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KLS Westbourne, LLC
3867 Mission Boulevard
San Diego, California 92109

April 2, 2020
Project No. 20-1247E1

Subject: Geotechnical Investigation for Four, New Two-Story Residences with Basements
460-462 Westbourne Street, La Jolla
City of San Diego, CA 92037

Ladies & Gentlemen:

In accordance with your request, we have performed a geotechnical investigation at the subject site, to determine the geotechnical site conditions and provide recommendations for design and construction of the proposed four, two-story residences with basements.

SCOPE OF SERVICES

The following scope of work was performed for this investigation:

- Site reconnaissance and review of published geologic, seismologic and geotechnical reports and maps pertinent to the project area
- Subsurface exploration consisting of two test borings and three test pits excavated within the limits of the proposed construction. The test borings and test pits were logged by our project supervisor.
- Collection of representative soil samples at selected depths. The obtained samples were sealed in moisture-resistant containers and transported to the laboratory for subsequent analysis.
- Laboratory testing of soil samples obtained during the subsurface exploration.
- Geotechnical analysis of the field and laboratory data, which provided the basis for our conclusions and recommendations.
- Preparation of this report, which summarizes the results of our analysis and presents our findings and recommendations for the proposed construction.

SITE DESCRIPTION AND PROPOSED CONSTRUCTION

The site location is shown on the attached Vicinity Map, Figure 1. The site is a rectangular-shaped, double residential parcel located at the northwest corner of Westbourne Street and La Jolla Boulevard, in the La Jolla area of San Diego. The east side of the property is vacant and the west side is occupied by two one-story buildings. The site slopes down gently to the west. Vegetation consists of grass, shrubs and a few trees. The property is bordered by Westbourne Street on the south, La Jolla Boulevard on the east and other homes on the north and west.

The preliminary building plans prepared by EOS Architecture, Inc. show that the proposed construction will consist of four, two-story residences with basements. The buildings will be wood frame and masonry structures founded on basement retaining walls with slab-on-grade floors. The anticipated maximum basement depth is about 10 feet.

SUBSURFACE EXPLORATION AND LABORATORY TESTING

Three test pits were excavated on January 31, 2020 with a Caterpillar mini-excavator equipped with a 24-inch wide bucket. On March 27, 2020 two additional test borings were drilled to a maximum depth of approximately 25 feet below existing site grades with a Yeti M10 drill rig equipped with a 6-inch diameter, hollow stem auger. The approximate locations of the test pits and test borings are shown on the attached Figure 2. Logs of the test pits and test borings are presented on Figure 3.

Following the subsurface exploration, laboratory testing was performed on selected soil samples to evaluate the pertinent engineering properties of the foundation materials. The laboratory tests included in-place moisture content and dry density tests, standard penetration tests and an expansion index test. The tests were performed in accordance with ASTM standards. The test results are shown on the logs of the test borings, Figure 3 and on the summary of laboratory test results, Figure 4.

SUBSURFACE SOIL CONDITIONS

The subsurface soil descriptions are interpreted from conditions encountered during the subsurface exploration and/or inferred from the geologic literature. Detailed descriptions of the subsurface materials are presented on the logs of the test borings on Figure 3. The following are general descriptions of the encountered soils:

Topsoil: Topsoil was encountered in the test pits and test borings to a depth of approximately 1 foot and consisted of dark brown, moist, loose and porous, silty sand with some organics (rootlets).

Colluvium: Colluvium was encountered beneath the topsoil to a depth of 3 to 6 feet. The colluvium consisted of dark reddish brown, moist, medium dense, clayey sand.

Old Paralic Deposits (Bay Point Formation): Old Paralic Deposits (also referred to as the Bay Point Formation) were encountered below the topsoil and colluvium. The formational soils consisted generally of reddish brown and tan brown, moist to wet, medium dense to dense, silty sand. The soils were loose to medium dense at a depth of 10 feet in Boring B-1.

SOIL PROPERTIES

a. Compressible Soils

The upper topsoil and colluvium are loose and compressible and unsuitable for the support of building loads or fill soils. The basement foundation walls will be founded in medium dense to dense formational soils, as discussed later in this report.

b. Expansive Soils

Expansion index tests were performed on representative samples of the colluvium and formational soils at the anticipated basement elevation. Expansion indices of 42 in the colluvium and 0 in the formational soils were obtained, which indicates the foundation soils are low to non-expansive.

GROUNDWATER

Groundwater seepage was encountered in Boring B-1 at a depth of 12 feet and in Boring B-2 at a depth of 16 feet.

GEOLOGY AND SEISMICITY

From published geologic maps, the site is underlain at depth by Old Paralic Deposits, also referred to as Bay Point Formation.

There are no known geologic hazards such as landslides, liquefaction-prone areas, or earthquake faults at the site. However, the proposed buildings are subject to ground shaking and possible damage from earthquakes on nearby, or more distant, active faults.

SEISMIC DESIGN VALUES

Seismic design values are presented on Figure 5.

CONCLUSIONS

Construction of the proposed four, two-story residences with basements is feasible from a geotechnical standpoint, provided the recommendations presented in this report are properly implemented during construction.

RECOMMENDATIONS

SITE GRADING

a. Site Clearing

The area of the proposed construction should be cleared of vegetation and other deleterious materials. Vegetation and debris from the clearing operation should be properly disposed of off-site.

b. Temporary Slopes for Basement Excavation

Temporary vertical slopes for the basement excavations should not exceed 5 feet in height. Temporary slopes greater than 5 feet in height should be shored or laid back at a minimum inclination of 1:1 (horizontal to vertical). Recommendations for shoring design can be provided by our office if desired.

c. Inspection of Basement Soils

The formational soils exposed at the bottoms of the basement excavations should be inspected and approved by our field representative. If loose or wet soils are encountered, it will be necessary to overexcavate the soils and replace with properly compacted fill. If groundwater seepage is encountered it may also be necessary to provide subsurface drainage. Recommendations will be provided at the time of construction.

d. Compaction and Method of Filling

Prior to placement of compacted fill, the exposed subgrade soils should be scarified to a depth of 6 to 8 inches, moisture conditioned to slightly above optimum moisture content and compacted to at least 90 percent relative compaction.

The on-site soils may be reused as compacted fill, provided they are free of organic materials and debris, and rocks or cobbles over 6 inches in dimension. Any imported fill soils should be predominantly granular and approved by our field representative.

All fill should be compacted to a minimum relative compaction of 90 percent as determined by ASTM D1557. Fill should be placed at a moisture content slightly above optimum moisture content, in lifts 6 to 8 inches thick, with each lift compacted by mechanical means.

Utility trench backfill and retaining wall backfill should also be compacted to at least 90 percent relative compaction.

All grading, fill placement, and compaction should be performed in accordance with the grading requirements of the City of San Diego. Fill placement and compaction should be observed and tested as necessary by our field representative.

EROSION CONTROL

Due to the sandy nature of the on-site soils, areas of recent grading or exposed soils may be subject to erosion. During construction, surface water should be controlled via berms, gravel/ sandbags, silt fences, straw wattles, siltation or bioretention basins, positive surface grades or other method to avoid damage to the finish work or adjoining properties. All site entrances and exits must have coarse gravel or steel shaker plates to minimize offsite sediment tracking. Best Management Practices (BMPs) must be used to protect storm drains and minimize pollution. The contractor should take measures to prevent erosion of graded areas until such time as permanent drainage and erosion control measures have been installed.

FOUNDATIONS AND FLOOR SLABS

- Basement retaining wall footings should be at least 12 inches deep below basement pad grade and designed by the project structural engineer.

- An allowable soil bearing value of 3,000 pounds per square foot may be used for the design of basement retaining wall footings bearing in medium dense to dense formational soils, or properly compacted fill. This value may be increased by one-third for short term wind or seismic loads. Total and differential settlements should be less than ½ inch.

- Lateral loads may be resisted by an equivalent fluid passive soil pressure of 400 pounds per cubic foot for formational soils or recompacted fill. A coefficient of friction of 0.4 may also be assumed. If passive and friction values are used together, the friction value should be reduced by one-third.

- All footing excavations should be inspected and approved by our field representative. Footing excavations should be properly cleaned of loose soils prior to inspection.

- Floor slabs should be at least 5 inches thick and reinforced with #4 bars placed at 18 inches on centers in two directions in the middle of the slab. The reinforcing steel should be supported on steel chairs or concrete blocks. Floor slabs should be underlain by 2 inches of clean sand over a 10-mil visqueen moisture barrier over 2 inches of clean sand. To minimize the potential for shrinkage cracks, the maximum concrete slump should be 4 inches and the maximum water-cement ratio should be 50 percent. Some shrinkage cracks are still possible.

SOIL PRESSURES FOR BASEMENT RETAINING WALL DESIGN

Basement retaining walls may be designed for an at-rest equivalent fluid soil pressure of 55 pounds per cubic foot assuming a level backfill. Should the walls be subject to a uniform surcharge load behind the walls, they should be designed for an additional, uniform lateral pressure equal to one-half the anticipated surcharge pressure. These pressures are based on the backfill soils being free draining and non-expansive.

Cantilever retaining walls may be designed for an active equivalent fluid soil pressure of 35 pounds per cubic foot assuming a level backfill. Should the walls be subject to a uniform surcharge load behind the walls, they should be designed for an additional, uniform lateral pressure equal to one-third the anticipated surcharge pressure. These pressures are based on the backfill soils being free draining and non-expansive.

A horizontal seismic coefficient $Kh = S_{DS}/2.5$ should be used for seismic design of basement retaining walls or cantilever walls over 6 feet in height. An inverted triangle soil pressure should be assumed. The resultant force F = 3/8*Kh*Soil density*Wall height (H)^2 should be located at a distance of 0.6*H above the base of the wall. Seismic design values are presented on Figure 5 .

RETAINING WALL WATERPROOFING AND DRAINAGE

Basement retaining walls should be provided with appropriate waterproofing designed by the project architect or designer. The above retaining wall soil values assume drainage will be provided behind the retaining walls. A 2-feet wide prism of Caltrans Class 2 Permeable Material should be placed behind the wall, as shown on Figure 6. Please note Caltrans Class 2 Permeable Material is a mixture of sand and gravel and is not the same as Class 2 road base. No wrapping of the Caltrans Class 2 Permeable Material with filter fabric is necessary. A perforated, 4-inch diameter, PVC pipe encased in a filter sock should be placed at the bottom, rear side of the wall and drained at a gradient of at least 1 percent to an approved outlet or sump-pump. We recommend SDR-35 PVC pipe or better. All joints should be glued and taped.

Wall drainage and backfill materials should be approved by our field representative prior to placement and compaction. All backfill should be compacted to at least 90 percent relative compaction based on ASTM D1557 and observed and tested as necessary by our field representative.

DRAINAGE

Adequate measures should be undertaken so that drainage water is directed away from the foundations, footings, floor slabs and the tops of slopes via rain gutters, downspouts, surface swales and subsurface drains and sump pumps towards the natural drainage for this area. As required in the current California Building Code, a minimum gradient of 2 percent is recommended in hardscape areas adjacent to the structure. In earth areas, a minimum gradient of 5 percent away from the structure for a distance of at least 10 feet should be provided. If this requirement cannot be met due to site limitations, drainage can be done through a swale in accordance with Section 1804.4 of the current California Building Code. Earth swales should have a minimum gradient of 2 percent. Drainage should be directed to approved drainage facilities. Proper surface and subsurface drainage will be required to minimize the potential of water seeking the level of the bearing soils under the foundations, footings and floor slabs, which may otherwise result in undermining and differential settlement of the structure and other improvements.

LIMITATIONS OF INVESTIGATION

Our investigation was performed using the skill and degree of care ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report. This report provides no warranty, either expressed or implied, concerning future building performance. Future damage from geotechnical or other causes is a possibility.

This report is prepared for the sole use of our client and may not be assigned to others without the written consent of the client and ECSC&E, Inc.

The samples collected and used for testing, and the observations made, are believed representative of site conditions; however, soil and geologic conditions can vary significantly between exploration trenches, boreholes and surface exposures. As in most major projects, conditions revealed by construction excavations may vary with preliminary findings. If this occurs, the changed conditions must be evaluated by a representative of ECSC&E and designs adjusted as required or alternate designs recommended.

This report is issued with the understanding that it is the responsibility of the owner, or his/her representative to ensure that the information and recommendations contained herein are brought to the attention of the project architect and engineer. Appropriate recommendations should be incorporated into the structural plans. The necessary steps should be taken to see that the contractor and subcontractors carry out such recommendations in the field.

The findings of this report are valid as of this present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside of our control. Therefore, this report is subject to review and should be updated after a period of two years.

ADDITIONAL SERVICES

The review of plans and specifications, field observations and testing under our direction are integral parts of the recommendations made in this report. If East County Soil Consultation and Engineering, Inc. is not retained for these services, the client agrees to assume our responsibility for any potential claims that may arise during construction. Observation and testing are additional services, which are provided by our firm, and should be budgeted within the cost of development.

This opportunity to be of service is appreciated. If you have any questions, or we can be of further service, please do not hesitate to call or contact us.

Respectfully Submitted,

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Attachments: Figures 1 through 6

FIGURE 1
VICINITY MAP

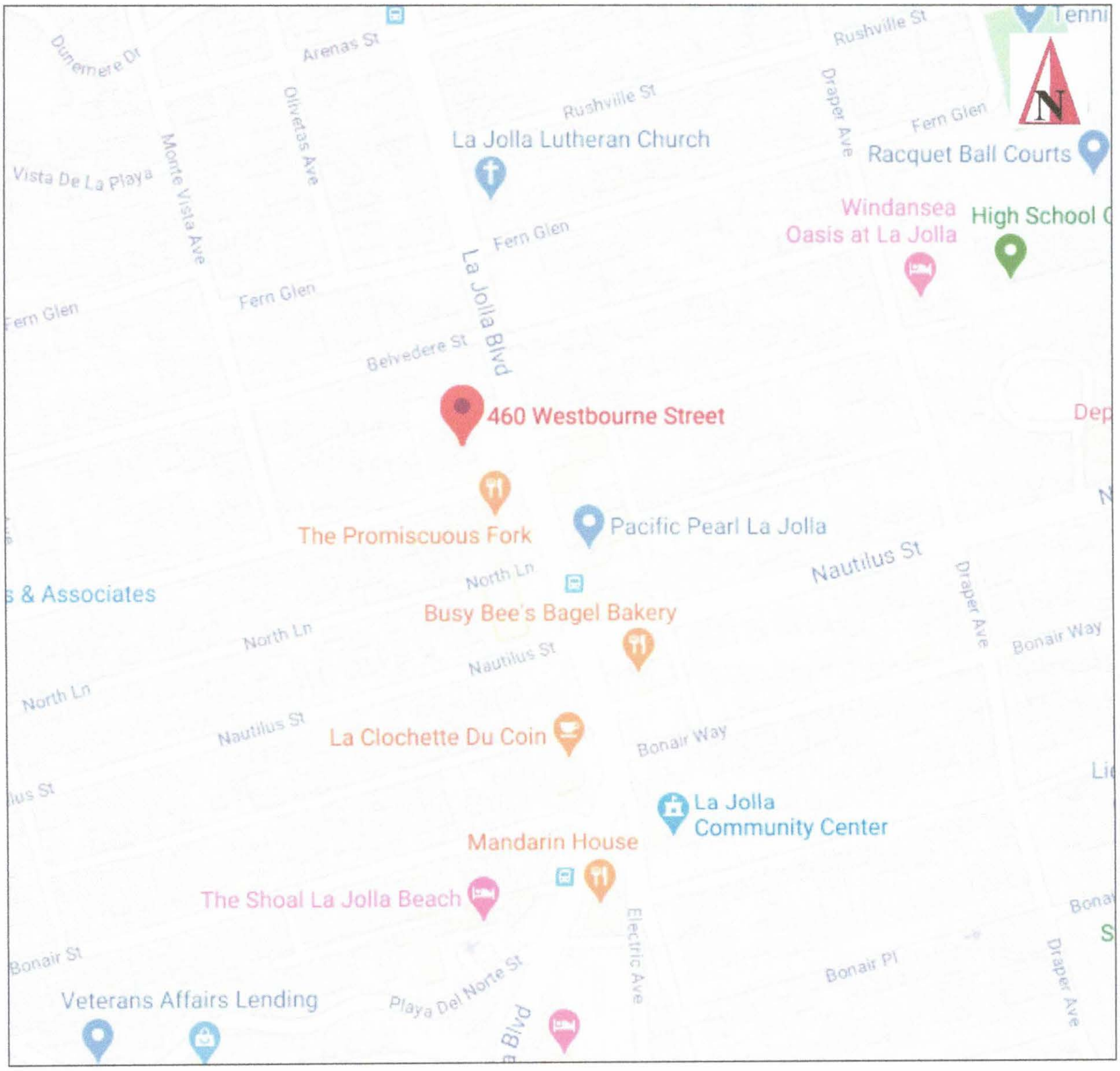


FIGURE 2
LOCATIONS OF TEST BORINGS

LEGEND

B-2 ● APPROXIMATE LOCATION OF TEST BORING

T-3 APPROXIMATE LOCATION OF TEST PIT

FIGURE 3
LOGS OF TEST PITS AND TEST BORINGS

TEST PIT T-1

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**TOPSOIL**		
	dark brown, moist, loose, silty sand with rootlets		
1.0'	**COLLUVIUM**		
	reddish brown, moist, medium dense, clayey sand		
4.0'	**OLD PARALIC DEPOSITS (BAY POINT FORMATION)**		
	tan/ reddish brown, moist, medium dense, silty sand		
5.0'	" " " " "	112.1	10.4
7.0'	tan, moist, medium dense, silty sand		
8.0'	" " " " "	110.9	5.5
9.0'	bottom of boring, no caving, no groundwater		
	Boring backfilled 1/31/2020		

TEST PIT T-2

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**TOPSOIL**		
	dark brown, moist, loose, silty sand with rootlets		
1.0'	**COLLUVIUM**		
	reddish brown, moist, medium dense, clayey sand		
4.0'	" " " " "	102.2	20.0
5.0'	**OLD PARALIC DEPOSITS (BAY POINT FORMATION)**		
	tan/ reddish brown, moist, medium dense, silty sand		
6.0'	" " " " "	112.5	12.2
7.0'	bottom of boring, no caving, no groundwater		
	Boring backfilled 1/31/2020		

TEST PIT T-3

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**TOPSOIL**		
	dark brown, moist, loose, silty sand with rootlets		
1.0'	**COLLUVIUM**		
	reddish brown, moist, medium dense, clayey sand		
6.0'	" " " " "	98.3	24.3
3.0'	**OLD PARALIC DEPOSITS (BAY POINT FORMATION)**		
	tan/ reddish brown, moist, medium dense, silty sand		
6.0'	" " " " "	112.0	12.7
7.0'	bottom of boring, no caving, no groundwater		
	Boring backfilled 1/31/2020		

Y = DRY DENSITY IN PCF
M = MOISTURE CONTENT IN %

FIGURE 3
LOGS OF TEST PITS AND TEST BORINGS (CONTINUED)

BORING B-1

DEPTH	SOIL DESCRIPTION	N	M
Surface	**TOPSOIL**		
	dark brown, moist, loose, silty sand with rootlets		
1.0'	**COLLUVIUM**		
	reddish brown, moist, medium dense, clayey sand		
4.0'	**OLD PARALIC DEPOSITS (BAY POINT FORMATION)**		
5.0'	tan/reddish brown, moist, medium dense, silty sand		
10.0'	tan, moist to wet, loose to medium dense, silty sand	8	12.4
12.0'	groundwater seepage		
15.0'	tan/ reddish brown, moist to wet, medium dense, silty sand	22	16.9
20.0'	reddish brown, moist, dense, silty sand with trace of clay	58	16.4
25.0'	bottom of boring, no caving, groundwater seepage at 12'		
	Boring backfilled 3/27/2020		

BORING B-2

DEPTH	SOIL DESCRIPTION	N	M
Surface	**TOPSOIL**		
	dark brown, moist, loose, silty sand with rootlets		
1.0'	**COLLUVIUM**		
	reddish brown, moist, medium dense, clayey sand		
6.0'	**OLD PARALIC DEPOSITS (BAY POINT FORMATION)**		
	tan/reddish brown, moist, medium dense, silty sand		
10.0'	tan/reddish brown, dry to moist, medium dense, silty sand	18	7.3
15.0'	" " " "		
16.0'	groundwater seepage		
16.0'	tan, wet, medium dense, silty sand	36	12.9
20.0'	reddish brown, moist, dense, silty sand with trace of clay		
20.0'	bottom of boring, no caving, groundwater seepage at 16'		
	Boring backfilled 3/27/2020		

N = STANDARD PENETRATION TEST IN BLOWS/FT
M = MOISTURE CONTENT IN %

FIGURE 4
RESULTS OF LABORATORY TESTS

EXPANSION INDEX TESTS
(ASTM D 4829

TEST LOCATION	INITIAL MOISTURE CONTENT (%)	SATURATED MOISTURE CONTENT (%)	INITIAL DRY DENSITY (PCF)	EXPANSION INDEX	EXPANSION POTENTIAL
T-1 @ 4.0'	13.5	26.8	100.8	42	MEDIUM
B-1 @ 10.0'	10.3	19.4	106.7	0	NON-EXPANSIVE

FIGURE 5
SEISMIC DESIGN VALUES

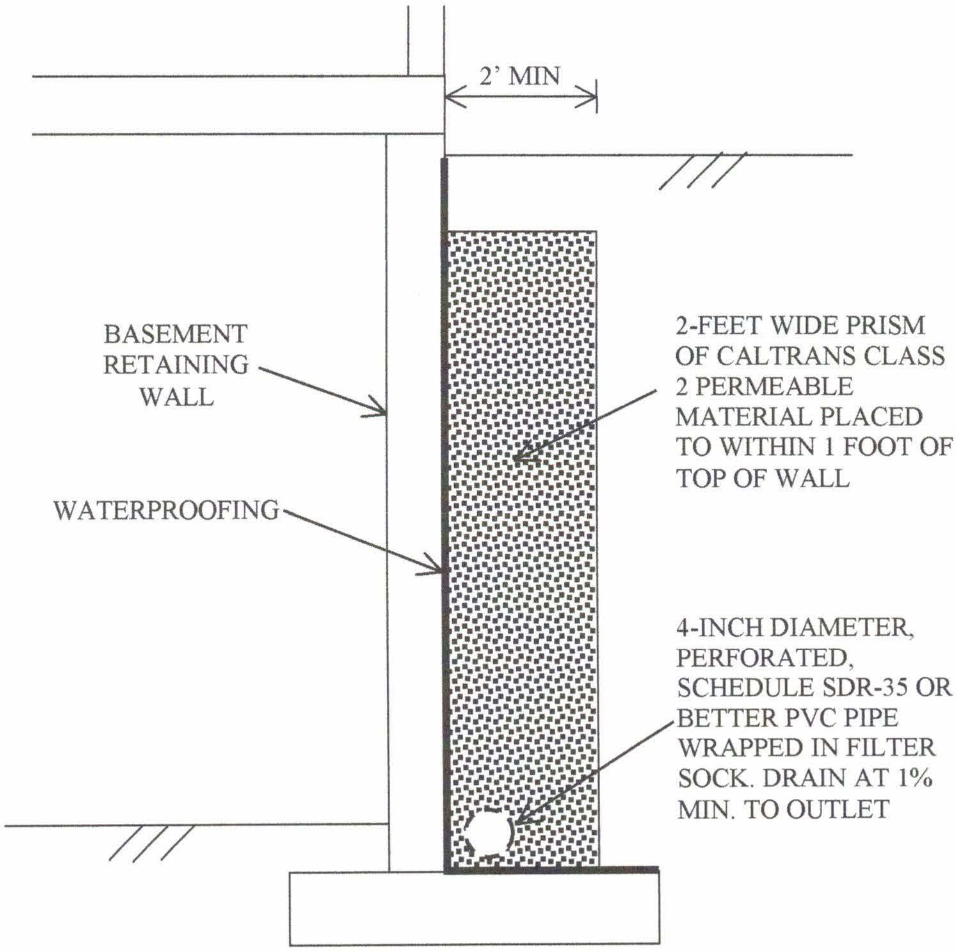
460 Westbourne St, La Jolla, CA 92037, USA
Latitude, Longitude: 32.8328415, -117.2773249

Date	3/19/2020, 2:56:31 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.312	MCE_R ground motion. (for 0.2 second period)
S_1	0.46	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.312	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	0.875	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second

FIGURE 6
BASEMENT RETAINING WALL DRAINAGE



CALTRANS CLASS 2 PERMEABLE MATERIAL GRADATION

Sieve Size	Percentage Passing
1"	100
3/4"	90–100
3/8"	40–100
No. 4	25–40
No. 8	18–33
No. 30	5–15
No. 50	0–7
No. 200	0–3

Class 2 Permeable Material shall also have a sand equivalent value of at least 75.