	SS	28					136
21.0	(Clayey silt with traces of sand and gravel). Dense.					610				
27.5	Brown.		10	SS	31					
28.6	Bed of boulders.					605				

姓名: 李 明 性别: 男 年龄: 25 岁 籍贯: 湖南长沙
 身份证号: 430101199801010001 联系电话: 13808888888

RECORD OF BOREHOLE NO. 10

PLANTAS DE LA ZONA

02-01

LOCATION Sta. 12490 and 69' to left of E. Hwy. 400

1994年12月12日

1990

BOOKING DATE SEP. 30 1962

CONTROLLED BY REG. 3.

3-1-5-5

BOREHOLE TYPE Pennsylvania Super

○ ○ ○ ○ ○

[illegible]

Mr. F. J. Carvey

June 30, 1959.

Location Plans Engineer

Materials and Research Section

Re: W.P. 200-99 May 600 Steele's Avenue
Plan 143 71 & 7 324 Profile 1416 Eas. 0 & 00 Jackson Twp.

Further to your memorandum of May 26, 1959, we would agree that the alignment and grade at this structure site, as shown on the above plan and profile, appear to be satisfactory.

A foundation investigation of this structure site has been completed, employing core drilling equipment, and the foundation report will be forthcoming in the fairly near future. The material was determined to be predominantly a silty sand and gravel fill, and no approach fill stability problems would be anticipated. Spread footings will be recommended for this structure.

We have been informed by Mr. H. Cholland of your section that it may be more economical to build a viaduct in view of the proposed new railway crossing in this area. This would have no effect on the above recommendations.

RDS/bc

Copies To: B. McCasbie
A. Strain
K. Pecker
P. Weber (2)
H. D. B.
Files ✓

L. C. Boderson
Principal Soils & Foundation Engineer
Per: H. D. Smith

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

Memo to: R. L. Cocchi, Date: June 11, 1961
Bridge Planning Engineer.

Re: C.C. 265-53 Proj. 400 Location: Teeles Ave.

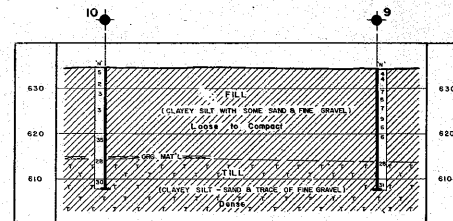
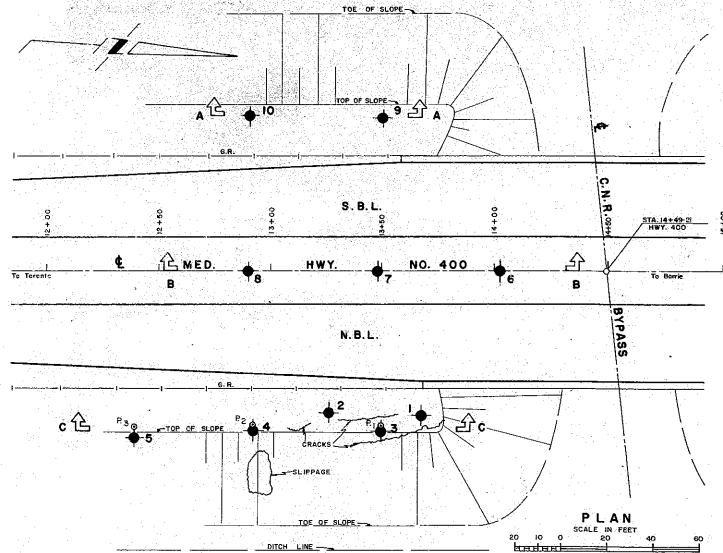
Our Foundation Section will be undertaking a foundation investigation of the above project, employing a core drill, and commencing approximately June 12th.

This project appears on Schedule 33 of the 1960-61 Programme.

B. Goderman
Principal Soils & Foundations Engineer.

Per: (Sgd.) A. Seaker.

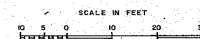
C.C. J. Fraser
T. Kovich
B. Weber
H. G. Smith
Files
Files L.G.S.



A - A

NOTE: NO WATER WAS OBSERVED IN BOREHOLES OR PIEZOMETERS

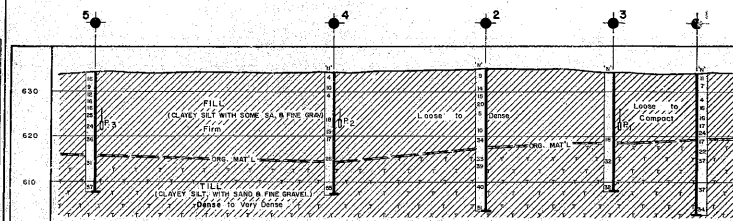
SECTIONS



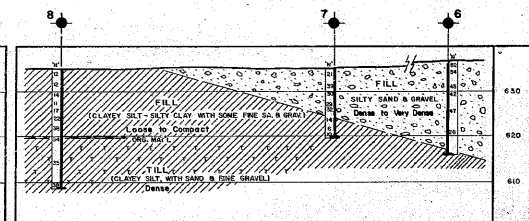
NOTE

The complete soil investigation report for this structure may be examined at the Bridge Office and Foundation Office, Downsview, and at the TORONTO District Office. The Department does not guarantee the accuracy of this report or the abridged version shown on these plans.

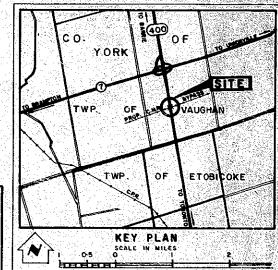
PRINT RECORD
NO.
DATE



C - C



B - B



LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Level established at time of field investigation, Nov. 27, 1962
- Piezometer (Piezometer Top Elevations are given)

NO.	ELEVATION	STATION	DEPTH
1	634.0	13+68	64 FT.
2	635.0	13+27	63 FT.
3	634.0	13+80	71 FT.
4	634.0	12+53	77 FT.
5	634.1	12+40	78 FT.
6	636.8	14+02	1
7	635.0	13+48	1
8	635.0	12+50	1
9	634.4	13+50	68 FT.
10	634.4	12+90	69 FT.
P.1	621.5	13+50	68 FT.
P.2	622.0	12+92	68 FT.
P.3	621.5	12+40	68 FT.

NOTE

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

DATE	BY	REVISION

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

CANADIAN NATIONAL RAILWAY
(PROPOSED BY-PASS)

KING'S HIGHWAY NO. 400 DIST. NO. 6
CO. YORK
TWP. VAUGHAN LOT 5 CON. 11

BORE HOLE LOCATIONS & SOIL STRATA

DRAWN BY: C. CHENIERE MAP NO. 268-58-1
CHECKED BY: C. CHENIERE CON. NO. 62-F-131A
DATE: FEB. 10, 1963 DATE NO. 62-F-131A
APPROVED BY: [Signature] DATE NO. 62-F-131A

30M 5/10