COUNCIL AGENDA/INFORMATION		
❒ In-Camera	Date: _____	Item # _____
❒ Regular	Date: _____	Item # _____
❒ Info Package	Date: _____	Item # _____
❒ Agenda Addendum	Date: _____	Item # _____

Dept. Manager	Director	Municipal Manager

The Corporation of the District of North Vancouver

REPORT TO COUNCIL

June 27, 2005
File: 3221-02

AUTHOR: Brian Bydwell - Chief Building Inspector

SUBJECT: **1593 Lennox Street**

RECOMMENDATION: That Council:

1. Consider that the following things located on the property having the civic address 1593 Lennox Street (the "Property") create an unsafe condition and declare those things to be nuisances:

   a) the fill located to the west of the house;
   b) the concrete block retaining wall located in the rear yard;
   c) the creosote tie retaining walls located to the west and south of the concrete block retaining wall;
   d) the roof drains, driveway drains and perimeter drains;.

2. Require that the owners of the Property complete the following remedial action requirements by September 2,2005:

   a) construct works to ensure that all storm water collected in all roof drains, driveway drains and perimeter drains is directed into the municipal storm sewer located on Lennox Street;
   b) Remove from the property the failed creosote tie retaining walls located to the west and south of the concrete block wall;
   c) Remove from the property the concrete block retaining wall;
   d) Remove, from the property, the fill to the west of the house;
   e) Restore the land to its natural slope and state;
   f) restore the land from which the fill and retaining walls are removed to a slope and state satisfactory to a qualified geotechnical engineer;
   g) retain the services of a qualified geotechnical engineer to direct the fulfillment of the remedial action requirements;
   h) obtain all permits as may be required to effect the works as described in sentences a-f above.

3. Direct that if the owners fail to fulfill one or more of the remedial action requirements by September 2, 2005, the municipality may fulfill the requirement or requirements at the expense of the owners and recover the costs incurred by the municipality from the

owners as a debt, including by dealing with those costs as taxes in arrear if they are unpaid on December 31,2005.

REASON FOR REPORT:

To take the action necessary to eliminate the safety hazard at 1593 Lennox Street.

SUMMARY:

A hazardous condition (fill, failed retaining walls and drainage) was identified January 21, 2005. An independent geotechnical engineer has recommended remedial works be undertaken. The Owner has refused to do the work. The Community Charter authorizes Council to consider that things create an unsafe condition and declare them a nuisance. Council is also authorized to set remedial action requirements to eliminate the unsafe condition and nuisance.

BACKGROUND:

On January 19, 2005 a catastrophic slide at 2175 Berkley Avenue resulted in loss of life, personal injury and property damage.

On January 21, 2005, one of the Owners advised the District of North Vancouver that "cracks" were appearing in the soil behind his house at 1593 Lennox Street. 1593 Lennox Street is at the top of the same ridge that failed on January 19. Brian Thompson, P. Eng. (Geotechnical), retained by the District, found evidence of earth movement, a failed creosote tie retaining wall and a concrete block retaining wall with significant cracking and negative batter. The geotechnical engineer recommended the immediate removal of soil behind the concrete block retaining wall. Residents of Swinburne Avenue and Riverside Drive were evacuated as a result of the concerns.

The District undertook emergency removal of soil on the evening of January 21-22. On the advice of the geotechnical engineer the District subsequently undertook emergency works to connect rainwater leaders and drain tile to a temporary drainage sump and the District's storm sewer system. These measures were in response to a critical public safety concern and done through powers authorized by the *Emergency Program Act*.

On January 23 a structural engineer attended the property. The structural engineer was asked by the District to evaluate the structural stability of the house foundations and the concrete block retaining wall. The structural engineer confirmed that the house foundations were in excellent condition and showed no sign or evidence of movement. The concrete block retaining wall was, however, significantly damaged. The engineer recommended that fill not be placed against the wall **(ATTACHMENT D)**.

On January 24, 2005 the Chief Building Official requested, by letter, that the Owners undertake measures to remove the hazardous condition **(ATTACHMENT E)**. Those measures were essentially the same as Recommendation 2. The Owner removed (to the Swinburne Road allowance) some additional fill and a children play structure. No other work

appears to have been done. The Owner has not replaced the District's temporary sump and pump with a permanent solution.

The District removed several truck loads of material from the Swinburne Avenue road allowance for the Owner.

EXISTING POLICY:

Division 12 of the Community Charter authorises local governments to impose Remedial Action Requirements **(ATTACHMENT B)**.

S. 72 authorizes local government to impose Remedial Action Requirements. Remedial Action Requirements include requirements to remove, demolish, alter or otherwise deal with the matter or thing in accordance with the directions of council or a person authorized by council **(ATTACHMENT B)**.

S. 73 authorizes remedial action requirements in relation to the matters or things referred to in that section if council considers the matter or thing is in or creates an unsafe condition **(ATTACHMENT B)**.

s. 74 authorizes council to declare certain matters or things to be a nuisance and to impose remedial action requirements in relation to the declared nuisance.

S. 17, in the case of a default, authorizes Council to fulfill the remedial action requirements at the expense of the person and to recover the costs incurred from that person as a debt **(ATTACHMENT B)**.

S. 258 provides for the debt to be collected in the same manner and with the same remedies as property taxes, and if it is due and payable by December 31 and unpaid on that date, is deemed to be taxes in arrear **(ATTACHMENT B)**.

ANALYSIS:

The condition of the rear yard at 1593 Lennox Street was considered so hazardous in January of 2005 that homes were evacuated on Swinburne Avenue and Riverside Drive. The District undertook short term emergency works to increase the safety factors to protect the properties below.

The geotechnical engineer has recommended that the tie and concrete block walls and all fill be removed. Further, the geotechnical engineer has recommended all storm water be connected to the municipal storm water system **(ATTACHMENT C)**. Storm water includes perimeter drains, rainwater leaders as well as hard surface runoff.

The District and Mr. Thompson have met with the Owners several times in order to clearly communicate the risk as well as the consequences of slope failure. The Owners have expressed concern over the loss of usable rear yard as well as the cost to eliminate the hazard.

Usable Rear Yard – It appears from Mr. Thompson's investigations that the house was originally built at the very crest of the slope. An upper deck area was included in the original 1974 building permit. Overtime, a series of walls, both creosted tie and concrete block, have been built down the slope in an attempt to create tiered level areas. Unfortunately, these walls were built without benefit of permits or inspections, have not be maintained and are now in a state of failure and decay. The District has suggested enlarged or terraced decks could provide the level space the family needs as well as satisfy the need to remove the weight on the slope that the fill and retaining walls represent (For Council's information, this is the approach that the Owner at 1815 Layton Ave is voluntarily taking).

Cost – The Owner has expressed concern that it is not their responsibility to protect the residents and homes below and, as such, should not bear the financial burden. The Owners are assuming a significant civil liability risk by taking this position. Recognizing a financial hardship, however, the District has carried out emergency measures on behalf of the Owners, has removed excavated fill and offered to provide Geotechnical assistance. The District offered to provide geotechnical engineering consulting. The scope of this consulting service would have been to oversee the removal of all fill, failed retaining walls and the required slope remediation. The engineer would have been available to review post and footing requirements for an enlarged deck. As the District does not typically provide engineering consulting services on private property a Release was requested. The Owners balked at the release, felt that complete removal of the fill was unreasonable and that other options should be provided. The Owners were advised, if they wanted to explore alternate solutions, that they should retain the services of a private geotechnical engineer to design and review the work and to provide assurances that the site would be safe for the intended use.

Timing/Approval Process:

Mr. Thompson recommended that the hazardous condition be removed by the end of July (prior to the next heavy rain or freeze-thaw cycle). The deadline of September 2, 2005 affords the District sufficient time to effect a remedy prior to the fall/winter seasons if the homeowner defaults on the Order.

Concurrence:

This report has been reviewed, and is supported by, the Environmental, Parks and Engineering Division and the Municipal Solicitor.

Financial Impacts:

In the case of a default, Council may undertake the remedial action requirements at the expense of the Owner and recover the costs incurred as a debt. The Community Charter provides for the debt to be collected in the same manner and with the same remedies as property taxes and, if it is due and payable by December 31 and unpaid on that date, is deemed to be taxes in arrear.

The remedial action is estimated to cost $30,000.00 - $40,000.00. If the Owner defaults on the order, and the District does the work, the funding source will be the operating fund and a recoverable account will be created.

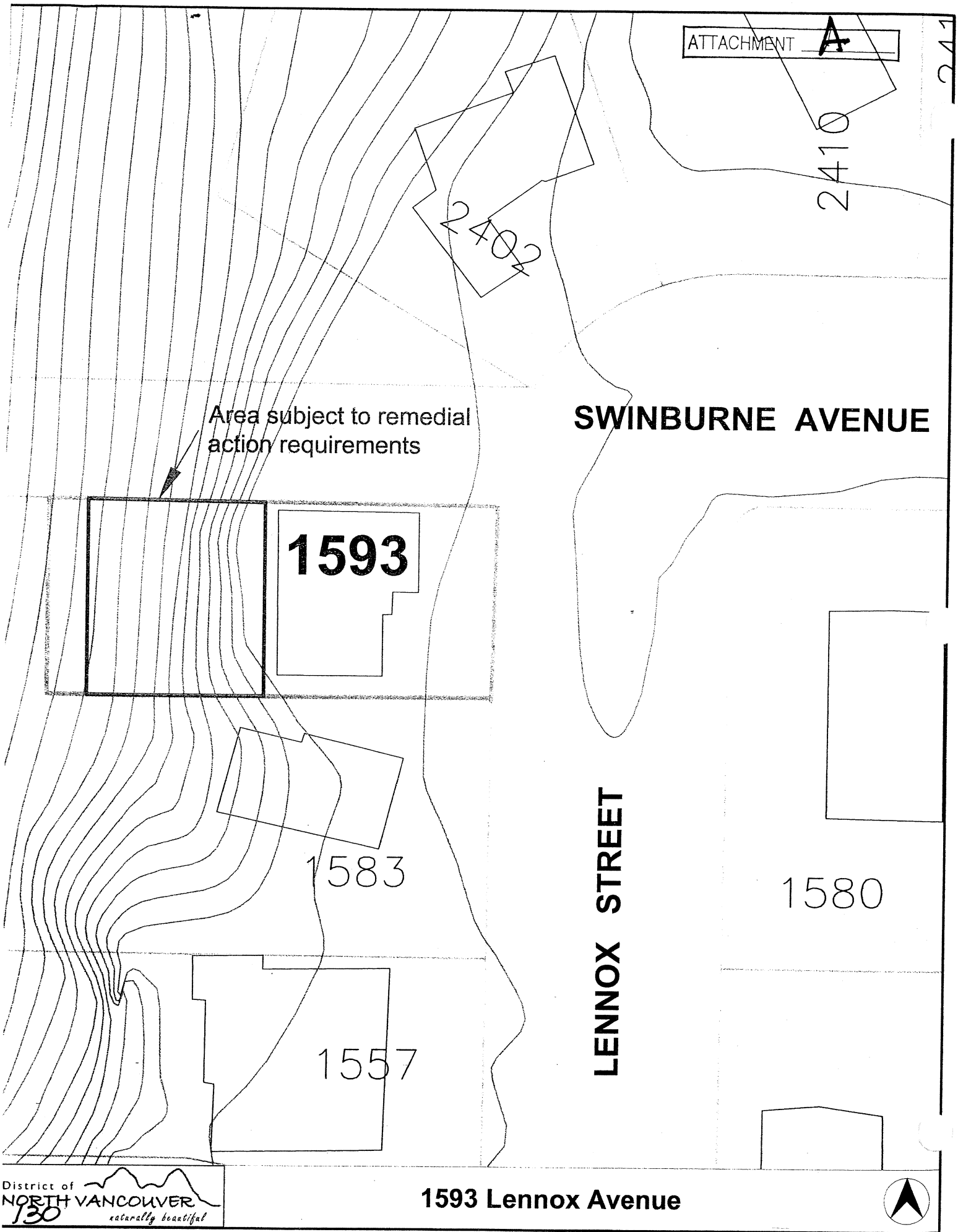
Liability/Risk

The existing fill, failing retaining walls and drainage represent a risk to the Owners, their family as well as persons and property below 1593 Lennox Street.

Attachments:
ATTACHMENT A - Site Plan
ATTACHMENT B - Community Charter Excerpts
ATTACHMENT C – Independent Geotechnical Engineer's Report
ATTACHMENT D – Independent Structural Engineer's Report
ATTACHMENT E – January 24, 2005 letter to owners

_____
Brian Bydwell MAIBC CP
Chief Building Inspector

REVIEWED WITH:	REVIEWED WITH:	REVIEWED WITH:	REVIEWED WITH:
❑ Communications	❑ Finance	External Agencies:	Advisory Committees:
❑ Env. Protection	❑ Fire Services	❑ Recreation Commission	❑ _____
❑ Human Resources	❑ Legislative Services	❑ Library Board	❑ _____
❑ Eng. Public Works	❑ Land	❑ Health Dept.	❑ _____
❑ Eng. Admin.	❑ Permits & Licenses	❑ RCMP	
❑ Eng. Parks	❑ Planning	❑ Other: _____	
	❑ Social Planning		



District of NORTH VANCOUVER 130 naturally beautiful

1593 Lennox Avenue

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Published : Jun 30, 2005

Municipal action at defaulter's expense

17 (1) The authority of a council under this or another Act to require that something be done includes the authority to direct that, if a person subject to the requirement fails to take the required action, the municipality may

(a) fulfill the requirement at the expense of the person, and

(b) recover the costs incurred from that person as a debt.

(2) Division 14 *[Recovery of Special Fees]* of Part 7 *[Municipal Revenue]* applies to an amount recoverable under subsection (1) that is incurred for work done or services provided in relation to land or improvements.

Council may impose remedial action requirements

72 (1) A council may impose remedial action requirements in relation to

(a) matters or things referred to in section 73 *[hazardous conditions]*,

(b) matters or things referred to in section 74 *[declared nuisances]*, or

(c) circumstances referred to in section 75 *[harm to drainage or dike]*.

(2) In the case of matters or things referred to in section 73 or 74, a remedial action requirement

(a) may be imposed on one or more of

(i) the owner or lessee of the matter or thing, and

(ii) the owner or occupier of the land on which it is located, and

(b) may require the person to

(i) remove or demolish the matter or thing,

(ii) fill it in, cover it over or alter it,

(iii) bring it up to a standard specified by bylaw, or

(iv) otherwise deal with it in accordance with the directions of council or a person authorized by council.

(3) In the case of circumstances referred to in section 75, a remedial action requirement

(a) may be imposed on the person referred to in that section, and

(b) may require the person to undertake restoration work in accordance with the directions of council or a person authorized by council.

Hazardous conditions

73 (1) Subject to subsection (2), a council may impose a remedial action requirement in relation to any of the following:

(a) a building or other structure, an erection of any kind, or a similar matter or thing;

(b) a natural or artificial opening in the ground, or a similar matter or thing;

(c) a tree;

(d) wires, cables, or similar matters or things, that are on, in, over, under or along a highway;

(e) matters or things that are attached to a structure, erection or other matter or thing referred to in paragraph (a) that is on, in, over, under or along a highway.

(2) A council may only impose the remedial action requirement if

(a) the council considers that the matter or thing is in or creates an unsafe condition, or

(b) the matter or thing contravenes the Provincial building regulations or a bylaw under section 8 (3) (l) *[spheres of authority -- buildings and other structures]* or Division 8 *[Building Regulation]* of this Part.

Declared nuisances

74 (1) A council may declare that any of the following is a nuisance and may impose a remedial action requirement in relation to the declared nuisance:

(a) a building or other structure, an erection of any kind, or a similar matter or thing;

(b) a natural or artificial opening in the ground, or a similar matter or thing;

(c) a drain, ditch, watercourse, pond, surface water, or a similar matter or thing;

(d) a matter or thing that is in or about any matter or thing referred to in paragraphs (a) to (c).

(2) Subsection (1) also applies in relation to a thing that council considers is so dilapidated or unclean as to be offensive to the community.

Division 14 -- Recovery of Special Fees

Special fees may be collected as property taxes

258 (1) This section applies to the following:

(a) fees imposed, under this Act or the *Local Government Act*, for work done or services provided to land or improvements;

(b) fees imposed under section 196 (1) (a) *[fire and security alarms systems]*;

(c) amounts that a municipality is entitled to recover for work done or services provided to land or improvements under any other provision of this Act or the *Local Government Act* that authorizes the municipality to recover amounts in the event of default by a person.

(2) An amount referred to in subsection (1)

(a) may be collected in the same manner and with the same remedies as property taxes, and

(b) if it is due and payable by December 31 and unpaid on that date, is deemed to be taxes in arrear.

(3) If an amount referred to in subsection (2) (b) is a fee referred to in section 194 (2) (a) *[municipal fees for services outside the municipality]*,

(a) the collector must promptly, after December 31, forward a statement showing the amount of the fee

(i) to the Surveyor of Taxes in the case of real property that is not in a municipality, or

(ii) to the applicable municipal collector in other cases, and

(b) the Surveyor of Taxes or collector must add the amount of the fee to the taxes payable on the property.

(4) If an amount is added under subsection (3) (b),

(a) the amount is deemed to be a municipal tax or Provincial tax, as applicable, and must be dealt with in the same manner as taxes against the property would be under this Act, the *Local Government Act* or the *Taxation (Rural Area) Act*, and

(b) when it is collected, the collecting municipality or Minister of Finance must pay the amount to the municipality to which it is owed.

(5) If an amount is added under subsection (3) (b) and is not paid at the time the property is sold by tax sale,

(a) if the upset price is obtained at the time of the tax sale, the minister or municipality referred to in subsection (4) must pay out of the proceeds of the sale the amount due under this section to the municipality to which it is owed, or

(b) if the upset price is not obtained and subsequently the property is sold, the proceeds of sale must be applied according to the respective interests in the upset price.

ATTACHMENT C

THOMPSON GEOTECHNICAL

January 28, 2005

District of North Vancouver
355 West Queens Road
North Vancouver, BC

Attn: Brian Bydwell
Chief Building Inspector

Re: Existing Retaining Walls
1593 Lennox Avenue

Dear Sir:

Further to your request, we have carried out a more detailed evaluation of the retaining walls and slope stability conditions on the property at 1593 Lennox Avenue. This follows a preliminary assessment and emergency stabilization work completed on January 21 and 22, 2005.

This letter summarizes our findings with regards to the stability of these walls and the measures which should be taken to minimize and/or eliminate the hazards presented.

SITE DESCRIPTION

The subject property is located at the crest of a steep slope on the east side of the Seymour River. The slope is about 75 m high and stands, in its upper region, at angles of 38 to 40 degrees. It is heavily forested. Near the northern side of the property, the slope is marked by a small ridge which trends westward and, thereafter, to the north and west. On both sides of this ridge there are small gullies. The southern gully runs down the face of the slope and opens towards Swinburne Avenue. The northern gully follows the low ridge and exits behind the property at 1650 Riverside Drive.

The property contains a small, single family residence which was constructed approximately 20 years ago. This is situated near the crest of the slope and founded on conventional footings. There are also two retaining walls located to the west of the home. These extend beyond the crest of the slope, in a tiered configuration, and have a combined height of approximately 5.0 m.

THOMPSON GEOTECHNICAL CONSULTANTS LTD 6095 Gleneagles Drive West Vancouver BC V7W 1W1 Tel: 604-921-1448

SOIL AND GROUNDWATER CONDITIONS

A sub-surface investigation has not been carried out. Observations within the adjoining regions indicate the slope is probably underlain with a shallow mantle of sandy and/or silty colluvium and an extensive stratum of dense glacial till and/or overconsolidated glaciofluvial deposits. Experience shows the phreatic surface (or water table) tends to parallel the surface of the till and becomes elevated during periods of prolonged or intense precipitation.

EXISTING RETAINING WALLS

Lower Wall

The lower wall is a timber crib structure comprised of treated 15 by 20 cm timbers (used railway ties). In plan, it appears as an irregular, "L" shaped structure with the primary, western side being approximately 16 m long. Its northern end is defined by a large fir tree while the southern end - the foot of the "L" - turns eastward and continues approximately 5.0 m to meet the natural slope. The average height of the western side is about 3.0 m. It appears to have been constructed at the time the house was built and much of it is covered with a thick growth of ivy.

This structure is in poor condition. Portions have settled up to 20 cm or more and there are at least two areas where there the lower face members have pulled away from the tieback timbers and bulged outwards. There are also indications of downslope movement as evidenced by a separation of approximately 10 cm near the mid point of the southern return. Some of these conditions are the result of age and decay of the timbers. Most are the result of design shortfalls, poor construction, and overloading due to construction of the newer wall above.

Upper Wall

The upper wall is comprised of 20 by 20 by 40 cm hollow core concrete blocks resting on a concrete footing. It sits inside the timber crib and is "C" shaped in plan. The northern leg, which follows the natural slope, measures 6.3 m in length. The western side is 17.3 m long while the southern leg has a length of 1.5 m. It has an average height of about 2.0 m along most of the western side but reaches a maximum height of 3.1 m at the northwest corner where the wall extends beyond the timber crib. It appears to have been constructed about 5 to 10 years ago.

The wall does not appear to be reinforced but has been fitted some form of tie back system at the middle and northern ends, as evidenced by the presence of load plates and threaded rods. During the emergency remedial work completed on January 21, 2005, it was determined that the threaded rods near the centre of the wall extend to a concrete deadman running eastward from the face. A second deadman is presumed to exist at the northern end. There is some evidence to suggest these anchors may have been installed after the wall was constructed.

The wall has also been fitted with a 75 mm PVC drain. This is situated near the footing and exits the structure at each end. It does not attract water as it is located above the phreatic surface.

This wall, like its timber counterpart, is also in poor condition. The western side has tilted outward and settled up to 30 cm at its southern end. It is also distorted along much of its length and cracked in several areas, with separations of up to 1.5 cm. The northern leg is in slightly better condition but there is cracking at several sites and a separation of approximately 2.0 cm near the eastern end. In addition, there has been approximately 10 cm of settlement of the foundation soils at the northwest corner of the wall, causing that portion of the footing to become unsupported. Most of these conditions are the result of inadequate foundation support and movements in the timber crib wall. The remainder reflect other design and construction shortfalls.

STABILITY CONCERNS

There are various concerns with regards to the stability of the two walls. There are also concerns with regards to the impact of these structures on the stability of the underlying slope.

Wall Stability

The forces acting on a retaining wall are determined, in part, by the characteristics of the retained material, the height of the wall, and the location and magnitude of any surcharge loads. The height of the wall is particularly important because the lateral loads increase in a disproportionate manner. In the case of the lower wall, which attracts loads from both the adjoining backfill and the wall above, the lateral forces are estimated to be of the order of 56 to 60 kN/m or 3,800 to 4,200 lb/ft. This more than likely exceeds the capacity of that structure.

Retaining walls can fail in sliding or overturning. They can also fail structurally if the components do not have sufficient strength to counter the soil forces acting on them. Sliding failures tend to be relatively benign because, in most cases, the displacements are small and the movements lead to reduced lateral pressures. They can, however, be problematic if the structure is located on a slope and/or the movements continue over a long period of time. Both of these factors are present here. Overturning and structural failures are of greater concern because the wall fails by toppling or collapse, sometimes with little warning.

The lower wall shows signs of sliding and progressive structural failure, largely as result of age and overloading. It presents minimal factors of safety and is considered to be unstable. It will, in all likelihood, continue to stand for a period of time but, at some point, this wall will collapse. When it does, the upper wall will also fail. This will likely occur quickly, during a period of heavy precipitation, and may not be proceeded by obvious warning signs. The risk of such a failure will increase with time.

The upper wall is in the initial stages of overturning and, like the lower wall, it also shows signs of progressive structural failure. Both are the result of inadequate foundation support and construction shortfalls. It too presents minimal factors of safety. If no action is taken, it will eventually fail through a combination of mechanisms. Since the concrete blocks are brittle in nature, this will probably occur quickly and without warning. The northern and southern ends of the wall are considered to be the most susceptible to failure because of the conditions in those areas.

It is of interest to note that the large (60 cm) fir tree located near the northwest corner of the upper wall has both positive and negative impacts. It serves, in a positive sense, to reduce the lateral load on the wall by interfering with the active wedge. If it was not present, this portion of the wall would probably have failed some time ago. It impacts the wall negatively in that, during windy periods, the movements of the trunk and root mass are transmitted to the wall causing cracking and other damage.

Both of these walls present a hazard to the occupants of the home and others who might enter the backyard area. If a rapid failure were to occur, there would be a risk of serious injury to anyone near the outer edge of the structure.

We note that both walls may experience delayed, creep type movements as a result of the high stresses encountered during the recent storm and that these movements will accelerate the failure process.

Slope Stability

The stability of a slope is governed by a number of factors. Foremost amongst these are the slope angle, the soil conditions, and the location of the phreatic surface. Generally speaking, if the angle of the slope is low and the phreatic surface is located at depth, the degree of stability will be relatively high. As the slope angle increases and/or the phreatic surface rises, the degree of stability is reduced. The conditions at 1593 Lennox, which include steep slopes and weak, silty soils overlying a smooth substrate, are such that the factor of safety against sliding could be relatively low during periods of prolonged and/or intense precipitation.

The stability of a slope can also be affected by external loads such as those imposed by the presence of a fill and/or retaining structure. Since these loads tend to increase the driving forces, they serve to further reduce the factor of safety. The location and configuration of the existing structure is such that it generates undesirable driving forces and increases the likelihood of a slope failure.

Because of the geology and groundwater conditions along the eastern side of the Seymour River valley, there is a tendency for small failures, near the crest of the slope to generate much larger failures, such as that which occurred near Chapman Way, on January 19, 2005. This is particularly likely during periods of prolonged and/or intense precipitation. A determination as to whether or not such a failure might occur if the subject wall(s) were to collapse cannot be made without additional knowledge of the soil and groundwater conditions and detailed analyses. We believe however, that there is a good probability this might occur.

If the southern end of the structure was to fail and cause failure of the underlying slope, the slide mass would travel down the southern gully, described previously. If the northern end were to fail, causing failure of the slope, the northern gully would be involved. A worst case scenario would see movement of the failure mass down both gullies. The northern gully is considered to be the more likely to fail as it is both steep and wet. There is also evidence to suggest this area experienced a failure in the recent past.

CONCLUSIONS AND RECOMMENDATIONS

The retaining walls at 1593 Lennox Avenue have not been constructed in accordance with good engineering practice and do not meet basic requirements with regards to stability and structural integrity. They present minimal factors of safety and, while they may continue to stand for a period of time, they will eventually succumb to failure in the form of sliding, collapse, or toppling.

Based on our observations, and with due consideration to the local stability conditions, it is our opinion they present a hazard to the occupants of the property and others who might enter the rear yard area. We also believe they present a potential hazard to the occupants of the properties at the toe of the slope, on Riverside Drive, as their collapse could conceivably trigger a failure of the slope below the walls.

To eliminate the immediate hazard and mitigate the potential for slope failure, we recommend that the structures be demolished in a controlled fashion, under the direction of a geotechnical engineer, and that all of the backfill, concrete, and timber materials be removed from the site. In addition, we also recommend that measures be taken to collect stormwater runoff from the property - including that from the roof, perimeter drain, and driveway - and convey this to the municipal storm system. During the course of this work, efforts should be made to locate and connect other, non-permitted drainage works which may have been added after the home was constructed.

At this time, there are no indications that significant amounts of fill have been placed beneath the subject walls or elsewhere on the property. If these are determined to exist during the course of the above recommended work, efforts should made to remove as much of these materials so as to return the slope to its natural configuration.

Since the drainage works installed as part of the emergency stabilization measures are of a temporary nature only, the recommended drainage improvements should be completed as soon as possible, and preferably within one to two weeks at the most.

Demolition of the retaining walls and removal of the backfill materials should also completed as soon as possible, and preferably, within 4 to 6 months. If this work cannot to be commenced within the next week or two, we recommend that additional measures be taken to further improve the stability conditions. These should include the removal of an additional 0.5 to 1.0 m of backfill from behind the upper wall and the installation of temporary fencing to prevent children and others from entering the area.

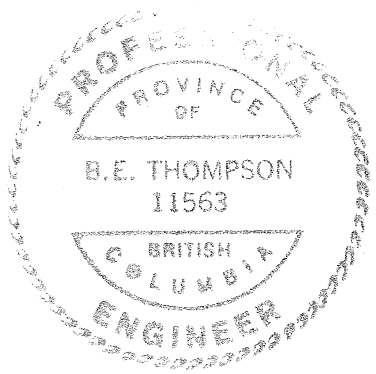
We trust the above provides the information you require at this time. Please feel free to contact us if you have any questions or require further assistance.

Sincerely,

THOMPSON GEOTECHNICAL CONSULTANTS LTD.

Brian E. Thompson, P. Eng.

\05101\DNV- Riverside\Ltr 012605



ATTACHMENT D

23 January 2005.

MARSH TOUWSLAGER ENGINEERING

DISTRICT OF NORTH VANCOUVER
BUILDING DEPARTMENT
355 Queens Road
NORTH VANCOUVER, B.C.
V7L 4K1

Attention: Mr. Brian Bydwell
Chief Building Inspector

Dear Sir: Re: HOUSE STABILITY STRUCTURAL EVALUATION
1593 Lennox Street, North Vancouver, B.C.
Our Job 04-071

PRELIMINARY STRUCTURAL EVALUATION REPORT

INTRODUCTION:

MARSH TOUWSLAGER ENGINEERING was requested to examine the subject house and rear yard retaining wall located at 1593 Lennox Street, North Vancouver, B.C. to evaluate the structural stability of the house foundations and rear yard retaining wall.

For the purposes of this report, examination of the subject building was restricted to a visual examination of the exterior from grade on all exposures. The interior crawl space was visually reviewed under the main floor of the south half of the house. The rear yard concrete block retaining wall was visually examined from grade on both uphill and downhill sides. The writer did not examine the slope beneath the concrete block wall foundations as such work was considered beyond the scope of this report. The following report is assembled from notes and observations made during our site review on 23 January 2005. Copies of our photographic record are available upon request.

BUILDING DESCRIPTION:

The subject property is located at the north end of Lennox Street on the west side of the street (see Photograph 1). Natural grade slopes down dramatically from the rear (west side) of the house. A concrete retaining wall located 9 feet from the north side of the house extends 22 feet to the west from the northwest corner of the house. Foundations step down from 2 feet to 10 feet below the top of the wall at the northwest corner. The retaining wall extends 59 feet to the south to 5 feet south of the house. At the southwest corner, the 4 foot high concrete block retaining wall is 28 feet west of the rear of the house. The wall returns east and extends 5 feet from the corner. Downhill grade at the southwest corner is 12 feet below the top of the concrete block wall with grade below retained by timber cribbing extending 10 feet below the concrete footing at the corner. Grade slopes up to the level of the crawl space grade at the back of the house. A wood picket fence extends four feet above the top of the wall supported by 4x4 posts bolted to the rear yard side of the wall.

At the time of our examination 2 feet of fill material had been removed from the rear yard extending in a 12 foot wide strip towards the house from the subject retaining wall. A temporary sump pump had been installed near the southwest corner of the rear yard (see Photograph 2).

The flat roofed house is split level with the one storey south half over a 4 foot high crawl space measuring 26 feet east/west by 23.5 feet north/south. The north half is two storeys with a concrete slab-on-grade floor at the bottom storey measuring 35.5 feet east/west by 22 feet north/south. The front (east side) of the house has horizontal cedar siding and the balance of the house has stucco exterior finishes. A deck extends 12 feet west from the south half main floor. The crawl space was accessible from an interior wall access opening. The main floor is constructed of conventional wood framing on a cast-in-place concrete perimeter foundation wall.

04-071.PRE.REP Continued Page 2.

Phone: (604) 986-8450
Fax: (604) 987-7626
177 East Carisbrooke Road
North Vancouver, B.C. V7N 1N1

OBSERVATIONS:

The building appears to be approximately 25 to 35 years old and is reasonably well maintained and the exterior finishes are in good condition. The writer observed no significant evidence of movement or settlement in the concrete foundations or the concrete skim coat in the crawl space where exposed. The only crack evident in the foundation was an old vertical crack in the west exposure located 18 feet from the south corner. This crack is less than 1/8 inches wide typical and extends vertically. The crack appears to be a shrinkage crack and likely would have occurred early in the life of the building.

The concrete block retaining wall shows evidence of significant structural movement and distortions throughout. On the north exposure a ¾ inch wide vertical gap is located 4 feet from the east end of the wall suggesting slope movement to the west (see Photograph 6). The northwest corner has settled 4 inches. Steel plates 1/8 inches thick anchored by pairs of ½ inch diameter bolts are located two feet each way from the northwest corner. A vertical ½ inch wide crack extends vertically in the west face 16 inches from the northwest corner. Step cracking extends from the top of the wall at the corner to the step up in the footing located 8 feet to the south. The top of the 7'-4" high wall bulges to the west between 8 feet and 24 feet from the northwest corner: the wall is tilting. A vertical ½ inch wide crack extends top to bottom of the wall where the top of the wall steps down 8 inches at a location 34 feet from the northwest corner. A ¾ inch wide crack extends vertically from a step up in the foundations located 39 feet from the northwest corner reducing in width to 1/8 inches at the top of the wall. A large number of significant step cracks are evident in the five foot wide section of wall between the previously noted vertical cracks and a 1/8 inch thick steel plate with two ½ inch diameter bolts is located in the cracked surface. A concrete dead man is evident in the excavated area of the back yard on the east side of the wall from the observed plate location. The south 26 feet is bulged to the west full height 6 to 8 inches and the top of the wall is rotated 2 to 3 inches out of plumb (see Photograph 7). The wood fence located along the south side rear yard is significantly distorted. The westmost 8 feet is fastened to the top of the south portion of the concrete block retaining wall and the balance extends on grade to the southwest corner of the deck (see Photograph 3). The southwest corner of the concrete block retaining wall appears to have shifted and rotated to the west approximately 5 inches. The wood corner post anchor bolts has pulled out of the block and the east half of the fence has partially separated from the centre of three supporting posts (see Photograph 5). The homeowner was not certain if the south fence distortion was long term or if it had increased or occurred lately.

The downhill exposed wall faces show evidence of significant repointing undertaken since the original construction. Cracks appear to be old and pre-exist the current significant rain fall period by a number of years. The writer observed no evidence of significant recent movement in the concrete block wall structure. The timber cribbing at the southwest corner of the rear yard is old and deteriorated and evidence of significant movement, likely recent, was observed (see Photograph 4).

COMMENTS AND RECOMMENDATIONS:

The house foundations are in excellent condition considering the age of the house and show no significant evidence of movement.

The rear yard retaining wall is significantly damaged and shows evidence of significant under strength and movements throughout. The distortion of the fence, partial collapse of the timber cribbing and gap in the north side of the wall are indicative of the slope moving to the west. Short term stability of the wall is likely not a significant life safety issue but stability of the slope and the fills on which the concrete block retaining wall appear to be founded certainly are worrisome and should be immediately addressed by a geotechnical engineer. Fill should not be replaced against the wall.

04-071.PRE.REP Continued Page3.

CONCLUSIONS:

This report is based on a detailed visual examination of the subject building and rear yard concrete block retaining wall. Marsh Touwslager Engineering has not undertaken a quantitative study of the structure. A geotechnical slope stability analysis likely would require immediate removal of the wall and subgrade fills. Replacement fill and new retaining wall structures, if allowed, require geotechnical and structural engineering detailing and site inspection services.

The District should review documentation regarding the subject rear yard retaining wall and backfill installation. If the work is located on the homeowner's property and no permit or engineering exists on file then it is the writer's opinion that all work should be the responsibility of the homeowner. The writer recommends the District obtain legal advice regarding this matter.

Should you require further input from us, we have kept detailed notes and photographs of the subject evaluation. A more detailed report can be prepared if requested.

We trust this report is adequate for its intended purpose. Should you have any queries, please do not hesitate to contact the writer.

Yours very truly,

MARSH TOUWSLAGER ENGINEERING

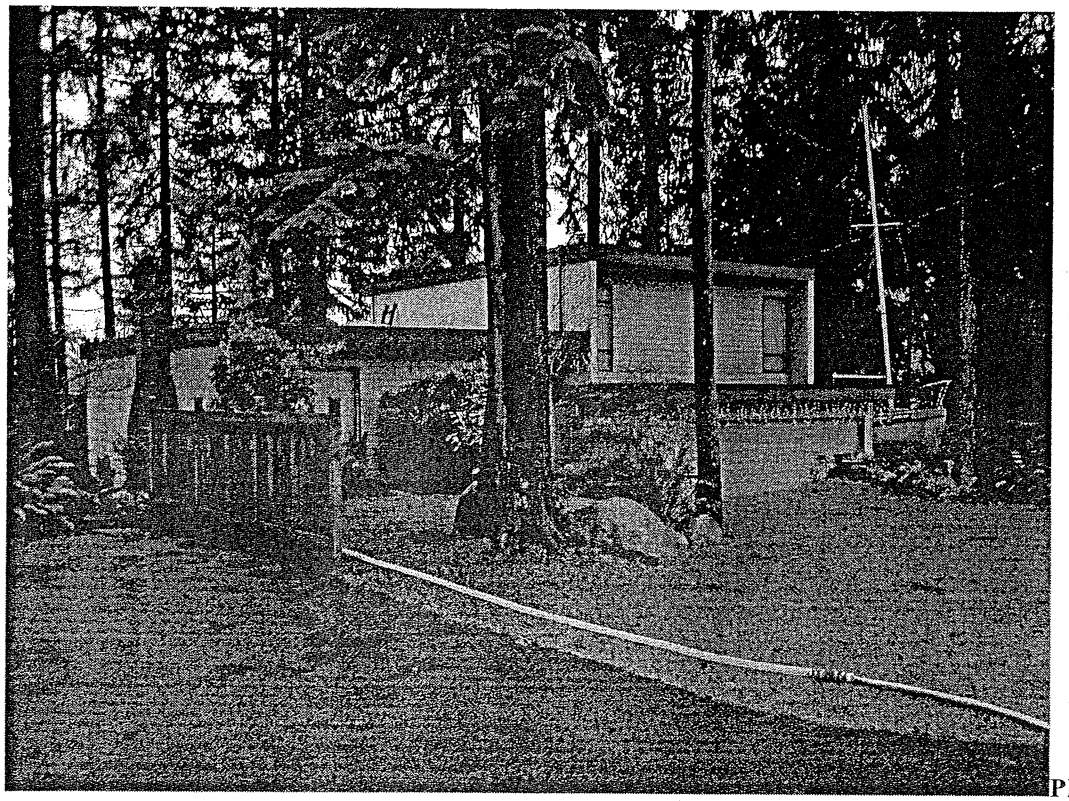
W.A. Marsh, P.Eng.

cc File 04-071.PRE.REP.doc

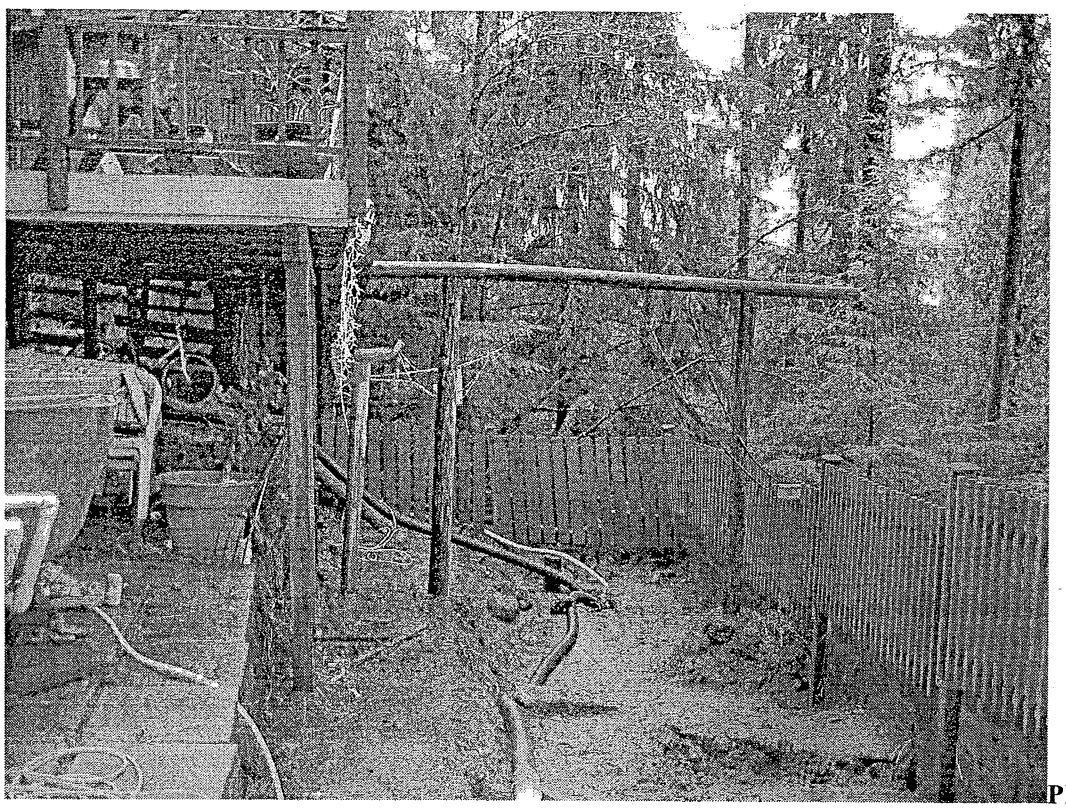
Attachments: Pages 4-7 Photographs 1-7

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
W. A. MARSH

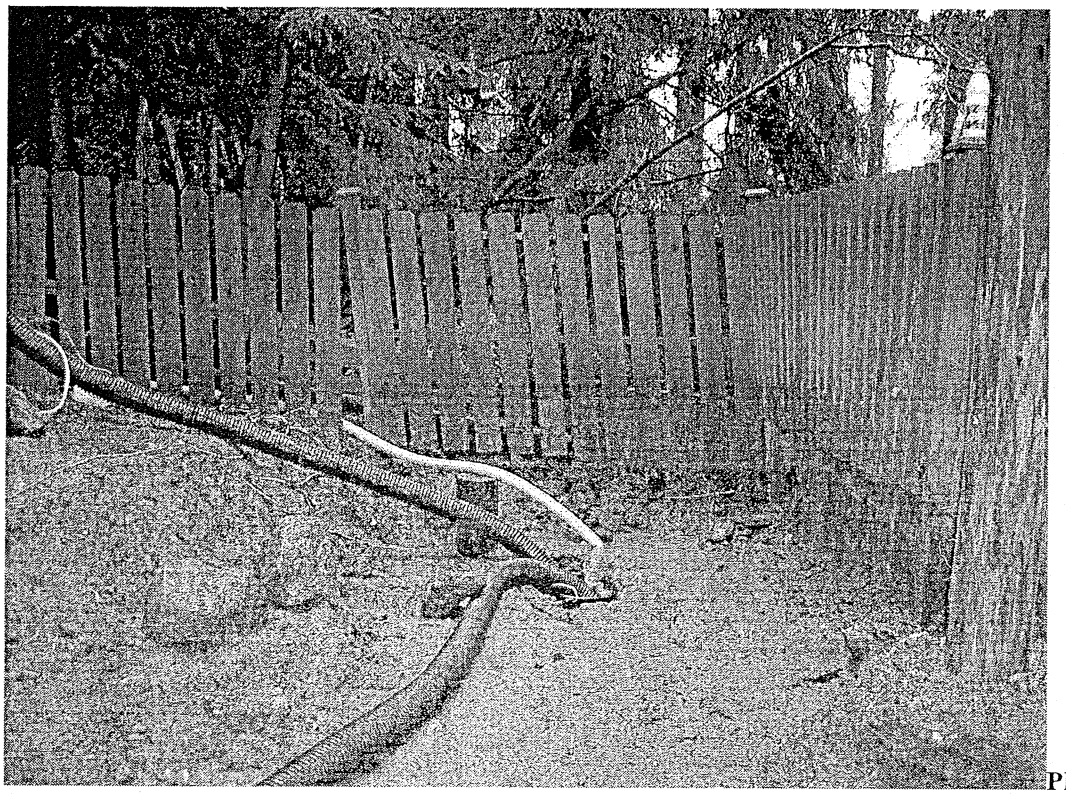
04-071.PRE.REP Continued Pages4 to 7.



Photograph 1

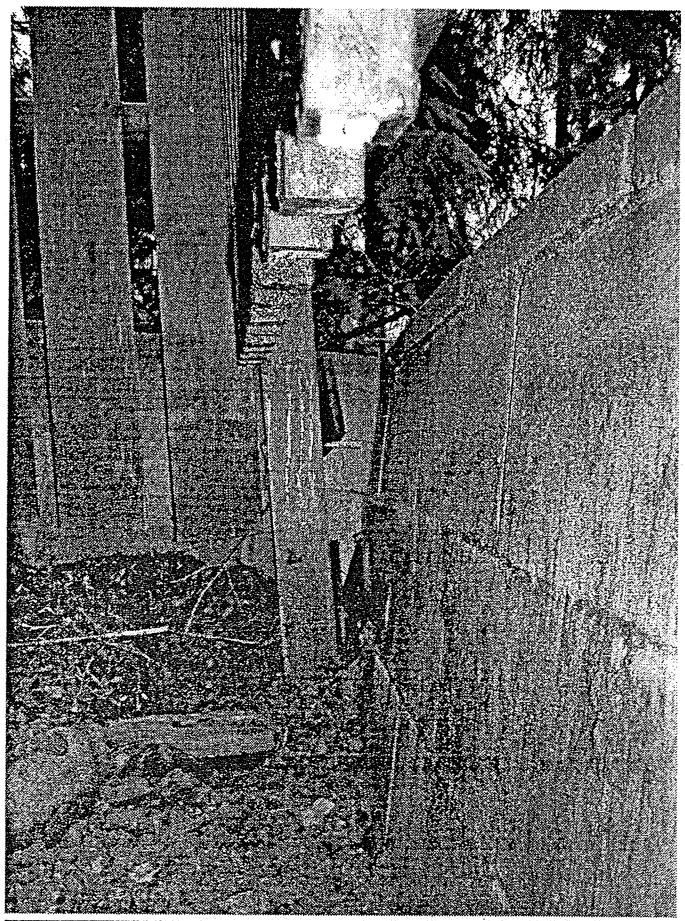


Photograph 2

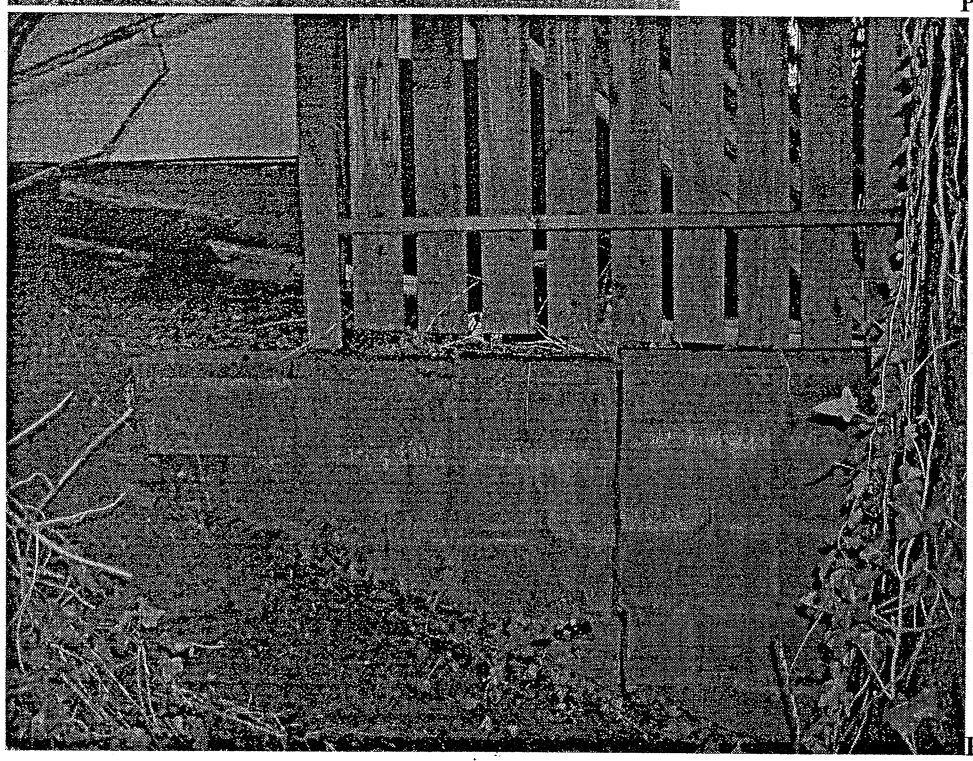


Photograph 3

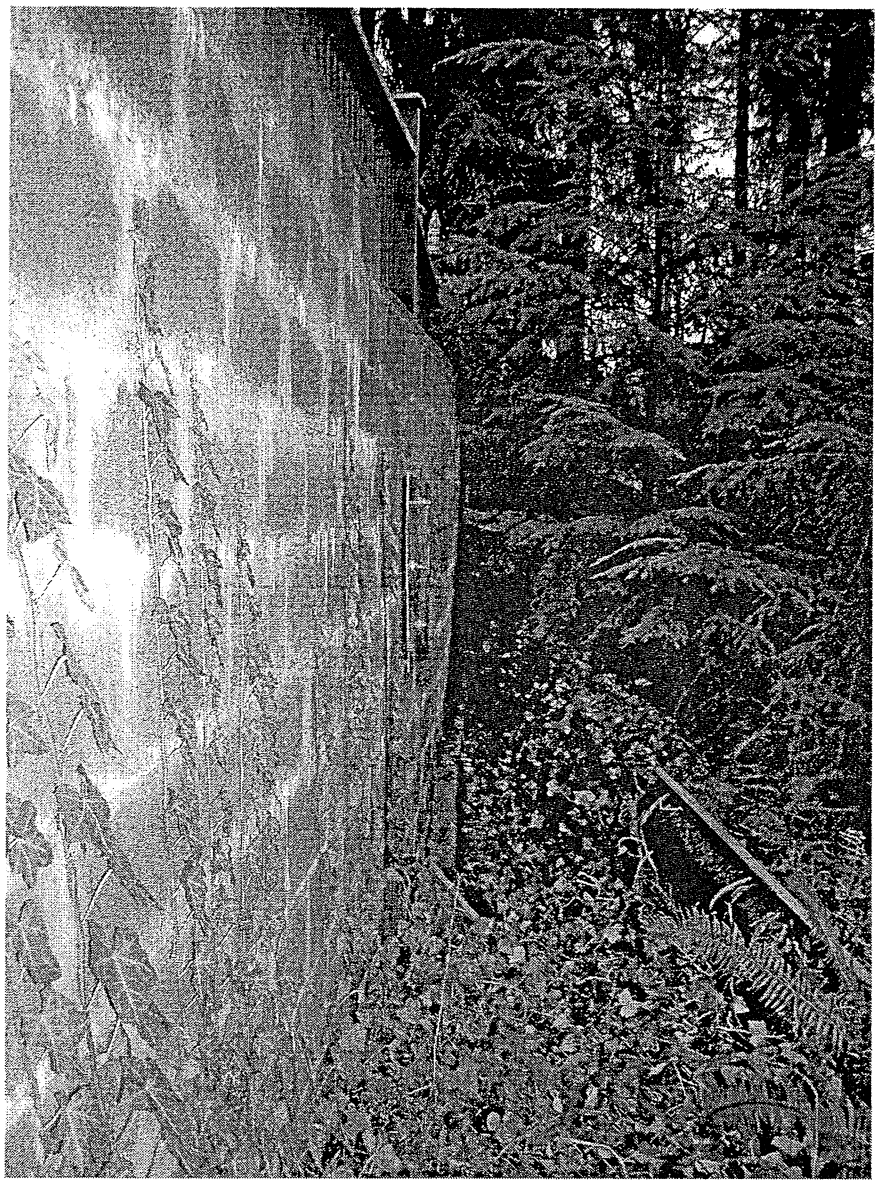
Photograph 4



Photograph 5



Photograph 6



Photograph 7

District of North Vancouver

355 West Queens Road
North Vancouver
British Columbia
V7N 4N5

ATTACHMENT E

Sustainability, Planning & Building Services Division

Telephone 604 987 7131
Fax 604 984 9683
Web www.dnv.org

January 24, 2005
File: 3221-03

Ian William Stabler
Lisa Ann Stabler
1593 Lennox Street
North Vancouver, BC
V7H 1X4

Dear Mr. and Ms. Stabler:

Re: 1593 Lennox Street

On January 21, 2005 the District of North Vancouver was alerted to concerns of earth slippage at 1593 Lennox Street. A geotechnical engineer found evidence of earth movement including a failed creosote tie retaining wall as well as a concrete block wall retaining wall with significant cracking and negative batter. The geotechnical engineer recommended the immediate removal of soil behind the concrete block retaining wall. The District affected the emergency removal of soil on the evening of January 21-22. On the advice of the geotechnical engineer the District subsequently connected rainwater leaders and drain tile to a temporary drainage sump and the District's storm sewer system. These measures were in response to a critical public safety concern and done through powers authorized by the *Emergency Program Act*.

On January 23 a structural engineer attended the property. The structural engineer was requested by the District to examine the foundations of the house and rear yard retaining wall to evaluate the structural stability of the house foundations and the rear yard retaining wall. The structural engineer has confirmed that the house foundations are in excellent condition and show no sign or evidence of movement. The concrete block retaining wall is, however, significantly damaged. The engineer has recommended that fill not be placed against the wall.

The geotechnical engineer has recommended that the tie and concrete block walls and all fill be removed. Further, the geotechnical engineer has recommended all storm water be connected to the municipal storm water system. Storm water includes foundation perimeter drains, rainwater leaders as well as hard surface runoff. Given the temporary nature of the emergency drainage works, the geotechnical engineer has stated that the recommended drainage works be completed and permanently connected within two weeks. He has also recommended removal of an additional .5-1.0 metre of fill from behind the concrete block wall within two weeks.

As such, you are requested to:

1. Retain the services of a qualified geotechnical engineer to direct the demolition and removal of the concrete block and wood tie retaining walls, and the remediation of the slope;
2. Obtain all permits as may be required to affect the works as described in sentences 3-7 below;
3. Collect and direct all storm water to the municipal storm system by February 18, 2005;
4. Remove from the property an additional .5 to 1.0 metres of backfill from behind the concrete block wall by February 18, 2005;
5. Remove from the property the fill excavated on the night of January 21/22, 2005;
6. Remove from the property the failed creosote tie retaining walls located to the west and south of the concrete block wall by May 31, 2005;
7. Remove from the property the damaged concrete block retaining wall by May 31, 2005;
8. Remove from the property the remaining fill to the west of the house by May 31, 2005;
9. Restore the land to its natural slope and state by May 31, 2005;
10. Confirm, in writing, to the Chief Building Official your intent to comply with this request by February 4, 2005.

Failure to meet any of the specified deadlines will result in the undersigned seeking a resolution of Council that it considers the failed retaining walls, the fill and the direction of storm water to the embankment, an unsafe condition. Further, Council will be requested to order you to complete the remedial actions as described in sentences 3-9 above, and to direct, in the case of a default of that order, municipal crews or its designated contractor authority to enter the property, complete the works and that the charges for doing the work be added to, and form part of, the property tax as taxes in arrears.

New structures, such as decks or new retaining walls, must be designed, and field reviews undertaken, by engineers. Professional certification that the structures are safe for the use intended, and will not negatively affect adjacent properties, will also be required,

Copies of the geotechnical and structural reports are attached. Please do not hesitate to contact the undersigned at 604 990.2247 to discuss any questions or concerns you may have.

Yours truly,

Brian Bydwell MAIBC CP
Chief Building Official

Encl
Cc Jozsef Dioszeghy

District of North Vancouver

355 West Queens Road
North Vancouver
British Columbia
V7N 4N5

Agnes S. Hilsen
Municipal Clerk

Telephone 604 990
Fax 604 984 9637
Web www.dnv.org

July 11, 2005
File: 3221-02

Mr. Ian Stabler
Mrs. Lisa Stabler
1593 Lennox Street
North Vancouver, BC
V7H 1X4

Attention: Mr. & Mrs. Stabler

Re: 1593 Lennox Street, North Vancouver

Council will consider the June 27, 2005 report of the Chief Building Inspector at the Regular Council meeting on Monday, July 18, 2005 at 7:00 p.m. The purpose of this letter is to invite you to attend the meeting and allow you an opportunity to speak to this matter. A copy of the report is attached for your information.

It would be appreciated if you would contact our office to confirm whether you wish to address Council on this issue. I look forward to hearing from you at the earliest opportunity.

Yours truly,

Thana Burnars
for Agnes S. Hilsen
Municipal Clerk

Encl.
cc: B. Bydwell, Chief Building Inspector

150

Document: 549274