LUST # 414542
Hilton Hotel Parking Garage

T-1772-03

Closure Services Related to Hilton USTs Seattle, Washington

July 1998

GW contam coming from off-site per J Hickey

Mr. Steve Long
AMPCO System Parking
1325 Fourth Avenue, Suite 910
Seattle, Washington 98101-2514

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July 10, 1998

Mr. Steve Long
AMPCO System Parking
1325 Fourth Avenue, Suite 910
Seattle, Washington 98101-2514

RE: CLOSURE SERVICES RELATED TO HILTON USTS, SEATTLE, WASHINGTON

Dear Mr. Long:

This letter report presents the results of the additional closure services performed at the Seattle Hilton Hotel, located at 6th Avenue and University Street, in downtown Seattle. The objective of the additional services was to provide additional information to the Department of Ecology (Ecology) in support of a No Further Action (NFA) designation with respect to the underground storage tank (UST) contamination below the Hilton parking garage. Our scope of work was described in our proposal dated May 11, 1998, which was authorized by Mr. Steve Long of AMPCO System Parking on May 14, 1998.

SITE BACKGROUND

In May 1968, the property was leased from the Crawford Family by Mr. R.C. Hedreen for a period of 99 years, based on review of previous Environmental Site Assessment (ESA) site histories. In June of that year, the property was subleased to University Parking who constructed and operated a parking garage. From 1969, the hotel was under construction and was built atop the garage; the hotel was completed in 1970. In 1972, AMPCO System Parking (AMPCO) (then AMPCO Auto Parks) leased the parking garage area of the Hilton Hotel. During AMPCO's lease, Mr. Eddie Bichoff and Mr. Steve Carlsen were the garage managers. Since the end of the 25-year lease in September 1998, the hotel gained control of the parking; it is currently being managed by Mr. Vernon Bair.

Two gasoline USTs were installed in approximately 1970. A short time after installation, one of the tanks (closest to the elevator shaft, according to Mr. Bichoff) leaked. The tank was removed and replaced. In 1985, the tanks were abandoned in place and filled with cement slurry.

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In the early 1990s, gasoline vapors were encountered during the excavation to extend the elevator shaft (located north of the USTs, Figure 1) to the depth of the pedestrian concourse. To address this contamination, Environmental Associates, Inc., advanced a boring adjacent to the two abandoned in-place gasoline USTs in November 1994, confirming that a release had occurred to the subsurface. Soil samples were submitted for laboratory analysis; gasoline-range petroleum hydrocarbons and associated constituents were detected in the samples exceeding Washington Model Toxics Control Act (MTCA) Method A cleanup levels. Groundwater was not encountered in the boring, however, a water sample from a sump located adjacent to the elevator contained elevated concentrations of gasoline constituents (benzene and xylenes).

In 1997, Shannon & Wilson performed an investigation to estimate groundwater flow direction and evaluate lateral and vertical extent of contamination relating to the two USTs. Four borings were advanced beneath the garage; three of the borings (all downgradient with respect to groundwater flow direction) were completed as monitoring wells (MW-2, MW-3 and MW-4). One additional boring was advanced in the sidewalk, outside of the garage, and upgradient of the tanks. This boring was also completed as a monitoring well (MW-5).

Soil and groundwater analyses determined that elevated levels of benzene are present in the groundwater beneath the site. Shannon & Wilson borings did not detect soil contamination on site; however, the upgradient boring had elevated levels of gasoline-range petroleum hydrocarbons and benzene. Additionally, over a foot of floating product was observed in the upgradient location (MW-5).

Groundwater flow direction (based on site survey of the monitoring wells and sump adjacent to concourse elevator) is to the west. Based on this flow direction, as well as the steep groundwater gradient (approximately 0.026 feet/foot), it appears that the encountered groundwater contamination is a result of offsite sources.

PROJECT OBJECTIVES

Results of the 1997 investigation were discussed with Mr. Nnamdi Madakor (Ecology) on April 27, 1998. Mr. Madakor indicated that several issues needed additional information to evaluate the site for NFA status:

1. Evaluation for vapors in the garage or other conduits,
2. Further delineation of the nature and extent of residual soil contamination from historical release at the tanks,
3. Evaluation of risk-based cleanup criteria,
4. Discussion of the potential for commingling of contamination from offsite with that at the on-site USTs, and
5. Cost analysis for removal action.

Shannon & Wilson prepared a scope of work to collect data for each of the five issues to support closure of the site. We understood from Mr. Madakor that additional soil sampling would not be needed if the findings of the additional data supported the conclusion that commingling was not occurring, that vapors were not posing an explosion hazard, that some removal action had already been taken, and that further excavation would be cost prohibitive. The scope of work and results of our evaluation of the five issues are described in the following subsections.

TASK 1 – TESTING FOR VAPORS

The purpose of this task was to evaluate the potential hazard from vapors in the garage and other conduits. Work performed included obtaining headspace measurements using a photoionization detector (PID) in site monitoring wells, and in representative areas of the garage, manholes, and other conduits. Additionally, previous garage operators were interviewed and parking garage ventilation system plans were reviewed. Hotel plans were reviewed with Mr. Jensen to determine where to monitor. Other than the storm drain access points, no other conduits were accessible for monitoring. Data collected are summarized below.

Monitoring Well Headspace Measurements

Headspace measurements were obtained from site monitoring wells using a PID on May 31, 1998. Results are presented below in the following table. Locations of the monitoring wells are presented on Figure 2.

Location	PID (ppm)
MW-2	159
MW-3	30
MW-4	0
MW-5	948
sump	0

ppm = parts per million

Garage Headspace Measurements

PID measurements were also obtained on May 29, 1998, from representative areas of the lowest levels of the parking garage immediately above, or in contact with, subsurface soil. Measurements were collected from each location at ground level, within personnel breathing zones, and approximately 7 feet above the ground. No volatile organic compounds were detected during monitoring. Measurements were collected from all four corners of the parking garage, in lower areas where vapors may collect, stairwells, the pedestrian concourse, two elevator pits (one for the hotel and second for the pedestrian concourse), and in several rooms accessible only by hotel personnel. Access to restricted areas was performed in the presence of Mr. Jeff Jensen, chief hotel engineer. PID measurements were not collected from the garbage collection area because it is not enclosed within the garage and is always open in the direction of the alley. Locations where air monitoring data were collected are shown on Figure 2.

Manhole Headspace Measurements

Two drains that collect surface water from the garage were selected for collecting PID measurements. No vapors were detected. Additionally, several manholes are present in the concourse level of the parking garage. However, according to Mr. Jensen, the manholes cover sand filters (for the runoff collected within the garage) and a pump vault. Since many sources contribute to the material collecting in these underground structures, PID readings were not obtained there. Additionally, several cleanouts are located around level B and the concourse.

These were not opened and monitored, also due to the unknown source of the material collecting within them. No other underground conduits were observed during monitoring and discussions with Mr. Jensen. Locations where monitoring data were collected are shown on Figure 2.

Interviews

Garage operators were interviewed to determine if any historical complaints were lodged about vapors in the garage. Mr. Eddie Bichoff (AMPCO manager, 1972 – 1995) and Mr. Steve Carlson (AMPCO manager, 1995 – 1997) were contacted. Mr. Vernon Bair, the current manager was on vacation when the interviews were conducted. However, according to Mr. Jensen, any complaints that would come to Mr. Bair's attention would immediately be forwarded to him. According to Mr. Bichoff, Mr. Carlson, and Mr. Jensen, no complaints were ever made about vapors or odors observed in the garage. Two exceptions include when the elevator shaft was extended downward to the level of the pedestrian concourse and during the summer when odors from the garbage area are strong.

According to Mr. Jensen, vapors were observed when the elevator shaft was extended from Level B to the concourse level. While no venting was in place during the initial days of excavation, Mr. Jensen believes the vapors were due to backhoe operations and not to the presence of contaminated soil. Once venting was in place, odors did not appear to pose a concern.

Based on further discussion with Mr. Jensen, the underground parking levels (B and Concourse) are vented, while the aboveground parking levels (1 through 9) are open to the air. The ventilation system present in the underground levels sucks air through four intakes along the west wall of the two levels (B and Concourse), which is eventually vented into the alley at the top of parking level 1. Venting for the hotel itself is separate (due to the fact the hotel was constructed after the garage), and vents out to the roof, 30 floors above the lowest levels of the garage. Approximate flow through each of the four intakes is 3,500 cubic feet per minute.

Task 1 – Conclusion

Based on PID measurements, interviews, and review of hotel plans, it does not appear that vapors are posing a risk to human health. While elevated PID measurements were detected in the monitoring wells, the results serve as a worst case and are probably a result of the benzene detected in the groundwater. As expected, the upgradient well, which contains free product, has

the highest PID measurement. Although not detected in the garage and conduits, hydrocarbon vapors may be present beneath the garage floor and sidewalk. As indicated in our Site Assessment Report (February 1998), anyone doing work beneath the basement floor or sidewalk should take note of these potential conditions and take appropriate actions.

TASK 2 – NATURE AND EXTENT OF RESIDUAL CONTAMINATION

To evaluate the nature and extent of residual contamination, the approximate volume of soil removed during tank replacement, during construction of the pedestrian concourse, and when the nearby elevator was deepened to the level of the concourse was calculated. Our calculations and assumptions are presented below.

Limited residual soil contamination is present beneath the site. The exact extent of soil contamination is not known, although the extent is known to be limited, based on borings. Therefore, our calculations are based on the assumption that soil contamination does not extend past 25 feet southwest of MW-3. The approximate extent of contaminated soil removed is presented in Figure 3.

- In the early 1970s, one of the two tanks leaked and was replaced. Approximately 64 cubic yards were removed when this occurred. This volume was calculated based on the assumption that the excavation extended down to 11 feet and two sides of the excavation were sloped 1:1. Based on our understanding of subsurface soil, the tank removal excavation did not extend beneath a hard clay and silt layer.

- The elevator shaft, from street level to the lower parking levels, was extended downward to the pedestrian concourse (early 1990s). At the time, approximately 356 cubic yards were removed. The concrete sawcut is apparent at the site. This volume is based on an approximate excavation depth of 20 feet, typical excavation practice, and review of plans detailing the work. Based on our understanding of subsurface soil and discussion with Mr. Jensen, the excavation extended past the hard silt and clay layer and to the top of the groundwater table.

- Prior to the elevator deepening, tunneling for the concourse occurred. Assuming that an additional two feet around the perimeter of the concourse was needed for working space, the approximate volume of soil removal is 915 cubic yards. This excavation also appears to extend past the hard silt and clay layer and to the top of the groundwater table.

Task 2 – Conclusion

Based on our calculations, a majority of the contaminated soil has been removed from the site during previous site work. Any remaining soil contamination is most likely in the immediate area of the tanks. Current investigation data indicate that soil contamination does not extend downgradient to MW-2 or MW-3. The volume may be on the order of 300 cubic yards.

TASK 3 – RISK-BASED CLEANUP CRITERIA

We reviewed the feasibility of calculating a site-specific, risk-based cleanup level for the petroleum hydrocarbons previously detected in site soils. We have evaluated potential exposure pathways by developing a conceptual site model (CSM). Based on our CSM, we determined that no complete exposure pathways exist at this site and no risk exists, given current site conditions. Our evaluation is further discussed below.

Preliminary Conceptual Site Model

A complete exposure pathway must exist before any risk to human or ecological receptors is possible. Potential exposure pathways are evaluated by developing CSMs. A CSM describes the primary contaminant sources, release mechanisms, secondary sources, mechanisms of retention in or transport to exposure media, receptors that may contact the exposure media, and intake routes through which receptors may be exposed. If any one of these elements is missing, a given exposure pathway is incomplete.

Primary Sources and Release Mechanisms

The former primary sources at the Hilton site are the two closed gasoline USTs, located beneath the lowest level of the parking garage. These tanks may have released gasoline, BTEX, and lead to the environment. The release mechanisms from these sources include spills and leaks.

Secondary Sources

Surface and/or subsurface soils adjacent to the source areas have been impacted by the release of contaminants from the primary sources (e.g., leaks from USTs). Results of historical analytical laboratory testing (Environmental Associates, Inc., 1994) have shown that site soils

contain measurable concentrations of potentially site-related chemicals (e.g., BTEX, gasoline). However, no soil contamination was found in recent sampling (Shannon & Wilson, 1998).

Mechanisms of Retention in or Transport to Exposure Media

The potential chemical retention and transport mechanisms include retention in soil, transport from subsurface soil to air attached as particles, transport from soil or groundwater to air in vapor phase, and leaching to groundwater. These mechanisms are discussed below.

Soil is a potential retention medium at this site. The degree of retention in or adsorption to soil is controlled by chemical properties and environmental factors. Many potential petroleum constituents, such as higher molecular weight alkanes, tend to strongly sorb to soil, while more volatile or water soluble chemicals such as BTEX are less strongly retained in soil. Because the primary source of the contamination was a gasoline release (comprised of low molecular weight constituents), the site soils have a limited adsorption potential (primarily composed of silty sand and fill materials), and no contaminants were detected in site soils in recent sampling (Shannon &Wilson, 1998), soil retention may be somewhat limited. Furthermore, most of the contaminated soil was removed as described under Task 2.

Because the site is covered with concrete, there is little potential for particulate matter from subsurface soil to become suspended in air. Future construction activities could mobilize subsurface soils into air, but because no major hotel renovation/demolition is planned, such disturbances are unlikely.

Because volatile chemicals have been detected in site soils, they may migrate to air. Therefore, inhalation of volatiles released from soil is a potential exposure route.

Leaching of contaminants from soil to groundwater is not expected to be a complete transport pathway for several reasons. Because the site is paved and located in an indoor parking facility, infiltration of rainwater is highly unlikely. In addition, it appears that a hard silt/clay layer is present above the water table which serves as a barrier to soil contaminants and prevents migration to groundwater (see Task 4 – Extent of Commingling). Therefore, groundwater is not considered a viable exposure medium.

Receptors and Exposure Routes

Potential human receptors identified for the site include parking attendants, hotel visitors, and utility workers. Because parking attendants would be more exposed (longer exposure duration, higher exposure frequency) to site contaminants than hotel visitors, protection of parking attendants would also be protective of hotel visitors. Utility workers may be exposed to site contaminants while repairing/replacing subsurface utility equipment. No offsite receptors were identified because no contamination was detected in any downgradient soil or groundwater samples. No exposure routes were identified for ecological receptors because the site is in a commercial area and is entirely paved.

For parking attendants and utility workers, the only exposure route determined to be potentially complete and significant is inhalation of volatiles released from subsurface soil. Incidental ingestion of, dermal contact with, and inhalation of particulates released from subsurface soil are considered to be incomplete pathways because the presence of concrete pavement prevents current exposure.

In order to measure current exposure levels to volatile chemicals, vapor monitoring was conducted in the lowest levels of the parking garage (see Task 1 – Testing for Vapors). However, no volatiles were detected at any sampling location. Based on these results, inhalation of volatiles is not a complete exposure pathway.

Task 3 – Conclusion

No complete exposure pathways exist at the Hilton site, given current conditions. With the absence of complete exposure pathways, interim risk-based cleanup criteria cannot be calculated and no risks are present.

TASK 4 – EXTENT OF COMMINGLING

Task 4 consisted of evaluating the subsurface stratigraphy and potential for commingling. Subsurface evidence indicates that residual soil contamination from the USTs is not mixing with or contributing to the contaminated groundwater that is migrating beneath the site from off site. This conclusion is supported by the following:

- Migration to groundwater is retarded by a hard silt/clay layer. Figures 4 and 5 are cross sections through the UST area. As shown on the cross sections, the USTs are bedded in sandy fill that overlies a hard silt/clay layer. The native soil adjacent to the UST area is sand. The silt/clay layer appears to be continuous beneath the site and the street and is 3 to 6 feet thick. Soil samples were collected and analyzed from above and below the silt/clay layer at locations as shown on Figures 4 and 5. A sample from above the silt/clay layer at B-1 (drilled in 1994) did have gasoline contamination at 2,000 mg/kg. At MW-2 and MW-3 (drilled in 1998), samples from immediately above (and below) the silt/clay layer did not contain measurable concentrations of gasoline. The lack of soil contamination (and the lack of water) on top of the silt/clay layer indicates that contamination is not migrating along the layer.

- There is essentially no recharge through the residual contaminated soil area which underlies the lower level of a parking garage. The lower level floor is concrete. The entire site is covered with the multi-story Hilton Hotel. The hotel shares common walls with adjacent buildings, and the streets and sidewalks are paved. Essentially, no infiltration of groundwater occurs. If any water drains from cars parked in the garage, it is collected in storm drains. Rain on streets and sidewalks outside the building is collected in city storm drains under the streets. No soil is exposed that would allow direct infiltration.

- Groundwater does not flow through the UST area. No water was observed above the silt/clay layer during either of the subsurface investigations (1994, 1998). Groundwater is present at 3 to 7 feet below the silt/clay layer as shown on Figures 4 and 5.

- Groundwater beneath the site is recharged laterally from a capture area uphill from the downtown area. No vertical recharge occurs on or adjacent to the site.

Task 4 – Conclusion

In our opinion (as confirmed by Mr. Madakor on April 27, 1998), compliance monitoring will not be needed since commingling is not occurring and therefore the residual contamination at the USTs is not contributing to groundwater contamination. For the same reason, additional groundwater sampling is not needed.

TASK 5 – COST ANALYSIS FOR REMOVAL ACTION

Task 5 consisted of preparing a cost analysis for the removal of the USTs and residual soil contamination to assist in determining the feasibility of such an action. Our costs and assumptions are summarized below.

Costs for the following were obtained: 1) shoring the building foundation, 2) excavation and removal of contaminated soil, 3) site restoration, 4) loss of revenue, and 5) protection of workers and public. Sources of information included Mr. Charles Engstrom (CEcon Corporation) and Mr. David Thyer (R.C. Hedreen Company). The costs are presented in the following table and further explained below.

Item	Description	Approximate Cost
1	Shoring	$50,000
2	UST Removal	$20,000
3	Excavation/Disposal of Contaminated Soil	$70,000
4	Site Restoration	$5,000
5	Loss of Parking Revenue	$32,800 *
6	Health and Safety	$9,000
	TOTAL	**$168,800 ***

* does not include loss to hotel revenue resulting from removal action which could be well over $30,000

Item 1. Based on limited review of building plans, and how the building appears to be supported by piles, shoring may not be required to protect the building. However, some support may be required if the adjacent sidewalk fails due to excavation beneath the garage. Shoring will be required within the garage during UST removal and excavation of contaminated soils for worker protection.

Item 2. This cost is based, in part, on discussion with CEcon Corporation. It includes the approximate cost for UST removal, sampling, site assessment time, and documentation. This cost is elevated due to the limited access, which would slow down removal, and because each tank was filled with slurry. Breaking of the concrete would be required before the tank could be lifted from the subsurface.

Item 3. This cost is based, in part, on discussion with CEcon Corporation. Disposal costs assume that approximately 300 cubic yards of soil would be removed and that the soil is not a hazardous waste and may be accepted by certified landfill. This task assumes that groundwater will not be encountered as determined by known site conditions.

Item 4. This cost is based on discussion with CEcon Corporation. It assumes placement and compaction of backfill, and placement of approximately 6 inches of concrete.

Item 5. For safety reasons, closure of the underground parking levels (a portion of street level which is enters and exits the lower levels, B, and concourse) of the garage would be required. Loss of revenue is based on work lasting approximately one month and estimated monthly revenue per stall, provided by Mr. David Thyer (R.C. Hedreen Company). At $328 per lower level stall per month, loss would be 100 x $328 = $32,800, plus any loss to hotel guests due to disturbance in garage. According to Mr. Thyer, lost hotel revenue from limited room occupancy would be substantial.

Item 6. Petroleum vapor concentrations are unknown at this time. No vapors were detected during monitoring (during mid-day, weekday) conducted within the garage. Odors were observed during drilling. However, it appears that with simple venting (as discussed with Mr. Jensen), odors are not noxious. This cost includes health and safety equipment and sampling.

Task 5 – Conclusion

Based on the above cost analysis, removal of the tanks and limited amount of residual contaminated soil is cost prohibitive and extremely disruptive to the hotel. Since the tanks are not in use and were abandoned in 1985, in our opinion, site closure of the site with respect to the USTs, should not require removal of the tanks.

SUMMARY OF CONCLUSIONS

Based on performing the additional tasks and the additional data collected, we offer the following conclusions and based on these conclusions, we recommend that no further action be taken with respect to cleanup of residual soil contamination from the USTs.

Vapors

Air monitoring was conducted in the garage and no vapors were detected. No historical complaints have been made regarding petroleum vapors during normal operation of the garage, and plans indicate that the lower levels of the garage are vented. Therefore, given current site conditions, we conclude that vapors are not posing a risk to human health. However, vapors are present within the subsurface based on headspace readings in the monitoring wells. Therefore

anyone doing work beneath the basement floor or sidewalk should take note of these potential conditions and take appropriate actions.

Residual Contamination

Approximately 1,300 cubic yards of soil has been removed during previous site work. Based on our calculations, it appears that the majority of contaminated soil has been removed. Current investigation data indicate that soil contamination does not extend downgradient to MW-2 or MW-3, therefore, we conclude that a limited amount of residual soil contamination is present in the immediate area of the tanks.

Risk Based Cleanup Criteria

Our Conceptual Site Model indicates that there are no complete exposure pathways at the Hilton site, therefore, no risk to human health exists. Risk-based cleanup criteria cannot be calculated.

Commingling

Subsurface evidence indicates that residual soil contamination from the USTs is not contributing to groundwater contamination because of a hard silt/clay layer that retards downward migration and because the area of residual soil contamination does not get any recharge. Therefore, groundwater monitoring is not needed.

Tank and Residually Contaminated Soil Removal

Our cost analysis indicates that removal of the tanks and limited amount of residual contaminated soil is cost prohibitive and extremely disruptive to the hotel. Because the tanks are already closed in place, closure of the site with respect to the USTs, should not require removal of the tanks.

Based on historical data, the additional data collected, and the above conclusions, we feel that appropriate site actions and characterization of risks have been completed. Therefore, we recommend that the Hilton Hotel site receive an NFA designation from the Department of Ecology.

Sincerely,

SHANNON & WILSON, INC.

Kathy Goetz Troost

Kathy Goetz Troost, R.P.G., R.E.P.A.
Senior Associate

ACT:KAT:JFZ/act

Enclosures: Figure 1 – Site and Exploration Plan
Figure 2 – Vapor Monitoring Locations and Results
Figure 3 – Approximate Extent of Soil Removal
Figure 4 – Cross Section A-A'
Figure 5 – Cross Section B-B'
Appendix A – Shannon & Wilson Memo to Ecology, dated April 23, 1998
Appendix B – Important Information About Your Environmental Report

cc: Mr. Nnamdi Madakor, Department of Ecology, Northwest Regional Office
Mr. David Thyer, R.C. Hedreen Company
Mr. Scott Isaacson, Bogle & Gates

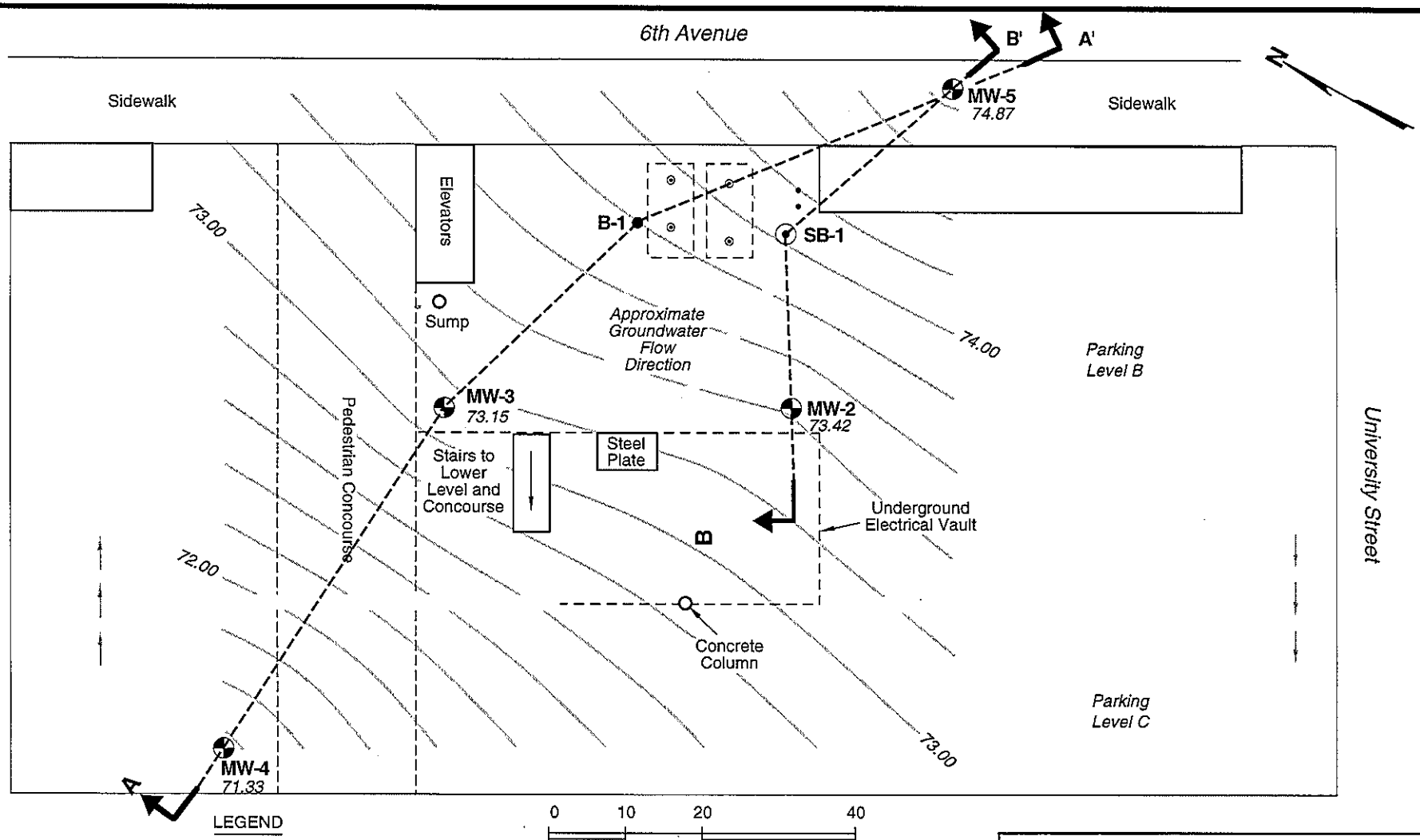

FIG. 1

Seattle Hilton Hotel
6th Avenue and University Street
Seattle, Washington

SITE AND EXPLORATION PLAN

July 1998 T-1772-03

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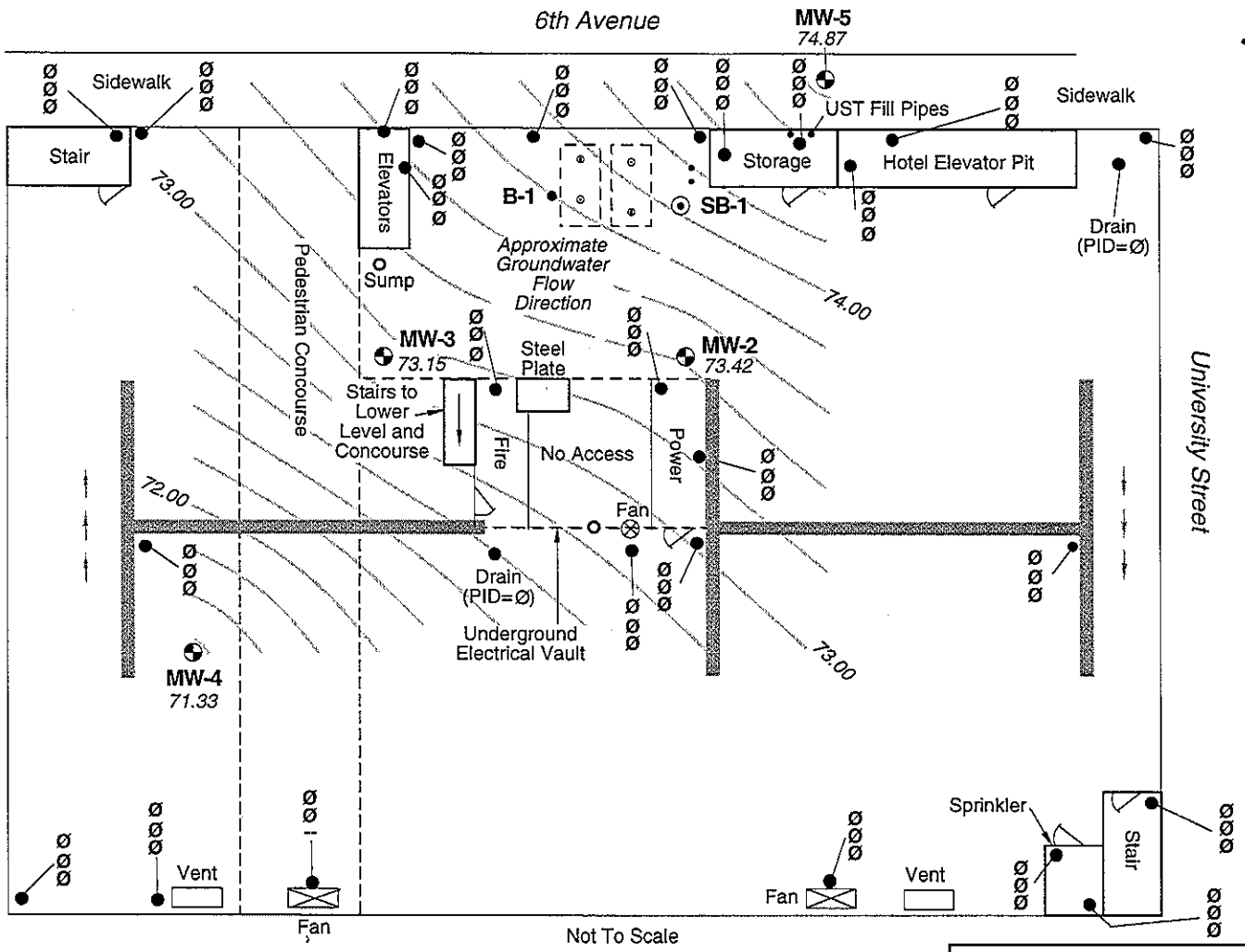
FIG. 1



LEGEND

- MW-2 ◔ Monitoring Well Designation and Approximate Location
- SB-1 ⊙ Boring Designation and Approximate Location
- B-1 ● Boring Designation and Approximate Location (by Environmental Associates, Inc., Nov. 1994)
- 74.87 Groundwater Elevation in Feet (January, 1998) (based on arbitrary site datum)
- Ø Ø Ø ● Vapor Monitoring Location and PID Reading (Overhead, Breathing Zone, Ground, Parts Per Million)

Seattle Hilton Hotel
6th Avenue and University Street
Seattle, Washington

VAPOR MONITORING LOCATIONS AND RESULTS

July 1998 T-1772-03

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FIG. 2

FIG. 2

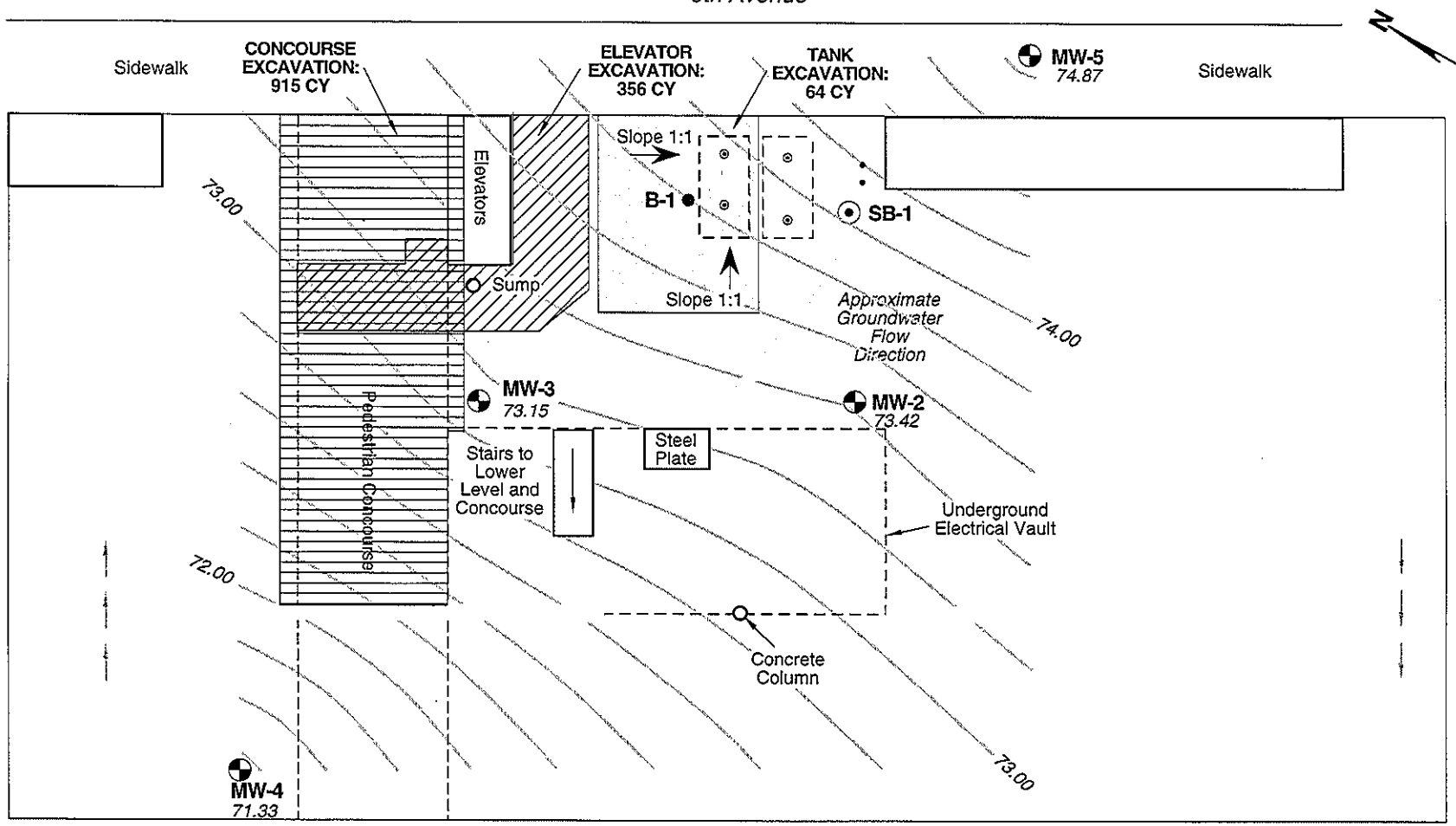

FIG. 3

Seattle Hilton Hotel
6th Avenue and University Street
Seattle, Washington

APPROXIMATE EXTENT OF SOIL REMOVAL

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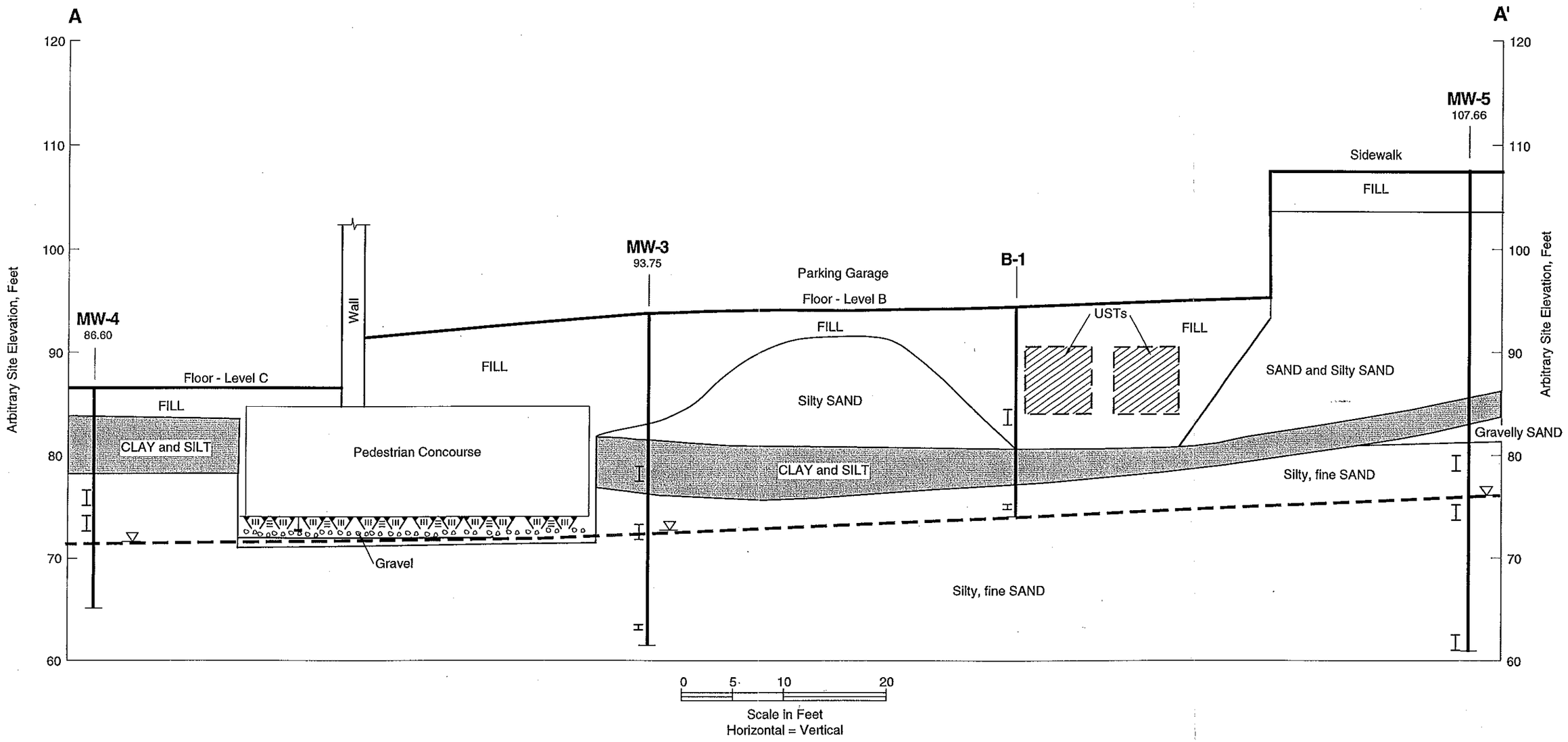
FIG. 3



LEGEND

- **MW-5** / 107.66 — Boring Location and Designation; Elevation Based on Arbitrary Site Datum
- Groundwater Level
- Analytical Sampling Interval
- Approximate Geologic Contact
- Bottom of Boring

Seattle Hilton Hotel
6th Avenue and University Street
Seattle, Washington

CROSS SECTION A-A'

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FIG. 4

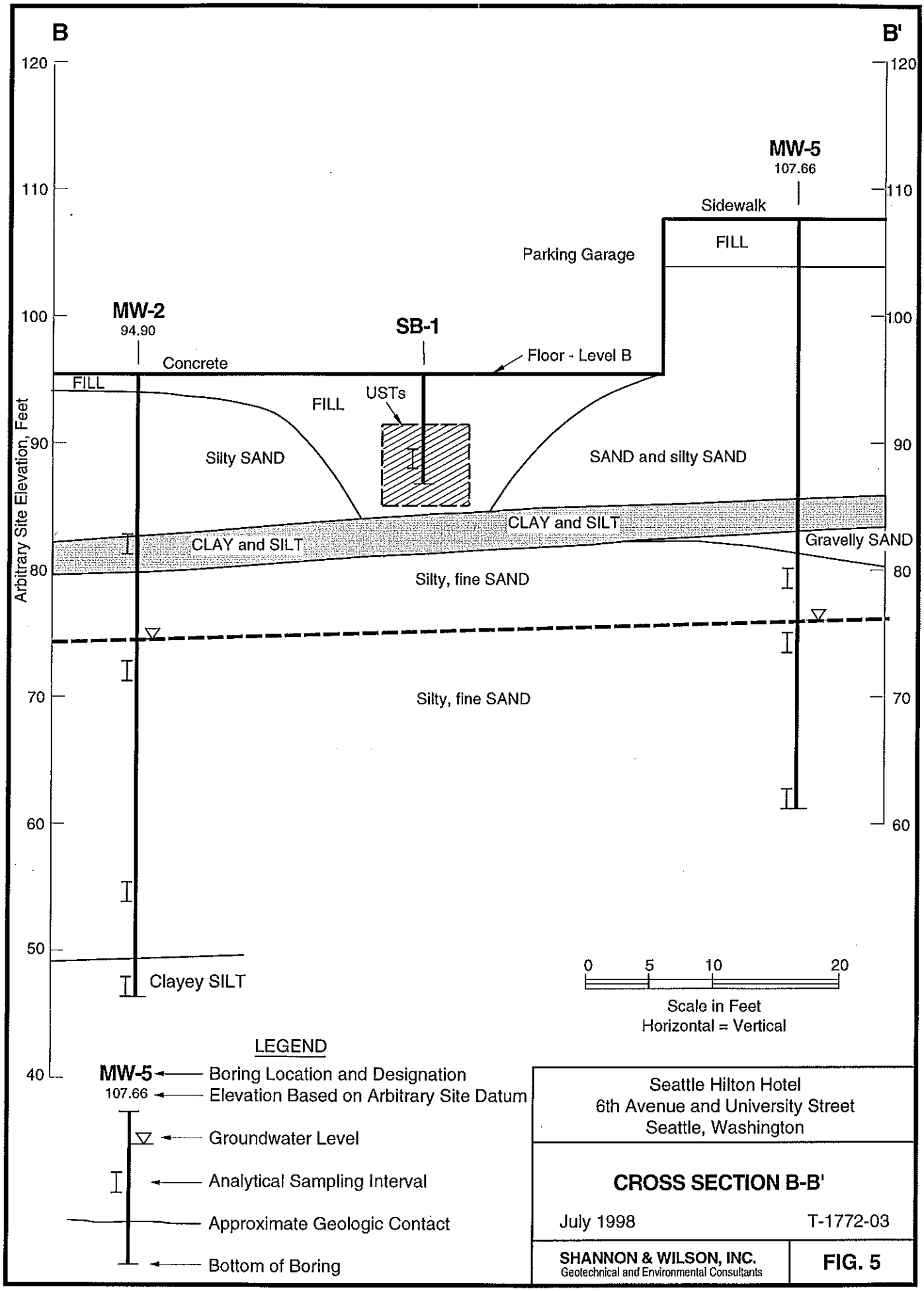
B
B'
120
110
100
90
80
70
60
50
40
Arbitrary Site Elevation, Feet
MW-5
107.66
Sidewalk
FILL
Parking Garage
MW-2
94.90
SB-1
Concrete
Floor - Level B
FILL
FILL
USTs
Silty SAND
SAND and silty SAND
CLAY and SILT
CLAY and SILT
Gravelly SAND
Silty, fine SAND
Silty, fine SAND
Clayey SILT
0
5
10
20
Scale in Feet
Horizontal = Vertical
LEGEND
MW-5
Boring Location and Designation
107.66
Elevation Based on Arbitrary Site Datum
Groundwater Level
Analytical Sampling Interval
Approximate Geologic Contact
Bottom of Boring
Seattle Hilton Hotel
6th Avenue and University Street
Seattle, Washington
CROSS SECTION B-B'
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FIG. 5

APPENDIX A

SHANNON & WILSON MEMO TO ECOLOGY
DATED April 23, 1998

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

SEATTLE
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BOSTON

MEMORANDUM

TO: Mr. Nnamdi Madakor

FROM: Ms. Kathy Troost (206) 633-6810

DATE: April 23, 1998

RE: **ADDITIONAL GROUNDWATER INFORMATION, SEATTLE HILTON HOTEL, TCP ID NO. 414542**

We have further evaluated the groundwater conditions at the above-referenced site. According to our conversation on March 5, 1998, you stated that an NFA would not be possible for the site groundwater because of insufficient data. To obtain additional data, we have:

1. Conducted another set of groundwater elevation measurements to further evaluate flow direction,

2. Revisited our conclusions regarding the groundwater conditions, and

3. Evaluated the possibility of chemical fingerprinting.

In our opinion, additional sampling is not warranted given the following.

Enclosed are hand-drawn groundwater contour maps from the last two rounds of water-level measurements. It is unlikely that the contamination in monitoring well MW-5 is a result of the former on-site tanks for the following reasons:

1. The predominant groundwater flow direction based on the two sets of groundwater elevation measurements is west across the site, away from MW-5 (Refer to Figures 2 and 3). Given the topography, geology, and unconfined aquifer, the westerly flow direction measured at the site is reasonable and consistent with expected regional flow. This supports the conclusion that sufficient data points exist to accurately contour the water table elevation.

2. The hydraulic gradient is very steep, averaging 0.035 foot/foot, with MW-5 directly upgradient. It seems highly unlikely that a leak from USTs could have migrated very far up such a steep gradient.

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3. The presence of almost 2 feet of product in MW-5 during the April groundwater measurements supports an off-site source, as one would expect there to be free product in the wells downgradient when there is product in an upgradient well.

4. MW-2 is more directly downgradient of MW-5 than MW-3. The concentration of gasoline at MW-2 (4,700 µg/L) is much higher than at MW-3 (700 µg/L). Therefore, MW-2 likely reflects contamination from MW-5 rather than from the USTs (which are cross-gradient from MW-2).

We have also enclosed hand-drawn cross-sections showing the distribution of potential confining layers in the subsurface. As you can see on Section A-A′ (location shown on the Site Plan, Figure 1), a fine-grained layer is present beneath the USTs but above the groundwater table. The free-product layer in MW-5 is located below this layer. This separation further supports the conclusion that the groundwater contamination is predominantly, if not all, from an off-site source.

Chemical fingerprinting is not guaranteed to be conclusive because we would have to compare free product in MW-5 to dissolved phase in MW-2 and MW-3. Both fuel sources likely predate 1980 and both types are gasoline.

We look forward to meeting with you to discuss these conditions to see if we can reach a consensus for the next step, if any, to be taken on the site. Thank you for your further evaluation of the data.

KAT/kat

Enclosure: Figure 1
Figure 2
Figure 3
Figure 4
Figure 5

cc: Mr. Stephen Long
Mr. David Thyer

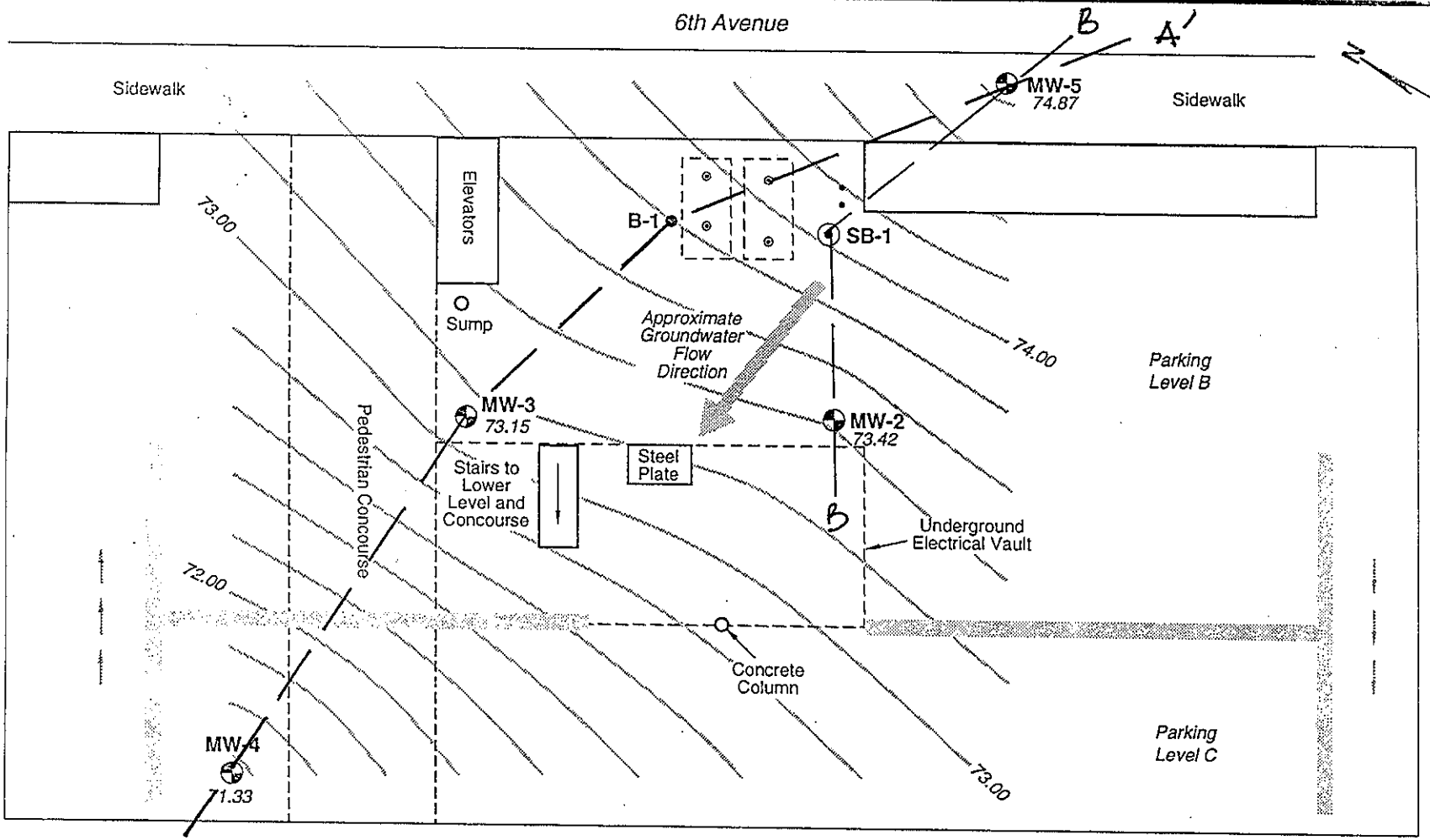


FIG. 1

Seattle Hilton Hotel
6th Avenue and University Street
Seattle, Washington

SITE AND EXPLORATION PLAN

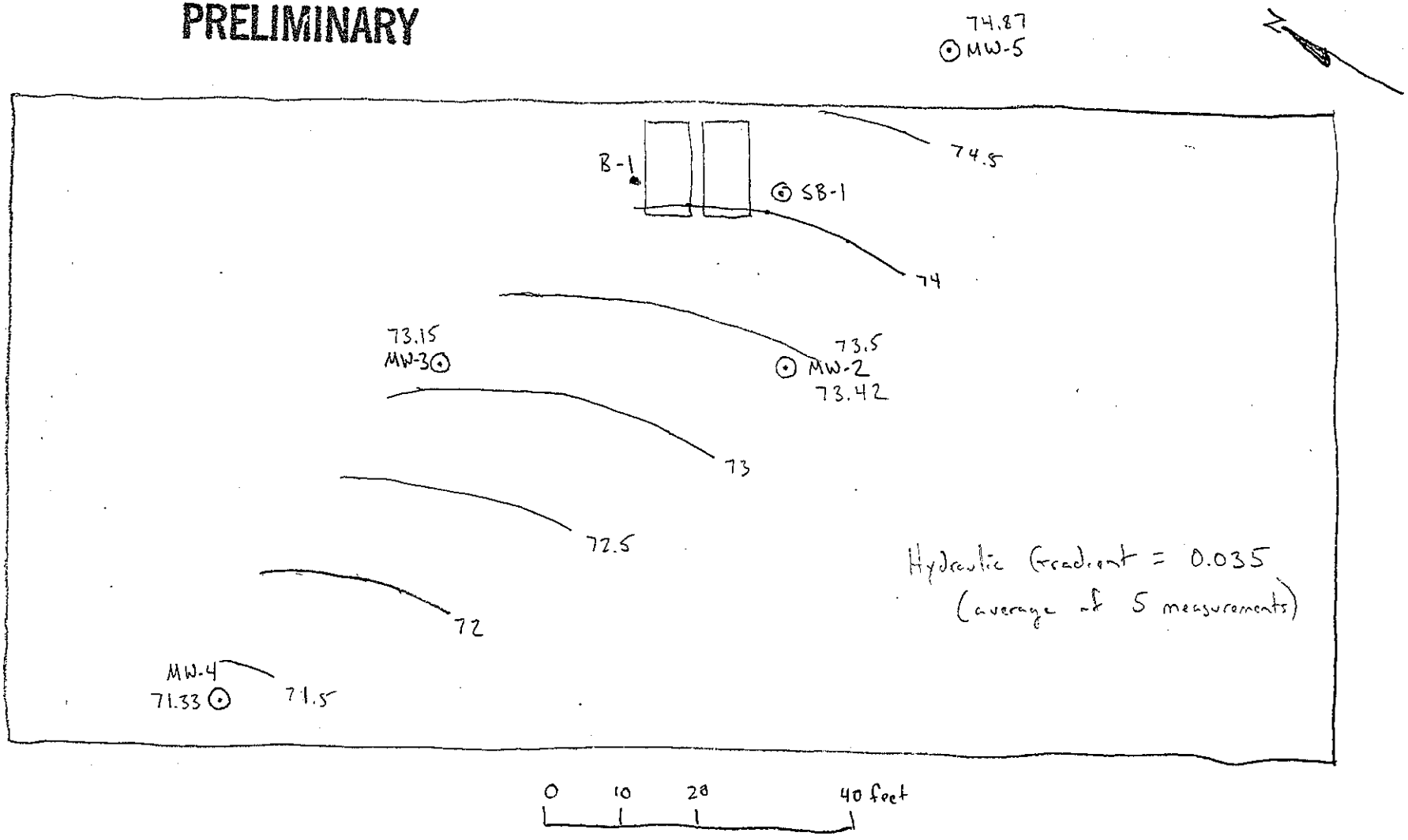
~~January~~ April 1998 T-1772-01

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 1

Jan. '92 data

PRELIMINARY

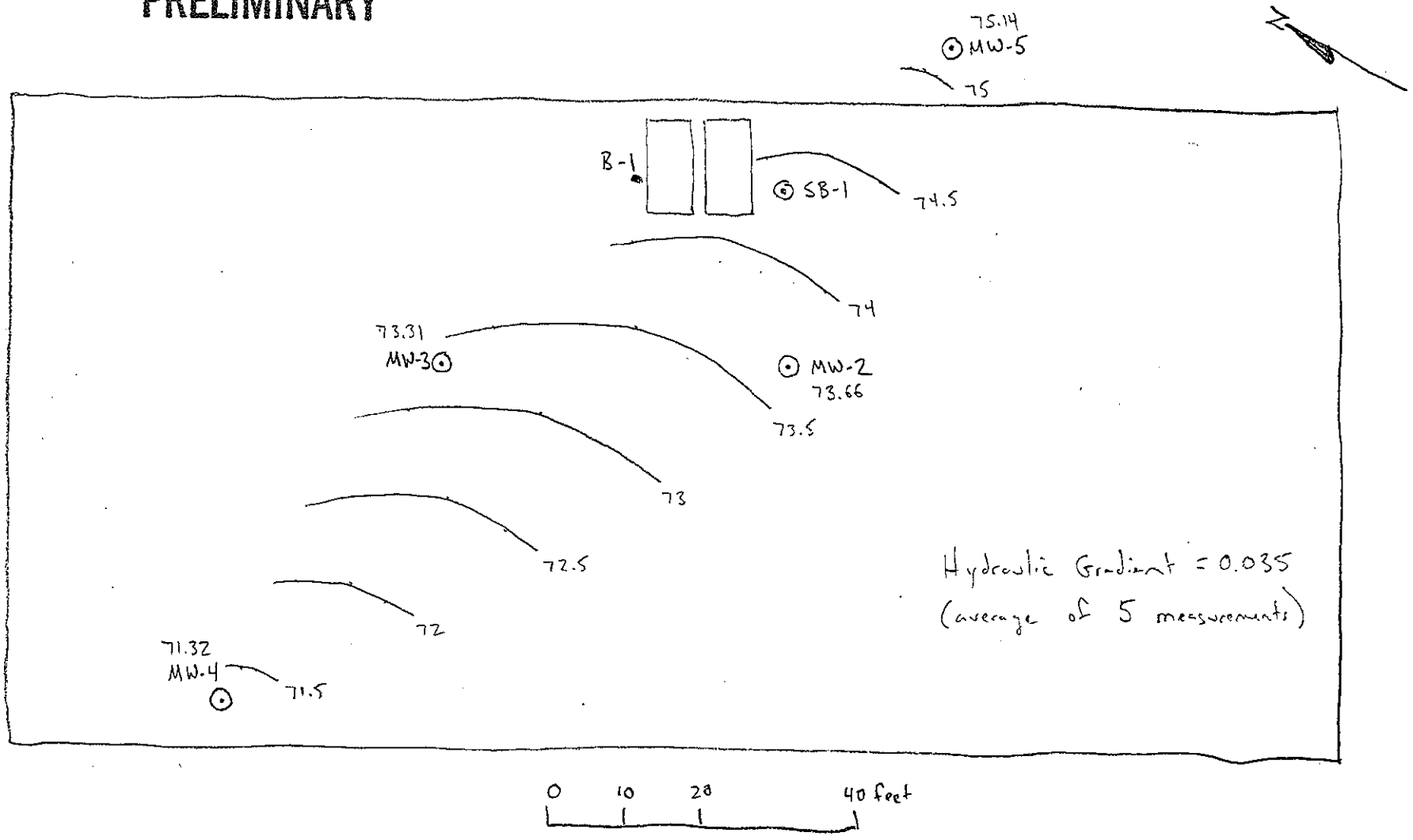


T-1772-02
GROUNDWATER CONTOUR
SHW

Fig 2

April '98 Data

PRELIMINARY



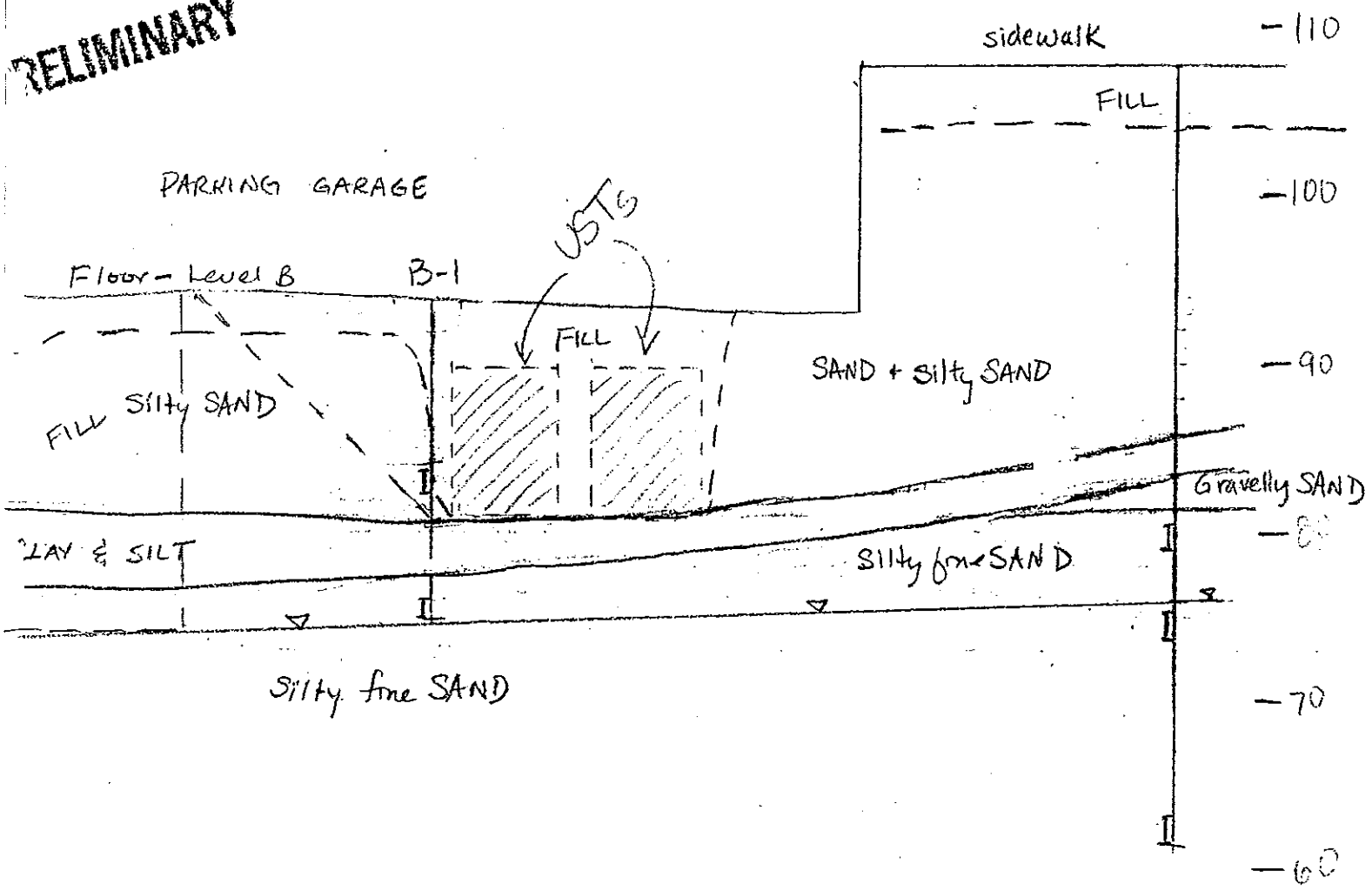
T-1772-02
GROUNDWATER CONTOUR
S&W Fig 3

* see colored X-sections for clarification

A'

MW-5
(107.66)

PRELIMINARY

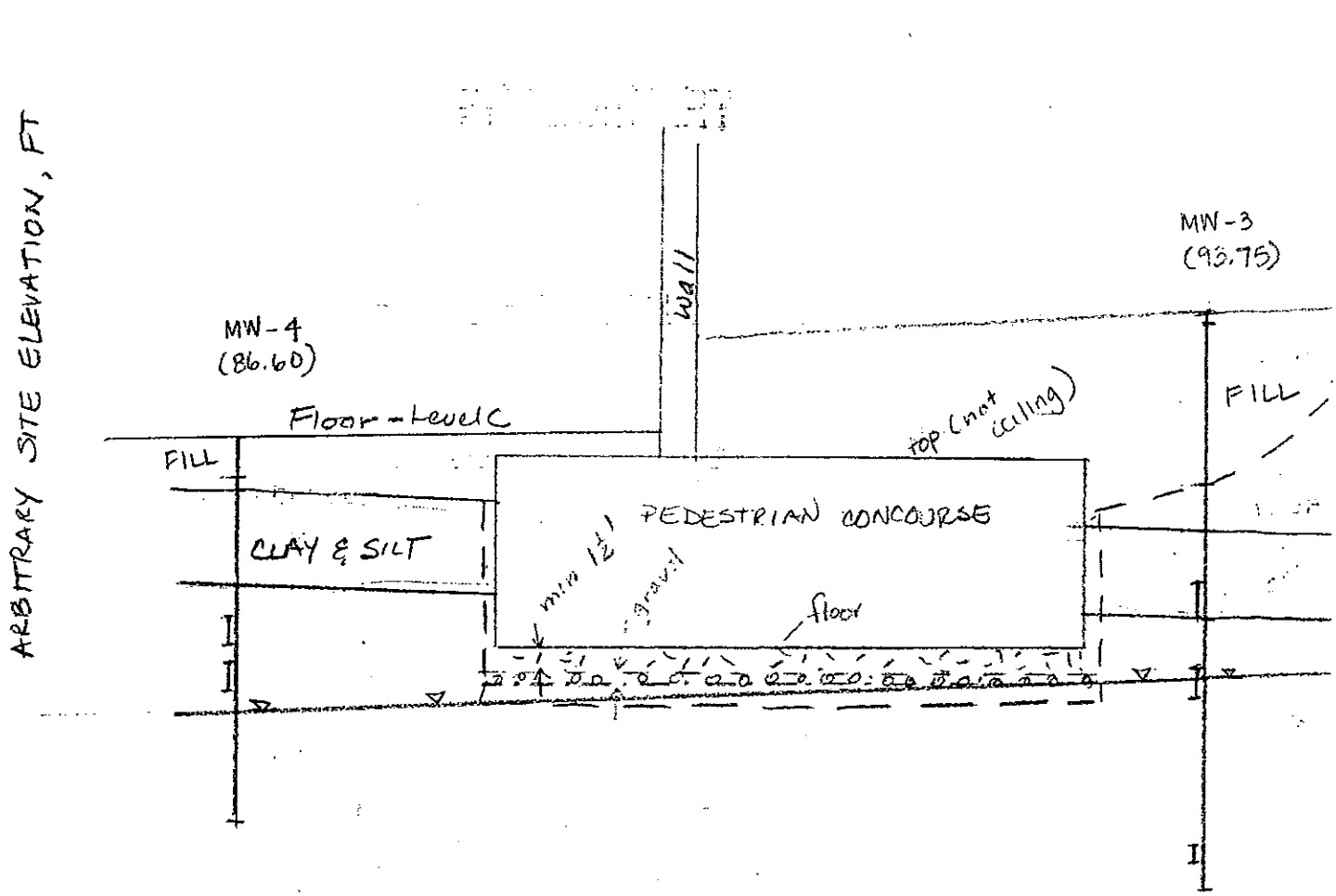


0 10
HORIZ SCALE, FT.
NO VERT. EXAG.

T-1772-02
CROSS SECTION A-A'
SCW FIG. 4 (1082

PRELIMINARY

A

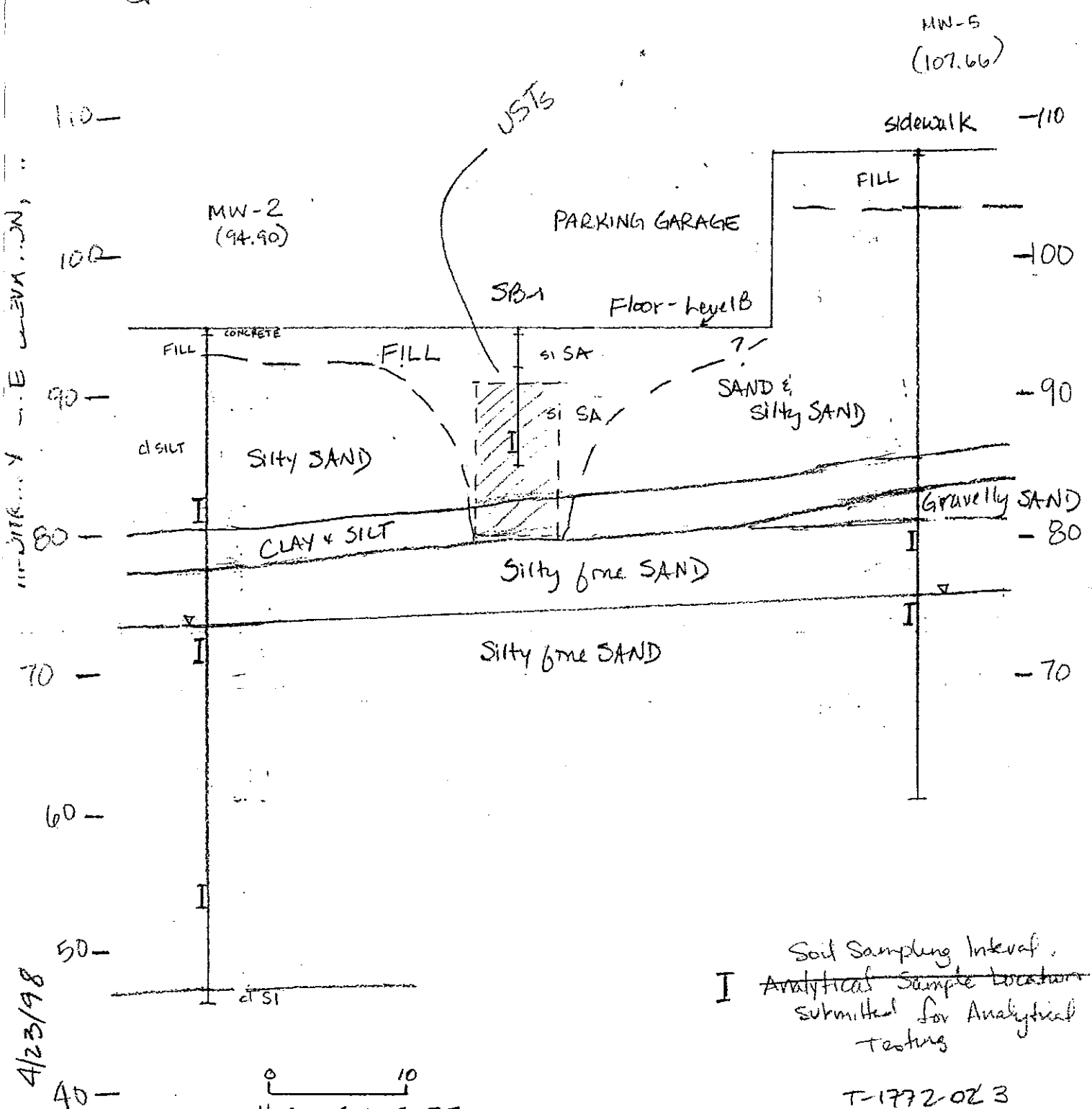


T-1772-02
CROSS SECTION A-A'
S+W Fig 4 (2082)

PRELIMINARY

B'

B



APPENDIX B

IMPORTANT INFORMATION ABOUT YOUR ENVIRONMENTAL REPORT

Dated: July 10, 1998

To: Mr. Steve Long
AMPCO System Parking

Important Information About Your Geotechnical/Environmental Report

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.