LGC Valley, Inc.

Geotechnical Consulting

UPDATE GEOTECHNICAL STUDY AND RESPONSE TO CITY RESPONSE TO CITY REVIEW COMMENTS, PROPOSED MORENA APARTMENT HOMES, 1579 AND 1623 MORENA BOULEVARD, SAN DIEGO, CALIFORNIA

Dated: May 4, 2017

Project No. 154004-03

Prepared For:

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May 4, 2017 Project No. 154004-03

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Subject: ***Update Geotechnical Study and Response to City Review Comments, Proposed Morena Apartment Homes, 1579 and 1623 Morena Boulevard, San Diego, California***

In accordance with your request, LGC Valley, Inc. (LGC) has performed an updated geotechnical evaluation for the proposed apartment home complex located at the northeast corner of Morena Boulevard and Frankfort Street in the Bay Park area of the City of San Diego, California. The purpose of our update study was to: 1) review the existing geotechnical documents applicable to the site; 2) evaluate the current on-site geotechnical conditions relative to the latest grading and development plans; 3) provide response to comments to the City of San Diego review of the project preliminary geotechnical investigation report (LGC, 2015); and 4) provide this report updating the geotechnical conclusions and recommendations applicable to the grading operations and future site construction for the project.

Based on the results of our update geotechnical study, it is our professional opinion that the proposed site development is feasible from a geotechnical standpoint provided the recommendations included in this report are incorporated into the project plans and specifications, and followed during site grading and construction. If you have any questions regarding our report, please contact this office. We appreciate this opportunity to be of service.

Respectfully submitted,

LGC VALLEY, INC.

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1.0 INTRODUCTION

1.1 Purpose and Scope of Services

The purpose of this investigation was to identify and evaluate the existing geologic and geotechnical conditions at the site (Figure 1, Site Location Map) and provide preliminary geotechnical design criteria. Recommendations for grading, construction, preliminary foundation design for the proposed structures, retaining walls and other relevant aspects of the proposed development are included herein to address the identified site geotechnical conditions. This report includes the results of our site exploration, laboratory testing, and engineering evaluation, and provides our conclusions, opinions and recommendations with respect to site development. The following items plus other geotechnical conditions are discussed and addressed within this document.

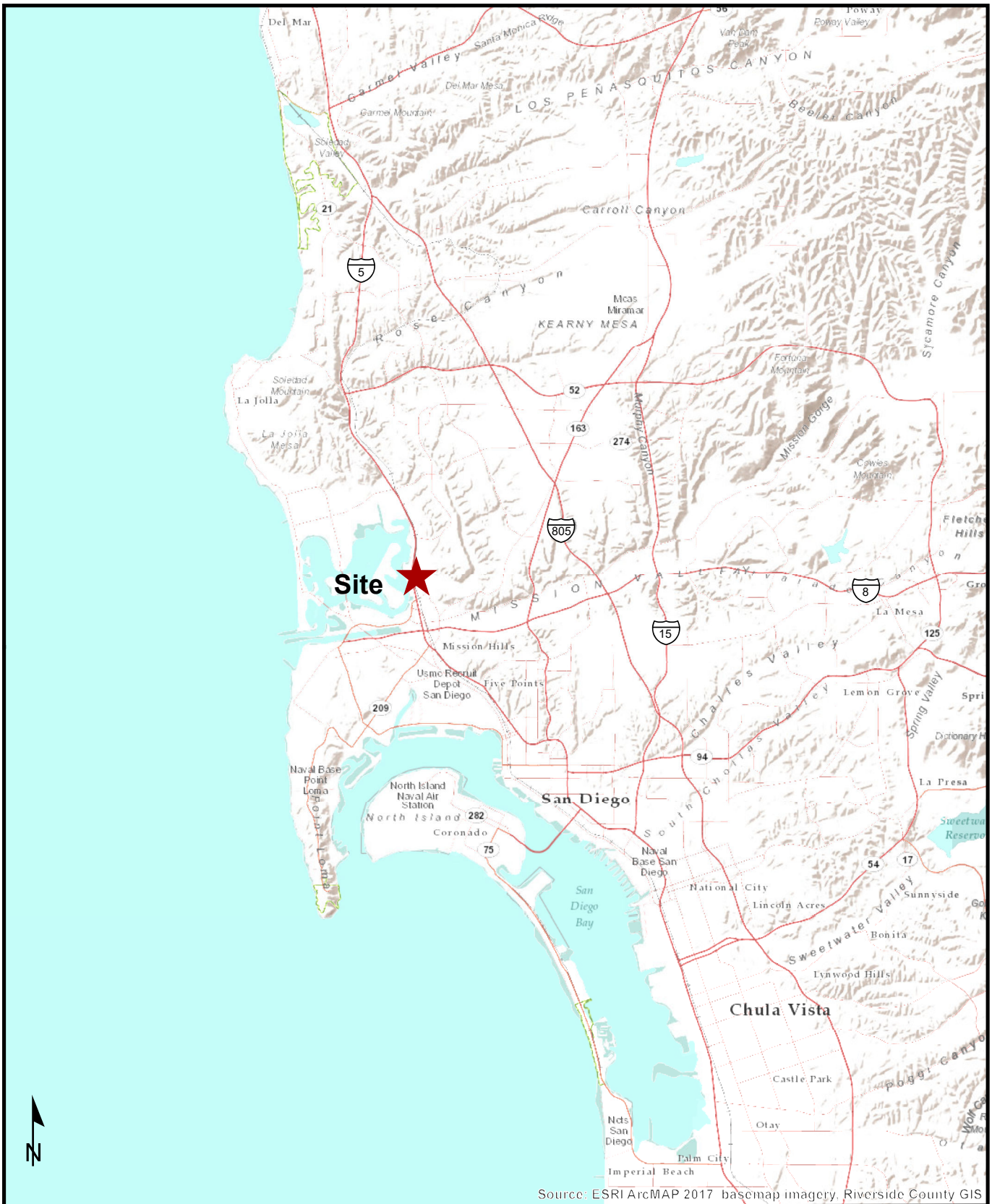
Our scope of services for preparation of this document included:

- Review of geotechnical reports, geologic maps and other documents relevant to the site (Appendix A).

- Perform a site visit to evaluate the existing site conditions and to mark-out the geotechnical boring and infiltration test locations.

- A subsurface investigation including the excavation, sampling, and logging of four small-diameter exploratory borings and four infiltration test pits. The borings are labeled B-1 through B-4 and the infiltration test pits are labeled I-1 through I-4. Logs of the borings are presented in Appendix B while the infiltration test results are presented in Appendix C. The approximate locations of the borings and infiltration test pits are depicted on the Geotechnical Map (Plate 1). All of the excavations were sampled and logged under the supervision of a licensed geologist from our firm. The excavations were performed to evaluate the general characteristics of the subsurface conditions on the site including classification of site soils, determination of depth to groundwater, infiltration rates, and to obtain representative soil samples.

- Laboratory testing of representative soil samples obtained during our investigation, including collection of a representative bulk sample of the on-site soil that could be used as future fill soils and performing a laboratory Saturated Hydraulic Conductivity Test (in accordance with ASTM D5084) on a the sample to determine the planning stage infiltration rate for the proposed water-quality basin that will be located in a fill area. Laboratory test results are included in Appendix D.



LGC

Figure 1
Site Location Map
Morena Apartment Homes
1579 and 1623 Morena Boulevard
San Diego, California

Project Name	Fairfield Morena
Project Number	154004-03
Eng./Geo.	BIH/RKW
Date	May 4, 2017

0 4 Miles

- Preparation of the City of San Diego Worksheets C.4-1: Categorization of Infiltration Feasibility Condition, and D.5-1: Factor of Safety and Design Infiltration Rate Worksheets (Appendix E).

- Preparation of four geologic cross-sections across the site showing the existing site topography, proposed grades, geologic units encountered during our subsurface investigation, and the existing geotechnical conditions (Plate 2).

- Perform geotechnical analyses and evaluation of the data (including a liquefaction analysis presented in Appendix F).

- Preparation of this report presenting our findings, conclusions, opinions and recommendations (including the General Earthwork and Grading Specifications for Rough Grading presented in Appendix G) with respect to the evaluated geologic and geotechnical conditions at the site.

1.2 Site and Project Description

The subject site is located at the northwest corner of Morena Boulevard and Frankfort Street in the Bay Park area of the City of San Diego, California. The site consists of two parcels: the larger of the two parcels, located in the southeastern portion of the site, is listed as 1579 Morena Boulevard (APN 436-020-41-00) and is approximately 4.4 acres in size. The other parcel, located in the northwest portion of the site, is listed as 1623 Morena Boulevard (APN 436-020-40-00) and is approximately 1.5 acres in size. The current usage of the larger parcel is the Coastal Trailer Villa recreational trailer park while the smaller parcel contains a number of single-story apartments, other buildings, and a recreational vehicle storage yard. The site is bounded by Morena Boulevard and Interstate 5 on the southwest; Tonopah Avenue, Frankfort Street, and existing residential developments to the north and east; and commercial developments to the south, southeast, and northwest.

A southwest facing slope is present on the northeast side of the site and ranges from 5 feet in height on the east to approximately 25 feet in height on the west side. Future grading of the site is anticipated to consist of minor cuts and fills to achieve finish grades with retaining walls around most of the perimeter of the site.

It is our understanding that the proposed development will consist of an apartment complex consisting of ten multi-story buildings (including a recreation center), driveways, parking spaces, three water-quality bioretention basins, retaining walls along the north, west, east, and southwest sides of the site, underground utility lines, landscaping, etc.

The proposed water-quality bioretention basins on the site include a large basin in the southern portion of the site and two basins in the northwest and northeast portions of the site. The two northern basins consist of basins located between apartment buildings. Based on the site development prepared by Project Design Consultants (PDC, 2017), the large water-quality bioretention basin in the southern portion of the site will be located in a fill area while the other two basins will be located in cut areas. Approximately 3 to 5 feet of fill is proposed above the existing ground surface in the area of the southern basin while cuts on the order of 3 to 6 feet are proposed in the other two basin locations. Removal of the alluvium to within a couple of feet of the groundwater elevation is also anticipated in the area of the southern basin, ultimately resulting in fills up to

approximately 10 feet in thickness. We understand that the finish grade elevation of the basin bottoms will be at an approximate elevation of 18 feet with the bottom of the gravel storage layer at an elevation of approximately 14 feet.

1.3 Subsurface Investigation and Laboratory Testing

The preliminary geotechnical investigation of the site was performed in September and October 2015 (LGC, 2015) and consisted of: 1) a background review of available geotechnical, geologic, and groundwater monitoring maps and reports of the general vicinity; 2) the excavation of four small-diameter exploratory borings and two percolation test pits; 3) laboratory testing of representative soils samples collected from the site; geotechnical analysis of the data; and 4) preparation of a report presenting our findings, conclusions, opinions, and recommendations for site development.

The borings of the subsurface investigation were excavated to depths ranging from approximately 8 to 48 feet below the existing ground surface and all were extended until practical refusal on rocks (gravels or cobbles) of the formational material. The approximate locations of the borings are presented on Plate1 while the boring logs are presented in Appendix B.

During the subsurface investigation, representative bulk and relatively undisturbed samples were collected for laboratory testing, where possible, and samples were forwarded to EGLAB, Inc. (EGL), Vinje & Middleton Engineering, Inc. and to LGC Valley, Inc. for classification testing. Laboratory testing was performed on representative soil samples and included moisture and density tests, maximum density and optimum moisture content, grain size distribution, Atterberg Limits, expansion, remolded direct shear, consolidation, collapse, and corrosion testing. A summary of the test procedures and laboratory test results are presented in Appendix E. The moisture and density test results were presented on the boring logs included in Appendix B.

1.4 Percolation/Infiltration Study

Our planning-stage percolation/infiltration field-testing was performed in general accordance with Section D.3.3.2 - Borehole Percolation Tests (Various Methods) of the San Diego City BMP Design Manual (San Diego City, 2016). The percolation/infiltration study was performed on November 9 and 10, 2016 and consisted of the excavation of four 8-inch diameter borings to depths ranging from approximately 7 to 9 feet below the existing ground surface. The percolation/infiltration tests were performed so that the soils being tested at the bottom of the borings were at the designed bottom elevation and within 50 feet of the proposed water-quality bioretention basins on the site. The approximate locations of the percolation tests are presented on Plate 1.

The four borehole percolation tests were excavated to the approximate depth of the bottom of the proposed water-quality bioretention basins and presaturated the day before the tests were run. Prior to presaturation, 2-inches of washed pea gravel was placed in the bottom of the holes and a solid 6-inch diameter pipe placed in the excavations to minimize caving during the presaturation period.

On the following day after presoaking of the holes, the percolation tests were performed in general accordance with Section D.3.3.2 - Borehole Percolation Tests (Various Methods) of the San Diego City BMP Design Manual. Measurement of the boring depths was performed prior to the percolation testing

and the results indicated that little to no sediment was present in the bottom of the excavations. The initial percolation testing indicated that less than 6-inches of water seeped away in the first two 25-minute periods in three of the test locations (i.e. Infiltration Tests I-1, I-2, and I-4), so each of these tests was run for approximately 6 hours with water level readings obtained at 30 minute intervals. The initial percolation testing also indicated that more than 6-inches of water seeped away in the first two 25 minute periods in one test location (i.e. Infiltration Test I-3), so the test was run for an additional approximately 1-hour with water level readings obtained every 10 minutes.

The percolation tests were conducted by filling the holes with clear water and measuring the water drop after 30 minutes or 10 minutes as the standard time interval dictated. The holes were refilled, as needed, to maintain a water height of at least 5 times the radius of the borehole (or a minimum of 20-inches of water assuming an eight-inch diameter borehole), and measured at least 12 times over the six-hour period, or 6 times over the one-hour period. The measurement of the last 10- or 30-minute period was then used to determine the percolation rate for each of the tests. Adjustment of the obtained percolation test results to an "infiltration rate" was performed utilizing the Porchet Method. The percolation testing indicated infiltration rates ranged from 0.2 to 2.0 inches per hour at the locations tested. The results of the testing are provided in Appendix C.

The infiltration rate of the proposed water-quality basin located in the southern portion of the site could not be tested on-site as the bottom of the basin is proposed to be located in a design fill area as shown on the site plan (PDC, 2016 and 2017). To determine the infiltration rate of this basin, a representative bulk sample of the on-site soil that could be utilized as fill was obtained and a saturated hydraulic conductivity test (in accordance with ASTM Test D5084) was run on the sample. Prior to running the hydraulic conductivity test, the maximum dry density of the representative soil was determined and the sample remolded to a 90-percent compaction at the optimum moisture content. The hydraulic conductivity test indicated that the soil tested at a 90-percent relative compaction has a saturated hydraulic conductivity for the anticipated fill soils of 3.7E-06 centimeters per second. This value corresponds to a final infiltration rate of 0.01 inches per hour.

1.4.1 Infiltration Findings

Based on our review of the referenced documents including the project preliminary geotechnical investigation of the site (LGC, 2015) and the results of our recent percolation/infiltration study, the following were noted:

Field Percolation/Infiltration Test Results: The infiltration test results of Infiltration Tests I-1 and I-2 in the general location of the northwestern water-quality basin indicated the subsurface soils at the bottom of the proposed water-quality bioretention basin had an unadjusted (pre-factor of safety) infiltration rate of 0.24 and 0.10 inches per hour, respectively. Infiltration test results of Infiltration Tests I-3 and I-4 in the general location of the northeastern water-quality basin indicated the subsurface soils at the bottom of the proposed water-quality basin had an unadjusted (pre-factor of safety) infiltration rate of 2.87 and 0.81 inches per hour, respectively. These results were found to be greater than the infiltration rates determined in I-1 and I-2, although they are in the same formational material, the bottom of I-3 was into more sandy layer which allowed for a higher infiltration rate. The results of the percolation testing are presented on the Percolation Test Data Sheets in Appendix C. It should be noted that the Old Paralic Deposits present on the site consists of interbedded silty clays, silts, clayey to silty sands, and gravelly sands that are highly variable in extent. Variation should be considered in infiltration

rates based on the layers exposed at the design basin bottom; therefore, the unadjusted infiltration rate of 0.1 and 0.81 inches per hour should be considered in the design for the northwestern and northeastern basins, respectively.

Saturated Hydraulic Conductivity Test Result: The saturated hydraulic conductivity test result of a sample of the representative on-site soil (compacted to a 90-percent relative compaction) that could be used as fill on the site indicated a final infiltration rate of 0.01 inches per hour. Design of the southern basin with the anticipated fill soils (i.e. mixture or clayey and sandy soils compacted to 90 percent relative compaction) should be designed for 0.01 inches per hour. If necessary, alternative recommendations for the southern basin maybe considered including select material grading (i.e. using only sandy soils for the basin bottom) or reduced compaction standards for the bottom of the basin to increase design infiltration rates.

Site Topography: Topographically, the area of the site that will be developed ranges in elevation from approximately 31 feet at the northwest corner of the site to an approximate elevation of 11 feet msl at the southeast corner. The existing ground surface near the proposed northwestern water-quality basin ranges from approximately 22.5 to 24 feet msl while the existing ground surface near the proposed northeastern water-quality basin ranges from approximately 20.5 to 23 feet msl.

Soil and Geologic Conditions: Based on the results of our field investigation during the preliminary geotechnical study and geologic logging of the percolation test borings, the subject site is composed of undocumented artificial fill over Quaternary-aged Alluvium and Pleistocene-aged Old Paralic Deposits (i.e. the Bay Point Formation). In the location of the northwestern and northeastern water-quality basins, the area is underlain Old Paralic Deposits consisting mainly of poorly sorted, orange to reddish-brown, interbedded silty clay, silt, silty to clayey sand, gravelly sands, and minor sandy to gravelly conglomerates. The borings in the southwestern portion of the site (i.e. Borings B-1 and B-2 of the preliminary investigation) encountered fined-grained soils from approximately 5 to 10 feet and 7.5 to 17.5 feet below the existing ground surface that may result in a groundwater ponding and/or mounding condition in this area, and may facilitate the migration of infiltrated water on these less permeable layers to adjacent properties.

Settlement and Volume Change: Due to existing site geologic conditions and the anticipated minimal fine grading of the site to reach the designed finish grades, settlement due to additional loads (such as fill soil and building loads) is assumed to be insignificant. The change in soil volume is also considered minor with respect to other conditions such as hydro-collapse, consolidation, and liquefaction. Likewise, bulking of the site soils is assumed to be low to moderate due to the low to medium expansion potential of the soils anticipated to be located at or near finish grade on the site.

Slope Stability: The two smaller water-quality basins are located in relatively flat portions of the site. Due to the lack of any significant slopes in the general area of the basins, slope instability issues are not likely. However, the southern water-quality basin is located at the top of a proposed fill slope that is on the order of 6 to 7 feet in height. Potential slope instability and detrimental seepage conditions are highly likely unless methods such as a cut-off wall or placement of an impermeable layer are placed so that seepage through the slope face or along the toe-of-the slope is minimized.

Utility Considerations: Underground utility trench lines are common avenues of groundwater migration. If groundwater seepage occurs along the underground trenches anticipated on the site, it is our opinion that this condition is not a constraint to the design of the project.

Groundwater Conditions: Groundwater was encountered during the subsurface investigation of the site at a depth of approximately 6 to 14 feet below the existing ground surface (or at an approximate elevation above sea level of 7 to 9 feet). Proposed finish grades of the water-quality basin bottoms are approximately 18 feet with the bottom of the gravel storage layer at an approximate elevation of 14 feet. Therefore, the bottom of the water-quality basins will be located approximately 5 to 7 feet above the current groundwater elevation on the site. In addition, as noted above in the Soil and Geologic Conditions Section, fine-grained soils within 5 to 17.5 feet of the ground surface consisted of fine-grained soils that could result in a groundwater mounding condition.

We anticipate that the groundwater has a slight flow or gradient towards the west/southwest. In general, groundwater levels will fluctuate with seasonal variations and local zones of perched groundwater may occur within the near-surface deposits when precipitation is high.

Retaining Wall and Building Foundations: The proposed retaining walls at the site are located at least 100 feet from the planned water-quality basins; and consequently, groundwater impacts from the basins relative to the retaining walls is not expected to be a significant constraint. The northwestern and northeastern water-quality basins are both located between proposed apartment buildings that are within approximately 5 feet of the basins. The proposed finish grade elevation of the building pads is 20 feet while the basin bottoms will be at an elevation of 18 feet. Impacts of groundwater seepage should be considerable unless cut-off walls are installed or the building footings are deepened so that the groundwater impact to the building is minimized.

Soil and Groundwater Contamination: Our background review of pertinent documents related to the site and the general vicinity indicated that there are no open County of San Diego Department of Environmental Health (DEH) cases relative to leaking underground gasoline tanks and/or contaminated groundwater in the general vicinity of the site. As a result, there appears to be no adverse impacts relative to soil or groundwater contamination.

1.4.2 City of San Diego Infiltration Worksheets C.4-1 and D.5-1

In accordance with the City of San Diego BMP Design Manual, Worksheet C.4.1 - Categorization of Infiltration Feasibility Condition and Worksheet D.5-1 - Factor of Safety and Design Infiltration Rate Worksheet have been completed and are enclosed in Appendix D. It should be noted that only the geotechnical aspects of Worksheet D.5.1 were filled out.

2.0 RESPONSE TO CITY REVIEW COMMENTS

LGC Valley, Inc. has reviewed the recent City of San Diego LDR-Geology Plan Check Comments (San Diego City, 2017) regarding geotechnical issues relative to the proposed Morena Apartment Homes development. Our responses to the outstanding/unresolved cycle issues/review comments are presented below.

Review Comments

Comments Issue No.2: *Submit an addendum geotechnical report or update letter that specifically addresses the proposed development for the purposes of environmental review and the following:*

Response:. The results of our preliminary geotechnical investigation performed in 2015, our infiltration study performed in November 2016, and the results of this update evaluation of the geotechnical conditions relative to the proposed current site grading and development plan (PDC, 2017) have been provided in this update geotechnical report as requested in this comment.

Comments Issue No.3: *Provide a site specific geologic/ geotechnical map that shows the proposed project on a topographic base map. Show the distribution of fill, geologic units, location of exploratory excavations, location of geologic/ geotechnical cross section(s). Circumscribe the limits of recommended remedial grading on the geologic/ geotechnical map and cross section(s).*

Response: The anticipated remedial grading limits are presented on the Geotechnical Map and Geologic Cross-Sections A-A' through D-D' (Plates 1 and 2), and the depth of remedial removals are discussed in Section 5.1.2 Removal and Recompaction on page 20 of this report.

Comments Issue No. 4: *Provide representative geologic/ geotechnical cross sections that show the existing and proposed grades, distribution of fill and geologic units.*

Response: Four geologic cross-sections showing the existing site topography, proposed grades, geologic units encountered during our subsurface investigation, and the existing geotechnical conditions are presented as Plate 2.

Comments Issue No. 5: *The projects geotechnical consultant must indicate if the site is suitable for the currently proposed development.*

Response: As indicated on the cover page and in Section 4.0, it is our professional opinion that the proposed site development is feasible from a geotechnical standpoint provided the recommendations included in this report are incorporated into the project plans and specifications, and followed during site grading and construction.

Comments Issue No. 6: *The project's geotechnical consultant should provide a conclusion regarding if the proposed development will destabilize or result in settlement of adjacent property or the Right-of-Way.*

Response: Based on the results of this update geotechnical study, it is our professional opinion that the proposed development will not destabilize or result in settlement of adjacent property or the right-of-way provided the recommendations included in this report are incorporated into the project plans and specifications, and followed during site grading and construction.

Comments Issue No. 7: *The project's geotechnical consultant has indicated that an existing, non-conforming cut slope adjacent to Tonopah Avenue will need to be regraded to a slope inclination of 2:1 (horizontal to vertical) or less and/ or a retaining wall will need to be construction along the slope. If the updated plans indicate a retaining wall is proposed, the geotechnical engineer must address global stability of the wall(s).*

Response: The slope along the north side of the property has likely been there since at least the early 1950's. Although, the slope is steeper than the currently agency-accepted 2:1 (horizontal to vertical) slope inclination; based on our review and evaluation, the existing slope is comprised of Quaternary-aged Old Paralic Deposits that are massive to thickly bedded with no adverse geologic conditions, and are considered to have no global instability issues. Surficial stability issues consisting of minor to moderate rilling of the slope have been observed and should be mitigated. Based on our geotechnical review and analysis of the proposed development and the current geotechnical condition of the slope, it is our opinion that the planned retaining wall with the proposed 2-foot tall debris wall at the top of the wall can be constructed along the slope and can be considered to be an acceptable mitigation measure of reducing potential surficial instability issues from impacting the developed portion of the site; from a geotechnical point of view, provided the recommendations of this report are followed in the design. The construction of a 2-foot tall debris wall at the top of the proposed retaining wall will create a catchment area to contain excessive erosion and debris material. Also it is our understanding that the slope will be planted with appropriate vegetation (as recommended by the project landscape architect to minimize future erosion) and should be covered with a jute mesh or other erosion control materials.

Comments Issue No. 8: *The project's geotechnical consultant has indicated that an existing, non-conforming cut slope adjacent to Tonopah Avenue will need to be regraded to a slope inclination of 2:1 (horizontal to vertical) or less and/ or a retaining wall will need to be construction along the slope. The project's engineer should update the plans to reflect the recommendations from the geotechnical engineer.*

Response: The grading plans have been revised by the project civil engineer to show the proposed retaining wall along with the 2-foot tall debris wall at the top of the proposed retaining wall along the north side of the property (PDC, 2017).

Comments Issue No. 9: *NOTE: Storm Water Requirements for the proposed conceptual development will be evaluated by LDR-Engineering review. Priority Development Projects (PDPs) may require an investigation of storm water infiltration feasibility in accordance with the Storm Water Standards (including Appendix C and D). Check with your LDR-Engineering reviewer on requirements. LDR-Engineering may determine that LDR-Geology review of a storm water infiltration evaluation is required.*

Response: Acknowledged. The infiltration tests results, findings, conclusions, and recommendations of our infiltration study that was performed in November of 2016 (LGC, 2016) have been incorporated into this report, specifically in Sections 1.4 and 4.0.

3.0 GEOTECHNICAL CONDITIONS

3.1 Regional Geology

The site is located on the northern fringe of Mission Valley near the mouth of the San Diego River and the east side of Mission Bay within the Coastal Plain Region of San Diego County. The Coastal Plain Region is the westernmost territory of three distinct Regions of San Diego County and is characterized by Mesozoic-age basement rocks overlain by a thick sequence of Cenozoic marine and non-marine sedimentary rocks. Faulting on nearby fault systems has broken the Coastal Plain Region into a number of distinct blocks, though in this area, many of the Cenozoic rocks remain fairly unaffected as they do not show much deformation.

Specifically, the area is underlain by sedimentary Pleistocene-aged Old Paralic Deposits consisting of inter-fingered strandline, beach, estuarine and colluvial deposits. Subsequent to the deposition of this unit, erosion and regional tectonic uplift created the valleys and ridges of the area. Recent weathering and erosional processes have produced Quaternary-aged alluvium while human influences have created the undocumented fill soils that mantle the site.

3.2 Site-Specific Geology

The subject site is composed of undocumented artificial fill over Quaternary-aged Alluvium and Pleistocene-aged Old Paralic Deposits (formerly knowns as the Quaternary-aged Bay Point Formation, Qbp). The undocumented fill on-site consists of silty sands and sandy clays derived from the alluvium and paralic deposits. The alluvium, consisting of silty fine to coarse sands, clayey sands, and fine sandy clays, were encountered in the southeastern portion of the site; ranging from 0 to 42 feet in depth (as encountered in our borings). The maximum thickness of the alluvium on the site is estimated to be on the order of 50 feet. Old Paralic Deposits consisting mainly of poorly sorted, orange to reddish-brown, silty fine to coarse sand, gravelly sands and sandy to gravelly conglomerates, were encountered beneath the alluvium and at grade in the northern portion of the site.

3.3 Geologic Structure

Based on our subsurface investigation, review of the geologic maps of the general vicinity (Appendix A) and our professional experience, the Old Paralic Deposits are generally massive to thickly-bedded. Bedding within the unit is flat lying to dipping less than 5 degrees to the west and thus not considered significant from a geotechnical perspective.

3.4 Landslides

Based on the relatively flat nature of the site bedrock bedding and our review of the geologic literature pertinent to the site, there are no indications of landslides close to or within the limits of the site.

3.5 Groundwater

Groundwater was encountered in three of our borings excavated onsite to a depth of approximately 6 to 14 feet below the existing ground surface (or at an approximate elevation of 7 to 9 feet above sea level). We could not locate any data indicating the depth to the historical high ground water level at the site. However, based on the close proximity of the site to Mission Bay, the groundwater level as encountered in our borings, is relatively close to the historical high ground water level.

In general, groundwater levels in alluvium fluctuate with seasonal variations and local zones of perched groundwater may occur within the near-surface deposits when precipitation is high.

3.6 Surface Water

Based on our review of local maps, sheet flow is to the south-southwest. Surface water runoff relative to project design is the purview of the project civil engineer and should be directed away from planned structures.

3.7 Seismicity, Faulting and Related Effects

3.7.1 Seismicity

The main seismic parameters to be considered when discussing the potential for earthquake-induced damage are the distances to the causative faults, earthquake magnitudes, and expected ground accelerations. We have performed site-specific analysis based on these seismic parameters for the site and the onsite geologic conditions. The results of our analysis are discussed in terms of the potential seismic events that could be produced by the maximum probable earthquakes. A maximum probable earthquake is the maximum earthquake likely to occur given the known tectonic framework.

The Rose Canyon fault zone is located approximately 150 feet northeast of the site, based on the State of California Special Studies Zones map for the La Jolla Quadrangle (CGS, 1991) and is considered to have the most significant effect at the site from a probabilistic design standpoint.

3.7.2 Seismic Design Criteria

The site seismic characteristics were evaluated per the guidelines set forth in Chapter 16, Section 1613 of the 2016 California Building Code (CBC). Representative site coordinates of latitude 32.7758º N and longitude -117.2061º W were utilized in our analyses. 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.

Table 1 California Building Code Site Seismic Characteristics	
Selected Parameters from 2016 CBC, Section 1613 - Earthquake Loads	**Seismic Design Values**
Site Class per Chapter 20 of ASCE 7	D
Risk-Targeted Spectral Acceleration for Short Periods (S_S)*	1.274g
Risk-Targeted Spectral Accelerations for 1-Second Periods (S_1)*	0.493g
Site Coefficient F_a per Table 1613.3.3(1)	1.00
Site Coefficient F_v per Table 1613.3.3(2)	1.507
Site Modified Spectral Acceleration for Short Periods (S_{MS}) for Site Class D [Note: $S_{MS} = F_aS_S$]	1.274g
Site Modified Spectral Acceleration for 1-Second Periods (S_{M1}) for Site Class D [Note: $S_{M1} = F_vS_1$]	0.743g
Design Spectral Acceleration for Short Periods (S_{DS}) for Site Class D [Note: $S_{DS} = (^2/_3)S_{MS}$]	0.850g
Design Spectral Acceleration for 1-Second Periods (S_{D1}) for Site Class D [Note: $S_{D1} = (^2/_3)S_{M1}$]	0.495g
Mapped Risk Coefficient at 0.2 sec Spectral Response Period, C_{RS} (per ASCE 7)	0.834
Mapped Risk Coefficient at 1 sec Spectral Response Period, C_{R1} (per ASCE 7)	0.865

* From USGS, 2013

Section 1803.5.12 of the 2016 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 geotechnical evaluations. The PGA_M for the site is equal to 0.579g (USGS, 2013).

A deaggregation of the PGA based on a 2,475-year average return period indicates that an earthquake magnitude of 6.62 at a distance of approximately 1.5 km (0.93 mi) from the site would contribute the most to this ground motion (USGS, 2008).

3.7.3 Faulting

The southern California region has long been recognized as being seismically active. The seismic activity results from a number of active faults that cross the region, all of which are related to the San Andreas transform system, a broad zone of right lateral faults that extend from Baja California to Cape Mendocino. The numerous faults in Southern California include active, potentially active, and inactive faults. The definitions of fault activity terms used here are based on those developed for the Alquist-Priolo Special Studies Zone Act of 1972 (Bryant and Hart, 2012).

Active faults are those faults that have had surface displacement within Holocene time (approximately the last 11,700 years) and/or have been included within an Alquist-Priolo Earthquake Zone. Faults are considered potentially active if they show evidence of surface displacement since the beginning of Quaternary time (about 2.58 million years ago), but not since Holocene time. Inactive faults are those which have not had surface movement since the beginning of Quaternary time.

The site is not within a currently established Alquist-Priolo Earthquake Fault Zone for fault rupture hazard (formerly Special Studies Zones for fault rupture hazard). Based on a review of geologic literature, no active faults are known to occur beneath the site; however strands of the Rose Canyon fault zone have been mapped approximately 150 feet northeast of the site. Accordingly, it appears that there is little probability of surface rupture due to faulting beneath the site. However, the close proximity of the Rose Canyon fault zone and the movement associated with the fault (and other nearby active faults) could cause significant ground motion at the site. Secondary effects of seismic shaking resulting from large earthquakes on the major faults in the southern California region include soil liquefaction and dynamic settlement. Other secondary seismic effects include shallow ground rupture, and seiches and tsunamis. In general, these secondary effects of seismic shaking are a possibility throughout the Southern California region and are dependent on the distance between the site and causative fault and the onsite geology.

Regional active faults that occur within the San Diego area include the on-shore and off-shore Rose Canyon-Newport Inglewood fault zone to the west, the Elsinore, San Jacinto, and San Andreas faults to the east, and the Coronado Bank and San Diego Trough faults offshore to the southwest. The closest known active faults to the site are the Rose Canyon fault zone located approximately 150 feet to the northeast; the Coronado Bank fault zone located 11.5 miles (18.5 kilometers) to the southwest, the San Diego Trough fault zone located 23.5 miles (37.5 kilometers) to the southwest, and the Elsinore fault zone located approximately 40 miles(64 kilometers) to the northeast. The location of the site to the regional active faults is presented on Figure 2 - Regional Fault Location Map.

Rose Canyon Fault Zone: Evidence suggesting movement along the Rose Canyon fault zone during the Holocene has been presented by Moore and Kennedy (1975). The State of California has zoned portions of the Rose Canyon fault zone as active under the Alquist-Priolo Senate Bill. This has come about as a result of faulted paleosols in Rose Canyon that are considered to be unquestionably of Holocene age (T. Rockwell, 1989). In addition, work performed by several consultants prior to and during construction of the Police Administration and Technical Center in downtown San Diego have indicated displacement of Holocene soil units (dated between 5,000 and 10,00 years before present) by what they have concluded to be a continuation of the Rose Canyon fault zone (Schlemon et al, 1989). Evaluations by Treiman (1993) have concluded that the main Holocene-aged section of the Rose Canyon fault zone occurs from Mount Soledad through Rose Canyon and adjacent to Mission Bay. As the fault zone extends southward it splays into a broad zone of parallel normal faults that define a structural graben. It has been suggested that the Point Loma fault zone and La Nacion fault zone represent now-inactive margins of this graben (Treiman, 1993).

3.7.4 Shallow Ground Rupture

Due to the distance from known active fault, shallow ground rupture due to active faulting is not considered a concern for the site.

3.7.5 Liquefaction

Liquefaction is a seismic phenomenon in which loose, saturated, granular soils behave similarly to a fluid when subject to high-intensity ground shaking. Liquefaction occurs when three general conditions exist: 1) shallow groundwater; 2) low density non-cohesive (granular) soils; and 3) high-intensity ground motion. Liquefaction is typified by a buildup of pore-water pressure in the affected soil layer to a point where a total loss of shear strength occurs, causing the soil to behave as a liquid. Studies indicate that saturated, loose to medium dense, near surface cohesionless soils exhibit the highest liquefaction potential, while dry, dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction potential.

Groundwater was encountered in our geotechnical excavations at depths ranging from 6 to 14 feet below the existing site grades; and the highest historic groundwater level for the site is anticipated to be between approximately 5 to 10 feet below the surface as discussed earlier. Our evaluation utilized the information collected from the excavations and laboratory test results, along with utilizing the more recent studies as indicated in SP 117A by Bray and Sancio, 2006 as a screening tool to determine if the encountered fine grained soils (clays) are susceptible to liquefaction and analyzed as such. Our evaluation included performing grain size distribution, Atterberg limit, and moisture content testing on thirteen representative fine-grained layers (i.e. sandy clayey silts, silty clay, sandy clay layers and layers on the margin of Clayey Sand/Sandy Clay) encountered within the geotechnical borings excavated on-site. Some fine/finer-grained layers were found to have a plasticity index of 18 or greater, and moisture contents less than 80 percent of the liquid limit, and can be considered as being not susceptible to liquefaction.

The liquefaction analysis was performed using the Liquefy2 program. The liquefaction analysis was performed considering the existing condition with potentially liquefiable soils located from a depth of 5 feet from the ground surface. The liquefaction analysis was performed using the following input data:

- Groundwater at a depth of 5 feet below the ground surface during seismic event, and boring groundwater at elevations of 6 to 8 feet determined from our excavations.
- A Peak Horizontal Ground Acceleration (PGA_M) of 0.579g for a Design Earthquake Magnitude of 6.62.
- Fines content as determined from laboratory testing during this investigation.
- The hammer used for determining blow-counts for both the ring and SPT sampling was an auto-trip hammer with a 140 pound weight and a 30 inch drop. Based on the type of hammer used, an energy correction factor (CE) of 1.3 is considered acceptable for use in the analysis.

Based on this analysis, liquefaction and liquefaction induced surface manifestations are not considered an issue at the site. The printout of the liquefaction analysis of Borings B-1 and B-2 is included in Appendix F.

During a strong seismic event, seismically induced settlement can occur within loose to moderately dense, dry or saturated granular soil. Settlement caused by ground shaking is often non-uniformly distributed, which can result in differential settlement. Based on in-situ densities, and soil types, dry sand settlement and induced surface manifestations are not considered an issue at the site.

3.7.6 Seismically Induced Settlements

Based on our analysis, seismically induced settlements may occur at the site. The estimation of potential seismic settlements is divided into two separate causative mechanisms: the dynamic settlement of dry coarse-grained soil above the groundwater table and seismic settlement below the groundwater from liquefaction.

Dynamic settlement of dry sands can occur as the sand particles tend to settle and densify as a result of a seismic event. The potential for dry sand settlement is considered negligible.

Based on the results of the liquefaction analysis, we estimate the amount of total seismically induced settlement possible for the *design* conditions, with the remedial recommendations provided herein, is up to a maximum of approximately 0.25 inches. We estimated these settlements based on the procedures proposed by Tokimatsu and Seed (1987).

The calculations estimated the total seismically induced settlement. Differential settlements due to lateral heterogeneities in the soil profile would likely be only a fraction of the total. Thus, we conclude that the differential settlements would be buffered by the remedial recommendations provided herein. Based on the publication, *Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California*, from case studies and field measurements after seismic event including the 1994 Northridge Earthquake, it can be concluded that the differential settlement at level ground sites with natural soils are expected to be small even if total settlements are large. However, for design purposes differential settlement should be assumed to be approximately one-half of the total settlement. Based on the above, the estimated differential seismically induced settlement that should be considered for site development is approximately 0.25 inches.

3.7.7 Tsunamis and Seiches

Based on our review of the San Diego County Tsunami Inundation Map for Emergency Planning (California State, 2009), the site is not located within the mapped inundation zone. However, the inundation zone has been mapped approximately 1000 feet west of the side along the eastern edge of Mission Bay. Due to the elevation of the proposed development at the site with respect to sea level and its distance from large open bodies of water, the potential of seiches and/or tsunami is considered to be low.

3.8 Slope Stability

An existing cut slope is present on along the north side of the site and ranges from less than 5 to 25+ feet in height. This slope has likely been there since at least the early 1950's. Although, the slope is steeper than the currently agency-accepted 2:1 (horizontal to vertical) slope inclination; based on our review and evaluation, the existing slope is comprised of Quaternary-aged Old Paralic Deposits that are massive to thickly bedded with no adverse geologic conditions, and are considered to have no global instability issues. Surficial stability issues consisting of minor to moderate rilling of the slope have been observed and should be mitigated.

Based on our geotechnical review and analysis of the proposed development and the current geotechnical condition of the slope, it is our opinion that the planned retaining wall with the proposed 2-foot tall debris wall at the top of the wall can be constructed along the slope and can be considered to be an acceptable mitigation measure of reducing potential surficial instability issues from impacting the developed portion of the site; from a geotechnical point of view, provided the recommendations of this report are followed in the design. The construction of a 2-foot tall debris wall at the top of the proposed retaining wall will create a catchment area to contain excessive erosion and debris material. Also it is our understanding that the slope will be planted with appropriate vegetation (as recommended by the project landscape architect to minimize future erosion) and should be covered with a jute mesh or other erosion control materials.

3.9 Laboratory Testing

Laboratory testing of the onsite soils was performed on representative samples obtained from the borings and included moisture and density tests, maximum density and optimum moisture content, grain size distribution, Atterberg Limits, expansion, direct shear, consolidation, and corrosion testing. Laboratory testing was performed by EGLAB, Inc. (EGL), Vinje &Middleton Engineering, Inc., and LGC Valley, Inc. LGC has reviewed the laboratory test data, procedures and results with respect to the subject site and concurs with and accepts responsibility as geotechnical engineer of record for their work (laboratory testing). A discussion of the tests performed and printout of the laboratory test results are presented in Appendix E. The moisture and density test results are presented on the boring logs in Appendix B.

These results should be confirmed at the completion of site grading.

Expansion potential testing of the upper site soils indicated expansion index range of 0 to 106, "very Low to high" (per ASTM D4829). Sulfate testing indicated soluble sulfate contents range from 0.003 to 0.032 percent ("Negligible" per ACI 318R-08 Table 4.3.1).

A corrosion suite (pH, resistivity, and chloride content) was also performed on a sample obtained from the geotechnical boring to estimate the corrosion potential of onsite soils. The resistivity tests resulted in a minimum resistivity of 520 ohm-centimeters, a pH of 8.05, and chloride content of 480 ppm.

Test results are provided in Appendix E. These results/assumptions should be confirmed at the completion of site grading.

4.0 CONCLUSIONS

Based on the results of our geotechnical investigation and infiltration study, evaluation, and review; it is our opinion that the proposed site development is feasible from a geotechnical standpoint, provided the following recommendations included in this report are incorporated into the project plans and specifications, and followed during site grading and construction. Our geotechnical conclusions are as follows:

- Based on the subsurface exploration, the site is underlain by undocumented artificial fills, ranging from less than 1-foot to 5 feet in thickness, underlain by Quaternary-aged Alluvium and Pleistocene-aged Old Paralic Deposits. The existing undocumented fill soils and alluvium are considered potentially compressible/collapsible and are considered unsuitable to support the proposed structures.

- Groundwater was encountered in three of our borings excavated onsite to a depth of approximately 6 to 14 feet below the existing ground surface (or at an approximate elevation of 7 to 9 feet above sea level).. We do not anticipate that the recommended site excavation will encounter groundwater. However, if deeper removals are determined to be necessary in the field, groundwater maybe encountered.

- Based on our site investigation, evaluation, and assessment, liquefaction potential is not a concern for the site; however, seismically induced settlements of 0.25-inches should be included in the foundation design, and seismically induced dry sand settlement is negligible.

- The anticipated site excavation and the proposed construction will not have an adverse impact on the adjacent properties.

- Active or potentially active faults are not known to exist on the site.

- The site is not located within an Alquist-Priolo Earthquake Fault Zone (Bryant and Hart, 2012). The closest active fault is the Rose Canyon fault zone which is located approximately 150 feet northeast of the site.

- Laboratory test results of the onsite soils indicate a very low to high expansion potential.

- Laboratory test results of the onsite soils indicate negligible soluble sulfate contents and should be considered severely corrosive to metals, a corrosion study including additional corrosion testing and recommendations should be provided by a corrosion specialist.

- The onsite soils below recommended remedial grading depths have a low potential for static settlement.

- Based on the current groundwater levels and relative soil moisture content of soil in the upper approximate 5 to 10 feet, remedial bottom stabilization through use of rock and fabric may be required.

- Although rock and fabric may not be necessary to stabilize the bottoms, there is still a high potential for moist native soil to yield to heavy rubber-tire construction equipment. Additional time for air drying of removal bottoms, using lighter-weight equipment (such as excavators and steel wheel equipment) and a skilled contractor should be duly considered to achieve the desired results.

- Some of the site soils encountered are well above optimum moisture contents and some drying of the site soils should be anticipated during the grading process to achieve near optimum soil moisture content. Moist/wet soils should be ripped and/or tilled to help dry the soils to near optimum moisture content. We do not believe that the standard overexcavation flip-flopping procedure will be able to be performed for a majority of the excavated soils due to an insufficient drying procedure. The excavated soils will most likely need to be stockpiled and tilled to help dry-out the soils sufficiently to a near optimum for placement as fill.

- Residential structures should be designed to be supported by a post-tension or mat slab foundation system designed to account for the anticipated static and seismic settlements.

- The existing cut slope present along the north side of the site has likely been there since at least the early 1950's and ranges from less than 5 to 25+ feet in height. Other than moderate rilling of the slope, there does not appear to be any slope instability issues associated with the slope. However, it appears that the slope is steeper than the currently agency-accepted 2:1 (horizontal to vertical) slope inclination. Based on our geotechnical review and analysis of the proposed development and the current geotechnical condition of the slope, it is our opinion that the planned retaining wall with the proposed 2-foot tall debris wall at the top of the wall can be constructed along the slope and can be considered to be an acceptable mitigation measure of reducing potential surficial instability issues from impacting the developed portion of the site; from a geotechnical point of view, provided the recommendations of this report are followed in the design. The construction of a 2-foot tall debris wall at the top of the proposed retaining wall will create a catchment area to contain excessive erosion and debris material. Also it is our understanding that the slope will be planted with appropriate vegetation (as recommended by the project landscape architect to minimize future erosion) and should be covered with a jute mesh or other erosion control materials.

- From a geotechnical perspective, the existing onsite soils are suitable for use as fill, provided they are relatively free from rocks greater than 12 inches in diameter, construction debris, and organic material.

Our infiltration/percolation testing conclusions are as follows:

- Infiltration of the storm water on the site is not feasible from a geotechnical standpoint; most of the infiltration rates obtained during our study at the site are significantly lower than a rate of 0.5 inches per hour and groundwater ponding or mounding conditions may occur. Only design infiltration rates in the location of the northeastern basin were greater than 0.5 inches per hour. Therefore, full/partial infiltration design is not considered feasible for the site.

- Due to proposed storm-water infiltration, mitigation measures for the proposed slopes and building foundations adjacent to proposed water-quality basins, such as moisture cut offs and deepened foundations, need to be considered in the project design.

- The groundwater elevation at the site is currently at an approximate elevation of 7 to 9 feet while the bottom of the gravel storage layer in the proposed water-quality basins will at an approximate elevation of 14 feet. Thus, groundwater at the site is within 5 to 7 feet of the bottom of the proposed water-quality bioretention basins. Additionally, near-surface fine-grained soils are present in the southwest portion of the site that may result in a groundwater mounding condition. Therefore, full or partial infiltration designs are not feasible at the site due to the shallow groundwater condition.

- Based on the criteria of the City of San Diego BMP Design Manual, Worksheet C.4.1 - Categorization of Infiltration Feasibility Condition, full infiltration at the site is not feasible or desirable at the site since the answers to Criteria 1 (i.e. Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?) and Criteria 2 (i.e. Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards) are no. Additionally, partial infiltration at the site is not feasible or desirable at the site since the answers to Criteria 6 (i.e. Can infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards?) and Criteria 7 (i.e. Can infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns [shallow water table, storm water pollutants or other factors]?) are also no. The two worksheets are provided in Appendix D.

5.0 RECOMMENDATIONS

5.1 Site Earthwork

We anticipate that earthwork at the site will consist of site preparation and demolition of the existing structures followed by remedial removals and site grading followed by construction of slab-on-grade type foundations for the proposed residential structures, installation of utilities, subsequently followed by paving/pouring of driveways and streets.

We recommend that earthwork onsite be performed in accordance with the recommendations herein, the City of San Diego, and the General Earthwork and Grading Specifications for Rough Grading included in Appendix G. In case of conflict, the recommendations in the following sections shall supersede those included as part of Appendix G.

5.1.1 Site Preparation

Prior to grading of areas to receive structural fill or engineered structures, all ground surfaces should be cleared of obstructions, any existing debris and stripped of vegetation. Heavy vegetation and debris should be removed and properly disposed of offsite. All debris from any demolition activities at the site should also be removed and disposed off-site. Holes or depressions resulting from the removal of buried obstructions should be replaced with compacted fill.

Following remedial removals, areas to receive fill should be scarified to a minimum depth of 12 inches, brought to a near-optimum moisture condition, and recompacted to at least 90 percent relative compaction (based on American Standard of Testing and Materials [ASTM] Test Method D1557).

5.1.2 Removal and Recompaction

As discussed in Section 2.2, the upper portion of the site is underlain by potentially compressible/collapsible or unsuitable soils (i.e. undocumented existing fills and alluvium), which may settle under the addition of water, under the surcharge of fill and/or foundation loads. Compressible materials not removed by the planned grading should be excavated to competent material and replaced with compacted fill soils.

We anticipate removals within and up to five feet outside the building footprints to be on the order of approximately 5 feet below design grades or a minimum of 3-feet below proposed footing bottom elevations, whichever is deeper, to remove the unsuitable fills and alluvium or to overexcavate the formational material to create a uniform fill underlying proposed footings; however, localized, deeper removals should be anticipated where deemed necessary by the geotechnical consultant based on observations during grading. We anticipate that the remedial removals for pavement areas and for other minor structures to be removal of the existing fills or 3 feet below design grades, whichever is deeper. Removal bottoms should be scarified to a minimum depth of 12 inches, brought to at least optimum-moisture content, and recompacted to a minimum 90 percent relative compaction.

From a geotechnical perspective, material that is removed may be placed as fill provided the material is relatively free from rocks (greater than 12 inches in maximum dimension), organic material and construction debris, is moisture-conditioned or dried (as needed) to obtain above-optimum moisture content, and then recompacted prior to additional fill placement or construction.

5.1.3 Shrinkage/Bulking

Based on the site soils, shrinkage of the undocumented fills and alluvium; and bulking of the formational material is anticipated at the site. The preliminary estimated shrinkage factors of approximately 5 to 10 percent for the existing undocumented fills and alluvium, and the preliminary estimated bulking factors of approximately 0 to 5 percent for the formational material may be used for consideration of earthwork calculations. Both value ranges are preliminary rough estimates which will vary with depth of removal, stripping losses, field conditions at the time of grading, etc. In addition, handling losses are not included in the estimates.

5.1.4 Temporary Excavation Stability

In general, all excavations should be performed in accordance with project plans, specifications, and all Occupational Safety and Health Administration (OSHA) requirements. Excavations should be laid back or shored in accordance with OSHA requirements before personnel or equipment are allowed to enter. Soil conditions should be mapped and frequently checked by a representative of LGC to verify conditions are as anticipated. The contractor shall be responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination with the geotechnical engineer should be maintained to facilitate construction while providing safe excavations. Excavation safety is the responsibility of the contractor.

Temporary excavations maybe cut vertically up to five feet. Excavations over five feet should be slot-cut, shored, or cut no steeper than 1H: 1V (horizontal, H: vertical, V) slope gradient. Surface water should be diverted away from the exposed cut, and not be allowed to pond on top of the excavations. Temporary cuts should not be left open for an extended period of time. Planned temporary conditions should be reviewed by the geotechnical consultant of record in order to reduce the potential for sidewall failure. The geotechnical consultant may provide recommendations for controlling the length of sidewall exposed.

5.1.5 Fill Placement and Compaction

From a geotechnical perspective, the onsite soils are suitable for use as compacted fill, provided they are screened of rocks greater than 12 inches in maximum dimension, organic material, and construction debris. Areas prepared to receive structural fill and/or other surface improvements should be scarified to a minimum depth of 6 inches, brought to at least optimum-moisture content, and recompacted to at least 90 percent relative compaction (based on ASTM Test Method D1557). The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in uniform lifts generally not exceeding 8 inches in loose thickness. Placement and compaction of fill should be performed in accordance with local grading ordinances under the observation and testing of the geotechnical consultant.

In general, oversized material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction. Rebar should be removed from concrete rubble prior to burial or mixing with fill. Oversize material may be incorporated into design fills in accordance with our standard grading details. Pulverized asphalt concrete paving or crushed Portland cement concrete from demolition of the existing improvements may be mixed in the fills in a 80/20 blend (with the 20 percent being crushed asphalt or concrete) with no material over 6-inches in maximum dimension; or be placed in a rock disposal.

If possible, import soils should contain no materials over 6 inches in maximum dimension and have a low expansion potential.

5.1.6 Trench Backfill and Compaction

The onsite soils may generally be suitable as trench backfill provided they are screened of rocks and other material over 8 inches in diameter and organic matter. Trench backfill should be compacted in uniform lifts (generally not exceeding 8 inches in compacted thickness) by mechanical means to at least 90 percent relative compaction (per ASTM Test Method D1557).

If trenches are shallow and the use of conventional equipment may result in damage to the utilities; clean sand, having sand equivalent (SE) of 30 or greater, should be used to bed and shade the utilities. Sand backfill should be densified. The densification may be accomplished by jetting or flooding and then tamping to ensure adequate compaction. A representative from LGC should observe, probe, and test the backfill to verify compliance with the project specifications.

5.2 Foundations

5.2.1 General

Preliminary recommendations for foundation design and foundation construction are presented herein. When the structural loads for the proposed structures are known they should be provided to our office to verify the recommendations presented herein.

The following foundation recommendations are provided for support of anticipated at grade residential/parking structures: conventional, post-tension, and Mat slab foundations, for use as needed. For preliminary design purposes low and medium expansion potentials should be considered for design. We anticipate the redistribution/mix of onsite soils will be in the low to medium expansion categories. The as-graded soil conditions should be verified as the completion of grading.

The information and recommendations presented in this section are not meant to supersede design by the project structural engineer or civil engineer specializing in the structural design nor impede those recommendations by a corrosion consultant. Should conflict arise, modifications to the foundation design provided herein can be provided.

5.2.2 Soil Bearing

Proposed site at-grade improvements may be supported on spread footings provided that the earthwork recommendations outlined in this report are properly implemented. An allowable soil bearing pressure of 1,500 psf may be used for the design of footings placed in compacted fill having a minimum width of 12 inches and minimum embedment of 12 inches below lowest adjacent ground surface. This value may be increased by 300 psf for each additional foot of embedment and 100 psf for each additional foot of foundation width to a maximum value of 3,000 psf. These allowable bearing pressures are applicable for level (ground slope equal to or flatter than 5H:1V) conditions only.

Bearing values indicated above are for total dead loads and frequently applied live loads. The above vertical bearing may be increased by one-third for short durations of loading which will include the effect of wind or seismic forces.

5.2.3 Conventional Foundations

Footings for proposed structures should have minimum depths (below lowest adjacent finish grade) of 18, 21, and 24 inches for exterior footings and 15, 18, and 24 inches for interior footings, for one, two, and three/four story structures.

Shallow foundations may be designed for a maximum allowable bearing capacity of 1,500 lb/ft^2 (gross), for the design of footings placed in compacted fill having a minimum width of 12 inches and minimum embedment of 12 inches below lowest adjacent ground surface. Shallow foundations for continuous footings should be a minimum of 12, 15, and 18 inches wide for one, two, and three/four story structures, respectively, and spread footings 24 inches wide founded into compacted fill or competent native soils. A factor of safety greater than 3 was used in evaluating the above bearing capacity values. This value may be increased by 300 psf for each additional foot of embedment and 100 psf for each additional foot of foundation width to a maximum value of 3,000 psf. An effective plasticity index of 25, for the on-site soils, may be used in the foundation design.

Lateral forces on footings may be resisted by passive earth resistance and friction at the bottom of the footing. Foundations may be designed for a coefficient of friction of 0.35, and a passive earth pressure of 250 $lb/ft^2/ft$. The passive earth pressure incorporates a factor of safety of about 1.5.

All footing excavations should be cut square and level, and should be free of sloughed materials and trash. Subgrade soils should be pre-moistened for the assumed low expansion potential (to be confirmed at the end of grading). The subgrade should be moisture-conditioned and proof-rolled just prior to construction to provide a firm, relatively unyielding surface, especially if the surface has been loosened by the passage of construction traffic.

Subgrade soils should be pre-saturated to 1.2 times optimum moisture content to a depth of 12 inches for a low expansion potential, and 1.3 time optimum moisture content to a depth of 18 inches for medium expansion potential. The minimum thickness of the floor slabs should be at least 4.5 inches, and joints should be provided per usual practice.

5.2.4 Post-Tension Foundations

Based on the site geotechnical conditions and provided the remedial recommendations provided herein are implemented, the site may be considered suitable for the support of the anticipated structures using a post-tensioned slab-on-grade foundation system for low and medium expansion potential (21-90 Expansion Index). The following section summaries our recommendations for the foundation system. The post-tension parameters provided in Table 2 are based on the expansion potential only.

Table 2
Preliminary Geotechnical Parameters for Post-Tensioned Foundation Design

Parameter	Value	
Expansion Classification (Assumed to be confirmed at the completion of grading):	Low and Medium Expansion	
Thornthwaite Moisture Index (from Figure 3.3):	-20	
Constant Soil Suction (from Figure 3.4):	PF 3.6	
Center Lift Edge moisture variation distance (from Figure 3.6), e_m: Center lift, y_m:	**Low** 9.0 feet 0.30 inches	**Medium** 9.0 feet 0.50 inches
Edge Lift Edge moisture variation distance (from Figure 3.6), e_m: Edge lift, y_m:	**Low** 5.1 feet 0.61 inches	**Medium** 5.0 feet 1.1 inches
Expansion Potential:	**Very Low to Low (0-50)**	**Medium (51-90)**
Soluble Sulfate Content for Design of Concrete Mix in Contact with Site Soils in Accordance with American Concrete Institute Standard 318, Section 4.3:	Negligible Exposure	
Corrosivity of Earth Materials to Ferrous Metals:	Moderately Corrosive	
Modulus of Subgrade Reaction, k (assuming presaturation as indicated below):	100 pci (very low to low) 85 pci (medium)	

Additional Recommendations:
1. Presaturate slab subgrade to at least optimum-moisture content, or to 1.2 times optimum moisture to minimum depths of 12, and 18 inches below ground surface, respectively for very low to low, and medium expansion potentials, respectively.
2. Install a 15-mil moisture/vapor barrier in direct contact with the concrete (unless superseded by the Structural/Post-tension engineer*) with minimum 1 inches of sand below the moisture/vapor barrier.
3. Minimum perimeter foundation embedment below finish grade for moisture cut off should be 12, and 18 inches, respectively for very low to low, and medium expansion potentials, respectively.
4. Minimum slab thickness should be 5 inches.

* The above sand and moisture/vapor barrier recommendations are traditionally included with geotechnical foundation recommendations although they are generally not a major factor influencing the geotechnical performance of the foundation. The sand and moisture/vapor barrier requirements are the purview of the foundation engineer/corrosion engineer (in accordance with ACI Publication 302 "Guide for Concrete Floor and Slab Construction") and the homebuilder to ensure that the concrete cures more evenly than it would otherwise, is protected from corrosive environments, and moisture penetration of through the floor is acceptable to future homeowners. Therefore, the recommendations provided herein may be superseded by the requirements of the previously mentioned parties.

As indicated above, the under-slab vapor/moisture retarder (i.e. an equivalent capillary break method) may consist of a minimum 15-mil vapor barrier in conformance with ASTM E 1745 Class A material, placed in general conformance with ASTM E1643, underlain by a minimum 1-inch of sand, as needed. The sand layer requirements above the vapor barrier are the purview of the foundation engineer/structural engineer, and should be provided in accordance with ACI Publication 302 "Guide for Concrete Floor and Slab Construction". These recommendations must be confirmed (and/or altered) by the foundation engineer, based upon the performance expectations of the foundation. Ultimately, the design of the moisture retarder system and recommendations for concrete placement and concrete mix design, which will address bleeding, shrinkage, and curling are the purview of the foundation engineer, in consideration of the project requirements provided by the architect and developer. The under-slab vapor/moisture retarder described above is considered a suitable alternative in accordance with the Capillary Break Section 4.505.2.1 of the CALGreen code.

5.2.5 Mat Foundation

Mat foundations can be used for support of proposed residential buildings. An allowable soil bearing pressure of 1,000 psf may be used for the design of the mat at the surface under the slab area. The allowable bearing value is for total dead loads and frequently applied live loads and may be increased by one-third for short durations of loading which will include the effect of wind or seismic forces. A coefficient of vertical subgrade reaction, k, of 85 pounds per cubic inch (pci) may be used to evaluate the pressure distribution beneath the mat foundation. The magnitude of total and differential settlements of the mat foundation will be a function of the structural design and stiffness of the mat.

Resistance to lateral loads can be provided by friction acting at the base of foundations and by passive earth pressure. Foundations may be designed for a coefficient of friction of 0.35. Minimum perimeter footing embedment provided in the previous sections maybe reduced for the mat slab design.

Coordination with the structural engineer will be required in order to ensure structural loads are adequately distributed throughout the mat foundation to avoid localized stress concentrations resulting in potential settlement. The foundation plan should be reviewed by LGC to confirm preliminary estimated total and differential static settlements.

5.2.6 Foundation Settlement

Based on our current understanding of the project, the results of our site investigation and the recommended remedial grading with shallow foundations embedded into compacted fills or competent native soils, we estimate the post-construction static settlement of the site to be 1-inch with a differential settlement of approximately of 0.5-inches in 30 feet. Post-construction settlement should also include the estimated differential seismic settlement up to ¼ -inch in 30 feet.

5.3 Lateral Earth Pressures for Retaining Walls

The following lateral earth pressures may be used for the design of any future site retaining walls. Due to the variable nature of onsite soils, we recommend site retaining walls be backfilled with select soils or clean sand having a sand equivalence of greater than 30. Select soils should consist of clean, granular soils (less than 15 percent passing the No. 200 sieve) of very low expansion potential (expansion index 20 or less based on U.B.C. 18-2). The recommended lateral pressures for clean sand or approved select soils for level or sloping backfill are presented in Table 3.

Table 3
Lateral Earth Pressures for Retaining Walls

Conditions	Equivalent Fluid Weight (pcf)				
	Level Backfill	2:1 Backfill Sloping Upwards	1:1 to 1.5:1 Backfill Sloping Upwards	Seismic Earth Pressure (pcf) *	
	Approved Select Material	Approved Select Material	Approved Select Material	Level	2:1 Slope
Active	35	50	87	9	18.4
At Rest	51	80	-	--	
Passive	250	--		--	

* For walls with greater than 6-feet in backfill height, the above seismic earth pressure should be added to the static pressures given in the table above. The seismic earth pressure should be considered as an inverted triangular distribution with the resultant acting at 0.6H in relation to the base of the retaining wall footing (where H is the retained height). The aforementioned incremental seismic load was determined in general accordance with the standard of practice in the industry (using the Mononobe-Okabe method for active and Woods method for at-rest) for determining earth pressures as a result of seismic events.

For design purposes, the recommended equivalent fluid pressure for each case for walls founded above the static ground water and backfilled with approved select soils is provided in Table 3. The equivalent fluid pressure values assume free-draining conditions. 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 engineer. Surcharge loading effects from the adjacent structures should be evaluated by the geotechnical and structural engineers. Retaining wall structures should be provided with appropriate drainage and appropriately waterproofed. The outlet pipe should be sloped to drain to a suitable outlet. Typical wall drainage design is illustrated on Figure 3. It should be noted that the recommended subdrain does not provide protection against seepage through the face of the wall and/or efflorescence. Efflorescence is generally a white crystalline powder (discoloration) that results when water, which contains soluble salts, migrates over a period of time through the face of a retaining wall and evaporates. If such seepage or efflorescence is undesirable, retaining walls should be waterproofed to reduce this potential.

For sliding resistance, a friction coefficient of 0.35 may be used at the concrete and soil interface. Wall footings should be designed in accordance with structural considerations. Refer to Sections 5.2.2 for allowable soil bearing.

5.4 Debris Wall Parameters

The recommended debris walls should be designed for a minimum equivalent fluid pressure of 125 pcf, and should be provided with a minimum freeboard height of 2 feet as shown on the proposed site development. The catchment area behind the wall should be periodically maintained to ensure the wall performs as intended. Debris should not be allowed to accumulate within this catchment area for a prolonged period of time. In the event of debris accumulation following excessive erosion, the debris should be removed promptly to maintain full design capacity of the catchment area.

5.5 Preliminary Pavement Recommendations

Based on an R-value of 20, we recommend the following preliminary minimum street sections for Traffic Indices of 5, 6, and 7 (Table 4). These recommendations should be confirmed with R-value testing of representative near-surface soils at the completion of grading. Final street sections should be confirmed by the project civil engineer based upon the projected Traffic Index. In addition, additional sections can be provided based on other traffic indices.

Table 4
Preliminary Pavement Design Sections

Assumed Traffic Index	5	6	7
R-Value Subgrade	20	20	20
AC Thickness	3.0 inches	3.5 inches	4.0 inches
Base Thickness	8.0 inches	10.0 inches	12.0 inches

Portland Cement Concrete Pavement (PCCP) may be designed using a minimum of 8-inches of Portland cement concrete over 8-inches of compacted aggregate base. The modulus of rupture of the concrete should be a minimum of 500 pounds per square inch (psi) at 28 days. Contraction joints should be placed at maximum 10-foot spacing. Where the outer edge of a concrete pavement connects to an asphalt pavement, the concrete slab should be thickened by 50 percent at a taper not to exceed a slope of 1 in 10.

Aggregate base should conform to the requirements of the latest edition of the Standard Specifications for Public Works Construction ("Greenbook"). Aggregate base should be compacted to a minimum of 95 percent relative compaction over subgrade compacted to a minimum of 90 percent relative compaction per ASTM- D1557.

For vehicular concrete pavers, If concrete pavers are designed for vehicular traffic and are underlain by 1-inch of sand. Based on ASCE 58-10 for interlocking pavers, considering a Traffic Index (TI) of 6.0 and an R-value of 20 for the subgrade soils, we recommend the following minimum base section underlying the proposed pavers. The proposed pavers and sand should be underlain by a minimum 12-inches of crushed aggregate base. The aggregate base material should conform to the specifications for Crushed Aggregate Base (Standard Specifications for Public Works Construction) and be place and compacted in maximum 6-inch thick lifts. The base material should be compacted to achieve a minimum relative compaction of 95 percent. The subgrade should achieve a minimum relative compaction of 90 percent through the upper 12 inches. Base and subgrade materials should be moisture-conditioned to a relatively uniform moisture content near optimum moisture.

5.6 Corrosivity to Concrete and Metal

The National Association of Corrosion Engineers (NACE) defines corrosion as "a deterioration of a substance or its properties because of a reaction with its environment." From a geotechnical viewpoint, the "environment" is the prevailing foundation soils and the "substances" are the reinforced concrete foundations or various buried metallic elements such as rebar, piles, pipes, etc., which are in direct contact with or within close vicinity of the foundation soil.

In general, soil environments that are detrimental to concrete have high concentrations of soluble sulfates and/or pH values of less than 5.5. ACI 318R-08 Table 4.3.1, provides specific guidelines for the concrete mix design when the soluble sulfate content of the soils exceeds 0.1 percent by weight or 1,000 ppm. The minimum amount of chloride ions in the soil environment that are corrosive to steel, either in the form of reinforcement protected by concrete cover, or plain steel substructures such as steel pipes or piles, is 500 ppm per California Test 532.

Based on site soil testing, the onsite soils are classified as having a negligible sulfate exposure condition in accordance with ACI 318R-08 Table 4.3.1. As a preliminary recommendation due to results of sulfate content testing, concrete in contact with onsite soils should be designed in accordance with ACI 318R-08 Table 4.3.1 for the negligible category. It is also our opinion that onsite soils should be preliminarily considered severely corrosive to buried metals. The client and/or other members of the design team should consider this potential as they determine necessary. LGC is not a corrosion consultant and does not provide recommendations related to corrosion.

5.7 Nonstructural Concrete Flatwork

Concrete flatwork (such as walkways, etc.) have a high potential for cracking due to changes in soil volume related to soil-moisture fluctuations because these slabs are typically much thinner than foundation slabs and are not reinforced with the same dynamic as foundation elements. To reduce the potential for excessive cracking and lifting, concrete should be designed in accordance with the minimum guidelines outlined in Table 5. 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.

Table 5 Nonstructural Concrete Flatwork				
	Private Sidewalks	**Private Driveways**	**Patio/Entryways**	**Sidewalk, Curb, and Gutter**
Minimum Thickness (in inches)	4	5	5	City/Agency Standard
Presaturation	Wet down subgrade soils prior to placement	Presoak to 12 inches	Presoak to 12 inches	City/Agency Standard
Reinforcement	--	No. 3 at 24 inches on centers	No. 3 at 24 inches on centers	City/Agency Standard
Thickened Edge	--	8” x 8”	--	City/Agency Standard
Crack Control	Saw cut or deep tool joint to a minimum of 1/3 the concrete thickness	Saw cut or deep tool joint to a minimum of 1/3 the concrete thickness	Saw cut or deep tool joint to a minimum of 1/3 the concrete thickness	City/Agency Standard
Maximum Joint Spacing	5 feet	10 feet or quarter cut whichever is closer	6 feet	City/Agency Standard
Aggregate Base	--	2	2	City/Agency Standard

5.8 Swimming Pool and Spa Recommendations

Pool excavation should occur in engineered fill or in formational material and is anticipated to be relatively uniform. Consideration should be given to the medium expansive potential of onsite soils in design of the pool, and associated decking. Also concrete in contact with onsite soils should be designed in accordance with the negligible category per ACI 318R-08 Table 4.3.1. The proposed pool, spa should be designed for a minimum lateral equivalent fluid pressure of 85 pounds per cubic foot (pcf).

Due to inherent differences in supporting capacity of fill and cut ground, it is undesirable to have structures partially supported on soils having different geotechnical characteristics or materials having different engineering characteristics. If a cut/fill transition condition exists, the cut portion of the transition should be excavated and converted to compacted fill (usually impractical for pool/spa construction), or the pool/spa can be designed with additional reinforcement and/or a thicker shell in order to cope with potential differences in supporting capacity and expansive potential.

Excavation and subsequent fill placement for pool, and spa including the placement of drains, outlets, water-proofing, etc. should be performed under the observation and testing of a geotechnical consultant. Observation and testing should be performed by the geotechnical consultant during pool excavation to verify that the exposed soil conditions are consistent with the design assumptions.

Concrete flatwork adjacent to the pool should be a minimum of 5 inches thick reinforced with No. 3 rebar at 18-inches on center each way with a 12-inch deep perimeter cut-off footing. Construction joints or weakened plane joints should be provided in all flatwork to a minimum depth of 1.5 inches at frequent internals (5 feet or less). The concrete slab should be underlain by a minimum of 4 inches of clean sand or base underlain in turn by a minimum 10-mil Visqueen barrier.

Presoaking of the subgrade prior to placing the Visqueen barrier should be performed to a minimum depth of 12 inches. The subgrade below the Visqueen barrier should be inclined so that any moisture that seeps through cracks in the concrete due to irrigation, rain, or pool splash will be directed away from the pool. The contractor must ensure that the Visqueen is properly lapped, sealed and not punctured during construction.

5.9 Control of Surface Water and Drainage Control

Positive drainage of surface water away from structures is very important. No water should be allowed to pond adjacent to buildings. Positive drainage may be accomplished by providing drainage away from buildings at a gradient of at least 2 percent for a distance of at least 5 feet, and further maintained by a swale or drainage path at a gradient of at least 1 percent. Where necessary, drainage paths may be shortened by use of area drains and collector pipes.

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.

5.10 Construction Observation and Testing

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 observation and testing should be performed by the geotechnical consultant during site excavations, subgrade for slab/foundation, backfill of utility trenches, preparation of any subgrade and placement of aggregate base, or when any unusual soil conditions are encountered at the site. Grading plans, foundation plans, and final project drawings should be reviewed by this office prior to construction.

6.0 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.

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.

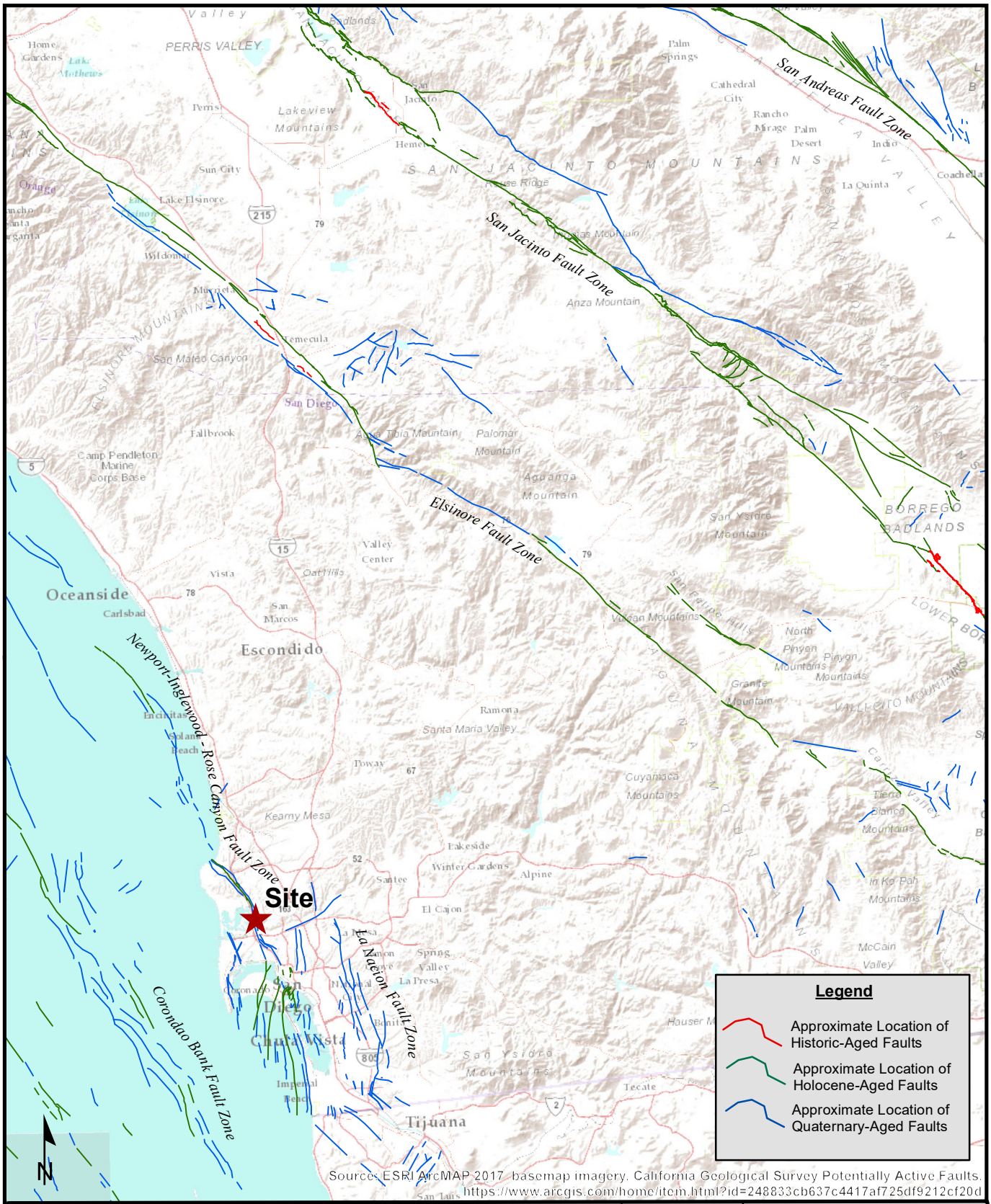


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Figure 2
Regional Fault Location Map
Morena Apartment Homes
1597 and 1623 Morena Boulevard
San Diego, California

Project Name	Fairfield Morena Boulevard
Project Number	154004-03
Eng./Geo.	BIH/RKW
Date	May 4, 2017

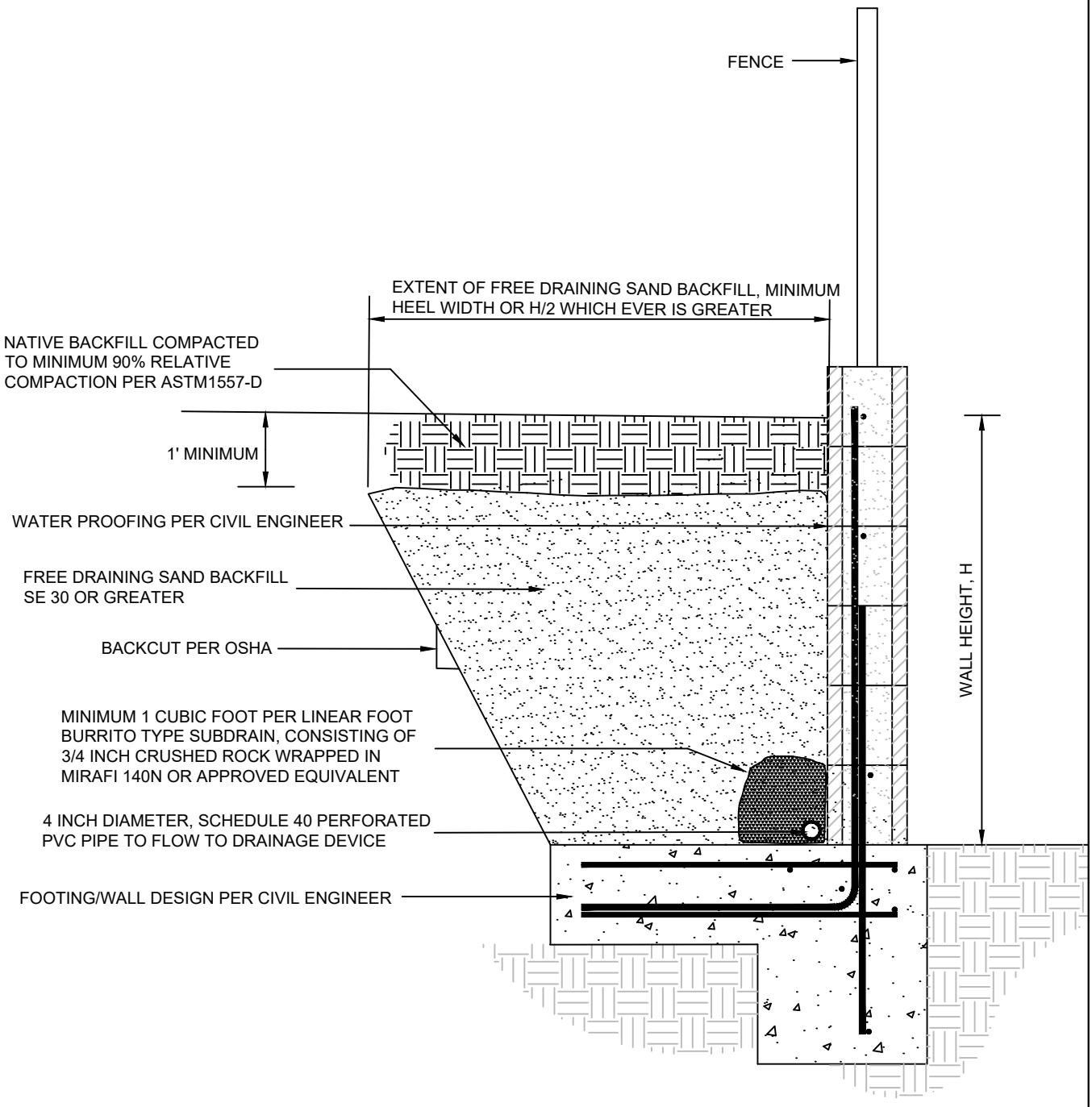

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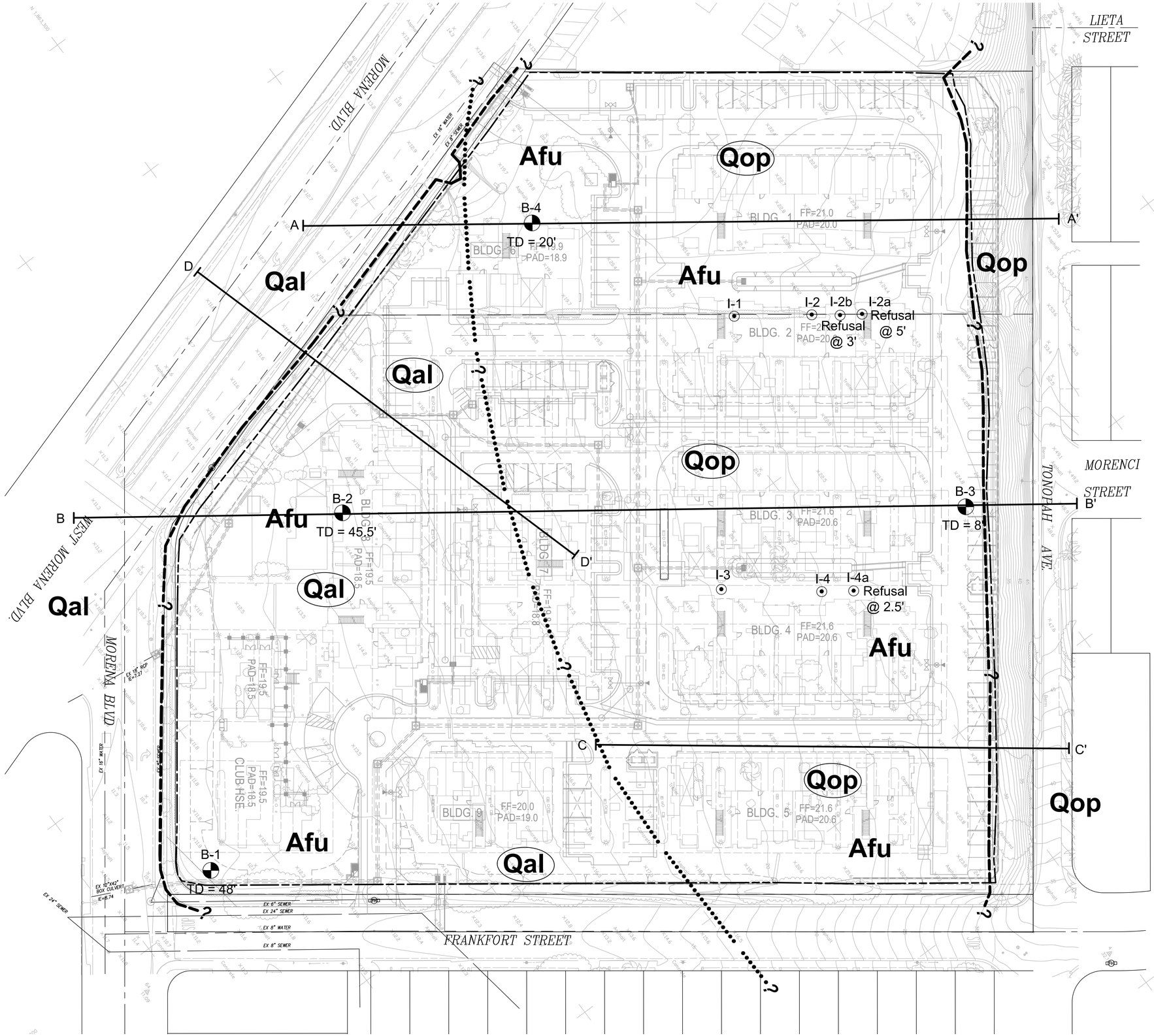
Figure 3: Retaining Wall Detail, Sand Backfill

Project Name	Fairfield Morena Boulevard
Project No.	154004-03
Eng. / Geol.	BIH/RKW
Scale	N/A
Date	May 4, 2017



Legend

Geologic Units

Afu	Artificial Fill, Undocumented
Qal	Quaternary-aged Alluvium, circled where buried
Qop	Quaternary-aged Paralic Deposite, circled where buried

Geologic Symbols

?	Approximate Geologic Contact, dotted where buried, quried where uncertain
	Limits of Anticipated Remedial Grading
B-4 TD = 20'	Approximate Boring Localton by LGC in 2015
I-4a Refusal @ 2.5'	Approximate Location of Infiltration Test
D D'	Geologic Cross-Section

N

30 0 30 60

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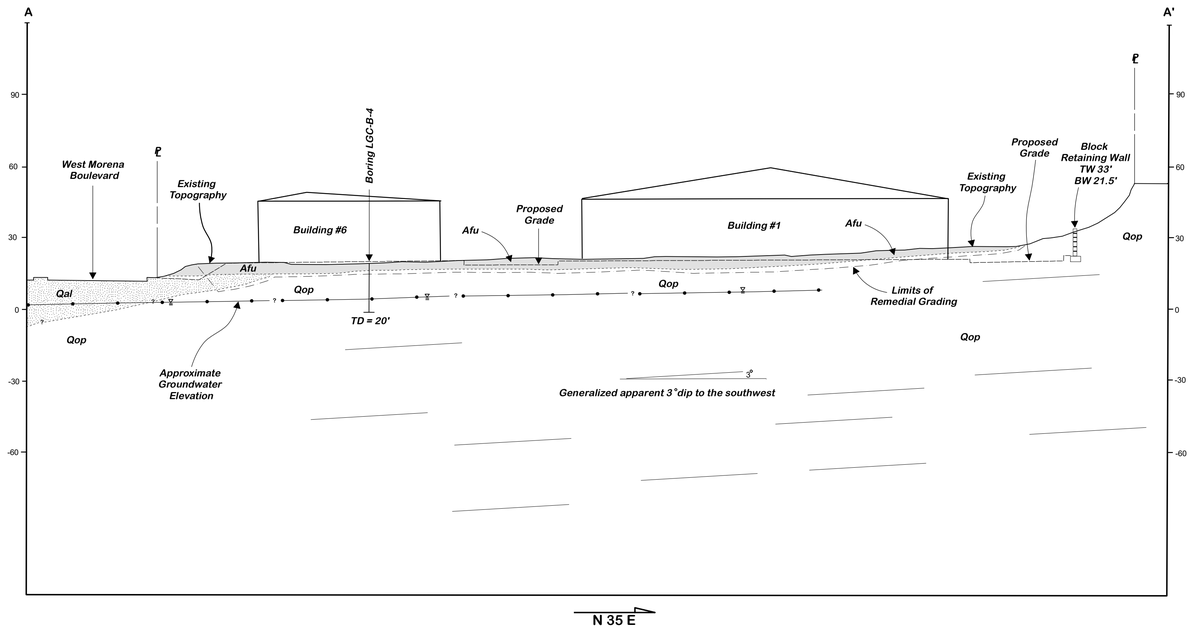
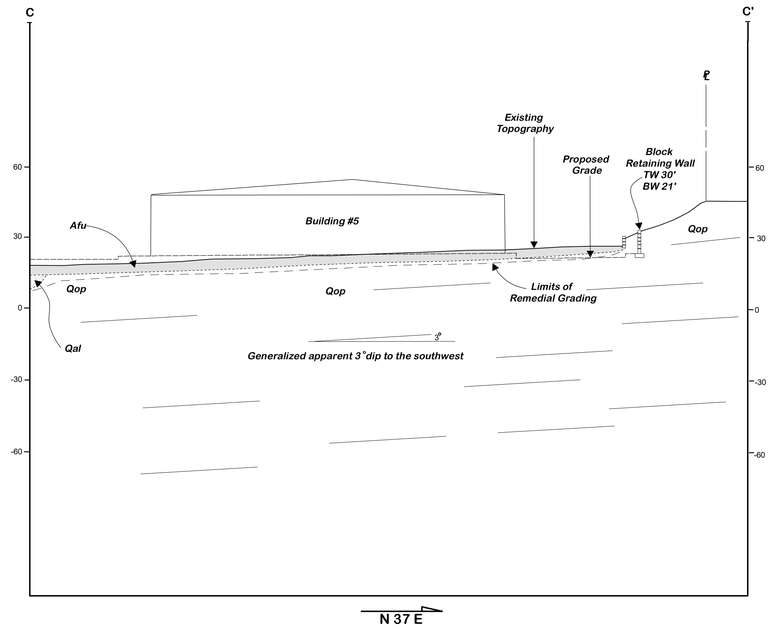
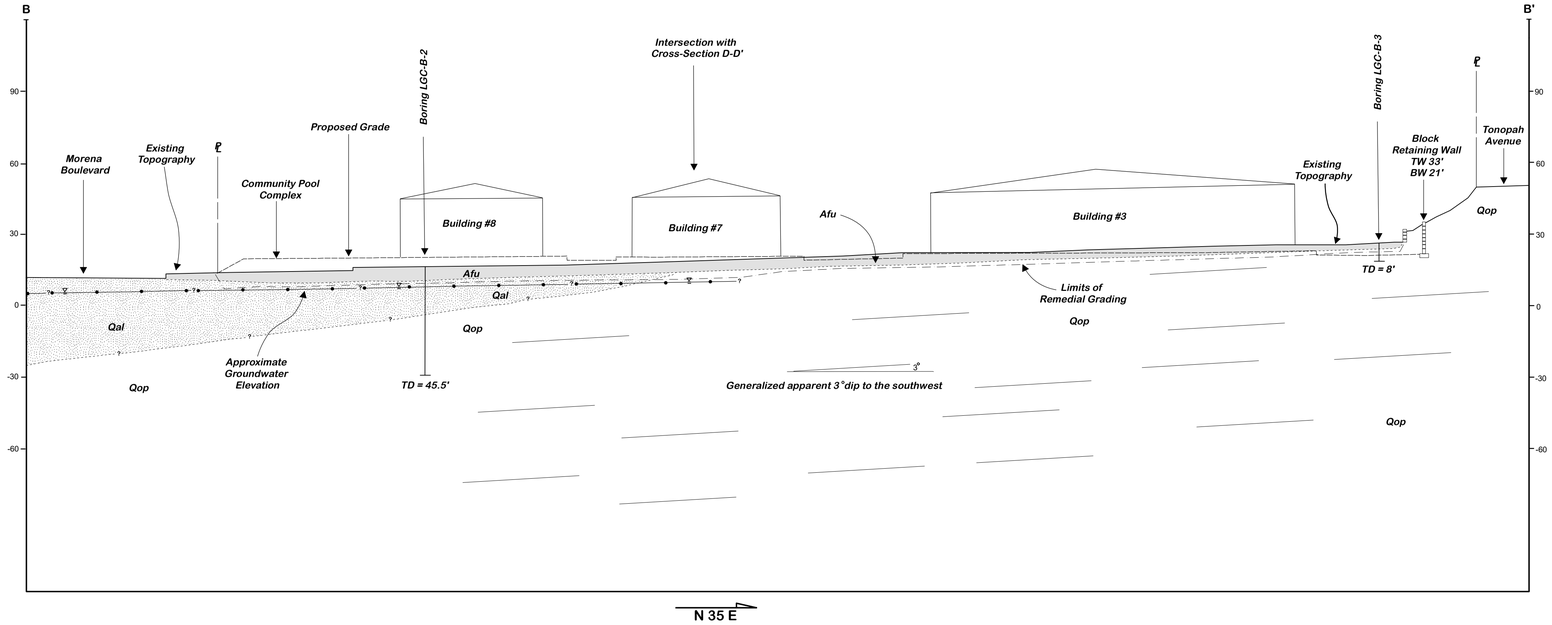
Plate 1
Geotechnical Map
Morena Apartment Homes
1597 and 1623 Morena Boulevard
San Diego, California

Project Name	Fairfield Morena Boulevard
Project No.	154004-03
Eng. / Geol.	BIH/RKW
Scale	1" = 30'
Date	May 4, 2017







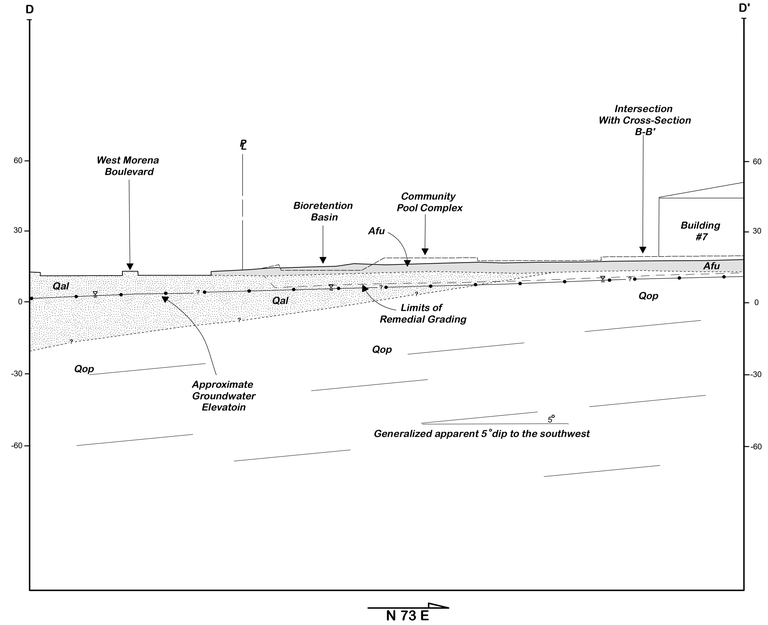


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Plate 2

Cross Sections A-A' to D-D'

Morena Apartment Homes
1597 and 1623 Morena Boulevard
San Diego, California

Project Name	Fairfield Morena Boulevard
Project Number	154004-03
Eng./Geo.	BIH/SMB
Date	May 4, 2017
Scale	1" = 30'

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APPENDIX B

Geotechnical Boring Logs

Geotechnical Boring Log B-1

Date: 9/2/2015	**Page: 1 of 2**
Project Name: 1579 & 1623 Morena Blvd	**Project Number: 154004-01**
Drilling Company: Baja Exploration	**Type of Rig: CME-75**
Drive Weight: 140 lbs.	**Drop: 30"** **Hole Dia: 8"**
Elevation of Top of Hole: +/- 14 Feet (mean sea level)	**Hole Location: See Map**

Elevation (ft)	Depth (ft)	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION Logged By: RKW Sampled By: RKW	Type of Test
14	0					SM	Asphalt Concrete: 2-inches thick **Undocumented Artificial Fill (Afu)** @ 0.2' Silty fine to medium SAND, slightly clayey; dark brown, moist, medium dense	
		1	42	124.3	9.9			
9	5	2	21	85.6	35.1	CH	**Quaternary Alluvium (Qal)** @ 5' CLAY; medium olive brown, moist, medium dense; blocky	AL, SHA COR
							@ 6' Groundwater encountered	
		3	13			CL-SC	@ 7.5' Silty CLAY to clayey fine to medium SAND; dark gray and medium red brown, saturated, loose to medium dense; scattered subrounded fine gravels	AL, SHA CN
4	10	4	31			SP-SM	@ 10' Silty fine to medium SAND; gray brown, saturated, medium dense; massive; friable; micaceous	CN
		5	24				@ 12.5' Same as above	SA
-1	15	6	44	111.9	17.6		@ 15' Silty fine to medium SAND and silty fine SAND; dark gray and orange brown, saturated, medium dense; friable; micaceous @ 17.5' Clayey fine to medium SAND; olive brown mottled orange brown	SA
		7	23			SC	@ 20' Interbedded clayey fine SAND and silty fine to medium SAND	SA
-6	20	8	16			SM	@ 22.5' Silty fine to medium SAND; gray brown, saturated, medium dense	SHA
		9	16				@ 25' Slightly silty fine SAND; dark gray mottled orange brown, saturated, medium dense	SA
-11	25	10	22				@ 27.5' Interbedded gray fine to medium SAND and olive gray mottled orange brown silty fine SAND	SA
		11	24					SA
-16	30							

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

Figure B-1

Geotechnical Boring Log B-1

Date: 9/2/2015	**Page: 2 of 2**
Project Name: 1579 & 1623 Morena Blvd	**Project Number: 154004-01**
Drilling Company: Baja Exploration	**Type of Rig: CME-75**
Drive Weight: 140 lbs.	**Drop: 30"** **Hole Dia: 8"**
Elevation of Top of Hole: +/- 14 Feet (mean sea level)	**Hole Location: See Map**

Elevation (ft)	Depth (ft)	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
							Logged By: RKW Sampled By: RKW	
-16	30	12	16			SM-SC	**Quaternary Alluvium (continued)** @30' Interbedded silty fine to medium SAND and silty fine to coarse SAND; dark gray, saturated, medium dense	SA
		13	18			SC	@ 32.5' Clayey fine SAND; dark gray mottled orange brown; micaceous; few medium sand grains	SA
-21	35	14	32			CL	@ 35' Silty CLAY w/fine to medium SAND with few fine gravels; medium and orange brown @ 37.5' Clayey fine to medium SAND; dark gray brown mottled orange brown	SA
		15	16			SC		AL, SHA
-26	40	16	15			CL&SM	@ 40' Interbedded dark gray silty CLAY; and dark gray mottled orange brown silty fine to medium SAND; wet to saturated, medium dense/stiff, micaceous	AL, SHA
		17	53			SM-SW	**Quaternary Bay Point Formation (Qbp)** @ 42' Silty fine to coarse SAND; dark brown, gray brown and orange brown, saturated, dense; thickly bedded	
-31	45	18	52				@ 45' Same as above	
						GW	@ 47' Becomes a sandy gravelly with possible fine cobbles @ 48' Practical refusal on rocks	
-36	50						**Total Depth = 48 Feet** **Groundwater Encountered at 6 Feet** **Backfilled with Bentonite Grout on 9/2/15**	
-41	55							
-46	60							

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

Figure B-2

Geotechnical Boring Log B-2

Date: 9/2/2015	**Page: 1 of 2**
Project Name: 1579 & 1623 Morena Blvd	**Project Number: 154004-01**
Drilling Company: Baja Exploration	**Type of Rig: CME-75**
Drive Weight: 140 lbs.	**Drop: 30"** **Hole Dia: 8"**
Elevation of Top of Hole: +/- 17 Feet (mean sea level)	**Hole Location: See Map**

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION Logged By: RKW Sampled By: RKW	Type of Test
17	0		1	19	91.7	28.4	SM/CL	4-inches AC with fabric between the layers **Undocumented Artificial Fill (Af)** @ 0.3' Silty fine SAND and sandy CLAY; medium brown mottled orange brown, moist, medium dense/stiff	
12	5		2	32			SM	**Quaternary Alluvium (Qal)** @ 4' Silty fine to medium SAND; gray brown, moist to very moist, loose to medium dense; friable; micaceous	CN
			3	22	98.2	27.1	ML	@ 7.5' Very fine sandy SILT; olive brown mottled orange brown, wet' very stiff @ 8' Groundwater encountered	AL, SHA
7	10		4	16			ML-MH	@ 10' Clayey SILT; medium gray mottled orange brown, saturated, medium dense; micaceous	SHA
			5	18	17.8		SC-CL	@ 12.5' Clayey fine SAND to fine sandy CLAY; dark brown and olive brown, saturated, medium dense/very stiff	AL, SHA
2	15		6	47	119.5	15.6		@ 15' Same as above	
			7	37			GW	@ 17.5' Silty very fine sandy GRAVEL; medium brown, saturated, dense; subrounded fine gravel	SA
-3	20		8	40			SW	**Quaternary Bay Point Formation (Qbp)** @20' Gravelly fine to coarse SAND; orange brown, saturated, medium dense; subrounded fine gravel up to 3/4' in size	
			9	27			SM	@ 23' silty fine SAND; medium brown, wet to saturated, medium dense; micaceous; thickly bedded	
-8	25		10	57	122.7	11.2	SW	@ 25' Becomes a gravelly fine to coarse SAND	
			11	36			SW&SM	@ 27.5' Interbedded brown fine to medium SAND and medium brown mottled orange brown sity fine SAND	
-13	30								

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

Figure B-3

Geotechnical Boring Log B-2

Date: 9/2/2015	**Page: 2 of 2**
Project Name: 1579 & 1623 Morena Blvd	**Project Number: 154004-01**
Drilling Company: Baja Exploration	**Type of Rig: CME-75**
Drive Weight: 140 lbs.	**Drop: 30"** **Hole Dia: 8"**
Elevation of Top of Hole: +/- 17 Feet (mean sea level)	**Hole Location: See Map**

Elevation (ft)	Depth (ft)	Sample Number	Blow Count	USCS Symbol	DESCRIPTION	Type of Test
					Logged By: RKW Sampled By: RKW	
-13	30	12	34	SM	**Quaternary Bay Point Formation (continued)** @30' Silty fine to medium SAND; gray brown, saturated, dense, slightly micaceous	
		13	50		@ 32.5' Silty fine SAND; gray brown mottled orange brown, saturated, dense, slightly micaceous, few fine subrounded gravel	
-18	35	14	50/6"	GW-SM	@ 35' Silty fine sandy GRAVEL to silty gravelly fine SAND; orange brown, saturated, dense fine to very fine gravels	
		15	24	SM	@ 37.5' Becomes a silty fine to medium SAND @ 39.5' gravel layer	
-23	40	16	75/10"	GW SM	@ 40' Silty gravelly fine to medium SAND; gray brown mottled orange brown, saturated, dense; subrounded gravel	
-28	45	17	50/5"	GW	@ 45' Abundant gravels to fine cobbles; @ 45.5' practical refusal on rocks	
					Total Depth = 45.5 Feet **Groundwater Encountered at 8 Feet** **Backfilled with Bentonite Grout on 9/2/15**	
-33	50					
-38	55					
-43	60					

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

Figure B-4

Geotechnical Boring Log B-3

Date: 9/2/2015	**Page: 1 of 1**
Project Name: 1579 & 1623 Morena Blvd	**Project Number: 154004-01**
Drilling Company: Baja Exploration	**Type of Rig: CME-75**
Drive Weight: 140 lbs.	**Drop: 30"** **Hole Dia: 8"**
Elevation of Top of Hole: +/- 27 Feet (mean sea level)	**Hole Location: See Map**

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
27	0						SM-SC	Asphalt Concrete: 2-inches thick **Undocumented Artificial Fill (Afu)** @ 0.2' Silty to clayey SAND, dark orange brown, moist, medium dense @1.2' 3" by 6" cobble	
22	5		1	61	110.4	4.3	SW GW-SW	**Quaternary Bay Point Formation (Qbp)** @ 2' Slightly silty fine to medium SAND, medium brown, moist, medium dense; few coarse sand and fine gravels @ 7' Abundant gravels and possibly fine cobbles @ 8' Practical refusal on rocks	
17	10							**Total Depth = 8 Feet** **No Groundwater Encountered** **Backfilled with Bentonite Grout on 9/2/15**	
12	15								
7	20								
2	25								
-3	30								

Logged By: RKW

Sampled By: RKW

LGC

■ = Ring sample
☒ = SPT sample
BULK = Bulk sample

Figure B-5

Geotechnical Boring Log B-4

Date: 9/2/2015	**Page: 1 of 1**
Project Name: 1579 & 1623 Morena Blvd	**Project Number: 154004-01**
Drilling Company: Baja Exploration	**Type of Rig: CME-75**
Drive Weight: 140 lbs.	**Drop: 30"** **Hole Dia: 8"**
Elevation of Top of Hole: +/- 21 Feet (mean sea level)	**Hole Location: See Map**

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION Logged By: RKW Sampled By: RKW	Type of Test
21	0						SM	**Undocumented Artificial Fill (Afu)** @ 0' Silty fine SAND with minor gravels; medium brown, damp, medium dense	
16	5		1	35			SM	**Quaternary Bay Point Formation (Qbp)** @ 2.5' Silty fine to very fine SAND; pale yellow brown, damp, medium dense; homogeneous @ 5' Silty fine to medium SAND; pale brown, dsmp, medium dense; few coarse sand; friable to very friable @ 8' Becomes orange brown, moist, and dense	S
11	10		2	59	99.6	3.6			
6	15		3	68				@ 14' Groundwater encountered @ 15' Slightly silty fine to coarse gravelly SAND; medium brown, saturated, dense; subrounded gravels up to 2-inches in maximum direction; slightly micaceous; sample disturbed @ 17' Becomes a gravelly SAND to sandy GRAVEL	
1	20		4	50/2"			SW-GW	@ 20' Practical refusal on sandy gravel with fine cobbles	
-4	25							**Total Depth = 20 Feet** **Groundwater Encountered at 14 Feet** **Backfilled with Bentonite Grout on 9/2/15**	
-9	30								

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

Figure B-6

APPENDIX C

Infiltration Testing Results

Test Hole No.: I-1 Elevation at Test Hole Bottom: 14 Feet

Date Excavated: 11/9/2016 Geologic Unit: Old Paralic Deposits/Baypoint Formation

Percolation Tested by: BJC Date: 11/10/2016 Test Hole Size: 8 inches

Test Hole Depth: 8 Feet Soil Type: Interbedded silty CLAY and silty SAND (CL/SM)

Test Hole Pre-Soaked on 11/9/2016 2-inches of gravel in bottom

TEST PERIOD

Time	T_1	H_1	H_2	D	R	D25
0:00 0:30	30	23.40	21.72	1.68	3.36	1.40 inches
0:30 1:05	35	21.72	20.40	1.32	2.26	0.94 inches
1:05 1:35	30	20.40	19.20	1.20	2.40	
1:35 2:05	30	19.20	18.12	1.08	2.16	
2:05 2:35	30	24.60	23.52	1.08	2.16	
2:35 3:05	30	23.52	22.08	1.44	2.88	
3:08 3:35	30	22.08	20.64	1.44	2.88	
3:35 4:05	30	24.24	22.80	1.44	2.88	
4:05 4:35	30	22.80	21.48	1.32	2.64	
4:35 5:05	30	21.48	20.16	1.32	2.64	
5:05 5:35	30	24.24	22.80	1.44	2.88	
5:35 6:05	30	22.80	21.48	1.32	2.64	
6:05 6:35	30	24.60	22.92	1.68	3.36	
6:35 7:05	30	22.92	21.48	1.44	2.88	

Percolation Rate: 2.88 inches/hour

Infiltration Rate: 0.24 inches/hour

$$I_t = \frac{\Delta H\ 60\ r}{\Delta t\ (r+2H_{ave})} = \frac{(1.44\ in)\left(60\frac{min}{hr}\right)(4\ in)}{(30\ min)\ (4\ in+2(22.2in))} = 0.24\ in/hour$$

T1 = Time Interval (min); H1 = Initial Water Level (inch.); H2 = Final Water Level (inch); D = Change in Water Level (inch); R = Percolation Rate (inches/hour); It = Tested Infiltration Rate (inches/hour); ΔH = Change in Water Height; Δt = Time Interval; H_{ave} = Average Head Height over Time Interval; r = Radius of Test Hole; D25 = Water Drop in 25 minutes

Figure C-1

Test Hole No.: I-2 Elevation at Test Hole Bottom: 14 Feet

Date Excavated: 11/9/2016 Geologic Unit: Old Paralic Deposits/Baypoint Formation

Percolation Tested by: BJC Date: 11/10/2016 Test Hole Size: 8 inches

Test Hole Depth: 9 Feet Soil Type: Interbedded silty CLAY and clayey SAND (CL/SC)

Test Hole Pre-Soaked on 11/9/2016 2-inches of gravel in bottom

TEST PERIOD

Time	T_1	H_1	H_2	D	R	D25
0:05 0:35	30	23.64	20.52	3.12	6.24	2.60 inches
0:35 1:25	50	20.52	19.20	1.32	1.58	0.66 inches
1:25 1:55	30	32.88	31.80	1.08	2.16	
1:55 2:25	30	31.80	30.48	1.32	2.64	
2:25 2:55	30	30.48	29.16	1.32	2.64	
2:55 3:25	30	29.16	28.32	0.84	1.68	
3:25 3:55	30	28.32	27.36	0.96	1.92	
3:55 4:25	30	27.36	26.40	0.96	1.92	
4:25 4:55	30	26.40	25.56	0.84	1.68	
4:55 5:25	30	25.56	24.84	0.72	1.44	
5:25 5:55	30	24.84	24.12	0.72	1.44	
5:55 6:25	30	24.12	23.40	0.72	1.44	
6:25 6:55	30	23.40	22.68	0.72	1.44	
6:55 7:25	30	22.68	22.08	0.60	1.20	

Percolation Rate: 1.20 inches/hour

Infiltration Rate: 0.10 inches/hour

$$I_t = \frac{\Delta H\ 60\ r}{\Delta t\ (r+2H_{ave})} = \frac{(0.60\ in)\left(60\frac{min}{hr}\right)(4\ in)}{(30\ min)\ (4\ in+2(22.38in))} = 0.10\ in/hour$$

T1 = Time Interval (min); H1 = Initial Water Level (inch.); H2 = Final Water Level (inch); D = Change in Water Level (inch); R = Percolation Rate (inches/hour); It = Tested Infiltration Rate (inches/hour); ΔH = Change in Water Height; Δt = Time Interval; H_{ave} = Average Head Height over Time Interval; r = Radius of Test Hole; D25 = Water Drop in 25 minutes

Figure C-2

Test Hole No.: I-3 Elevation at Test Hole Bottom: 14 Feet

Date Excavated: 11/9/2016 Geologic Unit: Old Paralic Deposits/Baypoint Formation

Percolation Tested by: BJC Date: 11/10/2016 Test Hole Size: 8 inches

Test Hole Depth: 7.0 Feet Soil Type: Interbedded silty SAND (SP-SM)

Test Hole Pre-Soaked on 11/9/2016 2-inches of gravel in bottom

TEST PERIOD

Time	T_1	H_1	H_2	D	R	D25
0:10 0:38	28	23.40	6.96	16.44	35.23	14.68 inches
0:38 1:10	32	21.36	6.24	15.12	28.35	11.81 inches
1:10 1:20	10	23.40	17.64	5.76	34.56	
1:20 1:30	10	22.80	17.16	5.64	33.84	
1:30 1:40	10	24.00	19.32	4.68	28.08	
1:40 1:50	10	24.00	17.40	6.60	39.60	
1:50 2:00	10	25.20	20.76	4.44	26.64	
2:00 2:10	10	24.48	19.20	5.28	31.68	
2:10 2:20	10	23.88	18.36	5.52	33.12	

Percolation Rate: 33.12 inches/hour

Infiltration Rate: 2.87 inches/hour

$$I_t = \frac{\Delta H\ 60\ r}{\Delta t\ (r+2H_{ave})} = \frac{(5.52\ in)\left(60\frac{min}{hr}\right)(4\ in)}{(10\ min)\ (4\ in+2(21.12in))} = 2.87\ in/hour$$

T1 = Time Interval (min); H1 = Initial Water Level (inch.); H2 = Final Water Level (inch); D = Change in Water Level (inch); R = Percolation Rate (inches/hour); It = Tested Infiltration Rate (inches/hour); ΔH = Change in Water Height; Δt = Time Interval; H_{ave} = Average Head Height over Time Interval; r = Radius of Test Hole; D25 = Water Drop in 25 minutes

Figure C-3

Test Hole No.: I-4 Elevation at Test Hole Bottom: 14 Feet

Date Excavated: 11/9/2016 Geologic Unit: Old Paralic Deposits/Baypoint Formation

Percolation Tested by: BJC Date: 11/10/2016 Test Hole Size: 8 inches

Test Hole Depth: 7.5 Feet Soil Type: Interbedded silty CLAY and fine SAND (CL/SP)

Test Hole Pre-Soaked on 11/9/2016 2-inches of gravel in bottom

TEST PERIOD

Time	T_1	H_1	H_2	D	R	D25
0:15	25	29.40	23.40	6.00	14.40	6.00 inches
0:40						
0:40	35	23.40	18.00	5.40	9.26	3.86 inches
1:15						
1:15	30	25.20	22.20	3.00	6.00	
1:45						
1:45	30	24.60	20.88	3.72	7.44	
2:15						
2:15	30	28.80	23.40	5.40	10.80	
2:45						
2:45	30	28.56	23.64	4.92	9.84	
3:15						
3:15	30	30.84	25.56	5.28	10.56	
3:45						
3:45	30	25.56	22.32	3.24	6.48	
4:15						
4:15	30	22.32	19.20	3.12	6.24	
4:45						
4:45	30	24.84	20.52	4.32	8.64	
5:15						
5:15	30	24.12	20.40	3.72	7.44	
5:45						
5:45	30	31.80	24.00	7.80	15.60	
6:15						
6:15	30	24.00	19.56	4.44	8.88	
6:45						
6:45	30	24.00	19.20	4.80	9.60	
7:15						

Percolation Rate: 9.6 inches/hour

Infiltration Rate: 0.81 inches/hour

$$I_t = \frac{\Delta H\ 60\ r}{\Delta t\ (r+2H_{ave})} = \frac{(4.8\ in)\left(60\frac{min}{hr}\right)(4\ in)}{(30\ min)\ (4\ in+2(21.6in))} = 0.81 in/hour$$

T1 = Time Interval (min); H1 = Initial Water Level (inch.); H2 = Final Water Level (inch); D = Change in Water Level (inch); R = Percolation Rate (inches/hour); It = Tested Infiltration Rate (inches/hour); ΔH = Change in Water Height; Δt = Time Interval; H_{ave} = Average Head Height over Time Interval; r = Radius of Test Hole; D25 = Water Drop in 25 minutes

*using the average of the last two readings

Figure C-4

LGC

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GEOTECHNICAL CONSULTING

APPENDIX D

City of San Diego

Worksheet C.4-1 - Categorization of Infiltration Feasibility Condition

and

Worksheet D.5-1 - Factor of Safety and Design Infiltration Rate Worksheet

Categorization of Infiltration Feasibility Condition	**Worksheet C.4-1 Page 1 of 4**

Part 1- Full Infiltration Feasibility Screening Criteria
Would infiltration of the full design volume be feasible from a physical perspective without and undesirable consequences that cannot be reasonable mitigated

Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to the Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	**X**	**X**

Provide basis:

The infiltration test results of the proposed northwestern water-quality basin had an unadjusted (pre-factor of safety) infiltration rate of 0.10 to 0.24 inches per hour. Infiltration test results of the proposed northeastern water-quality basin area had an unadjusted (pre-factor of safety) infiltration rate of 0.81 to 2.87 inches per hour.

The third basin located in the southern portion of the site will be located in a fill area. The infiltration for this basin was determined by obtaining a representative sample of soil that could be used as fill in the area of the basin. The sample was remolded to a 90-percent relative compaction and a saturated hydraulic conductivity test run on the sample. The test result indicated an infiltration rate of 0.10 inches per hour.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		**X**

Provide basis:

Based on the location of the planned water-quality basin in the southern portion of the site that will be located at the top of a proposed fill slope and both of the northern basins that will be located adjacent to planned buildings, full infiltration will likely have a detrimental impact on the slope and building foundations.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study source applicability.

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1 Page 2 of 4	
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	**X**	
Provide basis: **Impacts relative to the risk of increasing groundwater contamination does not appear to be a constraint from a geotechnical standpoint at the site.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in C.3.	**X**	
Provide basis: **Impacts relative to causing potential water balance issues or increased discharge of contaminated groundwater to surface waters does not appear to be a constraint at the site.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study source applicability.			
Part 1 Result*	If all answers to rows 1-4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration. If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2.	**Result** **Full Infiltration is NOT Feasible**	

*To be Completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1 Page 3 of 4	
Part 2- Partial Infiltration vs. No Infiltration Feasibility Screening Criteria Would Infiltration of Water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to the Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		**X**
Provide basis: **The infiltration rates of the three proposed basin locations vary from 0.01 to 2.87 inches per hour; and consequently, much of the site has infiltration rates significantly lower than 0.5 inches per hour. Additionally, fine-grained soil is present at a depth of approximately 5 to 10 feet and 7.5 to 17.5 feet, respectively, below the existing ground surface as encountered in Borings B-1 and B-2. These fine-grained soils may cause a groundwater ponding and/or mounding condition in the areas of the basins, and may facilitate the migration of infiltrated water along these less permeable layers to adjacent properties.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
6	Can infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		**X**
Provide basis: **Based on the location of the planned water-quality basin in the southern portion of the site that will be located at the top of a proposed fill slope and both of the northern basins that will be located adjacent to planned building, partial infiltration will likely have a detrimental impact on the slope and building foundations.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1 Page 4 of 4	
Criteria	Screening Question	Yes	No
7	Can infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		**X**
Provide basis: **Groundwater was encountered during the preliminary investigation of the site at an approximate elevation of 7 to 9 feet. Based on the elevation of the bottom of the gravel storage layer, the current groundwater elevation is within 5 to 7 feet of the proposed basin bottom elevations.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in C.3.	**X**	
Provide basis: **Based on Section C.3.7 of the San Diego City BMP Design Manual, downstream water rights should not be a constraint to partial infiltration at the site.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates			
Part 2 Result*	If all answers to rows 1-4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration. If any answer from row 5-8 is "No", then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category in No Infiltration.	**Result** **Partial Infiltration is NOT Feasible**	
Prepared by: _____ **Randall K Wagner, CEG 1612** **LGC Valley, Inc.**		**Dated: May 4, 2017**	

*To be Completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Factor of Safety and Design Infiltration Rate Worksheet				**Worksheet D.5-1 Page 1 of 1**	
Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w * v
A	Suitability Assessment	Soil assessment methods	0.25	**2**	**0.50**
		Predominant soil Texture	0.25	**3**	**0.75**
		Site soil variability	0.25	**3**	**0.75**
		Depth to groundwater/impervious layer	0.25	**2**	**0.50**
		Suitability Assessment Safety Factor, $S_A = \sum_p$			**2.50**
B	Design	Level of pretreatment/ expected sediment loads	0.5		
		Redundancy/ resiliency	0.25		
		Compaction during construction	0.25	**2**	**0.50**
		Design Safety Factor, $S_B = \sum_p$			
Combined Safety Factor, $S_{total} = S_A \times S_B$					
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)					
Design Infiltration Rate, in/hr, $K_{design} = {K_{observed}}/{S_{total}}$					
Supporting Data					

Briefly describe infiltration test and provide reference to test forms:

The percolation/infiltration field-testing for the northwestern and northeastern water-quality basins was performed in general accordance with Section D.3.3.2 - Borehole Percolation Tests (various methods) of the San Diego City BMP Design Manual. Adjustment of the field percolation test results to an "infiltration rate" was performed utilizing the Porchet Method. The infiltration testing for the southern water-quality basin was determined by obtaining a saturated hydraulic conductivity test of a representative sample of the on-site soil that could be used as fill in accordance with Section D.4.2 of the San Diego City BMP Design Manual.

The results of the percolation/infiltration testing is provided in the report entitled "Preliminary Bioretention Basin Infiltration Study, Proposed Apartment Complex Development, 1579 and 1623 Morena Boulevard, City of San Diego, California" by LGC Valley, Inc., dated November 29, 2016.

APPENDIX E

Laboratory Testing Procedures and Test Results

The laboratory testing program was directed towards providing quantitative data relating to the relevant engineering properties of the soils. Samples considered representative of site conditions were tested in general accordance with American Society for Testing and Materials (ASTM) procedure and/or California Test Methods (CTM), where applicable. The following summary is a brief outline of the test type and the results are presented on the following pages. LGC has reviewed the laboratory test data, procedures and results with respect to the subject site, concurs with, and accepts responsibility as geotechnical engineer of record for their work (laboratory testing).

Soil Classification: Soils were classified according the Unified Soil Classification System (USCS) in accordance with ASTM Test Methods D2487 and D2488. This system uses relies on the Atterberg limits and grain size distribution of a soil. The soil classifications (or group symbol) are shown on the laboratory test data and excavation logs.

Atterberg Limits: The liquid and plastic limits ("Atterberg limits") were determined in accordance with ASTM Test Method D4318 for engineering classification of fine-grained material and presented on the following table:

Sample Location	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
B-1 #2 @ 5 feet	51	24	27
B-1 #3 @ 7.5 feet	35	18	17
B-1 #8 @ 20 feet	Non-Plastic		
B-1 #15 @ 37.5 feet	25	18	7
B-1 #16 @ 40 feet	38	16	22
B-2 #3 @ 7.5 feet	30	25	5
B-2 #7 @ 17.5 feet	35	17	18

Consolidation: Consolidation tests were performed on selected, relatively undisturbed ring samples (per Modified ASTM Test Method D2435). Samples (2.42 inches in diameter and 1 inch in height) were placed in a consolidometer and increasing loads were applied. The samples were allowed to consolidate under "double drainage" and total deformation for each loading step was recorded. The percent consolidation for each load step was recorded as the ratio of the amount of vertical compression to the original sample height. The consolidation pressure curves are presented on the attached figures at the end of this appendix.

APPENDIX E

Laboratory Testing Procedures and Test Results (continued)

Chloride Content: Chloride content was tested in accordance with CTM 422. The results are presented below:

Sample Location	Sample Description	Chloride Content (ppm)	Potential Degree of Chloride Attack*
B-1 #A @ 5-7 feet	Olive brown silty CLAY	480	Negligible

* Extrapolation from California Test Method 532, Method for Estimating the Time to Corrosion of Reinforced Concrete Substructures and previous experience.

Grain Size Distribution: Representative samples were dried, weighed, and soaked in water until individual soil particles were separated (per ASTM D421) and then washed on a No. 200 sieve. The portion retained on the No. 200 sieve was dried and then sieved on a U.S. Standard brass sieve set in accordance with ASTM D422 (CTM 202). Where an appreciable amount of fines were encountered (greater than 20 percent passing the No. 200 sieve) a hydrometer analysis was done to determine the distribution of soil particles passing the No. 200 sieve. The sieve and hydrometer curves are presented on the attached figures at the end of this appendix.

Direct Shear (Remolded or Undisturbed): Direct shear tests were performed on selected remolded and/or undisturbed samples, which were soaked for a minimum of 24 hours under a surcharge equal to the applied normal force during testing. After transfer of the sample to the shear box, and reloading the sample, pore pressures set up in the sample due to the transfer were allowed to dissipate for a period of approximately 1 hour prior to application of shearing force. The samples were tested under various normal loads, a motor-driven, strain-controlled, direct-shear testing apparatus at a strain rate of less than 0.001 to 0.5 inch per minute (depending upon the soil type). The test results are presented on the following table and/or on the attached figures at the end of this appendix.

Sample Location	Sample Description	Friction Angle (degrees)	Apparent Cohesion (psf)
B-2 #A @ 3-5 feet	Olive brown clayey silty fine to medium SAND	26 (Peak) 27 (Ultimate)	470 (Peak) 220(Ultimate)

APPENDIX E

Laboratory Testing Procedures and Test Results (continued)

Expansion Index Tests: The expansion potential of selected materials was evaluated by the Expansion Index Test, UBC Standard No. 18-I-B and/or ASTM D4829. Specimens are molded under a given compactive energy to approximately the optimum moisture content and approximately 50 percent saturation or approximately 90 percent relative compaction. The prepared 1-inch thick by 4-inch diameter specimens are loaded to an equivalent 144 psf surcharge and are inundated with tap water until volumetric equilibrium is reached. The results of these tests are presented in the table below:

Sample Location	Sample Description	Expansion Index	Expansion Potential
B-1 #A @ 5-7 feet	Olive brown silty CLAY	106	High
B-4 #A @ 2.5-5 feet	Pale yellow brown silty fine to very fine SAND	0	Very Low

Moisture and Density Determination Tests: Moisture content (ASTM D2216) and dry density determinations (ASTM D2937) were performed on relatively undisturbed samples obtained from the test borings. The results of these tests are presented on the boring logs. Where applicable, only moisture content was determined from undisturbed or disturbed samples.

Maximum Dry Density Tests: The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM Test Method D1557. The results of these tests are presented in the table below:

Sample Location	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
B-2 #A @ 3-5 feet	Olive brown clayey silty fine to medium SAND	125.0	12.5

APPENDIX E

Laboratory Testing Procedures and Test Results (continued)

Minimum Resistivity and pH Tests: Minimum resistivity and pH tests were performed in general accordance with CTM 643 and standard geochemical methods. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. As results of soil's resistivity decreases corrosivity increases. The results are presented in the table below:

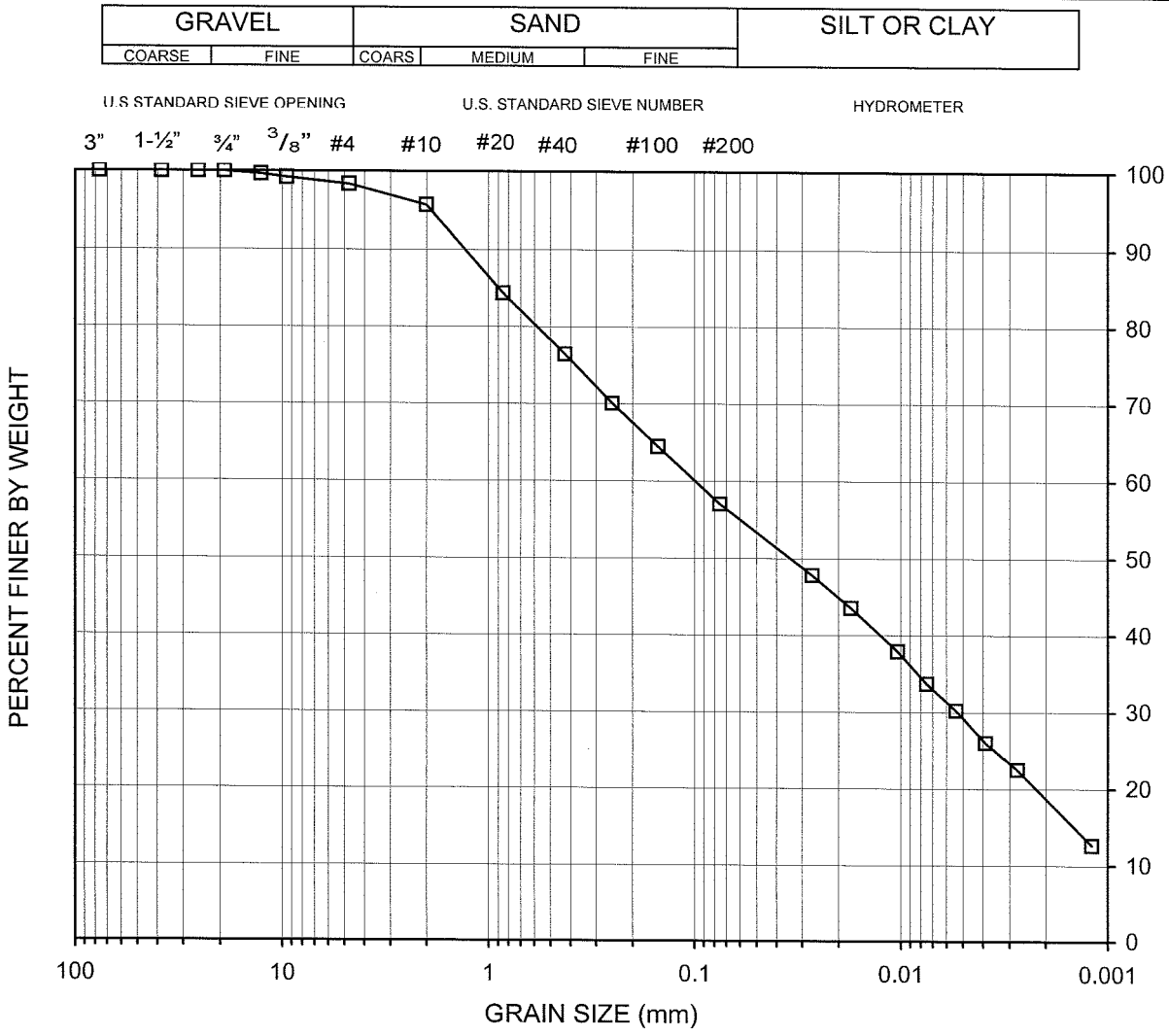
Sample Location	Sample Description	pH	Minimum Resistivity (ohms-cm)	Potential Degree of Corrosivity*
B-2 #A @ 3-5 feet	Olive brown clayey silty fine to medium SAND	8.05	520	Very Corrosive

* NACE Corrosion Basics

Soluble Sulfates: The soluble sulfate contents of selected samples were determined by standard geochemical methods (CTM417). The soluble sulfate content is used to determine the appropriate cement type and maximum water-cement ratios. The test results are presented in the table below:

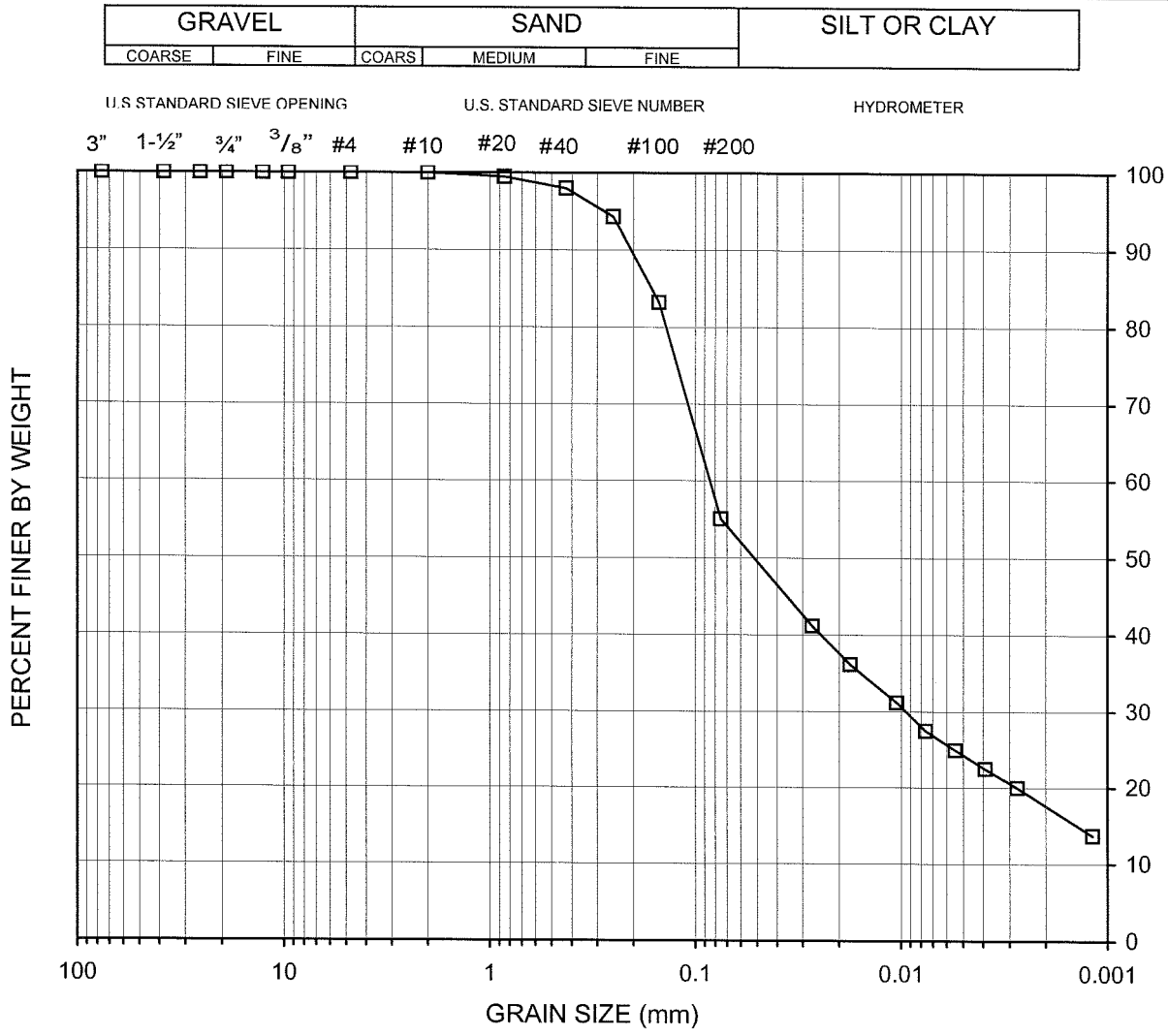
Sample Location	Sample Description	Sulfate Content (% by weight)	Potential Degree of Sulfate Attack*
B-1 #A @ 5-7 feet	Olive brown silty CLAY	0.032	Negligible
B-4 #A @ 2.5-5 feet	Pale yellow brown silty fine to very fine SAND	0.003	Negligible

* Per ACI 318R-08 Table 4.3.1 (ACI, 2008).



SYMBOL	BORING No.	SAMPLE No.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	R-2	5	Ring	CH	51	27

EGLAB, INC.	Project Name: FF / Morena Blvd. Client: LGC Valley, Inc. Job No.: 154004-01 EGLAB Project No.: 15-059-017
9/25/15	**GRAINSIZE DISTRIBUTION CURVE** (ASTM D422) FIGURE E-1



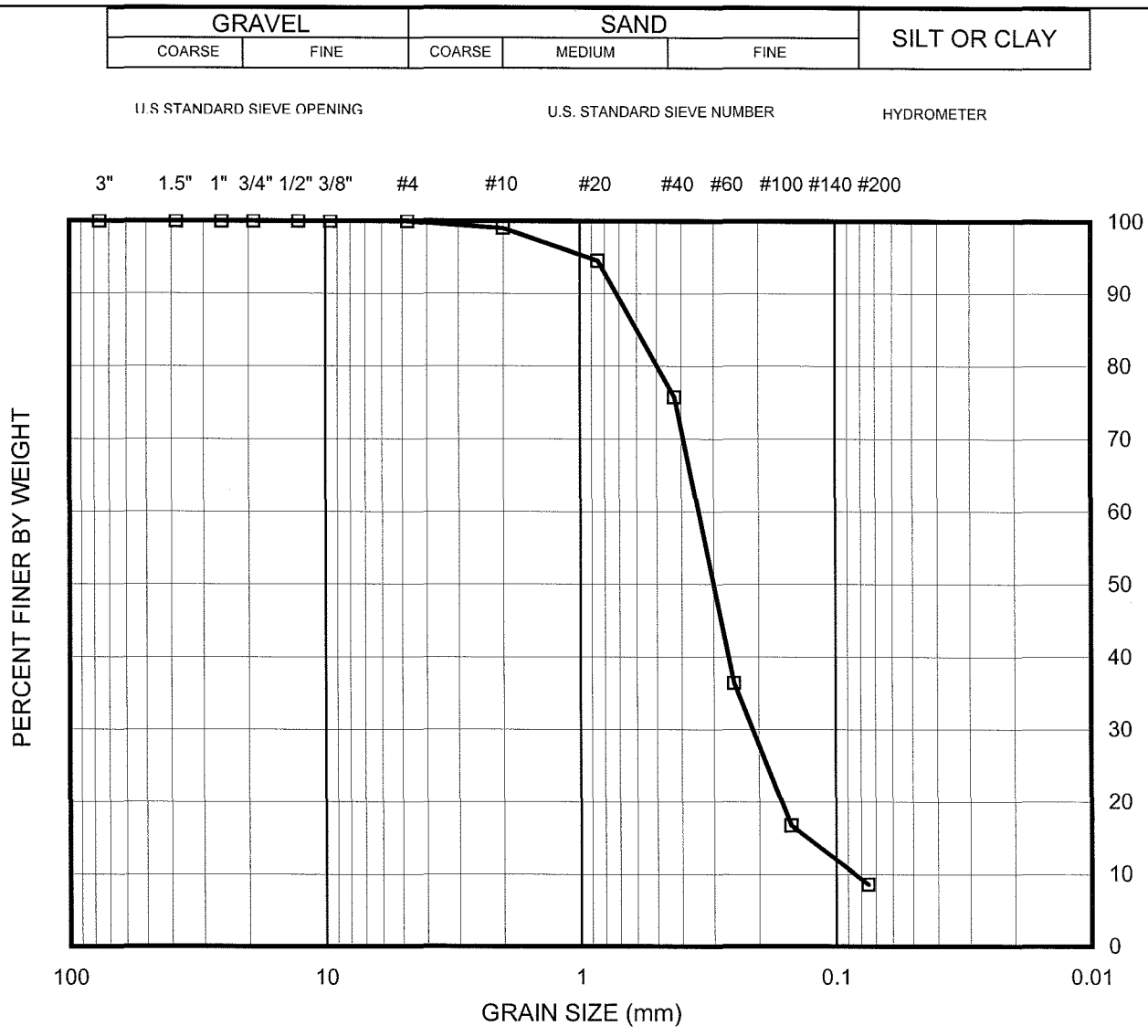
SYMBOL	BORING No.	SAMPLE No.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	R-3	7.5	Ring	CL	35	17

EGLAB, INC.

Project Name: FF / Morena Blvd.
Client: LGC Valley, Inc.
Job No.: 154004-01
EGLAB Project No.: 15-059-017

GRAINSIZE DISTRIBUTION CURVE

9/25/15 (ASTM D422) FIGURE



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	S-5	12.5	Bag	SP-SM	N/A	N/A

EGLAB, INC.

Project Name: FF / Morena Blvd.
Client Job No.: 154004-01
Client Name: LGC Valley, Inc.
EGLAB Project No.: 15-059-017

GRAIN SIZE DISTRIBUTION CURVE

09/25/15 (ASTM D422) FIGURE

SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	R-6	15	Ring	SP-SM	N/A	N/A

EGLAB, INC.

Project Name: FF / Morena Blvd.

Client Job No.: 154004-01

Client Name: LGC Valley, Inc.

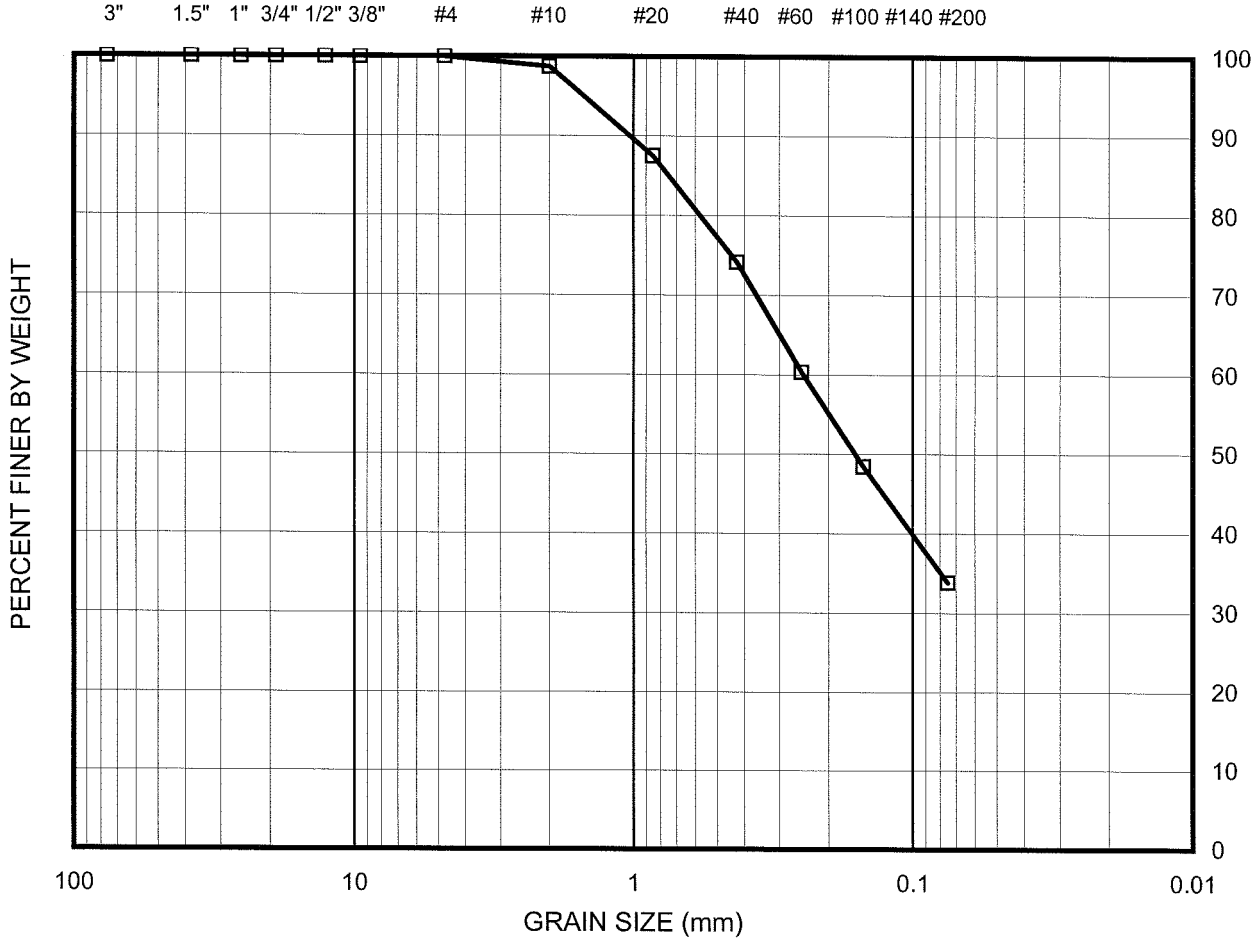
EGLAB Project No.: 15-059-017

GRAIN SIZE DISTRIBUTION CURVE

09/25/15 (ASTM D422) FIGURE

GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

U.S STANDARD SIEVE OPENING | U.S. STANDARD SIEVE NUMBER | HYDROMETER



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	S-7	17.5	Bag	SC	N/A	N/A

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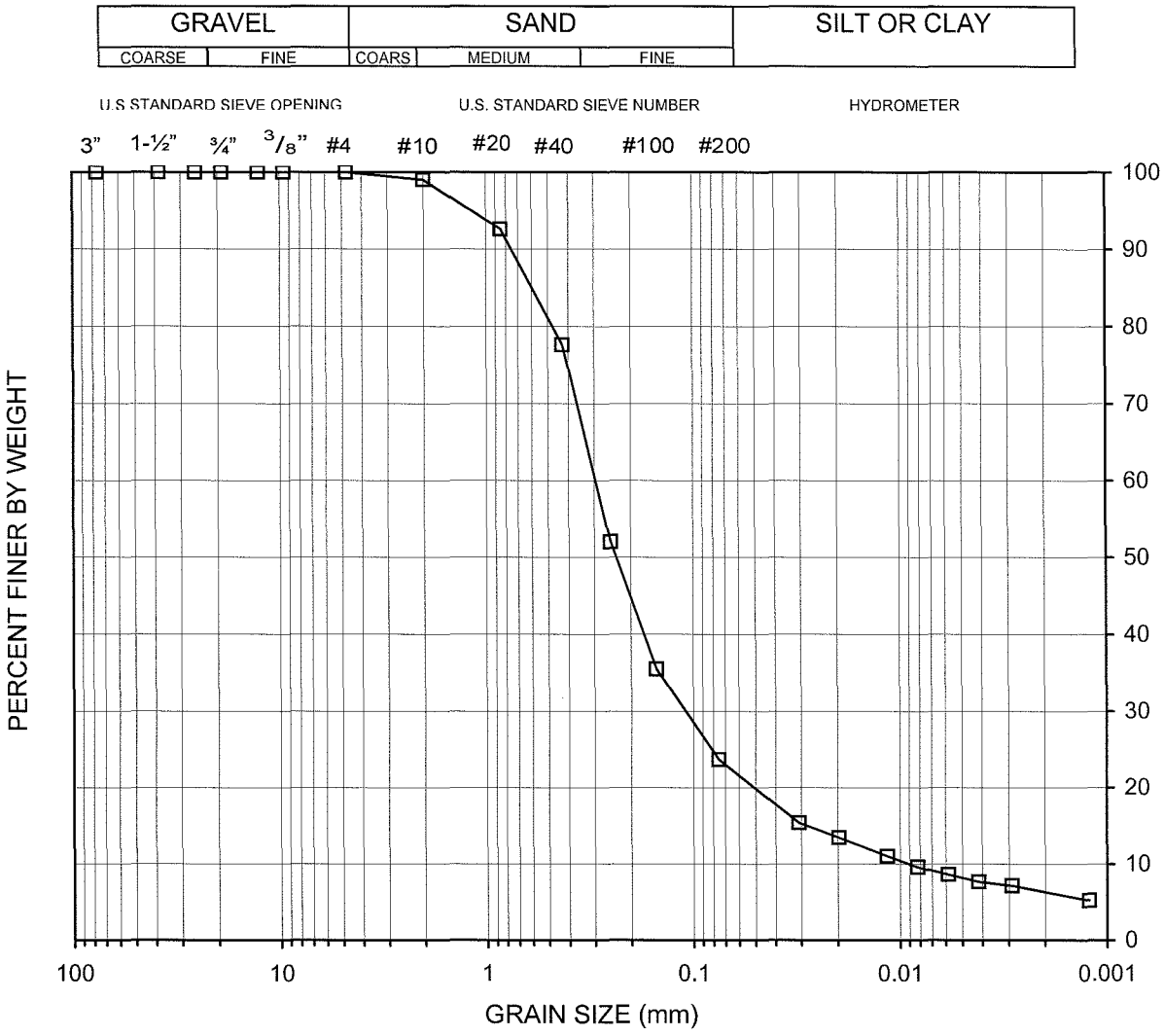
Project Name: FF / Morena Blvd.
Client Job No.: 154004-01
Client Name: LGC Valley, Inc.
EGLAB Project No.: 15-059-017

GRAIN SIZE DISTRIBUTION CURVE

09/25/15 (ASTM D422) FIGURE



SYMBOL	BORING No.	SAMPLE No.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	S-8	20	Bag	SM	N/A	N/A

EGLAB, INC.	Project Name: FF / Morena Blvd. Client: LGC Valley, Inc. Job No.: 154004-01 EGLAB Project No.: 15-059-017
9/25/15	**GRAINSIZE DISTRIBUTION CURVE** (ASTM D422) FIGURE

GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

U.S STANDARD SIEVE OPENING | U.S. STANDARD SIEVE NUMBER | HYDROMETER

SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	S-9	22.5	Bag	SC	N/A	N/A

EGLAB, INC.

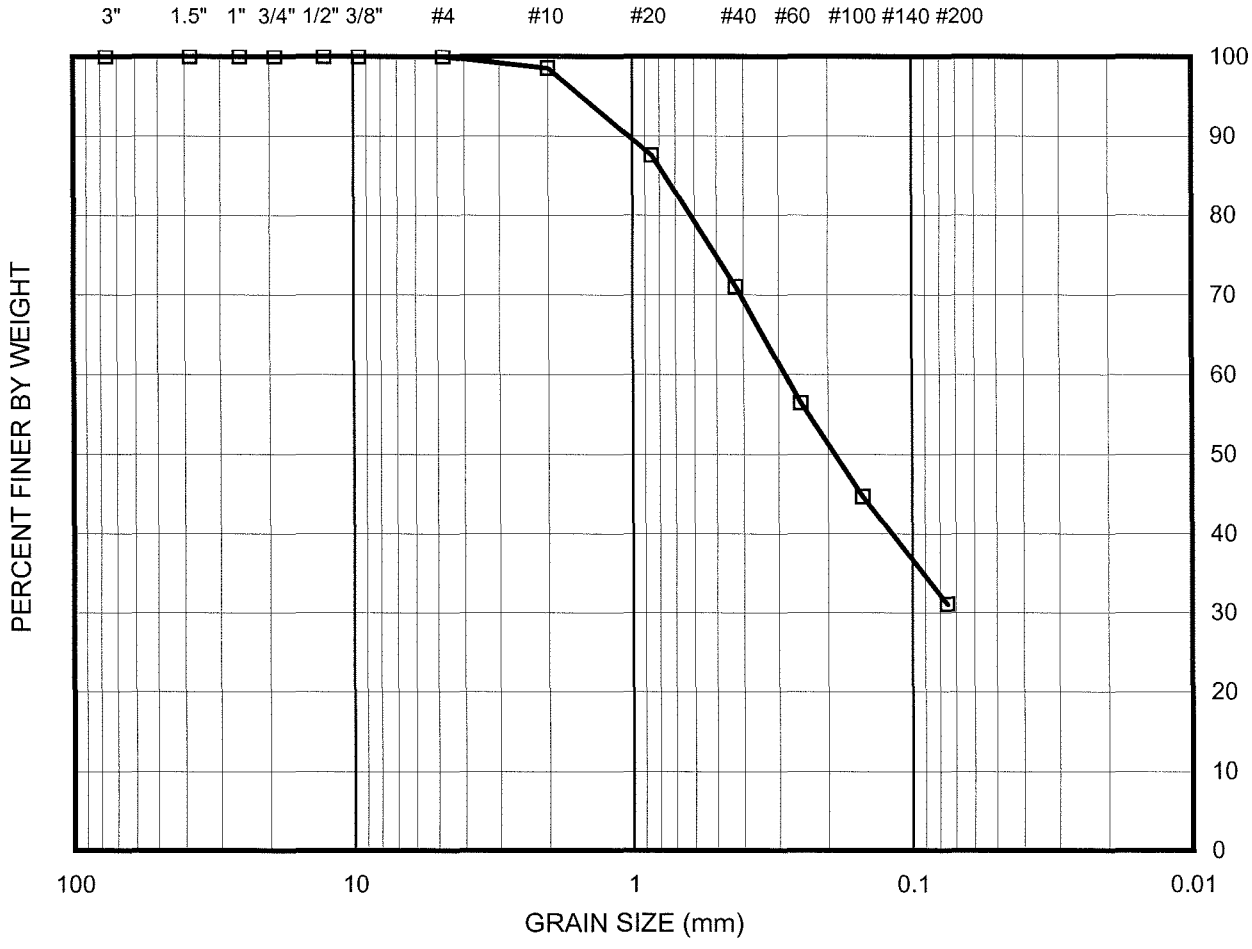
Project Name: FF / Morena Blvd.
Client Job No.: 154004-01
Client Name: LGC Valley, Inc.
EGLAB Project No.: 15-059-017

GRAIN SIZE DISTRIBUTION CURVE

09/25/15 (ASTM D422) FIGURE

GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

U.S STANDARD SIEVE OPENING | U.S. STANDARD SIEVE NUMBER | HYDROMETER



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	S-10	25	Bag	SC	N/A	N/A

EGLAB, INC.

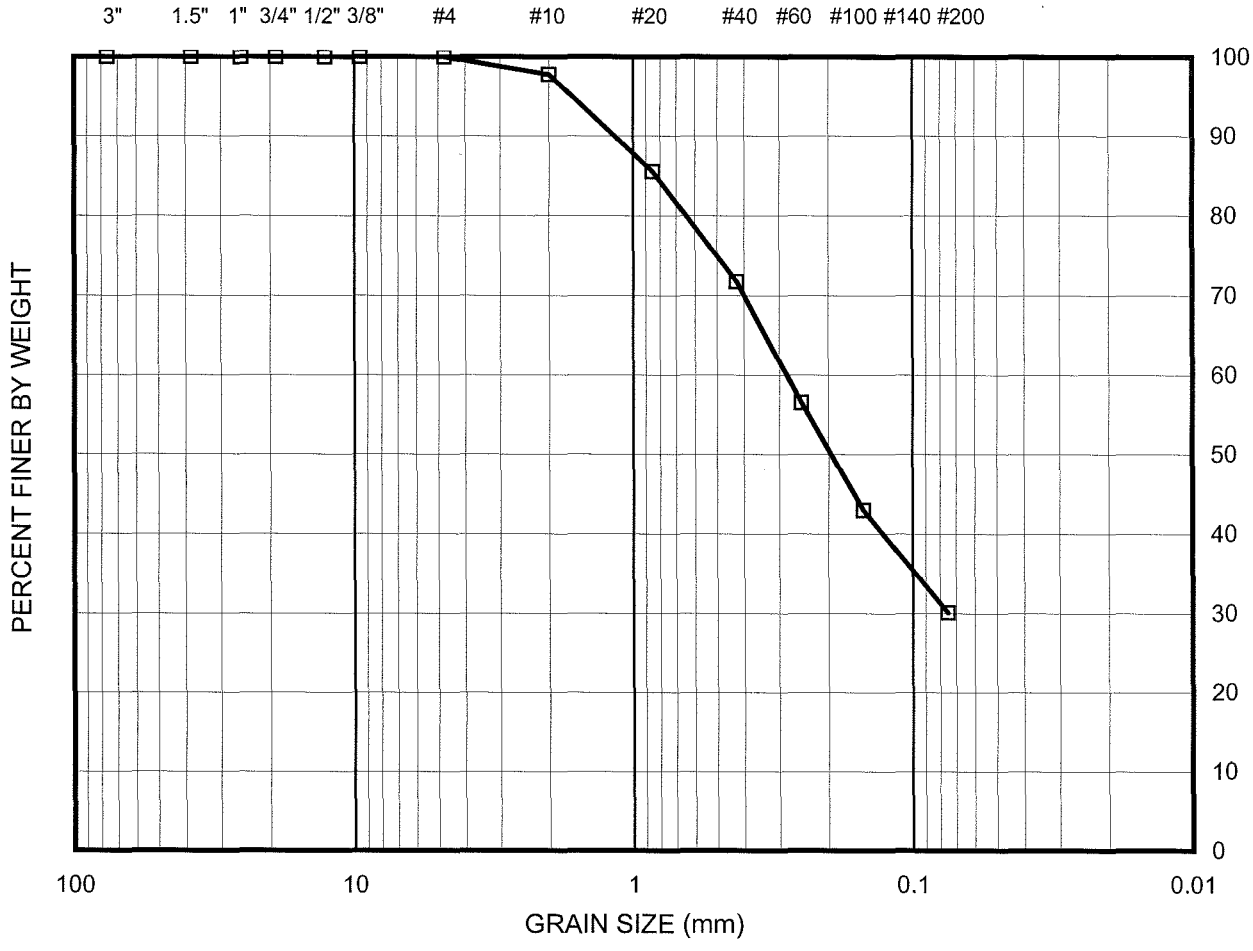
Project Name: FF / Morena Blvd.
Client Job No.: 154004-01
Client Name: LGC Valley, Inc.
EGLAB Project No.: 15-059-017

GRAIN SIZE DISTRIBUTION CURVE

09/25/15 (ASTM D422) FIGURE

GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

U.S STANDARD SIEVE OPENING | U.S. STANDARD SIEVE NUMBER | HYDROMETER



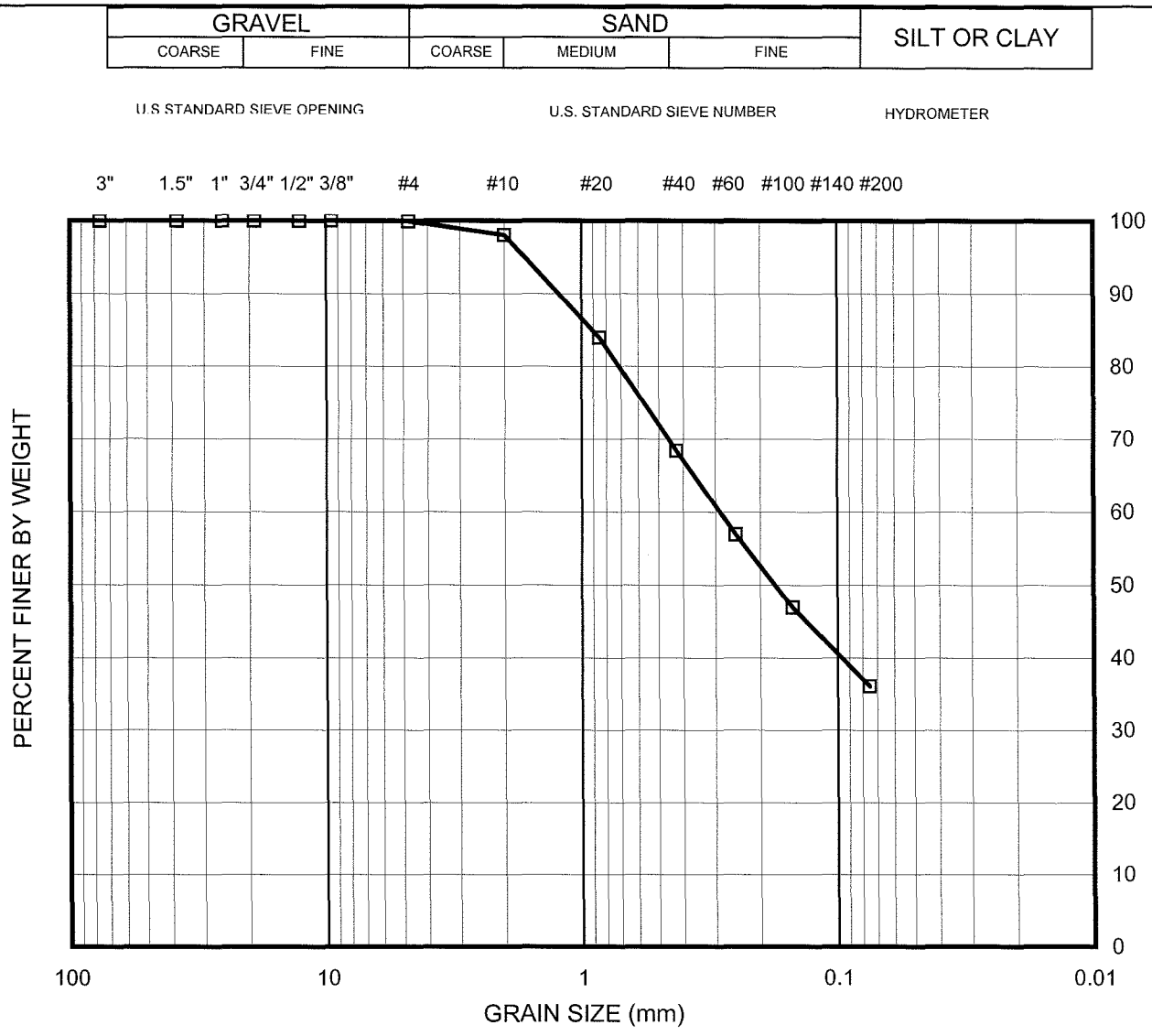
SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	S-11	27.5	Bag	SC	N/A	N/A

EGLAB, INC.

Project Name: FF / Morena Blvd.
Client Job No.: 154004-01
Client Name: LGC Valley, Inc.
EGLAB Project No.: 15-059-017

GRAIN SIZE DISTRIBUTION CURVE

09/25/15 (ASTM D422) FIGURE



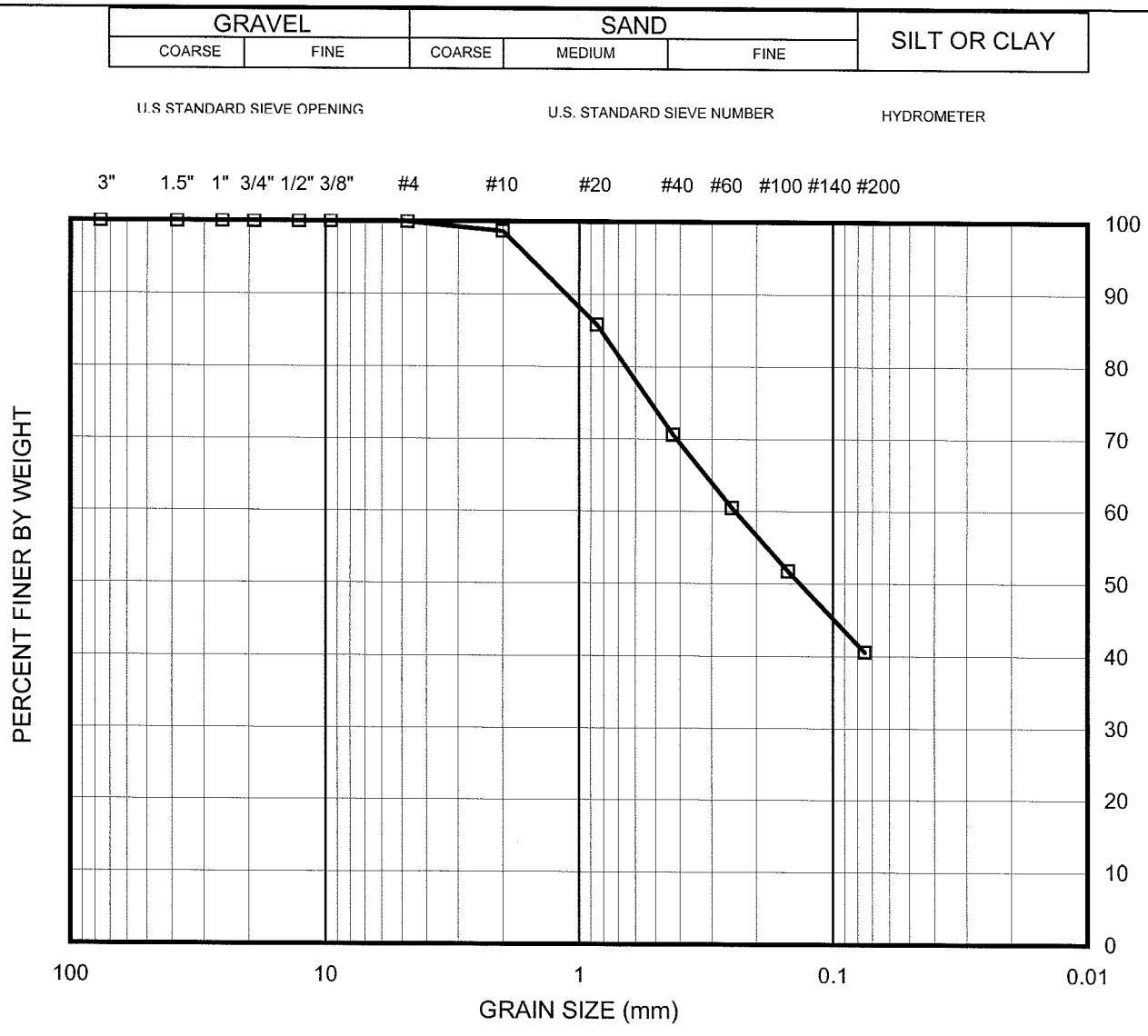
SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	S-12	30	Bag	SC	N/A	N/A

EGLAB, INC.

Project Name: FF / Morena Blvd.
Client Job No.: 154004-01
Client Name: LGC Valley, Inc.
EGLAB Project No.: 15-059-017

GRAIN SIZE DISTRIBUTION CURVE

09/25/15 (ASTM D422) FIGURE



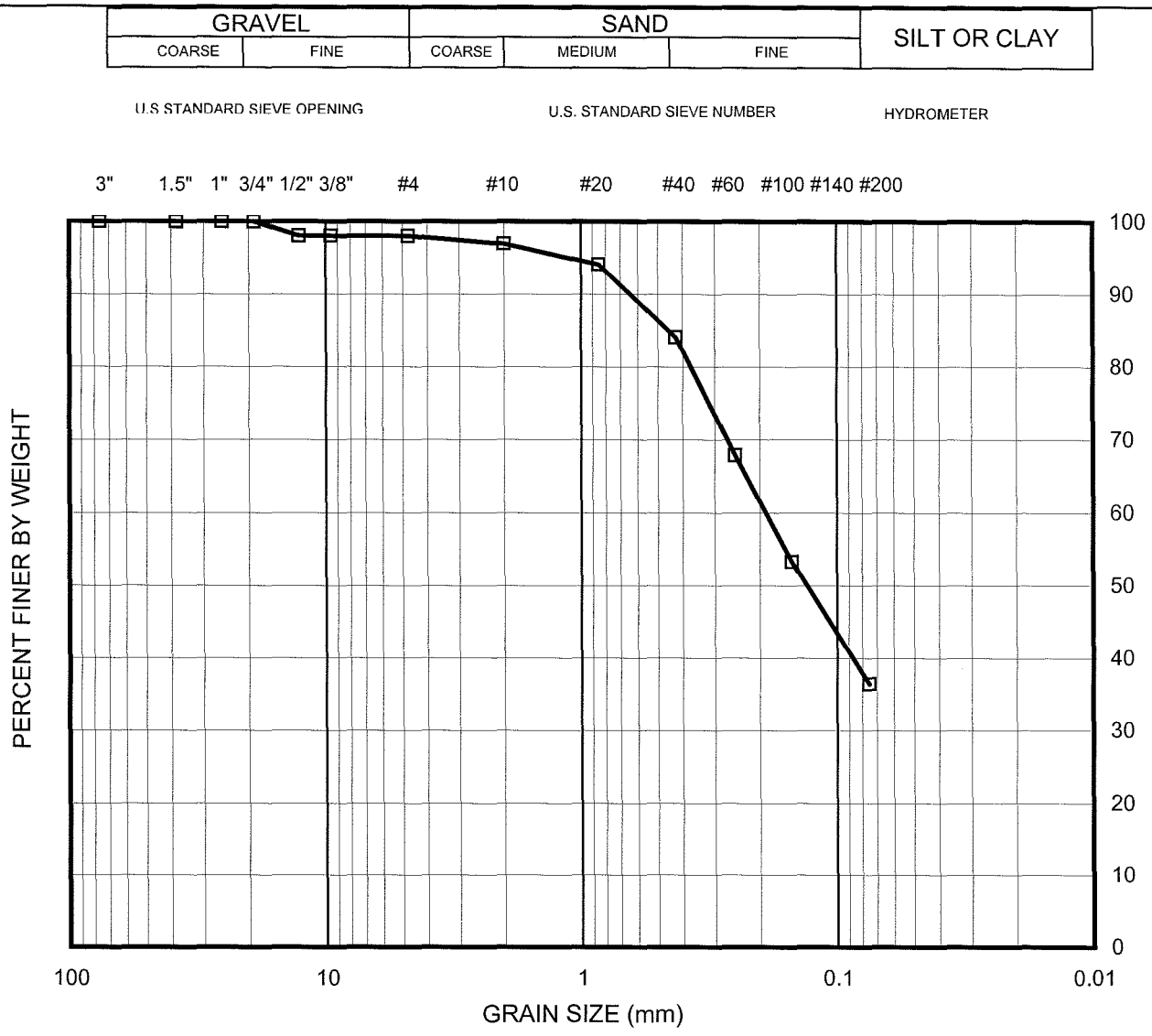
SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	S-13	32.5	Bag	SC	N/A	N/A

EGLAB, INC.

Project Name: FF / Morena Blvd.
Client Job No.: 154004-01
Client Name: LGC Valley, Inc.
EGLAB Project No.: 15-059-017

GRAIN SIZE DISTRIBUTION CURVE

09/25/15 (ASTM D422) FIGURE



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	S-14	35	Bag	SC	N/A	N/A

EGLAB, INC.

Project Name: FF / Morena Blvd.

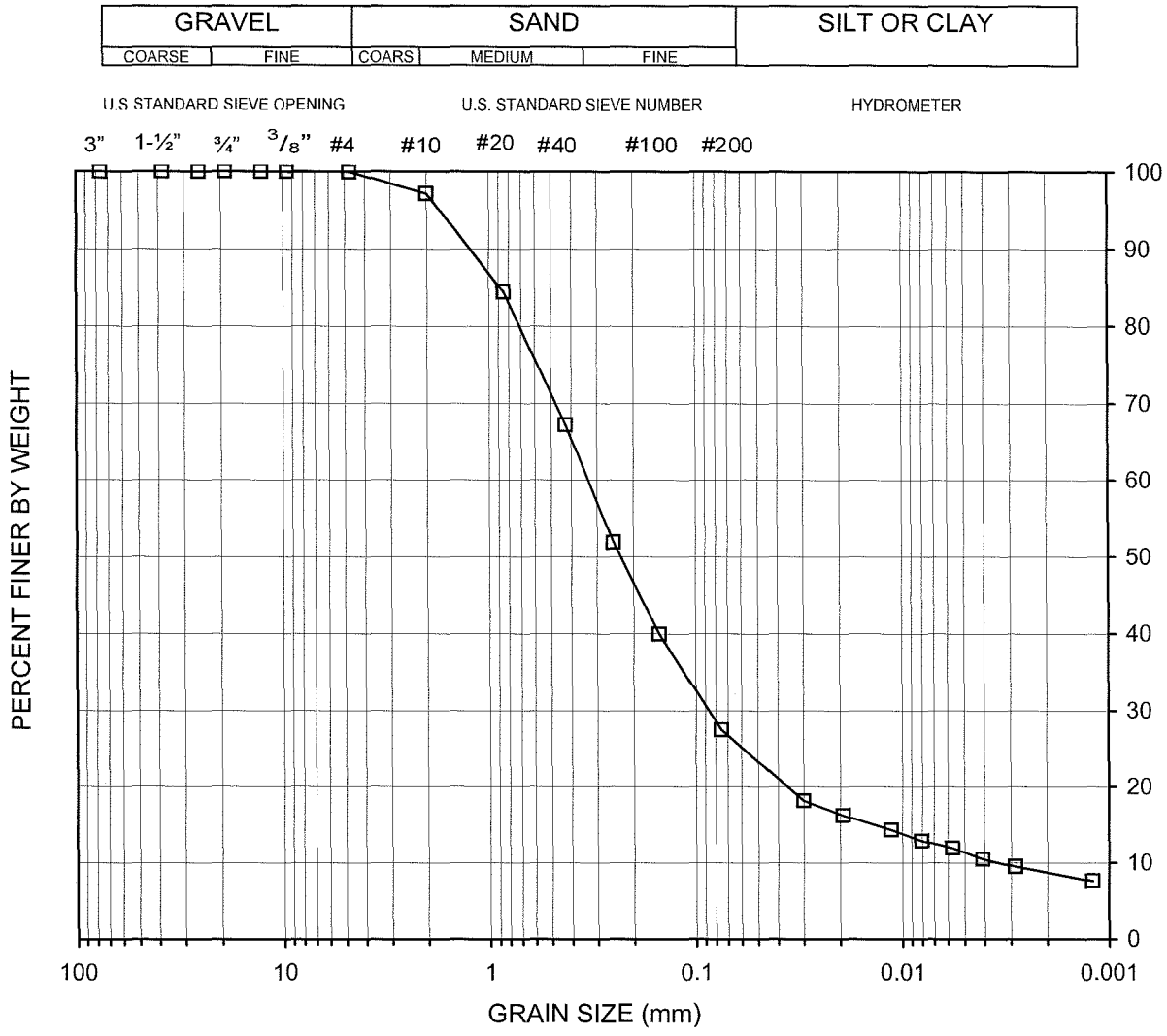
Client Job No.: 154004-01

Client Name: LGC Valley, Inc.

EGLAB Project No.: 15-059-017

GRAIN SIZE DISTRIBUTION CURVE

09/25/15 (ASTM D422) FIGURE



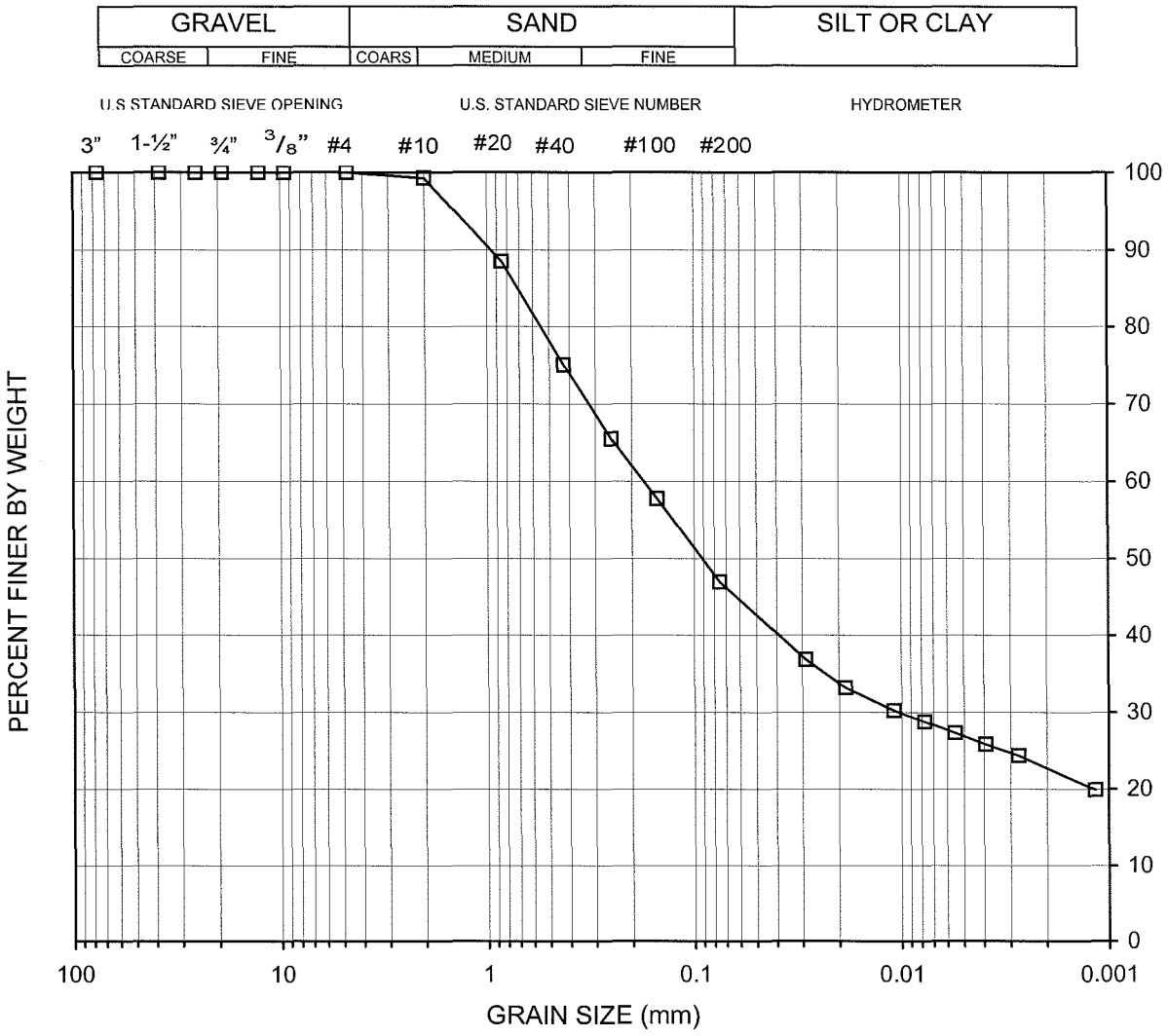
SYMBOL	BORING No.	SAMPLE No.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	S-15	37.5	Bag	SC	25	7

EGLAB, INC.

Project Name: FF / Morena Blvd.
Client: LGC Valley, Inc.
Job No.: 154004-01
EGLAB Project No.: 15-059-017

GRAINSIZE DISTRIBUTION CURVE

9/25/15 (ASTM D422) FIGURE



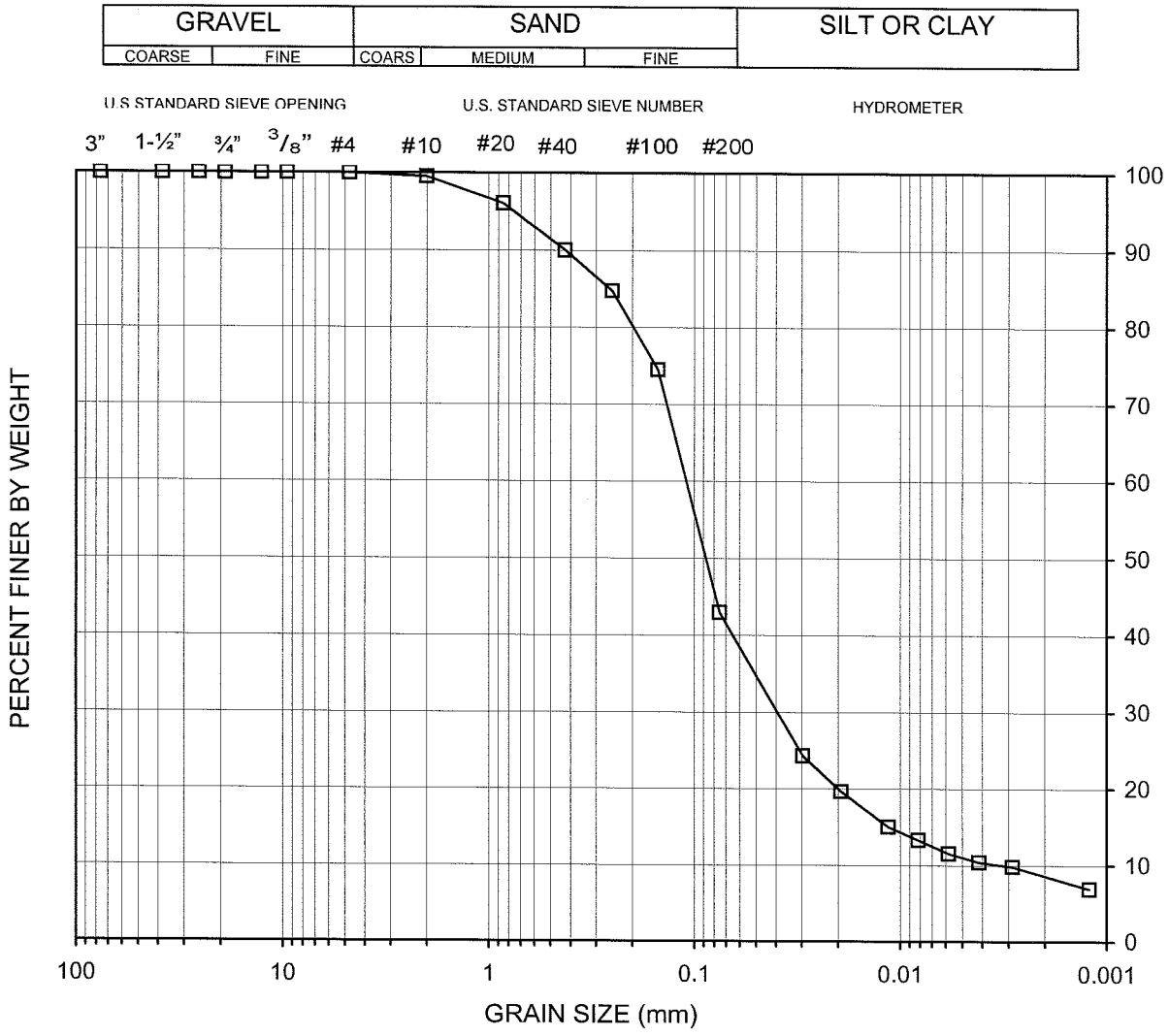
SYMBOL	BORING No.	SAMPLE No.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	S-16	40	Bag	SC	38	22

EGLAB, INC.

Project Name: FF / Morena Blvd.
Client: LGC Valley, Inc.
Job No.: 154004-01
EGLAB Project No.: 15-059-017

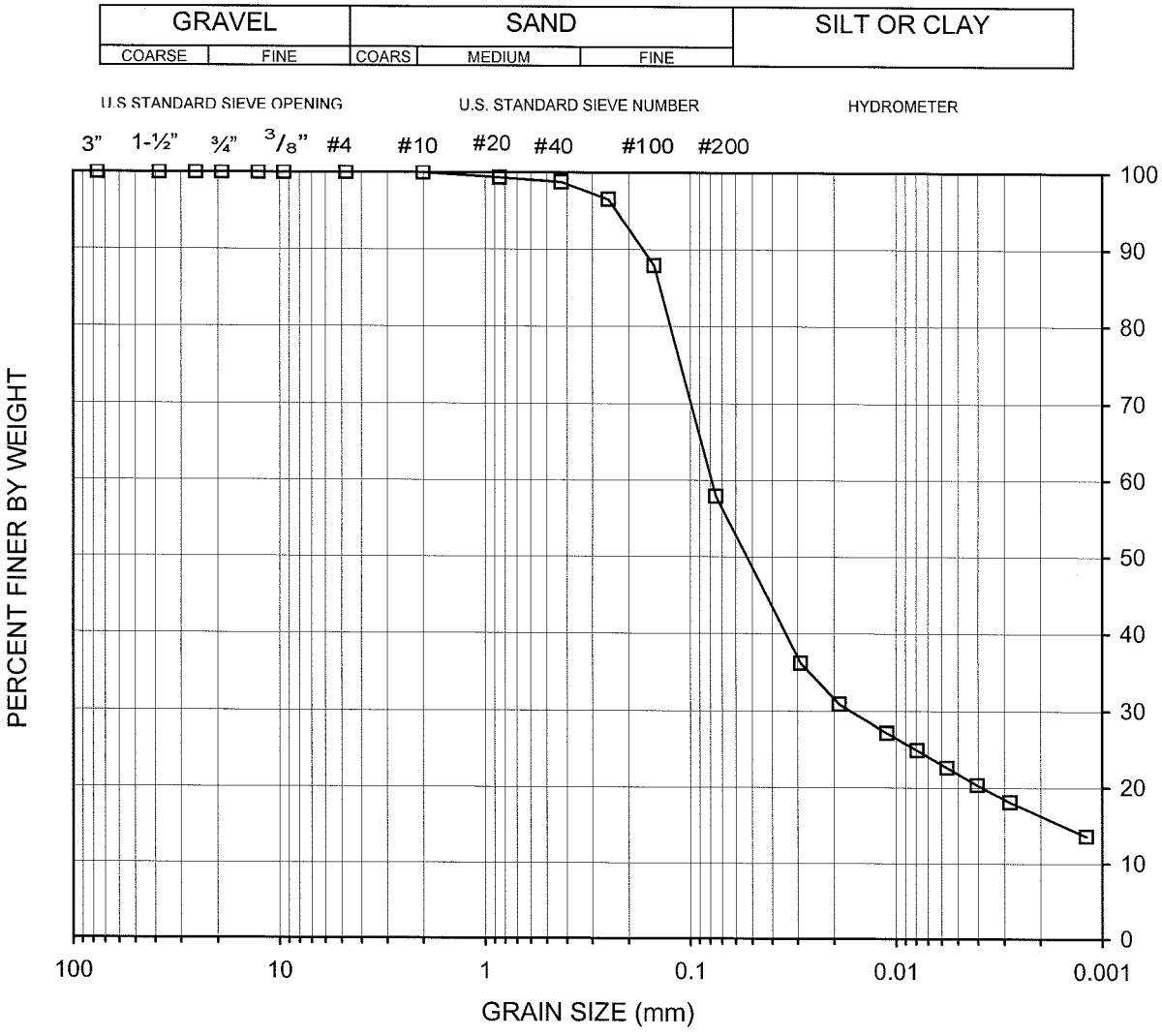
GRAINSIZE DISTRIBUTION CURVE

9/25/15 (ASTM D422) FIGURE



SYMBOL	BORING No.	SAMPLE No.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-2	R-3	7.5	Ring	SM	30	5

EGLAB, INC.	Project Name: FF / Morena Blvd. Client: LGC Valley, Inc. Job No.: 154004-01 EGLAB Project No.: 15-059-017
9/25/15	**GRAINSIZE DISTRIBUTION CURVE** (ASTM D422) FIGURE



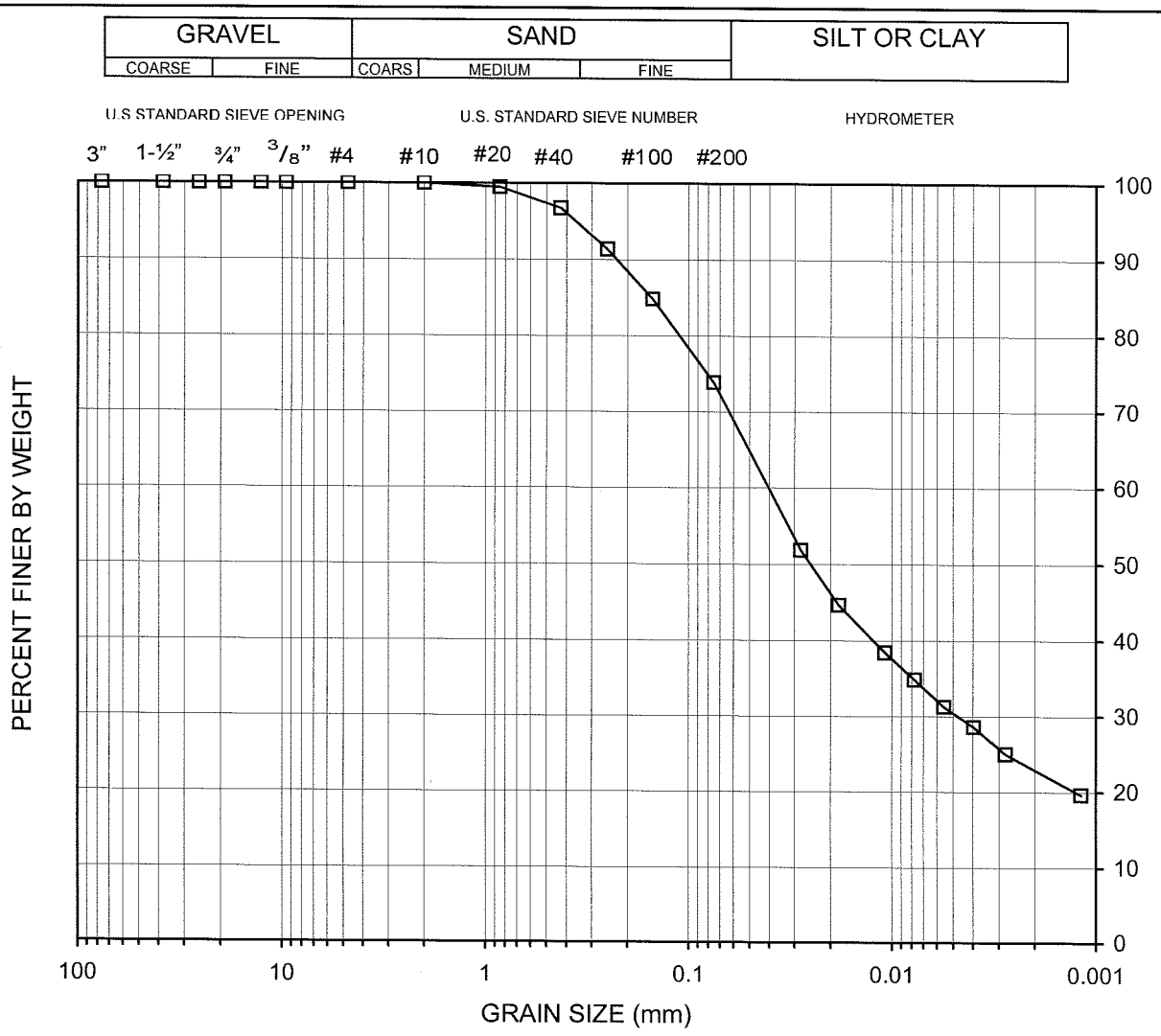
SYMBOL	BORING No.	SAMPLE No.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-2	S-4	10	Bag	CL	N/A	N/A

EGLAB, INC.

Project Name: FF / Morena Blvd.
Client: LGC Valley, Inc.
Job No.: 154004-01
EGLAB Project No.: 15-059-017

GRAINSIZE DISTRIBUTION CURVE

9/25/15 (ASTM D422) FIGURE



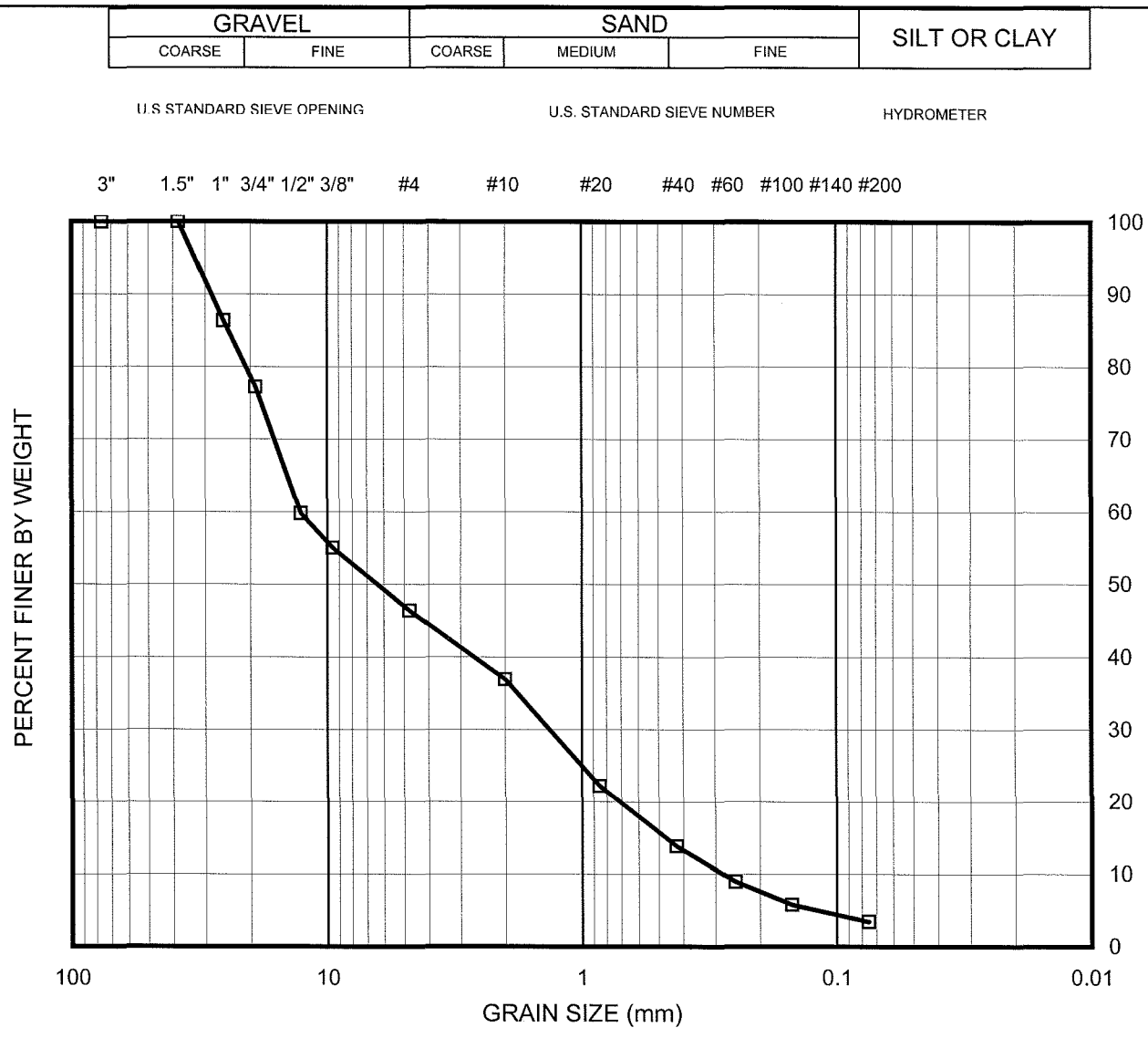
SYMBOL	BORING No.	SAMPLE No.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-2	S-5	12.5	Bag	CL	35	18

EGLAB, INC.

Project Name: FF / Morena Blvd.
Client: LGC Valley, Inc.
Job No.: 154004-01
EGLAB Project No.: 15-059-017

GRAINSIZE DISTRIBUTION CURVE

9/25/15 (ASTM D422) FIGURE



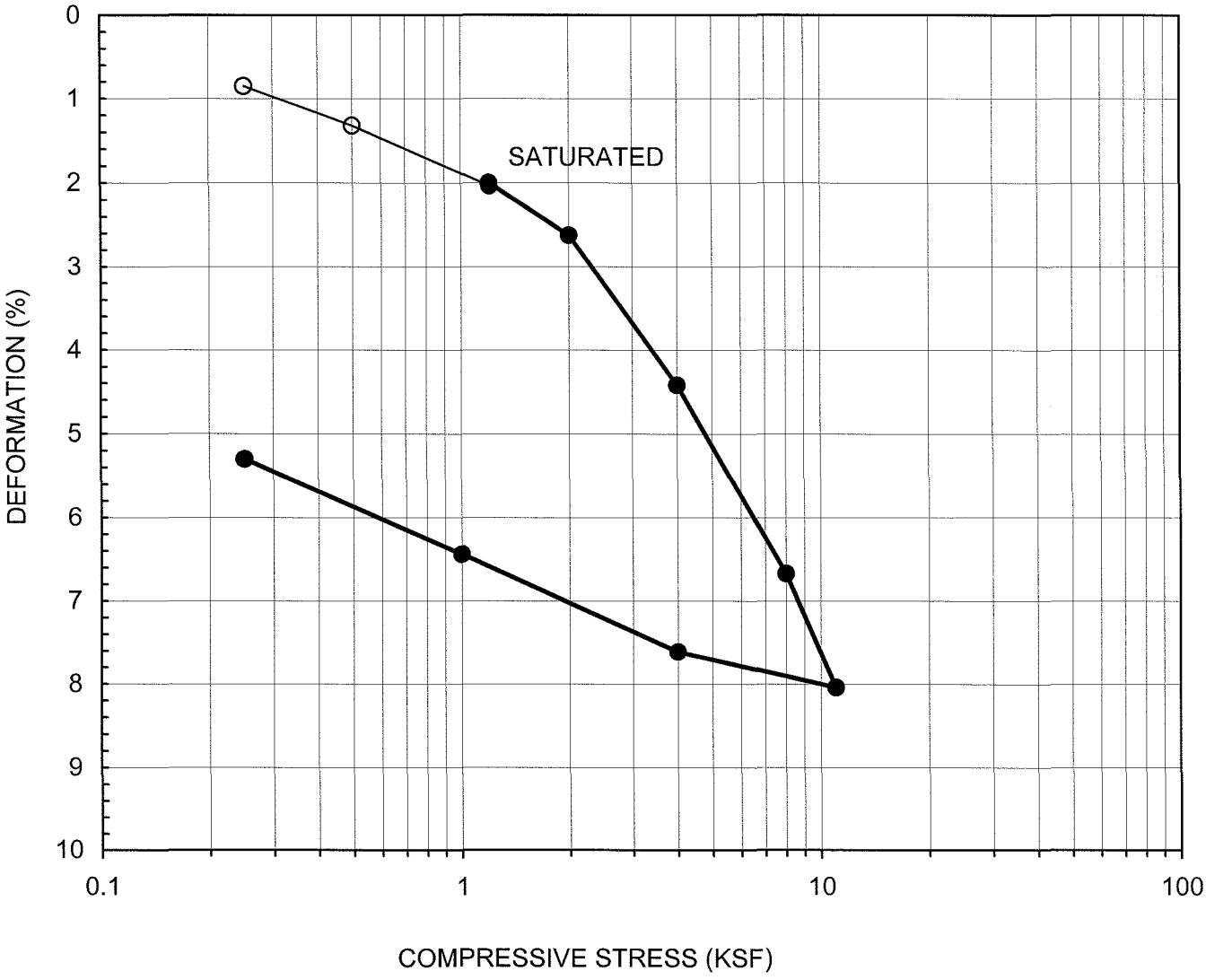
SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-2	S-7	17.5	Bag	GW	N/A	N/A

EGLAB, INC.

Project Name: FF / Morena Blvd.
Client Job No.: 154004-01
Client Name: LGC Valley, Inc.
EGLAB Project No.: 15-059-017

GRAIN SIZE DISTRIBUTION CURVE

09/25/15 (ASTM D422) FIGURE



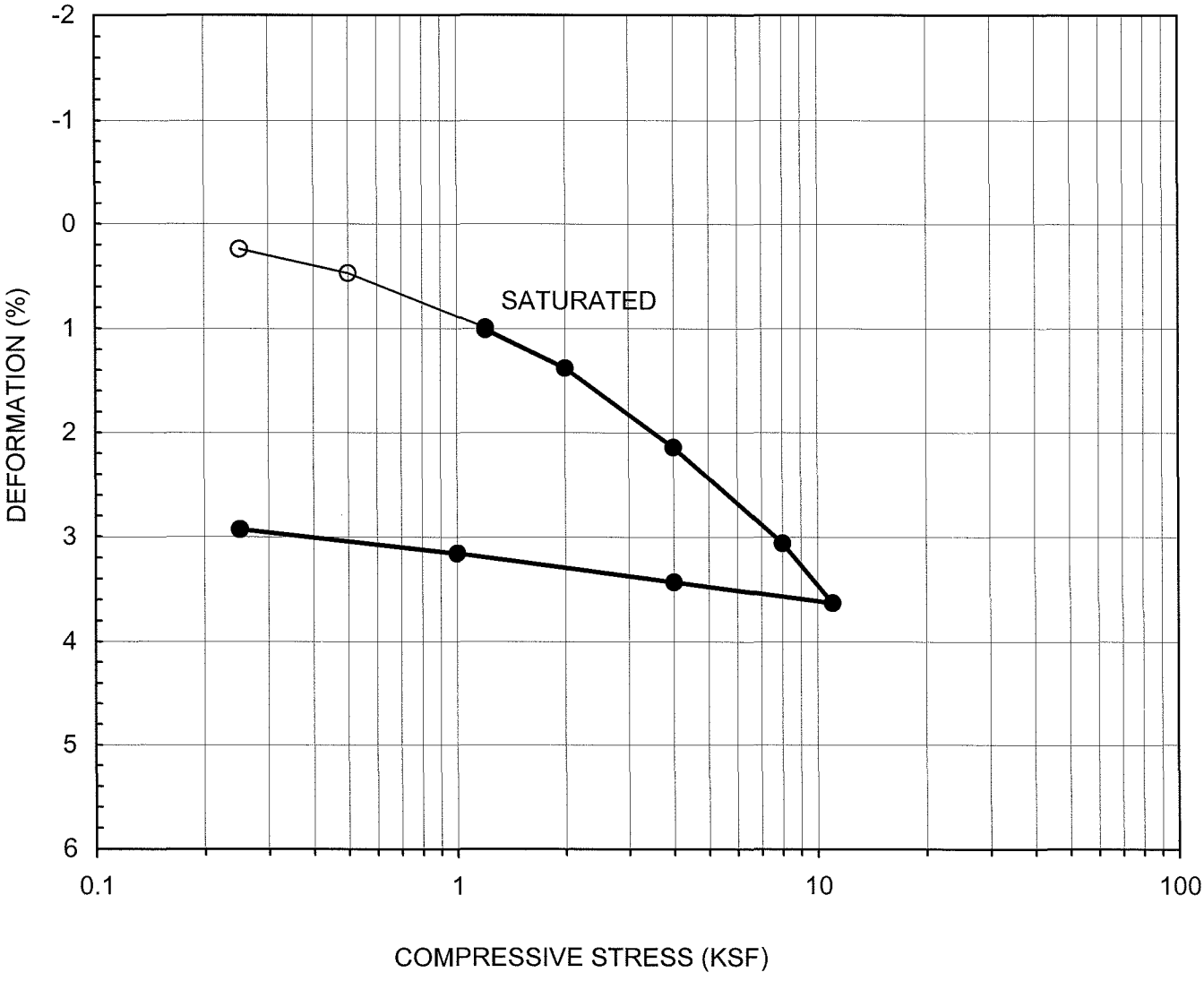
Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density (PCF)	Init. Void Ratio
○	B-1	R-3	7.5	CL	26.7	98.6	0.709

EGLAB, INC.

Project Name: FF / Morena Blvd.
Client: LGC Valley, Inc.
Job No.: 154004-01
EGLAB Project No.: 15-059-017

CONSOLIDATION

09/15 (ASTM D2435) Figure



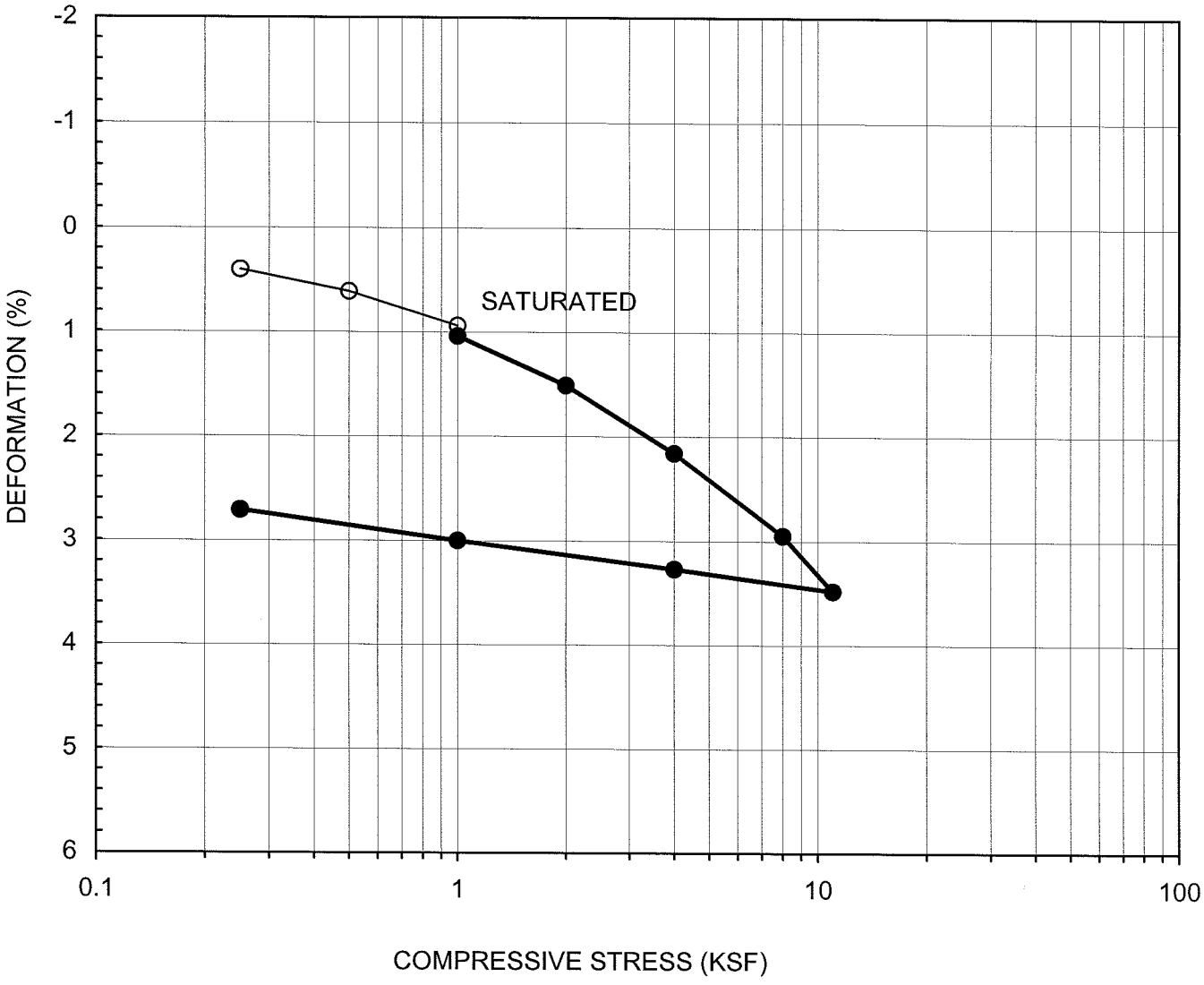
Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density (PCF)	Init. Void Ratio
○	B-1	R-4	10.0	SM	20.0	108.9	0.547

EGLAB, INC.

Project Name: FF / Morena Blvd.
Client: LGC Valley, Inc.
Job No.: 154004-01
EGLAB Project No.: 15-059-017

CONSOLIDATION

09/15 (ASTM D2435) Figure



Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density (PCF)	Init. Void Ratio
○	B-2	R-2	5.0	SP-SM	4.5	99.6	0.692

EGLAB, INC.

Project Name: FF / Morena Blvd.
Client: LGC Valley, Inc.
Job No.: 154004-01
EGLAB Project No.: 15-059-017

CONSOLIDATION

09/15 (ASTM D2435) Figure

APPENDIX F

Liquefaction Analysis

B1

```
*****************************
*                           *
*      L I Q U E F Y 2      *
*                           *
*       Version 1.50        *
*                           *
*****************************
```

EMPIRICAL PREDICTION OF
EARTHQUAKE-INDUCED LIQUEFACTION POTENTIAL

JOB NUMBER: 154004-01 DATE: 10-06-2015

JOB NAME: B-1

SOIL-PROFILE NAME: b1.LDW

BORING GROUNDWATER DEPTH: 6.00 ft

CALCULATION GROUNDWATER DEPTH: 5.00 ft

DESIGN EARTHQUAKE MAGNITUDE: 6.62 Mw

SITE PEAK GROUND ACCELERATION: 0.579 g

BOREHOLE DIAMETER CORRECTION FACTOR: 1.00

SAMPLER SIZE CORRECTION FACTOR: 1.20

N60 HAMMER CORRECTION FACTOR: 1.30

MAGNITUDE SCALING FACTOR METHOD: Idriss (1997, in press)

Magnitude Scaling Factor: 1.376

rd-CORRECTION METHOD: Seed (1985)

FIELD SPT N-VALUES ARE CORRECTED FOR THE LENGTH OF THE DRIVE RODS.

Rod Stick-Up Above Ground: 3.0 ft

CN NORMALIZATION FACTOR: 1.044 tsf

MINIMUM CN VALUE: 0.6

NCEER [1997] Method — LIQUEFACTION ANALYSIS SUMMARY — PAGE 1

File Name: b1.OUT

Figure F-1

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	FC DELTA N1_60	C N	CORR. (N1)60 (B/ft)	LIQUE. RESIST RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
1	0.25	0.015	0.015	28	2.29	*	*	*	*	*	**
1	0.75	0.045	0.045	28	2.29	*	*	*	*	*	**
1	1.25	0.075	0.075	28	2.29	*	*	*	*	*	**
1	1.75	0.105	0.105	28	2.29	*	*	*	*	*	**
1	2.25	0.135	0.135	28	2.29	*	*	*	*	*	**
1	2.75	0.165	0.165	28	2.29	*	*	*	*	*	**
1	3.25	0.195	0.195	28	2.29	*	*	*	*	*	**
1	3.75	0.225	0.225	28	2.29	*	*	*	*	*	**
1	4.25	0.255	0.255	28	2.29	*	*	*	*	*	**
1	4.75	0.285	0.285	28	2.29	*	*	*	*	*	**
2	5.25	0.315	0.307	9	~	~	~	~	~	~	~~
2	5.75	0.345	0.322	9	~	~	~	~	~	~	~~
2	6.25	0.375	0.336	9	~	~	~	~	~	~	~~
2	6.75	0.405	0.350	9	~	~	~	~	~	~	~~
2	7.25	0.435	0.365	9	~	~	~	~	~	~	~~
2	7.75	0.465	0.379	9	~	~	~	~	~	~	~~
2	8.25	0.495	0.394	9	~	~	~	~	~	~	~~
2	8.75	0.525	0.408	9	~	~	~	~	~	~	~~
2	9.25	0.555	0.422	9	~	~	~	~	~	~	~~
2	9.75	0.585	0.437	9	~	~	~	~	~	~	~~
3	10.25	0.615	0.451	21	1.18	1.429	38.1	Infin	0.979	0.502	NonLiq
3	10.75	0.645	0.466	21	1.18	1.429	38.1	Infin	0.978	0.510	NonLiq
3	11.25	0.675	0.480	21	1.18	1.429	38.1	Infin	0.977	0.517	NonLiq
3	11.75	0.705	0.494	21	1.18	1.429	38.1	Infin	0.976	0.524	NonLiq
3	12.25	0.735	0.509	21	1.18	1.429	38.1	Infin	0.974	0.530	NonLiq
4	12.75	0.765	0.523	24	1.27	1.355	43.5	Infin	0.973	0.536	NonLiq
4	13.25	0.795	0.538	24	1.27	1.355	43.5	Infin	0.972	0.541	NonLiq
4	13.75	0.825	0.552	24	1.27	1.355	43.5	Infin	0.971	0.546	NonLiq
4	14.25	0.855	0.566	24	1.27	1.355	43.5	Infin	0.970	0.551	NonLiq
4	14.75	0.885	0.581	24	1.27	1.355	43.5	Infin	0.969	0.556	NonLiq
5	15.25	0.915	0.595	29	2.55	1.262	53.0	Infin	0.968	0.560	NonLiq
5	15.75	0.945	0.610	29	2.55	1.262	53.0	Infin	0.967	0.564	NonLiq
5	16.25	0.975	0.624	29	2.55	1.262	53.0	Infin	0.966	0.568	NonLiq
5	16.75	1.005	0.638	29	2.55	1.262	53.0	Infin	0.965	0.572	NonLiq
5	17.25	1.035	0.653	29	2.55	1.262	53.0	Infin	0.964	0.575	NonLiq
6	17.75	1.065	0.667	23	12.39	1.210	52.0	Infin	0.963	0.578	NonLiq
6	18.25	1.095	0.682	23	12.39	1.210	52.0	Infin	0.961	0.581	NonLiq
6	18.75	1.125	0.696	23	12.39	1.210	52.0	Infin	0.960	0.584	NonLiq
6	19.25	1.155	0.710	23	12.39	1.210	52.0	Infin	0.959	0.587	NonLiq
6	19.75	1.185	0.725	23	12.39	1.210	52.0	Infin	0.958	0.589	NonLiq
7	20.25	1.215	0.739	16	6.77	1.143	33.8	Infin	0.956	0.592	NonLiq
7	20.75	1.245	0.754	16	6.77	1.143	33.8	Infin	0.955	0.594	NonLiq
7	21.25	1.275	0.768	16	6.77	1.143	33.8	Infin	0.954	0.596	NonLiq

NCEER [1997] Method

LIQUEFACTION ANALYSIS SUMMARY

File Name: b1.OUT

SOIL	CALC. DEPTH	TOTAL STRESS	EFF. STRESS	FIELD N	FC DELTA	C	CORR. (N1)60	LIQUE. RESIST	r	INDUC. STRESS	LIQUE. SAFETY

Figure F-2

NO.	(ft)	(tsf)	(tsf)	(B/ft)	N1_60	B1 N	(B/ft)	RATIO	d	RATIO	FACTOR
7	21.75	1.305	0.782	16	6.77	1.143	33.8	Infin	0.952	0.598	NonLiq
7	22.25	1.335	0.797	16	6.77	1.143	33.8	Infin	0.951	0.600	NonLiq
8	22.75	1.365	0.811	16	9.95	1.104	36.6	Infin	0.949	0.601	NonLiq
8	23.25	1.395	0.826	16	9.95	1.104	36.6	Infin	0.948	0.603	NonLiq
8	23.75	1.425	0.840	16	9.95	1.104	36.6	Infin	0.946	0.604	NonLiq
8	24.25	1.455	0.854	16	9.95	1.104	36.6	Infin	0.945	0.605	NonLiq
8	24.75	1.485	0.869	16	9.95	1.104	36.6	Infin	0.943	0.607	NonLiq
9	25.25	1.515	0.883	22	10.61	1.052	46.5	Infin	0.941	0.608	NonLiq
9	25.75	1.545	0.898	22	10.61	1.052	46.5	Infin	0.939	0.609	NonLiq
9	26.25	1.575	0.912	22	10.61	1.052	46.5	Infin	0.938	0.609	NonLiq
9	26.75	1.605	0.926	22	10.61	1.052	46.5	Infin	0.936	0.610	NonLiq
9	27.25	1.635	0.941	22	10.61	1.052	46.5	Infin	0.934	0.611	NonLiq
10	27.75	1.665	0.955	24	10.61	1.021	48.8	Infin	0.931	0.611	NonLiq
10	28.25	1.695	0.970	24	10.61	1.021	48.8	Infin	0.929	0.611	NonLiq
10	28.75	1.725	0.984	24	10.61	1.021	48.8	Infin	0.927	0.612	NonLiq
10	29.25	1.755	0.998	24	10.61	1.021	48.8	Infin	0.925	0.612	NonLiq
10	29.75	1.785	1.013	24	10.61	1.021	48.8	Infin	0.922	0.612	NonLiq
11	30.25	1.815	1.027	16	9.80	0.980	34.3	Infin	0.920	0.612	NonLiq
11	30.75	1.845	1.042	16	9.80	0.980	34.3	Infin	0.917	0.611	NonLiq
11	31.25	1.875	1.056	16	9.80	0.980	34.3	Infin	0.914	0.611	NonLiq
11	31.75	1.905	1.070	16	9.80	0.980	34.3	Infin	0.912	0.611	NonLiq
11	32.25	1.935	1.085	16	9.80	0.980	34.3	Infin	0.909	0.610	NonLiq
12	32.75	1.965	1.099	18	10.26	0.955	37.1	Infin	0.906	0.609	NonLiq
12	33.25	1.995	1.114	18	10.26	0.955	37.1	Infin	0.903	0.609	NonLiq
12	33.75	2.025	1.128	18	10.26	0.955	37.1	Infin	0.899	0.608	NonLiq
12	34.25	2.055	1.142	18	10.26	0.955	37.1	Infin	0.896	0.607	NonLiq
12	34.75	2.085	1.157	18	10.26	0.955	37.1	Infin	0.893	0.606	NonLiq
13	35.25	2.115	1.171	32	14.04	0.921	60.0	Infin	0.889	0.604	NonLiq
13	35.75	2.145	1.186	32	14.04	0.921	60.0	Infin	0.886	0.603	NonLiq
13	36.25	2.175	1.200	32	14.04	0.921	60.0	Infin	0.882	0.602	NonLiq
13	36.75	2.205	1.214	32	14.04	0.921	60.0	Infin	0.878	0.600	NonLiq
13	37.25	2.235	1.229	32	14.04	0.921	60.0	Infin	0.874	0.599	NonLiq
14	37.75	2.265	1.243	16	7.65	0.895	30.0	0.478	0.871	0.597	1.10
14	38.25	2.295	1.258	16	7.65	0.895	30.0	0.478	0.866	0.595	1.10
14	38.75	2.325	1.272	16	7.65	0.895	30.0	0.478	0.862	0.593	1.11
14	39.25	2.355	1.286	16	7.65	0.895	30.0	0.478	0.858	0.591	1.11
14	39.75	2.385	1.301	16	7.65	0.895	30.0	0.478	0.854	0.589	1.12
15	40.25	2.415	1.315	15	~	~	~	~	~	~	~~
15	40.75	2.445	1.330	15	~	~	~	~	~	~	~~
15	41.25	2.475	1.344	15	~	~	~	~	~	~	~~
15	41.75	2.505	1.358	15	~	~	~	~	~	~	~~

$2.5' \times 0.008 \times \frac{1}{1} = 0.24''$

Figure F-3

B2

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*                           *
*      L I Q U E F Y 2      *
*                           *
*       Version 1.50        *
*                           *
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EMPIRICAL PREDICTION OF
EARTHQUAKE-INDUCED LIQUEFACTION POTENTIAL

JOB NUMBER: 154004-01 DATE: 10-06-2015

JOB NAME: B-2

SOIL-PROFILE NAME: b2.LDW

BORING GROUNDWATER DEPTH: 8.00 ft

CALCULATION GROUNDWATER DEPTH: 5.00 ft

DESIGN EARTHQUAKE MAGNITUDE: 6.62 Mw

SITE PEAK GROUND ACCELERATION: 0.579 g

BOREHOLE DIAMETER CORRECTION FACTOR: 1.00

SAMPLER SIZE CORRECTION FACTOR: 1.20

N60 HAMMER CORRECTION FACTOR: 1.30

MAGNITUDE SCALING FACTOR METHOD: Idriss (1997, in press)

Magnitude Scaling Factor: 1.376

rd-CORRECTION METHOD: Seed (1985)

FIELD SPT N-VALUES ARE CORRECTED FOR THE LENGTH OF THE DRIVE RODS.

Rod Stick-Up Above Ground: 3.0 ft

CN NORMALIZATION FACTOR: 1.044 tsf

MINIMUM CN VALUE: 0.6

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File Name: b2.OUT

Figure F-4

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	FC DELTA N1_60	C N	CORR. (N1)60 (B/ft)	LIQUE. RESIST RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
1	0.25	0.015	0.015	13	10.97	*	*	*	*	*	**
1	0.75	0.045	0.045	13	10.97	*	*	*	*	*	**
1	1.25	0.075	0.075	13	10.97	*	*	*	*	*	**
1	1.75	0.105	0.105	13	10.97	*	*	*	*	*	**
1	2.25	0.135	0.135	13	10.97	*	*	*	*	*	**
1	2.75	0.165	0.165	13	10.97	*	*	*	*	*	**
1	3.25	0.195	0.195	13	10.97	*	*	*	*	*	**
1	3.75	0.225	0.225	13	10.97	*	*	*	*	*	**
1	4.25	0.255	0.255	13	10.97	*	*	*	*	*	**
1	4.75	0.285	0.285	13	10.97	*	*	*	*	*	**
2	5.25	0.315	0.307	21	13.06	1.669	54.1	Infin	0.990	0.382	NonLiq
2	5.75	0.345	0.322	21	13.06	1.669	54.1	Infin	0.989	0.399	NonLiq
2	6.25	0.375	0.336	21	13.06	1.669	54.1	Infin	0.987	0.415	NonLiq
2	6.75	0.405	0.350	21	13.06	1.669	54.1	Infin	0.986	0.429	NonLiq
2	7.25	0.435	0.365	21	13.06	1.669	54.1	Infin	0.985	0.442	NonLiq
3	7.75	0.465	0.379	15	10.04	1.464	35.7	Infin	0.984	0.454	NonLiq
3	8.25	0.495	0.394	15	10.04	1.464	35.7	Infin	0.983	0.465	NonLiq
3	8.75	0.525	0.408	15	10.04	1.464	35.7	Infin	0.982	0.475	NonLiq
3	9.25	0.555	0.422	15	10.04	1.464	35.7	Infin	0.981	0.485	NonLiq
3	9.75	0.585	0.437	15	10.04	1.464	35.7	Infin	0.980	0.494	NonLiq
4	10.25	0.615	0.451	16	~	~	~	~	~	~	~~
4	10.75	0.645	0.466	16	~	~	~	~	~	~	~~
4	11.25	0.675	0.480	16	~	~	~	~	~	~	~~
4	11.75	0.705	0.494	16	~	~	~	~	~	~	~~
4	12.25	0.735	0.509	16	~	~	~	~	~	~	~~
5	12.75	0.765	0.523	18	~	~	~	~	~	~	~~
5	13.25	0.795	0.538	18	~	~	~	~	~	~	~~
5	13.75	0.825	0.552	18	~	~	~	~	~	~	~~
5	14.25	0.855	0.566	18	~	~	~	~	~	~	~~
5	14.75	0.885	0.581	18	~	~	~	~	~	~	~~
6	15.25	0.915	0.595	31	~	~	~	~	~	~	~~
6	15.75	0.945	0.610	31	~	~	~	~	~	~	~~
6	16.25	0.975	0.624	31	~	~	~	~	~	~	~~
6	16.75	1.005	0.638	31	~	~	~	~	~	~	~~
6	17.25	1.035	0.653	31	~	~	~	~	~	~	~~
7	17.75	1.065	0.667	37	0.08	1.160	61.2	Infin	0.963	0.578	NonLiq
7	18.25	1.095	0.682	37	0.08	1.160	61.2	Infin	0.961	0.581	NonLiq
7	18.75	1.125	0.696	37	0.08	1.160	61.2	Infin	0.960	0.584	NonLiq
7	19.25	1.155	0.710	37	0.08	1.160	61.2	Infin	0.959	0.587	NonLiq
7	19.75	1.185	0.725	37	0.08	1.160	61.2	Infin	0.958	0.589	NonLiq

Figure F-5

APPENDIX G

General Earthwork and Grading Specifications for Rough Grading

1.0 General

1.1 Intent: These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 The Geotechnical Consultant of Record: Prior to commencement of work, the owner shall employ a qualified Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to confirm that the attained level of compaction is being accomplished as specified. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 The Earthwork Contractor: The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the project plans and specifications. The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading,

the number of "equipment" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate personnel will be available for observation and testing. . The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified. It is the contractor's sole responsibility to provide proper fill compaction.

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing: Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 10 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed. The contractor is responsible for all hazardous waste relating to his work. The Geotechnical Consultant does not have expertise in this area. If hazardous waste is a concern, then the Client should acquire the services of a qualified environmental assessor.

2.2 Processing: Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free

from oversize material and the working surface is reasonably uniform, flat, and free from uneven features that would inhibit uniform compaction.

2.3 ***Overexcavation:*** In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 ***Benching:*** Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.

2.5 ***Evaluation/Acceptance of Fill Areas:*** All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

3.1 ***General:*** Material to be used as fill shall be essentially free from organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 ***Oversize:*** Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 ***Import:*** If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 ***Fill Layers:*** Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 ***Fill Moisture Conditioning:*** Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557-91).

4.3 ***Compaction of Fill:*** After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557-91). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 ***Compaction of Fill Slopes:*** In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheeps-foot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557-91.

4.5 ***Compaction Testing:*** Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 ***Frequency of Compaction Testing:*** Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 ***Compaction Test Locations:*** The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with

sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

7.1 The Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

7.2 All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 1 foot above the top of the conduit to the surface.

7.3 The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

7.4 The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

LGC Valley, Inc.
Geotechnical Consulting

June 23, 2017 Project No. 154004-03

Mr. Shon Finch
FF Realty III, LLC
5510 Morehouse Drive, Suite 200
San Diego, California 92121

Subject: ***Addendum Geotechnical Study and Response to 2nd City of San Diego LDR-Geology Multi-Discipline Cycle Issues/Review Comments, Proposed Morena Apartment Homes, 1579 and 1623 Morena Boulevard, San Diego, California***

Introduction

LGC Valley, Inc. (LGC) has prepared this letter to address the review comments made in the recent City of San Diego LDR-Geology Plan Check Comments (San Diego City, 2017) regarding geotechnical issues relative to the apartment home complex located at the northeast corner of Morena Boulevard and Frankfort Street in the Bay Park area of the City of San Diego, California. The findings, conclusions and recommendations of our addendum geotechnical study and our response to the outstanding/unresolved cycle issues/review comments are presented below.

Addendum Study

Based on the results of this current addendum study and our recent update geotechnical study (LGC Valley, 2016), it is our professional opinion that the proposed site development is suitable for the currently proposed development from a geotechnical standpoint provided the recommendations included in this report and the other project geotechnical reports (Appendix A) are incorporated into the project plans and specifications, and followed during site grading and construction. Additional geotechnical recommendations are provided in the Review Comments Section of this report.

Review Comments

Comments Issue No. 5: The project geotechnical consultant must indicate if the site is suitable for the currently proposed development.

Response: Acknowledged. See comment above in the Addendum Study Section of this report.

Comments Issue No. 11: Submit an addendum geotechnical report or update letter that specifically addresses the proposed development for the purposes of environmental review and the following:

Response: Acknowledged.

Comments Issue No. 12: The project's geotechnical consultant indicates that the site development is feasible from geotechnical standpoint; however, as previously requested the geotechnical consultant must indicate if the site is suitable for the currently proposed development (per the City of San Diego's Guidelines for Geotechnical Reports, page 9).

Response: Acknowledged. See comment above in the Addendum Study section of this report.

Comments Issue No. 13: The answers to the screening question for Criteria #1 and 5 of worksheet C.4-1 should be based on the infiltration rates. The yes/ no response for Criteria #1 and 5 should be based on the infiltration rates from the site. Note: A 'Partial Infiltration' condition exists when the infiltration rates are between 0.01 inches per hour (in/hr) and 0.50 in/hr. Criterion #5 should be updated to reflect this information.

Response: The City of San Diego Worksheet C.4-1 - Categorization of Infiltration Feasibility Condition and Worksheet D.5-1 - Factor of Safety and Design Infiltration Rate Worksheet have been revised and included in Appendix B of this report. Criteria No. 1 and 5 have been updated to indicate that a partial infiltration category is applicable to the site. We understand that a partial infiltration condition exists when the site infiltration rates range between 0.01 and 0.5 inches per hour. The recommended unadjusted infiltration rates for the project biofiltration basins are 0.01 inches per hour for the southern basin, 0.10 inches per hour for the northwestern range, and 0.81 inches per hour for the northeastern biofiltration basin.

Comments Issue No. 14: Currently, Criteria #2 & 6 includes a general statement of geotechnical hazards on the site. In order for the City to accept the current geotechnical hazard(s) justification, the project's geotechnical consultant must address each specific geologic or geotechnical hazard associated with storm water infiltration. If geologic or geotechnical hazards are demonstrated, describe the measures available to mitigate the hazard to an acceptable level of risk and recommend specifications for each storm water basin. The analyses and supporting documentation should be submitted for review.

Response: Two geotechnical cross-sections were prepared showing the proposed biofiltration basins relative to the adjacent buildings and retaining wall along the south side of the site. As indicated in Cross-Sections E-E' and F-F' (Figures 1 and 2), the northwestern and northeastern biofiltration basins are located, as close as, 7 feet from the proposed residential buildings (Figure 1) while the southern bioretention basin is located, as close as, 2 feet from the corner of Building 8 and within approximately 5 to 6 feet of the retaining wall along the toe-of-slope. Figure 1 is located approximately 10 from the northern end of the northwestern biofiltration basin while Figure 2 is located approximately 30 feet from the eastern end of the southern biofiltration basin.

Geotechnical analysis indicates that lateral migration of the storm water infiltration water may have a detrimental impact on the proposed improvements. However, the impact can be mitigated to an acceptable level by the placement of an impermeable liner along the sides of the biofiltration basins (as indicated in Figures 1 and 2). The 30-mil thick impermeable liner should extend to at least 6-inches above the top of the catch basin riser/high water level in each of the biofiltration basins.

Groundwater mounding may also be a concern; however, the relatively low infiltration rates obtained on the site indicate that mounding should be minimal.

Based on our revised analysis, and as indicated on Worksheet C.4-1 - Categorization of Infiltration Feasibility Condition, we conclude that the site infiltration category should be considered a "partial infiltration" condition and that the biofiltration basins should be designed accordingly.

Closure

The opportunity to be of service is appreciated. Should you have any questions regarding the content of this report, or should you require additional information, please do not hesitate to contact this office at your earliest convenience.

If you should have any questions, please do not hesitate to contact us. The undersigned can be reached at (760) 599-7000.

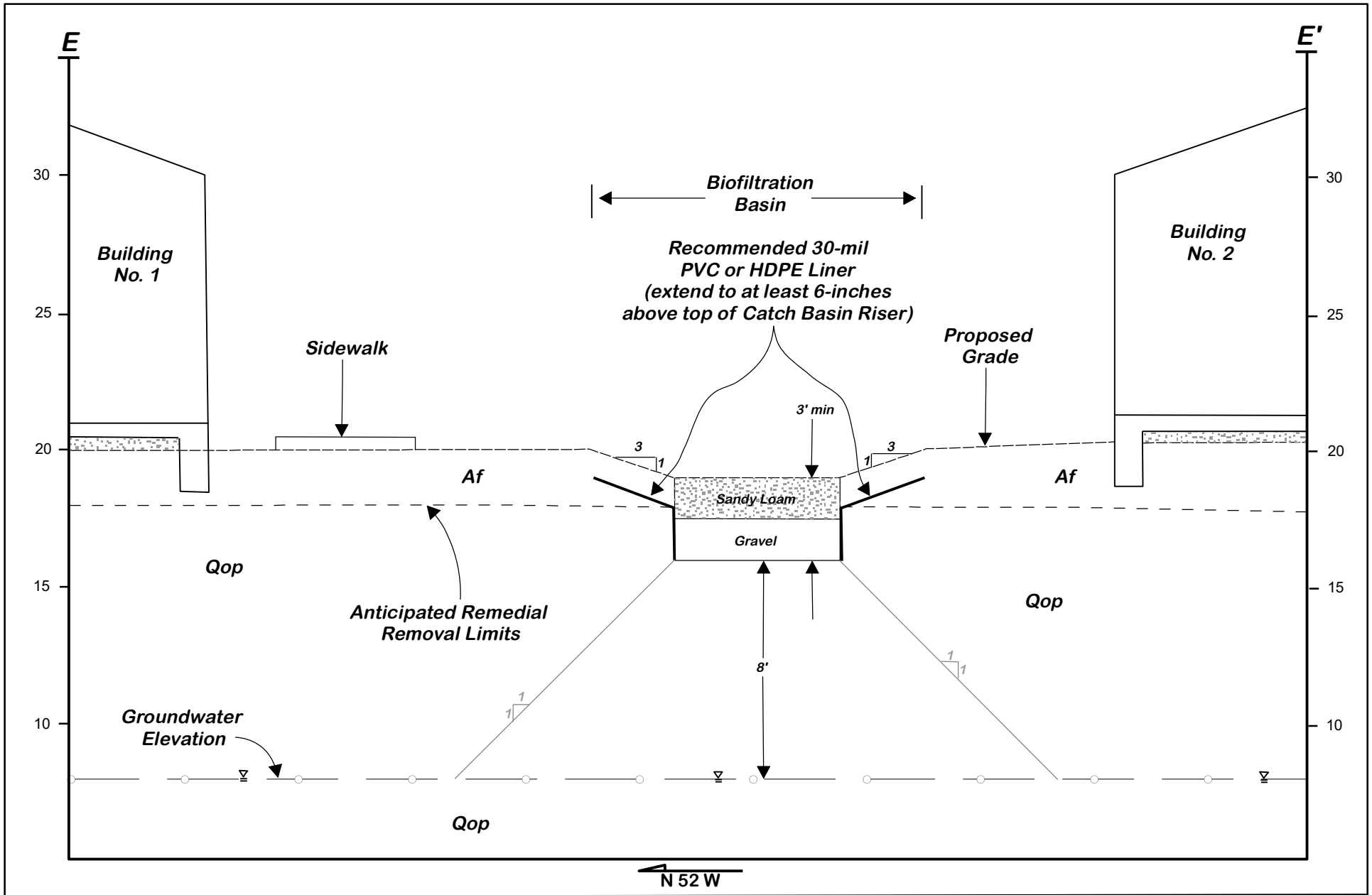
Respectfully submitted,

LGC Valley, Inc.

Randall Wagner, CEG 1612
Senior Project Geologist

Attachments: Figure 1 - Cross-Section E-E'
Figure 2 - Cross-Section F-F'
Appendix A - References
Appendix B - City of San Diego Worksheet C.4-1 - Categorization of Infiltration Feasibility Condition and Worksheet D.5-1 - Factor of Safety and Design Infiltration Rate Worksheet

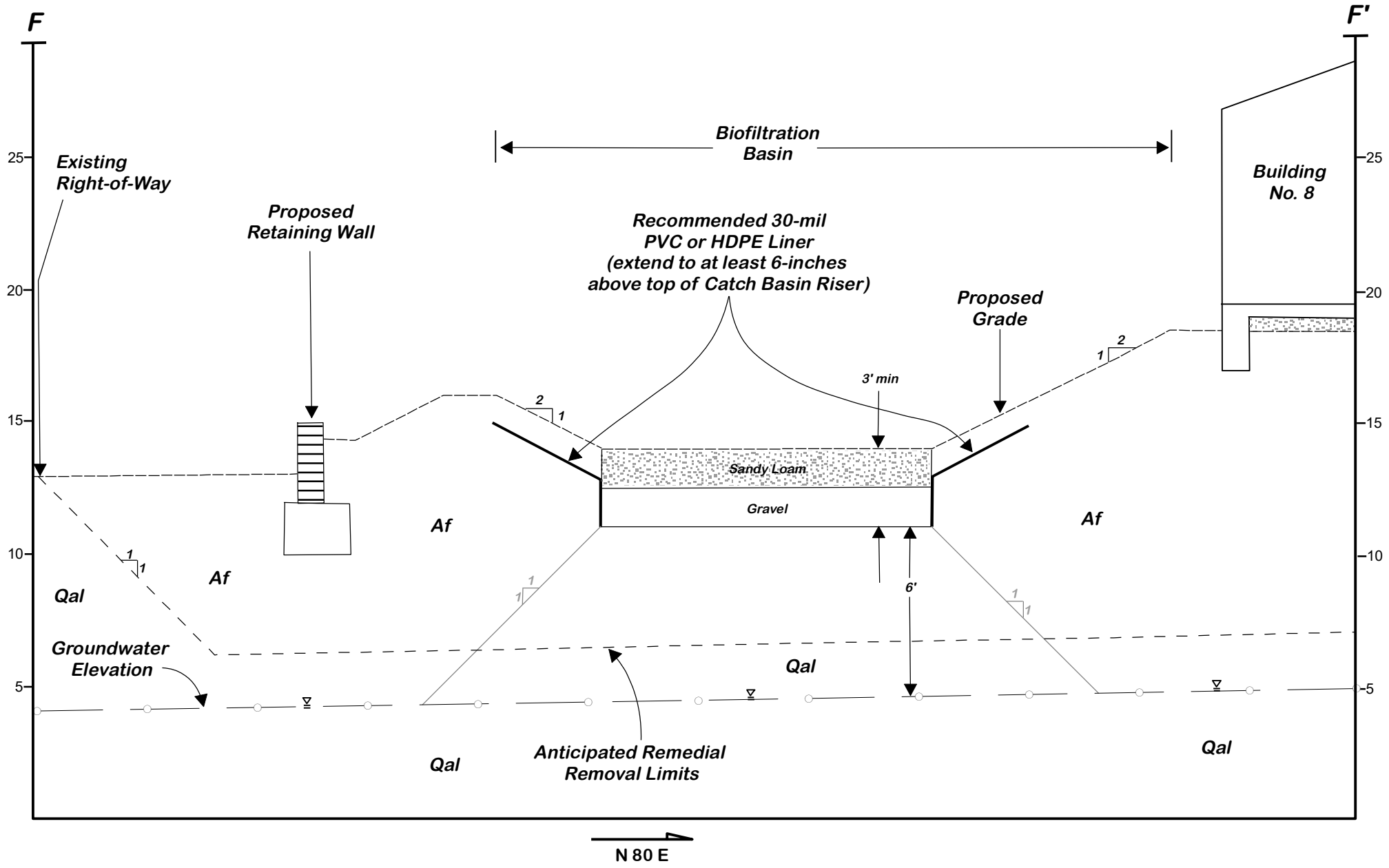
Distribution: (1) Addressee (via e-mail)
(1) Project Design Consultants; Attention Ms. Marina Wurst (via e-mail)
(1) Project Design Consultants; Attention Ms. Chelisa Pack (via e-mail)
(1) Project Design Consultants; Attention Ms. Cameron Bell (via e-mail)



LGC

Figure 1
Cross Section E-E'
Morena Apartment Homes
1597 and 1623 Morena Boulevard
San Diego, California

Project Name	Fairfield Morena Boulevard
Project Number	154004-03
Eng./Geo.	BIH/RKW
Date	June 23, 2017
Scale	1" = 5'



LGC

Figure 2
Cross Section F-F'
Morena Apartment Homes
1597 and 1623 Morena Boulevard
San Diego, California

Project Name	Fairfield Morena Boulevard
Project Number	154004-03
Eng./Geo.	BIH/RKW
Date	June 23, 2017
Scale	1" = 5'

APPENDIX A

References

LGC Valley, Inc., 2015, Preliminary Geotechnical Investigation Report for a Proposed Apartment Complex Development, 1579 and 1623 Morena Boulevard, San Diego, California, Project No. 154004-01, dated October 6, 2015.

LGC Valley, Inc., 2016, Preliminary Bioretention Basin Infiltration Study, Proposed Apartment Complex Development, 1579 and 1623 Morena Boulevard, City of San Diego, California, Project No. 154004-01, dated November 29, 2016.

LGC Valley, Inc., 2017, Update Geotechnical Study and Response to City Review Comments, Proposed Morena Apartment Homes, 1579 and 1623 Morena Boulevard, San Diego, California, Project Number 154004-03, dated May 4, 2017.

Project Design Consultants, 2017, Site Development Plans, Morena Apartment Homes, Vesting Tentative Map No. 186551, 58 sheets, dated December 5, 2016, revised May 8, 2017.

San Diego City, 2016, Storm Water Standards, Part 1: BMP Design Manual for Permanent Site Design, Storm Water Treatment and Hydromodification Management with Appendices, dated January 2016.

San Diego City, 2017, LDR-Geology Multi-Discipline Cycle Issues, Project No. 526167, Pages 28 and 29 of 37, dated June 1, 2017.

APPENDIX B

City of San Diego

Worksheet C.4-1 - Categorization of Infiltration Feasibility Condition

and

Worksheet D.5-1 - Factor of Safety and Design Infiltration Rate Worksheet

Categorization of Infiltration Feasibility Condition	Worksheet C.4-1 Page 1 of 4

Part 1- Full Infiltration Feasibility Screening Criteria
Would infiltration of the full design volume be feasible from a physical perspective without and undesirable consequences that cannot be reasonable mitigated

Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to the Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X

Provide basis:

The infiltration test results of the proposed northwestern biofiltration basin had an unadjusted (pre-factor of safety) infiltration rate of 0.10 to 0.24 inches per hour. Infiltration test results of the proposed northeastern biofiltration basin area had an unadjusted (pre-factor of safety) infiltration rate of 0.81 to 2.87 inches per hour. The third basin located in the southern portion of the site will be located in a fill area. The infiltration for this basin was determined by obtaining a representative sample of soil that could be used as fill in the area of the basin. The sample was remolded to a 90-percent relative compaction and a saturated hydraulic conductivity test run on the sample. The test result indicated an infiltration rate of 0.10 inches per hour.

Based on the tested infiltration rates, only the northeastern biofiltration basin has an infiltration rate greater than 0.5 inches per hour; as a result, full infiltration is not feasible. Additionally, full infiltration is not considered feasible, due to the highly variable nature of the Old Paralic Deposits/Baypoint Formation soil types that are anticipated below the biofiltration basin bottoms and preponderance of infiltration rates well-below (or significantly lower than) 0.5 inches per hour.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	

Provide basis:

Geotechnical analysis of the proposed biofiltration basins and adjacent proposed buildings, retaining wall, and slope, indicates that lateral migration of the infiltration water may have a detrimental impact on the proposed improvements. However, the impact can be mitigated to an acceptable level by the placement of an impermeable liner along the sides of the biofiltration basins.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study source applicability.

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1 Page 2 of 4	
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	**X**	
Provide basis: **Impacts relative to the risk of increasing groundwater contamination does not appear to be a constraint from a geotechnical standpoint at the site.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in C.3.	**X**	
Provide basis: **Impacts relative to causing potential water balance issues or increased discharge of contaminated groundwater to surface waters does not appear to be a constraint at the site.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study source applicability.			
Part 1 Result*	If all answers to rows 1-4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration. If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2.	**Result** **Full Infiltration is NOT Feasible**	

*To be Completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1 Page 3 of 4	
Part 2- Partial Infiltration vs. No Infiltration Feasibility Screening Criteria Would Infiltration of Water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to the Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	
Provide basis: **The infiltration rates of the three proposed basin locations vary from 0.01 to 2.87 inches per hour; and consequently, are at or greater than an infiltration rate of 0.01 inches per hour. As a result, partial infiltration is feasible.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
6	Can infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: **Geotechnical analysis of the proposed biofiltration basins and adjacent proposed buildings, retaining wall, and slope, indicates that lateral migration of the infiltration water may have a detrimental impact on the proposed improvements. However, the impact can be mitigated to an acceptable level by the placement of an impermeable liner along the sides of the biofiltration basins.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1 Page 4 of 4	
Criteria	Screening Question	Yes	No
7	Can infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	**X**	
Provide basis: **Groundwater was encountered during the preliminary investigation of the site at an approximate elevation of 7 to 9 feet. Based on the elevation of the bottom of the gravel storage layer, the current groundwater elevation is within 6 to 8 feet of the proposed biofiltration basin bottom elevations.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in C.3.	**X**	
Provide basis: **Based on Section C.3.7 of the San Diego City BMP Design Manual, downstream water rights should not be a constraint to partial infiltration at the site.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates			
Part 2 Result*	If all answers to rows 1-4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration. If any answer from row 5-8 is "No", then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category in No Infiltration.	**Result** **Partial Infiltration is Feasible**	

Prepared by: _____ **Dated:** **June 23, 2017**
Randall K Wagner, CEG 1612
LGC Valley, Inc.

*To be Completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Factor of Safety and Design Infiltration Rate Worksheet				**Worksheet D.5-1 Page 1 of 1**	
Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w * v
A	Suitability Assessment	Soil assessment methods	0.25	**2**	**0.50**
		Predominant soil Texture	0.25	**3**	**0.75**
		Site soil variability	0.25	**3**	**0.75**
		Depth to groundwater/impervious layer	0.25	**2**	**0.50**
		Suitability Assessment Safety Factor, $S_A = \sum_p$			**2.50**
B	Design	Level of pretreatment/ expected sediment loads	0.5		
		Redundancy/ resiliency	0.25		
		Compaction during construction	0.25	**2**	**0.50**
		Design Safety Factor, $S_B = \sum_p$			
Combined Safety Factor, $S_{total} = S_A \times S_B$					
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)					
Design Infiltration Rate, in/hr, $K_{design} = {K_{observed}}/{S_{total}}$					
Supporting Data					

Briefly describe infiltration test and provide reference to test forms:

The percolation/infiltration field-testing for the northwestern and northeastern biofiltration basins was performed in general accordance with Section D.3.3.2 - Borehole Percolation Tests (various methods) of the San Diego City BMP Design Manual. Adjustment of the field percolation test results to an "infiltration rate" was performed utilizing the Porchet Method. The infiltration testing for the southern biofiltration basin was determined by obtaining a saturated hydraulic conductivity test of a representative sample of the on-site soil that could be used as fill in accordance with Section D.4.2 of the San Diego City BMP Design Manual.

The results of the percolation/infiltration testing is provided in the report entitled "Preliminary Bioretention Basin Infiltration Study, Proposed Apartment Complex Development, 1579 and 1623 Morena Boulevard, City of San Diego, California" by LGC Valley, Inc., dated November 29, 2016.

LGC Valley, Inc.
Geotechnical Consulting

August 28, 2017 Project No. 154004-02

Mr. Shon Finch
FF Realty III, LLC
5510 Morehouse Drive, Suite 200
San Diego, California 92121

Subject: ***Response to City of San Diego LDR-Geology Cycle Issues/Review Comments Proposed Apartment Complex Development, 1579 and 1623 Morena Boulevard, City of San Diego, California***

References: *Project Design Consultants, 2017, Morena Apartment Homes, Rezone No. 1868548 / Vesting Tentative Map No. 1868551 / Planned Development Permit No. 1868549 / Site Development Permit No. 1868547 / Community Plan Amendment No. 1868552, 9 Sheets, dated December 5, 2016, revised May 8, 2017*

LGC Valley, Inc., 2016, Preliminary Bioretention Basin Infiltration Study, Proposed Apartment Complex Development, 1579 and 1623 Morena Boulevard, City of San Diego, California, Project No. 154004-01, dated November 29, 2016

LGC Valley, Inc., 2017, Addendum Geotechnical Study and Response to 2nd City of San Diego LDR-Geology Multi-Discipline Cycle Issues/Review Comments, Proposed Morena Apartment Homes, 1579 and 1623 Morena Boulevard, San Diego, California, Project Number 154004-03, dated June 23, 2017

San Diego City, 2017, LDR-Geology Cycle 8 Issues, Project No. 526167, dated August 11, 2017

Introduction

LGC Valley, Inc. (LGC) has prepared this letter to address the review comments made in the recent City of San Diego LDR-Geology Plan Check Comments (San Diego City, 2017) regarding geotechnical issues relative to the construction of the proposed Apartment Development Complex located at 1579 and 1623 Morena Boulevard in the City of San Diego, California. Our response to the outstanding/unresolved cycle issues/review comments is presented below.

Review Comments

Comments Issue No. 17: The answers to the screening question for Criteria #1 and 5 of worksheet C.4-1 should be based on the infiltration rates. The yes/no response for Criteria #1 and 5 should be based on the infiltration rates from the site. A 'Partial Infiltration' condition exists when the infiltration rates are between 0.01 inches

per hour (in/hr) and 0.50 in/hr. A 'Full Infiltration' condition exists when the rates are greater than 0.5 in/hr. Criterion #1 should be updated to reflect this condition.

Response: Two sets of worksheets have been prepared based on the infiltration rates obtained during our field percolation/ infiltration study. One set of worksheets was prepared for BMP #4 (with the unadjusted infiltrations rates of 0.81 and 2.87 inches per hour), the other for BMP #3 and #5 (where the unadjusted infiltration rates range from 0.10 to 0.24 inches per hour). The two sets of Worksheets C.4-1 and D.5-1 are attached.

Comments Issue No. 18: Based on the geotechnical consultants calculated infiltration rates it appears that both a partial and a full infiltration condition exist at the site. The project's geotechnical consultant should provide a completed Worksheet C.4-1 for each infiltration condition (if applicable).

Response: Two separate sets of worksheets have been prepared for the project and are attached.

Comments Issue No. 19: Provide an updated geologic map that delineates the area(s) where partial infiltration is feasible and the area(s) where full infiltration is feasible (if applicable).

Response: Since all of the proposed basins on the site are considered to have partial infiltration conditions, a map delineating the areas of full or partial infiltration conditions is not needed.

If you should have any questions, please do not hesitate to contact us. The undersigned can be reached at (760) 599-7000.

Respectfully submitted,

LGC Valley, Inc.

Randall Wagner, CEG 1612
Senior Project Geologist

Enclosures: (1) Morena Boulevard BMP #4 Basin (Adjacent to Buildings 3 and 4) Worksheets C.4-1 - Categorization of Infiltration Feasibility Condition and D.5-1 - Factor of Safety and Design Infiltration Rate (Pages 1 through 5)
(2) Morena Boulevard BMP #3 and #5 Biofiltration Basin (Adjacent to Buildings 1 and 2) Worksheets C.4-1 - Categorization of Infiltration Feasibility Condition and D.5-1 - Factor of Safety and Design Infiltration Rate (Pages 6 through 10)

Distribution: (1) Addressee (via e-mail)
(1) FF Reality III, LLC, Attention: Shon Finch (via e-mail)

Categorization of Infiltration Feasibility Condition	**Worksheet C.4-1 Page 1 of 4**

Part 1- Full Infiltration Feasibility Screening Criteria
Would infiltration of the full design volume be feasible from a physical perspective without and undesirable consequences that cannot be reasonable mitigated

Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to the Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	

Provide basis:

The Infiltration test results of the proposed BMP #4 biofiltration basin located between proposed Buildings 3 and 4 had an unadjusted (pre-factor of safety) infiltration rate of 0.81 to 2.87 inches per hour (or an average of 1.84 inches per hour). Utilizing the feasibility screening factor-of-safety of 2, the adjusted infiltration rate is 0.92 inches per hour.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	

Provide basis:

Geotechnical analysis of the proposed biofiltration basin BMP #4 and adjacent proposed buildings, indicates that lateral migration of the infiltration water may have a detrimental impact on the proposed improvements. However, the impact can be mitigated to an acceptable level by the placement of an impermeable liner along the sides of the biofiltration basin.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study source applicability.

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1 Page 2 of 4	
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		**X**
Provide basis: **Impacts relative to the risk of increasing groundwater contamination does not appear to be a constraint from a geotechnical standpoint at the site. However, the groundwater table at the site was encountered at an elevation of 7 to 9 feet (or approximately 6 to 8 feet below the bottom of the basin gravel storage elevation). As a result, the current ground water elevation is within 10 feet of the basin bottom and likely is even less when considering the high ground water level.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in C.3.	**X**	
Provide basis: **Impacts relative to causing potential water balance issues or increased discharge of contaminated groundwater to surface waters does not appear to be a constraint at the site.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study source applicability.			
Part 1 Result*	If all answers to rows 1-4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration. If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2.	**Result** **Full Infiltration is NOT Feasible**	

*To be Completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Categorization of Infiltration Feasibility Condition		**Worksheet C.4-1 Page 3 of 4**	
Part 2- Partial Infiltration vs. No Infiltration Feasibility Screening Criteria Would Infiltration of Water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to the Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	**X**	
Provide basis: **The Infiltration test results of the proposed BMP #4 biofiltration basin area had an unadjusted (pre-factor of safety) infiltration rate of 0.81 to 2.87 inches per hour (or an average of 1.84 inches per hour). Utilizing the feasibility screening factor-of-safety of 2, the adjusted infiltration rate is 0.92 inches per hour..** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
6	Can infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	**X**	
Provide basis: **Geotechnical analysis of the proposed BMP #4 biofiltration basins and adjacent proposed buildings, indicates that lateral migration of the infiltration water may have a detrimental impact on the proposed improvements. However, the impact can be mitigated to an acceptable level by the placement of an impermeable liner along the sides of the biofiltration basins.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1 Page 4 of 4	
Criteria	Screening Question	Yes	No
7	Can infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	

Provide basis:

Groundwater was encountered during the preliminary investigation of the site at an approximate elevation of 7 to 9 feet. Based on the elevation of the bottom of the gravel storage layer, the current groundwater elevation is within 6 to 8 feet of the proposed biofiltration basin bottom elevation.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates

8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in C.3.	X	

Provide basis:

Based on Section C.3.7 of the San Diego City BMP Design Manual, downstream water rights should not be a constraint to partial infiltration at the site.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates

Part 2 Result*	If all answers to rows 1-4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration. If any answer from row 5-8 is "No", then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category in No Infiltration.	**Result** **Partial Infiltration is Feasible**

Prepared by: _____ **Dated:** **August 28, 2017**
Randall K Wagner, CEG 1612
LGC Valley, Inc.

*To be Completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Factor of Safety and Design Infiltration Rate Worksheet					**Worksheet D.5-1 Page 1 of 1**
Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w * v
A	Suitability Assessment	Soil assessment methods	0.25	**2**	**0.50**
		Predominant soil Texture	0.25	**3**	**0.75**
		Site soil variability	0.25	**3**	**0.75**
		Depth to groundwater/impervious layer	0.25	**2**	**0.50**
		Suitability Assessment Safety Factor, $S_A = \sum p$			**2.50**
B	Design	Level of pretreatment/ expected sediment loads	0.5		
		Redundancy/ resiliency	0.25		
		Compaction during construction	0.25	**2**	**0.50**
		Design Safety Factor, $S_B = \sum p$			
Combined Safety Factor, $S_{total} = S_A \times S_B$					
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)					
Design Infiltration Rate, in/hr, $K_{design} = {}^{K_{observed}}/_{S_{total}}$					

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

The percolation/infiltration field-testing for the northeastern biofiltration basin was performed in general accordance with Section D.3.3.2 - Borehole Percolation Tests (various methods) of the San Diego City BMP Design Manual. Adjustment of the field percolation test results to an "infiltration rate" was performed utilizing the Porchet Method.

The results of the percolation/infiltration testing is provided in the report entitled "Preliminary Bioretention Basin Infiltration Study, Proposed Apartment Complex Development, 1579 and 1623 Morena Boulevard, City of San Diego, California" by LGC Valley, Inc., dated November 29, 2016.

Categorization of Infiltration Feasibility Condition	**Worksheet C.4-1 Page 1 of 4**

Part 1- Full Infiltration Feasibility Screening Criteria
Would infiltration of the full design volume be feasible from a physical perspective without and undesirable consequences that cannot be reasonable mitigated

Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than ~~0.5~~ 0.1 inches per hour? The response to the Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	

Provide basis:

The infiltration test results of the proposed BMP #5 basin located between Buildings No. 1 and 2 had an unadjusted (pre-factor of safety) infiltration rate of 0.10 and 0.24 inches per hour (or an average of 0.17 inches per hour). Utilizing the feasibility screening factor-of-safety of 2, the adjusted infiltration rate is 0.09 inches per hour. BMP #3 located in the southern portion of the site will be located in a fill area. The infiltration for this basin was determined by obtaining a representative sample of soil that could be used as fill in the area of the basin. The sample was remolded to a 90-percent relative compaction and a saturated hydraulic conductivity test run on the sample. The test result indicated an infiltration rate of 0.10 inches per hour (or a feasibility screening infiltration rate is 0.05 inches per hour).

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	

Provide basis:

Geotechnical analysis of the proposed biofiltration basins and adjacent proposed buildings, retaining wall, and slope, indicates that lateral migration of the infiltration water may have a detrimental impact on the proposed improvements. However, the impact can be mitigated to an acceptable level by the placement of an impermeable liner along the sides of the biofiltration basins.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study source applicability.

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1 Page 2 of 4	
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		**X**
Provide basis: **Impacts relative to the risk of increasing groundwater contamination does not appear to be a constraint from a geotechnical standpoint at the site. However, the groundwater table at the site was encountered at an elevation of 7 to 9 feet (or approximately 6 to 8 feet below the bottom of the Biofiltration Basin BMP #5 and approximately 3 feet below the bottom of the basin gravel storage elevation of Biofiltration Basin BMP #3). As a result, the current ground water elevation is within 10 feet of the basin bottom and likely is even less when considering the anticipated high ground water level.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in C.3.	**X**	
Provide basis: **Impacts relative to causing potential water balance issues or increased discharge of contaminated groundwater to surface waters does not appear to be a constraint at the site.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study source applicability.			
Part 1 Result*	If all answers to rows 1-4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration. If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2.	**Result** **Full Infiltration is NOT Feasible**	

*To be Completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Categorization of Infiltration Feasibility Condition	**Worksheet C.4-1 Page 3 of 4**

Part 2- Partial Infiltration vs. No Infiltration Feasibility Screening Criteria
Would Infiltration of Water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to the Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	**X**	

Provide basis:

The infiltration test results of the proposed Biofiltration Basin BMP #5 had an unadjusted (pre-factor of safety) infiltration rate of 0.10 to 0.24 inches per hour (or an average of 0.17 inches per hour) while BMP #3 had an unadjusted infiltration rate of 0.10 inches per hour. Utilizing the feasibility screening factor-of-safety of 2, the adjusted infiltration rate is 0.09 inches per hour for BMP #5 and 0.05 inches per hour for BMP #3. Consequently, both values are at or greater than an infiltration rate of 0.01 inches per hour; and as a result, partial infiltration is feasible.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

6	Can infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	**X**	

Provide basis:

Geotechnical analysis of the proposed biofiltration basins and adjacent proposed buildings, retaining wall, and slope, indicates that lateral migration of the infiltration water may have a detrimental impact on the proposed improvements. However, the impact can be mitigated to an acceptable level by the placement of an impermeable liner along the sides of the biofiltration basins.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1 Page 4 of 4	
Criteria	Screening Question	Yes	No
7	Can infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	

Provide basis:

Groundwater was encountered during the preliminary investigation of the site at an approximate elevation of 7 to 9 feet. Based on the elevation of the bottom of the gravel storage layer, the current groundwater elevation is within 6 to 8 feet of the basin bottom elevation of BMP #5 and within approximately 3 feet of the basin bottom elevation of BMP #3.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates

8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in C.3.	X	

Provide basis:

Based on Section C.3.7 of the San Diego City BMP Design Manual, downstream water rights should not be a constraint to partial infiltration at the site.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates

Part 2 Result*	If all answers to rows 1-4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration. If any answer from row 5-8 is "No", then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category in No Infiltration.	**Result** **Partial Infiltration is Feasible**

Prepared by: _____ **Dated:** **August 28, 2017**

Randall K Wagner, CEG 1612
LGC Valley, Inc.

*To be Completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Factor of Safety and Design Infiltration Rate Worksheet					**Worksheet D.5-1 Page 1 of 1**
Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w * v
A	Suitability Assessment	Soil assessment methods	0.25	**2**	**0.50**
		Predominant soil Texture	0.25	**3**	**0.75**
		Site soil variability	0.25	**3**	**0.75**
		Depth to groundwater/impervious layer	0.25	**2**	**0.50**
		Suitability Assessment Safety Factor, $S_A = \sum p$			**2.50**
B	Design	Level of pretreatment/ expected sediment loads	0.5		
		Redundancy/ resiliency	0.25		
		Compaction during construction	0.25	**2**	**0.50**
		Design Safety Factor, $S_B = \sum p$			
Combined Safety Factor, $S_{total} = S_A \times S_B$					
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)					
Design Infiltration Rate, in/hr, $K_{design} = {}^{K_{observed}}/_{S_{total}}$					
Supporting Data					

Briefly describe infiltration test and provide reference to test forms:

The percolation/infiltration field-testing for the northwestern biofiltration basin was performed in general accordance with Section D.3.3.2 - Borehole Percolation Tests (various methods) of the San Diego City BMP Design Manual. Adjustment of the field percolation test results to an "infiltration rate" was performed utilizing the Porchet Method. The infiltration testing for the southern biofiltration basin was determined by obtaining a saturated hydraulic conductivity test of a representative sample of the on-site soil that could be used as fill in accordance with Section D.4.2 of the San Diego City BMP Design Manual.

The results of the percolation/infiltration testing is provided in the report entitled "Preliminary Bioretention Basin Infiltration Study, Proposed Apartment Complex Development, 1579 and 1623 Morena Boulevard, City of San Diego, California" by LGC Valley, Inc., dated November 29, 2016.

PRELIMINARY SEWER STUDY

MORENA APARTMENTS

November 2017

Prepared For:
FAIRIFIELD RESIDENTIAL COMPANY, LLC
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San Diego, California 92121

Prepared By:

PROJECT DESIGN CONSULTANTS
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Registration Expires 03/31/2018

Prepared By: MW
Checked By: MW

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ATTACHMENTS

SECTION 1

INTRODUCTION

The purpose of this report is to present the design of the private onsite sanitary sewer facilities associated with the Morena Apartment (VTM 1868551) project flows and demonstrate that the sewer discharge from the proposed project does not exceed the hydraulic capacity of the existing downstream facilities, serviced by the City of San Diego.

SECTION 2

PROJECT DESCRIPTION

The Morena Apartment project is approximately 6.2 acres and is located within the Mission Bay neighborhood in the City of San Diego. The proposed project is esat of I-5, bounded by Morena Boulevard, West Morena Boulevard and Frankfort Street, as shown in Figure 1 on page 3.

The project proposes to develop a total of 150 multi-family residential units and a private recreational area that includes a 2,000square foot recreation building and swimming pool. Sewage from within the project will be collected through a series of private on-site 6-inch collector laterals, connecting to the existing 6-inch sewer main (per Dwg. 3465) in Frankfort Street.

The 6-inch sewer main in Frankfort Street will be converted to a private sewer line since it only serves the project site. An Encroachment Maintenance and Removal Agreement (EMRA) will be required as part of the final construction drawings.

The existing 8-inch sewer mains in both W.Morena Blvd and Morena Blvd will remain in place. The project was redesigned to allow for a 5foot distance from face of curb to sewer main to allow for future repairs/trenching without disturbing the constructed curb and gutter.

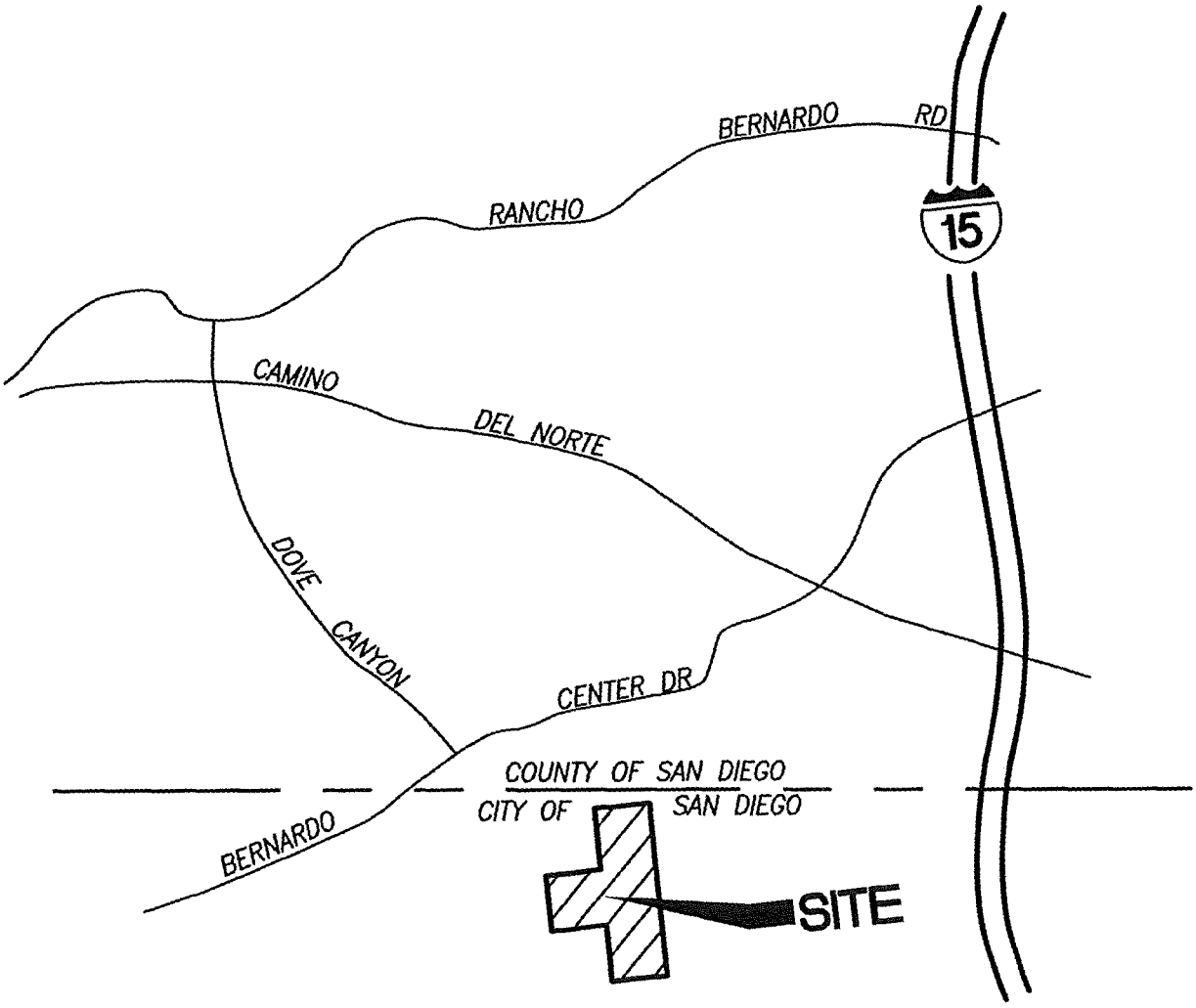


FIGURE 1

VICINITY MAP

SECTION 3

DESIGN CRITERIA

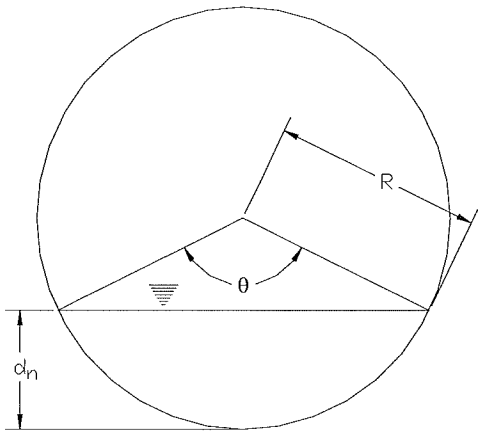
All sewer facilities have been designed in accordance with the *Sewer Design Guide (2013)* by the Metropolitan Wastewater Department, City of San Diego. The Sewer Flow Calculations Table summarizes peak flows, minimum pipe slopes, flow velocities, and normal depths. Minimum pipe slopes of 1 percent were maintained in all areas where flow velocities were less than 2 feet per second. Per section 1.3.3.1 on page 1-8 of the *Sewer Design Guide*, "sewer mains that do not sustain 2 fps at peak flow shall be designed to have a minimum slope of 1 percent."

The project site has an existing zoning of CC-4-2, RS-1-7 and CP-1-1, but will be rezoned to RM-2-5.

SECTION 4

FLOW CALCULATIONS AND EQUATIONS

Flow Velocities (V) and Normal Depths (d_n) are calculated using iterative solutions of the following equations:



Typical Cross Section

Q = Volumetric Flow = $V \times A$

where:

A = Cross-Sectional Area of Flow
V = Flow Velocity

$$A = (R)^2 \times [\theta/2 - \sin(\theta/2) \times \cos(\theta/2)]$$

where:

θ = $2 \times \text{ARCCOS}[(R - d_n)/(R)]$
d_n = Normal Depth

$$V = (1.486/n)R_h^{2/3}S^{1/2} \text{ (Manning Equation)}$$

where:

n = Manning Roughness Coefficient = 0.013
R_h = Hydraulic Radius = A/P_w
P_w = Wetted Perimeter = $\theta \times R$
S = Slope of Pipe

SECTION 5

CONCLUSION

This report analyzed the proposed design of the sanitary sewer facilities associated with the Morena Apartment project. Based on the sewer calculations, the sewer discharge from this proposed project does not exceed the hydraulic capacity of the existing 6inch downstream pipe in Frankfort Street. This report shows that the proposed system and the affected downstream pipes meet design criteria in accordance with the *Sewer Design Guide (2013),* City of San Diego.

TABLES

Sewer Flow Calculations

PROJECT DESIGN CONSULTANTS
701 'B' STREET, SUITE 800
SAN DIEGO, CALIFORNIA 92101

PDC JOB # 4197.00
VESTING TENTATIVE MAP 1868551 SEWER FLOW CALCULATIONS
DATE: 11/15/17 MORENA APARTMENTS

MH		POP PER	DU	PEAK /AVE	PEAK DESIGN	FLOW	LINE SIZE(D)	DESIGN SLOPE	dn/D	VEL.
FROM	TO	D.U.	TOTAL	RATIO	GAL/DAY	C.F.S.	(INCH.)	%		F.P.S.
MH # 9	MH # 8	3.5	20	4.00	6,400	0.010	6	1.00%	0.060	2.06
MH # 8	MH # 7	3.5	20	4.00	6,400	0.010	6	1.00%	0.060	2.06
MH # 14	MH # 7	3.5	10	4.00	3,200	0.005	6	1.00%	0.030	2.87
MH # 7	MH # 6	3.5	30	4.00	9,600	0.015	6	1.00%	0.080	0.99
MH # 11	MH # 6	3.5	40	4.00	12,800	0.020	6	1.00%	0.090	1.07
MH # 6	MH # 5	3.5	70	4.00	22,400	0.035	6	1.00%	0.120	1.33
MH # 13	MH # 12	3.5	30	4.00	9,600	0.015	6	1.00%	0.030	1.11
MH # 12	MH # 5	3.5	30	4.00	9,600	0.015	6	1.00%	0.030	1.11
MH # 5	MH # 4	3.5	100	4.00	32,000	0.050	6	1.00%	0.140	1.45
MH # 4	MH # 3	3.5	100	4.00	32,000	0.050	6	1.00%	0.140	1.45
MH # 10	MH # 3	3.5	40	4.00	12,800	0.020	6	1.00%	0.090	1.07
MH # 3	MH # 2	3.5	140	4.00	44,800	0.069	6	1.00%	0.160	1.62
MH # 2	MH # 1	3.5	150	4.00	48,000	0.074	6	1.00%	0.170	1.65
MH # 1	POC	3.5	155	4.00	49,600	0.077	6	1.00%	0.170	1.71

APPENDIX A

City of San Diego Sewer Design Guide Tables & Figures

Per Sewer Design Guide (2013)

TABLE 1-1
CITY OF SAN DIEGO SEWER DESIGN GUIDE
DENSITY CONVERSIONS

Zone	Maximum Density (DU/Net Ac)	Population per DU	Equivalent Population (Pop/Net Ac)
AR-1-1, RE-1-1	0.1	3.5	0.4
RE-1-2	0.2	3.5	0.7
AR-1-2, RE-1-3	1	3.5	3.5
RS-1-1, RS-1-8	1	3.5	3.5
RS-1-2, RS-1-9	2	3.5	7.0
RS-1-3, RS-1-10	3	3.5	10.5
RS-1-4, RS-1-11	4	3.5	14.0
RS-1-5, RS-1-12	5	3.5	17.5
RS-1-6, RS-1-13	7	3.5	24.5
RS-1-7, RS-1-14	9	3.5	31.5
RX-1-1	11	3.4	37.4
RT-1-1	12	3.3	39.6
RX-1-2, RT-1-2, RU-1-1	14	3.2	44.8
RT-1-3, RM-1-2	17	3.1	52.7
RT-1-4	20	3.0	60.0
RM-1-3	22	3.0	66.0
RM-2-4	25	3.0	75.0
RM-2-5	29	3.0	87.0
RM-2-6	35	2.8	98.0
RM-3-7, RM-5-12	43	2.6	111.8
RM-3-8	54	2.4	129.6
RM-3-9	73	2.2	160.6
RM-4-10	109	1.8	196.2
RM-4-11	218	1.5	327.0

TABLE 1-1
CITY OF SAN DIEGO SEWER DESIGN GUIDE
DENSITY CONVERSIONS (Continued)

Zone	Maximum Density (DU / Net Ac)	Population Per DU	Equivalent Population (Pop/Net Ac)
Schools/Public	8.9	3.5	31.2
Offices	10.9	3.5	38.2*
Commercial/Hotels	12.5	3.5	43.7*
Industrial	17.9	3.5	62.5*
Hospital	42.9	3.5	150.0*

Figures with asterisk (*) represent equivalent population per floor of the building.

Definitions:
DU = Dwelling Units
Ac = Acreage
Pop = Population

Net Acreage is the developable lot area excluding areas that are dedicated as public streets in acres. Gross Area is the entire area in acres of the drainage basin, including lots, streets, etc.

For undeveloped areas, assume Net Acreage = 0.8 x Gross Area in Acres

For developed areas, calculate actual Net Acreage.

Tabulated figures are for general case. The tabulated figures shall not be used if more accurate figures are available.

Population is based on actual equivalent dwelling units (EDU) or the maximum estimate obtained from zoning.

Conversion of Fixture Units to Equivalent Dwelling Units (EDU): The Water Meter Data Card, maintained by the Development Services Department, contains a table of plumbing fixtures that should be used for determining the equivalent dwelling units (EDU's) for the purpose of estimating the rate of wastewater generation in residential, commercial, or industrial areas. Currently, the basis for conversion is: 20 fixtures = 1 EDU and 1 EDU = 280 gallons of wastewater per day.

In high rise building areas, flow rates shall be based on the most current, adopted edition of the applicable Plumbing Code, assuming one lateral per area. The most conservative flow rate shall govern.

PUBLIC UTILITIES DEPARTMENT

PEAKING FACTOR FOR SEWER FLOWS
(Dry Weather)

Ratio of Peak to Average Flow* Versus Tributary Population

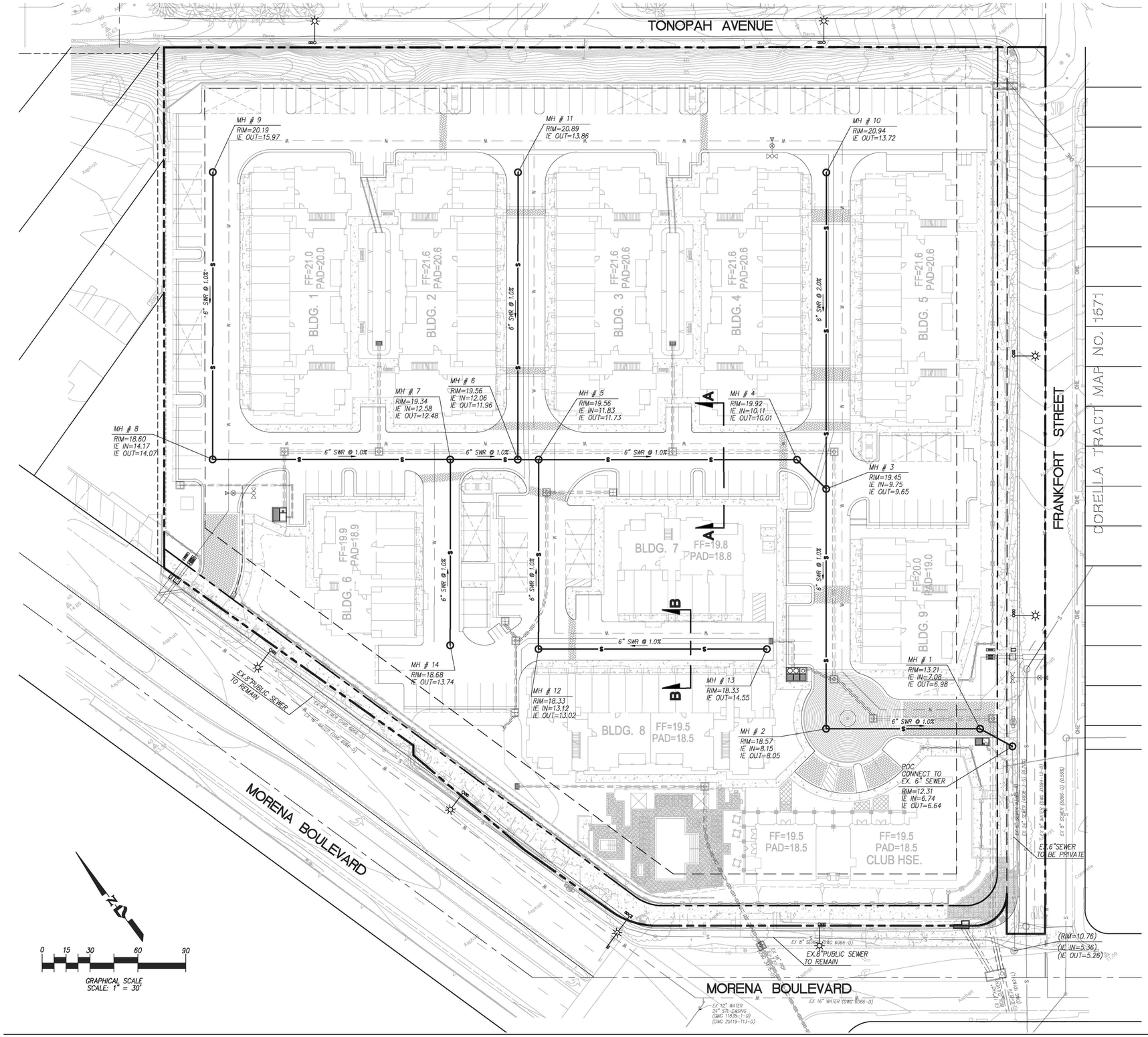
Population	Ratio of Peak to Average Flow	Population	Ratio of Peak to Average Flow
200	4.00	4,800	2.01
500	3.00	5,000	2.00
800	2.75	5,200	1.99
900	2.60	5,500	1.97
1,000	2.50	6,000	1.95
1,100	2.47	6,200	1.94
1,200	2.45	6,400	1.93
1,300	2.43	6,900	1.91
1,400	2.40	7,300	1.90
1,500	2.38	7,500	1.89
1,600	2.36	8,100	1.87
1,700	2.34	8,400	1.86
1,750	2.33	9,100	1.84
1,800	2.32	9,600	1.83
1,850	2.31	10,000	1.82
1,900	2.30	11,500	1.80
2,000	2.29	13,000	1.78
2,150	2.27	14,500	1.76
2,225	2.25	15,000	1.75
2,300	2.24	16,000	1.74
2,375	2.23	16,700	1.73
2,425	2.22	17,400	1.72
2,500	2.21	18,000	1.71
2,600	2.20	18,900	1.70
2,625	2.19	19,800	1.69
2,675	2.18	21,500	1.68
2,775	2.17	22,600	1.67
2,850	2.16	25,000	1.65
3,000	2.14	26,500	1.64
3,100	2.13	28,000	1.63
3,200	2.12	32,000	1.61
3,500	2.10	36,000	1.59
3,600	2.09	38,000	1.58
3,700	2.08	42,000	1.57
3,800	2.07	49,000	1.55
3,900	2.06	54,000	1.54
4,000	2.05	60,000	1.53
4,200	2.04	70,000	1.52
4,400	2.03	90,000	1.51
4,600	2.02	100,000+	1.50

*Based on formula: $\text{Peak Factor} = 6.2945 \times (\text{pop})^{-0.1342}$
(Holmes & Narver, 1960)

FIGURE 1-1

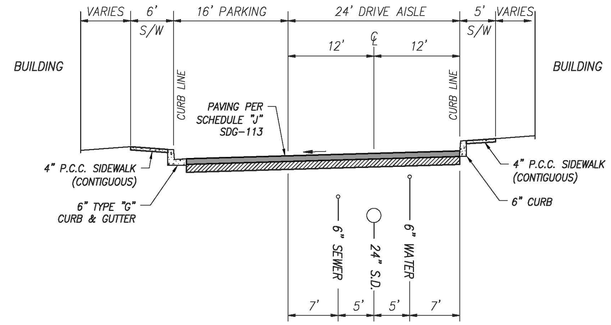
EXHIBIT A

Sewer Exhibit



LEGEND:

- S ..... SEWER LINE
- W ..... WATER LINE
- F ..... FIRE SERVICE
- ..... STORM DRAIN



SECTION 'A-A'

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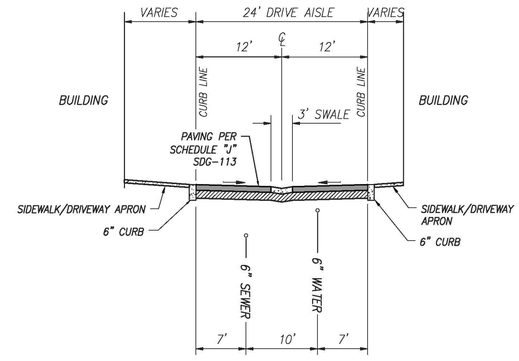

SECTION 'B-B'

NOT TO SCALE

ALL PROPOSED PRIVATE SEWER MAINS WILL BE OWNED AND MAINTAINED BY HOA

MORENA APARTMENT HOMES

SEWER EXHIBIT

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PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Engineering | Survey

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Waste Management Plan for the Morena Apartment Homes Project, San Diego, California

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May 2, 2017

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1.0 Introduction

The purpose of this Waste Management Plan (WMP) for the Morena Apartment Homes Project (project) is to identify the solid waste impacts generated by demolition, construction, and operation of the project, and to identify measures to reduce those impacts.

The WMP is divided into the four sections corresponding to the progress of site development, which are the Demolition Phase, the Grading Phase, the Construction Phase, and the Occupancy (post-construction) Phase. Each phase addresses the amount of waste that would be generated by project activities, waste reduction goals, and the recommended techniques to achieve the waste reduction goals. More specifically, for each phase, the WMP includes:

- Tons of waste anticipated to be generated.
- Material/type and amount of waste anticipated to be diverted.
- Project features that would reduce the amount of waste generated.
- Project features that would divert or limit the generation of waste.
- Source separation techniques for waste generated.
- How materials shall be reused on-site.
- Name and location of recycling, reuse, or landfill facilities where waste shall be taken.

2.0 Existing Conditions

The project site is located at 1577-79 Morena Boulevard in the city of San Diego, immediately east of Interstate 5 (I-5) and West Morena Boulevard. The project site is within the draft Morena Corridor Specific Plan area, which covers approximately 300 acres bounded by Gesner Drive to the north, I-5 to the west, and Friars Road to the south. The eastern specific plan area boundary follows the properties that front Morena Boulevard within Clairemont Mesa. Figures 1 and 2 depict the regional location and the project vicinity (on an aerial photograph), respectively.

The 6.21-acre project site (5.90 acres net) is composed of two parcels that are currently developed. The northwest parcel (Parcel 1–Assessor's Parcel Number [APN] 436-020-40) consists of several residences, storage sheds, a gravel loop road, and an associated driveway. The southeast parcel (Parcel 2–APN 436-020-41) is developed as the Coastal Trailer Villa mobile home park consisting of existing buildings (offices, laundry, and storage), internal roads and driveways, 90 mobile home spaces, and landscaping. The property is surrounded by a mixture of development with West Morena Boulevard, the San Diego rail line, and I-5 to the west; Morena Boulevard, an Arco gas station, and commercial land uses to the southwest; Frankfurt Street, commercial and residential land uses to the southeast; commercial land uses to the northwest, and Tonopah Avenue, single- and multi-family residential land uses to the northeast.

Project Location

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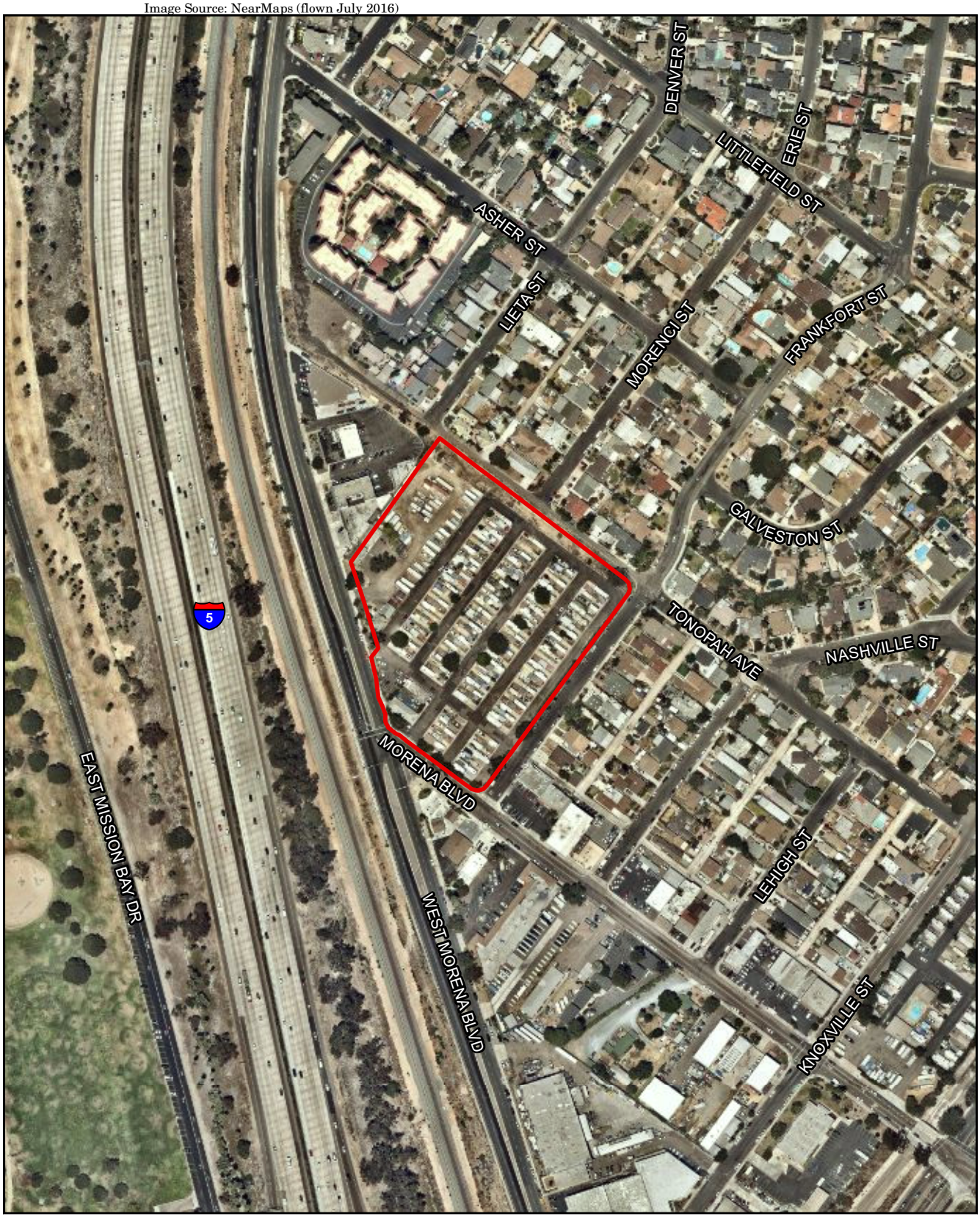
FIGURE 1

Regional Location

Image Source: NearMaps (flown July 2016)



Project Boundary

FIGURE 2

Project Location on Aerial Photograph

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3.0 Proposed Conditions

The project would remove the existing mobile home park and construct 150 market-rate multi-family units with a clubhouse (leasing, exercise room, and recreation areas), a pool and pool house, landscaping, and a water quality detention basin. Figure 3 shows the proposed site plan. The project would include garage and surface parking consistent with City Municipal Code requirements. In addition, 70 bicycle parking spaces and 16 motorcycle parking spaces are proposed.

The following entitlement requests are included as part of the application: an amendment to the Claremont Mesa Community Plan to remove the mobile home park overlay and apply a medium density residential (15 to 30 dwelling units per acre) designation to the site, a rezone from the RS-1-7 (Residential-Single Unit, 5,000-square-foot minimum lot size) and CC-4-2 zones (Commercial-Community, maximum density of 1 dwelling unit for each 1,500 square-foot lot area) to the RM-2-5 (Residential-Multiple Unit, maximum density of 1 dwelling unit for each 1,500-square-foot lot area) zone, a vesting tentative map to create condominium units, a site development permit due to the presence of environmentally sensitive lands (special flood hazard area), and a planned development permit to allow for deviations to the retaining wall heights, allow carports to encroach into the setbacks, and maintain the current roadway width of Tonopah Avenue.

The Morena Corridor Specific Plan is currently being developed, and is building on the Morena Boulevard Station Area Planning Study. Adoption of the Specific Plan is anticipated in spring 2017. The specific plan will provide policies and recommendations that address land use, mobility, and urban design to enhance the corridor. The northwestern parcel of the project site is currently designated as residential and the southeastern parcel is currently designated as commercial employment, retail, and services in the City of San Diego (City) General Plan.

4.0 Regulatory Framework

4.1 State Regulations

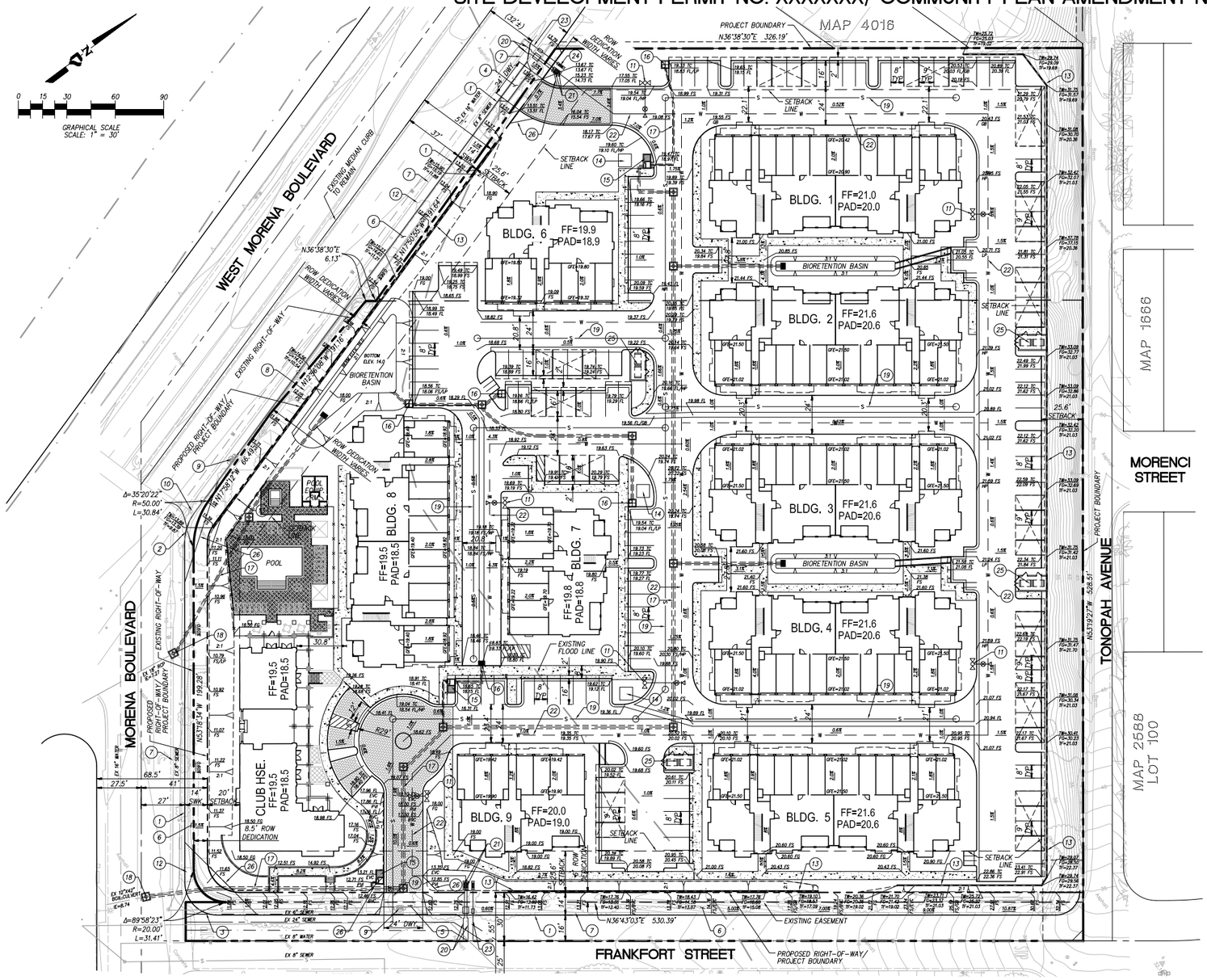
The California state legislature has enacted several bills intended to promote waste diversion. In 1989, Assembly Bill (AB) 939, the Integrated Waste Management Act—as modified in 2010 by Senate Bill 1016—mandated that all local governments reduce disposal waste in landfills from generators within their borders by 50 percent by the year 2000 (State of California 1989 and 2010).

AB 341, approved October 2011, sets a policy goal of 75 percent waste diversion by the year 2020 (State of California 2011).

Map Source: Project Design Consultants

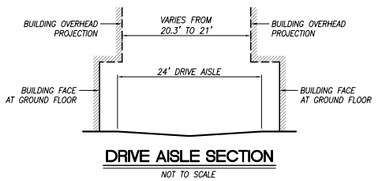
MORENA APARTMENT HOMES

REZONE NO. XXXXXXX/VESTING TENTATIVE MAP NO. XXXXXXX/PLANNED DEVELOPMENT PERMIT NO. XXXXXXX
SITE DEVELOPMENT PERMIT NO. XXXXXXX/ COMMUNITY PLAN AMENDMENT NO. XXXXXX



KEY NOTES:

1. PROPOSED TYPE 'G' CURB & GUTTER PER SDG-150
2. PROPOSED 30' RADIUS CURB RETURN
3. PROPOSED 20' RADIUS CURB RETURN
4. PROPOSED 24' DRIVEWAY PER SDG-159
5. PROPOSED 24' DRIVEWAY PER SDG-163
6. PROPOSED PCC SIDEWALK PER SDG-155
7. EXISTING TYPE 'G' CURB & GUTTER TO BE REMOVED
8. EXISTING SDG&E TRANSFORMER TO BE RELOCATED
9. EXISTING FIRE HYDRANT TO BE RELOCATED
10. EXISTING TRAFFIC SIGNAL POLE TO BE RELOCATED
11. PROPOSED FIRE HYDRANT ASSEMBLY
12. EXISTING STREET TREE TO BE REMOVED (TYPICAL)
13. PROPOSED RETAINING WALL
14. PROPOSED ELECTRIC TRANSFORMER LOCATION
15. PROPOSED MODULAR WETLAND UNIT (PRIVATE)
16. PROPOSED STORM DRAIN INLET (PRIVATE)
17. PROPOSED STORM DRAIN (PRIVATE) – SIZE VARIES FROM 18" TO 24" RCP
18. PROPOSED TYPE A-4 STORM DRAIN CLEANOUT PER D-09 (PUBLIC)
19. PROPOSED 6" SEWER LATERAL (PRIVATE)
20. PROPOSED WATER SERVICE METER (PUBLIC)
21. PROPOSED DOMESTIC/FIRE BACKFLOW (PRIVATE)
22. PROPOSED 8" DOMESTIC/FIRE WATER MAIN (PRIVATE)
23. PROPOSED 2" IRRIGATION SERVICE (PUBLIC)
24. PROPOSED IRRIGATION 2" REDUCED PRESSURE DETECTOR ASSEMBLY (PRIVATE)
25. PROPOSED TRASH ENCLOSURE
26. SIGHT DISTANCE LINE



DRIVE AISLE SECTION
NOT TO SCALE

SITE AND GRADING PLAN
SCALE: 1"=30'

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FIGURE 3
Site Plan

AB 1826, approved September 2014, requires businesses in California to arrange for recycling services for organic waste including food waste, green waste, landscape and pruning waste, nonhazardous wood waste, and food-soiled paper waste that is mixed in with food waste. The law is effective on and after January 1, 2016 for businesses that generate greater than eight cubic yards of organic waste per week; effective January 1, 2017 for businesses that generate greater than four cubic yards of organic waste per week; effective January 1, 2019 for businesses that generate greater than four cubic yards of commercial solid waste per week; and, if a 50 percent statewide reduction in organic waste from 2014 has not yet been achieved, the law will be effective January 1, 2020 for businesses that generate greater than two cubic yards of commercial solid waste per week (State of California 2014). Strategies for compliance are discussed in Section 6.2, Waste Reduction Measures.

4.2 City of San Diego Requirements

All landfills within the San Diego region are approaching capacity and are due to close within the next 3 to 20 years. In compliance with the state policies, the City Environmental Services Department (ESD) developed the Source Reduction and Recycling Element, which describes local waste management policies and programs. The City's Recycling Ordinance, adopted November 2007, requires on-site recyclable collection for residential and commercial uses (City of San Diego 2007a). The ordinance requires recycling of plastic and glass bottles and jars, paper, newspaper, metal containers, and cardboard. The focus of the ordinance is on education, with responsibility shared between the ESD, haulers, and building owners and managers. On-site technical assistance, educational materials, templates, and service provider lists are provided by the ESD. Property owners and managers provide on-site recycling services and educational materials annually and to new tenants. Strategies for compliance are discussed in Section 6.2, Waste Reduction Measures.

The City's Refuse and Recyclable Materials Storage Regulations, adopted December 2007, indicate the minimum exterior refuse and recyclable material storage areas required at residential and commercial properties (City of San Diego 2007b). These are intended to provide permanent, adequate, and convenient space for the storage and collection of refuse and recyclable materials; encourage recycling of solid waste to reduce the amount of waste material entering landfills; and meet the recycling goals established by the City Council and mandated by the State of California. These regulations are discussed further in Section 6.3, Exterior Storage.

In July 2008, the Construction and Demolition (C&D) Debris Deposit Ordinance was adopted by the City (City of San Diego 2008). The ordinance requires that the majority of construction, demolition, and remodeling projects requiring building, combination, or demolition permits pay a refundable C&D Debris Recycling Deposit and divert at least 50 percent of their waste by recycling, reusing, or donating reusable materials. The required diversion rate is currently proposed for an increase to 65 percent. The ordinance is designed to keep C&D materials out of local landfills. Requirements are discussed further in Section 5.4.2, Contractor Education and Responsibilities.

5.0 Demolition, Grading, and Construction Waste

According to the Waste Composition Study prepared by the City's ESD (City of San Diego 2000), C&D waste constituted the largest single component of disposed waste in San Diego. Of the 1,680,211 tons of waste disposed in 1999, C&D waste comprised of 35 percent (586,157 tons). By comparison, the second and third largest categories of waste materials were paper (21 percent, 356,578 tons) and organic waste (20 percent, 341,874 tons).

5.1 Demolition

Demolition activities would be required for approximately 75 percent of the 5.90-net-acre site, equivalent to 192,753 square feet of pavement (approximately 80 percent asphalt [154,202 square feet] and 20 percent concrete [38,550 square feet]) located throughout the property. Demolition would also include a total of approximately 8,000 square feet of existing buildings (Figure 4). Pavement depth varies by project and soil type, but is typically 0.5 feet thick. Based on the ESD C&D Debris Conversion Rate Table (Attachment 1), estimated asphalt (black or brown, tar-like material mixed with aggregate) and concrete (hard material made from sand, gravel, aggregate, cement mix and water) removed will total approximately 2,856 tons as shown in the calculations below.

Existing Asphalt:

$$192{,}753 \text{ square feet} \times 0.5 \text{ foot} = 77{,}101 \text{ cubic feet}$$

$$\frac{77{,}101\ cubic\ feet}{27\ cubic\ yards} = 2{,}855 \text{ cubic yards} \times 0.70\ \frac{tons}{unit} = 1{,}999 \text{ tons}$$

Existing Concrete:

$$38{,}550 \text{ square feet} \times 0.5 \text{ foot} = 19{,}275 \text{ cubic feet}$$

$$\frac{19{,}275\ cubic\ feet}{27\ cubic\ yards} = 714 \text{ cubic yards} \times 1.20\ \frac{tons}{unit} = 857 \text{ tons}$$

Estimated demolition waste from the existing buildings are based on a 2009 study by the U.S. Environmental Protection Agency (U.S. EPA) where a sample of residential demolition projects generated an average of 50 pounds of waste per square foot (U.S. EPA 2009). Based on this generation rate, existing building demolition will produce 200 tons as shown in the calculation below.

Existing Buildings:

$$8{,}000 \text{ square feet} \times \frac{50\ pounds}{square\ foot} \times \frac{1\ ton}{2{,}000\ pounds} = 200 \text{ tons}$$

Map Source: Project Design Consultants

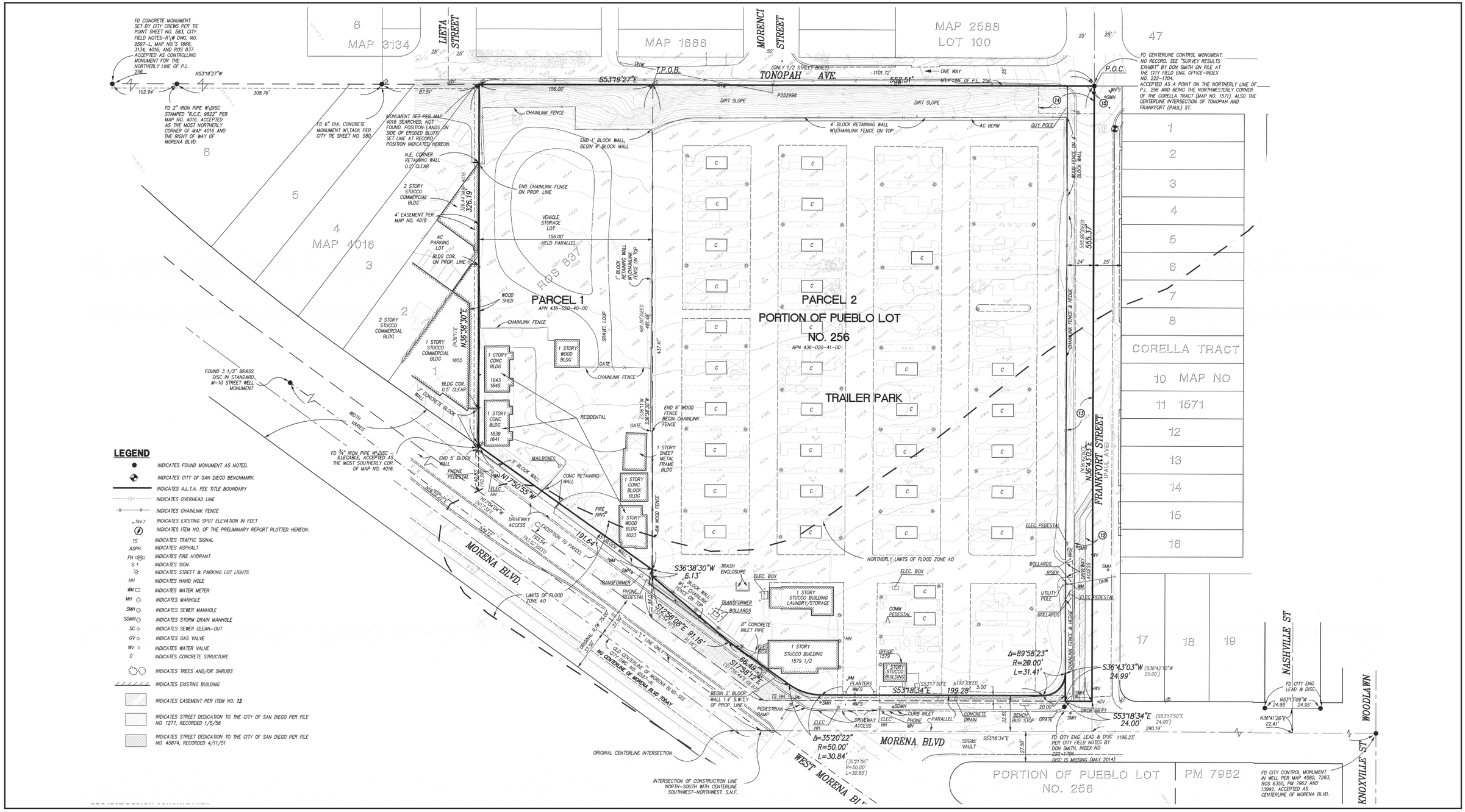

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FIGURE 4
Existing Development

Estimates of building material type and amounts are based on the specific characteristics of the buildings to be demolished. Nearest handling facilities are based on the ESD 2016 Certified C&D Recycling Facilities Table (Attachment 2). Estimates have a degree of uncertainty and would be revised as the project progresses and demolition debris is more specifically identified and weighed.

Estimates of material type and amounts are included in Table 1.

Table 1
Projected Materials Generated by Demolition Activities

Material	Tons Generated[1]	Percent Diverted	Nearest Handling Facility[2]	Tons Diverted	Tons Disposed
Paved Areas					
Asphalt	1,999	100	Hanson Aggregates West–Miramar	1,999	0
Concrete	857	100	Hanson Aggregates West–Miramar	857	0
Subtotal	*2,856*			*2,856*	*0*
Existing Buildings					
Building Materials (doors, windows, cabinets, etc.)	10.0	100	Reconstruction Warehouse	10	0
Carpet, padding/foam	16.0	100	DFS Flooring	16	0
Clean wood	50.0	100	Miramar Greenary	50	0
Concrete (broken)	24.0	100	Hanson Aggregates West–Miramar	24	0
Drywall (used)	56.0	62	EDCO Recovery & Transfer	34.7	21.3
Roofing Materials (mixed C&D debris)	10.0	65	EDCO Recovery & Transfer	6.5	3.5
Scrap Metal	20.0	100	IMS Recycling Services	20	0
Treated wood/trash/garbage	14.0	100	Miramar Landfill	0	14
Subtotal	*200*			*161.2*	*38.8*
Total	**3,056**			**3,017 (98.7%)**	**38.8 (1.3%)**

Note: Totals may vary due to independent rounding. Portions of material types are based on specific characteristics of buildings to be demolished
[1]ESD C&D Debris Conversion Rate Table (see Attachment 1).
[2]City of San Diego ESD 2016 Certified C&D Recycling Facility Directory (see Attachment 2).

5.2 Grading

Following demolition activities, implementation of the project would result in a net soil import of approximately 1,300 cubic yards (10,500 cubic yards of cut soil and 11,800 cubic yards of fill soil). However, any vegetation removed, including trees and shrubs, would be taken to the Miramar Greenery for 100 percent composting. Small- to medium-sized trees located within the existing development are estimated to account for approximately 125 tons.

5.3 Construction

The 150 proposed multi-family units will be divided into 9 residential buildings, a 4,400-square-foot clubhouse, and a 319-square-foot pool equipment room for a total of 211,958 square feet of proposed gross floor area. This total includes the attached garage, storage, stairways, and private patio/balconies. Roads, sidewalks, surface parking, 53 detached carports, and the water detention basin are not anticipated to generate waste from construction.

According to the previously referenced study by the U.S. EPA, a sample of multi-family residential construction projects in the report generated an average of 3.9 pounds of construction waste per square foot (U.S. EPA 2009). Based on this generation rate and the total proposed building construction area, approximately 413.3 tons of waste would result from construction (see calculation below).

$$211{,}958 \text{ square feet} \times \frac{3.9\ pounds}{square\ foot} \times \frac{1\ ton}{2{,}000\ pounds} = 413.3 \text{ tons}$$

Estimates of material types and portions are based on similar multi-family residential developments. The types of construction waste and materials anticipated to be generated are listed in Table 2.

Table 2
Construction Waste Diversion and Disposal by Material Type

Material Type	Estimated Waste (tons) [1]	Percent Diverted[2]	Nearest Handling Facility [1]	Estimated Diversion (tons)	Estimated Disposal (tons)
Asphalt and Concrete	58	100	Hanson Aggregates West–Miramar	58	0
Metals	92	100	IMS Recycling Services	92	0
Brick/Masonry/Tile	28	100	Hanson Aggregates West–Miramar	28	0
Clean Wood/Wood Pallets	16	100	Miramar Greenery	16	0
Carpet, Padding/Foam	33	100	DFS Flooring	33	0
Drywall	92	62	EDCO Recover & Transfer	57	35
Corrugated Cardboard	25	100	Allan Company Miramar Recycling	25	0
Trash/Garbage	69	0	Miramar Landfill	0	69
Total	**413**			**310 74.9%**	**104 25.1%**

Note: Totals may vary due to independent rounding.
[1]Portions of material types based on demolition estimates of similar residential developments.
[2]City of San Diego ESD 2016 Certified C&D Recycling Facility Directory (see Attachment 2).

5.4 Waste Diversion

Waste diversion would be conducted through source separation rather than mixed debris diversion. With mixed debris diversion, all material waste is disposed of in a single container for transport to a mixed C&D recycling facility where 65 percent is diverted for recycling. With source-separated diversion, materials are separated on-site before transport to appropriate facilities that accept specific material types and a greater diversion rate is achieved. Recyclable waste materials would be separated on-site into material-specific containers and diverted to an approved recycler selected from ESD's directory of facilities that recycle specific waste materials from construction and demolition (see Attachment 2). These facilities achieve a 100 percent diversion rate for most materials a 62 percent diversion rate for drywall and a 65 diversion rate for demolished/treated roof scraps. Given the waste reduction target of 75 percent, the majority of waste must be handled at facilities other than landfills.

With implementation of the diversion-estimated calculations outlined in the following Table 3, it is estimated that 75 percent of the waste generated during the construction phase of the proposed project would be diverted to appropriate facilities for reuse. Only 104 tons of drywall and trash/garbage, equivalent to 25 percent of the total construction waste, would be disposed of in the landfill.

5.4.1 Total Diversion

Table 3 summarizes the amount of waste estimated to be generated and diverted by each phase of the proposed project. Of the 3,594 tons estimated to be produced 3,452 tons would be diverted, primarily through source separation. This would result in 96 percent of waste material diverted from the landfill for reuse.

Table 3
Total Waste Generated, Diverted, and Disposed of by Phase

Phase	Tons Generated	Tons Diverted	Tons Disposed
Demolition	3,056	3,017 (98.7%)	38.8 (1.3%)
Grading/Landscape Debris	125	125 (100%)	0
Construction	413	310 (74.9%)	104 (25.1%)
Total	**3,594**	**3,452 (96%)**	**143 (4%)**

5.4.2 Contractor Education and Responsibilities

A Solid Waste Management Coordinator (SWMC) for the proposed project would be designated to ensure that all contractors and subcontractors are educated and that procedures for waste reduction and recycling efforts are implemented. Specific responsibilities of the SWMC would include the following:

- Review of the WMP at the preconstruction meeting, including the SWMC responsibilities.

- Distribute the WMP to all contractors when they first begin work on-site and when training workers, subcontractors, and suppliers on proper waste management procedures applicable to the project.

- Work with the contractors to estimate the quantities of each type of material that would be salvaged, recycled, or disposed of as waste, then assist in documentation.

- Use detailed material estimates to reduce risk of unplanned and potentially wasteful material cuts.

- Review and enforce procedures for source-separated receptacles. Containers of various sizes shall:

    - Be placed in readily accessible areas that will minimize misuse or contamination.
    - Be clearly labeled with a list of acceptable and unacceptable materials, the same as the materials recycled at the receiving material recovery facility or recycling processor.
    - Contain no more than 10 percent non-recyclable materials, by volume.
    - Be inspected daily to remove contaminants and evaluate discarded material for reuse on-site.

- Review and enforce procedures for transportation of materials to appropriate recipients selected from ESD's directory of facilities that recycle demolition and construction materials (see Tables 1 and 2; Attachment 2).

- Ensure removal of demolition and construction waste materials from the project site at least once every week to ensure no over-topping of containers. The accumulation and burning of on-site construction, demolition, and land-clearing waste materials will be prohibited.

- Document the return or reuse of excess materials and packaging to enhance the diversion rate.

- Coordinate implementation of a "buy recycled" program for green construction products, including incorporating mulch and compost into the landscaping.

- Coordinate implementation of solid waste mitigation with other requirements such as storm water requirements, which may include specifications such as the placement of bins to minimize the possibility of runoff contamination.

The SWMC would ensure that the proposed project meets the following state law and City Municipal Code requirements. Adjustments would be made as needed to maintain conformance:

- The City's C&D Debris Diversion Deposit Program, which requires a refundable deposit based on the tonnage of the expected recyclable waste materials as part of the building permit requirements (City of San Diego 2008).
- The City's Recycling Ordinance, which requires that collection of recyclable material is provided (City of San Diego 2007a).
- The City's Storage Ordinance, which requires that areas for recyclable material collection must be provided (City of San Diego 2007b).
- The name and contact information of the waste contractor provided to ESD at least 10 days prior to the start of any work and updated within 5 days of any changes.

6.0 Occupancy – Operational Waste

The City operates the Miramar Landfill, which is currently the only municipal landfill in the City. According to the City of San Diego Municipal Code (San Diego Municipal Code, Chapter 6, Article 6, Division 7, Section 66.0701), the Miramar Landfill is expected to close and preserving landfill capacity is a realistic concern. City efforts have made progress, but studies have shown that there is still room for improvement through additional recycling efforts. Approximately 21 percent of the waste generated in the city of San Diego and delivered for landfill disposal is paper and 16 percent is compostable organics, all of which could be diverted from landfill disposal.

6.1 Waste Generation

The estimated annual waste to be generated during occupancy of the proposed project is based on findings from the State of California's Department of Resources Recycling and Recovery (CalRecycle) Residential Sector Generation Rates (State of California 2016). The generation rate is based on the average of five case studies for multi-family projects. The studies found that the estimated solid waste generation rate for multi-family units is an average of 5.1 pounds/dwelling unit/day. The estimated annual amount in tons is calculated below:

$$150 \text{ dwelling units} \times \frac{5.1\ pounds}{dwelling\ unit/day} \times \frac{1\ ton}{2{,}000\ pounds} = 0.38 \text{ tons/day}$$

$$\frac{0.38\ tons}{day} \times \frac{365\ days}{1\ year} = 139 \text{ tons/year}$$

Table 4 shows the amount of tons that would be generated during the occupancy phase. The total generation of waste for the proposed 150 multi-family dwelling units equates to approximately 139 tons per year based on a total of 150 dwelling units. As discussed in the following section, Waste Reduction Measures, an ongoing plan to manage waste disposal in order to meet state and City waste reduction goals would be implemented by the applicant (or applicant's successor in interest).

Table 4
Occupancy Phase Annual Waste Generation

	Dwelling unit	Generation Rate[1]	Waste Generated (tons)
Habitable space	150	5.1 lbs/du/day	139
Total			**139**

[1]CalRecycle (State of California 2016).
du = dwelling unit; lbs = pounds

6.2 Waste Reduction Measures

According to the City Waste Management Guidelines (City of San Diego 2013), compliance with the City's Recycling Ordinances is expected to provide a minimum recycling service volume of 40 percent for large complexes. Therefore, waste anticipated to be diverted during the occupancy phase would be approximately 56 tons per year. The remaining 83 tons per year would still exceed the 60 ton-per-year threshold of significance for a cumulative impact on solid waste services in the city (City of San Diego 2016).

Therefore, the applicant (or applicant's successor in interest) shall be responsible for implementing a long-term waste management program. This program shall include recyclables collection services required by and in accordance with the Recycling Ordinance, as well as providing exterior storage space for refuse, recyclable materials, and a means of handling landscaping and green waste materials. Specific program measures shall include the following:

- Multi-family residential facilities which receive solid waste collection services from a Franchisee, the responsible person shall provide on-site recycling services to occupants as required by the dates prescribed in the San Diego Municipal Code, Chapter 6, Article 6, Division 7, Section 66.0706c.

- Occupants of multi-family residential facilities which receive solid waste collection services from a Franchisee, shall participate in a recycling program by separating recyclable material from other solid waste and depositing the recyclable materials in the recycling container provided by the Franchisee or Recyclable Materials Collector Chapter 6, Article 6, Division 7, Section 66.0706d.

- At a minimum recycling services would include the following (San Diego Municipal Code, Chapter 6, Article 6, Division 7, Section 66.0706e):

    1. Collection of recyclable materials at least two times per month.

    2. Collection of plastic bottles and jars, paper, newspaper, metal containers, cardboard, and glass containers.

    3. Utilization of recycling receptacles which comply with the standards in the Container and Signage Guidelines established by the City ESD or its successor.

    4. Designated recycling collection and storage areas.

    5. Signage on all recycling receptacles, containers, chutes, and/or enclosures which comply with the standards described in the Container and Signage Guidelines established by the City ESD or its successor.

- Occupant Education – For multi-family residential facilities, the responsible person shall ensure that occupants are educated about the recycling services as follows (San Diego Municipal Code, Chapter 6, Article 6, Division 7, Section 66.0706f):

    1. Information, including the types of recyclable materials accepted, the location of recycling containers, and the occupants responsibility to recycle, shall be distributed to all occupants annually.

    2. All new occupants shall be given information and instructions upon occupancy.

    3. All occupants shall be given information and instructions upon any change in recycling service to the facility.

6.3 Exterior Storage

This WMP follows the City's Municipal Code on-site refuse and recyclable material storage space requirements (City of San Diego 2007b). Table 5 shows the exterior storage area requirements for residential developments.

Because the proposed project would include a total of 150 dwelling units, a minimum of 288 square feet of refuse storage area and a minimum of 288 square feet of recyclable material storage area would be required. The total exterior refuse and recyclable material storage requirement for the proposed project would be 576 square feet. Site plans show the location and square footage of refuse and recyclable storage areas and shows compliance with this requirement.

Table 5 Minimum Exterior Refuse and Recyclable Material Storage Areas for Residential Development			
# of units	Minimum Refuse Area (square feet)	Minimum Recyclable Area (square feet)	Total Storage Area (square feet)
2–6	12	12	24
7–15	24	24	48
16–25	48	48	96
26–50	96	96	192
51–75	144	144	288
76–100	192	192	384
101–125	240	240	480
126–150	288	288	576
151–175	336	336	672
176–200	384	384	768
200+	384 plus 48 square feet for every 25 dwelling units above 201	384 plus 48 square feet for every 25 dwelling units above 201	768 plus 96 square feet for every 25 dwelling units above 201
Project (150 units)	**288**	**288**	**576**
SOURCE: City of San Diego Municipal Code, Chapter 14, Article 2, Division 8: Refuse and Recyclable Material Storage Regulations, Section 142.0820, Table 142-08B.			

6.4 Organic Waste Recycling

The proposed project would require landscaping and landscape maintenance. Drought tolerant plants would be used to reduce the amount of green waste produced. Collection of organic waste and its disposal at recycling centers that accept organic waste would further reduce the waste generated by the proposed project during occupancy. An ongoing WMP would include a means for handling landscaping and other organic waste materials. The ongoing WMP discussed in Section 6.2, Waste Reduction Measures, would include a means for handling landscaping and other organic waste materials.

7.0 Conclusion

7.1 Demolition, Grading, and Construction Waste

Diversion goals will be communicated to contractors through contract documents; the project's California Environmental Quality Act document, and corresponding Mitigation Monitoring and Reporting Program, or permit conditions; and the SWMC for the project. A total of approximately 3,594 tons of waste would be generated during the demolition, grading, and construction of the proposed project (see Table 3). Most would be recycled at source separated facilities that achieve a 100 percent diversion rate. When necessary, used drywall and demolished roofing materials would be recycled at a lower diversion rate,

leaving 143 tons to be disposed of. This amounts to a 96 percent reduction in solid waste, which would be diverted from the landfill.

7.2 Occupancy – Operational Waste

The proposed project would include 150 dwelling units for a multi-family development, generating approximately 139 tons of waste per year; and would be required to provide a minimum of 288 square feet of exterior refuse area and the same amount of recyclable material storage area (total of 576 square feet; see Table 5). The applicant (or applicant's successor in interest) would implement an ongoing waste reduction measures as prescribed in this WMP to ensure that the waste is minimized and the operation of the project complies with City ordinances. According to the City Waste Management Guidelines (City of San Diego 2013), compliance with existing ordinances is expected to achieve a 40 percent diversion rate. Therefore, approximately 83 tons of non-recyclable waste per year would be generated from the proposed project, exceeding the 60 ton-per-year threshold of significance for having a cumulative impact on solid waste services by 23 tons per year. However, preparation of this waste management plan and implementation of the Waste Reduction Measures, outlined in Section 6.2 above, would mitigate the cumulative solid waste impact to below a level of significance. In addition, the applicant (or applicant's successor) would implement the following additional measures to further mitigate operational waste:

- Ensure the use of drought tolerant plants, as indicated in the Project's landscape plans, which would result in a reduction in the amount of yard waste once the project is constructed and occupied.

- Provide litter bins with recycling as an integral feature in all common areas to increase the opportunity to separate out recyclables from the trash.

7.3 Overall Compliance

With implementation of the strategies outlined in this WMP and compliance with all applicable City ordinances, solid waste impacts would be reduced to below a level of significance regarding collection, diversion, and disposal of waste generated from C&D, grading, and occupancy. During occupancy, an ongoing waste management plan would include provisions to provide adequate exterior storage space for refuse, recyclable, and landscape/green waste materials.

This WMP outlines strategies to achieve 96 percent of waste being diverted from disposal during C&D of the proposed project. This would reduce the anticipated impact of waste disposal to below the direct impact threshold of significance. The occupancy phase is anticipated to involve a recurring shortcoming due to achieving a projected 40 percent diversion. However, the implementation of the ongoing WMP, including the above-mentioned additional measures, and the project providing better than a 75 percent diversion rate during the other phases would compensate to achieve overall compliance.

8.0 References Cited

California, State of

1989 Assembly Bill 939. Integrated Waste Management Act.

2006 Waste Disposal and Diversion Findings for Selected Industry Groups. California Environmental Protection Agency, Integrated Waste Management Board. June. http://www.calrecycle.ca.gov/Publications/Documents/Disposal/34106006.pdf Accessed on December 23, 2016.

2010 Senate Bill 1016. Solid Waste Per Capita Disposal Measurement Act.

2011 Assembly Bill 341. Jobs and Recycling.

2014 Assembly Bill 1826. Solid Waste: Organic Waste.

2016 CalRecycle – Estimated Solid Waste Generation Rates. https://www2.calrecycle.ca.gov/WasteCharacterization/General/Rates Accessed on December 23, 2016.

San Diego, City of

2000 Waste Composition Study 1999-2000. Final Report. San Diego Environmental Services Department. November 2000.

2007a Recycling Ordinance. San Diego Municipal Code Chapter 6, Article 6, Division 7. November 20, 2007.

2007b Refuse and Recyclable Materials Storage Regulations. Municipal Code Chapter 14, Article 2, Division 8. December 9, 2007.

2008 Construction and Demolition Debris Diversion Deposit Program. San Diego Municipal Code Chapter 6, Article 6, Division 6.

2013 California Environmental Quality Act – Guidelines for a Waste Management Plan. June 2013. https://www.sandiego.gov/sites/default/files/legacy/environmental-services/pdf/recycling/wmpguidelines.pdf. Accessed on December 22, 2016

2016 Significance Determination Thresholds. California Environmental Quality Act. July.

United States Environmental Protection Agency (U.S. EPA)

2009 Estimating 2003 Building-Related Construction and Demolition Materials Amounts. March.

ATTACHMENT 1

City of San Diego Environmental Services Department
Construction & Demolition Debris Conversion Rate Table

CITY OF SAN DIEGO
CONSTRUCTION & DEMOLITION (C&D) DEBRIS CONVERSION RATE TABLE

This worksheet lists materials typically generated from a construction or demolition project and provides formulas for converting common units (i.e., cubic yards, square feet, and board feet) to tons. It should be used for preparing your Waste Management Form, which requires that quantities be provided in tons.

Step 1
Enter the estimated quantity for each applicable material in Column I, based on units of cubic yards (cy), square feet (sq ft), or board feet (bd ft).

Step 2
Multiply by Tons/Unit figure listed in Column II. Enter the result for each material in Column III. If using Excel version, column III will automatically calculate tons.

Step 3
Enter quantities for each separated material from Column III on this worksheet into the corresponding section of your Waste Management Form.

For your final calculations, use the actual quantities, based on weight tags, gate receipts, or other documents.

		Column I			Column II		Column III
Category	**Material**	**Volume**	**Unit**		**Tons/Unit**		**Tons**
Asphalt/Concrete	Asphalt (broken)		cy	x	0.70	=	
	Concrete (broken)		cy	x	1.20	=	
	Concrete (solid slab)		cy	x	1.30	=	
Brick/Masonry/Tile	Brick (broken)		cy	x	0.70	=	
	Brick (whole, palletized)		cy	x	1.51	=	
	Masonry Brick (broken)		cy	x	0.60	=	
	Tile		sq ft	x	0.00175	=	
Building Materials (doors, windows, cabinets, etc.)			cy	x	0.15	=	
Cardboard (flat)			cy	x	0.05	=	
Carpet	By square foot		sq ft	x	0.0005	=	
	By cubic yard		cy	x	0.30	=	
Carpet Padding/Foam			sq ft	x	0.000125	=	
Ceiling Tiles	Whole (palletized)		sq ft	x	0.0003	=	
	Loose		cy	x	0.09	=	
Drywall (new or used)	1/2" (by square foot)		sq ft	x	0.0008	=	
	5/8" (by square foot)		sq ft	x	0.00105	=	
	Demo/used (by cubic yd)		cy	x	0.25	=	
Earth	Loose/Dry		cy	x	1.20	=	
	Excavated/Wet		cy	x	1.30	=	
	Sand (loose)		cy	x	1.20	=	
Landscape Debris (brush, trees, etc)			cy	x	0.15	=	
Mixed Debris	Construction		cy	x	0.18	=	
	Demolition		cy	x	1.19	=	
Scrap metal			cy	x	0.51	=	
Shingles, asphalt			cy	x	0.22	=	
Stone (crushed)			cy	x	2.35	=	
Unpainted Wood & Pallets	By board foot		bd ft	x	0.001375	=	
	By cubic yard		cy	x	0.15	=	
Garbage/Trash			cy	x	0.18	=	
Other (estimated weight)			cy	x	estimate	=	
			cy	x	estimate	=	
			cy	x	estimate	=	
			cy	x	estimate	=	

5/21/08

Total All

ATTACHMENT 2

City of San Diego 2016 Construction & Demolition Recycling Facility Directory

2016 Certified Construction & Demolition Recycling Facility Directory

These facilities are certified by the City of San Diego to accept materials listed in each category. Hazardous materials are not accepted. The diversion rate for these materials shall be considered 100%, except mixed C&D debris which updates quarterly. The City is not responsible for changes in facility information. Please call ahead to confirm details such as accepted materials, days and hours of operation, limitations on vehicle types, and cost. For more information visit: www.recyclingworks.com.

Please note: In order to receive recycling credit, Mixed C&D Facility and transfer station receipts must: *-be coded as construction & demolition (C&D) debris* *-have project address or permit number on receipt* **Make sure to notify weighmaster that your load is subject to the City of San Diego C&D Ordinance.* *Note about landfills: Miramar Landfill and other landfills do not recycle mixed C&D debris.*	Mixed C&D Debris	Asphalt/Concrete	Brick/Block/Rock	Building Materials for Reuse	Cardboard	Carpet	Carpet Padding	Ceiling Tile	Ceramic Tile/Porcelain	Clean Fill Dirt	Clean Wood/Green Waste	Drywall	Industrial Plastics	Lamps/Light Fixtures	Metal	Mixed Inerts	Styrofoam Blocks
EDCO Recovery & Transfer 3660 Dalbergia St, San Diego, CA 92113 619-234-7774 | www.edcodisposal.com/public-disposal	65%											•					
EDCO Station Transfer Station & Buy Back Center 8184 Commercial St, La Mesa, CA 91942 619-466-3355 | www.edcodisposal.com/public-disposal	65%				•							•			•		
EDCO CDI Recycling & Buy Back Center 224 S. Las Posas Rd, San Marcos, CA 92078 760-744-2700 | www.edcodisposal.com/public-disposal	87%				•										•		
Escondido Resource Recovery 1044 W. Washington Ave, Escondido 760-745-3203 | www.edcodisposal.com/public-disposal	65%																
Fallbrook Transfer Station & Buy Back Center 550 W. Aviation Rd, Fallbrook, CA 92028 760-728-6114 | www.edcodisposal.com/public-disposal	65%				•										•		
Otay C&D/Inert Debris Processing Facility 1700 Maxwell Rd, Chula Vista, CA 91913 619-421-3773 | www.sd.disposal.com	76%																
Ramona Transfer Station & Buy Back Center 324 Maple St, Ramona, CA 92065 760-789-0516 | www.edcodisposal.com/public-disposal	65%				•										•		
SANCO Resource Recovery & Buy Back Center 6750 Federal Blvd, Lemon Grove, CA 91945 619-287-5696 | www.edcodisposal.com/public-disposal	65%				•										•		
All American Recycling 10805 Kenney St, Santee, CA 92071 619-508-1155 (Must call for appointment)						•											
Allan Company 6733 Consolidated Wy, San Diego, CA 92121 858-578-9300 | www.allancompany.com/facilities.htm					•										•		
Allan Company Miramar Recycling 5165 Convoy St, San Diego, CA 92111 858-268-8971 | www.allancompany.com/facilities.htm					•										•		
AMS 4674 Cardin St, San Diego, CA 92111 858-541-1977 | www.a-m-s.com								•									

	Mixed C&D Debris	Asphalt/Concrete	Brick/Block/Rock	Building Materials for Reuse	Cardboard	Carpet	Carpet Padding	Ceiling Tile	Ceramic Tile/Porcelain	Clean Fill Dirt	Clean Wood/Green Waste	Drywall	Industrial Plastics	Lamps/Light Fixtures	Metal	Mixed Inerts	Styrofoam Blocks
Armstrong World Industries, Inc. 300 S. Myrida St, Pensacola, FL 32505 877-276-7876 (Press 1, Then 8) www.armstrong.com/commceilingsna								•									
Cactus Recycling 8710 Avenida De La Fuente, San Diego, CA 92154 619-661-1283 | www.cactusrecycling.com					•								•		•		•
DFS Flooring 10178 Willow Creek Road, San Diego, CA 92131 858-630-5200 | www.dfsflooring.com						•	•										
Duco Metals 220 Bingham Drive Suite 100, San Marcos, CA 92069 760-747-6330 | www.ducometals.com															•		
Enniss Incorporated 12421 Vigilante Rd, Lakeside, CA 92040 619-443-9024 | www.ennissinc.com		•	•						•	•							
Escondido Sand and Gravel 500 N. Tulip St, Escondido, CA 92025 760-432-4690 | www.weirasphalt.com/esg		•															
Habitat for Humanity ReStore 10222 San Diego Mission Rd, San Diego, CA 92108 619-516-5267 | www.sdhfh.org/restore.php				•													
Hanson Aggregates West – Lakeside Plant 12560 Highway 67, Lakeside, CA 92040 858-547-2141		•															
Hanson Aggregates West – Miramar 9229 Harris Plant Rd, San Diego, CA 92126 858-974-3849		•								•							
HVAC Exchange 2675 Faivre St, Chula Vista, CA 91911 619-423-1855 | www.thehvacexchange.com															•		
IMS Recycling Services 2740 Boston Ave, San Diego, CA 92113 619-423-1564 | www.imsrecyclingservices.com					•								•				
IMS Recycling Services 2697 Main St, San Diego, CA 92113 619-231-2521 | www.imsrecyclingservices.com													•		•		
Inland Pacific Resource Recovery 12650 Slaughterhouse Canyon Rd, Lakeside, CA 92040 619-390-1418											•						
Lamp Disposal Solutions 1405 30th Street, San Diego, CA 92154 858-569-1807 | www.lampdisposalsolutions.com														•			
Los Angeles Fiber Company 4920 S. Boyle Ave, Vernon, CA 90058 323-589-5637 | www.lafiber.com						•	•										

	Mixed C&D Debris	Asphalt/Concrete	Brick/Block/Rock	Building Materials for Reuse	Cardboard	Carpet	Carpet Padding	Ceiling Tile	Ceramic Tile/Porcelain	Clean Fill Dirt	Clean Wood/Green Waste	Drywall	Industrial Plastics	Lamps/Light Fixtures	Metal	Mixed Inerts	Styrofoam Blocks
Miramar Greenery, City of San Diego 5180 Convoy St, San Diego, CA 92111 858-694-7000 | www.sandiego.gov/environmental-services/miramar/greenery.shtml											•						
Moody's 3210 Oceanside Blvd., Oceanside, CA 92056 760-433-3316		•								•						•	
Otay Valley Rock, LLC 2041 Heritage Rd, Chula Vista, CA 91913 619-591-4717 | www.otayrock.com		•															
Reclaimed Aggregates Chula Vista 855 Energy Wy, Chula Vista, CA 91913 619-656-1836		•														•	
Reconstruction Warehouse 3650 Hancock St., San Diego, CA 92110 619-795-7326 | www.recowarehouse.com				•													
Robertson's Ready Mix 2094 Willow Glen Dr, El Cajon, CA 92019 619-593-1856		•								•						•	
Romero General Construction Corp. 8354 Nelson Wy, Escondido, CA 92026 760-749-9312 | www.romerogc.com/crushing/nelsonway.htm		•															
SA Recycling 3055 Commercial St., San Diego, CA 92113 619-238-6740 | www.sarecycling.com															•		
SA Recycling 1211 S. 32nd St., San Diego, CA 92113 619-234-6691 | www.sarecycling.com															•		
Universal Waste Disposal 8051 Wing Avenue, El Cajon, CA 92020 619-438-1093 | www.universalwastedisposal.com														•			
Vulcan Carol Canyon Landfill and Recycle Site 10051 Black Mountain Rd, San Diego, CA 92126 858-530-9465 | www.vulcanmaterials.com		•	•							•						•	
Vulcan Otay Asphalt Recycle Center 7522 Paseo de la Fuente, San Diego, CA 92154 619-571-1945 | www.vulcanmaterials.com		•															

CLIMATE ACTION PLAN CONSISTENCY CHECKLIST INTRODUCTION

In December 2015, the City adopted a Climate Action Plan (CAP) that outlines the actions that City will undertake to achieve its proportional share of State greenhouse gas (GHG) emission reductions. The purpose of the Climate Action Plan Consistency Checklist (Checklist) is to, in conjunction with the CAP, provide a streamlined review process for proposed new development projects that are subject to discretionary review and trigger environmental review pursuant to the California Environmental Quality Act (CEQA).[1]

Analysis of GHG emissions and potential climate change impacts from new development is required under CEQA. The CAP is a plan for the reduction of GHG emissions in accordance with CEQA Guidelines Section 15183.5. Pursuant to CEQA Guidelines Sections 15064(h)(3), 15130(d), and 15183(b), a project's incremental contribution to a cumulative GHG emissions effect may be determined not to be cumulatively considerable if it complies with the requirements of the CAP.

This Checklist is part of the CAP and contains measures that are required to be implemented on a project-by-project basis to ensure that the specified emissions targets identified in the CAP are achieved. Implementation of these measures would ensure that new development is consistent with the CAP's assumptions for relevant CAP strategies toward achieving the identified GHG reduction targets. Projects that are consistent with the CAP as determined through the use of this Checklist may rely on the CAP for the cumulative impacts analysis of GHG emissions. Projects that are not consistent with the CAP must prepare a comprehensive project-specific analysis of GHG emissions, including quantification of existing and projected GHG emissions and incorporation of the measures in this Checklist to the extent feasible. Cumulative GHG impacts would be significant for any project that is not consistent with the CAP.

The Checklist may be updated to incorporate new GHG reduction techniques or to comply with later amendments to the CAP or local, State, or federal law.

[1] Certain projects seeking ministerial approval may be required to complete the Checklist. For example, projects in a Community Plan Implementation Overlay Zone may be required to use the Checklist to qualify for ministerial level review. See Supplemental Development Regulations in the project's community plan to determine applicability.

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CAP CONSISTENCY CHECKLIST SUBMITTAL APPLICATION

- The Checklist is required only for projects subject to CEQA review.[2]
- If required, the Checklist must be included in the project submittal package. Application submittal procedures can be found in Chapter 11: Land Development Procedures of the City's Municipal Code.
- The requirements in the Checklist will be included in the project's conditions of approval.
- The applicant must provide an explanation of how the proposed project will implement the requirements described herein to the satisfaction of the Planning Department.

Application Information

Contact Information

Project No./Name: Project No. 526167/Morena Apartment Homes

Property Address: 1577-1579 Morena Boulevard, San Diego

Applicant Name/Co.: Fairfield Residential Company LLC

Contact Phone: Shon Finch 858-626-8263 Contact Email: sfinch2@ffres.com

Was a consultant retained to complete this checklist? ☑ Yes ☐ No If Yes, complete the following

Consultant Name: Jennifer Campos Contact Phone: 619.308.9333

Company Name: RECON Environmental, Inc. Contact Email: jcampos@reconenvironmental.com

Project Information

1. What is the size of the project (acres)? 6.21 acres

2. Identify all applicable proposed land uses:
   - ☐ Residential (indicate # of single-family units):
   - ☑ Residential (indicate # of multi-family units): 150
   - ☐ Commercial (total square footage):
   - ☐ Industrial (total square footage):
   - ☐ Other (describe):

3. Is the project or a portion of the project located in a Transit Priority Area? ☑ Yes ☐ No

4. Provide a brief description of the project proposed:

Amend the Clairemont Mesa Community Plan to remove the mobile home park overlay and single-family zoning and redesignate the property to residential (15-30 du/ac), rezone the property from CC-4-2 and RS-1-7 to RM-2-5, and prepare a Vesting Tentative Map, Site Plan, and PDP to accommodate 150 multi-family residential units.

[2] Certain projects seeking ministerial approval may be required to complete the Checklist. For example, projects in a Community Plan Implementation Overlay Zone may be required to use the Checklist to qualify for ministerial level review. See Supplemental Development Regulations in the project's community plan to determine applicability.

CAP CONSISTENCY CHECKLIST QUESTIONS

Step 1: Land Use Consistency

The first step in determining CAP consistency for discretionary development projects is to assess the project's consistency with the growth projections used in the development of the CAP. This section allows the City to determine a project's consistency with the land use assumptions used in the CAP.

Step 1: Land Use Consistency		
Checklist Item (Check the appropriate box and provide explanation and supporting documentation for your answer)	Yes	No
A. Is the proposed project consistent with the existing General Plan and Community Plan land use and zoning designations?;[3] OR,		
B. If the proposed project is not consistent with the existing land use plan and zoning designations, and includes a land use plan and/or zoning designation amendment, would the proposed amendment result in an increased density within a Transit Priority Area (TPA) and implement CAP Strategy 3 actions, as determined in Step 3 to the satisfaction of the Development Services Department?; OR,	☑	☐
A General Plan and Community Plan Amendment is required to amend the Clairemont Mesa Community Plan to remove the mobile home park overlay and apply a medium density residential (15 to 30 dwelling units per acre) designation to the project site. This would result in an increase in residential density within a TPA. The project would implement CAP Strategy 3 actions, as detailed below.		
C. If the proposed project is not consistent with the existing land use plan and zoning designations, does the project include a land use plan and/or zoning designation amendment that would result in an equivalent or less GHG-intensive project when compared to the existing designations?		

If "***Yes***," proceed to Step 2 of the Checklist. For question B above, complete Step 3. For question C above, provide estimated project emissions under both existing and proposed designation(s) for comparison. Compare the maximum buildout of the existing designation and the maximum buildout of the proposed designation.

If "***No***," in accordance with the City's Significance Determination Thresholds, the project's GHG impact is significant. The project must nonetheless incorporate each of the measures identified in Step 2 to mitigate cumulative GHG emissions impacts unless the decision maker finds that a measure is infeasible in accordance with CEQA Guidelines Section 15091. Proceed and complete Step 2 of the Checklist.

[3] This question may also be answered in the affirmative if the project is consistent with SANDAG Series 12 growth projections, which were used to determine the CAP projections, as determined by the Planning Department.

Step 2: CAP Strategies Consistency

The second step of the CAP consistency review is to review and evaluate a project's consistency with the applicable strategies and actions of the CAP. Step 2 only applies to development projects that involve permits that would require a certificate of occupancy from the Building Official or projects comprised of one and two family dwellings or townhouses as defined in the California Residential Code and their accessory structures.[4] All other development projects that would not require a certificate of occupancy from the Building Official shall implement Best Management Practices for construction activities as set forth in the Greenbook (for public projects).

Step 2: CAP Strategies Consistency			
Checklist Item (Check the appropriate box and provide explanation for your answer)	Yes	No	N/A
Strategy 1: Energy & Water Efficient Buildings			
1. *Cool/Green Roofs.* • Would the project include roofing materials with a minimum 3-year aged solar reflection and thermal emittance or solar reflection index equal to or greater than the values specified in the voluntary measures under California Green Building Standards Code (Attachment A)?; OR • Would the project roof construction have a thermal mass over the roof membrane, including areas of vegetated (green) roofs, weighing at least 25 pounds per square foot as specified in the voluntary measures under California Green Building Standards Code?; OR • Would the project include a combination of the above two options? Check "N/A" only if the project does not include a roof component. The project would install cool roofs using one of the above options or a combination of the above two options.	☑	☐	☐

[4] Actions that are not subject to Step 2 would include, for example: a) discretionary map actions that do not propose specific development, b) permits allowing wireless communication facilities, c) special events permits, d) use permits or other permits that do not result in the expansion or enlargement of a building (e.g., decks, garages, etc.), and e) non-building infrastructure projects such as roads and pipelines. Because such actions would not result in new occupancy buildings from which GHG emissions reductions could be achieved, the items contained in Step 2 would not be applicable.

2. *Plumbing fixtures and fittings* With respect to plumbing fixtures or fittings provided as part of the project, would those low-flow fixtures/appliances be consistent with each of the following: Residential buildings: • Kitchen faucets: maximum flow rate not to exceed 1.5 gallons per minute at 60 psi; • Alternate nonpotable water sources are used for indoor potable water reduction and installed per A4.303.2 of the California Green Building Standards Code and the California Plumbing Code; • At least one qualified ENERGY STAR dischwasher or clothes washer is installed per A4.303.3 of the California Green Building Standards Code; • Nonwater supplied urinals or waterless toilets are installed per A4.303.4 of the California Green Building Standards Code; and • One- and two-family dwellings are be equipped with a demand hot water recirculation system per A4.303.5 of the California Green Building Standards Code? Nonresidential buildings: • Plumbing fixtures and fittings that do not exceed the maximum flow rate specified in Table A5.303.2.3.1 (voluntary measures) of the California Green Building Standards Code (See Attachment A); and • Appliances and fixtures for commercial applications that meet the provisions of Section A5.303.3 (voluntary measures) of the California Green Building Standards Code (See Attachment A)? Check "N/A" only if the project does not include any plumbing fixtures or fittings. The project would install low-flow fixtures/appliances consistent with the standards for residential buildings. Additionally, the project would install smart irrigation controllers to provide landscape watering only when needed.	☑	☐	☐

Strategy 2: Clean & Renewable Energy			
3. *Energy Performance Standard / Renewable Energy* Is the project designed to have an energy budget that meets the following performance standards when compared to the Title 24, Part 6 Energy Budget for the Standard Design Building as calculated by Compliance Software certified by the California Energy Commission (percent improvement over current code): • Low-rise residential – 85% of the Title 24, Part 6 Energy Budget or 15% reduction from the Standard Design Building? • Nonresidential with indoor lighting OR mechanical system, but not both – 95% of the Title 24, Part 6 Energy Budget or 5% reduction from the Standard Design Building? • Nonresidential with both indoor lighting AND mechanical systems – 90% of the Title 24, Part 6 Energy Budget or 10% reduction from the Standard Design Building?[5] The demand reduction may be provided through on-site renewable energy generation, such as solar, or by designing the project to have an energy budget that meets the above-mentioned performance standards, when compared to the Title 24, Part 6 Energy Budget for the Proposed Design Building (percent improvement over current code). Note: For Energy Budget calculations, high-rise residential and hotel/motel buildings are considered non-residential buildings. Check "N/A" only if the project does not contain any residential or non-residential buildings. The project would be designed to have a 15 percent improvement in energy performance compared to the Title 24, Part 6 Energy Budget for the Proposed Design Building as calculated by Compliance Software certified by the California Energy Commission. Additionally, the project would incorporate the following energy efficiency measures: • 100 percent LED lights • Low-e dual-pane windows that minimize heat loss in winter and heat gain in summer • Insulation in exterior walls up to R-19 • EnergyStar appliances in all units • Home Efficiency Rating System (HERS) testing for low leakage testing and building commissioning for installed energy-consuming systems to verify systems operation to their rated operational efficiency	☑	☐	☐

[5] CALGreen defines mechanical systems as equipment, appliances, fixtures, fittings and/or appurtenances, including ventilating, heating, cooling, air-conditioning and refrigeration systems, incinerators and other energy-related systems.

Strategy 3: Bicycling, Walking, Transit & Land Use			
4. *Electric Vehicle Charging* • Multiple-family projects of 17 dwelling units or less: Would 5% of the total parking spaces required, or a minimum of one space, whichever is greater, be provided with a listed cabinet, box or enclosure connected to a conduit linking the parking spaces with the electrical service, in a manner approved by the building and safety official, to allow for the future installation of electric vehicle supply equipment to provide electric vehicle charging stations at such time as it is needed for use by residents? • Multiple-family projects of more than 17 dwelling units: Would 5% of the total parking spaces required, or a minimum of one space, whichever is greater, be provided with a listed cabinet, box or enclosure connected to a conduit linking the parking spaces with the electrical service, in a manner approved by the building and safety official? Of the total listed cabinets, boxes or enclosures provided, would 50% have the necessary electric vehicle supply equipment installed to provide active electric vehicle charging stations ready for use by residents? • Non-residential projects: If the project includes new commercial, industrial, or other uses with the building or land area, capacity, or numbers of employees listed in Attachment A, would 6% of the total parking spaces required, or a minimum of one space, whichever is greater, be provided with a listed cabinet, box or enclosure connected to a conduit linking the parking spaces with the electrical service, in a manner approved by the building and safety official? Of the total listed cabinets, boxes or enclosures provided, would 50% have the necessary electric vehicle supply equipment installed to provide active electric vehicle charging stations ready for use? Check "N/A" only if the project is does not include new commercial, industrial, or other uses with the building or land area, capacity, or numbers of employees listed in Attachment A. The project would provide 3 percent of the total parking spaces (8 spaces) with a listed cabinet, box, or enclosure connected to a conduit linking the parking spaces to electrical service and would provide 50 percent of those spaces (4 spaces) with the necessary electric vehicle supply equipment installed to provide active electric vehicle charging stations ready for use by residents.	☑	☐	☐

Strategy 3: Bicycling, Walking, Transit & Land Use
(Complete this section if project includes non-residential or mixed uses)

5. *Bicycle Parking Spaces*

Would the project provide more short- and long-term bicycle parking spaces than required in the City's Municipal Code (Chapter 14, Article 2, Division 5)?[6]

Check "N/A" only if the project is a residential project.

Not applicable

☐ ☐ ☑

6. *Shower facilities*

If the project includes nonresidential development that would accommodate over 10 tenant occupants (employees), would the project include changing/shower facilities in accordance with the voluntary measures under the California Green Building Standards Code as shown in the table below?

Number of Tenant Occupants (Employees)	Shower/Changing Facilities Required	Two-Tier (12" X 15" X 72") Personal Effects Lockers Required
0-10	0	0
11-50	1 shower stall	2
51-100	1 shower stall	3
101-200	2 shower stalls	4
Over 200	2 shower stalls plus 2 additional shower stall for each 200 additional tenant-occupants	1 two-tier locker plus 1 two-tier locker for each 50 additional tenant-occupants

Check "N/A" only if the project is a residential project, or if it does not include nonresidential development that would accommodate over 10 tenant occupants (employees).

Not applicable

☐ ☐ ☑

[6] Non-portable bicycle corrals within 600 feet of project frontage can be counted towards the project's bicycle parking requirements.

7. *Designated Parking Spaces*

If the project includes nonresidential use, would the project provide designated parking for a combination of low-emitting, fuel-efficient, and carpool/vanpool vehicles in accordance with the following table?

Number of Nonresidential Parking Spaces Required by the Permit	Number of Designated Parking Spaces
0-9	0
10-25	2
26-50	4
51-75	6
76-100	9
101-150	11
151-200	18
201 and over	At least 10% of total

This measure does not cover electric vehicles. See Question 4 for electric vehicle parking requirements.

Note: Vehicles bearing Clean Air Vehicle stickers from expired HOV lane programs may be considered eligible for designated parking spaces. The required designated parking spaces are to be provided within the overall minimum parking requirement, not in addition to it.

Check "N/A" only if the project is a residential project.

Not applicable

☐ ☐ ☑

8. *Transportation Demand Management Program* If the project would accommodate over 50 tenant-occupants (employees), would it include a transportation demand management program that would be applicable to existing tenants and future tenants that includes: At least one of the following components: • Parking cash out program • Parking management plan that includes charging employees market-rate for single-occupancy vehicle parking and providing reserved, discounted, or free spaces for registered carpools or vanpools • Unbundled parking whereby parking spaces would be leased or sold separately from the rental or purchase fees for the development for the life of the development And at least three of the following components: • Commitment to maintaining an employer network in the SANDAG iCommute program and promoting its RideMatcher service to tenants/employees • On-site carsharing vehicle(s) or bikesharing • Flexible or alternative work hours • Telework program • Transit, carpool, and vanpool subsidies • Pre-tax deduction for transit or vanpool fares and bicycle commute costs • Access to services that reduce the need to drive, such as cafes, commercial stores, banks, post offices, restaurants, gyms, or childcare, either onsite or within 1,320 feet (1/4 mile) of the structure/use? Check "N/A" only if the project is a residential project or if it would not accommodate over 50 tenant-occupants (employees).	☐	☐	☑
Not applicable			

Step 3: Project CAP Conformance Evaluation (if applicable)

The third step of the CAP consistency review only applies if Step 1 is answered in the affirmative under option B. The purpose of this step is to determine whether a project that is located in a TPA but that includes a land use plan and/or zoning designation amendment is nevertheless consistent with the assumptions in the CAP because it would implement CAP Strategy 3 actions. In general, a project that would result in a reduction in density inside a TPA would not be consistent with Strategy 3. The following questions must each be answered in the affirmative and fully explained.

1. **Would the proposed project implement the General Plan's City of Villages strategy in an identified Transit Priority Area (TPA) that will result in an increase in the capacity for transit-supportive residential and/or employment densities?**
   Considerations for this question:
   - Does the proposed land use and zoning designation associated with the project provide capacity for transit-supportive residential densities within the TPA?
   - Is the project site suitable to accommodate mixed-use village development, as defined in the General Plan, within the TPA?
   - Does the land use and zoning associated with the project increase the capacity for transit-supportive employment intensities within the TPA?

2. **Would the proposed project implement the General Plan's Mobility Element in Transit Priority Areas to increase the use of transit?**
   Considerations for this question:
   - Does the proposed project support/incorporate identified transit routes and stops/stations?
   - Does the project include transit priority measures?

3. **Would the proposed project implement pedestrian improvements in Transit Priority Areas to increase walking opportunities?**
   Considerations for this question:
   - Does the proposed project circulation system provide multiple and direct pedestrian connections and accessibility to local activity centers (such as transit stations, schools, shopping centers, and libraries)?
   - Does the proposed project urban design include features for walkability to promote a transit supportive environment?

4. **Would the proposed project implement the City of San Diego's Bicycle Master Plan to increase bicycling opportunities?**
   Considerations for this question:
   - Does the proposed project circulation system include bicycle improvements consistent with the Bicycle Master Plan?
   - Does the overall project circulation system provide a balanced, multimodal, "complete streets" approach to accommodate mobility needs of all users?

5. **Would the proposed project incorporate implementation mechanisms that support Transit Oriented Development?**
   Considerations for this question:
   - Does the proposed project include new or expanded urban public spaces such as plazas, pocket parks, or urban greens in the TPA?
   - Does the land use and zoning associated with the proposed project increase the potential for jobs within the TPA?
   - Do the zoning/implementing regulations associated with the proposed project support the efficient use of parking through mechanisms such as: shared parking, parking districts, unbundled parking, reduced parking, paid or time-limited parking, etc.?

6. **Would the proposed project implement the Urban Forest Management Plan to increase urban tree canopy coverage?**
   Considerations for this question:
   - Does the proposed project provide at least three different species for the primary, secondary and accent trees in order to accommodate varying parkway widths?
   - Does the proposed project include policies or strategies for preserving existing trees?
   - Does the proposed project incorporate tree planting that will contribute to the City's 20% urban canopy tree coverage goal?

Step 3: Project CAP Conformance Evaluation

1. **Would the proposed project implement the General Plan's City of Villages strategy in an identified Transit Priority Area (TPA) that will result in an increase in the capacity for transit-supportive residential and/or employment densities?** Considerations for this question:
    - Does the proposed land use and zoning designation associated with the project provide capacity for transit-supportive residential densities within the TPA?
    - Is the project site suitable to accommodate mixed-use village development, as defined in the General Plan, within the TPA?
    - Does the land use and zoning associated with the project increase the capacity for transit-supportive employment intensities within the TPA?

RESPONSE:

The project requires approval of a Community Plan Amendment, Rezone, Vesting Tentative Map, Planned Development Permit, and Site Development Permit to rezone the site from CC-4-2/RS-1-7 to RM-2-5, to remove the mobile home overlay, and to consolidate two lots for the construction of 150 multi-family dwelling units. This project would implement the City of Villages strategy by increasing density within a TPA. Specifically, the project would remove the existing Recreational Vehicle (RV) Park that supports 90 RVs. The project would increase the density on the project site by constructing a 150-unit multi-family residential apartment complex. Higher density development on this project site would be supportive of the existing and planned transit access to the project site.

The project does not provide mixed-use village development, as multi-family residential uses were determined to be the most feasible in terms of marketability. With the exception of employment associated with apartment management and leasing office staff, the project would not provide a significant source of employment.

2. **Would the proposed project implement the General Plan's Mobility Element in Transit Priority Areas to increase the use of transit?** Considerations for this question:
    - Does the proposed project support/incorporate identified transit routes and stops/stations?
    - Does the project include transit priority measures?

RESPONSE:

The project would add density directly adjacent to an existing bus stop located on Morena Boulevard (Route 105). The project would install new accessible sidewalks along the project frontage along West Morena Boulevard, Morena Boulevard and Frankfort Street. Internal paths would connect to sidewalks to provide pedestrian connectivity to adjacent transit.

Route 105 travels between the Old Town Transit Station and the University Transit Center (UTC). Monday through Friday it travels with 30-minute frequencies in the morning and 60

minute frequencies in the evening, between 5:00 A.M. and 10:00 P.M. On Saturdays, it travels between 6:00 A.M. and 8:30 P.M. with 60-minute frequencies. On Sundays it travels between 6:07 A.M. and 8:36 P.M. with 60-minute frequencies.

Additionally, the proposed multi-family residential use would be supportive of the planned Mid-Coast trolley station at Tecolote Road. The Mid-Coast Corridor Transit Project will extend Trolley Blue Line service from the Old Town Transit Center to major destinations in the north including University of California San Diego (UCSD) and Westfield UTC. The extension will serve nine new stations including Tecolote Road, which is in close proximity to the Project. Residents would be within walking distance to the proposed Tecolote station, approximately 7 minutes or 0.4 mile away.

3. **Would the proposed project implement pedestrian improvements in Transit Priority Areas to increase walking opportunities?** Considerations for this question:
    - Does the proposed project circulation system provide multiple and direct pedestrian connections and accessibility to local activity centers (such as transit stations, schools, shopping centers, and libraries)?
    - Does the proposed project urban design include features for walkability to promote a transit supportive environment?

RESPONSE:

The project would be designed to provide access by connecting to existing and proposed transit lines. The bus stop for Transit Route 108 is located on Morena Boulevard just north of Frankfort Street, which corresponds to the southern edge of the project site. The project incorporates internal pedestrian pathways that provide direct connections to Frankfort Street, close to the corner of Morena Boulevard. This pedestrian connection to Frankfort Street would provide convenient access to the bus stop at this corner. Similarly, there are commercial amenities located across Frankfort Street that would be directly accessible from the proposed pedestrian access point. The project design would also include pedestrian access at the northern end of West Morena Boulevard to provide easy access to amenities along Morena Boulevard to the North. No pedestrian access is provided to Tonopah Avenue, because the roadway sits atop a steep slope above grade from the project site. Additionally, there are no local amenities or activity centers that need to be directly accessed from Tonopah Avenue.

The project would provide frontage improvements including sidewalks along Frankfort Street, Morena Boulevard, and West Morena Boulevard. Thus, with the proposed internal private pedestrian connections to the improved public sidewalks, the project incorporates features for walkability, providing direct access to the transit stop and to local commercial amenities.

4. **Would the proposed project implement the City of San Diego's Bicycle Master Plan to increase bicycling opportunities?** Considerations for this question:
    - Does the proposed project circulation system include bicycle improvements consistent with the Bicycle Master Plan?
    - Does the overall project circulation system provide a balanced, multimodal, "complete streets" approach to accommodate mobility needs of all users?

RESPONSE:

There are currently no bicycle facilities provided on either roadway fronting the project site. The City of San Diego Bicycle Master Plan (2013) identifies a planned Class II bicycle facility along Morena Boulevard as it transitions to West Morena Boulevard and a Class III bicycle lane along the segment of Morena Boulevard west of Tecolote Road. The project would provide adequate frontage to allow for implementation of these priority bicycle improvements. The project would provide frontage improvements including the roadway widths required to implement planned bicycle improvements but would not install bike lane striping since this would need to be coordinated and implemented along the length of the roadway, which is beyond the control of the project applicant. The project would not alter the surrounding circulation system, but would provide roadway improvements consistent with City standards.

Sidewalks would not be installed along Tonopah Avenue at the project's northern boundary because of existing roadway constraints and because there is no existing or future demand for pedestrian improvements along this segment. The project is requesting a deviation from City Roadway Standards for Tonopah Avenue along the project's northern boundary to allow a reduction in standard City right-of-way improvements. Tonopah Avenue is designated as an unclassified local roadway that runs one-way east-to-west above the site's northern boundary, terminating on a bluff of private property at a grade well above Morena Boulevard. This segment of road is not accessible from the project site due to its grade located above the site at the top of a slope. Further, the roadway terminates at a dead end and does not provide any connectivity to surrounding amenities. The top of slope and edge condition of this roadway also present significant right-of-way improvement limitations. Thus, while pedestrian improvements would not be provided in this location, the project would maximize pedestrian connectivity from the project site connecting to the surrounding area. Overall, proposed roadway improvements would promote a balanced, multimodal, "complete streets" approach to accommodate mobility needs of all users.

The project design includes 10 outdoor bicycle parking areas located close to each building that would accommodate space for up to 70 parked bicycles.

5. **Would the proposed project incorporate implementation mechanisms that support Transit Oriented Development?** Considerations for this question:
    - Does the proposed project include new or expanded urban public spaces such as plazas, pocket parks, or urban greens in the TPA?
    - Does the land use and zoning associated with the proposed project increase the potential for jobs within the TPA?
    - Do the zoning/implementing regulations associated with the proposed project support the efficient use of parking through mechanisms such as: shared parking, parking districts, unbundled parking, reduced parking, paid or time-limited parking, etc.?

RESPONSE:

The project is a private multi-family development. All interior portions of the project site would be open only to residents of the community. However, the project would enhance the surrounding right-of-way by providing improved pedestrian pathways adjacent to the project site. Landscaping, including larger trees, would be planted along the project frontage at Morena Boulevard, West Morena Boulevard, Frankfort Street, and Tonopah Avenue that would enhance the roadway corridor and the pedestrian realm.

The project would accommodate a minimum of 263 parking spaces on-site in single-car garages, carports, and surface parking spaces consistent with City Municipal Code parking requirements. With the assumed dwelling unit configuration of 75 one-bedroom units and 75 two-bedroom units, the minimum vehicular parking requirements for the proposed project are 263 automobile parking spaces. The project site's location in proximity to an existing bus stop and a future trolley stop would encourage transit use.

6. **Would the proposed project implement the Urban Forest Management Plan to increase urban tree canopy coverage?** Considerations for this question:
    - Does the proposed project provide at least three different species for the primary, secondary and accent trees in order to accommodate varying parkway widths?
    - Does the proposed project include policies or strategies for preserving existing trees?
    - Does the proposed project incorporate tree planting that will contribute to the City's 20% urban canopy tree coverage goal?

RESPONSE:

Approximately 35 ornamental trees are currently located on the project site. As the entire site will be graded and redeveloped, all existing trees would be removed. However, the project would install new trees and landscaping. The project landscape plan provides for a number of tree options (12 different species) to accommodate the varying needs throughout the project site and frontage. The project would incorporate approximately 318 trees throughout the project site and overall would provide approximately 1.63 acres of landscaped area. Overall, the project would contribute to the City's 20 percent urban canopy tree coverage goal.

CLIMATE ACTION PLAN CONSISTENCY CHECKLIST
ATTACHMENT A

This attachment provides performance standards for applicable Climate Action Pan (CAP) Consistency Checklist measures.

Table 1 Roof Design Values for Question 1: Cool/Green Roofs supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan

Land Use Type	Roof Slope	Minimum 3-Year Aged Solar Reflectance	Thermal Emittance	Solar Reflective Index
Low-Rise Residential	≤ 2:12	0.63	0.75	75
	> 2:12	0.20	0.75	16
High-Rise Residential Buildings, Hotels and Motels	≤ 2:12	0.55	0.75	64
	> 2:12	0.20	0.75	16
Non-Residential	≤ 2:12	0.63	0.75	75
	> 2:12	0.20	0.75	16

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 residential and non-residential voluntary measures shown in Tables A4.106.5.1 and A5.106.11.2.2, respectively. Roof installation and verification shall occur in accordance with the CALGreen Code.

CALGreen does not include recommended values for low-rise residential buildings with roof slopes of ≤ 2:12 for San Diego's climate zones (7 and 10). Therefore, the values for climate zone 15 that covers Imperial County are adapted here.

Solar Reflectance Index (SRI) equal to or greater than the values specified in this table may be used as an alternative to compliance with the aged solar reflectance values and thermal emittance.

Table 2	Fixture Flow Rates for Non-Residential Buildings related to Question 2: Plumbing Fixtures and Fittings supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan
Fixture Type	**Maximum Flow Rate**
Showerheads	1.8 gpm @ 80 psi
Lavatory Faucets	0.35 gpm @60 psi
Kitchen Faucets	1.6 gpm @ 60 psi
Wash Fountains	1.6 [rim space(in.)/20 gpm @ 60 psi]
Metering Faucets	0.18 gallons/cycle
Metering Faucets for Wash Fountains	0.18 gallons/cycle 20 [rim space(in.) @ 60 psi]
Gravity Tank-type Water Closets	1.12 gallons/flush
Flushometer Tank Water Closets	1.12 gallons/flush
Flushometer Valve Water Closets	1.12 gallons/flush
Electromechanical Hydraulic Water Closets	1.12 gallons/flush
Floor-mounted Urinals or Wall-mounted Urinals	0.44 or 0.11 gallons/flush

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 non-residential voluntary measures shown in Tables A5.303.2.3.1 and A5.106.11.2.2, respectively. See the California Plumbing Code for definitions of each fixture type.

Where complying faucets are unavailable, aerators rated at 0.35 gpm or other means may be used to achieve reduction.

Acronyms:
gpm = gallons per minute
psi = pounds per square inch (unit of pressure)
in. = inch

Table 3	**Standards for Appliances and Fixtures for Commercial Application related to Question 2: Plumbing Fixtures and Fittings supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan**	
Appliance/Fixture Type	**Standard**	
Clothes Washers	Maximum Water Factor (WF) that will reduce the use of water by 10 percent below the California Energy Commissions' WF standards for commercial clothes washers located in Title 20 of the *California Code of Regulations.*	
Single Tank Conveyor Dishwashers	0.70 maximum gallons per rack (2.6 L) (High-Temperature)	0.79 maximum gallons per rack (4.4 L) (Low-Temperature)
Multiple Tank Conveyor Dishwashers	0.54 maximum gallons per rack (2 L) (High-Temperature)	0.54 maximum gallons per rack (2 L) (Low-Temperature)
Stationary Single Tank Door Dishwashers	0.89 maximum gallons per rack (3.4 L) (High-Temperature)	1.18 maximum gallons per rack (4.5 L) (Low-Temperature)
Undercounter-type Dishwashers	0.86 maximum gallons per rack (3.3 L) (High-Temperature)	1.19 maximum gallons per rack (4.5 L) (Low-Temperature)
Pot, Pan, and Utensil Dishwashers	0.58 maximum gallons per square foot of rack	
Single Tank Flight Type Dishwashers	GPH ≤ 2.975x + 55.00	
Multiple Tank Flight Type Dishwashers	GPH ≤ 4.96x + 17.00	
Combination Ovens	Consume no more than 1.5 gallons per hour per pan, including condensate water.	
Commercial Pre-rinse Spray Valves (manufactured on or after January 1, 2006)	Function at equal to or less than 1.6 gallons per minute (0.10 L/s) at 60 psi (414 kPa) and • Be capable of cleaning 60 plates in an average time of not more than 30 seconds per plate. • Be equipped with an integral automatic shutoff. • Operate at static pressure of at least 30 psi (207 kPa) when designed for a flow rate of 1.3 gallons per minute (0.08 L/s) or less.	

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 non-residential voluntary measures shown in Section A5.303.3. See the California Plumbing Code for definitions of each appliance/fixture type.

Acronyms:
L = liter
GPH = gallons per hour
X = square feet of conveyor belt/minute (max conveyor speed sf/min as tested and certified to NSF/ANSI Standard 3)
L/h = liters per hour
L/s = liters per second
psi = pounds per square inch (unit of pressure)
kPa = kilopascal (unit of pressure)

Table 4	Size-based Trigger Levels for Electric Vehicle Charging Requirements for Non-Residential Buildings related to Question 4: Electric Vehicle Charging supporting Strategy 3: Bicycling, Walking, Transit & Land Use of the Climate Action Plan
Land Use Type	**Size-based Trigger Level**
Hospital	500 or more beds OR Expansion of a 500+ bed hospital by 20%
College	3,000 or more students OR Expansion of a 3,000+ student college by 20%
Hotels/Motels	500 or more rooms
Industrial, Manufacturing or Processing Plants or Industrial Parks	1,000 or more employees OR 40 acres or more of land area OR 650,000 square feet or more of gross floor area
Office buildings or Office Parks	1,000 or more employees OR 250,000 square feet or more of gross floor area
Shopping centers or Trade Centers	1,000 or more employees OR 500,000 square feet or more of gross floor area
Sports, Entertainment or Recreation Facilities	Accommodate at least 4,000 persons per performance OR Contain 1,500 or more fixed seats
Transit Projects (including, but not limited to, transit stations and park and ride lots).	All

Source: Adapted from the Governor's Office of Planning and Research's (OPR's) Model Building Code for Plug-In Electric Vehicle Charging

Air Quality Analysis for the Morena Apartment Homes Project, San Diego, California

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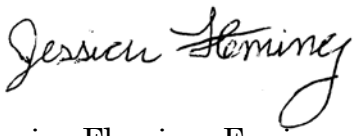
RECON Number 8456
May 3, 2017



Jessica Fleming, Environmental Analyst

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FIGURES

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ATTACHMENT

Acronyms

°C	degree Celsius
°F	degree Fahrenheit
µg/m3	micrograms per cubic meter
AB	Assembly Bill
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
City	City of San Diego
CO	carbon monoxide
DPM	diesel particulate matter
I-5	Interstate 5
LOS	Level of Service
NAAQS	National Ambient Air Quality Standards
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
OEHHA	Office of Environmental Health Hazard Assessment
Pb	lead
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns or less
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 microns or less
ppb	parts per billion
ppm	parts per million
RAQS	Regional Air Quality Strategy
ROG	reactive organic gas
SANDAG	San Diego Association of Governments
SDAB	San Diego Air Basin
SDAPCD	San Diego Air Pollution Control District
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_X	oxides of sulfur
TACs	toxic air contaminants
TCM	Transportation Control Measures
U.S. EPA	United States Environmental Protection Agency
USC	United States Code
VOC	volatile organic compounds

Executive Summary

This report evaluates potential local and regional air quality impacts associated with the proposed Morena Apartment Homes project (project) located at 1577-79 Morena Boulevard in the city of San Diego, immediately east of Interstate 5 (I-5) and West Morena Boulevard. The project site is currently developed with the Coastal Trailer Villa recreational vehicle (RV) park. The project would remove the existing RV park and construct 150 multi-family units with a recreational facility and water quality detention basin.

The primary goal of the San Diego Air Pollution Control District's Regional Air Quality Strategy (RAQS) is to reduce ozone precursor emissions. The northwestern parcel of the project site is currently designated as residential and the southeastern parcel is currently designated as commercial employment, retail, and services in the City of San Diego General Plan. The project would be consistent with the land use designation of the northwestern parcel. Under the commercial employment, retail, and services land use designation of the southeastern parcel, a range of commercial and retail uses could occur on site. Generally, commercial and retail uses generate more traffic than residential uses. Although the project would not be consistent with the commercial employment, retail, and services designation of the southeastern parcel, for air quality purposes, there would not be a significant change in traffic generation or area emissions from what is already accounted for in the RAQS. Therefore, the project would not obstruct or conflict with implementation of the RAQS or other air quality plans.

Additionally, as calculated in this analysis, project construction emissions would not exceed the applicable City emissions thresholds. These thresholds are designed to provide limits below which project emissions would not significantly change regional air quality. Therefore, as project emissions would be well below these limits, project construction would not result in regional emissions that would exceed the National Ambient Air Quality Standards (NAAQS) or California Ambient Air Quality Standards (CAAQS) or contribute to existing violations. Additionally, construction emissions would be temporary, intermittent, and would cease at the end of project construction.

Long-term emissions of regional air pollutants occur from operational sources. Based on emissions estimates, project operational emissions would not exceed the applicable regional emissions thresholds. Therefore, as project emissions would be well below these limits, project operations would not result in regional emissions that would exceed the NAAQS or CAAQS or contribute to existing violations.

The project would not result in the exposure of sensitive receptors to substantial concentrations of diesel particulate matter. Additionally, the project is not anticipated to result in a carbon monoxide hot spot.

The project does not include heavy industrial or agricultural uses that are typically associated with objectionable odors. The project would involve the use of diesel-powered equipment during construction. Diesel exhaust may occasionally be noticeable at adjacent properties; however, construction activities would be temporary and the odors would dissipate quickly in an outdoor environment. Therefore, this impact would be less than significant.

1.0 Introduction

The purpose of this report is to assess potential short-term and long-term local and regional air quality impacts resulting from development of the proposed Morena Apartment Homes Project (project).

Air pollution affects all southern Californians. Effects can include increased respiratory infections, increased discomfort, missed days from work and school, and increased mortality. Polluted air also damages agriculture and our natural environment.

The state of California is divided geographically into 15 air basins for managing the air resources of the state on a regional basis. Areas within each air basin are considered to share the same air masses and, therefore, are expected to have similar ambient air quality. The project site is located within the San Diego Air Basin (SDAB). The SDAB is currently classified as a federal non-attainment area for ozone, and a state non-attainment area for particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), and ozone.

Air quality impacts can result from the construction and operation of the project. Construction impacts are short term and result from fugitive dust, equipment exhaust, and indirect effects associated with construction workers and deliveries. Operational impacts can occur on two levels: regional impacts resulting from growth-inducing development, or local hot-spot effects stemming from sensitive receivers being placed close to highly congested roadways. In the case of this project, operational impacts would be primarily due to emissions to the basin from mobile sources associated with vehicular travel along the roadways within the project area.

The analysis of impacts is based on federal and state Ambient Air Quality Standards and is assessed in accordance with the guidelines, policies, and standards established by the City of San Diego (City) and the San Diego Air Pollution Control District (SDAPCD). Project compatibility with the adopted air quality plan for the area is also assessed. Measures are recommended, as required, to reduce potentially significant impacts.

2.0 Project Description

The 6.21-acre project site is located at 1577-79 Morena Boulevard in the City of San Diego (City), immediately east of Interstate 5 (I-5) and West Morena Boulevard. The project site consists of two parcels (Assessor Parcel Numbers 436-020-40 and -41). Figure 1 shows the regional location of the project site. Figure 2 shows an aerial photograph of the project vicinity.

Project Location

RECON

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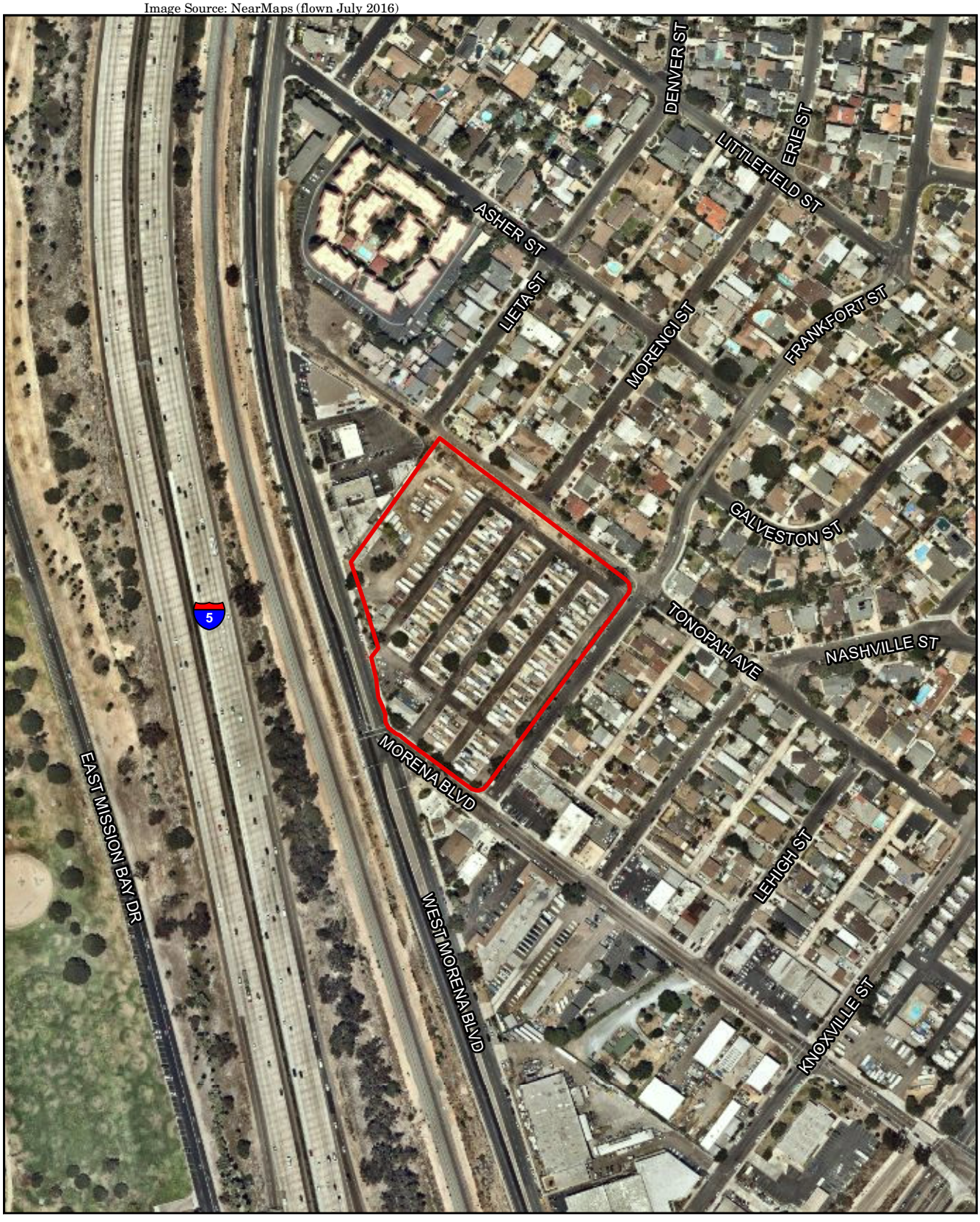
FIGURE 1

Regional Location

Image Source: NearMaps (flown July 2016)



Project Boundary

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FIGURE 2

Project Location on Aerial Photograph

The project site is currently developed with the Coastal Trailer Villa recreational vehicle (RV) park. The project would remove the existing RV park and construct 150 market-rate multi-family units with an approximately 4,400-square-foot clubhouse facility with leasing and exercise areas, recreational facility, landscaped areas including a pool and approximately 319-square-foot pool house building, and a water quality detention basin. Figure 3 shows the proposed site plan. The project would include garage and surface vehicular parking consistent with City Municipal Code requirements. In addition, 70 bicycle parking spaces and 16 motorcycle parking spaces are proposed.

The following entitlement requests are included as part of the application: an amendment to the Claremont Mesa Community Plan to remove the RV park overlay and apply a medium density residential (15 to 30 dwelling units per acre) designation to the site, a rezone from the RS-1-7 and CC-4-2 zones to the RM-2-5 zone, a Vesting Tentative Map to create condominium units, a Site Development Permit due to the presence of environmentally sensitive lands (special flood hazard area), and a Planned Development Permit to allow for deviations to the retaining wall heights, allow carports to encroach into the setbacks, and to maintain the current roadway width of Tonopah Avenue.

3.0 Regulatory Framework

3.1 Federal Regulations

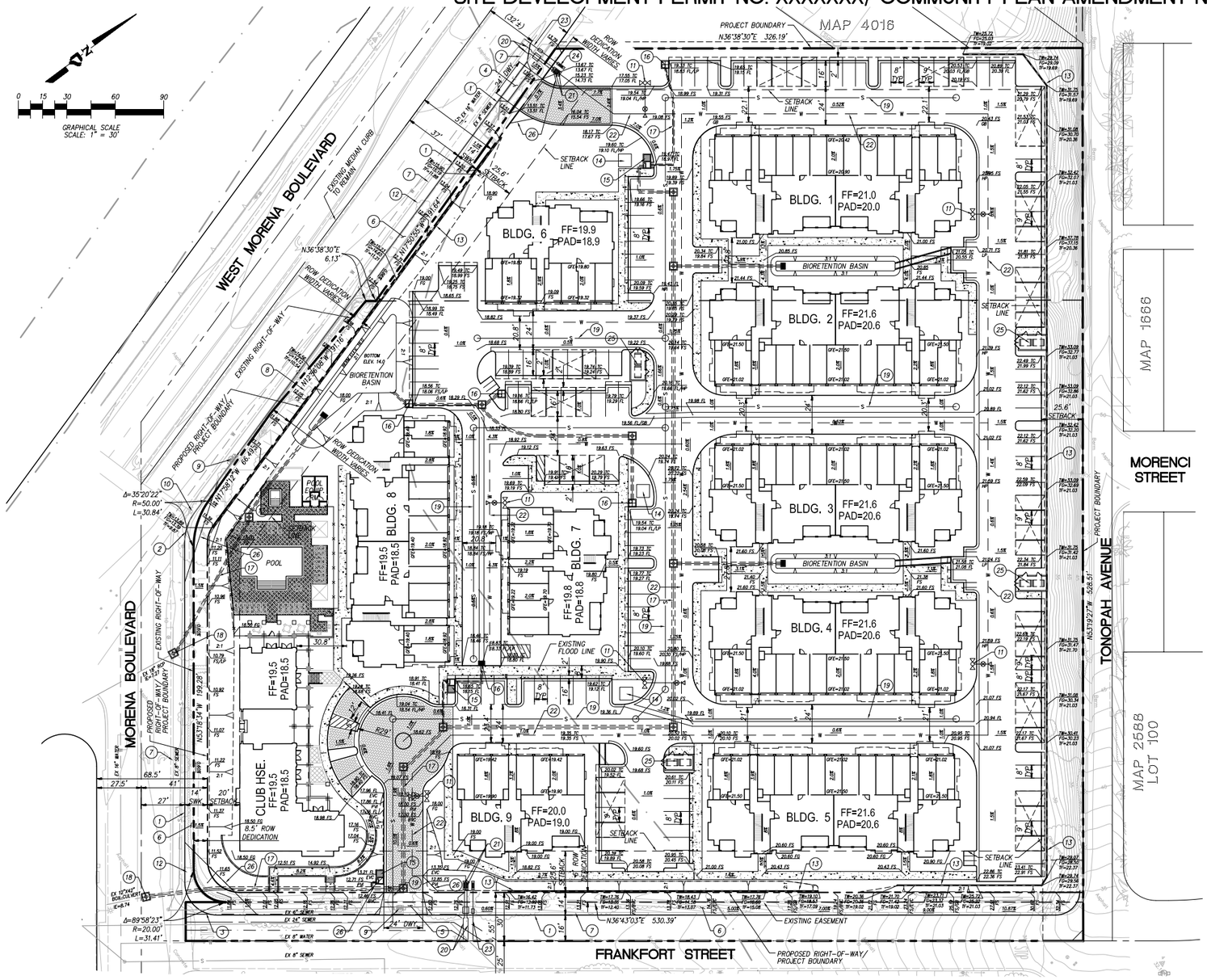
AAQS represent the maximum levels of background pollution considered safe, with an adequate margin of safety, to protect the public health and welfare. The federal Clean Air Act (CAA) was enacted in 1970 and amended in 1977 and 1990 [42 United States Code (USC) 7401] for the purposes of protecting and enhancing the quality of the nation's air resources to benefit public health, welfare, and productivity. In 1971, in order to achieve the purposes of Section 109 of the CAA [42 USC 7409], the U.S. Environmental Protection Agency (EPA) developed primary and secondary NAAQS.

Six criteria pollutants of primary concern have been designated: ozone, carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead (Pb), and respirable particulate matter (PM_{10} and $PM_{2.5}$). The primary NAAQS ". . . in the judgment of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health . . . " and the secondary standards ". . . protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air" [42 USC 7409(b)(2)]. The primary NAAQS were established, with a margin of safety, considering long-term exposure for the most sensitive groups in the general population (i.e., children, senior citizens, and people with breathing difficulties). The NAAQS are presented in Table 1 (California Air Resources Board [CARB] 2016a).

Map Source: Project Design Consultants

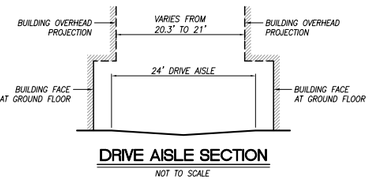
MORENA APARTMENT HOMES

REZONE NO. XXXXXXX/VESTING TENTATIVE MAP NO. XXXXXXX/PLANNED DEVELOPMENT PERMIT NO. XXXXXXX
SITE DEVELOPMENT PERMIT NO. XXXXXXX/ COMMUNITY PLAN AMENDMENT NO. XXXXXX



KEY NOTES:

1. PROPOSED TYPE 'G' CURB & GUTTER PER SDG-150
2. PROPOSED 30' RADIUS CURB RETURN
3. PROPOSED 20' RADIUS CURB RETURN
4. PROPOSED 24' DRIVEWAY PER SDG-159
5. PROPOSED 24' DRIVEWAY PER SDG-163
6. PROPOSED PCC SIDEWALK PER SDG-155
7. EXISTING TYPE 'G' CURB & GUTTER TO BE REMOVED
8. EXISTING SDG&E TRANSFORMER TO BE RELOCATED
9. EXISTING FIRE HYDRANT TO BE RELOCATED
10. EXISTING TRAFFIC SIGNAL POLE TO BE RELOCATED
11. PROPOSED FIRE HYDRANT ASSEMBLY
12. EXISTING STREET TREE TO BE REMOVED (TYPICAL)
13. PROPOSED RETAINING WALL
14. PROPOSED ELECTRIC TRANSFORMER LOCATION
15. PROPOSED MODULAR WETLAND UNIT (PRIVATE)
16. PROPOSED STORM DRAIN INLET (PRIVATE)
17. PROPOSED STORM DRAIN (PRIVATE) – SIZE VARIES FROM 18" TO 24" RCP
18. PROPOSED TYPE A-4 STORM DRAIN CLEANOUT PER D-09 (PUBLIC)
19. PROPOSED 6" SEWER LATERAL (PRIVATE)
20. PROPOSED WATER SERVICE METER (PUBLIC)
21. PROPOSED DOMESTIC/FIRE BACKFLOW (PRIVATE)
22. PROPOSED 8" DOMESTIC/FIRE WATER MAIN (PRIVATE)
23. PROPOSED 2" IRRIGATION SERVICE (PUBLIC)
24. PROPOSED IRRIGATION 2" REDUCED PRESSURE DETECTOR ASSEMBLY (PRIVATE)
25. PROPOSED TRASH ENCLOSURE
26. SIGHT DISTANCE LINE



DRIVE AISLE SECTION
NOT TO SCALE

SITE AND GRADING PLAN
SCALE: 1"=30'

0 Feet 60

RECON

M:\JOBS5\8456\air\graphics\fig3.ai 12/06/16 sab

FIGURE 3
Site Plan

An air basin is designated as either attainment or non-attainment for a particular pollutant. Once a non-attainment area has achieved the AAQS for a particular pollutant, it is re-designated as an attainment area for that pollutant. To be redesignated, the area must meet air quality standards for three consecutive years. After re-designation to attainment, the area is known as a maintenance area and must develop a 10-year plan for continuing to meet and maintain air quality standards, as well as satisfy other requirements of the federal CAA. The SDAB is a non-attainment area for the federal ozone standard.

3.2 State Regulations

3.2.1 Criteria Pollutants

The CARB has developed the CAAQS and generally has set more stringent limits on the criteria pollutants than the NAAQS (see Table 1). In addition to the federal criteria pollutants, the CAAQS also specify standards for visibility-reducing particles, sulfates, hydrogen sulfide, and vinyl chloride (see Table 1).

Similar to the federal CAA, the state classifies as either “attainment” or “non-attainment” areas for each pollutant based on the comparison of measured data with the CAAQS. The SDAB is a non-attainment area for the state ozone standards, the state PM_{10} standard, and the state $PM_{2.5}$ standard.

3.2.2 Toxic Air Contaminants

The public’s exposure to toxic air contaminants (TACs) is a significant public health issue in California. Diesel-exhaust particulate matter emissions have been established as TACs. In 1983, the California Legislature enacted a program to identify the health effects of TACs and to reduce exposure to these contaminants to protect the public health (Assembly Bill [AB] 1807: Health and Safety Code Sections 39650–39674). The Legislature established a two-step process to address the potential health effects from TACs. The first step is the risk assessment (or identification) phase. The second step is the risk management (or control) phase of the process.

The California Air Toxics Program establishes the process for the identification and control of TACs and includes provisions to make the public aware of significant toxic exposures and for reducing risk. Additionally, the Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, 1987, Connelly Bill) was enacted in 1987 and requires stationary sources to report the types and quantities of certain substances routinely released into the air.

The goals of the Air Toxics "Hot Spots" Act are to collect emission data, to identify facilities having localized impacts, to ascertain health risks, to notify nearby residents of significant risks, and to reduce those significant risks to acceptable levels.

Table 1
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone[8]	1 Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	–	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.07 ppm (137 µg/m³)		0.070 ppm (137 µg/m³)		
Respirable Particulate Matter (PM_{10})[9]	24 Hour	50 µg/m³	Gravimetric or Beta Attenuation	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m³		–		
Fine Particulate Matter ($PM_{2.5}$)[9]	24 Hour	No Separate State Standard		35 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m³	Gravimetric or Beta Attenuation	12 µg/m³	15 µg/m³	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m³)	Non-dispersive Infrared Photometry	35 ppm (40 mg/m³)	–	Non-dispersive Infrared Photometry
	8 Hour	9.0 ppm (10 mg/m³)		9 ppm (10 mg/m³)	–	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m³)		–	–	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m³)	Gas Phase Chemi-luminescence	100 ppb (188 µg/m³)	–	Gas Phase Chemi-luminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m³)		0.053 ppm (100 µg/m³)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m³)	Ultraviolet Fluorescence	75 ppb (196 µg/m³)	–	Ultraviolet Fluorescence; Spectro-photometry (Pararosaniline Method)
	3 Hour	–		–	0.5 ppm (1,300 µg/m³)	
	24 Hour	0.04 ppm (105 µg/m³)		0.14 ppm (for certain areas)[11]	–	
	Annual Arithmetic Mean	–		0.030 ppm (for certain areas)[11]	–	
Lead[12,13]	30 Day Average	1.5 µg/m³	Atomic Absorption	–	–	High Volume Sampler and Atomic Absorption
	Calendar Quarter	–		1.5 µg/m³ (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	–		0.15 µg/m³		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m³	Ion Chroma-tography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m³)	Gas Chroma-tography			

See footnotes on next page.

Table 1
Ambient Air Quality Standards

ppm = parts per million; ppb = parts per billion; µg/m^3 = micrograms per cubic meter; – = not applicable.

[1] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, particulate matter (PM_{10}, $PM_{2.5}$, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[2] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

[3] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Any equivalent measurement method which can be shown to the satisfaction of the Air Resources Board to give equivalent results at or near the level of the air quality standard may be used.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.

[8] On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

[9] On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 µg/m^3 to 12.0 µg/m^3. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/m^3, as was the annual secondary standards of 15 µg/m^3. The existing 24-hour PM_{10} standards (primary and secondary) of 150 µg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

[10] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national standards are in units of ppb. California standards are in units of ppm. To directly compare the national standards to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

[11] On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated non-attainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.
Note that the 1-hour national standard is in units of ppb. California standards are in units of ppm. To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

[12] The Air Resources Board has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[13] The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated non-attainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[14] In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

SOURCE: CARB 2016a.

The Children's Environmental Health Protection Act, California Senate Bill 25 (Chapter 731, Escutia, Statutes of 1999), focuses on children's exposure to air pollutants. The act requires CARB to review its air quality standards from a children's health perspective, evaluate the statewide air monitoring network, and develop any additional air toxic control measures needed to protect children's health. Locally, toxic air pollutants are regulated through the SDAPCD's Regulation XII. Of particular concern statewide are diesel-exhaust particulate matter emissions. Diesel-exhaust particulate matter was established as a TAC in 1998, and is estimated to represent a majority of the cancer risk from TACs statewide (based on the statewide average). Diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the CARB and are listed as carcinogens either under the state's Proposition 65 or under the federal Hazardous Air Pollutants program.

Following the identification of diesel particulate matter (DPM) as a TAC in 1998, CARB has worked on developing strategies and regulations aimed at reducing the risk from DPM. The overall strategy for achieving these reductions is found in the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* (CARB 2000). A stated goal of the plan is to reduce the statewide cancer risk arising from exposure to DPM by 85 percent by 2020.

In April 2005, CARB published the *Air Quality and Land Use Handbook: A Community Health Perspective* (CARB 2005). The handbook makes recommendations directed at protecting sensitive land uses from air pollutant emissions while balancing a myriad of other land use issues (e.g., housing, transportation needs, economics, etc.). It notes that the handbook is not regulatory or binding on local agencies and recognizes that application takes a qualitative approach. As reflected in the CARB Handbook, there is currently no adopted standard for the significance of health effects from mobile sources. Therefore, the CARB has provided guidelines for the siting of land uses near heavily traveled roadways. Of pertinence to this study, the CARB guidelines indicate that siting new sensitive land uses within 500 feet of a freeway or urban roads with 100,000 or more vehicles/day should be avoided when possible.

As an ongoing process, CARB will continue to establish new programs and regulations for the control of diesel particulate and other air-toxics emissions as appropriate. The continued development and implementation of these programs and policies will ensure that the public's exposure to DPM will continue to decline.

3.2.3 State Implementation Plan

The State Implementation Plan (SIP) is a collection of documents that set forth the state's strategies for achieving the NAAQS. In California, the SIP is a compilation of new and previously submitted plans, programs (such as air quality management plans, monitoring, modeling, permitting, etc.), district rules, state regulations, and federal controls. The CARB is the lead agency for all purposes related to the SIP under state law. Local air districts and other agencies, such as the Department of Pesticide Regulation and the Bureau of

Automotive Repair, prepare SIP elements and submit them to CARB for review and approval. The CARB then forwards SIP revisions to the U.S. EPA for approval and publication in the Federal Register. All of the items included in the California SIP are listed in the Code of Federal Regulations (CFR) at 40 CFR 52.220.

The SDAPCD is responsible for preparing and implementing the portion of the SIP applicable to the SDAB. The SIP plans for San Diego County specifically include the Redesignation Request and Maintenance Plan for the 1997 National Ozone Standard for San Diego County (2012), and the 2004 Revision to the California State Implementation Plan for Carbon Monoxide – Updated Maintenance Plan for Ten Federal Planning Areas.

3.2.4 The California Environmental Quality Act

Section 15125(d) of the California Environmental Quality Act (CEQA) Guidelines requires discussion of any inconsistencies between the project and applicable general plans and regional plans, including the applicable air quality attainment or maintenance plan (or SIP).

3.3 San Diego Air Pollution Control District

The SDAPCD is the agency that regulates air quality in the SDAB. The SDAPCD prepared the RAQS in response to the requirements set forth in the California CAA AB 2595 (SDAPCD 1992) and the federal CAA. Motor vehicles are San Diego County's leading source of air pollution (SDAPCD 2013). In addition to these sources, other mobile sources include construction equipment, trains, and airplanes. Reducing mobile source emissions requires the technological improvement of existing mobile sources and the examination of future mobile sources, such as those associated with new or modification projects (e.g., retrofitting older vehicles with cleaner emission technologies). In addition to mobile sources, stationary sources also contribute to air pollution in the SDAB. Stationary sources include gasoline stations, power plants, dry cleaners, and other commercial and industrial uses. Stationary sources of air pollution are regulated by the local air pollution control or management district, in this case the SDAPCD.

The SDAPCD is responsible for preparing and implementing the RAQS. As part of the RAQS, the SDAPCD developed Transportation Control Measures (TCMs) for the air quality plan prepared by the San Diego Association of Governments (SANDAG) in accordance with AB 2595 and adopted by SANDAG on March 27, 1992, as Resolution Number 92-49 and Addendum. The RAQS and TCM set forth the steps needed to accomplish attainment of NAAQS and CAAQS. The required triennial updates of the RAQS and corresponding TCM were adopted in 1995, 1998, 2001, 2004, and 2009. The SDAPCD published a workshop draft of the 2016 RAQS in August 2016. SDAPCD has solicited public feedback on the draft 2016 RAQS through public meetings.

The SDAPCD has also established a set of rules and regulations initially adopted on January 1, 1969 and periodically reviewed and updated. These rules and regulations are available for review on the agency's website.

4.0 Environmental Setting

4.1 Geographic Setting

The project is located in the city of San Diego, adjacent to Mission Bay and about three miles east of the Pacific Ocean. The eastern portion of the SDAB is surrounded by mountains to the north, east, and south. These mountains tend to restrict airflow and concentrate pollutants in the valleys and low-lying areas below.

4.2 Climate

The project area, like the rest of San Diego County, has a Mediterranean climate characterized by warm, dry summers and mild winters. The mean annual temperature for the project area is 63 degrees Fahrenheit (°F). The average annual precipitation is 10 inches, falling primarily from November to April. Winter low temperatures in the project area average about 49°F, and summer high temperatures average about 74°F. The average relative humidity is 69 percent and is based on the yearly average humidity at Lindbergh Field (Western Regional Climate Center 2016).

The dominant meteorological feature affecting the region is the Pacific High Pressure Zone, which produces the prevailing westerly to northwesterly winds. These winds tend to blow pollutants away from the coast toward the inland areas. Consequently, air quality near the coast is generally better than that which occurs at the base of the coastal mountain range.

Fluctuations in the strength and pattern of winds from the Pacific High Pressure Zone interacting with the daily local cycle produce periodic temperature inversions that influence the dispersal or containment of air pollutants in the SDAB. Beneath the inversion layer pollutants become "trapped" as their ability to disperse diminishes. The mixing depth is the area under the inversion layer. Generally, the morning inversion layer is lower than the afternoon inversion layer. The greater the change between the morning and afternoon mixing depths, the greater the ability of the atmosphere to disperse pollutants.

Throughout the year, the height of the temperature inversion in the afternoon varies between approximately 1,500 and 2,500 feet above mean sea level. In winter, the morning inversion layer is about 800 feet above mean sea level. In summer, the morning inversion layer is about 1,100 feet above mean sea level. Therefore, air quality generally tends to be better in the winter than in the summer.

The prevailing westerly wind pattern is sometimes interrupted by regional "Santa Ana" conditions. A Santa Ana occurs when a strong high pressure develops over the Nevada-Utah area and overcomes the prevailing westerly coastal winds, sending strong, steady, hot, dry northeasterly winds over the mountains and out to sea.

Strong Santa Anas tend to blow pollutants out over the ocean, producing clear days. However, at the onset or during breakdown of these conditions, or if the Santa Ana is weak,

local air quality may be adversely affected. In these cases, emissions from the South Coast Air Basin to the north are blown out over the ocean, and low pressure over Baja California draws this pollutant-laden air mass southward. As the high pressure weakens, prevailing northwesterly winds reassert themselves and send this cloud of contamination ashore in the SDAB. When this event does occur, the combination of transported and locally produced contaminants produce the worst air quality measurements recorded in the basin.

4.3 Existing Air Quality

Air quality at a particular location is a function of the kinds, amounts, and dispersal rates of pollutants being emitted into the air locally and throughout the basin. The major factors affecting pollutant dispersion are wind speed and direction, the vertical dispersion of pollutants (which is affected by inversions), and the local topography.

Air quality is commonly expressed as the number of days in which air pollution levels exceed state standards set by the CARB or federal standards set by the EPA. The SDAPCD maintains 10 air quality monitoring stations located throughout the greater San Diego metropolitan region. Air pollutant concentrations and meteorological information are continuously recorded at these stations. Measurements are then used by scientists to help forecast daily air pollution levels.

The San Diego – Beardsley Street monitoring station located at 1110A Beardsley Street, approximately six miles south of the project site, is the nearest station to the project site. The San Diego – Beardsley Street monitoring station measures ozone, NO_2, CO, PM_{10}, and $PM_{2.5}$. Table 2 provides a summary of measurements collected at the San Diego – Beardsley Street monitoring station for the years 2011 through 2015.

4.3.1 Ozone

Nitrogen oxides and hydrocarbons (reactive organic gases [ROG]) are known as the chief "precursors" of ozone. These compounds react in the presence of sunlight to produce ozone, which is the primary air pollution problem in the SDAB. Because sunlight plays such an important role in its formation, ozone pollution—or smog—is mainly a concern during the daytime in summer months. The SDAB is currently designated a federal and state non-attainment area for ozone. During the past 25 years, San Diego had experienced a decline in the number of days with unhealthy levels of ozone despite the region's growth in population and vehicle miles traveled (SDAPCD 2013).

About half of smog-forming emissions come from automobiles. Population growth in San Diego has resulted in a large increase in the number of automobiles expelling ozone-forming pollutants while operating on area roadways. In addition, the occasional transport of smog-filled air from the South Coast Air Basin only adds to the SDAB's ozone problem. Stricter automobile emission controls, including more efficient automobile engines, have played a large role in why ozone levels have steadily decreased.

Table 2
Summary of Air Quality Measurements Recorded at the San Diego – Beardsley Street Monitoring Station

Pollutant/Standard	2011	2012	2013	2014	2015
Ozone					
Days State 1-hour Standard Exceeded (0.09 ppm)	0	0	0	0	0
Days State 8-hour Standard Exceeded (0.07 ppm)	0	0	0	2	0
Days Federal 8-hour Standard Exceeded (0.075 ppm)	0	0	0	0	0
Max. 1-hr (ppm)	0.082	0.071	0.063	0.093	0.089
Max 8-hr (ppm)	0.061	0.065	0.053	0.073	0.067
Nitrogen Dioxide					
Days State 1-hour Standard Exceeded (0.18 ppm)	0	0	0	0	0
Days Federal 1-hour Standard Exceeded (0.100 ppm)	0	0	0	0	0
Max 1-hr (ppm)	0.067	0.065	0.072	0.075	0.062
Annual Average (ppm)	0.014	0.013	0.014	0.013	0.014
Carbon Monoxide					
Days Federal 8-hour Standard Exceeded (35 ppm)	0	0	--	--	--
Days State 8-hour Standard Exceeded (20 ppm)	0	0	--	--	--
Max. 8-hr (ppm)	2.44	1.81	--	--	--
PM_{10}*					
Measured Days State 24-hour Standard Exceeded (50 µg/m^3)	0	0	1	0	1
Calculated Days State 24-hour Standard Exceeded (50 µg/m^3)	0.0	0.0	6.0	0.0	5.7
Measured Days Federal 24-hour Standard Exceeded (150 µg/m^3)	0	0	0	0	0
Calculated Days Federal 24-hour Standard Exceeded (150 µg/m^3)	0.0	0.0	0.0	0.0	0.0
Max. Daily (µg/m^3)	49.0	47.0	92.0	41.0	54.0
State Annual Average (µg/m^3)	24.0	22.2	25.4	23.8	23.2
Federal Annual Average (µg/m^3)	23.3	21.8	24.9	23.3	23.0
$PM_{2.5}$*					
Measured Days Federal 24-hour Standard Exceeded (35 µg/m^3)	0	1	1	1	0
Calculated Days Federal 24-hour Standard Exceeded (35 µg/m^3)	0.0	1.0	1.1	1.0	0.0
Max. Daily (µg/m^3)	34.7	39.8	37.4	37.2	44.9
State Annual Average (µg/m^3)	10.9	--	10.4	10.2	10.2
Federal Annual Average (µg/m^3)	10.8	11.0	10.3	10.1	9.3

SOURCE: CARB 2016b.
-- = Not available.
* Calculated days value. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

In order to address adverse health effects due to prolonged exposure, the U.S. EPA phased out the national 1-hour ozone standard and replaced it with the more protective 8-hour ozone standard. The SDAB is currently a non-attainment area for the previous (1997) national 8-hour standard, and is recommended as a non-attainment area for the revised (2008) national 8-hour standard of 0.075 parts per million (ppm).

Not all of the ozone within the SDAB is derived from local sources. Under certain meteorological conditions, such as during Santa Ana wind events, ozone and other pollutants are transported from the Los Angeles Basin and combine with ozone formed from local emission sources to produce elevated ozone levels in the SDAB.

Local agencies can control neither the source nor the transportation of pollutants from outside the air basin. The SDAPCD's policy, therefore, has been to control local sources

effectively enough to reduce locally produced contamination to clean air standards. Through the use of air pollution control measures outlined in the RAQS, the SDAPCD has effectively reduced ozone levels in the SDAB.

Actions that have been taken in the SDAB to reduce ozone concentrations include:

- **TCMs if vehicle travel and emissions exceed attainment demonstration levels.** TCMs are strategies that will reduce transportation-related emissions by reducing vehicle use or improving traffic flow.

- **Enhanced motor vehicle inspection and maintenance program.** The smog check program is overseen by the Bureau of Automotive Repair. The program requires most vehicles to pass a smog test once every two years before registering in the state of California. The smog check program monitors the amount of pollutants automobiles produce. One focus of the program is identifying "gross polluters," or vehicles that exceed two times the allowable emissions for a particular model. Regular maintenance and tune-ups, changing the oil, and checking tire inflation can improve gas mileage and lower air pollutant emissions. It can also reduce traffic congestion due to preventable breakdowns, further lowering emissions.

- **Air Quality Improvement Program.** This program, established by AB 118, is a voluntary incentive program administered by the CARB to fund clean vehicle and equipment projects, research on biofuels production and the air quality impacts of alternative fuels, and workforce training.

4.3.2 Carbon Monoxide

The SDAB is classified as a state attainment area and as a federal maintenance area for CO. Until 2003, no violations of the state standard for CO had been recorded in the SDAB since 1991, and no violations of the national standard had been recorded in the SDAB since 1989. The violations that took place in 2003 were likely the result of massive wildfires that occurred throughout the county. No violations of the state or federal CO standards have occurred since 2003.

Small-scale, localized concentrations of CO above the state and national standards have the potential to occur at intersections with stagnation points such as those that occur on major highways and heavily traveled and congested roadways. Localized high concentrations of CO are referred to as "CO hot spots" and are a concern at congested intersections, where automobile engines burn fuel less efficiently and their exhaust contains more CO.

4.3.3 Particulate Matter

Particulate matter is a complex mixture of microscopic solid or liquid particles including chemicals, soot, and dust. Anthropogenic sources of direct particulate emissions include crushing or grinding operations, dust stirred up by vehicle traffic, and combustion sources such as motor vehicles, power plants, wood burning, forest fires, agricultural burning and

industrial processes. Additionally, indirect emissions may be formed when aerosols react with compounds found in the atmosphere.

Health studies have shown a significant association between exposure to particulate matter and premature death in people with heart or lung diseases. Other important effects include aggravation of respiratory and cardiovascular disease, lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems such as heart attacks and irregular heartbeat (U.S. EPA 2016).

As its properties vary based on the size of suspended particles, particulate matter is generally categorized as particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) or particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$)

4.3.3.1 PM_{10}

PM_{10}, occasionally referred to as "inhalable coarse particles" has an aerodynamic diameter of about one-seventh of the diameter of a human hair. High concentrations of PM_{10} are often found near roadways, construction, mining, or agricultural operations.

4.3.3.2 $PM_{2.5}$

$PM_{2.5}$, occasionally referred to as "inhalable fine particles" has an aerodynamic diameter of about one-thirtieth of the diameter of a human hair. $PM_{2.5}$ is the main cause of haze in many parts of the United States. Federal standards applicable to $PM_{2.5}$ were first adopted in 1997.

4.3.4 Other Criteria Pollutants

The national and state standards for NO_2, oxides of sulfur (SO_x), and the previous standard for lead are being met in the SDAB, and the latest pollutant trends suggest that these standards will not be exceeded in the foreseeable future. As discussed above, new standards for these pollutants have been adopted, and new designations for the SDAB will be determined in the future. The SDAB is also in attainment of the state standards for vinyl chloride, hydrogen sulfides, sulfates, and visibility-reducing particulates.

5.0 Thresholds of Significance

Thresholds used to evaluate potential impacts to air quality are based on applicable criteria in the CEQA Guidelines Appendix G and the City of San Diego Significance Determination Thresholds. The project would have a significant air quality impact if it would (City of San Diego 2016):

1. Obstruct or conflict with the implementation of the RAQS.
2. Result in emissions that would violate any air quality standard or contribute substantially to an existing or projected air quality violation.

3. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including the release of emissions which exceed quantitative thresholds for ozone precursors).

4. Expose sensitive receptors to substantial pollutant concentration including air toxics such as diesel particulates.

5. Create objectionable odors affecting a substantial number of people.

The SDAPCD does not provide specific numeric thresholds for determining the significance of air quality impacts under CEQA. However, the SDAPCD does specify Air Quality Impact Analysis trigger levels for new or modified stationary sources (SDAPCD Rules 20.1, 20.2, and 20.3). The SDAPCD does not consider these trigger levels to represent adverse air quality impacts, rather, if these trigger levels are exceeded by a project, the SDAPCD requires an air quality analysis to determine if a significant air quality impact would occur. While, these trigger levels do not generally apply to mobile sources or general land development projects, for comparative purposes these levels are used to evaluate the increased emissions that would be discharged to the SDAB if the project were approved.

The SDAPCD trigger levels are also utilized by the City of San Diego in their Significance Determination Thresholds (City of San Diego 2016) as one of the considerations when determining the potential significance of air quality impacts for projects within the city. The air quality impact screening levels used in this analysis are shown in Table 3.

Table 3
Air Quality Impact Screening Levels

Pollutant	Emission Rate		
	Pounds/Hour	Pounds/Day	Tons/Year
NO_X	25	250	40
SO_X	25	250	40
CO	100	550	100
PM_{10}	--	100	15
Lead	--	3.2	0.6
VOC, ROG	--	137	15
$PM_{2.5}$[a]	--	67	10

SOURCE: SDAPCD, Rules 20.1, 20.2, 20.3; City of San Diego 2016.
[a]The City does not specify a threshold for $PM_{2.5}$. Threshold here is based on SDAPCD, Rules 20.1, 20.2, 20.3.

6.0 Air Quality Assessment

Construction impacts are short term and result from fugitive dust, equipment exhaust, and indirect effects associated with construction workers and deliveries. Operational impacts can occur on two levels: regional or local. In the case of this project, operational impacts are primarily due to emissions from mobile sources associated with vehicular travel along the roadways within the project area.

Construction and operation air emissions were calculated using California Emissions Estimator Model (CalEEMod) 2016.3.1 (California Air Pollution Control Officers Association [CAPCOA] 2016). The CalEEMod program is a tool used to estimate air emissions resulting from land development projects based on California-specific emission factors. The model estimates mass emissions from two basics sources: construction sources and operational sources (i.e., area and mobile sources).

Inputs to CalEEMod include such items as the air basin containing the project, land uses, trip generation rates, trip lengths, vehicle fleet mix (percentage of autos, medium truck, etc.), trip destination (i.e., percent of trips from home to work, etc.), duration of construction phases, construction equipment usage, grading areas, season, and ambient temperature, as well as other parameters. The CalEEMod output files contained in Attachment 1 indicate the specific outputs for each model run. Emissions of oxides of nitrogen (NO_X), CO, SO_X, PM_{10}, $PM_{2.5}$, and ROG are calculated. Emission factors are not available for lead, and consequently, lead emissions are not calculated. The SDAB is currently in attainment of the federal and state lead standards. Furthermore, fuel used in construction equipment and most other vehicles is not leaded.

6.1 Construction Emissions

Construction-related activities are temporary, short-term sources of air emissions. Sources of construction-related air emissions include:

- Fugitive dust from grading activities;
- Construction equipment exhaust;
- Construction-related trips by workers, delivery trucks, and material-hauling trucks; and
- Construction-related power consumption.

Construction-related pollutants result from dust raised during demolition and grading, emissions from construction vehicles, and chemicals used during construction. Fugitive dust emissions vary greatly during construction and are dependent on the amount and type of activity, silt content of the soil, and the weather. Vehicles moving over paved and unpaved surfaces, demolition, excavation, earth movement, grading, and wind erosion from exposed surfaces are all sources of fugitive dust. Construction operations are subject to the requirements established in Regulation 4, Rules 52, 54, and 55, of the SDAPCD's rules and regulations.

Heavy-duty construction equipment is usually diesel powered. In general, emissions from diesel-powered equipment contain more NO_X, SO_X, and particulate matter than gasoline-powered engines. However, diesel-powered engines generally produce less CO and less ROG than do gasoline-powered engines. Standard construction equipment includes tractors/loaders/backhoes, rubber-tired dozers, excavators, graders, cranes, forklifts, rollers, paving equipment, generator sets, welders, cement and mortar mixers, and air compressors.

Construction is anticipated to begin in December 2017 and last for approximately 18 months. Primary inputs are the numbers of each piece of equipment and the length of each construction stage. Specific construction phasing and equipment parameters are not available at this time. However, CalEEMod can estimate the required construction equipment when project-specific information is unavailable. The estimates are based on surveys, performed by the South Coast Air Quality Management District and the Sacramento Metropolitan Air Quality Management District, of typical construction projects which provide a basis for scaling equipment needs and schedule with a project's size. Air emission estimates in CalEEMod are based on the duration of construction phases; construction equipment type, quantity, and usage; grading area; season; and ambient temperature, among other parameters. Project construction would occur in five stages: site preparation, grading/excavation, building construction, paving, and architectural coatings.

Table 4 shows the total projected construction maximum daily emission levels for each criteria pollutant. The CalEEMod output files for construction emissions are contained in Attachment 1.

Table 4
Summary of Worst-case Construction Emissions
(pounds per day)

	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Demolition	4	43	24	0	3	2
Site Preparation	5	52	24	0	21	13
Grading	3	31	17	0	8	5
Building Construction	3	26	22	0	3	2
Paving	2	18	15	0	1	1
Architectural Coatings	106	2	2	0	0	0
Maximum Daily Emissions	**106**	**52**	**24**	**0**	**21**	**13**
Significance Threshold	*137*	*250*	*550*	*250*	*100*	*67*

Standard dust control measures would be implemented as a part of project construction in accordance with SDAPCD rules and regulations. Fugitive dust emissions were calculated using CalEEMod default values, and did not take into account the required dust control measures. Thus, the emissions shown in Table 4 are conservative.

For assessing the significance of the air quality emissions resulting during construction of the project, the construction emissions were compared to the City significance thresholds shown in Table 4. As shown in Table 4, maximum daily construction emissions associated with the project are projected to be less than the applicable thresholds for all criteria pollutants. Construction related air quality impacts would be less than significant.

6.2 Operation Emissions

Mobile source emissions would originate from traffic generated by the project. Area source emissions would result from the use of natural gas, fire places, consumer products, as well as applying architectural coatings and landscaping activities.

Mobile source operational emissions are based on the trip rate, trip length for each land use type and size. According to the project traffic report, the project would generate 900 average daily trips (Linscott, Law, & Greenspan [LLG] 2016). Based on regional data compiled by CARB as part of the emission factor model, the average regional trip length for all trips in San Diego County is 5.8 miles. This distance is multiplied by the total trip generation of the project to determine total project annual vehicle miles traveled (CARB 2011). Default vehicle emission factors were used.

Area source emissions associated with the project include consumer products, natural gas used in space and water heating, architectural coatings, and landscaping equipment. Hearths (fireplaces) and woodstoves are also a source of area emissions; however, the project would not include hearths or woodstoves. Consumer products are chemically formulated products used by household and institutional consumers, including, but not limited to, detergents, cleaning compounds, polishes, floor finishes, disinfectants, sanitizers, and aerosol paints but not including other paint products, furniture coatings, or architectural coatings. Emissions due to consumer products are calculated using total building area and product emission factors. Emissions are generated from the combustion of natural gas used in space and water heating. Emissions are based on the Residential Appliance Saturation Survey which is a comprehensive energy use assessment that includes the end use for various climate zones in California.

For architectural coatings, emissions result from evaporation of solvents contained in surface coatings such as in paints and primers. Emissions are based on the building surface area, architectural coating emission factors, and a reapplication rate of 10 percent of area per year. Landscaping maintenance includes fuel combustion emission from equipment such as lawn mowers, rototillers, shredders/grinders, blowers, trimmers, chain saws, and hedge trimmers as well as air compressors, generators, and pumps. Emission calculations take into account building area, equipment emission factors, and the number of operational days (summer days).

Table 5 provides a summary of the operational emissions generated by the project. CalEEMod output files for project operation are contained in Attachment 1. As shown, project-generated emissions are projected to be less than the City's significance thresholds for all criteria pollutants.

Table 5
Summary of Project Operational Emissions
(pounds per day)

	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Area Sources	4	0	12	0	0	0
Energy Sources	0	0	0	0	0	0
Mobile Sources	2	7	17	0	4	1
Total	**6**	**7**	**30**	**0**	**4**	**1**
Significance Threshold	*137*	*250*	*550*	*250*	*100*	*67*
NOTE: Totals may vary due to independent rounding.						

6.3 Impact Analysis

1. Would the project obstruct or conflict with the implementation of the San Diego RAQS?

The RAQS is the applicable regional air quality plan that sets forth the SDAPCD's strategies for achieving the NAAQS and CAAQS. The SDAB is designated non-attainment for the federal and state ozone standard. Accordingly, the RAQS was developed to identify feasible emission control measures and provide expeditious progress toward attaining the standards for ozone. The two pollutants addressed in the RAQS are ROG and NOx, which are precursors to the formation of ozone. Projected increases in motor vehicle usage, population, and growth create challenges in controlling emissions and by extension to maintaining and improving air quality. The RAQS, in conjunction with the TCM, were most recently adopted in 2009 as the air quality plan for the region.

The growth projections used by the SDAPCD to develop the RAQS emissions budgets are based on the population, vehicle trends, and land use plans developed in general plans and used by SANDAG in the development of the regional transportation plans and sustainable communities strategy. As such, projects that propose development that is consistent with the growth anticipated by SANDAG's growth projections and/or the general plan would not conflict with the RAQS. In the event that a project would propose development that is less dense than anticipated by the growth projections, the project would likewise be consistent with the RAQS. In the event a project proposes development that is greater than anticipated in the growth projections, further analysis would be warranted to determine if the project would exceed the growth projections used in the RAQS for the specific subregional area.

As discussed in Section 2.0, the northwestern parcel of the project site is currently designated as residential and the southeastern parcel is currently designated as commercial employment, retail, and services in the City General Plan. SANDAG growth projections used to develop the RAQS are based on current land use designations in the General Plan. The project would be consistent with the land use designation of the northwestern parcel. Under the commercial employment, retail, and services land use designation of the southeastern parcel, a range of commercial and retail uses could occur on site. Generally, commercial and retail uses generate more traffic than residential uses. Although the project would not be consistent with the commercial employment, retail, and services designation of the southeastern parcel, for air quality purposes, there would not be a significant change in traffic generation or area emissions from what is already accounted for in the RAQS. Therefore, the project would not obstruct or conflict with implementation of the RAQS.

2. Would the project result in emissions that would violate any air quality standard or contribute substantially to an existing or projected air quality violation?

As shown in Table 4, project construction would not exceed the applicable regional emissions thresholds. These thresholds are designed to provide limits below which project emissions would not significantly change regional air quality. Therefore, as project

construction emissions would be well below these limits, project construction would not result in regional emissions that would exceed the NAAQS or CAAQS or contribute to existing violations.

Long-term emissions of regional air pollutants occur from operational sources. As shown in Table 5, project operation would not exceed the applicable regional emissions thresholds. Therefore, as project operation emissions would be well below these limits, project operation would not result in regional emissions that would exceed the NAAQS or CAAQS or contribute to existing violations. Therefore, the project would result in a less than significant impact.

3. *Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including release emissions which exceed quantitative thresholds for ozone precursors)?*

The region is classified as attainment for all criterion pollutants except ozone, PM_{10}, and $PM_{2.5}$. The SDAB is non-attainment for the 8-hour federal and state ozone standards. Ozone is not emitted directly, but is a result of atmospheric activity on precursors. NO_X and ROG are known as the chief "precursors" of ozone. These compounds react in the presence of sunlight to produce ozone.

As shown in Tables 4 and 5, emissions of ozone precursors (ROG and NO_X), PM_{10}, and $PM_{2.5}$ from construction and operation would be below the applicable thresholds. Therefore, the project would not result in a cumulatively considerable net increase in emissions of ozone, PM_{10}, or $PM_{2.5}$, and impacts would be less than significant.

4. *Would the project expose sensitive receptors to substantial pollutant concentration including air toxics such as diesel particulates?*

Sensitive land uses include schools and schoolyards, parks and playgrounds, daycare centers, nursing homes, hospitals, and residential communities. There are residential uses located south, east, and north of the project site.

Construction of the project and associated infrastructure would result in short-term diesel exhaust emissions from on-site heavy-duty equipment. Construction of the project would result in the generation of diesel-exhaust DPM emissions from the use of off-road diesel equipment required for site grading and excavation, paving, and other construction activities and on-road diesel equipment used to bring materials to and from the project site.

Generation of DPM from construction projects typically occurs in a single area for a short period. Construction of the project would occur from February to October 2017. The dose to which the receptors are exposed is the primary factor used to determine health risk. Dose is a function of the concentration of a substance or substances in the environment and the extent of exposure that person has with the substance. Dose is positively correlated with time, meaning that a longer exposure period would result in a higher exposure level for the Maximally Exposed Individual. The risks estimated for a Maximally Exposed Individual are higher if a fixed exposure occurs over a longer period of time. According to the Office of

Environmental Health Hazard Assessment (OEHHA), health risk assessments, which determine the exposure of sensitive receptors to toxic emissions, should be based on a 30-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the project (OEHHA 2015). Thus, if the duration of proposed construction activities near any specific sensitive receptor were 12 months, the exposure would be less than 3 percent of the total exposure period used for health risk calculation.

Therefore, DPM generated by project construction is not expected to create conditions where the probability is greater than 10 in 1 million of contracting cancer for the Maximally Exposed Individual or to generate ground-level concentrations of noncarcinogenic TACs that exceed a Hazard Index greater than 1 for the Maximally Exposed Individual. Additionally, with ongoing implementation of U.S. EPA and CARB requirements for cleaner fuels; off-road diesel engine retrofits; and new, low-emission diesel engine types, the DPM emissions of individual equipment would be substantially reduced over the years as the project construction continues. Therefore, project construction would not expose sensitive receptors to substantial pollutant concentration.

Localized CO concentration is a direct function of motor vehicle activity at signalized intersections (e.g., idling time and traffic flow conditions), particularly during peak commute hours and meteorological conditions. The SDAB is a CO maintenance area under the federal CAA. This means that SDAB was previously a non-attainment area and is currently implementing a 10-year plan for continuing to meet and maintain air quality standards. As a result, ambient CO levels have declined significantly. CO hot spots have been found to occur only at signalized intersections that operate at or below level of service E with peak-hour trips for that intersection exceeding 3,000 trips. Based on the traffic impact analysis, the project would not result in a signalized intersection to operate at a Level of Service (LOS) E or worse (LLG 2016), and, therefore, is not anticipated to result in a CO hot spot. Therefore, localized air quality impacts to sensitive receptors would be less than significant.

5. Would the project create objectionable odors affecting a substantial number of people?

The project does not include heavy industrial or agricultural uses that are typically associated with odor complaints. During construction, diesel equipment may generate some nuisance odors. Sensitive receptors near the project site include residential uses to the south, east, and north; however, exposure to odors associated with project construction would be short term and temporary in nature. Impacts would be less than significant.

7.0 Conclusions

The primary goal of the RAQS is to reduce ozone precursor emissions. The northwestern parcel of the project site is currently designated as residential and the southeastern parcel is currently designated as commercial employment, retail, and services in the City General Plan. The project would be consistent with the land use designation of the northwestern parcel. Although the project would not be consistent with the commercial employment, retail, and services designation of the southeastern parcel, for air quality purposes, there would not be a significant change in traffic generation or area emissions from what is

already accounted for in the RAQS. Therefore, the project would not obstruct or conflict with implementation of the RAQS or other air quality plans.

As shown in Table 4, project construction emissions would not exceed the applicable regional emissions thresholds. These thresholds are designed to provide limits below which project emissions would not significantly change regional air quality. Therefore, as project emissions would be well below these limits, project construction would not result in regional emissions that would exceed the NAAQS or CAAQS or contribute to existing violations. Additionally, construction emissions would be temporary, intermittent, and would cease at the end of project construction.

Long-term emissions of regional air pollutants occur from operational sources. As shown in Table 5, project operational emissions would not exceed the applicable regional emissions thresholds. Therefore, as project emissions would be well below these limits, project operations would not result in regional emissions that would exceed the NAAQS or CAAQS or contribute to existing violations.

The project would not result in the exposure of sensitive receptors to substantial concentrations of DPM. Additionally, based on the traffic impact analysis, the project would not result in a signalized intersection to operate at LOS E or worse (LLG 2016), and therefore is not anticipated to result in a CO hot spot.

The project does not include heavy industrial or agricultural uses that are typically associated with objectionable odors. The project would involve the use of diesel-powered construction equipment. Diesel exhaust may be noticeable temporarily at adjacent properties; however, construction activities would be temporary. Therefore, odor impacts would be less than significant.

8.0 References Cited

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ATTACHMENT 1

CalEEMod Output – Project Emissions

8456 Morena Apartment Homes

San Diego County APCD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	150.00	Dwelling Unit	5.80	150,000.00	429

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	556.22	**CH4 Intensity (lb/MWhr)**	0.022	**N2O Intensity (lb/MWhr)**	0.005

1.3 User Entered Comments & Non-Default Data

8456 Morena Apartment Homes - San Diego County APCD Air District, Winter

Project Characteristics - RPS 2020 goal 33%
CalEEMod accounts for 10.2%
Additional 22.8% reduction applied
(556.22, 0.022, 0.005)

Land Use - 150 units
5.8 acres

Demolition -

Architectural Coating - SDAPCD Rule 67

Vehicle Trips - 6 trips/du
5.8 mile trip length

Woodstoves - No woodstoves or fireplaces

Area Coating - SDAPCD Rule 67

Energy Use - Default

Water And Wastewater - CalGreen 20% decrease in indoor water use (7,818,483.072)

Waste Mitigation -

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	250.00	150.00
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	100.00
tblArchitecturalCoating	EF_Residential_Exterior	250.00	150.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	100.00
tblAreaCoating	Area_EF_Nonresidential_Exterior	250	150
tblAreaCoating	Area_EF_Nonresidential_Interior	250	100
tblAreaCoating	Area_EF_Residential_Exterior	250	150
tblAreaCoating	Area_EF_Residential_Interior	250	100
tblFireplaces	FireplaceDayYear	82.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceWoodMass	3,078.40	0.00
tblFireplaces	NumberGas	82.50	0.00
tblFireplaces	NumberNoFireplace	15.00	150.00

tblFireplaces	NumberWood	52.50	0.00
tblLandUse	LotAcreage	3.95	5.80
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.022
tblProjectCharacteristics	CO2IntensityFactor	720.49	556.22
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.005
tblProjectCharacteristics	OperationalYear	2018	2019
tblVehicleTrips	HO_TL	7.50	5.80
tblVehicleTrips	HS_TL	7.30	5.80
tblVehicleTrips	HW_TL	10.80	5.80
tblVehicleTrips	WD_TR	6.65	6.00
tblWater	IndoorWaterUseRate	9,773,103.84	7,818,483.07
tblWoodstoves	NumberCatalytic	7.50	0.00
tblWoodstoves	NumberNoncatalytic	7.50	0.00
tblWoodstoves	WoodstoveDayYear	82.00	0.00
tblWoodstoves	WoodstoveWoodMass	3,019.20	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	5.0563	52.3455	24.1184	0.0416	18.2141	2.8797	21.0938	9.9699	2.6493	12.6192	0.0000	4,210.5349	4,210.5349	1.1993	0.0000	4,237.8472
2018	4.6493	48.2607	23.0608	0.0404	18.2141	2.5780	20.7921	9.9699	2.3717	12.3416	0.0000	3,995.7653	3,995.7653	1.1981	0.0000	4,013.6128
2019	105.9552	15.2902	15.1034	0.0240	0.1807	0.8255	0.9487	0.0479	0.7594	0.7921	0.0000	2,379.5395	2,379.5395	0.7180	0.0000	2,397.4907
Maximum	**105.9552**	**52.3455**	**24.1184**	**0.0416**	**18.2141**	**2.8797**	**21.0938**	**9.9699**	**2.6493**	**12.6192**	**0.0000**	**4,210.5349**	**4,210.5349**	**1.1993**	**0.0000**	**4,237.8472**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	5.0563	52.3455	24.1184	0.0416	18.2141	2.8797	21.0938	9.9699	2.6493	12.6192	0.0000	4,210.5349	4,210.5349	1.1993	0.0000	4,237.8472
2018	4.6493	48.2607	23.0608	0.0404	18.2141	2.5780	20.7921	9.9699	2.3717	12.3416	0.0000	3,995.7653	3,995.7653	1.1981	0.0000	4,013.6128
2019	105.9552	15.2902	15.1034	0.0240	0.1807	0.8255	0.9487	0.0479	0.7594	0.7921	0.0000	2,379.5395	2,379.5395	0.7180	0.0000	2,397.4907
Maximum	**105.9552**	**52.3455**	**24.1184**	**0.0416**	**18.2141**	**2.8797**	**21.0938**	**9.9699**	**2.6493**	**12.6192**	**0.0000**	**4,210.5349**	**4,210.5349**	**1.1993**	**0.0000**	**4,237.8472**

8456 Morena Apartment Homes - San Diego County APCD Air District, Winter

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	4.1693	0.1441	12.4365	6.5000e-004		0.0681	0.0681		0.0681	0.0681	0.0000	22.2829	22.2829	0.0219	0.0000	22.8297
Energy	0.0393	0.3359	0.1429	2.1400e-003		0.0272	0.0272		0.0272	0.0272		428.7476	428.7476	8.2200e-003	7.8600e-003	431.2955
Mobile	1.6631	6.5695	17.0922	0.0469	3.8112	0.0553	3.8665	1.0188	0.0521	1.0708		4,751.9604	4,751.9604	0.2956		4,759.3505
Total	**5.8716**	**7.0494**	**29.6716**	**0.0497**	**3.8112**	**0.1506**	**3.9618**	**1.0188**	**0.1474**	**1.1661**	**0.0000**	**5,202.9909**	**5,202.9909**	**0.3257**	**7.8600e-003**	**5,213.4756**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	4.1693	0.1441	12.4365	6.5000e-004		0.0681	0.0681		0.0681	0.0681	0.0000	22.2829	22.2829	0.0219	0.0000	22.8297
Energy	0.0393	0.3359	0.1429	2.1400e-003		0.0272	0.0272		0.0272	0.0272		428.7476	428.7476	8.2200e-003	7.8600e-003	431.2955
Mobile	1.6631	6.5695	17.0922	0.0469	3.8112	0.0553	3.8665	1.0188	0.0521	1.0708		4,751.9604	4,751.9604	0.2956		4,759.3505
Total	**5.8716**	**7.0494**	**29.6716**	**0.0497**	**3.8112**	**0.1506**	**3.9618**	**1.0188**	**0.1474**	**1.1661**	**0.0000**	**5,202.9909**	**5,202.9909**	**0.3257**	**7.8600e-003**	**5,213.4756**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	1/25/2019	2/21/2019	5	20	
2	Building Construction	Building Construction	2/9/2018	12/27/2018	5	230	
3	Demolition	Demolition	12/1/2017	12/28/2017	5	20	
4	Grading	Grading	1/12/2018	2/8/2018	5	20	
5	Paving	Paving	12/28/2018	1/24/2019	5	20	
6	Site Preparation	Site Preparation	12/29/2017	1/11/2018	5	10	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 10

Acres of Paving: 0

Residential Indoor: 303,750; Residential Outdoor: 101,250; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

8456 Morena Apartment Homes - San Diego County APCD Air District, Winter

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	158	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Paving Equipment	2	8.00	132	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	22.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	108.00	16.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	6	15.00	0.00	36.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Architectural Coating - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	105.5911					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2664	1.8354	1.8413	2.9700e-003		0.1288	0.1288		0.1288	0.1288		281.4481	281.4481	0.0238		282.0423
Total	**105.8575**	**1.8354**	**1.8413**	**2.9700e-003**		**0.1288**	**0.1288**		**0.1288**	**0.1288**		**281.4481**	**281.4481**	**0.0238**		**282.0423**

3.2 Architectural Coating - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0977	0.0677	0.6433	1.8000e-003	0.1807	1.2900e-003	0.1820	0.0479	1.1900e-003	0.0491		179.7210	179.7210	5.8000e-003		179.8660
Total	**0.0977**	**0.0677**	**0.6433**	**1.8000e-003**	**0.1807**	**1.2900e-003**	**0.1820**	**0.0479**	**1.1900e-003**	**0.0491**		**179.7210**	**179.7210**	**5.8000e-003**		**179.8660**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	105.5911					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2664	1.8354	1.8413	2.9700e-003		0.1288	0.1288		0.1288	0.1288	0.0000	281.4481	281.4481	0.0238		282.0423
Total	**105.8575**	**1.8354**	**1.8413**	**2.9700e-003**		**0.1288**	**0.1288**		**0.1288**	**0.1288**	**0.0000**	**281.4481**	**281.4481**	**0.0238**		**282.0423**

3.2 Architectural Coating - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0977	0.0677	0.6433	1.8000e-003	0.1807	1.2900e-003	0.1820	0.0479	1.1900e-003	0.0491		179.7210	179.7210	5.8000e-003		179.8660
Total	**0.0977**	**0.0677**	**0.6433**	**1.8000e-003**	**0.1807**	**1.2900e-003**	**0.1820**	**0.0479**	**1.1900e-003**	**0.0491**		**179.7210**	**179.7210**	**5.8000e-003**		**179.8660**

3.3 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6795	23.3900	17.5804	0.0269		1.4999	1.4999		1.4099	1.4099		2,620.9351	2,620.9351	0.6421		2,636.9883
Total	**2.6795**	**23.3900**	**17.5804**	**0.0269**		**1.4999**	**1.4999**		**1.4099**	**1.4099**		**2,620.9351**	**2,620.9351**	**0.6421**		**2,636.9883**

3.3 Building Construction - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0860	2.1117	0.6176	4.3500e-003	0.1083	0.0168	0.1251	0.0312	0.0160	0.0472		465.1167	465.1167	0.0403		466.1229
Worker	0.5193	0.3718	3.5071	9.1400e-003	0.8872	6.3900e-003	0.8936	0.2353	5.8900e-003	0.2412		909.7135	909.7135	0.0315		910.5016
Total	**0.6053**	**2.4835**	**4.1247**	**0.0135**	**0.9955**	**0.0232**	**1.0187**	**0.2665**	**0.0219**	**0.2884**		**1,374.8302**	**1,374.8302**	**0.0718**		**1,376.6245**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6795	23.3900	17.5804	0.0269		1.4999	1.4999		1.4099	1.4099	0.0000	2,620.9351	2,620.9351	0.6421		2,636.9883
Total	**2.6795**	**23.3900**	**17.5804**	**0.0269**		**1.4999**	**1.4999**		**1.4099**	**1.4099**	**0.0000**	**2,620.9351**	**2,620.9351**	**0.6421**		**2,636.9883**

3.3 Building Construction - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0860	2.1117	0.6176	4.3500e-003	0.1083	0.0168	0.1251	0.0312	0.0160	0.0472		465.1167	465.1167	0.0403		466.1229
Worker	0.5193	0.3718	3.5071	9.1400e-003	0.8872	6.3900e-003	0.8936	0.2353	5.8900e-003	0.2412		909.7135	909.7135	0.0315		910.5016
Total	**0.6053**	**2.4835**	**4.1247**	**0.0135**	**0.9955**	**0.0232**	**1.0187**	**0.2665**	**0.0219**	**0.2884**		**1,374.8302**	**1,374.8302**	**0.0718**		**1,376.6245**

3.4 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.3987	0.0000	0.3987	0.0604	0.0000	0.0604			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425		3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**0.3987**	**2.1935**	**2.5921**	**0.0604**	**2.0425**	**2.1029**		**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

3.4 Demolition - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0199	0.6311	0.1350	1.4400e-003	0.0315	3.5800e-003	0.0350	8.6200e-003	3.4300e-003	0.0121		156.2438	156.2438	0.0147		156.6099
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0995**	**0.6895**	**0.6874**	**2.7500e-003**	**0.1547**	**4.4900e-003**	**0.1592**	**0.0413**	**4.2700e-003**	**0.0456**		**286.2515**	**286.2515**	**0.0196**		**286.7403**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.3987	0.0000	0.3987	0.0604	0.0000	0.0604			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425	0.0000	3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**0.3987**	**2.1935**	**2.5921**	**0.0604**	**2.0425**	**2.1029**	**0.0000**	**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

3.4 Demolition - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0199	0.6311	0.1350	1.4400e-003	0.0315	3.5800e-003	0.0350	8.6200e-003	3.4300e-003	0.0121		156.2438	156.2438	0.0147		156.6099
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0995**	**0.6895**	**0.6874**	**2.7500e-003**	**0.1547**	**4.4900e-003**	**0.1592**	**0.0413**	**4.2700e-003**	**0.0456**		**286.2515**	**286.2515**	**0.0196**		**286.7403**

3.5 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	2.7733	30.6725	16.5770	0.0297		1.5513	1.5513		1.4272	1.4272		2,988.0216	2,988.0216	0.9302		3,011.2769
Total	**2.7733**	**30.6725**	**16.5770**	**0.0297**	**6.5523**	**1.5513**	**8.1037**	**3.3675**	**1.4272**	**4.7947**		**2,988.0216**	**2,988.0216**	**0.9302**		**3,011.2769**

3.5 Grading - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0721	0.0516	0.4871	1.2700e-003	0.1232	8.9000e-004	0.1241	0.0327	8.2000e-004	0.0335		126.3491	126.3491	4.3800e-003		126.4586
Total	**0.0721**	**0.0516**	**0.4871**	**1.2700e-003**	**0.1232**	**8.9000e-004**	**0.1241**	**0.0327**	**8.2000e-004**	**0.0335**		**126.3491**	**126.3491**	**4.3800e-003**		**126.4586**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	2.7733	30.6725	16.5770	0.0297		1.5513	1.5513		1.4272	1.4272	0.0000	2,988.0216	2,988.0216	0.9302		3,011.2769
Total	**2.7733**	**30.6725**	**16.5770**	**0.0297**	**6.5523**	**1.5513**	**8.1037**	**3.3675**	**1.4272**	**4.7947**	**0.0000**	**2,988.0216**	**2,988.0216**	**0.9302**		**3,011.2769**

3.5 Grading - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0721	0.0516	0.4871	1.2700e-003	0.1232	8.9000e-004	0.1241	0.0327	8.2000e-004	0.0335		126.3491	126.3491	4.3800e-003		126.4586
Total	**0.0721**	**0.0516**	**0.4871**	**1.2700e-003**	**0.1232**	**8.9000e-004**	**0.1241**	**0.0327**	**8.2000e-004**	**0.0335**		**126.3491**	**126.3491**	**4.3800e-003**		**126.4586**

3.6 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6437	17.5209	14.7964	0.0228		0.9561	0.9561		0.8797	0.8797		2,294.0887	2,294.0887	0.7142		2,311.9432
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6437**	**17.5209**	**14.7964**	**0.0228**		**0.9561**	**0.9561**		**0.8797**	**0.8797**		**2,294.0887**	**2,294.0887**	**0.7142**		**2,311.9432**

3.6 Paving - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0721	0.0516	0.4871	1.2700e-003	0.1232	8.9000e-004	0.1241	0.0327	8.2000e-004	0.0335		126.3491	126.3491	4.3800e-003		126.4586
Total	**0.0721**	**0.0516**	**0.4871**	**1.2700e-003**	**0.1232**	**8.9000e-004**	**0.1241**	**0.0327**	**8.2000e-004**	**0.0335**		**126.3491**	**126.3491**	**4.3800e-003**		**126.4586**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6437	17.5209	14.7964	0.0228		0.9561	0.9561		0.8797	0.8797	0.0000	2,294.0887	2,294.0887	0.7142		2,311.9432
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6437**	**17.5209**	**14.7964**	**0.0228**		**0.9561**	**0.9561**		**0.8797**	**0.8797**	**0.0000**	**2,294.0887**	**2,294.0887**	**0.7142**		**2,311.9432**

3.6 Paving - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0721	0.0516	0.4871	1.2700e-003	0.1232	8.9000e-004	0.1241	0.0327	8.2000e-004	0.0335		126.3491	126.3491	4.3800e-003		126.4586
Total	**0.0721**	**0.0516**	**0.4871**	**1.2700e-003**	**0.1232**	**8.9000e-004**	**0.1241**	**0.0327**	**8.2000e-004**	**0.0335**		**126.3491**	**126.3491**	**4.3800e-003**		**126.4586**

3.6 Paving - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4544	15.2441	14.6648	0.0228		0.8246	0.8246		0.7586	0.7586		2,257.0025	2,257.0025	0.7141		2,274.8548
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4544**	**15.2441**	**14.6648**	**0.0228**		**0.8246**	**0.8246**		**0.7586**	**0.7586**		**2,257.0025**	**2,257.0025**	**0.7141**		**2,274.8548**

3.6 Paving - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0666	0.0462	0.4386	1.2300e-003	0.1232	8.8000e-004	0.1241	0.0327	8.1000e-004	0.0335		122.5371	122.5371	3.9500e-003		122.6359
Total	**0.0666**	**0.0462**	**0.4386**	**1.2300e-003**	**0.1232**	**8.8000e-004**	**0.1241**	**0.0327**	**8.1000e-004**	**0.0335**		**122.5371**	**122.5371**	**3.9500e-003**		**122.6359**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4544	15.2441	14.6648	0.0228		0.8246	0.8246		0.7586	0.7586	0.0000	2,257.0025	2,257.0025	0.7141		2,274.8548
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4544**	**15.2441**	**14.6648**	**0.0228**		**0.8246**	**0.8246**		**0.7586**	**0.7586**	**0.0000**	**2,257.0025**	**2,257.0025**	**0.7141**		**2,274.8548**

3.6 Paving - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0666	0.0462	0.4386	1.2300e-003	0.1232	8.8000e-004	0.1241	0.0327	8.1000e-004	0.0335		122.5371	122.5371	3.9500e-003		122.6359
Total	**0.0666**	**0.0462**	**0.4386**	**1.2300e-003**	**0.1232**	**8.8000e-004**	**0.1241**	**0.0327**	**8.1000e-004**	**0.0335**		**122.5371**	**122.5371**	**3.9500e-003**		**122.6359**

3.7 Site Preparation - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.9608	52.2754	23.4554	0.0380		2.8786	2.8786		2.6483	2.6483		3,894.9500	3,894.9500	1.1934		3,924.7852
Total	**4.9608**	**52.2754**	**23.4554**	**0.0380**	**18.0663**	**2.8786**	**20.9448**	**9.9307**	**2.6483**	**12.5790**		**3,894.9500**	**3,894.9500**	**1.1934**		**3,924.7852**

3.7 Site Preparation - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0955	0.0701	0.6630	1.5700e-003	0.1479	1.0900e-003	0.1490	0.0392	1.0100e-003	0.0402		156.0093	156.0093	5.8800e-003		156.1564
Total	**0.0955**	**0.0701**	**0.6630**	**1.5700e-003**	**0.1479**	**1.0900e-003**	**0.1490**	**0.0392**	**1.0100e-003**	**0.0402**		**156.0093**	**156.0093**	**5.8800e-003**		**156.1564**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.9608	52.2754	23.4554	0.0380		2.8786	2.8786		2.6483	2.6483	0.0000	3,894.9500	3,894.9500	1.1934		3,924.7852
Total	**4.9608**	**52.2754**	**23.4554**	**0.0380**	**18.0663**	**2.8786**	**20.9448**	**9.9307**	**2.6483**	**12.5790**	**0.0000**	**3,894.9500**	**3,894.9500**	**1.1934**		**3,924.7852**

3.7 Site Preparation - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0955	0.0701	0.6630	1.5700e-003	0.1479	1.0900e-003	0.1490	0.0392	1.0100e-003	0.0402		156.0093	156.0093	5.8800e-003		156.1564
Total	**0.0955**	**0.0701**	**0.6630**	**1.5700e-003**	**0.1479**	**1.0900e-003**	**0.1490**	**0.0392**	**1.0100e-003**	**0.0402**		**156.0093**	**156.0093**	**5.8800e-003**		**156.1564**

3.7 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.5627	48.1988	22.4763	0.0380		2.5769	2.5769		2.3708	2.3708		3,831.6239	3,831.6239	1.1928		3,861.4448
Total	**4.5627**	**48.1988**	**22.4763**	**0.0380**	**18.0663**	**2.5769**	**20.6432**	**9.9307**	**2.3708**	**12.3014**		**3,831.6239**	**3,831.6239**	**1.1928**		**3,861.4448**

3.7 Site Preparation - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0866	0.0620	0.5845	1.5200e-003	0.1479	1.0600e-003	0.1489	0.0392	9.8000e-004	0.0402		151.6189	151.6189	5.2500e-003		151.7503
Total	**0.0866**	**0.0620**	**0.5845**	**1.5200e-003**	**0.1479**	**1.0600e-003**	**0.1489**	**0.0392**	**9.8000e-004**	**0.0402**		**151.6189**	**151.6189**	**5.2500e-003**		**151.7503**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.5627	48.1988	22.4763	0.0380		2.5769	2.5769		2.3708	2.3708	0.0000	3,831.6239	3,831.6239	1.1928		3,861.4448
Total	**4.5627**	**48.1988**	**22.4763**	**0.0380**	**18.0663**	**2.5769**	**20.6432**	**9.9307**	**2.3708**	**12.3014**	**0.0000**	**3,831.6239**	**3,831.6239**	**1.1928**		**3,861.4448**

3.7 Site Preparation - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0866	0.0620	0.5845	1.5200e-003	0.1479	1.0600e-003	0.1489	0.0392	9.8000e-004	0.0402		151.6189	151.6189	5.2500e-003		151.7503
Total	**0.0866**	**0.0620**	**0.5845**	**1.5200e-003**	**0.1479**	**1.0600e-003**	**0.1489**	**0.0392**	**9.8000e-004**	**0.0402**		**151.6189**	**151.6189**	**5.2500e-003**		**151.7503**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.6631	6.5695	17.0922	0.0469	3.8112	0.0553	3.8665	1.0188	0.0521	1.0708		4,751.9604	4,751.9604	0.2956		4,759.3505
Unmitigated	1.6631	6.5695	17.0922	0.0469	3.8112	0.0553	3.8665	1.0188	0.0521	1.0708		4,751.9604	4,751.9604	0.2956		4,759.3505

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	900.00	958.50	879.00	1,697,347	1,697,347
Total	900.00	958.50	879.00	1,697,347	1,697,347

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	5.80	5.80	5.80	41.60	18.80	39.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.581689	0.044135	0.186694	0.113515	0.018244	0.005600	0.015197	0.022573	0.001888	0.002088	0.006279	0.000742	0.001357

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0393	0.3359	0.1429	2.1400e-003		0.0272	0.0272		0.0272	0.0272		428.7476	428.7476	8.2200e-003	7.8600e-003	431.2955
NaturalGas Unmitigated	0.0393	0.3359	0.1429	2.1400e-003		0.0272	0.0272		0.0272	0.0272		428.7476	428.7476	8.2200e-003	7.8600e-003	431.2955

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	3644.35	0.0393	0.3359	0.1429	2.1400e-003		0.0272	0.0272		0.0272	0.0272		428.7476	428.7476	8.2200e-003	7.8600e-003	431.2955
Total		**0.0393**	**0.3359**	**0.1429**	**2.1400e-003**		**0.0272**	**0.0272**		**0.0272**	**0.0272**		**428.7476**	**428.7476**	**8.2200e-003**	**7.8600e-003**	**431.2955**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	3.64435	0.0393	0.3359	0.1429	2.1400e-003		0.0272	0.0272		0.0272	0.0272		428.7476	428.7476	8.2200e-003	7.8600e-003	431.2955
Total		**0.0393**	**0.3359**	**0.1429**	**2.1400e-003**		**0.0272**	**0.0272**		**0.0272**	**0.0272**		**428.7476**	**428.7476**	**8.2200e-003**	**7.8600e-003**	**431.2955**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	4.1693	0.1441	12.4365	6.5000e-004		0.0681	0.0681		0.0681	0.0681	0.0000	22.2829	22.2829	0.0219	0.0000	22.8297
Unmitigated	4.1693	0.1441	12.4365	6.5000e-004		0.0681	0.0681		0.0681	0.0681	0.0000	22.2829	22.2829	0.0219	0.0000	22.8297

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.5786					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	3.2100					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.3807	0.1441	12.4365	6.5000e-004		0.0681	0.0681		0.0681	0.0681		22.2829	22.2829	0.0219		22.8297
Total	**4.1693**	**0.1441**	**12.4365**	**6.5000e-004**		**0.0681**	**0.0681**		**0.0681**	**0.0681**	**0.0000**	**22.2829**	**22.2829**	**0.0219**	**0.0000**	**22.8297**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.5786					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	3.2100					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.3807	0.1441	12.4365	6.5000e-004		0.0681	0.0681		0.0681	0.0681		22.2829	22.2829	0.0219		22.8297
Total	**4.1693**	**0.1441**	**12.4365**	**6.5000e-004**		**0.0681**	**0.0681**		**0.0681**	**0.0681**	**0.0000**	**22.2829**	**22.2829**	**0.0219**	**0.0000**	**22.8297**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation