

May 17, 2022

Project No. 17172-02

Mr. Ted Hart
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1730 East Holly Avenue, #808
El Segundo, California 90245

**Subject: Updated Geotechnical Recommendations for Proposed Industrial Development,
25630 Trumble Road, Menifee, California**

In accordance with your request, LGC Geotechnical, Inc. has prepared this updated geotechnical report regarding the proposed industrial development of the property located at 25630 Trumble Road in Menifee, California.

Should you have any questions regarding this report, please do not hesitate to contact our office. We appreciate this opportunity to be of service.

Respectfully,

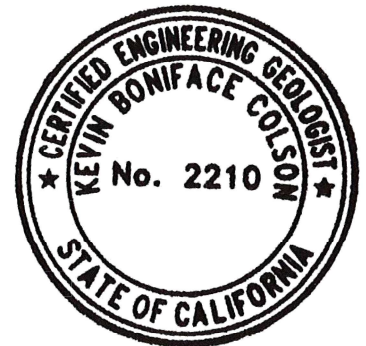
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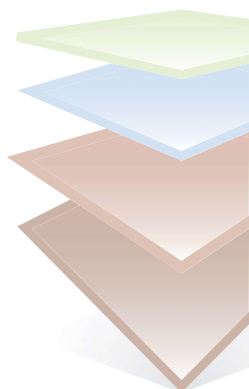


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1.0 INTRODUCTION

LGC Geotechnical has previously performed a geotechnical evaluation of the site and provided geotechnical recommendations for remedial grading and backfill for the open pit restoration at the site (LGC Geotechnical, 2018). We are also providing geotechnical observation and testing services during the in-progress grading operations for the pit backfill. This report has been prepared to provide recommendations for the proposed development of the site at the completion of site grading.

Although recommendations and parameters for site development were provided in our previous report (LGC Geotechnical, 2018), they were conceptual only and were per the 2016 California Building Code (CBC). The recommendation and parameters provided herein are specific to the current proposed site development and are updated to the 2019 CBC.

This report is not a stand-alone document and must be used in conjunction with the referenced geotechnical report (LGC Geotechnical, 2018) for completeness. In the case of conflict, the recommendations contained herein should supersede those provided in our previous report. The remaining recommendations provided in our previous geotechnical report (LGC Geotechnical, 2018) remain valid and applicable.

1.1 Project Description

The approximately 17.8-acre, irregular-shaped site is located just southeast of the intersection at Interstate 215 (I-215) and Highway 74 (CA-74). The site is bounded by Trumble Road to the west, an industrial welding building and empty lot to the north, a food waste recycling center to the east, and residential housing to the south (Figure 1). The site was originally used as an open pit mine and more recently was used as a soils and concrete recycling area.

Remedial grading and backfill grading of the pit began in April of 2019. The operations have been performed periodically since then under the observation and testing services of LGC Geotechnical. The operations to date have been performed in general accordance with the recommendations of the project geotechnical report (LGC Geotechnical, 2018). We understand that ultimately, the pit will be backfilled with compacted fill to the approximate elevation of the adjacent Trumble Road.

Once finish grade has been achieved, we understand that the proposed site development will include precise and post grading for and construction of an approximately 327,865 square-foot, one-story industrial warehouse, associated parking, drive isles, and improvements (HPA, 2022).

We understand that preliminary maximum column and wall structural (dead plus live) loads are estimated to be on the order of 90 kips and 9 kips per lineal foot, respectively.

The recommendations provided in this report are based on preliminary structural loads and grading information as indicated above. LGC Geotechnical should be provided with any updated project information, plans, and/or updated structural loads as they become available in order to either confirm or modify the recommendations provided herein.

1.2 Seismic Design Parameters

The site seismic characteristics were evaluated per the guidelines set forth in Chapter 16, Section 1613 of the 2019 California Building Code (CBC) and applicable portions of ASCE 7-16 which has been adopted by the CBC. Please note that the following seismic parameters are only applicable for code-based acceleration response spectra and are not applicable for where site-specific ground motion procedures are required by ASCE 7-16. Representative site coordinates of latitude 33.7485 degrees north and longitude -117.1822 west were utilized in our analysis. The maximum considered earthquake (MCE) spectral response accelerations (S_{MS} and S_{M1}) and adjusted design spectral response acceleration parameters (S_{DS} and S_{D1}) for Site Class D are provided in Table 1 on the following page. Since site soils are Site Class D, additional adjustments are required to code acceleration response spectrums as outlined below and provided in ASCE 7-16. The structural designer should contact the geotechnical consultant if structural conditions (e.g., number of stories, seismically isolated structures, etc.) require site-specific ground motions.

A deaggregation of the PGA based on a 2,475-year average return period (MCE) indicates that an earthquake magnitude of 6.94 at a distance of approximately 16.21 km from the site would contribute the most to this ground motion (USGS, 2014).

Section 1803.5.12 of the 2019 CBC (per Section 11.8.3 of ASCE 7) states that the maximum considered earthquake geometric mean (MCE_G) Peak Ground Acceleration (PGA) should be used for liquefaction potential. The PGA_M for the site is equal to 0.55g (SEAOC, 2022). The design PGA is equal to 0.37g (2/3 of PGA_M).

TABLE 1**Seismic Design Parameters**

Selected Parameters from 2019 CBC, Section 1613 - Earthquake Loads	Seismic Design Values	Notes/Exceptions
Distance to applicable faults classifies the site as a "Near-Fault" site.		Section 11.4.1 of ASCE 7
Site Class	D*	Chapter 20 of ASCE 7
S _s (Risk-Targeted Spectral Acceleration for Short Periods)	1.424g	From SEAOC, 2022
S ₁ (Risk-Targeted Spectral Accelerations for 1-Second Periods)	0.529g	From SEAOC, 2022
F _a (per Table 1613.2.3(1))	1.000	For Simplified Design Procedure of Section 12.14 of ASCE 7, F _a shall be taken as 1.4 (Section 12.14.8.1)
F _v (per Table 1613.2.3(2))	1.771	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
S _{MS} for Site Class D [Note: S _{MS} = F _a S _s]	1.424g	-
S _{M1} for Site Class D [Note: S _{M1} = F _v S ₁]	0.937g	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
S _{DS} for Site Class D [Note: S _{DS} = (2/3)S _{MS}]	0.949g	-
S _{D1} for Site Class D [Note: S _{D1} = (2/3)S _{M1}]	0.625g	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
C _{RS} (Mapped Risk Coefficient at 0.2 sec)	0.935	ASCE 7 Chapter 22
C _{R1} (Mapped Risk Coefficient at 1 sec)	0.918	ASCE 7 Chapter 22
*Since site soils are Site Class D and S ₁ is greater than or equal to 0.2, the seismic response coefficient C _s is determined by Eq. 12.8-2 for values of T ≤ 1.5T _s and taken equal to 1.5 times the value calculated in accordance with either Eq. 12.8-3 for T _L ≥ T > T _s , or Eq. 12.8-4 for T > T _L . Refer to ASCE 7-16.		

2.0 FINDINGS AND CONCLUSIONS

Based on review of our previous geotechnical evaluation (LGC Geotechnical, 2018), the results of our geotechnical observation and testing services performed to date, and review of the proposed development plan (HPA, 2022), it is our opinion that the proposed site development is feasible from a geotechnical standpoint, provided that the grading operations continue to be performed in accordance with the recommendations of the project geotechnical report (LGC Geotechnical, 2018) or as revised and/or updated herein. In the case of conflict, the recommendations provided herein shall supersede all previous.

3.0 RECOMMENDATIONS

The following recommendations are to be considered preliminary and should be confirmed upon completion of earthwork operations. In addition, they should be considered minimal from a geotechnical viewpoint, as there may be more restrictive requirements from the architect, structural engineer, building codes, governing agencies, or the City. It is the responsibility of the builder to ensure these recommendations are provided to the appropriate parties.

It should be noted that the following geotechnical recommendations are intended to provide sufficient information to develop the site in general accordance with the 2019 California Building Code (CBC) requirements. Regarding the potential occurrence of potentially catastrophic geotechnical hazards such as fault rupture, earthquake-induced landslides, liquefaction, etc., the following geotechnical recommendations should provide adequate protection for the proposed development to the extent required to reduce seismic risk to an “acceptable level.” The “acceptable level” of risk is defined by the California Code of Regulations as “the level that provides reasonable protection of the public safety, though it does not necessarily ensure continued structural integrity and functionality of the project” [Section 3721(a)]. Therefore, repair and remedial work of the proposed improvement may be required after a significant seismic event. With regards to the potential for less significant geologic hazards to the proposed development, the recommendations contained herein are intended as a reasonable protection against the potential damaging effects of geotechnical phenomena such as expansive soils, fill settlement, groundwater seepage, etc. It should be understood, however, that although our recommendations are intended to maintain the structural integrity of the proposed development and structures given the site geotechnical conditions, they cannot preclude the potential for some cosmetic distress or nuisance issues to develop as a result of the site geotechnical conditions.

The geotechnical recommendations contained herein must be confirmed to be suitable or modified based on the actual exposed conditions.

3.1 Site Earthwork

We anticipate that earthwork at the site will consist of required earthwork removals, fill placement, and utility line construction and backfill. We recommend that earthwork onsite continue to be performed in accordance with the project geotechnical report (LGC Geotechnical, 2018), 2019 CBC, and City of Menifee requirements. In case of conflict, the following recommendations shall supersede previous recommendations.

As previously recommended; from a geotechnical viewpoint, “select” import soils would be preferable in the upper 15 feet of the finish surface of the area of proposed development. These soils should consist of clean, relatively granular soils of Very Low expansion potential (expansion index 20 or less based on ASTM D4829) and no particles larger than 3 inches in greatest dimension. Source samples of planned importation of select materials should be provided to the geotechnical consultant for laboratory testing a minimum of 3 working days prior to any planned importation for required laboratory testing. The recommendations and parameters provided herein are contingent upon implementation of this select import. The geotechnical properties of the material placed in the upper 15 feet of site grades should be confirmed prior to import, during site grading and based on laboratory testing of the finish grade soils.

3.2 Settlement Waiting Period for Deep Fills

Where overlying deep fills (generally 50 feet deep or greater), shallow footings and slabs-on-grade foundations should be constructed after a waiting period to verify that total settlements are within tolerable limits. Please note, that it is very difficult to predict the settlement waiting period.

3.2.1 Settlement Monuments and Monitoring

Fill soils are subject to post-grading settlement. For shallower fills (up to approximately 50 feet deep), fill settlement typically occurs during grading for granular soils, and/or within a few months of the completion of grading. Longer settlement periods are expected for deeper fill and for those comprised of finer-grained soils and deeper fills. This occurs even to properly compacted fill soils over competent removal bottoms. Development areas above areas of deep fill should not be released for construction until settlement monitoring indicates settlement has diminished to within the tolerable limits for the proposed foundations and other structural improvements.

Settlement monuments must be installed after grading, in order to monitor settlement of deeper fills (approximately 50 feet or deeper). We anticipated that three surface settlement monuments will be required. The monuments should be installed in accordance with the details provided in Appendix C of our referenced report (LGC Geotechnical, 2018). The monuments installation should be performed by or under the observation of the project geotechnical consultant. The approximate locations for recommended monuments are depicted on the attached Settlement Monument Location Map (Figure 2); the actual installation locations may vary at the discretion of the geotechnical consultant, based on as-graded conditions. Settlement monuments should be installed as site grading is completed.

At the completion of their construction, the monuments should be surveyed by a licensed surveyor to a fixed benchmark, preferably within Trumble Road. Other locations may be considered but must ultimately be approved by the geotechnical consultant. All survey must be performed by a digital level capable of reading to an accuracy of at least 0.001-foot. The survey must be performed by an experienced surveyor who has previously performed level surveys to this level of precision. The survey must close to 0.004-feet per mile. All surveys must take place early in the morning in good weather for survey work. The geotechnical consultant will determine the appropriate survey schedule, but the schedule may be varied slightly by the surveyor based on anticipated weather.

The monuments should then be monitored periodically at regular intervals (four times in the first two months, twice in the third month, and then once a month thereafter until informed otherwise by the geotechnical consultant). The readings should be provided to this office and continue until total settlements are within tolerable limits. The frequency of the readings may be adjusted during the monitoring period based on results of the readings.

3.2.2 Preliminary Foundation Recommendations

The proposed structures may be supported on spread or continuous footings and conventional slabs, provided earthwork is performed in accordance with the recommendations presented in this report. Since the finish grade site soils are anticipated to be "Very Low" expansion potential (EI of 20 or less per ASTM D4829), special design considerations from a geotechnical perspective are not anticipated, however, this must be verified based on as-graded conditions. Footings should be supported on properly compacted fill. Please note that the following foundation recommendations are preliminary and must be confirmed by LGC Geotechnical at the completion of grading.

Preliminary foundation recommendations are provided in the following sections. The foundation design must be performed by the structural engineer based on the following geotechnical parameters and minimum values provided.

3.2.3 Slab Design and Construction

From a geotechnical perspective, minimum slab thicknesses of 6 inches and 4 inches are recommended for new slabs in the warehouse areas and office areas, respectively. Slabs are to be supported on compacted fill soils properly prepared in accordance with the recommendations provided in this report. Actual slab reinforcement and thickness should be determined by the structural engineer based on the imposed loading. Additional slab-on-grade recommendations can be provided for alternative building types upon request.

The foundation designer may use a modulus of vertical subgrade reaction (k) of 200 pounds per cubic inch (pounds per square inch per inch of deflection). This value is for a 1-foot by 1-foot square loaded area and should be adjusted by the structural designer for the area of the proposed footing using the following formula:

$$k = 200 \times [(B+1)/2B]^2$$

k = modulus of vertical subgrade reaction, pounds per cubic inch (pci)

B = foundation width (feet)

It is recommended that subgrade soils below slabs be moisture conditioned in order to maintain the recommended moisture content up to the time of concrete placement. The recommended moisture content of the slab subgrade soils should be between optimum moisture content and approximately 2 percent above optimum moisture content to a minimum depth of 12 inches. The moisture content of the slab subgrade should be verified by the geotechnical consultant within 1 to 2 days prior to concrete placement. In addition, this moisture content should be maintained around the immediate perimeter of the slab during construction and up to occupancy of the building structures.

The following recommendations are for informational purposes only, as they are unrelated to the geotechnical performance of the foundation. The following recommendations may be superseded by the foundation engineer and/or owner. Some post-construction moisture migration should be expected below the foundation. In

general, interior floor slabs with moisture sensitive floor coverings should be underlain by a minimum 10 mil thick polyolefin material vapor retarder, which has a water vapor transmission rate (permeance) of less than 0.03 perms. The need for sand and/or the sand thickness (above and/or below the vapor retarder) should be specified by the structural engineer, architect or concrete contactor. The selection and thickness of sand is not a geotechnical engineering issue and is therefore outside our purview.

3.2.4 Foundation Design Parameters

For the proposed industrial warehouse structures, minimum continuous wall and column footing widths are to be 12 inches and 24 inches, respectively, minimum exterior foundation embedment is to extend a minimum of 18 inches below the adjacent exterior grade, and interior column footings should be embedded a minimum of 12 inches beneath the adjacent subgrade. The following allowable bearing pressures for both continuous and column spread footings presented in Table 2 below are recommended for corresponding footing widths and embedments.

TABLE 2

Allowable Soil Bearing Pressures

Allowable Static Bearing Pressure (psf)	Minimum Footing Width (feet)	Minimum Footing Embedment* (feet)
3,500	4	2
3,000	3	2
2,500	2	1.5
2,000	1	1.5

* Refers to minimum depth measured below lowest adjacent grade.

These allowable bearing values indicated above (exclusive of the weight of the footings) are for total dead loads and frequently applied live loads and may be increased by $\frac{1}{3}$ for short duration loading (i.e., wind or seismic loads). The allowable bearing pressures are applicable for level (ground slope equal to or flatter than 5H:1V) conditions only.

In utilizing the above-mentioned allowable bearing capacity and provided our earthwork recommendations are implemented, foundation settlement due to structural loads is anticipated to be on the order of 1-inch. Differential static settlement may be taken as half of the static settlement (i.e., $\frac{1}{2}$ -inch over a horizontal span of 40 feet). Liquefaction recommendations are provided in reference geotechnical report (LGC Geotechnical, 2018). Liquefaction potential and potential for liquefaction-induced settlement is considered very low.

3.2.5 Foundation Construction

The foundation is to be excavated into competent compacted artificial fill placed during grading operations. It is recommended that the foundation subgrade soils be evaluated by the geotechnical engineer prior to steel and/or concrete placement.

The geotechnical parameters provided herein assume that if the areas adjacent to the foundations are planted and irrigated, these areas will be designed with proper drainage and adequately maintained so that ponding, which causes significant moisture changes below the foundation, does not occur. Our recommendations do not account for excessive irrigation and/or incorrect landscape design. Plants should only be provided with sufficient irrigation for life and not overwatered to saturate subgrade soils. Sunken planters placed adjacent to the foundation should either be designed with an efficient drainage system or liners to prevent moisture infiltration below the foundation.

3.2.6 Lateral Load Resistance

Resistance to lateral loads can be provided by friction acting at the base of foundations and by passive earth pressure. For concrete/soil frictional resistance, an allowable coefficient of friction of 0.35 may be assumed with dead-load forces. An allowable passive lateral earth pressure of 250 psf per foot of depth (or pcf) to a maximum of 2,500 psf may be used for the sides of footings poured against properly compacted fill. Allowable passive pressure may be increased to 340 pcf (maximum of 3,400 psf) for short duration seismic loading. This passive pressure is applicable for level (ground slope equal to or flatter than 5H:1V) conditions. Frictional resistance and passive pressure may be used in combination without reduction. We recommend that the upper foot of passive resistance be neglected if finished grade will not be covered with concrete or asphalt. The provided allowable passive pressures are based on a factor of safety of 1.5 and 1.1 for static and seismic loading conditions, respectively.

3.3 Lateral Earth Pressures for Retaining Walls

The following preliminary lateral earth pressures may be used for any minor site retaining walls 8 feet or less. Lateral earth pressures are provided as equivalent fluid unit weights, in pound per square foot (psf) per foot of depth or pcf. These values do not contain an appreciable factor of safety, so the retaining wall designer should apply the applicable factors of safety and/or load factors during design.

The following lateral earth pressures are presented on Table 3 on the following page for approved select granular soils with a maximum of 35 percent fines (passing the No. 200 sieve per ASTM D-421/422) and Very Low expansion potential (EI of 20 or less per ASTM D4829). The wall designer should clearly indicate on the retaining wall plans the required sandy soil backfill criteria.

TABLE 3

Lateral Earth Pressures – Select Sandy Backfill

Conditions	Equivalent Fluid Unit Weight (pcf)	
	Level Backfill	2:1 Backfill Sloping Upwards
	Sandy Backfill	Sandy Backfill
Active	35	55
At-Rest	55	75

If the wall can yield enough to mobilize the full shear strength of the soil, it can be designed for “active” pressure. If the wall cannot yield under the applied load, the earth pressure will be higher. Such walls should be designed for “at-rest.” The equivalent fluid pressure values assume free-draining conditions. Retaining wall structures should be provided with appropriate drainage and appropriately waterproofed (Refer to Figure 3). Please note that waterproofing and outlet systems are not the purview of the geotechnical consultant. If conditions other than those assumed above are anticipated, the equivalent fluid pressure values should be provided on an individual-case basis by the geotechnical consultant.

Surcharge loading effects from any adjacent structures should be evaluated by the retaining wall designer. In general, structural loads within a 1:1 (horizontal to vertical) upward projection from the bottom of the proposed retaining wall footing will surcharge the proposed retaining structure. In addition to the recommended earth pressure, retaining walls adjacent to streets should be designed to resist vehicular traffic if applicable. Uniform surcharges may be estimated using the applicable coefficient of lateral earth pressure using a rectangular distribution. A factor of 0.5 and 0.33 may be used for at-rest and active conditions, respectively. The vertical traffic surcharge may be determined by the structural designer. The structural designer should contact the geotechnical engineer for any required geotechnical input in estimating any applicable surcharge loads.

If required, the retaining wall designer may use a seismic lateral earth pressure increment of 10 pcf. This increment should be applied in addition to the provided static lateral earth pressure using a “normal” triangular distribution with the resultant acting at H/3 in relation to the base of the retaining structure (where H is the retained height). For the restrained, at-rest condition, the seismic increment may be added to the applicable active lateral earth pressure (in lieu of the at-rest lateral earth pressure) when analyzing short duration seismic loading. Per Section 1803.5.12 of the 2019 CBC, the seismic lateral earth pressure is applicable to structures assigned to Seismic Design Category D through F for retaining wall structures supporting more than 6 feet of backfill height. This seismic lateral earth pressure is estimated using the procedure outlined by the Structural Engineers Association of California (Lew, et al, 2010).

Soil bearing and lateral resistance (friction coefficient and passive resistance) are provided in the “Foundation Design Parameters” Section. Earthwork considerations (temporary backcuts, backfill, compaction, etc.) for retaining walls are provided in the reference geotechnical report

(LGC Geotechnical 2018).

3.4 Preliminary Asphalt Concrete Pavement Sections

For the purposes of these preliminary recommendations, we used an estimated R-value of 40 and calculated pavement sections for Traffic Indices of 5.0 (or less) and 7.0. R-value testing of the drive aisle and parking subgrade will need to be performed to confirm our preliminary testing results/assumptions once the drive aisles and parking areas have been graded to finish subgrade elevations and the final Traffic Index is determined by the Civil Engineer. Determination of the Traffic Index is not the purview of the geotechnical consultant. The City of Menifee may have more stringent minimum pavement sections. Final street sections should be confirmed by the project civil engineer based upon the projected design Traffic Index. If requested, LGC Geotechnical will provide sections for alternate TI values.

TABLE 4

Preliminary Asphalt Concrete Pavement Sections

Assumed Traffic Index	5.0 (or less)	7.0
R -Value Subgrade	40	40
AC Thickness	4.0 inches	4.0 inches
CAB Thickness	4.0 inches	7.0 inches

The thicknesses shown are minimum thicknesses. Increasing the thickness of any or all of the above layers will reduce the likelihood of the pavement experiencing distress during its service life. The above recommendations are based on the assumption that proper maintenance and irrigation of the areas adjacent to the roadway will occur through the design life of the pavement. Failure to maintain a proper maintenance and/or irrigation program may jeopardize the integrity of the pavement.

Aggregate base material (crushed aggregate base and crushed miscellaneous base) should be compacted to a minimum of 95 percent relative compaction at or slightly above optimum moisture content per ASTM D1557. Subgrade below aggregate base should be compacted to a minimum of 90 percent relative compaction, or the City of Menifee specifications, at or slightly above optimum moisture content per ASTM D1557. Earthwork recommendations are provided in the reference report (LGC Geotechnical, 2018).

3.5 Preliminary Portland Cement Concrete Pavement Sections

For the purposes of these preliminary recommendations, we used an estimated R-value of 40. Preliminary minimum Portland Cement Concrete (PCC) pavement street sections are provided in Table 5 on the following page for Traffic Indices of 5.0 (or less), 6.0, and 7.0 and may be utilized in the design of the truck parking/circulation areas or loading docks. These recommendations must be confirmed with R-value testing of representative near-surface soils at the completion of grading and after underground utilities have been installed and backfilled. Final street sections

should be confirmed by the project civil engineer based upon the projected design Traffic Index. If requested, LGC Geotechnical will provide sections for alternate TI values. The appropriate paving section must be selected by the project civil engineer/client based on design traffic indexes.

TABLE 5

Preliminary PCC Pavement Sections

Provided Traffic Index	5.0 (or less)	6.0	7.0
R -Value Subgrade	40	40	40
PCC Thickness	5.0 inches	6.0 inches	7.0 inches
95% Compacted Subgrade	12.0 inches	12.0 inches	12.0 inches

For preliminary planning purposes, the PCC pavement sections may consist of a minimum of concrete over subgrade soils compacted to 95 percent relative compaction (see Table 5 for section thicknesses). The concrete should have a minimum compressive strength of 3,000 psi and a minimum flexural strength of 475 psi at the time the pavement is subjected to traffic. Steel reinforcement is not required (ACI, 2017). The provided pavement sections assume that edge restraints like a curb and gutter will be provided. To reduce the potential (but not eliminate) for cracking, paving should provide control joints at regular intervals in each direction. The maximum joint spacing within all PCC pavements is recommended to be equal to or less than 30 times the pavement thickness; however, we recommend joint spacing not exceed 15 feet in each direction. Joints should be a depth of 1/3 of the concrete thickness. Decreasing the spacing of these joints will further reduce, but not eliminate the potential for unsightly cracking.

If semi-trailers are to be disconnected from the tractors from dolly jacks the design should consider concentrated loads imposed on the concrete pavement. These loads typically exceed the axle loads of the semi-trailer combination and are applied to smaller contact areas, especially if applied near joint locations. If these irregular loadings are confined to specific areas of the site, the pavement section required thickness can be economized. These and other factors (e.g., traffic patterns, irregular loading, doweled vs un-doweled joints, etc.) outlined in ACI, 2017 should be addressed for the final design.

The thicknesses shown are minimum thicknesses. Increasing the thickness of any or all of the above layers will reduce the likelihood of the pavement experiencing distress during its service life. The above recommendations are based on the assumption that proper maintenance and irrigation of the areas adjacent to the roadway will occur through the design life of the pavement. Failure to maintain a proper maintenance and/or irrigation program may jeopardize the integrity of the pavement.

Subgrade below the PCC pavement should be compacted to a minimum of 95 percent relative compaction per ASTM D1557 near optimum moisture content (generally within optimum and 2 percent above optimum moisture content). Earthwork recommendations are provided in the reference report (LGC Geotechnical, 2018).

3.6 Soil Corrosivity

Although not corrosion engineers (LGC Geotechnical is not a corrosion consultant), several governing agencies in Southern California require the geotechnical consultant to determine the corrosion potential of soils to buried concrete and metal facilities. However, grading within the subject site has yet to be completed and is likely to be/had been graded using multiple sources of imported materials. Therefore, testing should be performed at the completion of grading.

3.7 Nonstructural Concrete Flatwork

Nonstructural concrete (such as flatwork, sidewalks, etc.) has a potential for cracking due to changes in soil volume related to soil-moisture fluctuations. To reduce the potential for excessive cracking and lifting, concrete should be designed in accordance with the minimum guidelines outlined below. These guidelines will reduce the potential for irregular cracking and promote cracking along construction joints but will not eliminate all cracking or lifting. Thickening the concrete and/or adding additional reinforcement will further reduce cosmetic distress.

Nonstructural and non-vehicular concrete flatwork placed on compacted non-expansive subgrade may be a minimum 4-inches in thickness with crack control joints spaced 8 feet apart for flatwork slabs and 6 feet apart for flatwork sidewalks. Crack control joints should be sawcut or deep open tool joint to a minimum of 1/3 the concrete thickness. The compacted subgrade below the nonstructural and non-vehicular concrete flatwork should be wet down prior to placing concrete.

To reduce the potential for nonstructural concrete flatwork to separate from entryways and doorways, the owner may elect to install dowels to tie these two elements together.

3.8 Surface Drainage and Landscaping

3.8.1 Precise Grading

From a geotechnical perspective, we recommend that compacted finished grade soils adjacent to proposed structures be sloped away from the proposed building structures and towards an approved drainage device or unobstructed swale. Drainage swales, wherever feasible, should not be constructed within 5 feet of buildings. Where lot and building geometry necessitates that drainage swales be routed closer than 5 feet to structural foundations, we recommend the use of area drains together with drainage swales. Drainage swales used in conjunction with area drains should be designed by the project civil engineer so that a properly constructed and maintained system will prevent ponding within 5 feet of the foundation. Code compliance of grades is not the purview of the geotechnical consultant.

Planters with open bottoms adjacent to buildings should be avoided. Planters should not be designed adjacent to buildings unless provisions for drainage, such as catch basins, liners, and/or area drains, are made. Overwatering must be avoided.

3.8.2 Landscaping

Planters adjacent to a building or structure should be avoided wherever possible or be properly designed (e.g., lined with a membrane), to reduce the penetration of water into the adjacent footing subgrades and thereby reduce moisture-related damage to the foundation. Planting areas at grade should be provided with appropriate positive drainage. Wherever possible, exposed soil areas should be above adjacent paved grades to facilitate drainage. Planters should not be depressed below adjacent paved grades unless provisions for drainage, such as multiple depressed area drains, are constructed. Adequate drainage gradients, devices, and curbing should be provided to prevent runoff from adjacent pavement or walks into the planting areas. Irrigation methods should promote uniformity of moisture in planters and beneath adjacent concrete flatwork. Overwatering and underwatering of landscape areas must be avoided. Irrigation levels should be kept to the absolute minimum level necessary to maintain healthy plant life.

Area drain inlets should be maintained and kept clear of debris in order to properly function. Owners and property management personnel should also be made aware that excessive irrigation of neighboring properties can cause seepage and moisture conditions. Owners and property management personnel should be furnished with these recommendations communicating the importance of maintaining positive drainage away from structures, towards streets, when they design their improvements.

The impact of heavy irrigation or inadequate runoff gradients can create perched water conditions. This may result in seepage or shallow groundwater conditions where previously none existed. Maintaining adequate surface drainage and controlled irrigation will significantly reduce the potential for nuisance-type moisture problems. To reduce differential earth movements such as heaving and shrinkage due to the change in moisture content of foundation soils, which may cause distress to a structure and associated improvements, moisture content of the soils surrounding the structure should be kept as relatively constant as possible.

3.9 Subsurface Water Infiltration

Recent regulatory changes have occurred that mandate that storm water be infiltrated below grade rather than collected in a conventional storm drain system. Typically, a combination of methods is implemented to reduce surface water runoff and increase infiltration including; permeable pavements/pavers for roadways and walkways, directing surface water runoff to grass-lined swales, retention areas, and/or drywells, etc.

It should be noted that collecting and concentrating surface water for the purpose of intentional infiltration below grade, conflicts with the geotechnical engineering objective of directing surface water away from slopes, structures and other improvements. The geotechnical stability and integrity of a site is reliant upon appropriately handling surface water. In general, the vast

majority of geotechnical distress issues are directly related to improper drainage. In general, distress in the form of movement of improvements could occur as a result of soil saturation and loss of soil support, expansion, internal soil erosion, collapse and/or settlement.

At completion, the proposed development will consist almost entirely of compacted fill soils, we do not recommend that surface water be intentionally infiltrated into subsurface soils.

3.10 Geotechnical Plan Review

Grading, foundation and any retaining wall plans, and final project drawings should be reviewed by this office prior to construction to verify that our geotechnical recommendations, provided herein, have been appropriately incorporated. Additional or modified geotechnical recommendations may be required based on the proposed layout.

3.11 Geotechnical Observation and Testing During Construction

The recommendations provided in this report are based on limited subsurface observations and geotechnical analysis. The interpolated subsurface conditions should be checked in the field during construction by a representative of LGC Geotechnical. Geotechnical observation and testing are required per Section 1705 of the 2019 California Building Code (CBC).

Geotechnical observation and/or testing should be performed by LGC Geotechnical at the following stages:

- During grading (removal bottoms, fill placement, etc.);
- During utility trench and any retaining wall backfill and compaction;
- Preparation of pavement subgrade and placement of aggregate base;
- After building/wall foundation excavation and prior to placing reinforcement and/or concrete; and
- When any unusual soil conditions are encountered during any construction operation subsequent to issuance of this report.

4.0 LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable 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. The samples taken and submitted for laboratory testing, the observations made, and the in-situ field testing performed are believed representative of the entire project; however, soil and geologic conditions revealed by excavation may be different than our preliminary findings. If this occurs, the changed conditions must be evaluated by the project soils engineer and geologist and design(s) adjusted as required or alternate design(s) recommended.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and/or project engineer and incorporated into the plans, and the necessary steps are taken to see that the contractor and/or subcontractor properly implements the recommendations in the field. The contractor and/or subcontractor should notify the owner if they consider any of the recommendations presented herein to be unsafe.

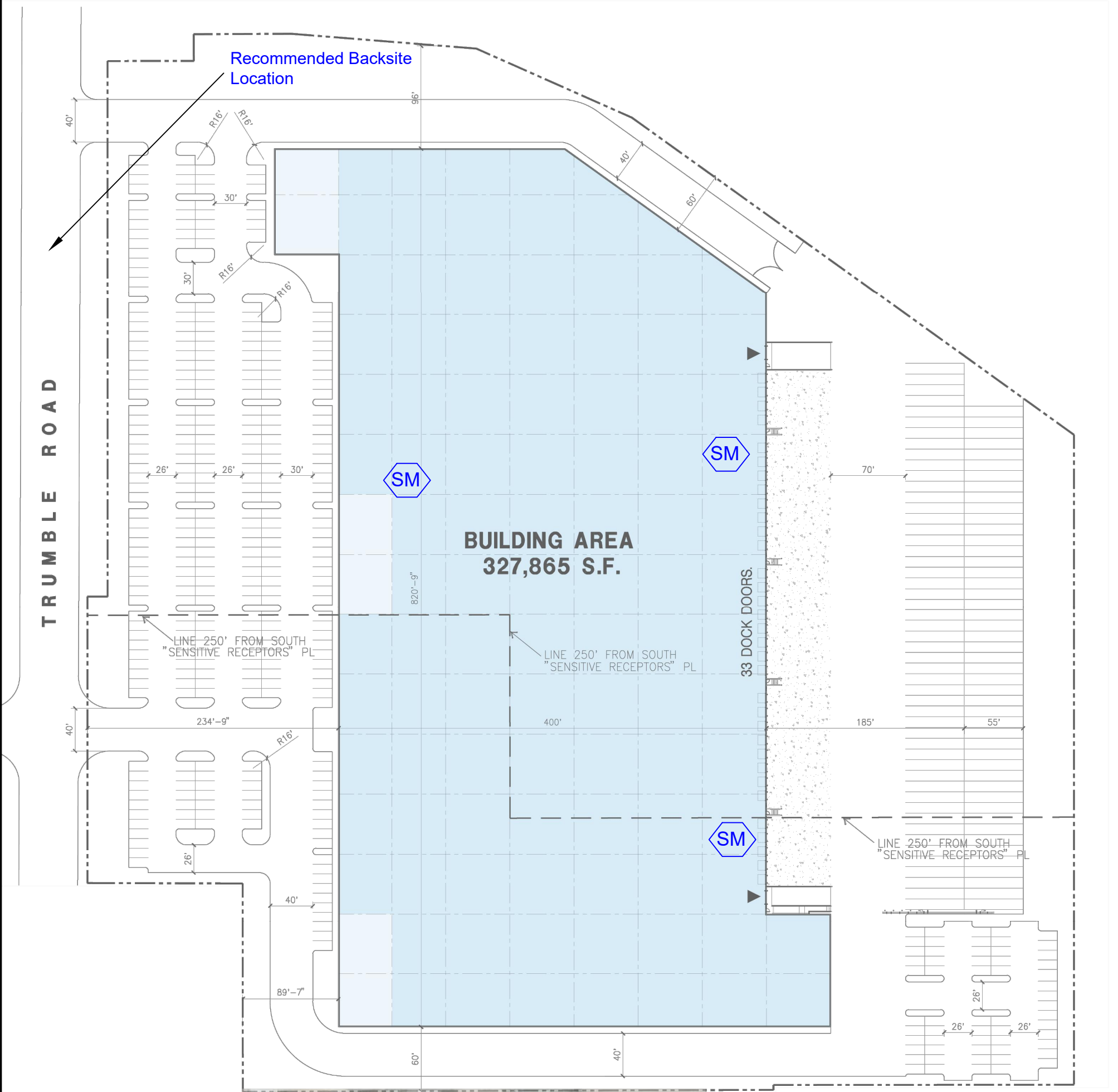
The findings of this report are valid as of the present date. However, changes in the conditions of a property can and do occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. Therefore, the findings, conclusions, and recommendations presented in this report can be relied upon only if LGC Geotechnical has the opportunity to observe the subsurface conditions during grading and construction of the project, in order to confirm that our preliminary findings are representative for the site.

In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and modification, and should not be relied upon after a period of 3 years.



FIGURE 1
Site Location Map

PROJECT NAME	Lovett Industrial - Trumble Road
PROJECT NO.	17172-02
ENG. / GEOL.	RLD/KBC
SCALE	Not to Scale
DATE	May 2022



LEGEND



Approximate Location of Recommended Settlement Monuments



SCALE: 1"=100'



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**FIGURE 2 -
Settlement Monument
Location Map**

PROJECT NAME	Lovett Industrial - Trumble Road
PROJECT NO.	17172-02
ENG. / GEOL.	RLD/KBC
SCALE	1" = 100'
DATE	May 2022

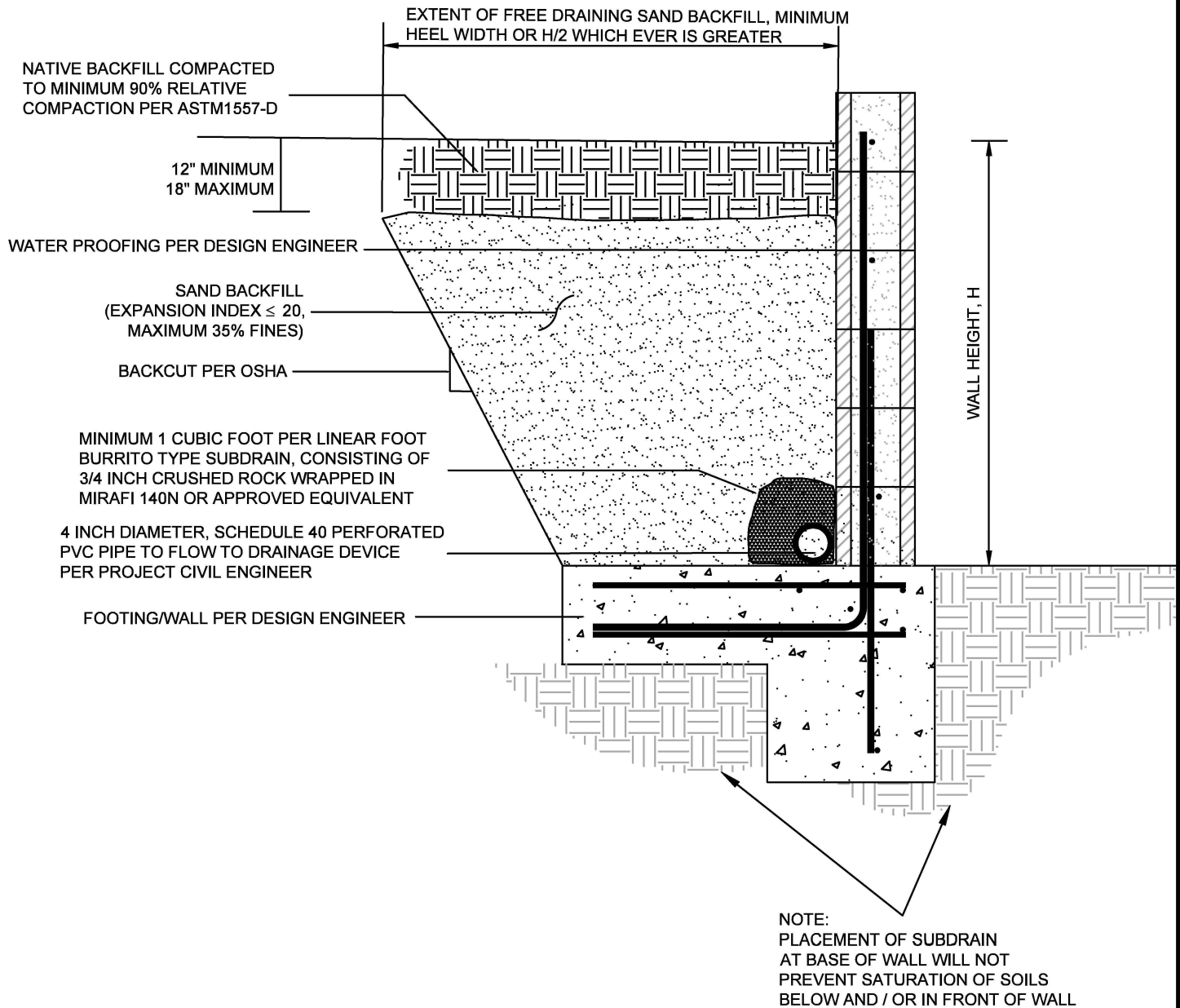


FIGURE 3
Retaining Wall
Backfill Detail

PROJECT NAME	Lovett Industrial - Trumble Road
PROJECT NO.	17172-02
ENG. / GEOL	RLD/KBC
SCALE	Not to Scale
DATE	May 2022

Appendix A

References

APPENDIX A

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