APPENDIX 8.3
Geotechnical Investigation

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April 30, 2015
Project 1741-13

BRANAGH DEVELOPMENT
100 School Street
Danville, CA 94526

Attention: Mr. Cristian Streeter

Gentlemen:

Report Update
Proposed Commercial Development
985 Montague Expressway
Milpitas, California

Introduction

As requested, we have completed a geotechnical investigation at the site for the planned commercial development. The property is located at 985 Montague Expressway in Milpitas, California. This report summarizes our findings, conclusions and recommendations. This report is submitted to update a previous geotechnical investigation report dated September 2004. The 2004 geotechnical investigation report was prepared for WPI. The general location of the property is shown on the Vicinity Map, Figure 1.

Proposed Development

The site is to be developed into a self-storage facility. The facility will consist of six buildings five of which will be a single story in height and the other one will be two stories high. One of the single story buildings will be designed such that another story can be added on in future. The proposed facility will be accessed from Montague Expressway. The storage buildings will be accessed by interior driveways that will be required to withstand vehicular loading from fire trucks and occasional moving trucks.

Information Provided

We were provided with electronic photographic copies of the proposed of the proposed development. We were also provided with a pdf copy of the site plan showing the outline of the proposed construction in relation to the existing surroundings. A copy of the layout plan was used to prepare our site plan, Figure 2. Figure 2 also shows the approximate location of the exploratory holes that were made as part of the investigation for this report update.

Scope Of Work

Our scope of work was to evaluate the conditions at the property, particularly the subsurface soils and the fill soils from a geotechnical engineering viewpoint and provide information for the development of the project. To this end, we performed the following scope of work

1. Reviewed our files for the work we have previously done at the property.

2. Made site reconnaissance visits to check the existing conditions and compare them with those that existed at the time when we performed our field investigation in 2000. This was completed on Wednesday, October 2, 2014.

3. Complemented the subsurface data currently in our files by means of four small diameter exploratory holes to obtain samples for laboratory testing. The holes were logged by a certified engineering geologist who supervised the field exploration and obtained samples for laboratory testing.

4. Performed laboratory testing on selected samples obtained from the field exploration to evaluate their index and mechanical properties.

5. Collated the field and laboratory data obtained to develop information for site preparation, grading and compaction including the demolition of existing structures and the removal of their foundation system; provided information for the design and construction of the proposed building foundations, concrete slabs-on-grade, retaining walls, utility trench backfilling and site drainage.

6. Provided minimum pavement section for site driveways and parking area based on the site soils and projected traffic indices.

7. Summarized our findings, conclusions and recommendations in this written report.

Findings

Surface Conditions

In addition to the conditions described in our December 4, 2000-report, a stockpile of soil had been brought onto the northern end of the property in addition to the existing structures. Th concrete pads encountered during our 2000 investigation were still in existence at the time of our recent soil exploration. There were a few electrical components that had been placed in the southern area of the property and it appeared workers were assembling the parts together at the time of our site visits. Ground elevation at the property is about 85 feet above Mean Sea Level.

Subsurface Conditions

The descriptions given below pertain only to the subsurface conditions found at the site at the time of our field exploration on January 8, 2015. Subsurface conditions, particularly, groundwater levels and the consistency of the near-surface soils will vary with time and the seasons.

Subsurface soils at the site were explored by means of six small diameter exploratory holes using a truck-mounted drill rig with an auger attachment (Mobil B24 with solid stem augers). Samples were obtained by driving down a sampler 18 inches using a 140-pound hammer over a cat head. The hammer was dropped freely a distance of 30 inches to drive the sampler18 inches into "undisturbed" soil. The number of blows required (unless otherwise stated) to drive the sampler the last 12 inches into the soil is shown on the attached boring logs.

The drill holes encountered fill, clay, silt, sand and gravel. Fill was encountered in all four exploratory holes. One of the holes encountered concrete at a depth of four feet and had to be relocated six feet to the north of the original location. Concrete was encountered at the same depth and the hole had to be abandoned.

The fill encountered consists of brown and black mottled sandy clay with some gravel. The clay is moist and firm to stiff. The fill thickness at the borings ranged between three and seven feet. The fill is underlain by brown clayey sand with gravel that grades to dark sandy clay with grave to the maximum depth of exploration. The clayey sand is moist and medium dense. The underlying sandy clay is moist and firm to stiff. The holes were backfilled with cement grout. No free groundwater was encountered in any of the exploratory holes. Depth to groundwater is expected to vary with time and the seasons.

Detailed descriptions of the materials encountered in the borings are given on the appended boring logs.

Seismic Considerations

This project site is located within the seismically active San Francisco Bay region but outside of any mapped as the Alquist-Priolo Earthquake Fault Zones.

Type A and Type B faults close to the site are listed in the following table.

TABLE 1 - TYPES A AND B FAULTS CLOSE TO THE SITE*

Fault	Type	Maximum Moment Magnitude	Slip Rate (mm/yr)	Distance (miles/km)
San Andreas (1906 Segment)	A	7.9	24	16/26
Hayward (Total Length)	A	7.1	9	5/8
Calaveras (So of Calaveras Reservoir)	B	6.2	15	5/8
Calaveras (North of Calaveras Reservoir)	B	6.8	6	5 /8
Hayward (SE Extension)	B	6.4	3	12/19

*California Division Of Mines and Geology

Seismic hazards can be divided into two general categories, hazards due to ground rupture and hazards due to ground shaking. Since no active faults are known to cross this property, the risk of earthquake-induced ground rupture occurring across the project site appears to be remote.

Should a major earthquake occur with an epicentral location close to the site, ground shaking at the site will undoubtedly be severe, as it will for other property in the general area. Even under the influence of severe ground shaking, the soils that underlie the area proposed for the planned development are unlikely to liquefy. Even in the unlikely event of liquefaction of the clayey sand, the most likely result will be differential settlement across the property.

The following general site seismic parameters may be used for design in accordance with the 2013 California Building Code:

Site Class: D
Site Coordinates Latitude = 37.41 degrees Longitude = -121.89 degrees
Fa = 1.0; Fv =1.5

Spectral Response Accelerations SMs and SM1
SMs = FaSs and SM1 = FvS1; For Site Class D with Fa = 1.0, and Fv = 1.5

Period (sec)	Sa (g)
0.2	1.648 (SMs, Site Class D)
1.0	0.972 (SM1, Site Class D)

SDs = 2/3 x SMs and SD1 = 2/3 x SM1; For Site Class D with Fa = 1.0, and Fv = 1.5

Period (sec)	Sa (g)
0.2	1.099 (SDs, Site Class D)
1.0	0.648 (SD1, Site Class D)

Discussion

As discussed in our December 2000 report, the principal geotechnical item that will impact the proposed development is the presence of undocumented fill soil. Since no records are available as to the manner in which the fill was placed, we recommend that the fill be removed and replaced as properly compacted structural fill. The fill excavation should extend a minimum of 24 inches below the bottom of proposed building foundations and 12 inches below proposed pavement subgrades.

The near-surface native soils are moderately expansive. Expansive soils contract when dry but increase in volume when they gain water. The degree of expansion depends on the antecedent soil water content prior to gaining water. The cycle of contraction and expansion in the soil tend to have detrimental effects on foundation elements, particularly, on concrete elements. This should be considered during foundation construction.

The proposed buildings may be supported on conventional, shallow footing-type foundations. Details are provided below.

Recommendations

The following recommendations, which are presented as guidelines to be used by project planners and designers, have been prepared assuming FRIAR ASSOCIATES, INCORPORATED will be commissioned to review the grading and foundation plans prior to construction, and to observe and test during site grading and foundation construction. This additional opportunity to inspect the project site will allow us to compare subsurface conditions exposed during construction with those that were observed during this investigation.

Site Preparation, Grading and Compaction

Existing buildings, pavements and other structures designated for removal on the Project Plans should be demolished and their foundations and associated substructures should be excavated out and hauled off-site. Utility lines, sanitary sewers and storm drain designated for abandonment on the Project Plans, should either be excavated out or filed with concrete

Any or all of the existing monitoring wells designated for abandonment on the Project Plans should be sealed and capped in accordance with the requirements of the Santa Clara County Valley District.

Areas to be built on or paved should be stripped to remove surface vegetation and organic laden topsoil. Soil containing more than two percent by weight of organic matter should be considered organic. Striping depths should be determined in the field by a member from our office at the time of stripping. For planning purposes, an average depth of three inches may be assumed. Strippings should be wasted off-site or, if so required by the Project Landscape Architect, stockpiled for subsequent use in landscape areas.

Loose fill or soil and any debris within the area proposed for construction should be excavated out to expose firm native ground. The depth and horizontal limits of these excavations should be determined in the field by the soil engineer at the time of excavation. For planning purposes, it may be assumed that these excavations will extend to an average depth of about 24 inches below proposed building foundations and 12 inches below proposed pavement subgrade. These excavations should extent to at least five feet horizontally beyond proposed building lines and three feet horizontally beyond pavement edges. Soil from these excavations may be stockpiled for subsequent use as structural fill, if needed. If not, the excavated soil should be wasted off-site.

Soil surfaces exposed by excavations of loose fills should be scarified to a depth of at least eight inches, conditioned with water (or allowed to dry, as necessary) to produce a soil water content of at least three percent above the optimum water content and then compacted to about 90 percent of the maximum dry density as determined by ASTM Test Method D1557-09.

Structural fill may then be placed up to design grades in the proposed building and pavement areas. Structural fill using on-site inorganic soil, or approved import, should be placed in layers, each not exceeding eight inches thick (before compaction), conditioned with water (or allowed to dry, as necessary) to produce a soil water content of at three percent above the optimum value, and then compacted to 90 percent relative compaction based on ASTM Test D1557-09.

On-site soils proposed for use as structural fill should be inorganic, free from deleterious materials, and should contain no more than 15% by weight of rocks larger than three inches

(largest dimension) and no rocks larger than six inches. The suitability of existing fill soil for reuse as a structural fill should be determined by a member of our staff at the time of grading. If import soil is required for use as structural fill, it should be inorganic, should preferably have a low expansion potential and should be free from clods or rocks larger than four inches in largest dimension. Prior to delivery to the site, proposed import should be tested in our laboratory to verify its suitability for use as structural fill and, if found to be suitable, further tested to estimate the water content and density at which it should be placed.

Building Foundations

Shallow Footing-Type Foundations

The proposed building may be supported on conventional, shallow foundations bearing on the native competent "undisturbed" soil or properly compacted fill as recommended above under "Site Preparation, Grading and Compaction," provided a level building pad is created during grading.

Continuous, reinforced concrete foundations may be designed to impose pressures on foundation soils up to 3000 pounds per square foot (psf) from dead plus normal live loading. Continuous foundations should be least 15 inches wide and should be embedded at least 24 inches below rough pad grade or adjacent finished grade, whichever is lower.

Interior isolated foundations, such as may support column loads, may be designed to impose pressures on foundation soils up to3500 pounds per square foot from dead plus normal live loading. Interior foundations should be embedded at least 18 inches below rough pad grade and should be at least 18 inches in smallest dimension.

For the purposes of calculating bending moments, shear and deflection in the continuous foundations, a modulus of subgrade reaction (K_{v1}) of 250 pounds per cubic inch may be assumed for the foundation soils.

Lateral forces on the proposed buildings may be resisted by passive pressure acting against the sides of the footings and by friction between the soil and the bottom of slabs and footings. An equivalent fluid pressure of 350 pounds per square foot per foot of depth may be used to calculate the ultimate passive resistance to lateral loads. Unless the ground adjacent to the foundation is paved, the top nine inches of embedment should be neglected when calculating horizontal passive resistance of the soil against the foundation. A coefficient of friction of 0.35 may be assumed to calculate resistance to lateral loads at the base of concrete slabs and foundations. If both passive resistance and friction are used to resist lateral loads, the lower value of the two should be reduced by 50 percent.

Structural Slab Foundation

For design of concrete floors, the following design parameters may be used: a modulus of subgrade reaction (k) of 250 pounds per cubic inch would be applicable to on-site soils; an allowable soil bearing pressure of up to 3000 psf and a plasticity index of 24.2 may be used. For the post-tension foundation design, the following may be used: $\mathbf{e_m}$ = 5.5 feet (center lift); $\mathbf{e_m}$ = 3.0 feet (edge lift); $\mathbf{y_m}$ = 1.05 inches (center lift); $\mathbf{y_m}$ = 0.2 inch (edge lift); a coefficient of friction between slab and subgrade of 0.75 may be assumed. This assumes that a vapor barrier will be placed between the concrete slab and the underlying material. The slab should be at least 10 inches thick and should be thickened at the edges to provide additional resistance to lateral forces.

The allowable foundation pressures given previously may be increased by one-third when considering additional short-term wind or seismic loading.

During foundation construction, care should be taken to minimize evaporation of water from foundation and floor subgrades. Scheduling the construction sequence to minimize the time interval between foundation excavation and concrete placement is important. Concrete should be placed only in foundation excavations that have been kept moist, are free from drying cracks and contain no loose or soft soil or debris.

Based on our experience with similar building constructed on similar soils, we anticipate that total and differential settlements of building foundations designed and constructed as recommended above will be nominal (about 0.75 inch for long-term static settlement and differential settlement to be between 0.5 and 0.75 of the long-term total settlement).

Concrete Slabs-On-Grade

Concrete floor slabs should be constructed on compacted soil subgrades prepared as described in the section under "Site Preparation, Grading and Compaction." The soil water content at slabs-on-grade prior to the placement of the concrete will be critical at expansive soil subgrade areas.

Interior slabs should be underlain by a section of capillary break material at least five inches thick and covered with a membrane vapor barrier be placed between the floor slab and the compacted soil subgrade. The capillary break should be a free-draining material, such as 3/8" pea gravel or a permeable aggregate complying with CALTRANS Standard Specifications, Section 68, Class 1, Type A or Type B. The membrane vapor barrier should be a high quality membrane. A protective cushion of sand or capillary break material at least two inches thick should be placed between the membrane vapor barrier and the floor slab. It is important that clayey subgrades at slab-on-grade areas be maintained at the s-graded soil water content to

minimize post-construction movement of slabs due to expansion/contraction of the subgrade soils.

If floor dampness is not objectionable, concrete slabs may be constructed directly on a minimum of six-inch-thick compacted aggregate base material over the water-conditioned and compacted soil subgrade and the non-expansive soil cap. The aggregate base should be compacted to a minimum of 92 percent relative compaction as determined by ASTM Test Method D1557-09.

Cement Type

In general, soils in the San Francisco Bay area contain negligible amounts of water soluble sulfates and water soluble chlorides. Type II Portland cement may be used in concrete for all structures with soil contact unless chemical analysis of the fill soils prove otherwise. It will be prudent to test the soils for water soluble sulfates and chlorides after grading and prior to concrete placement to confirm the proper type of cement needed to be used for structures in direct contact with the site soils.

Driveway Pavement

Based on our experience with soils with identical properties, the near-surface soil at the site will have low support when used for pavement support; therefore, an R-value of 5 was used in pavement design calculations shown below. This is based on the R-value test we conducted on a sample of the site soils from our 2000 geotechnical investigation. We recommend that R-value test of the pavement subgrade soil be performed when roadway subgrades are established to determine the actual pavement sections required based on the projected Traffic Indices listed in the table below. Therefore, the design sections shown in the table below are preliminary.

TABLE 2 - RECOMMENDED MINIMUM ASPHALT CONCRETE PAVEMENT SECTIONS

Traffic Index (T.I.)	Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)	Total Thickness (inches)
4.5	3.0	8.0	11.0
5.0	3.0	9.0	12.0
5.5	3.5	10.0	13.5
6.0	4.0	11.0	15.0

Pavement subgrades should be compacted as described above in the section under “Site Preparation Grading and Compaction.”

Curbs and gutters should be constructed directly on the soil subgrade rather than on a layer of aggregate base. This will minimize the amount of surface water that seeps below the curb and into the pavement subgrade. The seepage of water into subgrade soils beneath vehicle pavements, can result in subgrade softening and premature pavement distress.

Pavement construction should comply with the requirements of the CALTRANS Standard Specifications, latest editions, except that compaction requirements for pavement soil subgrades and aggregate base should be based on ASTM Test D1557-09, as described in the part of this report dealing with "Site Preparation, Grading and Compaction."

Utility Trenches

The attention of contractors, particularly the underground contractor, should be drawn to the requirements of California Code of Regulations, Title 8, Construction Code Section 1540 regarding Safety Orders for "Excavations, Trenches, Earthwork." The sides of trenches and excavations four feet and deeper should be supported. A lateral active pressure of 45 pcf equivalent fluid pressure may be used for the design of shoring for temporary excavation.

For purposes of this section of the report, bedding is defined as material placed in a trench up to one foot above a utility pipe and backfill is all material placed in the trench above the bedding.

Unless concrete bedding is required around utility pipes, free-draining sand should be used as bedding. Sand proposed for use in bedding should be tested in our laboratory to verify its suitability and to measure its compaction characteristics. Sand bedding should be compacted by mechanical means to achieve at least 90 percent compaction density based on ASTM Tests D1557-09.

Approved, on-site, inorganic soil, or imported material may be used as utility trench backfill. Proper compaction of trench backfill will be necessary under and adjacent to structural fill, building foundations, concrete slabs and vehicle pavements. In these areas, backfill should be conditioned with water (or allowed to dry) to produce a soil-water content of about three percent above the optimum value and placed in horizontal layers not exceeding six inches in thickness (before compaction). Each layer should be compacted to 85-90 percent relative compaction based of ASTM Test D1557-09. The upper eight inches of pavement subgrades should be compacted to about 90 percent relative compaction based on ASTM Test D1557-09.

Where any trench crosses the perimeter foundation line of any building, the trench should be completely plugged and sealed with compacted clay soil for a horizontal distance of at least two feet on either side of the foundation.

Surface Drainage

Surface drain gradients should be planned to prevent ponding and to promote drainage of surface water away from building foundations, slabs, edges of pavements and sidewalks, and towards suitable collection and discharge facilities.

Water seepage or the spread of extensive root systems into the soil subgrades of foundations, slabs, or pavements, could cause differential movements and consequent distress in these structural elements. This potential risk should be given due consideration in the design and construction of landscaping.

Follow-up Geotechnical Services

Our recommendations are based on the assumption that FRIAR ASSOCIATES, INCORPORATED will be commissioned to perform the following services.

1. Review final grading and foundation plans prior to construction.

2. Observe, test and advise during site preparation, grading and excavations.

3. Observe, test and advise during foundation excavations for the proposed buildings.

4. Observe, test and advise during utility trench backfilling.

5. Observe, test and advise during pavement construction.

6. Observe and advise during site drainage provisions.

Limitations

The recommendations contained in this report are based on certain plans, information and data that have been provided to us. Any change in those plans, information and data will render our recommendations invalid unless we are commissioned to review the change and to make any necessary modifications and/or additions to our recommendations.

Subsurface exploration of any site is necessarily confined to selected locations. Conditions may, and often do, vary between and around such locations. Should conditions different from those encountered in our explorations come to light during project development, additional exploration, testing and analysis may be necessary; changes in project design and construction may also be necessary.

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Our recommendations have been made in accordance with the principles and practices generally employed by the geotechnical engineering profession. This is in lieu of all other warranties, express or implied.

All earthwork and associated construction should be observed by our field representative, and tested where necessary, to compare the generalized site conditions assumed in this report with those found at the site at the time of construction, and to verify that construction complies with the intent of our recommendations.

Sincerely,

FRIAR ASSOCIATES, INCORPORATED

John H. Friar
CE 52281

APPENDIX A

Key to Exploratory Boring Logs
and
Boring Logs

BORING LOG

No. B-4

PROJECT	Proposed Commercial Development	DATE	01/08/15	LOGGED BY	pt
DRILL RIG	Mobil B-24 on Ford F350 Flatbed	HOLE DIA.	4"	SAMPLER	M - Modified California, S - S.P.T
GROUND WATER DEPTH INITIAL		FINAL		HOLE ELEVATION	

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
Dark brown to black sandy CLAY with gravel (moist) (firm) Fill	CL		M									
		1	M									
			M	16	2.5							
		2										
		3										
Dark brown silty SAND with some gravel (slightly moist) (medium dense) Fill	SM											
		4										
			M									
		5	M									
grades clayey			M	16	4.5							
		6										
Dark brown to black clayey SAND with gravel (slightly moist) (medium dense)	SC											
		7										
		8										
			M									
		9	M		3.6							
			M	10	4.1							
		10										
		11										
		12										
			M		1.8							
		13	M		2.5							
Dark brown and dark gray mottled sandy CLAY (moist) (firm)	CL		M	10	1.8							
		14	M									
			M									
		15	M	10								
Bottom Of Hole At 15 Feet. No Free Groundwater Encountered		16										
		17										
		18										
		19										
		20										

APPENDIX B

2000 Report

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GEOTECHNICAL INVESTIGATION
JONES CHEMICALS SITE
MILPITAS, CALIFORNIA

INTRODUCTION

This report presents the results of our geotechnical investigation of the Jones Chemicals property located at 985 Montague Expressway (northeast corner of the intersection of Montague Expressway and South Milpitas Boulevard) in Milpitas, California.

W.P.I proposes to construct two, commercial/industrial buildings on this property. The buildings will have reinforced concrete "tilt-up" walls and concrete slab-on-grade floors. Paved driveways will provide access to the new buildings from Montague Expressway. Paved parking areas and landscaped areas will be constructed as part of the development.

INFORMATION PROVIDED

W.P.I. provided us with a sketch that shows the location of the two proposed buildings. A copy of this sketch was used to prepare our Site Plan, Figure 2, which shows the locations of the exploration holes that were made as part of this investigation.

SCOPE OF WORK

We performed the following scope of work for the geotechnical investigation of this site.

1. Reviewed geologic and geotechnical information in our files pertinent to the site and the surrounding area.

2. Explored, sampled and classified foundation soils by means of four small diameter exploration holes. At the end of drilling, all exploration holes were backfilled with cement grout as required by the Santa Clara Valley Water District.

3. Performed laboratory testing on selected soil samples to measure their pertinent index and engineering properties.

4. Reviewed and analyzed field and laboratory test data.

5. Based on the findings of 1 through 4 above, developed geotechnical recommendations for: site preparation, grading and compaction; building foundations; concrete slabs-on-grade; retaining walls; pavement thickness design for on-site streets; and utility trench backfilling.

6. Prepared this report summarizing our findings, conclusions and recommendations.

FINDINGS

Surface Conditions

The property is located in the City of Milpitas and is nearly level. Based on the U.S.G.S Topographic maps, ground elevation at the site is about 62 feet. The property is bounded by Montague Expressway on the south, by Berryesa Creek on the west, by a vacant land on the north and by the newly constructed Montague Court Business Park on the east.

At the time of our investigation, the southwest portion of the Jones Chemicals site was occupied by an existing building. The site was also occupied by storage structures and concrete pads on the north of the existing building. A number of ground water monitoring wells were found across the majority of the site.

Subsurface Conditions

Subsurface conditions at the site were explored by means of four small diameter exploration borings, which ranged in depth from 20 feet to 30 feet. Within the depths of our exploration, the native soils at the site consist of alluvial deposits of CLAY, SILT and SAND.

A surficial layer fill ranging in thickness from about 4 feet (borings B-1) to about 9 feet (boring B-2) was penetrated by all four of our borings. This fill consists of stiff fat clay (CL/CH) of low to intermediate plasticity and moderate potential for expansion.

Below the fill, the surficial layer of native soil at the site consists of stiff clay (CI/CL) of intermediate to low plasticity and moderate potential for expansion. This layer of clay extends to about 10 feet below existing ground surface and is underlain by between 3 and 4 feet thick layer of clayey sand with gravel. This layer of sand is underlain by clay to the maximum depth of our exploration.

Ground water was encountered in all four boring. The depths from existing ground surface to the ground water was measured in the borings after drilling was completed and was found to range between 12.5 feet and 14.5 feet.

The descriptions given above pertain only to the subsurface conditions found at the site at the time of our subsurface exploration in November 2000.

Subsurface conditions, particularly ground water levels and the consistency of the near-surface soils, will vary with the seasons.Detailed descriptions of the materials encountered in the borings are given on the appended boring logs together with the results of some of the laboratory tests performed on selected samples obtained from the drill holes. The remainder of the laboratory test

results are presented separately after the boring logs.

Seismic Considerations

This site is located within the seismically active San Francisco Bay region but outside any of the Alquist-Priolo Earthquake Fault Zones.

Type A and Type B faults close to the site are listed in the following table.

TABLE I - TYPES A AND B FAULTS CLOSE TO THE SITE

Fault	Type	Maximum Moment Magnitude	Slip Rate (mm/yr)	Distance (miles/km)
San Andreas (1906 Segment)	A	7.9	24	16/26
Hayward (Total Length)	A	7.1	9	5/8
Calaveras (No. of Calaveras Reservoir)	A	6.8	6	5/8
Calaveras (So. of Calaveras Reservoir)	B	6.2	15	5/8
Hayward (SE Extension)	B	6.4	3	2/3
Monte Vista - Shannon	B	6.8	0.4	12/19

Seismic hazards can be divided into two general categories, hazards due to ground rupture and hazards due to ground shaking. Since no active faults are known to cross this property, the risk of earthquake-induced ground rupture occurring across the project site appears to be remote.

Should a major earthquake occur with an epicentral location close to the site, ground shaking at the site will undoubtedly be severe, as it will for other property in the general area. Even under the influence of severe ground shaking, the soils that underlie the area proposed for development are unlikely to liquefy.

The following general site seismic parameters may be used for design in accordance with the 1997 Uniform Building Code.

Seismic Zone:	4
Soil Type:	S_D: Stiff Soil
Seismic Source Type:	**A**; (Hayward); 8km **B**; (Hayward SE Extension); 3km
Near Source Factors:	Consistent for source type **A** of distance 8km and for source type **B** of distance 3km

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Our main geotechnical concern about the site is the presence of between 4 to 7 feet of fill at this site. This layer of fill was found to vary in consistency between soft to stiff. If left untreated, this fill may result in some differential deformations of any structures (buildings or pavements) that are built on.

We recommend that this layer of fill soil be subexcavated and replaced as structural fill below proposed buildings and pavements areas. The depths and horizontal limits of these excavations should be determined in the field by the Soils Engineer at the time of excavation. For planning purposes, however, it may be assumed that these excavations will extend to an average depth of about 24 inches below the bottom of proposed building foundation and about 12 inches below proposed pavement subgrade.

The site e is suitable for the proposed development provided the recommendations presented in this report are followed.

The following recommendations, which are presented as guidelines to be used by project planners and designers, have been prepared assuming FRIAR ASSOCIATES, INC. will be commissioned to review the grading and foundation plans prior to construction, and to observe and test during site grading and foundation construction. This additional opportunity to inspect the project site will allow us to compare subsurface conditions exposed during construction with those that were observed during this investigation.

Site Preparation Grading and Compaction

Existing buildings, pavements and other structures designated for removal on the Project Plans should be demolished and their foundations and associated substructures should be dug out and removed. Utility lines, sanitary sewers and storm drains designated for abandonment on the Project Plans, should either be dug out and removed or filled solid with concrete.

Existing monitoring wells designated for abandonment on the Project Plans should be sealed and capped in accordance with the requirements of the Santa Clara Valley Water District.

Areas of the site to be built on or paved should be stripped to remove surface vegetation, and organic topsoil. Soils containing more than 2% by weight of organic matter should be considered organic. Stripping depths should be determined in the field by the Soils Engineer at the time of stripping but, for planning purposes, an average stripping depth of 3 inches may be assumed. Strippings should be wasted off-site or, if so required by the Project Landscape Architect, stockpiled for subsequent use in landscape areas.

Loose fill within areas of the site to be built on or paved should be excavated. The depth and horizontal limits of these excavations should be determined in the field by the Soils Engineer at the time of excavation. For planning purposes, however, it may be assumed that these excavations will extend to an average depth of about 24 inches below building foundations and 12 inches below proposed pavement subgrade. These excavations should extend 5 feet horizontally beyond proposed building lines and should extend 3 feet horizontally beyond edges of pavement.

Soil from these excavations may be stockpiled for subsequent use as structural fill, if needed; otherwise the excavated soil should be wasted off-site.

Soil surfaces exposed by excavations of expansive soils should be scarified to a depth of 8 inches, conditioned with water (or allowed to dry, as necessary) to produce a soil water content of about 3 percent above the optimum value and then compacted to 90 percent relative compaction based on ASTM Test D1557-91.

Structural fill may then be placed up to design grades in the proposed building and pavement areas. Structural fill using on-site inorganic soil, or approved import, should be placed in layers, each not exceeding 8 inches thick (before compaction), conditioned with water (or allowed to dry, as necessary) to produce a soil water content of about 3 percent above the optimum value, and then compacted to 90 percent relative compaction based of ASTM Test D1557-91. The upper 8 inches of pavement subgrades should be compacted to about 95 percent relative compaction based on ASTM Test D1557-91.

On-site soils proposed for use as structural fill should be inorganic, free from deleterious materials, and should contain no more than 15% by weight of rocks larger than 3 inches (largest dimension) and no rocks larger than 6 inches. The suitability of existing fill soil for reuse as a structural fill should be determined by a member of our staff at the time of grading. We expect that most of the existing fill soil will be suitable for reuse as structural fill. If import is required for use as structural fill, it should be inorganic, should preferably have a low expansion potential and should be free from clods or rocks larger than 4 inches in largest dimension. Prior to delivery to the site, proposed import should be tested in our laboratory to verify its suitability for use as structural fill

and, if found to be suitable, further tested to estimate the water content and density at which it should be placed.

Building Foundations

The proposed buildings may be supported on conventional shallow foundations bearing on competent in-place native soil or on compacted structural fill placed as described in the previous section.

Continuous, reinforced concrete foundations may be designed to impose pressures on foundation soils up to 3000 pounds per square foot from dead plus normal live loading. Continuous foundations should be at least 15 inches wide and should be embedded at least 18 inches below rough pad grade or adjacent finished grade, whichever is lower.

Interior isolated foundations, such as may support column loads, may be designed to impose pressures on foundation soils up to 3500 pounds per square foot from dead plus normal live loading. Interior foundations should be embedded at least 18 inches below rough pad grade.

For the purpose of calculating bending moments, shear and deflection in the continuous foundations, a modulus of subgrade reaction (K_{v1}) of 250 pounds per cubic inch may be assumed for the foundation soils.

Lateral forces on the proposed building may de resisted by passive pressure acting against the sides of footings and by friction between the soil and the bottom of slabs and footings. An equivalent fluid pressure of 350 pounds per square foot per foot of depth may be used to calculate the ultimate passive resistance to lateral loads. A coefficient of friction of 0.35 may be assumed to calculate resistance to lateral loads at the base of concrete slabs and foundations.

The allowable foundation pressures given previously may be increased by one-third when considering additional short-term wind or seismic loading.

Base upon our experience with similar buildings constructed on similar foundation soils, we expect the total long-term static settlement of the building to be approximately 3/4(±) inch. Using the design values presented above, and assuming a minimum embeddment of both continuous and isolated footings, we would expect the post-construction differential settlement of a relatively uniformly loaded structure to be no more than about 3/4 of the total settlement.

If floor slabs will be structurally connected to the building walls, we recommend that the structural connection be delayed until the majority of the building dead load has been imposed on the foundations. This can be accomplished by leaving a "closure strip" between the floor slab and the foundations. The closure strip will minimize the potential effects of differential movements between the continuous foundation and the floor slab.

During foundation construction, care should be taken to minimize evaporation of water from foundation and floor subgrades. Scheduling the construction sequence to minimize the time interval between foundation excavation and concrete placement is important. Concrete should be placed only in foundation excavations that have been kept moist, are free from drying cracks and contain no loose or soft soil or debris.

Concrete Slabs-On-Grade

Concrete floor slabs should be constructed on compacted soil subgrades prepared as described in the section on Site Preparation, Grading and Compaction.

To minimize floor dampness, a section of capillary break material at least five inches thick and covered with a membrane vapor barrier should be placed between the floor slab and the compacted soil subgrade. The capillary break should be a free-draining material, such as 3/8" pea gravel or a permeable aggregate complying with CALTRANS Standard Specifications, Section 68, Class 1, Type A or Type B. The material proposed for use as a capillary break should be tested in our laboratory to verify its effectiveness as a capillary break. The membrane vapor barrier should be a high quality membrane such as Moistop (by Fortifiber Corporation) or similar. A protective cushion of sand or capillary break material at least two inches thick should be placed between the membrane vapor barrier and the floor slab.

If floor dampness is not objectionable, concrete slabs may be constructed directly on the water-conditioned and compacted soil subgrade.

Cement Type

In general, soils in the San Francisco Bay area contains negligible amounts of water soluble sulfates and water soluble chlorides. Type II Portland cement may be used in concrete for all structures with soil contact. We recommend, however, that water soluble suphates and chlorides be tested on soil samples obtained from the site after grading is completed and prior to concrete placement to confirm the proper type of cement needed for structures in direct contact with the soil.

Vehicle Pavements

Near-surface soils across the site have a low pavement-supporting capacity. An R-value of 10 at 300 psi exudation pressure was measured on a bulk sample of soil obtained from the area near boring B-2. This R-value was selected for use in pavement design calculations.

Recommended minimum sections for pavement areas are presented in Table 1. A pavement section based on a Traffic Index of at least 5 should be selected for areas where traffic includes occasional light trucks.

TABLE 1 - RECOMMENDED MINIMUM ASPHALT CONCRETE PAVEMENT SECTIONS

Traffic Index (T.I.)	Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)	Total Thickness (inches)
4.5	3.0	8.0	11.0
5.0	3.0	9.0	12.0
5.5	3.5	10.0	13.5
6.0	4.0	11.0	15.0

Pavement subgrades should be compacted as described above in the section for Site Preparation Grading and Compaction.

Curbs and gutters should be constructed directly on the soil subgrade rather than on a layer of aggregate base. This will minimize the amount of surface water that seeps below the curb and into the pavement subgrade. The seepage of water into subgrade soils beneath vehicle pavements, can result in subgrade softening and premature pavement distress.

Pavement construction should comply with the requirements of the CALTRANS Standard Specifications, latest editions, except that compaction requirements for pavement soil subgrades and aggregate base should be based on ASTM Test D1557-91, as described in the part of this report dealing with "Site Preparation, Grading and Compaction."

Retaining Walls

The following may be used in the design calculations for the proposed cast-in-place reinforced concrete retaining walls and loading docks walls.

1. The average bulk density of material placed on the backfill side of the wall will be 120 pcf.

2. The vertical plane extending down from the ground surface to the bottom of the heel of the wall will be subject to pressure that increases linearly with depth as follows.

Condition	Design Pressure
Active, drained	45 pcf
At-rest, drained	65 pcf

The above values are for non-seismic conditions.

3. The effects of earthquakes may be simulated by applying a horizontal line load surcharge to the stem of the wall at a rate of 15 H_2 lb/horizontal foot of wall, where H is the height of the surface of the backfill above the base of the wall. This surcharge should be applied at a height of 0.6H above the base of the wall.

4. A coefficient of "friction" of 0.35 may be used to calculate the ultimate resistance to horizontal sliding of the wall base over the ground beneath the base.

5. An equivalent fluid pressure of 350 psf/ft may be used to calculate the ultimate passive resistance to lateral movement of the ground in front of the toe of the wall and in front of any "key" beneath the toe or stem of the wall.

6. 3000 psf may be used as the maximum allowable bearing pressure for the ground beneath the toe of the wall. This value is for non-seismic conditions and may be increased to 4500 psf when considering additional loads on the wall resulting from earthquakes.

The following factors of safety may be used for use in retaining wall design.

Sliding

F.S. at least 1.5	considering friction alone (non-seismic).
F.S. at least 2.0	considering friction plus passive resistance (non-seismic).
F.S. at least 1.2	considering friction plus passive resistance plus earthquake surcharge.

Overturning

F.S. at least 2.0	for non-seismic conditions
F.S. at least 1.2	for combined static and seismic conditions

A zone of drainage material at least 18 inches wide should be placed on the backfill side of walls designed for drained condition. This zone should extend up the back of the wall to about 18 inches down from the proposed ground surface above. The upper 18 inches or so of material above the drainage material should consist of native, clayey soil.

The drainage material and the clayey soil cap should be placed in layers about 6 inches thick and moderately compacted by hand-operated equipment to eliminate voids and to minimize post-construction settlement. Heavy compaction should not be applied; otherwise, the design pressure on the wall may be exceeded.

The drainage material should consist of either Class 2 Permeable Material complying with Section 68 of the CALTRANS Standard Specifications, latest edition, or 3/4 to 1½ inch clean, durable coarse aggregate. If the coarse aggregate is chosen as the drainage material, it should be separated from all adjacent soil by Mirafi 700XG or a similar filter fabric approved by the project Soil Engineer.

Any water that may accumulate in the drainage material should be collected and discharged by a 4-inch-diameter, perforated pipe placed "holes down" near the bottom of the drainage material. The perforated pipe should have holes no larger that 1/4-inch diameter.

Utility Trenches

The attention of contractors, particularly the underground contractor, should be drawn to the requirements of California Code of Regulations, Title 8, Construction Code Section 1540 regarding Safety Orders for "Excavations, Trenches, Earthwork".

For purposes of this section of the report, bedding is defined as material placed in a trench up to 1 foot above a utility pipe and backfill is all material placed in the trench above the bedding.

Unless concrete bedding is required around utility pipes, free-draining sand should be used as bedding. Sand proposed for use in bedding should be tested to verify its suitability and to measure its compaction characteristics. Sand bedding should be compacted by mechanical means to achieve at least 90 percent compaction density based on ASTM Tests D1557-91.

Approved, on-site, inorganic soil, or imported material may be used as utility trench backfill. Proper compaction of trench backfill will be necessary under and adjacent to structural fill, building foundations, concrete slabs and vehicle pavements. In these areas, backfill should be conditioned with water (or allowed to dry) to produce a soil-water content of about 3 percent above the optimum value and placed in horizontal layers not exceeding 6 inches in thickness (before

compaction). Each layer should be compacted to 90 percent relative compaction based of ASTM Test D1557-91. The upper 8 inches of pavement subgrades should be compacted to about 95 percent relative compaction based on ASTM Test D1557-91.

Where any trench crosses the perimeter foundation line of any building, the trench should be completely plugged and sealed with compacted clay soil for a horizontal distance of at least 2 feet on either side of the foundation.

Surface Drainage

Surface drainage gradients should be planned to prevent ponding and to promote drainage of surface water away from building foundations, slabs, edges of pavements and sidewalks, and towards suitable collection and discharge facilities.

Water seepage or the spread of extensive root systems into the soil subgrades of foundations, slabs, or pavements, could cause differential movements and consequent distress in these structural elements. This potential risk should be given due consideration in the design and construction of landscaping.

Follow-up Geotechnical Services

Our recommendations are based on the assumption that FRIAR ASSOCIATES, INC. will be commissioned to perform the following services.

1. Review final grading and foundation plans prior to construction.

2. Observe and advise during clearing and stripping of the site.

3. Observe, test and advise during grading and placement of structural fill.

4. Test proposed capillary break material that will be used beneath concrete slabs-on-grade and advise on suitability.

5. Observe and advise during foundation and slab construction.

6. Observe, test and advise during utility trench backfilling.

7. Observe, test and advise during construction of pavements.

LIMITATIONS

The recommendations contained in this report are based on certain plans, information and data that have been provided to us. Any change in those plans, information and data will render our recommendations invalid unless we are commissioned to review the change and to make any necessary modifications and/or additions to our recommendations.

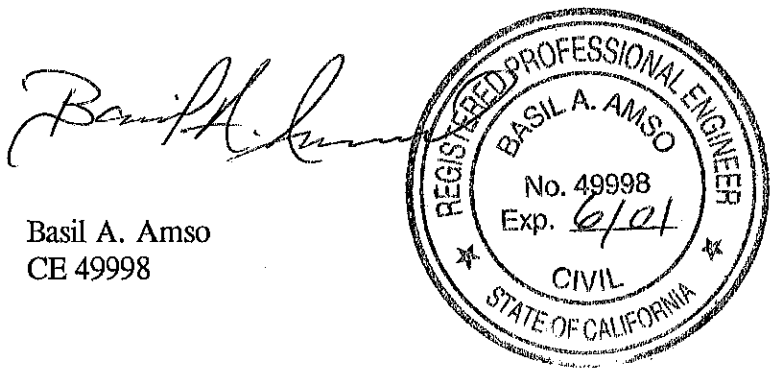
Subsurface exploration of any site is necessarily confined to selected locations. Conditions may, and often do, vary between and around such locations. Should conditions different from those encountered in our explorations come to light during project development, additional exploration, testing and analysis may be necessary; changes in project design and construction may also be necessary.

Our recommendations have been made in accordance with the principles and practices generally employed by the geotechnical engineering profession. This is in lieu of all other warranties, express or implied.

All earthwork and associated construction should be observed by our field representative, and tested where necessary, to compare the generalized site conditions assumed in this report with those found at the site at the time of construction, and to verify that construction complies with the intent of our recommendations.

Report prepared by:

FRIAR ASSOCIATES, INC.



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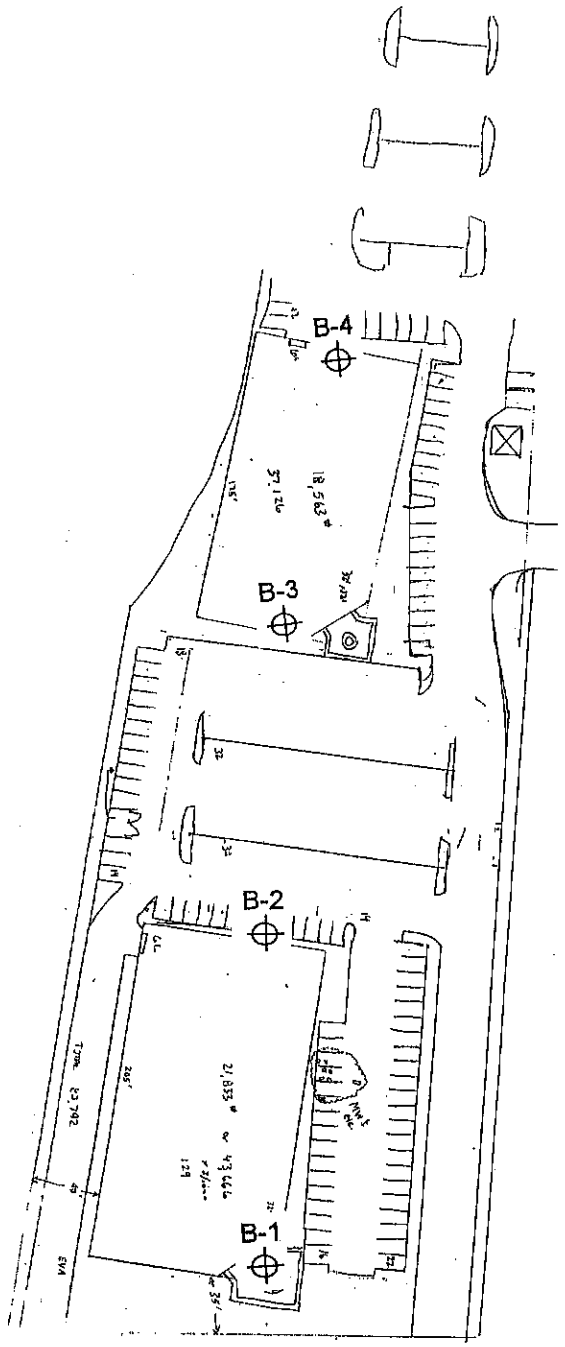


NOT TO SCALE

FRIAR ASSOCIATES, INC.	SITE PLAN AND LOCATION OF EXPLORATION HOLES	FIGURE 2
NOVEMBER 2000	JONES CHEMICALS SITE 985 MONTAGUE EXPRESSWAY MILPITAS, CALIFORNIA	PROJECT 3103

Base Map: Milpitas, California
U.S.G.S. 7.5' Quadrangle Topographic Map

FRIAR ASSOCIATES, INC.	**VICINITY MAP**	**FIGURE 1**
December 2000	**JONES CHEMICALS SITE** **985 MONTAGUE EXPRESSWAY** **MILPITAS, CALIFORNIA**	**PROJECT 3103**

APPENDIX A

Key to Exploratory Boring Logs
and
Boring Logs

KEY TO EXPLORATORY BORING LOGS

SOIL CLASSIFICATIONS

PRIMARY DIVISIONS			GROUP1 SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS More than half of material is larger than No. 200 sieve size	GRAVELS More than half coarse fraction is larger than No.4 sieve	Clean Gravels (less than5% fines*)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		Gravel with fines*	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines
	SANDS More than half coarse fraction is smaller than No.4 sieve	Clean Sands (less than 5%fines*)	SW	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands or gravelly sands, little or no fines
		Sands with fines*	SM	Silty sands, silt-sand mixtures, non-plastic fines
			SC	Clayey sand, sand-clay mixtures, plastic fines
FINE GRAINED SOILS More than half of material is smaller than No. 200 sieve size	SILTS AND CLAYS Liquid limit is less than 35		ML	Inorganic silts, clayey silts, rock flour, silty very fine sands
			CL	Inorganic clays of low plasticity, gravelly clay of low plasticity
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit is between35 and 50		MI	Inorganic silts, clayey silts and silty fine sand with intermediate plasticity
			CI	Inorganic clays, gravely clays, sandy clays and silty clays of intermediate plasticity
			OI	Inorganic clays and silty clays of intermediate plasticity
	SILTS AND CLAYS Liquid limit is greater than 50		MH	Inorganic silts, clayey silts, elastic silts, micaceous or diatomaceous silty or fine sandy soil
			CH	Inorganic clays of high plasticity
			OH	Organic clays and silts of high plasticity
HIGHLY ORGANIC SOILS			Pt	Peat, meadow mat, highly organic soils

GRAIN SIZES

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENINGS			
200	40	10	4	¾"	3"	12"	
Silts and Clays	Fine	Medium	Coarse	Fine	Coarse	Cobbles	Boulders
	SAND			GRAVEL			

RELATIVE DENSITY

SANDS, GRAVELS AND NON-PLASTIC SILTS	BLOWS/FOOT*
VERY LOOSE	0 – 4
LOOSE	4 – 10
MEDIUM DENSE	10 – 30
DENSE	30 – 50
VERY DENSE	OVER 50

CONSISTENCY

CLAYS AND PLASTIC SILTS	UNCONFINED SHEAR STRENGTH (PSF)	BLOWS/FOOT*
VERY SOFT	0 – 250	0 – 2
SOFT	250-500	2 – 4
FIRM	500-1000	4 – 8
STIFF	1000-2000	8 – 16
VERY STIFF	2 000– 4000	16 – 32
HARD	>4000	OVER 32

SYMBOLS

▽	Initial Ground Water Level
▼	Final Ground Water Level
S	Standard Penetration Sampler
M	Modified California Sampler
D	Dames & Moore Sampler

NOTES

*BLOWS per FOOT – Resistance to advance the soil sampler in number of blows of a 140-pound hammer falling 30 inches to drive a split spoon sampler.

Stratification lines on the logs represent the approximate boundary between soil types, and the transition may be gradual.

Modified California Sampler – 2 ½ O.D. (1 7/8 Inch I.D.) sampler

Standard Penetration Sampler – 2 inch O.D. (1 3/8 Inch I.D.) split spoon sampler (ASTM D1586).

Dames & Moore Sampler – 3 inch O.D. (2.5 inch I.D.) sampler

BORING LOG

No. B-1

PROJECT JONES CHEMICALS SITE | DATE 11/10/2000 | LOGGED BY BAA

DRILL RIG Continuous Flight Auger | HOLE DIA. 4 | SAMPLER X - Modified California, * - S.P.T

GROUND WATER DEPTH INITIAL 17.5' | FINAL 14' | HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
CLAY; brown, dry, soft to firm; with abundance of gravel and sand; FILL.	CL	1										
		2	x									
			x	5	1.1			10		99		
		3										
		4										
CLAYEY SAND; light brown, damp, loose to medium dense.	SP		x	12				17		103		
		5										
		6										
loose.		7										
		8										
		9										
loose with trace of fine gravel.			x	6								
CLAY; brown, damp, stiff.	CL	10										
		11										
		12										
		13										
		14										
with a trace of fine gravel.			x	20	2.8			18		102	7	3480
		15										
		16										
		17										
		18	x	23	2.1							
Bottom of hole at 18 feet.		19										
		20										

BORING LOG

No. B-2

PROJECT JONES CHEMICALS SITE | DATE 11/10/2000 | LOGGED BY BAA

DRILL RIG Continuous Flight Auger | HOLE DIA. 4 | SAMPLER X - Modified California, * - S.P.T

GROUND WATER DEPTH INITIAL 18' | FINAL 14.5' | HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
2 inches asphalt concrete over 4 inches of base rock.		1										
LEAN CLAY; brown, damp, firm to stiff; with abundance of crushed rock; FILL.	CL	2										
			x	12	1.8			5		104		
		3										
		4										
SANDY GRAVEL; tanish brown, dry, medium dense to dense; gravel size upto 2 inches; about 30 to 35 percent fine grained sand; FILL.			x	60								
		5										
		6										
		7										
		8										
		9										
			*	56								
SANDY CLAY; brown, dry, stiff; about 10 to 20 percent fine grained sand.	CL/ CH	10										
		11										
		12										
		13										
		14										
	▼		x	16	2.8			21		102	7	3710
		15										
		16										
slightly silty; more sandy; about 30 percent fine grained sand.		17										
	▽	18										
CLAY; brown, damp to moist; stiff.		19	x	13	2.2							
		20										

BORING LOG

No. B-2

PROJECT JONES CHEMICALS SITE | DATE 11/10/2000 | LOGGED BY BAA

DRILL RIG Continuous Flight Auger | HOLE DIA. 4 | SAMPLER X - Modified California, * - S.P.T

GROUND WATER DEPTH INITIAL 18' | FINAL 14.5' | HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
CLAY; brown, damp to moist; stiff.	CL											
		21										
		22										
		23										
		24										
			x	21	4.1							
		25										
		26										
		27										
with a trace of fine grained sand.		28										
		29										
		30	x	25	4.5							
Bottom of hole at 30 feet.												
		31										
		32										
		33										
		34										
		35										
		36										
		37										
		38										
		39										
		40										

BORING LOG

No. B-3

PROJECT JONES CHEMICALS SITE | DATE 11/10/2000 | LOGGED BY BAA

DRILL RIG Continuous Flight Auger | HOLE DIA. 4 | SAMPLER X - Modified California, * - S.P.T

GROUND WATER DEPTH INITIAL 16' | FINAL 13' | HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
1 inch asphalt over 8 inches of aggregate base.		1										
CLAY; brown, dry, stiff; with fine pieces of crushed rock and bricks; FILL.	CL	2	x									
			x	15	2.1			6		97	2	750
		3										
SANDY GRAVEL WITH CLAY; dry, brown to gray; medium dense to dense; FILL?	GP	4										
			x	12				7		106		
		5										
		6										
CLAY; brown, damp, stiff to very stiff;	CL/ CH	7										
		8										
		9										
			x	17	3.2			21		93	8	3509
		10										
		11										
		12										
CLAYEY SAND WITH GRAVEL; gray brown, moist, medium dense to dense.	SP	13										
		14										
CLAY; brown, wet, very stiff.	CL		x	23								
		15										
		16										
		17										
		18										
		19										
Bottom of hole at 20 feet.		20	x	12	3.2							

BORING LOG

No. B-4

PROJECT JONES CHEMICALS SITE | DATE 11/10/2000 | LOGGED BY BAA

DRILL RIG Continuous Flight Auger | HOLE DIA. 4 | SAMPLER X - Modified California, * - S.P.T

GROUND WATER DEPTH INITIAL 14.5' | FINAL 12.5' | HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
GRAVELLY CLAY; brown, dry to damp, firm; with about 10 to 20 percent gravel; gravel size up about 2 inches; FILL.	CL/ GP	1										
		2	x	17				9		101		
		3										
		4	x	13				14		108		
		5										
LEAN CLAY; brown, damp, stiff.	CL	6										
		7										
		8										
		9	x	18	2.5			16		107	7	5300
		10										
		11										
		12										
CLAYEY SAND WITH GRAVEL; brown, moist, medium dense; with about 20 to 30 percent clay; about 20 percent gravel.	SP	13										
		14	x	18								
		15										
		16										
CLAY; brown, moist, stiff to hard.		17										
		18										
		19										
Bottom of hole at 20 feet.		20	x	25	3.1							

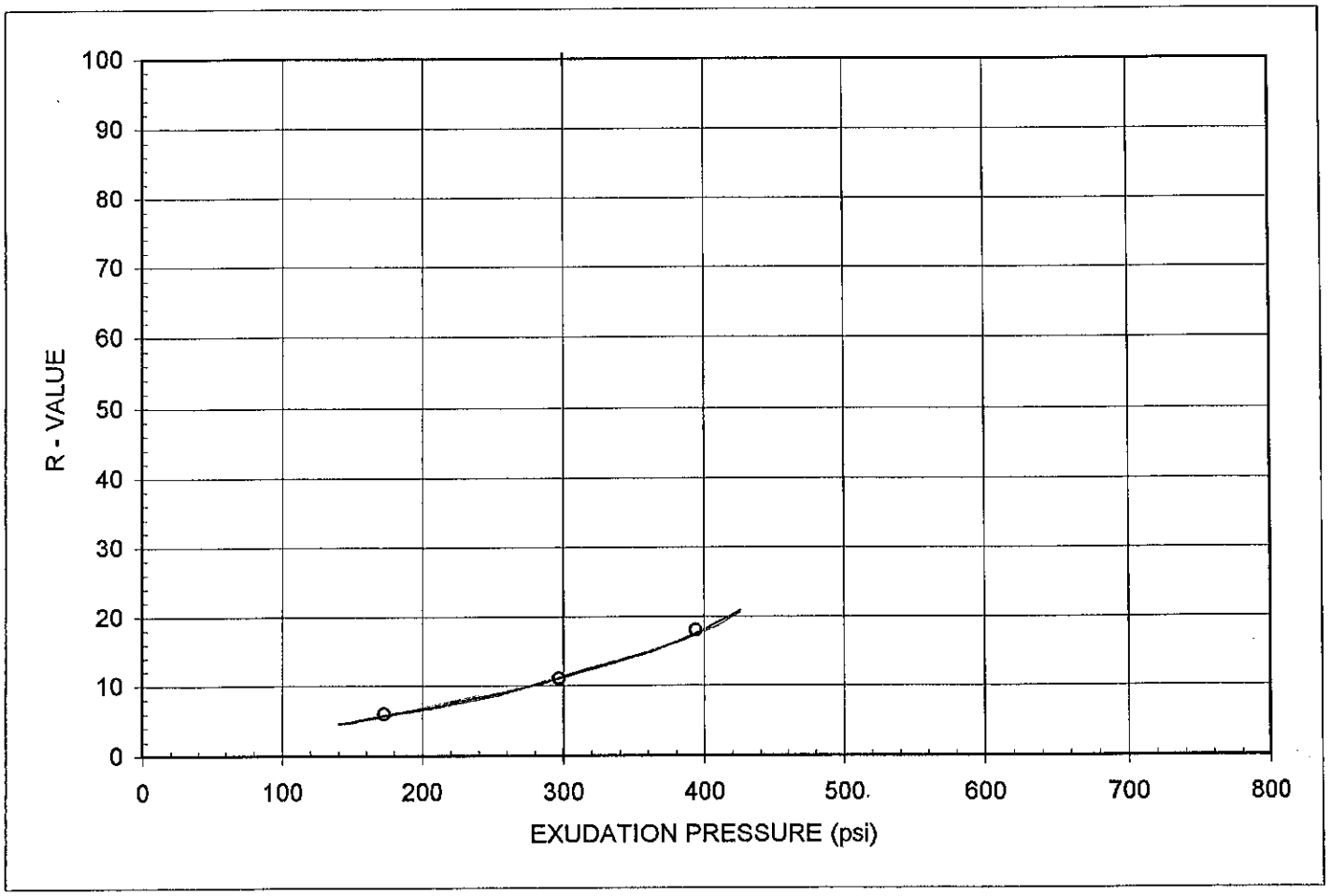
APPENDIX B

Laboratory Test Results

R-VALUE REPORT

ASTM D2844

Project:	JONES CHEMICALS	Date:	11/29/2000
Client:	W.P.I.	Project #:	3103
Sample #:	Bulk 1	Sample Date:	09/25/2000
Material Description:	GRAVELLY CLAY	Sampled By:	BAA



Specimen No.	A	B	C
Exudation Pressure, psi	297	173	394
Expansion Pressure, psf	0	0	0
R-Value	11	6	18
Moisture Content at Test, %	19.6	22.2	17.8
Dry Density at Test, pcf	107.6	102.6	111.3

R-Value @ 300 psi Exudation Pressure = 11

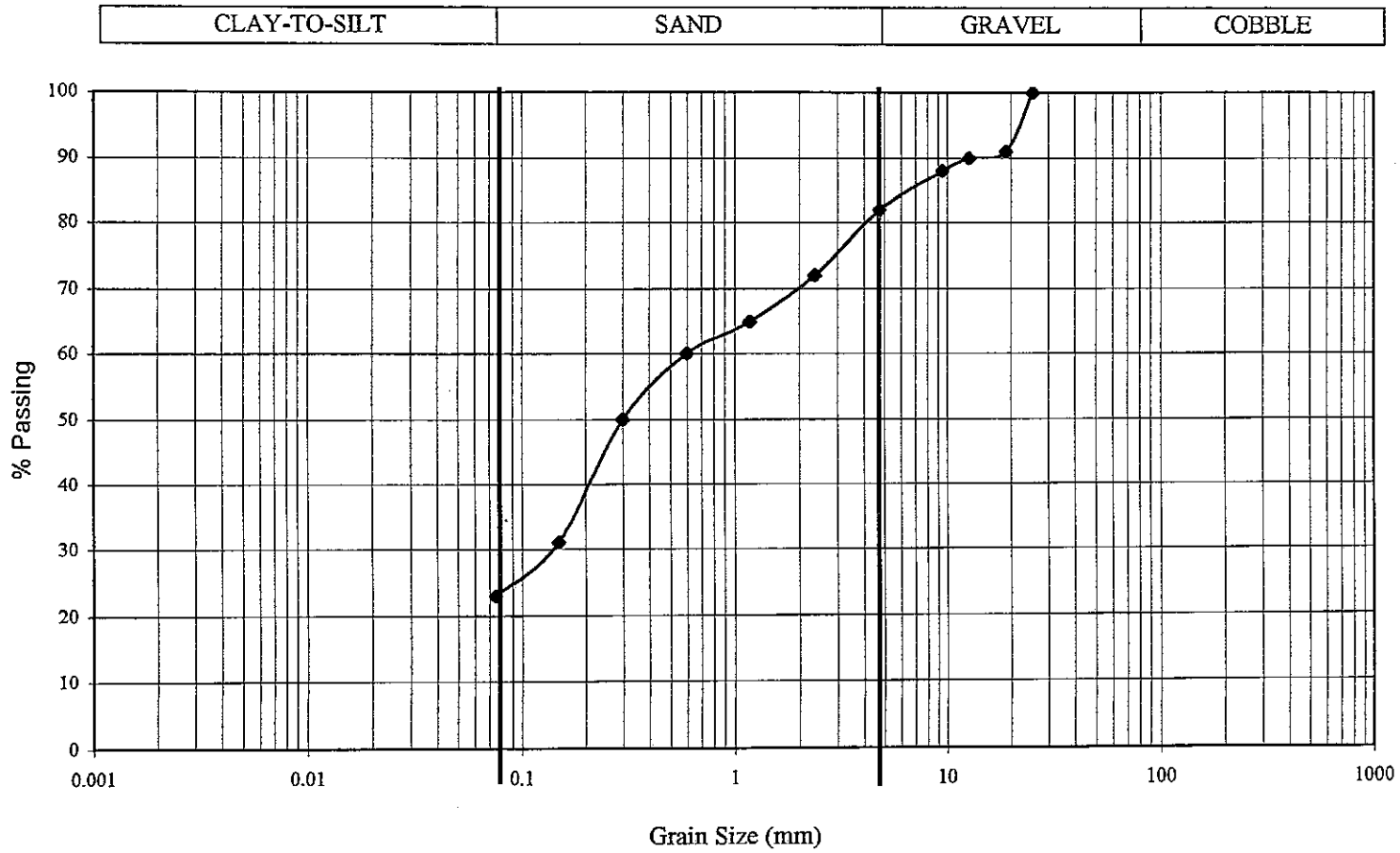
Expansion Pressure @300 psi Exudat'n, psf = **0**

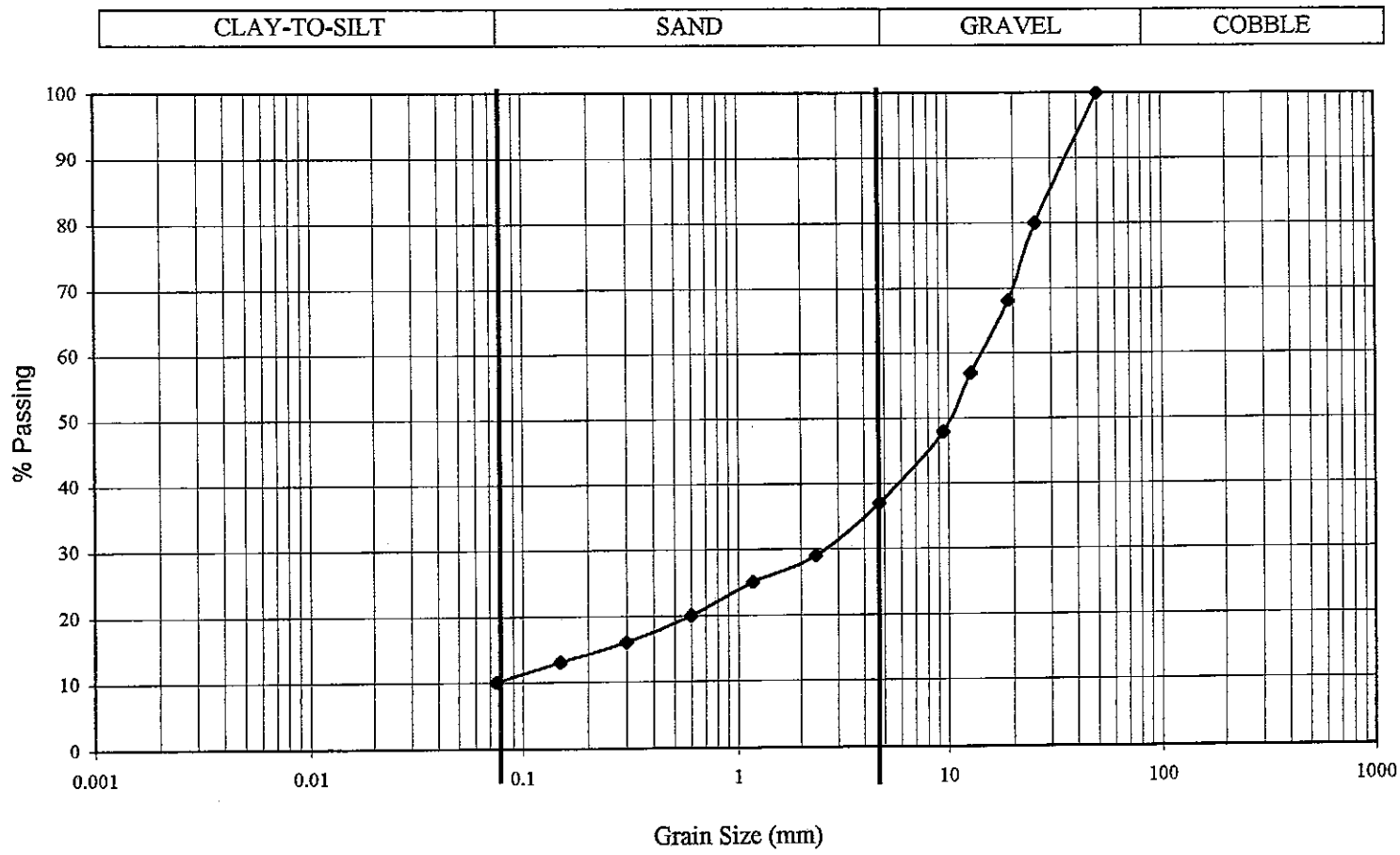
Minimum R-Value Requirement:

Comments:

GRAIN SIZE DISTRIBUTION

Project:	JONES CHEMICAL SITE	Date:	11/18/2000
Sample	B1 @ 9 '	Project #:	3103
		Lab # :	
Material Description:	CLAYEY SAND WITH GRAVEL	Date Tested:	11/15/2000



GRAIN SIZE DISTRIBUTION

Project:	JONES CHEMICAL SITE	Date:	11/18/2000
Sample	B2 @ 4 '	Project #:	3103
		Lab # :	
Material Description:	GRAVELLY SAND	Date Tested:	11/15/2000