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MEMORANDUM NOTE DE SERVICE

TO / À: Mr. H.N. Kuchison
Project Manager

FROM / DE: R.D. Cook
Quality Control Engineer

SECURITY - CLASSIFICATION - DE SÉCURITÉ

OUR FILE - N/RÉFÉRENCE

YOUR FILE - V/RÉFÉRENCE

DATE: May 1, 1974

SUBJECT / OBJET: INNISFAIL, ALTA - PROPOSED RCMP DOG KENNELS

Three test holes were bored at the above site on April 19 and 22, 1974. Borehole log data and laboratory test results are summarized on the following pages and a site plan illustrating drill-hole locations is included at the rear of this report.

The subsoil profile was similar in all holes and consisted of two major strata - 1) a surficial layer of fill material to 8 - 10' overlying, 2) a loose or soft sandy clay-silt extending to the depth of the holes at 40'.

The fill material is composed of intermixed sands, clays, silts and organic material and is relatively unconsolidated or poorly compacted. It will not provide a good bearing for the proposed structure and will undoubtedly settle or consolidate under even light loads. This fill was apparently placed in conjunction with installation of a septic tank and tile field which lies in the proposed building area as indicated on the site plan.

The clay-silt stratum below the fill is also loose or soft as evidenced by an average Standard Penetration Resistance of 6 blows per foot for 19 tests, and a laboratory unconfined compressive strength of only 1.2 kips/ft^2 for tests on 3 Shelby tubes. This deposit is low plastic and moisture contents are above the liquid limit of the material throughout. Free water was evident in the holes below a depth of roughly 20' during drilling, and the equilibrium water level was recorded at a depth of 18' in hole #3 after 54 hours.

It is understood the proposed structure is a relatively light single storey unit without basement or crawl space. A foundation design utilizing cast-in-place concrete piles to a depth of 36 feet has been completed by the designers, utilizing an allowable shaft friction of 350 psf.

Unfortunately this site is not a good construction site from the foundation aspect. The 8 - 10' of poorly compacted fill material at the surface, plus the presence of the septic tank and field below the building area precludes the use of a 'normal' spread footing foundation.

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A friction pile foundation into the soft clay-silt will provide an adequate foundation for the structure, however the costs will be relatively high in relation to the total cost of the project.

It is understood the site is not level at present but is 'terraced' somewhat and will require dozer work to prepare for construction.

Therefore it is suggested the site be subexcavated to a depth of 4' below final grade and backfilled with compacted pit run gravel over an area extending roughly 10' beyond the edges of the proposed building. The structure could then be founded upon this granular pad with the footings placed at a depth of 1' below the surface and designed on the basis of 2000 psf. Ground floor slabs could bear directly upon the pad and would undergo little or no vertical movements. I believe this would provide the most economical foundation and an adequate foundation for the structure. The material excavated could be utilized for landscaping on-site. It would be necessary to remove all or part of the septic tank, and replace with compacted material accordingly.

However, if the decision is made to proceed with a piled foundation either the present design utilizing cast-in-place piles, or driven timber piles will be adequate. The low plastic clay-silt at depth is expected to act more like a cohesive soil, than a cohesionless soil, and the piles should be designed accordingly. Cast-in-place piles in cohesive soils cannot develop more shaft friction than the soil cohesion, hence the ultimate shaft friction in the clay-silt would be approximately 600 psf. The present friction value of 350 psf therefore includes a safety factor of slightly less than 2.0, however for the type of structure proposed, this should be acceptable.

The major problem with cast-in-place piles will be installation. The test holes remained open after drilling and severe sloughing of pile holes is not expected, with the possible exception of the zone below the water table, if the holes are left open for a lengthy period before concreting. The bottom 1/2 of all piles will be placed below the water table, hence concrete should be placed by a tremie pipe with a bottom-open flap, to avoid both segregation and washing of the cement constituents from the mix. No uplift forces are expected on the piles hence reinforcing may be minimal. Close inspection of pile installation is recommended.

Driven timber piles present less installation problems than cast-in-place piles and can be designed on the basis of a similar shaft friction value for this structure. However piles driven into soft, saturated, or near-saturated, clay-silts may cause severe disturbance and near liquification near the piles which may require several days for strength regain. Thus pile driving may not become increasingly difficult with depth and driven piles may tend to 'pop-up' slightly when adjacent piles are driven. Elevations of all driven piles should be checked immediately after driving and re-driven, when all piles are installed, if pile 'pop-up' does occur.

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If a piled foundation is utilized it is assumed slab-on-grade construction is proposed for the ground floor. Some settlement may be expected depending on the floor loadings on the unconsolidated fill material, hence the floor slabs should not be tied to the foundations but should be free to move vertically. Floor slabs should be placed on at least 6" of compacted 1" granular crush material.

Normal portland cement may be utilized in all foundation concrete.

R.D. Cook
Quality Control Engineer

LOG SHEETS

RECORD OF SUBSURFACE EXPLORATION AND LABORATORY TESTING PROGRAM.

DEPARTMENT OF PUBLIC WORKS, WESTERN REGION, EDMONTON, ALBERTA.

PROPOSED STRUCTURE	HOLE No.	LOCATION	DATE OF BORING	CHECKED
R.C.M.P. Dog Kennels	1	Innisfail, Alberta.	22/4/74	

ELEVATION OF GROUND – DATUM

SAMPLING METHOD
2" DIA SPLIT TUBE –
2" DIA SHELBY TUBE –
BAG SAMPLE –

DEPTH IN FEET TO :
GROUND WATER
BOTTOM OF HOLE ROCK

PENETRATION RESISTANCE – N
2" DIA. SPLIT TUBE
2" DIA. CONE
STRENGTH
UNCONFINED COMPRESSIVE STRENGTH (QU) –

CONSISTENCY
NATURAL MOISTURE CONTENT
LIQUID LIMIT
PLASTIC LIMIT

SAMPLE NO.	SAMPLE TYPE	SYMBOLS	SOIL DESCRIPTION	DEPTH FT
			FILL MATERIAL - SILTS, CLAYS, SANDS, ORGANICS	
		ML CL	- SOFT OR LOOSE	5
				10
			10' SILT - SANDY CLAYEY - LOW PLASTIC	
		ML	- SOFT OR LOOSE	15
				20
			- FREE WATER IN HOLE BELOW 23'	25
				30
				35
			40' BOTTOM OF HOLE - 40'	40
			NOTE. - WATER TABLE @ 26' IMMEDIATELY AFTER DRILLING	45

PENETRATION RESISTANCE – N: QU, K.S.F; N, BLOWS/FT (10, 20, 30, 40)

CONSISTENCY: MOISTURE CONTENT – ω %; NATURAL MOISTURE CONTENT, LIQUID LIMIT, PLASTIC LIMIT (10, 20, 30, 40, 50)

PHYSICAL PROPERTIES

NATURAL MOISTURE CONTENT ω %	BULK DENSITY γ LBS/FT	CONSISTENCY LIMITS: LIQUID LIMIT ω_L %	PLASTIC LIMIT ω_p %	PLASTICITY INDEX I_p %	MECHANICAL ANALYSIS: CLAY %	SILT %	SAND %	GRAVEL %
27.6					80	20	0	
28.2					89	11	0	
31.0					90	10	0	
31.9		26.7	18.9	7.8	89	11	0	
33.3					90	10	0	
35.2		25.0	16.0	19.0	97	3	0	

UNCONFINED COMPRESSIVE STRENGTH

STRENGTH AS RECEIVED q_u K.S.F	REMOLDED STRENGTH q_u' K.S.F	SENSITIVITY St	SULPHATE

RECORD OF SUBSURFACE EXPLORATION AND LABORATORY TESTING PROGRAM.

DEPARTMENT OF PUBLIC WORKS, WESTERN REGION, EDMONTON, ALBERTA.

PROPOSED STRUCTURE	HOLE No	LOCATION	DATE OF BORING	CHECKED
R.C.M.P. DOG KENNELS	2.	INNISFAIL, ALBERTA	22/4/74.	

ELEVATION OF GROUND – DATUM

SAMPLING METHOD
2" DIA SPLIT TUBE –
2" DIA SHELBY TUBE –
BAG SAMPLE –

DEPTH IN FEET TO :
GROUND WATER
BOTTOM OF HOLE 40' ROCK

PENETRATION RESISTANCE – N
2" DIA SPLIT TUBE
2" DIA CONE
STRENGTH
UNCONFINED COMPRESSIVE STRENGTH (QU) – ⊕

CONSISTENCY
NATURAL MOISTURE CONTENT
LIQUID LIMIT
PLASTIC LIMIT

SAMPLE NO	TYPE	SYMBOLS	SOIL DESCRIPTION	DEPTH FT	QU K.S.F (N 10 20 30 40 BLOWS/FT)	MOISTURE CONTENT – ω % (10 20 30 40 50)	NATURAL MOISTURE CONTENT ω %	BULK DENSITY γ LBS/FT	CONSISTENCY LIMITS: LIQUID LIMIT ω_L %	PLASTIC LIMIT ω_P %	PLASTICITY INDEX I_P %	MECHANICAL ANALYSIS: CLAY %	SILT %	SAND %	GRAVEL %	UNCONFINED COMPRESSIVE STRENGTH: STRENGTH AS RECEIVED q_u K.S.F	REMOLDED STRENGTH q_u' K.S.F	SENSITIVITY S_t	SULPHATE
			FILL MATERIAL - SILTS, CLAY, SAND, PEBBLES ORGANIC MTL.	5															
		ML. CL	- SOFT OR LOOSE	10'			23.8					-71-	29	0					
			SILT. WITH SAND AND CLAY - LOW PLASTIC	15			25.3					-88-	12	0					
		ML	- SOFT OR LOOSE.	20			29.2		28.8	21.8	7.0	-92-	8	0					
			- FREE WATER IN HOLE BELOW 25'	25			30.0					-90-	10	0					
				30			28.9					-90-	10	0					
				35			29.2		25.4	18.0	7.4	-89-	11	0					
				40'			35.0					-75-	25	0					
			BOTTOM OF HOLE - 40' NOTE. - WATER TABLE @ 19' AFTER 3 HRS.	45															

RECORD OF SUBSURFACE EXPLORATION AND LABORATORY TESTING PROGRAM.

DEPARTMENT OF PUBLIC WORKS, WESTERN REGION, EDMONTON, ALBERTA.

PROPOSED STRUCTURE	HOLE No	LOCATION	DATE OF BORING	CHECKED
R.C.M.P. Dog. Kennels	3	Innisfail, Alberta.	19/4/74	

ELEVATION OF GROUND – DATUM

SAMPLING METHOD
2" DIA SPLIT TUBE –
2" DIA SHELBY TUBE –
BAG SAMPLE –

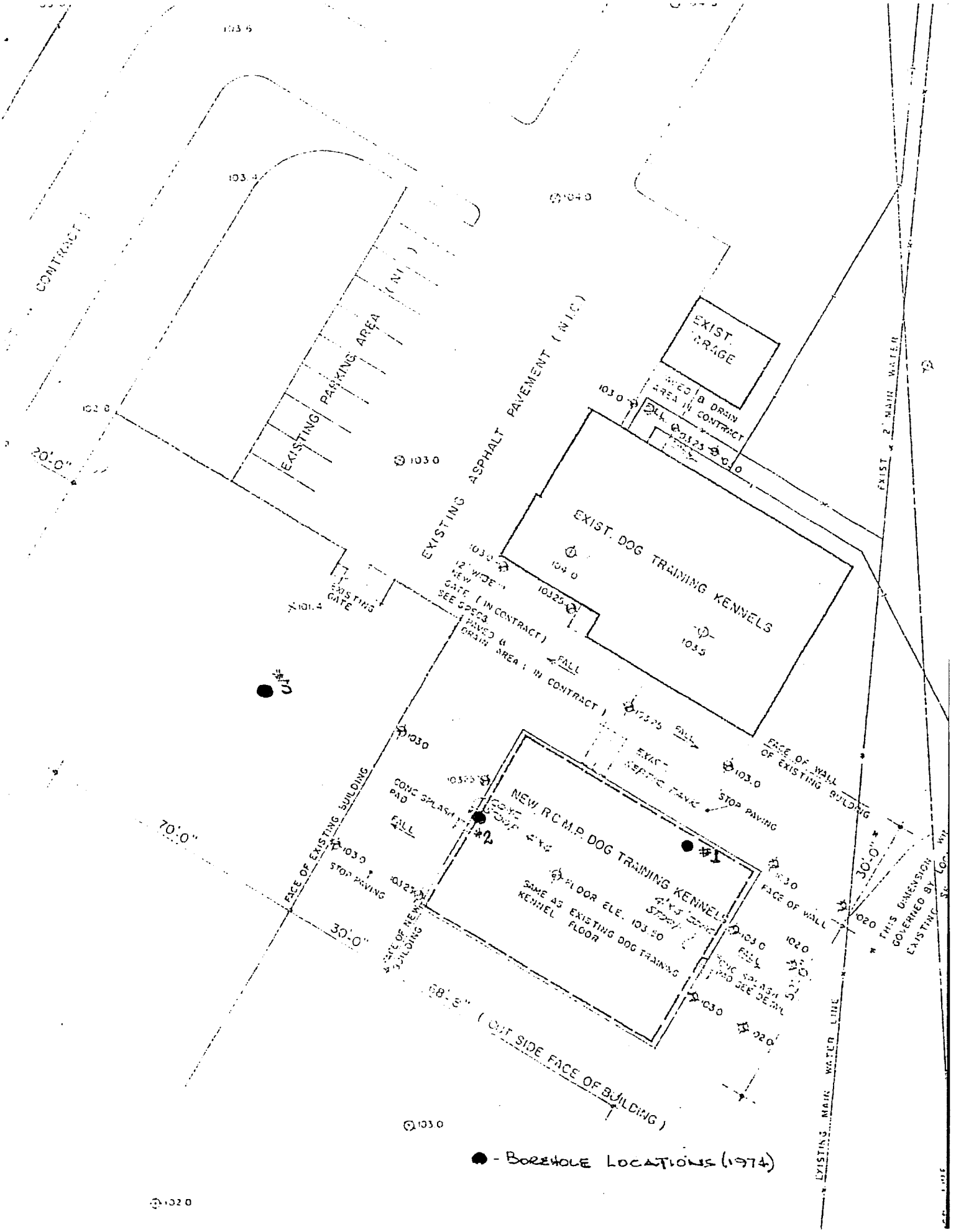
DEPTH IN FEET TO :
GROUND WATER
BOTTOM OF HOLE 40' ROCK

PENETRATION RESISTANCE – N
2" DIA SPLIT TUBE
2" DIA CONE
STRENGTH
UNCONFINED COMPRESSIVE STRENGTH (QU) – ⊕

CONSISTENCY
NATURAL MOISTURE CONTENT
LIQUID LIMIT
PLASTIC LIMIT

SAMPLE NO	SAMPLE TYPE	SYMBOLS	SOIL DESCRIPTION	DEPTH FT	QU. K.S.F. / N 10 20 30 40 BLOWS/FT	MOISTURE CONTENT – w % 10 20 30 40 50	NATURAL MOISTURE CONTENT w %	BULK DENSITY γ LBS/FT	CONSISTENCY LIMITS: LIQUID LIMIT w_L %	CONSISTENCY LIMITS: PLASTIC LIMIT w_p %	CONSISTENCY LIMITS: PLASTICITY INDEX I_p %	MECHANICAL ANALYSIS: CLAY %	MECHANICAL ANALYSIS: SILT %	MECHANICAL ANALYSIS: SAND %	MECHANICAL ANALYSIS: GRAVEL %	UNCONFINED COMPRESSIVE STRENGTH: STRENGTH AS RECEIVED q_u K.S.F.	UNCONFINED COMPRESSIVE STRENGTH: REMOLDED STRENGTH q_u' K.S.F.	UNCONFINED COMPRESSIVE STRENGTH: SENSITIVITY S_t	SULPHATE
			Fill Material - Silt, Sand, Clay with Pebbles - soft or loose	5															
		CL-ML CL		8'															
			Sandy clayey Silt. - Low plastic - soft or loose	10			21.2		26.5	18.9	7.6	-90-		10	0				
							26.9		25.0	17.0	8.0	-91-		9	0				
		ML		15			28.9	123	24.5	18.1	6.4	-94-		6	0	0.7			
							26.4		26.2	18.6	7.6	-92-		8	0				
			- Free water in hole near 18'	20			30.9		28.2	18.6	9.6	-93-		7	0				
							28.5	120				-91-		9	0	1.8			
				25			32.5		32.0	22.7	9.3	-95-		5	0				
				30			30.1	120	24.4	17.3	7.1	-76-		24	0	1.0			
							29.2		23.9	17.4	6.5	-76-		24	0				
				35			32.0		26.7	19.9	6.8	-98-		2	0				
							33.5					-94-		6	0				
			Bottom of Hole - 40'	40															
			Note. - Water table @ 18' after 54 hours.	45															

SITE PLAN


EXIST. GARAGE
EXISTING PARKING AREA
EXISTING ASPHALT PAVEMENT (N.I.C.)
EXIST. DOG TRAINING KENNELS
NEW R.C.M.P. DOG TRAINING KENNELS
FLOOR ELE. 103.50
SAME AS EXISTING DOG TRAINING KENNEL FLOOR
12' WIDE NEW GATE (IN CONTRACT) SEE SPEC'S.
EXISTING GATE
PAVED & DRAIN AREA 1 IN CONTRACT
AREA 1a DRAIN IN CONTRACT
EXIST. SEPTIC TANK
CONC SPLASH PAD
CONC SPLASH PAD SEE DETAIL
STOP PAVING
FACE OF EXISTING BUILDING
FACE OF WALL OF EXISTING BUILDING
FACE OF NEW BUILDING
EXIST. 2" MAIN WATER
EXISTING MAIN WATER LINE
20'-0"
30'-0"
70'-0"
68'-6" (OUT SIDE FACE OF BUILDING)
#1
#2
#3
● - BOREHOLE LOCATIONS (1974)