DEWATERING FOR

CRESSEY DEVELOPMENT AND VLC PROPERTIES

ON

LOTS C,D AND E, KENT AVE. N.

VANCOUVER, B.C.

FOR

SCS ENGINEERING LIMITED

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May, 1990

INTRODUCTION

A proposal was made May 1, 1990 to SCS Engineering Limited concerning the dewatering of the proposed excavation on Lots C, D, and E; 3000 Block Kent Avenue North, Vancouver, B.C. Following a meeting between Cressey Development Corporation, VLC Properties, SCS Engineering Limited and Brown, Erdman & Associates Ltd., the proposal was accepted and a drilling contractor was mobilized to the site on Monday, May 7, 1990. The third well was completed on May 22, 1990.

These three wells were drilled, screened, developed and tested and three piezometers were installed during the May 7 - 22 period

DRILLING

The three wells were drilled with 8-inch diameter casing to depths of between 60 and 74 feet. The wells were screened with 6-inch telescopic size well screens (5-inch inside diameter). Five-inch diameter blank casing was carried to surface. The 8-inch diameter working casing was removed as a filter sand was placed between the water-bearing formations and the well screen.

The well screens used were of continuous wire wound construction with slot openings of 18/1000 and 20/1000 inches. The filter sand used is a 2/12 target sand that has an effective size of 18/1000 inch to 22/1000 inch and a uniformity coefficient of 1.5.

Well development was done by bailing until the sand pack was stabilized and the fine silts had been removed from the formation adjacent to the well screen.

Well No. 1 was drilled on the property line between lots C and D opposite the south side of the excavation. The ground elevation at the well is approximately 134 feet. The well was drilled to a depth of 60 feet. The stratigraphy of Well No. 1 is as follows:

Depth Feet	Lithography
0 - 42	Till, 4 inch thick water-bearing stringer at 26 feet
42 - 45	Clay, silty
45 - 48	Sand, medium to coarse with clay stringers, Water-Bearing

Depth Feet	Lithography
48 - 50	Sand and gravel, Water-Bearing
50 - 60 T.D.	Sand, fine to medium, Water-Bearing

The well was screened between depths of 47 and 60 feet. The screen slot size is 20/1000 inches.

Well No. 2 was drilled on the northeast corner of Lot D adjacent to Lot E. The surface elevation at Well No. 2 is approximately 153 feet. The well was drilled to a depth of 72 feet.

The stratigraphy of Well No. 2 is:

Depth Feet	Lithography
0 - 19	Till with boulders
19 - 40	Till
40 - 43	Clay, brown, odd pebble
43 - 45	Sand, fine to medium silty, some water
45 - 49	Till
49 - 53	Clay, sandy
53 - 56	Till
56 - 72 T.D.	Sand, fine to medium, Water-Bearing

The well was screened between depths of 59 and 72 feet, with 18/1000 inch slot screen.

Well No. 3 was drilled on the northwest corner of VLC Property's Lot C. The surface elevation at this location is approximately 155 feet. The well was drilled to a depth of 74 feet.

The stratigraphy of Well No. 3 is:

Depth Feet	Lithography
0 - 58	Till
58 - 73	Sand, fine to medium, Water-Bearing
73 - 74 T.D.	Clay, blue stiff

The well was screened between depths of 60 and 73 feet with 18/1000 inch slot screens.

The drilling of the above three wells was done by the cable tool percussion method.

PUMP TESTING

The three wells were test pumped using electrical submersible pumps powered by a portable electrical generator. The time of testing ranged from 400 minutes on Well No. 2 to 260 minutes on Well No. 3. Pumping rates ranged from 72 U.S. gallons per minute for Well No. 2 to 14 U.S. gpm for Well No. 3.

Drawdown and recovery measurements were made with an electrical sounder in the wells and standpipe piezometers. Water level measurements were taken at predetermined times in accordance with accepted well testing practice.

The results of the tests on individual wells are:

Well No. 1

Well No. 1 was pumped at a rate of 30 U.S. gpm for 300 minutes. Water level measurements were taken during the test and 40 minutes after the pump was shut down. The transmissivity of the aquifer in Well No. 1 was calculated to be 2730 U.S. gpd/ft. from the drawdown measurements and 2060 U.S. gpd/ft. from the recovery data. The specific capacity of the well after 300 minutes of pumping was 1.44 U.S. gpm/ft. of drawdown. The storage coefficient was calculated from a piezometer 151 feet away to be 8×10^{-4}.

Well No. 2

Well No. 2 was pumped at a rate of 72 U.S. gpm for 400 minutes. Recovery measurements were made for 50 minutes after pumping had stopped. The transmissivity of the aquifer in Well No. 2 is calculated to be 8,640 U.S. gpd/ft. from the drawdown data and 8,500 U.S. gpd/ft. from the recovery data. The specific capacity of the well after 400 minutes of pumping was 2.9 U.S. gpm/ft. The coefficient of storage was calculated from two piezometer standpipes and ranged between 4×10^{-3} to 7.4×10^{-3}. The piezometers are 120 and 230 feet from the pumping well.

Well No. 3

This well was pumped for 260 minutes at a final rate of 14 U.S. gpm. The plot of the drawdown measurements show a transmissivity of 540 U.S. gpd/ft. and the recovery data show a similar transmissivity of 520 U.S. gpd/ft. The specific capacity of Well No. 3 after 260 minutes of pumping was 0.5 U.S. gpm/ft. Coefficient of storage could not be calculated from the data obtained during this test.

SYSTEM OPERATION

Submersible pumps were placed in Wells No.1 and 2. The two pumps were started on May 22, 1990. Water level measurements taken on Lot D May 28, 1990 indicated that water levels were low enough so that excavation could begin. Water levels have continued to decline since the May 28th reading.
On Lot C the water levels have declined except for the pneumatic piezometer on the South-West corner of the deep excavation. The elevation of the piezometric surface is 10 feet above the ground surface. The piezometric surface in this area has not been effected by the pumping of the other two Wells so that an additional Well will be required in this area.

The water level in the Well in the North-West corner of Lot C has been effected by pumping too such an extent that it will not be necessary to place a pump in this Well as long as the two pumps on Lot D are in operation.

Additional water level readings will be required before it will be possible to determine if an additional dewatering Well will be required on Lot E. If an extra Well is required on Lot E the Well in the North-East corner of Lot D would have to be operational at the time of excavation on Lot E.

The attached table from SCS Engineering shows the water levels in various piezometers on the site. It will be noted that several of the stand pipes have water levels that have fluctuated very little since dewatering has started. These water levels are thought to be related to thin water-bearing strings in the till-like material. Water flows can be antisipated from those strings, and they will require control by local sumping and pumping. Flows could be substantial when water bearing strings are first penetrated but these flows should reduce soon after.

The movement of water is not harmful to the excavation as long as material is not removed or the foundation weakened.

CONCLUSION:

1. Excavation on Lot D can be carried out until the bulk excavation reaches elevation 119 feet when stand-by power for the pumps in Wells 1 and 2 should be operational.

2. With the drilling of an additional well at the South-West corner of the excavation on Lot C excavation on this lot can be started

3. When stand-by power will be required on this Lot will be determined by the results of the testing of the additional new Well

4. The determination of the spacing of the permanate under slab dewatering-depressurizing wells system is being calculated, and should be available within one week

If any of the above needs clarification or amplification please do not hesitate to contact the writer.

Yours Truly,

BROWN, ERDMAN & ASSOCIATES LTD.