CITY OF LOS ANGELES
DEPARTMENT OF CITY PLANNING
CITY HALL 200 NORTH SPRING STREET LOS ANGELES CA 90012

INITIAL STUDY

Elysian Park Lofts Project

Case Number: ENV-2016-4064-EIR

Project Location: 1251 North Spring Street and 1030 - 1380 North Broadway, Los Angeles, CA 90012

Community Plan Area: Central City North

Council District: 1—Cedillo

Project Description: The Elysian Park Lofts project proposes development of a mixed-use residential and commercial retail project (Project) consisting of approximately 920 residential units, including 17 live-work units, approximately 17,941 square feet (sf) of neighborhood-serving retail uses, and approximately 5,465 sf of leasing offices on an irregular bow-shaped parcel that is currently used for Metro vehicle and equipment storage and parking. All existing structures on the Project site would be demolished, including a one-story, wood modular building at the southwestern corner of the Project site, a rectangular one-story metal building at the western boundary of the Project site, a wood trailer shed at the southeastern boundary of the Project site, a metal storage container, and a one-story building that is attached to an adjacent off-site building, as well as surface parking, site improvements, and fences at the southern portion of the Project site. Upon completion, the Project would result in 1,159,800 square feet of new floor area with a 3.3 floor area ratio (FAR).

The Project site consists of a north parcel ("North Parcel") and a south parcel ("South Parcel"). The North Parcel would be developed with approximately 469 dwelling units, including 10 live-work units, in 3 buildings over a 3-level subterranean parking garage. Building A on the North Parcel would be 7 stories and approximately 85 feet high; Building B would be 14 stories and approximately 170 feet high; and Building C would be 8 stories and approximately 100 feet high. The North Parcel would include 8,070 sf of neighborhood-serving restaurant/outdoor dining uses and a leasing office of 2,000 sf. The North Parcel would also be developed with recreational and open space uses, and a pool for residents.

The South Parcel would be developed with approximately 451 dwelling units, including 7 live-work units, in 3 buildings constructed over a 3-level subterranean parking garage. Building A on the South Parcel would be 7 stories and 85 feet high; Building B would be 7 stories and approximately 84 feet high; and Building C would be 13 stories and approximately 155 feet high. The South Parcel would include approximately 9,871 sf of neighborhood-serving restaurant/outdoor dining uses and a leasing office of approximately 3,465 sf. The South Parcel also would have a residential community center that would be 2 stories and 34 feet high, with a pool, club and lounge for residents.

PREPARED FOR:	PREPARED BY:	APPLICANT:
The City of Los Angeles Department of City Planning	Psomas 225 South Lake Avenue Suite 1000 Pasadena, CA 91101	S&R Partners, LLC 737 Lamar Street Los Angeles, CA 90031

November 2017

INITIAL STUDY
Table of Contents

List of Exhibits **Follows Page**

List of Tables **Page**

Appendices

CITY OF LOS ANGELES

OFFICE OF THE CITY CLERK
ROOM 395, CITY HALL
LOS ANGELES, CALIFORNIA 90012

CALIFORNIA ENVIRONMENTAL QUALITY ACT

INITIAL STUDY
AND APPENDIX G CHECKLIST

LEAD CITY AGENCY	COUNCIL DISTRICT	DATE
City of Los Angeles Department of City Planning	1, Cedillo	November 6, 2017

RESPONSIBLE AGENCIES
State Water Resources Control Board
Metropolitan Transportation Authority

PROJECT TITLE / CASE NO.	RELATED CASES
Elysian Park Lofts / ENV-2016-4064-EIR	CPC-2016-4063-GPA-ZC-HD-ZAD-SPR; CPC-2016-4139-DA; VTT-74548

PROJECT LOCATION
1251 North Spring Street and 1030 - 1380 North Broadway, Los Angeles, CA 90012

APPLICANT NAME AND ADDRESS	PHONE NUMBER
S&R Partners, LLC	(323) 223-1401

PROJECT DESCRIPTION:
The Elysian Park Lofts Project proposes development of a mixed-use residential and commercial retail project (Project) consisting of approximately 920 residential units, including 17 live-work units, approximately 17,941 square feet (sf) of neighborhood-serving retail uses, and approximately 5,465 sf of leasing offices on an irregular bow-shaped parcel that is currently used for Metro vehicle and equipment storage and parking. All existing structures on the Project site would be demolished, including a one-story, wood modular building at the southwestern corner of the Project site, a rectangular one-story metal building at the western boundary of the Project site, a wood trailer shed at the southeastern boundary of the Project site, a metal storage container, and a one-story building that is attached to an adjacent off-site building, as well as surface parking, site improvements, and fences at the southern portion of the Project site. Upon completion, the Project would result in 1,159,800 square feet of new floor area with a 3.3 floor area ratio (FAR).

The Project site consists of a north parcel ("North Parcel") and a south parcel ("South Parcel"). The North Parcel would be developed with approximately 469 dwelling units, including 10 live-work units, in 3 buildings over a 3-level subterranean parking garage. Building A on the North Parcel would be 7 stories and approximately 85 feet high; Building B would be 14 stories and approximately 170 feet high; and Building C would be 8 stories and approximately 100 feet high. The North Parcel would include 8,070 sf of neighborhood-serving restaurant/outdoor dining uses and a leasing office of 2,000 sf. The North Parcel would also be developed with recreational and open space uses, and a pool for residents.

The South Parcel would be developed with approximately 451 dwelling units, including 7 live-work units, in 3 buildings constructed over a 3-level subterranean parking garage. Building A on the South Parcel would be 7 stories and 85 feet high; Building B would be 7 stories and approximately 84 feet high; and Building C would be 13 stories and approximately 155 feet high. The South Parcel would include approximately 9,871 sf of neighborhood-serving restaurant/outdoor dining uses and a leasing office of approximately 3,465 sf. The South Parcel also would have a residential community center that would be 2 stories and 34 feet high, with a pool, club and lounge for residents. (For additional detail, see Attachment A).

ENVIRONMENTAL SETTING:
The Project site is located at 1030–1380 North Broadway and 1251 North Spring Street. The Metro Gold Line railroad tracks run parallel and adjacent to the southeastern boundary of the Project site, which is adjacent to the Los Angeles State Historic Park to the southeast. North Broadway borders the northwestern and western boundary of the Project site, and commercial and multi-family residential uses are located west of the Project site. The Project site is within the Chinatown neighborhood of Los Angeles and in the vicinity of downtown Los Angeles, Lincoln Heights, and Echo Park.
(For additional detail, see Attachment A).

Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, has consultation begun?
No. Outreach to tribes will occur upon the issuance of the Notice of Preparation for the Project.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☒ Hazards & Hazardous Materials	☒ Recreation
☐ Agriculture and Forestry Resources	☒ Hydrology / Water Quality	☒ Transportation / Traffic
☒ Air Quality	☒ Land Use / Planning	☒ Tribal Cultural Resources
☐ Biological Resources	☐ Mineral Resources	☒ Utilities / Service Systems
☒ Cultural Resources	☒ Noise	☒ Mandatory Findings of Significance
☒ Geology / Soils	☒ Population / Housing	
☒ Greenhouse Gas Emissions	☒ Public Services	

DETERMINATION (to be completed by Lead Agency)

On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions on the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☒ I find the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Erin Strelich	City Planning Associate
PRINTED NAME	**TITLE**
	(213) 978-1351
SIGNATURE	**TELEPHONE NUMBER**

EVALUATION OF ENVIRONMENTAL IMPACTS:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less that significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of a mitigation measure has reduced an effect from "Potentially Significant Impact" to "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analysis," as described in (5) below, may be cross referenced).

5) Earlier analysis must be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR, or negative declaration. Section 15063 (c)(3)(D). In this case, a brief discussion should identify the following:

    a) Earlier Analysis Used. Identify and state where they are available for review.

    b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

    c) Mitigation Measures. For effects that are "Less Than Significant With Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated

7) Supporting Information Sources: A sources list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whichever format is selected.

9) The explanation of each issue should identify:

    a) The significance criteria or threshold, if any, used to evaluate each question; and

    b) The mitigation measure identified, if any, to reduce the impact to less than significance.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
I. AESTHETICS. Would the project:				
a. Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c. Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☒	☐
d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐
II. AGRICULTURE AND FOREST RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
III. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a. Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☒	☐	☐	☐
c. 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 releasing emissions which exceed quantitative thresholds for ozone precursors)?	☒	☐	☐	☐
d. Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐
e. Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐
IV. BIOLOGICAL RESOURCES. Would the project:				
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☐	☐	☒
c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒
V. CULTURAL RESOURCES: Would the project:				
a. Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?	☒	☐	☐	☐
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☒	☐	☐	☐
c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☒	☐	☐	☐
d. Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☒	☐
VI. GEOLOGY AND SOILS. Would the project:				
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault, caused in whole or in part by the project's exacerbation of the existing environmental conditions? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii. Strong seismic ground shaking caused in whole or in part by the project's exacerbation of the existing environmental conditions?	☐	☐	☒	☐
iii. Seismic-related ground failure, including liquefaction, caused in whole or in part by the project's exacerbation of the existing environmental conditions?	☒	☐	☐	☐
iv. Landslides, caused in whole or in part by the project's exacerbation of the existing environmental conditions?	☐	☐	☒	☐
b. Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c. Be located on a geologic unit that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse, caused in whole or in part by the project's exacerbation of the existing environmental conditions?	☒	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property caused in whole or in part by the project's exacerbation of the existing environmental conditions?	☐	☐	☒	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
VII. GREENHOUSE GAS EMISSIONS. Would the project:				
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐
b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☒	☐	☐	☐
VIII. HAZARDS AND HAZARDOUS MATERIALS. Would the project:				
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☒	☐	☐	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☒	☐
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment caused in whole or in part from the project's exacerbation of existing environmental conditions?	☒	☐	☐	☐
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
h. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including, where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands, caused in whole or in part from the project's exacerbation of existing environmental conditions?	☐	☐	☐	☒
IX. HYDROLOGY AND WATER QUALITY. Would the project:				
a. Violate any water quality standards or waste discharge requirements?	☒	☐	☐	☐
b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☒	☐	☐	☐
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☒	☐	☐	☐
e. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☒	☐	☐	☐
f. Otherwise substantially degrade water quality?	☒	☐	☐	☐
g. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h. Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☒
i. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
j. Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒
X. LAND USE AND PLANNING. Would the project:				
a. Physically divide an established community?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☒	☐	☐	☐
c. Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒
XI. MINERAL RESOURCES. Would the project:				
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☒	☐
b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☒	☐
XII. NOISE. Would the project result in:				
a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☒	☐	☐	☐
b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☒	☐	☐	☐
c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☒	☐	☐	☐
d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☒	☐	☐	☐
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
XIII. POPULATION AND HOUSING. Would the project:				
a. Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☒	☐	☐	☐
b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
XIV. PUBLIC SERVICES. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
a. Fire protection?	☒	☐	☐	☐
b. Police protection?	☒	☐	☐	☐
c. Schools?	☒	☐	☐	☐
d. Parks?	☒	☐	☐	☐
e. Other public facilities?	☒	☐	☐	☐
XV. RECREATION.				
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☒	☐	☐	☐
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☒	☐	☐	☐
XVI. TRANSPORTATION/TRAFFIC. Would the project:				
a. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☒	☐	☐	☐
b. Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☒	☐	☐	☐
c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
d. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
e. Result in inadequate emergency access?	☐	☐	☒	☐
f. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☒	☐	☐	☐
XVII. TRIBAL CULTURAL RESOURCES. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?	☒	☐	☐	☐
b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?	☒	☐	☐	☐
XVIII. UTILITIES AND SERVICE SYSTEMS. Would the project:				
a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☒	☐
b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☒	☐	☐	☐
c. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☒	☐	☐	☐
d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☒	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
e. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☒	☐	☐	☐
f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☒	☐	☐	☐
g. Comply with federal, state, and local statutes and regulations related to solid waste?	☒	☐	☐	☐
XIX. MANDATORY FINDINGS OF SIGNIFICANCE.				
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☒	☐	☐	☐
c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

ATTACHMENT A:
PROJECT DESCRIPTION

1. INTRODUCTION

S&R Partners, LLC (the Applicant) proposes to develop a mixed-use residential and commercial retail project (Project) consisting of approximately 920 residential units, including 17 live-work units, approximately 17,941 square feet (sf) of neighborhood-serving retail uses, and approximately 5,465 sf of leasing offices on an 8.08-acre site located at 1030–1380 North Broadway and 1251 North Spring Street. Exhibit 1, Regional Location and Local Vicinity, shows the Project location, Project boundaries, and surrounding areas on an aerial photograph of the vicinity.

2. PROJECT LOCATION

The Project site is located within the Central City North Community Plan Area, immediately east of the Chinatown Redevelopment Project Area. The Project site consists of Assessor's Parcel Number (APN) 5414-016-002 and is located southeast of North Broadway, north of the City's Downtown area. The Los Angeles County Metropolitan Transportation Authority (Metro) Gold Line railroad tracks run parallel and adjacent to the southeastern boundary of the Project site, with the Los Angeles State Historic Park farther to the southeast of the Project site. North Broadway borders the northwestern boundary of the Project site, and commercial and multi-family residential uses are located west of the Project site. The Project site has an irregular bow shape that follows the curve of Broadway and the Metro Gold Line railroad. The northeastern corner is defined by the Broadway bridge over the Gold Line tracks for approximately 3,200 feet, with 200- to 250-foot-wide southwestern and northeastern sections and the narrow central section.

Primary vehicular access to the Project site is provided by North Broadway, which forms the northwestern and western boundaries of the Project site. Several gated driveways on the Project site connect with North Broadway. Vehicle access is also available to the southern section of the Project site through a short roadway that extends west from Spring Street and runs under the Metro Gold Line tracks and onto the Project site. Regional access is available through the Hollywood Freeway (U.S. 101) to the south, which has westbound on-ramps at North Broadway and westbound off-ramps at Spring Street, and through historic Arroyo Seco Parkway (State Route [SR-110]) to the west, which has northbound off-ramps and on-ramps at Hill Street and northbound on-ramps at Bishops Road. The Golden State Freeway (Interstate [I]-5) is located approximately 0.4-mile to the north of the North Parcel.

Bus service and light rail service are provided by Metro, and bus service is also provided by the City of Los Angeles Department of Transportation (LADOT). There are two bus stops located on the northwestern boundary of the Project site, one near the North Broadway/Bishops Road intersection and the other near the North Broadway/Solano Avenue intersection. The Metro operates Lines 28, 45, and 83, all of which run on North Broadway and stop at the Project site. Two other stops are located across the street from these bus stops. Metro's Gold Line Chinatown station at the Spring Street/College Street intersection is located approximately 380 feet south of the South Parcel. The Metro's Union Station in Downtown Los Angeles is located approximately 0.65-mile from the South Parcel.

Regional Location and Local Vicinity

Exhibit 1

Elysian Park Lofts Project

N W E S

1,000 500 0 1,000 Feet

PSOMAS

(Rev: 8-02-2017 MMD) R:\Projects\LPC Lincoln\3LPC010100\Graphics\ex_LV_RL.pdf

D:\Projects\3LPC010100\MXD\ex_LV_RL_20170802.mxd

3. ENVIRONMENTAL SETTING

A. CURRENT LAND USES

The Project site has an irregular, bow shape. Although the majority of the Project site has a relatively flat slope, the narrow central portion of the Project site has slopes over 15 percent. The Project site is currently used for vehicle and equipment storage and parking and is developed with various one-story structures in the southwestern portion of the Project site; a construction staging/bus parking area in the northeastern portion; and a vacant area in the central section. The southwestern portion of the Project site is largely paved and built over. At the southwestern corner of the Project site, there is an L-shaped, one-story, wood modular building and a long, rectangular, one-story metal building along the Project site's western boundary. There is a wood trailer shed along the southeastern boundary; a metal storage container at the northwestern boundary near the metal building; and a one-story building that is attached to an adjacent off-site building behind the on-site metal building. These five structures have a total floor area of approximately 19,346 sf and are more than 50 years old. Additionally, a segment of the historic Los Angeles Zanja Madre, the Mother Ditch, is located within the parcel along the eastern boundary of the Project site.

The southwestern section also includes a guard house at the entry gate, concrete pads for trash enclosure, electric panels, drain grates, and an asphalt-paved outdoor storage yard. There are 69 parking spaces in this area and a concrete wall and chain-link fence topped with barbed wire surrounds this section of the Project site. Outdoor lights line the interior chain-link fence. This section is at a lower elevation than North Broadway, and the western portion of this area is a sloped dirt area, with two billboard signs, an eight-foot-high chain-link fence along North Broadway, and a gate at the southwestern corner.

The narrow strip of vacant land at the central section of the Project site consists mainly of bare ground with scattered weeds, although concrete pads, billboards, and a tree are present. This area features a flat strip of land at the southern portion, with a four- to six-foot-high chain-link fence along Broadway and the tracks. The flat area narrows to a steep slope down from Broadway toward the railroad tracks. Here, a retaining wall and a four- to six-foot-high chain-link fence runs along the Project site boundaries with the railroad tracks (at the southeastern boundary) and a concrete and metal fence running along North Broadway (at the northwestern boundary).

Trees and billboards are located in the northeastern portion of the Project site, as well as a paved area previously used as a storage container yard and for bus storage (with a gate across Solano Avenue); this section is also surrounded by a six-foot-high chain-link fence topped with barbed wire along North Broadway and an eight-foot-high chain-link fence along the tracks. The northeastern tip of the Project site slopes down to the Metro tracks, as North Broadway transitions into a bridge over the tracks.

Throughout the southwestern section of the Project site, there are scattered drain grates which connect to underground storm drain lines that convey stormwater to the Los Angeles River, approximately 0.1 to 0.5-mile east of the Project site. Overhead power lines run from the on-site billboards to the streetlights on either side of North Broadway and at the southeastern entry gate at Spring Street.

B. SURROUNDING LAND USES

Commercial uses immediately west of the southwestern corner of the Project site include two 1-story commercial buildings (Golden Dragon Restaurant and Bella Ana Salon); and one 1-story commercial building; two 2-story commercial buildings; and a two-level parking structure (comprising the Mandarin

Plaza shopping center). South of the Project site are 2- and 5-story buildings of the Capitol Milling Company that will house a microbrewery, restaurants, and offices.

West of the Project site across North Broadway are various commercial retail and restaurant uses, St. Peter's Italian Catholic Church, Casa Italiana Cultural Center, Cathedral High School, Quan Yum Temple, offices, surface parking lots, multi-family residences, the Radio Hill Gardens, and vacant lots. Elysian Park is north of the northeastern section of the Project site (across North Broadway).

A maintenance road within the Metro Gold Line right-of-way runs southeast of and along the Project site boundaries and separates the Project site from the tracks. A chain-link fence separates the maintenance road from the tracks. The railroad tracks are at-grade and at a lower elevation than the northeastern and central sections, but then slowly rise on an elevated platform supported by concrete columns toward the Gold Line Chinatown Station at the intersection of Spring Street and College Street. The tracks are approximately 22 feet higher than the ground elevation, where the entry roadway into the Project site crosses under the tracks. The Los Angeles State Historic Park, various industrial uses, and the Los Angeles River are located across the Gold Line tracks to the southeast of the Project site. The 34-acre Los Angeles State Historic Park (aka Cornfield Park) reopened to the public in April 2017 after approximately 3 years of renovation. In addition to active and passive open spaces, the park contains a visitor's center, events area, parking, plaza, picnic area, and a raised pedestrian bridge.

C. EXISTING LAND USE AND ZONING DESIGNATIONS

The City of Los Angeles General Plan sets forth goals, objectives, and programs to provide a guideline for land use policies and to meet the existing and future needs and desires of the community, while integrating a range of State-mandated elements including Land Use, Transportation, Noise, Safety, Housing, and Open Space/Conservation. The Land Use Element of the General Plan consists of the General Plan Framework Element, which addresses citywide policies, and the 35 community plans that guide land use at a more local level. Together, the community plans make up the Land Use Element of the General Plan. The Project site is located within the Central City North Community Plan and has a land use designation of "Light Industrial" (City of Los Angeles 2001).

The Community Plans are implemented through the development standards in the City's Zoning Code. The Project site is zoned MR2-1 (Restricted Light Industrial). The Light Industrial and MR2-1 designations allow for the development of various industrial and manufacturing uses. The -1 suffix refers to Height District 1, which establishes a maximum floor area ratio of 1.5:1 per Section 12.21.1 of the Zoning Code (City of Los Angeles 2017).

The Central City North Community Plan Area (Central City North CPA) includes Chinatown and portions of Little Tokyo and El Pueblo (beginning east of Olvera Street), and is the birthplace of Los Angeles. The Central City North CPA was developed to promote a vision of a community that preserves and enhances the positive characteristics of housing and existing uses in the area; improves the function, design, and economic vitality of commercial corridors; maximizes the development opportunities of future transit systems while minimizing adverse impacts; and plans the remaining development opportunity sites for job-producing uses that may improve the economic and physical condition of the Central City North CPA (Los Angeles 2000).

The Central City North CPA consists of approximately 2,005 acres and is located adjacent to downtown Los Angeles and bounded by Stadium Way, Lilac Terrace, and North Broadway to the north; the City of Vernon to the south; the Los Angeles River to the east; and Alameda Street, Cesar Chavez Avenue, Sunset Boulevard, and Marview Avenue to the west. The Central City North CPA consists of seven subareas: Figueroa Terrace, Alpine Hill, Chinatown, North Industrial, Government Support, Artists-in Residence District, and South Industrial. The Project site is located within the North Industrial subarea (Los Angeles 2000). The Project site is adjacent to other areas within the Central City North CPA, such as the Cornfield/Arroyo Seco Specific Plan southwest of the Project site and the Chinatown Redevelopment Project area west of the site.

4. PROJECT DESCRIPTION

The Project involves the demolition of existing structures on the Project site, including surface parking areas and paved outdoor areas, as well as the removal of fences and walls on the site and at the site boundaries. Demolition of a portion of an existing structure on the Project site would be required; the majority of the building is off-site but a portion is located on-site. The on-site portion of the structure, including the associated surface parking, would be demolished for the proposed Project.

The Project site would then be graded to remove the slopes to accommodate three levels of subterranean parking. The proposed mixed-use project includes approximately 920 dwelling units in 6 buildings and approximately 17,941 sf of neighborhood-serving restaurant/outdoor dining uses and 5,465 sf of leasing offices on the ground floor of 2 of these buildings. A community center/pool pavilion is proposed as the 7th building. The total floor area of the proposed residential and commercial uses would be approximately 1,159,800 sf. Exhibit 2, Site Plan provides an overview of the overall site plan for the Project, including proposed building locations and landscaping.

The Project would consist of a north parcel ("North Parcel") and a south parcel ("South Parcel"). The North Parcel would be developed with approximately 469 dwelling units, including 10 live-work units, in 3 buildings over a 3-level subterranean parking garage. Building A on the North Parcel would be 7 stories and approximately 85 feet high; Building B would be 14 stories and approximately 170 feet high; and Building C would be 8 stories and approximately 100 feet high. The North Parcel would provide approximately 8,070 sf of neighborhood-serving restaurant/outdoor dining and 2,000 sf of leasing offices in Building B, recreational and open space uses, and a pool for residents. Exhibit 3, North Parcel-Site Section, shows a cross-section view of the North Parcel from the Los Angeles State Historic Park looking northward, and Exhibit 4, North Parcel-Site Elevation, shows the exterior proposed design features and landscaping from this same view.

The South Parcel would be developed with approximately 451 dwelling units, including 7 live-work units, in 3 buildings constructed over a 3-level subterranean parking garage. Building A on the South Parcel would be 7 stories and 85 feet high; Building B would be 7 stories and approximately 84 feet high; and Building C would be 13 stories and approximately 155 feet high. The South Parcel would provide a residential community center that would be 2 stories and 34 feet high, with a pool club and lounge for residents. The South Parcel would also provide approximately 9,871 sf of neighborhood-serving restaurant/outdoor dining uses in Building B, and 3,465 sf of leasing offices in Building A. Exhibit 5, South Parcel-Site Section shows a cross-section view of the South Parcel from the Los Angeles State Historic Park looking westward, and Exhibit 6, South Parcel-Site Elevation, shows the exterior proposed design features and landscaping from this same view.

Source: Newman Garrison + Partners, 2017

Site Plan

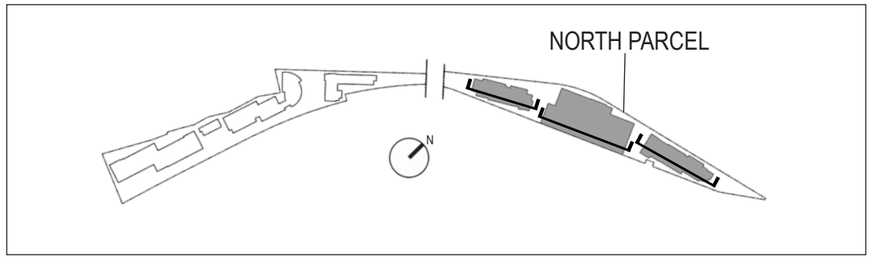
Exhibit 2

Elysian Park Lofts Project

PSOMAS

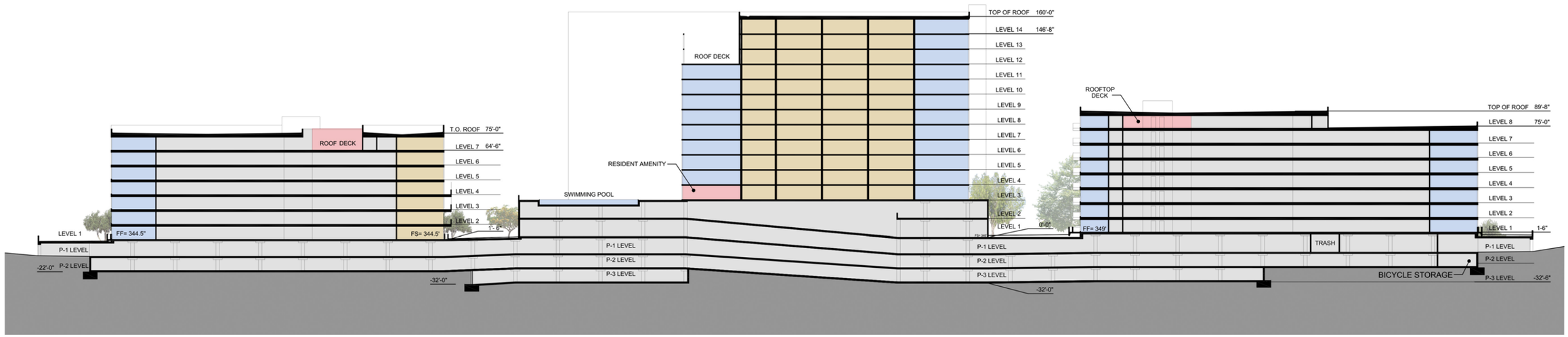
(08/02/2017 MMD) R:\Projects\LPC Lincoln\3LPC010100\Graphics\ex_SitePlan.pdf

D:\Projects\3LPC\010100\GRAPHICS\ex_SitePlan.ai



LEGEND

- A - UNIT TYPE
- B - UNIT TYPE
- RESIDENT AMENITY
- PARKING & COMMON USE
- LOBBY
- COMMERCIAL SPACE



BUILDING A BUILDING B BUILDING C

Source: Newman Garrison + Partners, 2017

North Parcel – Site Section

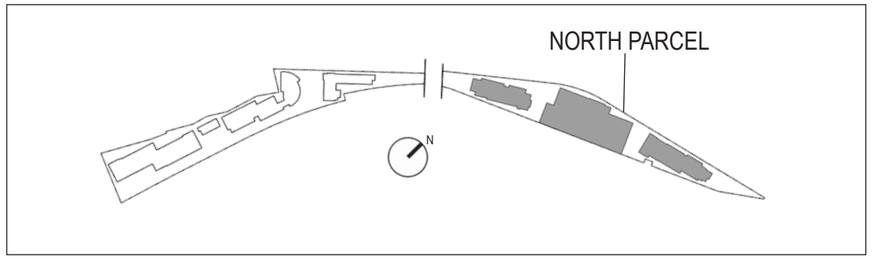
Exhibit 3

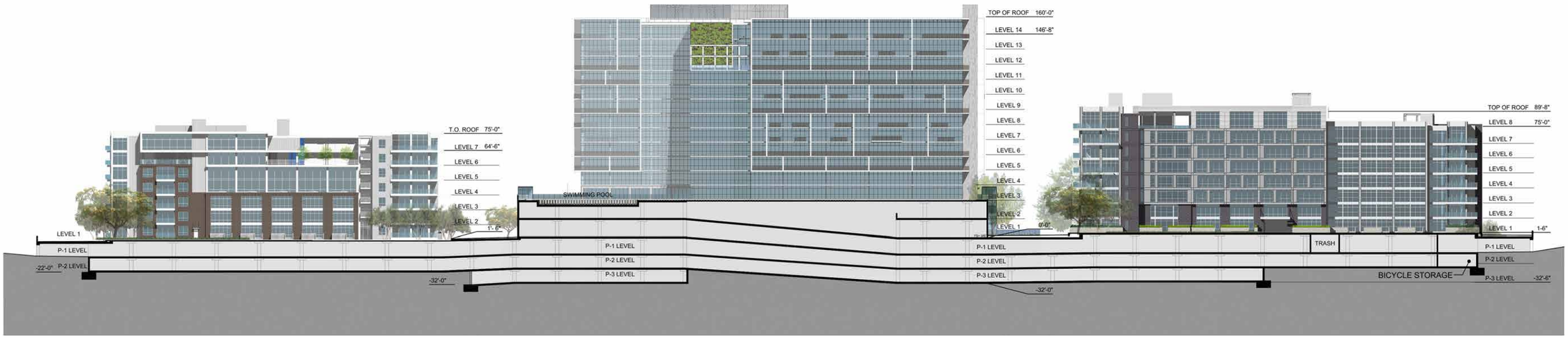
Elysian Park Lofts Project

PSOMAS

(08/02/2017 MMD) R:\Projects\LPC Lincoln\3LPC010100\Graphics\ex_NParcel_SiteSection.pdf

D:\Projects\3LPC\010100\GRAPHICS\ex_NParcel_SiteSection_20170802.ai





BUILDING A BUILDING B BUILDING C

Source: Newman Garrison + Partners, 2017

North Parcel – South Site Elevation

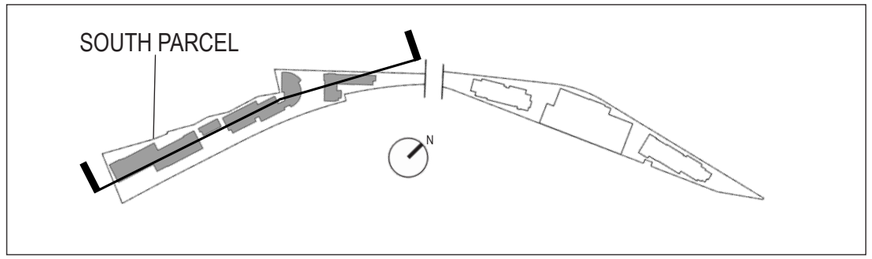
Exhibit 4

Elysian Park Lofts Project

PSOMAS

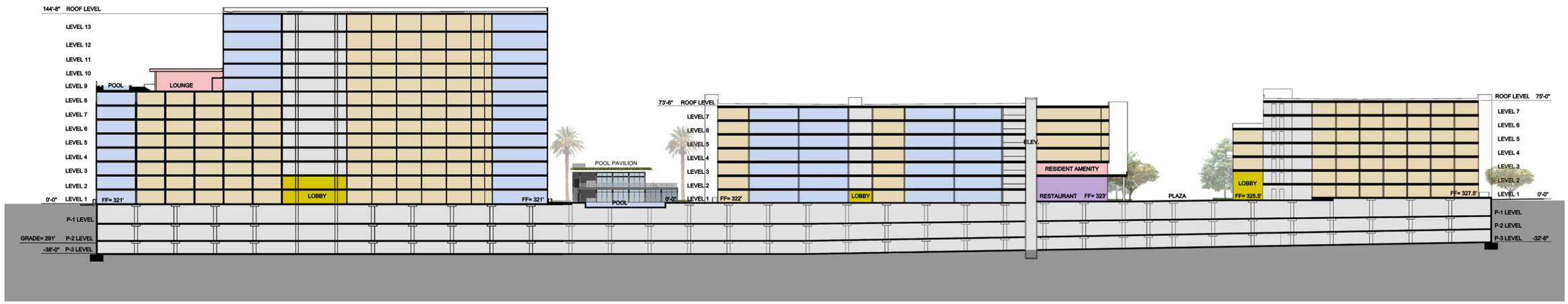
(08/02/2017 MMD) R:\Projects\LPC Lincoln\3LPC010100\Graphics\ex_NorthParcel_S_Elev.pdf

D:\Projects\3LPC\010100\GRAPHICS\ex_NorthParcel_S_Elev_20170802.ai



LEGEND

- A - UNIT TYPE
- B - UNIT TYPE
- RESIDENT AMENITY
- PARKING & COMMON USE
- LOBBY
- COMMERCIAL SPACE



BUILDING C BUILDING B BUILDING A

Source: Newman Garrison + Partners, 2017

South Parcel – Site Section

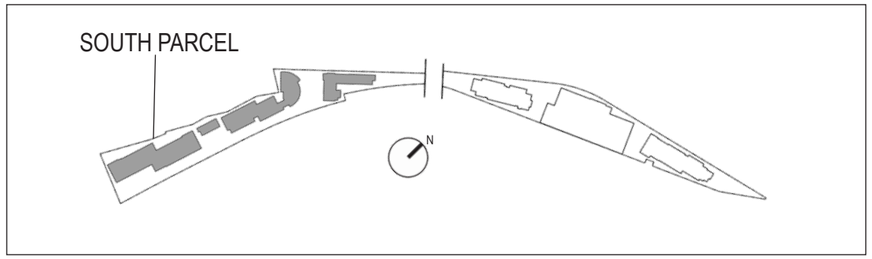
Exhibit 5

Elysian Park Lofts Project

PSOMAS

(08/02/2017 MMD) R:\Projects\LPC Lincoln\3LPC010100\Graphics\ex_SParcel_SiteSection.pdf

D:\Projects\3LPC\010100\GRAPHICS\ex_SParcel_SiteSection_20170802.ai



Source: Newman Garrison + Partners, 2017

South Parcel – Southeast Site Elevation

Exhibit 6

Elysian Park Lofts Project

PSOMAS

(08/02/2017 MMD) R:\Projects\LPC Lincoln\3LPC010100\Graphics\ex_SouthParcel_SE_Elev.pdf

D:\Projects\3LPC\010100\GRAPHICS\ex_SouthParcel_SE_Elev_20170802.ai

The Project also involves a three-foot-wide right-of-way dedication along the Project site boundaries on North Broadway to provide an expanded sidewalk/parkway area and the relocation of existing billboards to alternative locations on-site. Table 1 provides a summary of the proposed Project developed floor area and Table 2 provides a summary of the ground-level open space.

Table 1
Project Land Uses

Land Use	Description	Approximate Size (Square Feet)
Proposed on North Parcel		
Residential	469 du	416,505
Non-Residential	Restaurant/café	5,830
	Outdoor dining	2,240
	Leasing office	2,000
Other support spaces	Lobbies, hallways, roof decks, clubroom/lounge, fitness room, media room, conference room, amenity areas, pool	219,455
	North Parcel Subtotal	*646,030*
Proposed on South Parcel		
Residential	451 du	380,458
Non-Residential	Restaurants	6,531
	Outdoor dining	3,340
	Leasing office	3,465
Other support spaces	Community center, lobbies, hallways, roof decks, amenity areas, lounge, concierge, pools	56,957
	South Parcel Subtotal	*513,770*
	TOTAL FLOOR AREA	**1,159,800**
Parking		
Parking Spaces	North Parcel	903 spaces
Parking Spaces	South Parcel	880 spaces
	TOTAL PARKING	**1,783 spaces**
sf: square feet; du: dwelling units		

Table 2
Project Ground-Level Open Space

Description	Approximate Size (Square Feet)	Approximate Size (Acres)
North Parcel Ground Level Open Space		
Public-Linear Park	25,580	0.59
Public-Outdoor Plazas	27,594	0.63
Private Plazas	19,577	0.45
Total North Parcel	72,751	1.67
South Parcel Ground Level Open Space		
Public-Linear Park	18,960	0.44
Public-Outdoor Plazas	24,247	0.56
Private Plazas	25,370	0.58
Total South Parcel	68,577	1.57
Total Ground-Level Open Space	**141,328**	**3.24**

A. PROPOSED RESIDENTIAL USES

The proposed dwelling units would be located in 6 buildings, 3 of which would be on the North Parcel providing approximately 469 units, and 3 of which would be on the South Parcel providing approximately 451 dwelling units. On the North Parcel, approximately 90 dwelling units would be provided in the 7-story Building A. Building B would provide 248 units on 14 floors. Building C would provide 131 units on 8 floors. On the South Parcel, approximately 53 dwelling units would be provided in the 7-story Building A. Building B would provide approximately 122 units on 7 floors. Building C would provide 276 units on 13 floors.

B. PROPOSED COMMERCIAL USES

The proposed commercial uses would include a total of approximately 23,406 sf on the ground floors of the North Parcel's Building B and the South Parcel's Buildings A and B. Approximately 10,070 sf of non-residential sf would be located on the North Parcel. This would include approximately 5,830 sf of restaurant and cafés, 2,240 sf in outdoor dining areas, and 2,000 sf for a leasing office in the North Parcel's Building B.

Also, approximately 13,336 sf of non-residential floor area would be located on the South Parcel. This would include approximately 6,531 sf of restaurant uses and 3,340 sf in outdoor dining areas in Building B and 3,465 sf for a leasing office in Building A on the South Parcel.

C. PROPOSED LIVE-WORK UNITS

The Project proposes a total of approximately 17 live-work units, with 10 units on the North Parcel and 7 units on the South Parcel. These units would include 7 units with 3 levels, 2 bedrooms, and 1,850 sf of floor area in Building A on the South Parcel. The remaining 10 units would have 2 levels, 1 bedroom, and 1,370 sf of floor area, with 7 live-work units in Building A and 3 units in Building C on the North Parcel.

D. PROPOSED LAND USE AND ZONING DESIGNATIONS

The Project requires a General Plan Amendment (GPA) to change the land use designation from Light Industrial to Regional Commercial. According to the General Plan Framework Element, Regional Centers are intended to serve as the focal points of commerce, identity, and activity for populations of 250,000 to 500,000 persons. As defined by the Framework Element, Regional Centers are expected to contain a diversity of uses including professional offices, retail centers, and mixed-use housing and commercial developments (Los Angeles 2001). The Project is proposing a mix of residential- and neighborhood-serving retail uses, which would serve as a point of commerce and activity in the Chinatown community and is consistent with the General Plan's Regional Center designation. Adjacent and nearby properties (e.g., parcels south and southwest of the Project site, as well as a few parcels to the west across North Broadway) are also designated Regional Commercial.

The Project requires a zone change to change the zoning for the Project site from MR2 to C2. In addition, a height district change from Height District 1 to Height District 2D is also needed. The zone change to C2 would make the zoning of the Project site consistent with the proposed Regional Commercial land-use designation and would allow for the development of the proposed mixed-use Project. With approval of the change to Height District 2, the allowable floor area ratio (FAR) in the C2 zone would be six times the buildable area of the lot. The D limitation is proposed to ensure a development that is compatible with the surrounding property and neighborhood. The C2-2D zoning would also be similar to the current zoning of parcels south and southwest of the Project site and across North Broadway.

E. DESIGN AND ARCHITECTURE

The proposed structures have been designed to increase pedestrian activity on the east side of North Broadway. A combination of restaurants, cafés, live-work units, two-story loft units, public open space, and residential lobby entrances front the public sidewalk along North Broadway. Each entryway has been designed to provide highly visible unobstructed views from public rights-of-way. All residential exit stairs would be open steel-frame structures to provide transparency and to integrate into the building architecture. All ground floor uses are designed to maximize the visual connection to the street by providing clear and unobstructed windows that are free of reflective glass coatings, exterior mounted gates, or security grills. Entrances to each building facing North Broadway are designed to be at grade level or raised approximately 1.5 feet above the finished grade. The on-site structures have also been designed and located to create light and view corridors within and through the Project site.

The building architecture reflects the industrial character of past land uses by utilizing cast-in-place concrete walls, structural steel, metal siding, concrete block, sand blasted brick, and glass. Variations in the textures, colors, and sizes of these materials are intended to allow for a unified design that links but differentiates the buildings. Building massing and scale is designed to provide vertical and horizontal plane changes along the facades of the buildings. Roof top terraces have been integrated into each building to provide outdoor amenity zones and to promote activity above the street level.

Large open space areas are proposed in between the buildings to the Los Angeles State Historic Park along Broadway and to adjacent land uses to the north. View corridors have been provided from the pool pavilion on the South Parcel; from Cottage Home Street, Solano Avenue, and Casanova Street; along the proposed linear park at the central portion of the Project site; and for northern and southern views from North Broadway. These view corridors have also been designed to provide outdoor open space amenities for the

public and residents. Decorative gates and landscape plantings are proposed along North Broadway at the openings between buildings and to provide a continuous visual presence at the street level.

F. OPEN SPACE, LANDSCAPING AND PUBLIC ART

Open space areas have been located and distributed throughout the Project site. Each building would have outdoor open space areas designed for passive and active uses. These areas are located throughout the development and are designed to take advantage of the views of Downtown Los Angeles, as well as Los Angeles State Historic Park. Swimming pools, decks, amphitheater seating, outdoor movie theaters, lounge areas with fire pits, barbecue stations with dining areas, dog parks, playgrounds, viewing platforms, and multi-level amenities with viewing roof decks for social gatherings and events would be provided on-site. In addition, private and public plaza spaces would be provided throughout the Project site. Balconies have been provided throughout the buildings to augment rather than substitute for actively used common open spaces and recreational areas. Certain buildings would also provide unique "art walls" where local artists can be commissioned to promote their work and encourage community participation.

The linear park located in the central portion of the Project site would provide a new public amenity that has been crafted to showcase the views of Downtown Los Angeles, the Los Angeles State Historic Park, Union Station, and the historic Zanja Madre Aqueduct (an uncovered section of the historic Los Angeles River that is adjacent to the Project site). Smaller terraced retaining walls would be used in the linear park linking the North and South Parcels. Walkways would connect the North and South Parcels and would be located where they would not have a grade elevation change of 30 feet or more. Along the ¼-mile path would be a series of perches that extend beyond the sidewalk to create new vistas and resting areas. Where the topography allows, new pocket plazas and a dog park have been situated at major intersections and level areas of the park.

A total of approximately 141,328 sf of common open space areas would be provided by the Project at the ground level, which would be approximately 17,478 sf more than the required 123,850 sf. Approximately 32 percent of the open space would be within the 44,540 sf linear park, 37 percent would be publicly accessible outdoor plazas, and 32 percent would be private plazas for use by Project residents.

The landscaping plan includes new street trees along the east side of North Broadway to provide shade to pedestrians and to connect to a ¼-mile walking path that incorporates a series of perches that provide new vistas and resting areas that extend beyond the existing sidewalk. In total, the landscape plan will add approximately 264 trees to the Project site. The Project will incorporate a mix of native plant materials along with Mediterranean and Australian plants, which are suitable for the Southern California climate and are considered low water use. Shade trees would be provided in areas for active use and passive pedestrian areas. Evergreen screening trees and vine plantings would buffer views of the parking and podium levels above grade.

G. ACCESS AND CIRCULATION, PARKING, AND BICYCLE AMENITIES

Access to the Project would be provided by several driveways off North Broadway that would lead to loading areas at the ground level and the subterranean parking garages. A driveway off Spring Street at the southern end of the Project site would also lead into the South Parcel's subterranean parking garage.

A total of approximately 1,783 parking spaces would be provided on-site. A total of approximately 903 parking spaces would be provided in 3 subterranean levels and 2 podium levels in the North Parcel's

Building B. Approximately 18 would be accessible spaces and 28 would be electric vehicle (EV) charging stations. Bicycle parking spaces would also be provided, with 488 long-term spaces and 56 short-term spaces.

A total of 880 parking spaces would be provided in 3 subterranean levels on the South Parcel. Of this total, 18 would be accessible spaces and 27 would be EV charging stations. Bicycle parking spaces would also be provided, with 470 long-term spaces and 55 short-term spaces. Bicycle parking spaces would also be provided, with 470 long-term spaces and 55 short-term spaces.

The exposed southeastern face of the multi-level parking structures would incorporate architectural facade treatments along with climbing vines to provide a visually interesting "green wall," as seen from the Metro Gold Line tracks, the Los Angeles State Historic Park, and areas farther southeast.

H. ROADWAY AND PEDESTRIAN IMPROVEMENTS

North Broadway is classified as Avenue II (Secondary Highway). The half street right-of-way width for this roadway classification is 43 feet, which includes a roadway pavement of 28 feet, as measured from the road centerline to the curb face and a 15-foot-wide parkway and sidewalk. In the existing condition, the half street right-of-way width of North Broadway is only 40 feet along the Project site frontage. This includes a roadway pavement width of 36 feet and a sidewalk ranging from 4 to 10 feet at the bus stop areas. As part of the Project, 3 feet of right-of-way width would be dedicated to the City of Los Angeles and would be incorporated into the public right-of-way to bring the total half street right-of-way width to 43 feet and the total sidewalk width of 7 feet. If required by the City, the sidewalk could be further widened to more than 7 feet by reducing the street's roadway pavement width accordingly.

The proposed curb cuts for new driveways into the Project site have been located along North Broadway in a manner that does not reduce on-street parking. Unused curb cuts and driveways would be replaced with sidewalks to maintain continuity for pedestrians. There would be no changes to existing signalized pedestrian crosswalks across North Broadway (at its intersections with Cottage Home Street, Bishop Road, Solano Avenue, Casanova Street, and Elysian Park Drive). However, the Project proposes a crosswalk with a signal at the northeastern tip of the Project site to connect with the adjacent Elysian Park.

While the Project site and the segment of North Broadway fronting the site are located outside the Cornfield Arroyo Seco Specific Plan, Broadway Street is designated for Street Tree Variety No. 1, which includes a list of permitted street trees. The Project will incorporate appropriate street trees to be planted in tree wells along the sidewalk.

I. LIGHTING AND SIGNAGE

Architectural lighting is proposed to complement key architectural features of each building through the use of low profile; low wattage light-emitting diode (LED) building-mounted fixtures and fixtures integrated into the building facades. Low intensity LED luminaires, pedestrian poles, decorative lanterns, lighted bollards, and recessed step lights would also be used.

Low glare fixtures and decorative fixtures would be located at the ground level of each building to create a sense of arrival and scale, and would include the use of building-mounted decorative fixtures, low level landscape lanterns, and floor lamps. Specialty LED accent lighting would be located on key wall art

displays, murals, and perforated screens on the exterior of each building (where applicable) to enhance the night time experience and to create a strong connection to the adjacent park and neighborhood.

The security lighting for the exterior courtyards and pedestrian walkways would include a combination of low-intensity LED luminaries, pedestrian poles, decorative lanterns, bollards, and recessed step lights. All exterior lighting would be designed to meet minimum light levels for emergency egress and to comply with the requirements of the California Building Code (Title 24 of the California Code of Regulations) and the California Green Building Standards (CalGreen) Code.

Signage would be located at a height and of size that is visible to pedestrians and that facilitates access to the building entrances. The signage program has not been fully developed and shall be presented upon completion. Existing billboards would be relocated, but would remain on-site.

J. SUSTAINABILITY FEATURES

The Project is a mixed-use, transit-oriented development within a Transit Priority Area (TPA) that would reduce the need for vehicle use for residents due to the Project site's proximity to local destinations and alternative transportation opportunities. Residents of the Project could visit the on-site commercial uses or nearby commercial uses within walking distance, and those in the live-work units could avoid commuting entirely. In addition, the Project site is located near the Metro Gold Line Chinatown Station, which would allow residents and employees to go to and from the Project by light rail. The Project would be built in accordance with the CalGreen and LA Green Code and would incorporate water and energy conservation measures, as well as solid waste recycling and diversion programs.

Lastly, Section 21100(b) of the State CEQA Guidelines requires that an EIR include a detailed statement setting forth mitigation measures proposed to minimize a project's significant effects on the environment, including, but not limited to, measures to reduce the wasteful, inefficient, and unnecessary consumption of energy. Appendix F of the State CEQA Guidelines states that, in order to ensure that energy implications are considered in project decisions, the potential energy implications of a project shall be considered in an EIR, to the extent relevant and applicable to the project. Consistent with these requirements, the EIR to be prepared for the Project will include, but not be limited to, an analysis of Project consistency with applicable energy conservation requirements (e.g., Title 24 of the CBC, CALGreen, SCAG RTP requirements for promoting regional land use patterns that promote sustainability, City transportation demand management requirements, etc.), including identification of attributes of the Project and the energy conservation features proposed to ensure consistency with these requirements.

K. UTILITIES

The Project requires the abandonment and/or removal of existing utility connections and lines and the provision of new utility meters (for water, gas, and electrical services) and associated aboveground utility appurtenances that would be located primarily along North Broadway. These facilities would be appropriately screened via landscaping and/or building massing strategies. New on-site electrical infrastructure would be provided via underground duct banks with at-grade pad-mounted transformer equipment. All other utility service lines (i.e., water, sewer, gas, and phone/data lines) would be placed underground.

L. OFF-SITE FEATURES

The Project would require minor off-site improvements, including the following:

- A new crosswalk with a signal at the northeastern tip of the Project site to connect with the adjacent Elysian Park.
- Demolition of a portion of an existing structure and associated surface parking located on the Project site would cause impacts to the remainder of the structure, located off-site.

M. CONSTRUCTION SCHEDULE

Construction of the Project would be phased, with development of the South Parcel occurring as Phase 1 and development of the North Parcel occurring as Phase 2. Grading activities would involve over 187,000 cubic yards of cut and soil export to accommodate the proposed subterranean parking levels.

N. DISCRETIONARY ACTIONS- PROJECT APPROVALS

Lead Agency

Pursuant to the California Environmental Quality Act (CEQA), the public agency with the principal responsibility for carrying out or approving a project is referred to as the "Lead Agency" (State CEQA Guidelines Section 15367). For the Elysian Park Lofts Project, the City of Los Angeles (City) is the Lead Agency and has determined that the preparation of an Environmental Impact Report (EIR) is the appropriate environmental document for the proposed Project. As such, the City is responsible for preparing the EIR and would review and consider the EIR in its discretion and approve, revise, or deny the Project with findings, as appropriate. The EIR would serve as the primary environmental document for implementation of the Project, including all required discretionary approvals for implementation.

Discretionary approvals and permits required for implementation of the Project would include, but would not necessarily be limited to, the following:

- A General Plan Amendment to change the land use designation of the Project site from Light Industrial to Regional Commercial, pursuant to Charter Section 555 and City of Los Angeles Municipal Code (LAMC) Sections 11.5.6 and 12.32.
- Zone Change to change the zoning for the Project site from MR2 to C2, pursuant to Charter Section 558 and LAMC Section 12.32.
- Height district change from Height District 1 to Height District 2D, pursuant to Charter Section 558 and LAMC Section 12.32.
- A zoning administrator's determination (ZAD) to permit a building height greater than specified in LAMC Section 12.21.1.A.10.
- Approval of Site Plan Review for the development of more than 50 dwelling units, pursuant to Charter Section 558 and LAMC Section 16.05.
- Vesting Tentative Tract Map (approval of VTTM 74548) that involves the dedication of a 3-foot-wide strip along North Broadway to the City (resulting in a net acreage of 7.87 acres) and subdivision of the Project site into 13 lots consisting of 2 master lots and 11 airspace lots for

residential and commercial condominium purposes, pursuant to LAMC Section 17.15. The proposed lots include the following:

- **Lot 1**: North Master (Ground) Lot
- **Lot 2:** North Parking
- **Lot 3:** North Commercial Space (5 commercial condominiums)
- **Lot 4:** North Residential Space – Building B
- **Lot 5:** North Residential Space – Building A
- **Lot 6:** North Residential Space – Building C
- **Lot 7:** South Master (Ground) Lot
- **Lot 8:** South Parking
- **Lot 9:** South Commercial Space (5 commercial condominiums)
- **Lot 10:** South Residential Space – Community Center
- **Lot 11:** South Residential Space – Building B
- **Lot 12:** South Residential Space – Building A
- **Lot 13:** South Residential Space – Building C

- Approval of a Development Agreement pursuant to Sections 65864–65869.5 of the *California Government Code*.
- Certification of the Environmental Impact Report.
- Demolition permits.
- Haul Route approval.
- Grading, excavation, foundation, and associated building permits.
- Original Art Mural approval for murals on several walls on the proposed buildings.
- Other entitlements and approvals deemed necessary by the City to implement the Project.

Responsible Agencies

Public agencies other than the Lead Agency that have discretionary approval power or regulatory oversight over the proposed Project are considered "Responsible Agencies" (State CEQA Guidelines Section 15381). The EIR would provide environmental information to responsible, trustee, and other public agencies that may be required to grant approvals or coordinate with the City as a part of Project implementation. These agencies may include, but are not limited to:

- **State Water Resources Control Board.** For coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit.
- **Metropolitan Transportation Authority:** For construction within 100 feet of the Metro Rail Line

ATTACHMENT B:
EXPLANATION OF CHECKLIST DETERMINATIONS

1. AESTHETICS

Would the project:

a) Have a substantial adverse effect on a scenic vista?

Less Than Significant Impact. SB 743 (PRC §21099(d)) sets forth criteria for evaluating certain transit-oriented infill projects under CEQA, as follows: "Aesthetic and parking impacts of a residential, mixed-use residential, or employment center project on an infill site within a transit priority area shall not be considered significant impacts on the environment." The related City of Los Angeles Department of City Planning Zoning Information File ZI No. 2451 provides further instruction concerning the definition of transit priority projects and affirms that aesthetics need not be evaluated in environmental documentation prepared in accordance with CEQA for these projects. Since the Project qualifies as [a residential] [a mixed use residential] [an employment center] project on an infill site within a transit priority area, its potential aesthetic effects need not be studied in the Draft EIR.

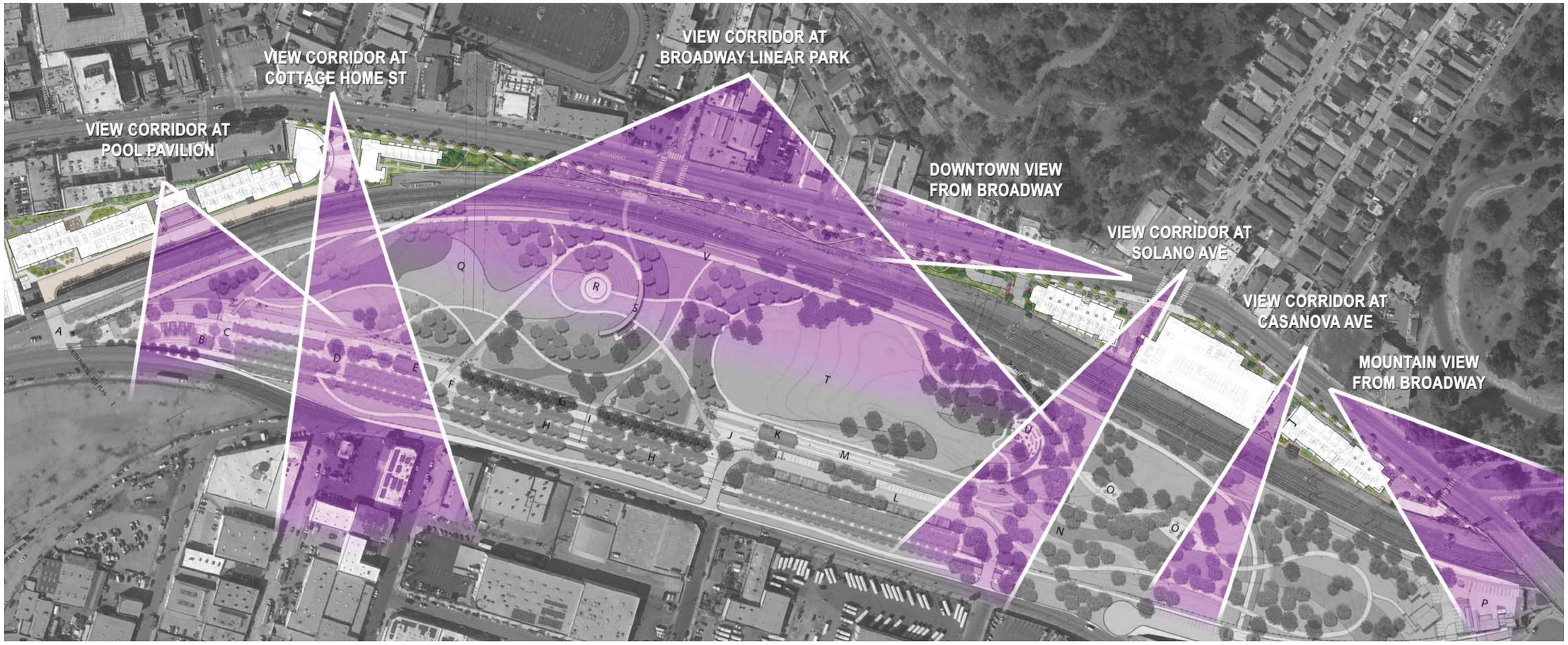
For additional context related to this threshold, the Project site is located in a highly urbanized area northeast of Chinatown and Downtown Los Angeles. It is adjacent to the Los Angeles State Historic Park and the Metro Gold Line tracks on its southeastern border, with commercial and multi-family residential uses and Radio Hill Gardens located on the northern and western sides of the Project site. Existing uses of the Project site are limited to single-story industrial buildings and outdoor storage, staging areas for vehicles and equipment, and billboards.

The Project would remove existing structures and introduce mid- to high-level buildings, ranging from 2 to 14 stories. The Project development would be separated onto two parcels (i.e., North and South Parcels) with a linear park to connect the parcels, allowing for a wide view corridor between the Los Angeles State Historic Park to the southeast, and the Radio Hill Gardens and developed land uses to the northwest. As shown on Exhibit 7, View Corridor Diagram, the arrangement of the Project's buildings would allow for view corridors of the Los Angeles State Historic Park from the following locations: through the proposed pool pavilion, from Cottage Home Street; from the residences and pedestrians on North Broadway; from Solano Avenue; and from Casanova Avenue. The Project site is not located on a ridgeline, nor is it part of a designated scenic vista identified in local planning documents by the City of Los Angeles. As discussed above, in compliance with SB 743 and the City's Zoning Information File ZI No. 2451, no analysis of this issue will be provided in the Draft EIR.

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a city-designated scenic highway?

Less Than Significant Impact. The Project site is not located adjacent to an officially designated State Scenic Highway, although it is near the State-designated Arroyo Seco Historic Parkway located 0.12-mile northwest of the Project site (Caltrans 2011). The Project site is not readily visible from the nearest vantage point on the Arroyo Seco Historic Parkway due to distance, topography, and intervening structures.

The nearest City-designated Scenic Highway to the Project site is on Stadium Way, which stretches from the I-5 Freeway to the State Route 110 (SR-110) Freeway. This portion of Stadium Way, which winds through Elysian Park, is located approximately 0.12-mile northwest of the Project site and views toward



Source: Newman Garrison + Partners, 2017

View Corridors

Exhibit 7

Elysian Park Lofts Project

PSOMAS

(10/23/2017 MMD) R:\Projects\LPC Lincoln\3LPC010100\Graphics\ex_View_Corridors.pdf

D:\Projects\3LPC\010100\GRAPHICS\ex_View_Corridors_20171023.ai

the Project site are obscured due to existing buildings and distance. Additionally, the portion of the Project site that could be visible from Stadium Way (via views down Bishops Road) is the central portion of the Project site that would be landscaped with pedestrian paths and would have no buildings to obstruct views. As discussed above, in compliance with SB 743 and the City's Zoning Information File ZI No. 2451, no analysis of this issue will be provided in the Draft EIR.

c) Substantially degrade the existing visual character or quality of the site and its surroundings?

Less Than Significant Impact. The Project would replace existing asphalt paved/storage areas and low-rise industrial buildings with new mid- to high-level buildings, from 2 to 14 stories. The Project would introduce approximately 648,030 sf of floor area to the North Parcel and 513,770 sf to the South Parcel, consisting of various residential and commercial uses, parking and supporting recreational amenities. The Project would not degrade the existing visual character of the Project site; rather, it would be changed from a largely undeveloped industrial/storage site to an active, enhanced pedestrian environment with a mix of land uses that comprise a transit-oriented community. As discussed above, in compliance with SB 743 and the City's Zoning Information File ZI No. 2451, no analysis of this issue will be provided in the Draft EIR.

d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Less Than Significant Impact. The Project would introduce new light sources in the form of various outdoor lighting (building mounted fixtures, low intensity light-emitting diode [LED] luminaires, pedestrian poles, decorative lanterns, floor lamps, lighted bollards, recessed step lights, and accent lighting) at the ground floor plaza, outdoor dining areas, walkways, and lighted signs to promote visibility and security. All exterior lighting would be designed to meet minimum light levels for emergency egress and to comply with the requirements of the California Building Code (Title 24 of the California Code of Regulations) and the California Green Building Standards (CalGreen) Code. In addition, the Project would be required to comply with Chapter IX, Article 3, Section 93.0117 of the City of Los Angeles Municipal Code (LAMC), which applies to any exterior luminaire, multi-head luminaire, lamp holder, or sign light source. As discussed above, in compliance with SB 743 and the City's Zoning Information File ZI No. 2451, no analysis of this issue will be provided in the Draft EIR.

2. AGRICULTURE / FOREST

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.

Would the project:

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No Impact. The Project site does not support any agricultural uses or activities. It is currently developed with several buildings, parking lots, outdoor storage areas, staging areas, and disturbed/developed areas. Based on a review of the current (2016) Los Angeles County Important Farmland Map produced by the

California Department of Conservation's Farmland Mapping and Monitoring Program (FMMP), there is no land designated as Prime Farmland, Unique Farmland, Farmland of Statewide Importance, or Farmland of Local Importance on or near the Project site (FMMP 2017). Due to the predominance of urban development in the southern and central portions of Los Angeles County where the site is located, this area was not included in the FMMP mapping effort. As such, there are no designated farmlands in or near the Project site. Thus, no impact on Farmlands would occur with the Project. No further analysis of this issue will be provided in the Draft EIR.

b) Conflict with existing zoning for agricultural use, or a Williamson Act Contract?

No Impact. Refer to Threshold 2(a) above. The Project site is zoned MR2-1 (Restricted Light Industrial), and there is no Williamson Act contract on the site or on areas near the site. Thus, no impact on existing zoning for agricultural use or a Williamson Act Contract would occur with the Project. No further analysis of this issue will be provided in the Draft EIR.

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code § 12220 (g)), timberland (as defined in Public Resources Code § 4526), or timberland zoned Timberland Production (as defined in Government Code § 51104(g))?

No Impact. There are no forests on or near the Project site (USFS 2017). The Project site is not zoned as forest land as defined by Section 1220(g) of the *California Public Resources Code;* as timberland as defined by Section 4526 of the *California Public Resources Code;* or as timberland zoned for timberland production as defined by Section 51104(g) of the *California Public Resources Code.* The existing zoning for the Project site is MR2-1, Restricted Light Industrial. The proposed Project would not cause the rezoning of forest land, timberland, or timberland zoned for timberland production. No impact on forest land or timberland would occur with the Project. No further analysis of this issue will be provided in the Draft EIR.

d) Result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. Refer to Threshold 2(c) above. There is no forest land on or near the Project site that may be affected by the Project. No further analysis of this issue will be provided in the Draft EIR.

e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

No Impact. Refer to Threshold 2(c) above. The Project would not convert farmland or forestland to other uses. No further analysis of this issue will be provided in the Draft EIR.

3. AIR QUALITY

Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations.

Would the project:

a) Conflict with or obstruct implementation of the Air Quality Management Plan or Congestion Management Plan?

Potentially Significant Impact. The Project would generate short-term, construction-related and long-term operational air pollutant emissions that have the potential to affect local and regional air quality. Further evaluation in the Draft EIR would determine whether this Project would conflict with the South Coast Air

Quality Management District's (SCAQMD's) 2016 Air Quality Management Plan and the Congestion Management Program administered by the Los Angeles County Metropolitan Transportation Authority (Metro). These potential impacts will be analyzed further in the Draft EIR.

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Potentially Significant Impact. The Project would generate pollutant emissions during short-term construction and long-term operation and occupancy. An air quality analysis will be conducted to determine whether the mobile and stationary air pollutant emissions associated with the Project would violate any air quality standard or contribute substantially to an existing or projected air quality violation. These potential impacts will be analyzed further in the Draft EIR.

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the air basin is nonattainment (ozone, PM10, PM2.5) under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

Potentially Significant Impact. Refer to Threshold 3(b) above. The Project, along with several other developments planned or proposed near the Project site, could cause a considerable cumulative net increase of a criteria pollutant for which the South Coast Air Basin (SoCAB) is in non-attainment. These potential impacts will be analyzed further in the Draft EIR.

d) Expose sensitive receptors to substantial pollutant concentrations?

Potentially Significant Impact. There are parks located near the Project site as well as residences and a school west of the Project site that would be considered sensitive receptors. The air quality analysis will determine whether the potential mobile and stationary air emissions associated with the Project could result in exposure of sensitive receptors to significant concentrations of air pollutants. The nearest sensitive receptors (residential properties and a high school located across North Broadway from the Project site, and receptors at the Los Angeles State Historic Park, Elysian Park, and Radio Hill Gardens) could be exposed to substantial pollutant concentrations.

Additionally, the Project site is within 1,000 feet of the SR-110 (Arroyo Parkway Boulevard) and therefore requires the preparation of a site-specific health risk assessment (HRA). The HRA would identify air quality levels at Project site based upon variables such as location, distance to the freeway, and prevailing wind patterns. The HRA would disclose potential health risks to future residents or occupants that may result from the Project, and offer best practices to improve health outcomes. These potential impacts will be analyzed further in the Draft EIR.

e) Create objectionable odors affecting a substantial number of people?

Less Than Significant Impact. The proposed commercial and residential land uses are not expected to create unusual or objectionable odors. No odor-generating land uses (e.g. industrial, solid waste, wastewater treatment) are proposed. Some odors may be associated with the operation of diesel engines during construction activities. However, these odors are typical of urbanized environments and would be subject to construction and air quality regulations, including proper maintenance of machinery, in order to minimize engine emissions. These emissions are also of short duration, and odors would quickly disperse into the atmosphere. Proposed residential uses would not generate objectionable odors. Future on-site commercial uses that may emit odors (from proposed restaurants) are required to secure appropriate permits from the SCAQMD to reduce off-site odors. Compliance with SCAQMD rules and permit requirements would ensure that no objectionable odors would be created by the Project; therefore, the Project would not create

objectionable odors affecting a substantial number of people. No further analysis of this issue will be provided in the Draft EIR.

4. BIOLOGICAL RESOURCES

Would the project:

a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

No Impact. The Project site is located in an urbanized area of the City of Los Angeles, and is currently developed with several buildings, parking lots, outdoor storage areas, staging areas, and disturbed/developed areas. Existing annual grasses, shrubs, and trees would be removed during Project construction. However, due to the urbanized and disturbed nature of the Project site, the site does not support habitat for candidate, sensitive, or special status species in local or regional plans, policies, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service (USFWS). Thus, no impact on sensitive species would occur with the Project. No further analysis of this issue will be provided in the Draft EIR.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

No Impact. As discussed above in Threshold 4(a), the Project site is located in a highly urbanized area of Los Angeles. Review of aerial photographs by qualified biologists shows that there are no natural drainage streams or open channels on the Project site. The Project is northwest of the Los Angeles River, which the USFWS has identified as wetland habitat. However, there are no riparian or other sensitive natural vegetation communities located on the Project site. Therefore, implementation of the Project would not result in a substantial adverse impact to riparian habitat or other sensitive natural communities, and no impact would occur. No further analysis of this issue will be provided in the Draft EIR.

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

No Impact. As discussed above in Threshold 4(a), the Project site is in a highly urbanized area of Los Angeles. There are no jurisdictional waterways located on the Project site. No impacts to wetlands would result from Project implementation. No further analysis of this issue will be provided in the Draft EIR.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Less Than Significant Impact. Wildlife corridors and habitat linkages are features that promote habitat connectivity and are generally characterized as undisturbed canyon and riverine stream habitat areas. The Project site does not serve as a key wildlife movement corridor due to its disturbed and developed nature and the presence of roads, railroad tracks, and urban development around the Project site.

The Migratory Bird Treaty Act (MBTA) prohibits activities that result in the direct take (defined as killing or possession) of a migratory bird. Additionally, Sections 3503 and 3503.5 of the *California Fish and Game Code* make it unlawful to take, possess, or destroy the nests and eggs of birds of prey. Section 3513 of the

California Fish and Game Code duplicates the federal protection of migratory birds and prohibits the taking and possession of any migratory non-game bird, as designated in the MBTA. The Project would be required to comply with the MBTA by preventing the disturbance of nesting birds during Project construction activities. This would generally involve clearing the Project site of all vegetation outside the nesting season, or if construction would commence within the nesting season, conducting a pre-construction nesting bird survey to determine the presence of nesting birds or active nests at the Project site. Any active nests and nesting birds must be protected from disturbance by construction activities through buffers between nest sites and construction activities. The buffer areas may be removed only after the birds have fledged.

The Project site is developed with several buildings, and the Project site is enclosed by several fences, with the Metro Gold Line tracks located adjacent and parallel to the southeastern Project boundary. North Broadway, a major arterial in the City, is located to the northwest. The developed and disturbed character of the Project site and associated fencing impedes wildlife movement through the Project site. Wildlife at Elysian Park and Radio Hill Gardens do not have opportunities to use the Project site for wildlife movement due to the presence of North Broadway between the Project site and these parks. Also, there are no on-site drainages or ponds that may serve as habitat for migratory fish species. Due to the presence of physical barriers at the Project site, the Project would not affect the movement of any native resident or land-based wildlife species, nor would it affect established native resident or migratory wildlife corridors. The Project would not have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means. Therefore, the Project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. No further analysis of this issue will be provided in the Draft EIR.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

No Impact. As part of the Project, existing vegetation, including trees, would be removed; however, the existing trees are not protected by the City. As indicated in Appendix A, Tree Report, there are 20 trees on the site with a diameter at breast height of 8 inches or greater. These included 18 Canary Island date palm (*Phoenix canariensis*) trees, 1 Mexican fan palm (*Washingtonia robusta*), and 1 desert fan palm (*Washingtonia filifera*) tree. The Canary Island date palm trees are located at the northeastern section of the site, clustered together at the northern end except for one tree, and the Mexican fan palm and Desert fan palm trees are located at the southwestern section, generally north of Cottage Home Street. These trees are not protected under the City of Los Angeles Native Tree Protection Ordinance; this ordinance protects oak trees (*Quercus* sp.) that are indigenous to California, but excludes the scrub oak (*Quercus dumosa*), as well as the Southern California black walnut (*Juglans californica* var. *californica*); western sycamore (*Platanus racemosa*); and California bay laurel (*Umbellularia californica*) trees with a diameter at breast height of four inches or greater (The Tree Resource 2016).

The 20 existing non-protected significant trees on the Project site would be removed as part of the construction of the Project. As proposed, the Project would add approximately 264 trees to the Project site. Therefore, the Project would not conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. No further analysis of this issue will be provided in the Draft EIR.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

No Impact. The Project site is located in a highly urbanized area of Los Angeles, and there is no adopted Habitat Conservation Plan or Natural Community Conservation Plan for the site or the surrounding area.

No conflict with a Habitat Conservation Plan or Natural Community Conservation Plan would occur with the Project. No further analysis of this issue will be provided in the Draft EIR.

5. CULTURAL RESOURCES

Would the project:

a) Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines § 15064.5?

Potentially Significant Impact. There are buildings on the Project site that may be over 50 years old and therefore may the potential to be historically significant. All on-site buildings would be demolished as a part of the Project. The historic alignment of the Zanja Madre, which was an aqueduct that connected early residents to water from the Los Angeles River for drinking, washing, cooking, and irrigation, is in the vicinity of the Project site. Additionally, the Project site is within the boundaries of the Historic Cultural Monument No. 82. The Project site is adjacent to the Los Angeles State Historic Park and within the Chinatown neighborhood, which contains important cultural resources. A historic resource evaluation will be conducted as part of the Draft EIR to evaluate the significance of existing buildings and to assess the direct and indirect impacts to historic resources, if present, resulting from implementation of the Project. These potential impacts will be analyzed further in the Draft EIR.

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines § 15064.5?

Potentially Significant Impact. The Project site is a developed area and has been previously graded and disturbed. Thus, no surface archaeological resources are expected to be present. However, excavation into underlying native soils (i.e., non-artificial geologic materials) through trenching, excavation, and grading for subterranean parking levels has the potential to encounter unknown archaeological and/or paleontological resources. A cultural resources study will be conducted as part of the Draft EIR to determine whether the Project site has potential to contain archaeological and paleontological resources. These potential impacts will be analyzed further in the Draft EIR.

c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Potentially Significant Impact. The Project site is a developed area and has been subject to previous excavation activities for existing structures and site improvements. However, excavation into underlying native soils (i.e., non-artificial geologic materials) through trenching, excavation, and grading for three subterranean parking levels has the potential to encounter unknown paleontological resources. A cultural resources study will be conducted as part of the Draft EIR to determine whether the Project site has potential to contain paleontological resources. These potential impacts will be analyzed further in the Draft EIR.

d) Disturb any human remains, including those interred outside of formal cemeteries?

Less than Significant Impact. As stated in response to Thresholds 5(a)–5(c), the Project site is developed with several structures and paved areas and has been previously disturbed. The Project site is not known to have been utilized for religious or sacred purposes or as a burial area. If human remains are uncovered during excavation activities, the contractor would need to comply with Section 7050.5 of the *California Health and Safety Code* and Section 5097.98 of the *California Public Resources Code* on the proper identification, treatment, and disposition of the remains. This includes notification of the County Coroner within 24 hours of the discovery; protection of the discovery site from further disturbance; County Coroner notification of the Native American Heritage Commission (NAHC) if the remains are believed to be Native American; NAHC notification of the persons to be the most likely descendant (MLD) of the deceased

Native American; and MLD inspection and recommendation on the disposition of the human remains, which may include scientific removal and non-destructive analysis of the human remains and any items associated with Native American burials or reburial of the remains with appropriate dignity on the property in a location that will not be subject to further subsurface disturbance. Therefore, the Project would not have a significant potential to disturb any human remains, including those interred outside of formal cemeteries. No further analysis of this issue will be provided in the Draft EIR.

6. GEOLOGY AND SOILS

Would the project:

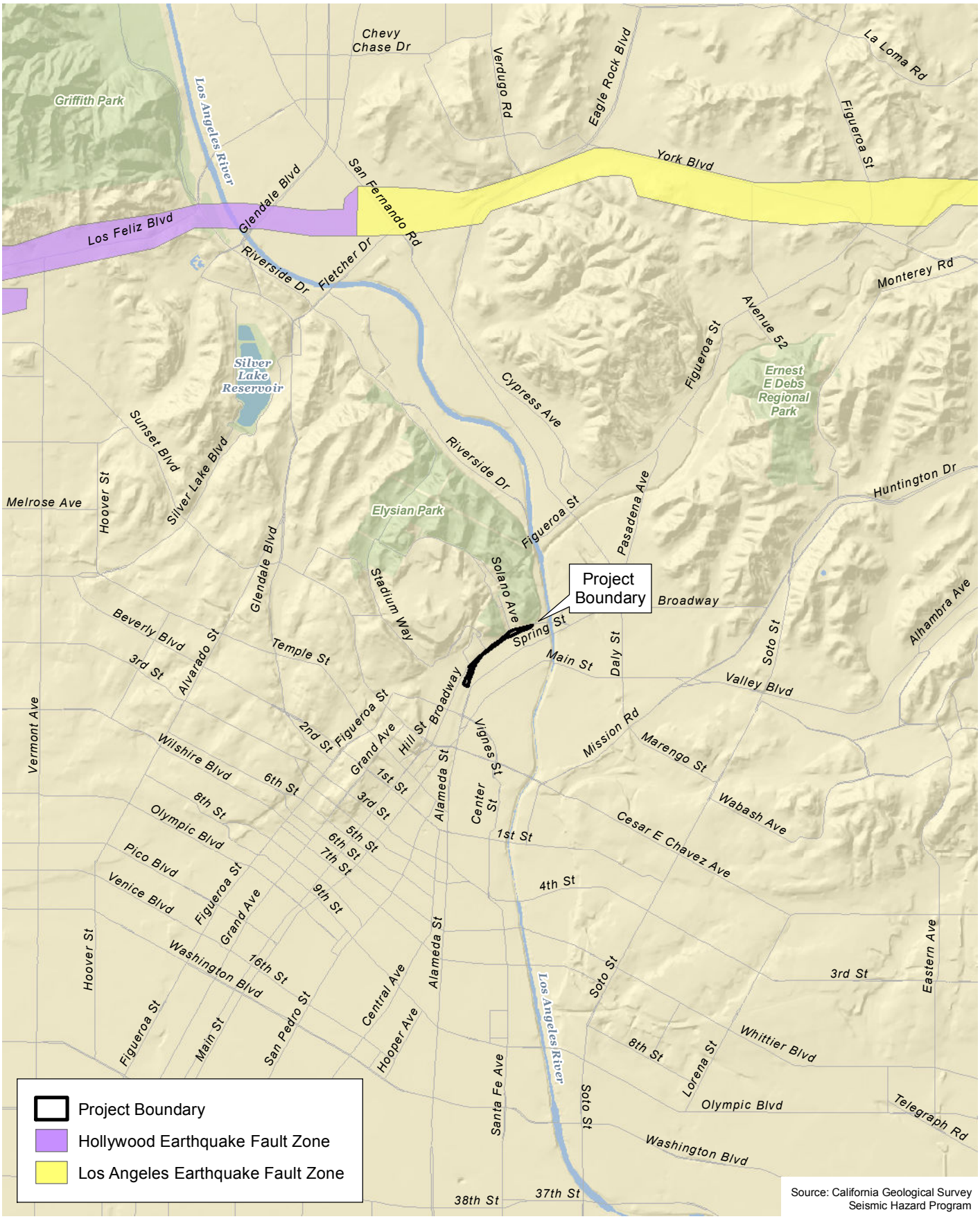
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault, caused in whole or in part by the project's exacerbation of the existing environmental conditions? Refer to Division of Mines and Geology Special Publication 42.

Less than Significant Impact. There is no active or potentially active earthquake fault on the Project site or that extends into the Project site. The Project site is also not located within a designated Alquist-Priolo Fault Zone. The closest Alquist-Priolo Fault Zone is along the Hollywood Fault, approximately 3.48 miles north of the Project site, as shown on Exhibit 8, Alquist-Priolo Fault Zones. The Geotechnical Engineering Investigation prepared by Geotechnologies, Inc. for the Project site, included as Appendix B of this Initial Study, states that there may be two unnamed faults cutting across the Project site; however, their locations are doubtful, other geological maps do not show these faults, and the soil borings taken on-site do not indicate evidence of faulting (Geotechnologies 2015). Therefore, the potential for fault rupture on the Project site is considered low. Nevertheless, these potential impacts will be analyzed further in the Draft EIR.

ii) Strong seismic ground shaking caused in whole or in part by the project's exacerbation of the existing environmental conditions?

Less than Significant Impact. The primary seismic hazard on the Project site, as with all of Southern California, is ground shaking due to the presence of major active faults. Increases in the on-site population due to the proposed development of residential and non-residential uses could result in the increased exposure of persons and property to ground shaking hazards at the Project site. However, the design, construction, quality of materials, use and occupancy, location, and maintenance of all buildings and structures erected or to be erected within the City must comply with Chapter IX, Building Regulations, of the City of Los Angeles Municipal Code. Compliance with the City's Building Code would ensure the structural stability of the proposed Project. This would require design and construction of proposed structures and infrastructure to account for ground shaking hazards; through adherence to the seismic design criteria in the California Building Code; and with incorporation of the recommendations in the geotechnical report prepared for the Project. Thus, impacts related to ground shaking would be considered less than significant. Nevertheless, these potential impacts will be analyzed further in the Draft EIR.



Source: California Geological Survey
Seismic Hazard Program

D:\Projects\3LPC\010100\MXD\ex_FaultZones_20171023.mxd

Alquist-Priolo Fault Zones

Exhibit 8

Elysian Park Lofts Project

N W E S

1 0.5 0 1 Miles

PSOMAS

(Rev: 10-23-2017 MMD) R:\Projects\LPC Lincoln\3LPC010100\Graphics\ex_FaultZones.pdf

iii) Seismic-related ground failure, including liquefaction, caused in whole or in part by the project's exacerbation of the existing environmental conditions?

Potentially Significant Impact. Liquefaction refers to a process by which water-saturated granular soils transform from a solid to a liquid state during strong ground shaking. Liquefaction usually occurs during or shortly after a large earthquake. The movement of saturated soils during seismic events from ground shaking can result in soil instability and possible structural damage. Groundwater levels at the Project site were historically 20 feet below grade (Geotechnologies 2015). These potential impacts will be analyzed further in the Draft EIR.

iv) Landslides, caused in whole or in part by the project's exacerbation of the existing environmental conditions?

Less than Significant Impact. The Project site is not located adjacent to a mapped landslide. On-site elevations at the South Parcel range from 330 feet above mean sea level (msl) on North Broadway to 291 feet above msl at the Metro Gold Line tracks. On-site elevations at the North Parcel range from 348 feet above msl on North Broadway to 301 feet above msl at the Metro Gold Line tracks. While there are slopes at the Project site, there was no indication of slope instability during the subsurface exploration of the Project site, as discussed in the Geotechnical Engineering Investigation. Also, the existing slopes in areas where buildings and subterranean parking levels are proposed would be removed as part of the Project. Therefore, no impact related to the potential for landslides would occur and the Project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides (Geotechnologies 2015). No further analysis of this issue will be provided in the Draft EIR.

b) Result in substantial soil erosion or the loss of topsoil?

Less Than Significant Impact. Grading and excavation activities associated with the proposed Project would result in the disruption of on-site soils and the exposure of uncovered soils to potential erosion due wind, rain, and surface water runoff during the construction phases. The Project would be required to implement erosion-control measures, in compliance with the applicable National Pollutant Discharge Elimination System (NPDES) Construction General Permit, issued by the State Water Resources Control Board (SWRCB), which requires preparation of a Storm Water Pollution Prevention Plan (SWPPP) and identification of Best Management Practices (BMPs) for temporary erosion control. This would reduce erosion during construction activities at the Project site. In addition, the Project would result in the creation of impervious surfaces over those currently existing on the Project site, which would reduce the potential for long-term erosion. Compliance with the requirements of the Construction General Permit would reduce impacts to less than significant levels. No further analysis of this issue will be provided in the Draft EIR.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse, caused in whole or in part by the project's exacerbation of the existing environmental conditions?

Potentially Significant Impact. The Project would be exposed to local geologic hazards, and proposed grading and excavation activities associated with the Project would change the local geology. The soil and geologic characteristics of the Project site will be discussed further in the Draft EIR and be based on the findings of the Geotechnical Engineering Investigation for the Project, which includes recommendations for preventing hazards associated with landslides, lateral spreading, subsidence, liquefaction and collapse. These potential impacts will be analyzed further in the Draft EIR.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property caused in whole or in part by the project's exacerbation of the existing environmental conditions?

Less Than Significant Impact. The Project's Geotechnical Engineering Investigation indicates that the on-site geological materials, which include alluvium and bedrock, are in the very low expansion index range. Thus, reinforcing beyond the minimum required by City Department of Building and Safety is not required (Geotechnologies 2015). Therefore, potential impacts related to hazards associated with expansive soils would be less than significant. No further analysis of this issue will be provided in the Draft EIR.

e) Have soils incapable of adequately supporting the use of on-site wastewater treatment systems where sewers are not available for the disposal of wastewater?

No Impact. The proposed Project would be connected to the municipal sewer system and does not propose the use of septic tanks or other on-site wastewater treatment systems. Therefore, there would be no impact related to soils incapable of adequately supporting the use of on-site wastewater treatment systems. No further analysis of this issue will be provided in the Draft EIR.

7. GREENHOUSE GAS EMISSIONS

Would the project:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Potentially Significant Impact. Construction and operation of the Project would generate greenhouse gas (GHG) emissions that have the potential to directly or indirectly have a significant impact on the environment. GHG emissions from the Project will be addressed and quantified in the Draft EIR to determine their significance. These potential impacts will be analyzed further in the Draft EIR.

b) Conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Potentially Significant Impact. The proposed Project would result in construction and operational activities that would generate GHGs. In addition, the Project would increase the resident population, households, and employees at the Project site. Project consistency with applicable plans, policies, and regulations related to the reduction of GHG emissions will be analyzed in the Draft EIR.

8. HAZARDS AND HAZARDOUS MATERIALS

Would the project:

a) Create a significant hazard to the public or the environment through the routine transport, storage, use, or disposal of hazardous materials?

Less than Significant Impact. Grading and construction activities would involve the transport, storage, use, and disposal of hazardous materials such as paint, solvents, oil, grease, and fuel for construction equipment. Hazardous materials used during construction would be handled, stored, transported, and disposed of according to applicable federal, State, and local health and safety requirements.

The proposed Project consists of residential and commercial uses, and these uses typically do not generate hazardous emissions, nor do they involve the routine use, transport, or disposal of hazardous materials in

quantities that may pose hazards to the public. Hazardous materials used on-site would consist of common commercial cleansers, solvents, paints, pesticides, fertilizers, and other maintenance and janitorial materials, and compliance with existing regulations on the use, storage, disposal and transport of these materials would minimize any hazards to the public, and impacts would be less than significant. Nevertheless, these potential impacts will be analyzed further in the Draft EIR.

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials or waste into the environment?

Potentially Significant Impact. The Project site is currently used for vehicle and equipment storage and as a construction staging/bus parking area. Existing hazardous materials at the Project site will be identified based on the findings of the Phase I Environmental Site Assessment (ESA), including the presence of asbestos and lead-based paint in existing structures and site improvements. The Project site has also been identified to have one plugged oil well on-site and one plugged oil well adjacent to the Project site (Geotechnologies 2015). In addition, the southern portion of the site is located within the City's designated Methane Zone and Methane Buffer Zone (Los Angeles 2004). Methane testing will be conducted to determine hazards that may be posed by methane to future residents, visitors, and employees at the Project site. The findings of the Phase I ESA regarding hazardous materials, oil wells, and methane levels will be discussed in the Draft EIR.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Less Than Significant Impact. Cathedral High School is located approximately 180 feet west of the Project site across North Broadway. During the Project's construction phases, the contractor is expected to comply with existing regulations, and there would be a limited risk of accidental release of hazardous emissions and hazardous materials (e.g., gasoline, oil, or other fluids) associated with the use and maintenance of construction equipment. Compliance with the applicable federal, state, and local regulations related to hazardous materials would reduce the risks to the nearby school from potential hazardous emissions or acutely hazardous materials to a less than significant level.

The long-term operation and occupancy of the proposed commercial and residential uses would involve the transport, use, storage, and disposal of various hazardous materials, such as paint, solvents, pesticides, fertilizers, and other maintenance and cleaning products. However, these hazardous materials would be in limited quantities and would be used, stored, disposed of, and transported in accordance with applicable federal, state, and local regulations. The Project would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing school. Nevertheless, these potential impacts will be analyzed further in the Draft EIR.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

Potentially Significant Impact. The Project site is currently used as a vehicle and equipment storage area and as a construction staging/bus parking area. Hazardous materials use from past or current land uses will be addressed in the Phase I ESA, and the findings of the Phase I ESA will be discussed in the Draft EIR. The Phase I ESA will include a review of government records and determination on the inclusion of the Project site in various government databases as a contaminated site, hazardous waste generator, or a site subject to clean-up activities. These potential impacts will be analyzed further in the Draft EIR.

e) For a project located within an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

No Impact. There is no public airport located within 2 miles of the Project site. The nearest airport to the Project site is the El Monte Airport, located approximately 10.8 miles northeast of the Project site. The Project site is outside the Airport Influence Area for this airport (ALUC 2004). The Project site is also outside the areas where Federal Aviation Administration (FAA) notification is required; the Project does not propose structures over 200 feet in height where rooftop lighting or markings are required (per the *Code of Federal Regulations*, Title 14, Part 77). No impacts related to airport hazards are anticipated with the Project. No further analysis of this issue will be provided in the Draft EIR.

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

No Impact. The Project Site is not located within the vicinity of a private airstrip. No impact would occur, and no mitigation measures are required. No further evaluation of this topic in an EIR is required.

g) Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan?

Less than Significant Impact. Construction activities may result in temporary lane obstruction along North Broadway during landscaping and sidewalk construction and during any cross-walk construction. Preparation of a Worksite Traffic Control Plan (LADOT) would be required, in compliance with the California Manual on Uniform Traffic Control Devices (MUTCD). Typical worksite traffic control requirements during construction may include, but not be limited to, appropriate traffic-control devices to ensure public safety; City approval for any lane or sidewalk closures; adequate signage and striping for lane closures; flaggers with stop/slow paddles to manage traffic; installation of signage for tow/away and no stopping zones; coordination with residences and businesses regarding driveway access; and maintenance of pedestrian access that is compliant with the Americans with Disabilities Act (ADA). Long-term operation and occupancy of the proposed Project would also increase the volume of traffic on local and regional roadway networks, which serve as emergency response and evacuation routes. However, the Project would be required to design, construct, and maintain structures, roadways, and facilities to provide adequate access in compliance with applicable local, regional, state, and/or federal requirements related to emergency access and evacuation plans. North Broadway is not a County-designated disaster route, and the Project site is not included as part of an adopted emergency response plan or emergency evacuation plan (DPW 2014). Therefore, impacts on emergency response and evacuation would be less than significant. No further analysis of this issue will be provided in the Draft EIR.

h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

No Impact. The Project site is not located within a designated Very High Fire Hazard Severity Zone (VHFHSZ) area, but Elysian Park and Radio Hill Gardens are each in a VHFHSZ, and these parks are located across North Broadway from the Project site (CalFire 2011). The Project site would be graded and developed with structures, which would require removal of on-site annual grasses that may serve as wildfire "fuel" sources. Also, North Broadway separates the Project site from wildfire hazards at Elysian Park and Radio Hill Gardens. Impacts related to wildland fires would be less than significant with Project compliance with applicable City fire codes and ordinances. No further analysis of this issue will be provided in the Draft EIR.

9. HYDROLOGY AND WATER QUALITY

Would the project:

a) Violate any water quality standards or waste discharge requirements?

Potentially Significant Impact. Demolition, grading, and excavation activities associated with construction of the proposed Project would result in the potential for pollutants to enter the stormwater. The requirements of the NPDES Construction General Permit for preparation of an SWPPP and identification of BMPs for temporary construction-phase BMPs that would be implemented by the Project to reduce stormwater pollutants will be addressed in the Draft EIR. In addition, long-term changes in storm-water quality would occur with the replacement of the vehicle and equipment storage and construction staging/bus parking areas with the proposed residential and commercial uses and parking areas. The Project would include permanent BMPs to reduce long-term storm-water pollution, in accordance with the Los Angeles County Municipal NPDES Permit and City requirements in accordance with the Low Impact Development Ordinance and for a Standard Urban Stormwater Management Plan (SUSMP). These potential impacts will be analyzed further in the Draft EIR.

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level which would not support existing land uses or planned land uses for which permits have been granted)?

Potentially Significant Impact. The Project site has two groundwater monitoring wells (associated with groundwater remediation activities at the former Union Pacific Railroad facility (Cornfield Yard) (Cardno 2015), but these wells would not be used to provide water to the Project and no groundwater well is proposed on-site. Also, the Project site is not used as a groundwater recharge area. The Project site would convert areas of currently unpaved pervious surfaces into paved/non-pervious surfaces, which would affect the amount of stormwater infiltration on the Project site. However, the Project would be required to comply with the City's Low Impact Development Ordinance, which requires on-site infiltration of stormwater flows. These potential impacts will be analyzed further in the Draft EIR.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

Less than Significant Impact. The Project would require the demolition of all on-site structures and the grading/excavation of soils to accommodate the subterranean parking and buildings, which would substantially alter the current Project site drainage patterns. During construction, the Project would be required to implement erosion-control measures in compliance with the applicable NPDES Construction General Permit.

In the long term, the Project would result in the creation of impervious surfaces over those currently existing on the Project site, which would reduce the potential for long-term erosion or siltation at off-site areas. There are several storm drain inlets at the Project site, and the Project area is served by underground storm drainage facilities that discharge into the concrete-lined Los Angeles River (located 0.1 to 0.5 mile east of the site) (Rand McNally 2003). The Project would not substantially alter the existing drainage patterns on the site or area in a manner that would result in the substantial erosion or siltation on-site and would not affect off-site streams or the adjacent Los Angeles River. Nevertheless, these potential impacts will be analyzed further in the Draft EIR.

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

Potentially Significant Impact. The Project would change drainage patterns on the Project site and would have the potential to increase runoff volumes and rates due to the increase in impervious surfaces at the Project site. Approximately 66.8 percent of the Project site would be covered with buildings, with another 15.4 percent paved and the remaining 17.8 percent landscaped. Stormwater runoff from the Project site would be directed into underground storm drain lines that connect to the Los Angeles River. Increases in the rate and/or amount of surface runoff have the potential to affect downstream properties. These potential impacts will be analyzed further in the Draft EIR.

e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

Potentially Significant Impact. The Project would change drainage patterns on the Project site and would be required to reduce pollutants entering the stormwater through construction-phase BMPs in accordance with the NPDES Construction General Permit and through permanent BMPs, in accordance with the Los Angeles County Municipal NPDES Permit and City requirements for SUSMP compliance. The capacity of existing storm drainage systems to accommodate runoff from the Project site, and the potential generation of stormwater pollutants by the Project could result in impacts to the stormwater drainage system. These potential impacts will be analyzed further in the Draft EIR.

f) Otherwise substantially degrade water quality?

Potentially Significant Impact. Refer to Thresholds 9(a) and 9(e) above. The Project would be connected to the existing storm drainage facilities that convey stormwater to the Los Angeles River. Stormwater pollutants from the Project site and the potential for degradation of stormwater quality in the Los Angeles River will be analyzed based on the findings of the hydrology and water quality studies that will be completed for the Project. These potential impacts will be analyzed further in the Draft EIR.

g) Place housing within a 100-year flood hazard area as mapped on federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

No Impact. The Project site is located outside the 100-year and 500-year floodplains, as designated by the Federal Emergency Management Agency (FEMA), although the adjacent Los Angeles River is within the 100-year floodplain (FEMA 2008). The Project would not place housing within the 100-year floodplain, and no impact would occur. No further analysis of this issue will be provided in the Draft EIR.

h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

No Impact. Refer to Threshold 9(g) above. The Project would not place any structures within the 100-year floodplain, and no impact would occur. No further analysis of this issue will be provided in the Draft EIR.

i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

No Impact. There are no levees or dams located near the Project site that may result in flooding at the Project site in the event of levee or dam failure. According to the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM) No. 06037C1628F, dated September 26, 2008, the Project Site is located within Zone X, which depicts areas determined to be outside the 0.2 percent (500-year) annual chance floodplain. The Project would not expose people or structures to a significant risk of

loss, injury, or death involving flooding as a result of the failure of a levee or dam. No further analysis of this issue will be provided in the Draft EIR.

j) Inundation by seiche, tsunami, or mudflow?

No Impact. There are no large bodies of water located near the Project site that may lead to flooding at the site in the event of a seiche. The Project site is located approximately 14.5 miles inland from the Pacific Ocean and would not be affected by a tsunami (sea wave) and is not located within a designated tsunami hazard area (City of Los Angeles 1996). While the site is sloped, there was no indication of slope instability during the subsurface exploration of the Project site, as discussed in the Geotechnical Engineering Investigation (Geotechnologies 2015). Also, the existing slopes in areas where buildings and subterranean parking levels are proposed would be excavated as part of the Project, and other areas would be landscaped. Therefore, no impacts related to inundation by seiche, tsunami, or mudflow would occur. No further analysis of this issue will be provided in the Draft EIR.

10. LAND USE AND PLANNING

Would the project:

a) Physically divide an established community?

No Impact. The Project site is located in a highly urbanized area characterized by a mix of land uses. The Project site runs adjacent to an existing commercial corridor along North Broadway and separates existing commercial and residential uses from the Gold Line tracks. The Project would serve to foster the growth of the existing community by converting property designated as Light Industrial to Regional Commercial. The Project is proposing a mix of residential and neighborhood-serving retail uses, which would serve as a point of commerce and activity in the community and be consistent with the General Plan's Regional Center designation. Adjacent and nearby properties are also designated Regional Commercial. In addition to increasing housing and retail opportunities, the Project includes a landscape, lighting and pedestrian circulation plan that would activate the extended frontage of the Project Site along Broadway and adjacent to the Chinatown Gold Line station. Furthermore, the Project is providing publicly accessible open space. Therefore, the Project would not physically divide Chinatown or other established communities. No further analysis of this issue will be provided in the Draft EIR.

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

Potentially Significant Impact. The Project requires a General Plan amendment, zone change, and height district change. The Draft EIR will discuss the proposed General Plan amendment, zone change, and height district change, and address Project consistency with the goals, objectives, and policies of the City's General Plan, Central City North Community Plan, Zoning Code, and other applicable land use policies and programs. Further analysis of this issue will be provided in the Draft EIR to demonstrate the proposed Project's consistency with the City's land use plans and programs.

c) Conflict with any applicable habitat conservation plan or natural community conservation plan?

No Impact. The Project site is located in a highly urbanized area of Los Angeles, and there is no adopted Habitat Conservation Plan for the Project site or the surrounding area. No conflict with a Habitat Conservation Plan or Natural Community Conservation Plan would occur with the Project. No further analysis of this issue will be provided in the Draft EIR.

11. MINERAL RESOURCES

Would the project:

a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

Less than Significant Impact. The California Department of Conservation's Information Warehouse: Mineral Land Classification map and associated Surface Mining and Reclamation Act (SMARA) report show that the Project site is partially located within MRZ-2, which is an area where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists (CDMG 1979). This designation is related to the Project site's location near the Los Angeles River, which is designated as MRZ-2 near the Project site. However, the Los Angeles River, east of the Project site, is concrete-lined, and there are no mineral extraction activities on or near the River or the Project site. Also, there are no large undeveloped areas along the River that may be subject to future mineral extraction activities.

According to the City's Safety Element of the General Plan, the Project site is adjacent to the Los Angeles City Oil Field. According to the State of California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR), the Project site contains one plugged/abandoned oil well in the North Parcel (i.e. Ventura Oil Company, API #03716588), which is not within the Los Angeles City Oil Field. The well was never a producing well, was considered to be a "dry hole," and was abandoned in 1958 (DOGGR 2017). A second well located adjacent to the South Parcel (i.e. McKenzie, API #03716580) is also listed as plugged/abandoned and has no available records of any history of production or injection (DOGGR 2017). The Project site was not a contributing component of the Los Angeles Oil Field, either historically or currently, and does not contribute to the availability of known mineral resources. The wells identified by DOGGR that are near the South Parcel of the Project site are either identified as plugged or buried, and are located beneath developed and occupied land uses to the west of North Broadway. Therefore, the Project would not lead to the loss of regionally significant mineral resources. No further analysis of this issue will be provided in the Draft EIR.

b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

Less than Significant Impact. Refer to Threshold 11(a) above. The Project site is located near the Los Angeles Oil Field, which is generally located west of the Project site. However, the wells within the Los Angeles Oil Field in the vicinity of the Project site are not in active production. Thus, the Project would not result in the loss of locally important mineral resources, as associated with aggregate materials on and near the Los Angeles River, or oil and gas resources associated with the Los Angeles Oil Field. No further analysis of this issue will be provided in the Draft EIR.

12. NOISE

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Potentially Significant Impact. Noise from the proposed Project would occur during short-term construction associated with on-site heavy equipment and excavation of soils required for the subterranean parking. Noise would also be generated by the long-term occupancy and operation of the Project. A noise analysis will be prepared to address potential noise impacts from the Project, and compliance with the City's noise standards in the Los Angeles General Plan and the noise regulations in Chapter XI of the Los Angeles Municipal Code. These potential impacts will be analyzed further in the Draft EIR.

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Potentially Significant Impact. The proposed Project would generate noise during construction due to construction vehicular traffic, demolition, excavation, grading, and building construction. Short-term noise levels would likely be higher than existing ambient noise levels in the Project area but would cease upon completion of construction. Construction noise impacts may exceed standards set forth in the City's Noise Ordinance, and construction activities (e.g., demolition and excavation activities) may also result in vibration impacts. Long-term operation of residential and commercial land uses that are proposed on the Project site may increase the ambient noise levels above existing conditions due to stationary equipment and on-site activities. Long-term noise impacts would also occur associated with increased traffic on nearby roadways. These potential impacts will be analyzed further in the Draft EIR.

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Potentially Significant Impact. As discussed previously under Threshold 12(a), long-term operation and occupancy of residential and commercial land uses proposed at the Project site could increase the ambient noise levels above existing conditions due to the introduction of stationary noise sources and activities on the Project site and the associated increase in traffic volumes on local roadways. The Project would increase the potential for long-term and permanent increases in noise levels on and near the Project site. These potential impacts will be analyzed further in the Draft EIR.

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Potentially Significant Impact. Refer to Threshold 12(b) above. Increases in noise levels at the Project site during demolition, excavation, grading, and building construction activities at the Project site will be addressed in the Draft EIR.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. The El Monte Airport is the nearest airport to the Project site, located approximately 10.8 miles northeast of the Project site. The Project site is not located within an airport land use plan or within 2 miles of an airport. Therefore, the Project would not be exposed to excessive noise levels from airport operations. No further analysis of this issue will be provided in the Draft EIR.

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. There are no airstrips located on or near the Project site. Therefore, the Project would not be exposed to excessive noise levels from private airstrip operations. No further analysis of this issue will be provided in the Draft EIR.

13. POPULATION AND HOUSING

Would the project:

a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

Potentially Significant Impact. The proposed Project would introduce approximately 920 dwelling units and 17,941 sf of neighborhood-serving retail uses that would lead to an increase in resident population and in visitors/patrons and employees at the proposed commercial uses and common areas (e.g., leasing office, recreational facilities, public plaza, and parking areas). The increase in residents and employees on the Project site is anticipated to spur development along North Broadway and in the Chinatown area. These potential impacts will be analyzed further in the Draft EIR.

b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

No Impact. The Project site is not currently developed with housing units. Development of the proposed Project would not result in the displacement of any existing housing and would not necessitate a need for the construction of replacement housing elsewhere. No impacts associated with the displacement of existing housing units would occur with the Project. No further analysis of this issue will be provided in the Draft EIR.

c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

No Impact. Refer to Threshold 14(b) above. There are no residents on the Project site who would be displaced by the Project. Because there would be no displacement of people, the construction of replacement housing would not be required. No further analysis of this issue will be provided in the Draft EIR.

14. PUBLIC SERVICES

a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

Fire protection?

Potentially Significant Impact. Fire protection services are provided to the Project site by the City of Los Angeles Fire Department. The Project site is served by Fire Station 1, located at 2230 Pasadena Avenue, approximately 0.6-mile west of the Project site. With development of the Project introducing various multi-story commercial and residential uses, there would be an associated increase in demand for fire protection services. These potential impacts will be analyzed further in the Draft EIR.

Police protection?

Potentially Significant Impact. Police protection services are provided to the Project site by the Los Angeles Police Department. The Project site is within the service area of the Central Community Police

Station located at 251 E. 6th Street, approximately 0.75-mile southwest of the Project site. With the introduction of various commercial and residential uses on-site and the increase in the number of people (e.g., residents, employees, visitors, patrons) who would be at the Project site, there would be an increased potential for crime and accidents, resulting in an increase in demand for police protection and law enforcement services. These potential impacts will be analyzed further in the Draft EIR.

Schools?

Potentially Significant Impact. The occupancy of the approximately 920 dwelling units would lead to up to 920 households with school-aged children at the Project site. These children would require school services from the Los Angeles Unified School District (LAUSD). An estimate of the number of children that would require school services will be provided in the Draft EIR, based on student generation factors from the LAUSD. Impacts of Project residents on school services and facilities will be based on consultation with the LAUSD. These potential impacts will be analyzed further in the Draft EIR.

Parks?

Potentially Significant Impact. Residents of the approximately 920 dwelling units that would be built on the Project site would create a demand for parks and recreational facilities and services. On-site recreational facilities would be provided in the form of swimming pools, a community center, indoor lounges, roof decks, and recreational facilities. Residents are also likely to visit the Los Angeles State Historic Park to the southeast of the Project site, Elysian Park to the north, and the Radio Hill Gardens to the northwest. Increased demand on neighborhood and regional parks and recreational facilities may occur. These potential impacts will be analyzed further in the Draft EIR.

Other public facilities?

Potentially Significant Impact. The introduction of residential and commercial uses on the Project site and its associated residents, visitors, patrons and employees would generate a demand for library services and other governmental services, including roads. These potential impacts will be analyzed further in the Draft EIR.

15. RECREATION

a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

Potentially Significant Impact. As discussed above under Threshold 14(a) Parks, the proposed Project would introduce new residents to the Project site, who would generate a demand for parks and recreational facilities. Impacts to neighborhood and regional parks will be addressed in the Draft EIR.

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

Potentially Significant Impact. As discussed under Threshold 14(a) Parks, the proposed Project would include swimming pools, a community center, indoor lounges, recreational facilities, and rooftop decks. These facilities would be located within the development footprint assumed for the Project. Therefore, any physical effects associated with construction of these facilities would be evaluated throughout the Draft EIR. These potential impacts will be analyzed further in the Draft EIR.

16. TRANSPORTATION/TRAFFIC

Would the project:

a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

Potentially Significant Impact. The proposed Project would increase the volumes of traffic on local roads and regional freeways and would increase the number of daily and peak hour vehicle trips to, from, and within the Project site in comparison to current levels. These increases would occur during short-term construction and long-term operation. The Project also includes improvements on North Broadway, including the dedication of a three-foot-wide strip along the Project site for a widened sidewalk/parkway area and a crosswalk at the northern end of the Project site. A Traffic Study will be prepared for the Project to determine the potential traffic impacts (including compliance with level of service standards established for designated roads and highways in the vicinity of the Project site), as compared to current traffic conditions. The Project has the potential to conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system. These potential impacts will be analyzed further in the Draft EIR

b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

Potentially Significant Impact. Refer to Threshold 16(a) above. I-110, U.S. 101, and I-5 are in the Los Angeles County Congestion Management Program's Highway and Roadway System. Impacts on these freeways will be addressed in the Traffic Study for the Project. These potential impacts will be analyzed further in the Draft EIR.

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

No Impact. The Project would not create a direct demand for air transportation, nor would it have an impact on air traffic patterns at regional airports. No airports are located in the immediate Project area, with the nearest airport being the El Monte Airport, located approximately 10.8 miles northeast of the Project site. Indirect air traffic demands would be accommodated by Los Angeles International Airport and other airports in the region. No substantial safety risks related to airports would be created with the Project. No further analysis of this issue will be provided in the Draft EIR.

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Less Than Significant Impact. As discussed previously, the proposed Project would involve widening of North Broadway and the creation of new driveways on North Broadway. The proposed roadway and driveway improvements would be constructed in accordance with City standards for minimum widths and curves, sight distance, clearances, and other factors and would be subject to review and approval by the City's Departments of Building and Safety and Public Works. The Project does not propose any roadway or bridge construction or realignment, or otherwise alter existing roadway structures that could involve incompatible uses. Therefore, impacts related to traffic hazards would be less than significant. No further analysis of this issue will be provided in the Draft EIR.

e) Result in inadequate emergency access?

Less Than Significant Impact. The Project would require new site access points and driveways, and would require adequate parking garage access and at-grade access for emergency vehicles. As discussed previously under Threshold 16(d), roadway and driveway improvements would be subject to review and approval by the City's Departments of Building and Safety and Public Works. Access by emergency vehicles and evacuation routes would also be reviewed by the City's Fire Department. The proposed Project would be developed in compliance with the Fire Department's emergency access requirements. The Project would not result in inadequate emergency access. Nevertheless, these potential impacts will be analyzed further in the Draft EIR.

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

Potentially Significant Impact. The Project would include commercial retail uses, a linear park, public plazas, walkways, and vista points on the Project site that would attract visitors and patrons to the area. These facilities are expected to serve future on-site residents, visitors, patrons and employees, as well as existing and future residents, visitors, patrons and employees of the Chinatown neighborhood. The Project also proposes the widening of the sidewalk along Broadway and the provision of a cross walk at the northern end of the Project site. As such, the Project would augment opportunities for public transit use and for bicycle/pedestrian access to the Project site and surrounding areas. Although impacts are anticipated to be beneficial and the Project to be consistent with adopted policies, plans and programs regarding public transit, bicycle and pedestrian facilities, the Project's potential impacts will be analyzed further in the Draft EIR.

17. TRIBAL CULTURAL RESOURCES

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or

Potentially Significant Impact. The findings of the cultural resources study and historic resource evaluation that will be completed for the Project, as they may relate to local tribes and tribal resources will be summarized in the Draft EIR. The City will also consult with local tribes in accordance with Assembly Bill (AB) 52 to determine if anything on the Project site can be considered a tribal cultural resource that is eligible for listing in the California Register of Historical Resources or the City's Register of Historical Resources. The results of the consultation process will be summarized into the Draft EIR to evaluate direct and indirect impacts on tribal cultural resources. These potential impacts will be analyzed further in the Draft EIR.

b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Potentially Significant Impact. See Threshold 17(a) above. The findings of the cultural resources study and the results of the SB 18 and AB 52 consultation process will determine impacts to significant tribal cultural resources. These potential impacts will be analyzed further in the Draft EIR.

18. UTILITIES AND SERVICE SYSTEMS

Would the project:

a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

Less Than Significant Impact. The City of Los Angeles Department of Public Works provides sewage/wastewater collection and treatment services in the City, including the Project site. Wastewater generated by the Project would be conveyed and treated at the Hyperion Treatment Plant in El Segundo. The Project would increase wastewater generation from the Project site, and this wastewater would be similar in quality as those generated by multi-family residential and neighborhood retail and restaurant uses located near the site and in other areas of the City. The wastewater generated by the Project is not likely to require treatment that is not currently provided to existing wastewater flows in the Hyperion Treatment Plant or that exceeds the requirements of the Los Angeles Regional Water Quality Control Board. Nevertheless, these potential impacts will be analyzed further in the Draft EIR.

b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

Potentially Significant Impact. The proposed Project is anticipated to increase the demand for water and increase the generation of wastewater from the site. The capacity of the existing water lines serving the site and the water system of the Los Angeles Department of Water and Power will be discussed in the Draft EIR, based on the existing and proposed utility infrastructure plans and the Water Supply Assessment prepared for the Project. This will include the available capacity of the existing area water infrastructure, appropriate sizing of the proposed water distribution system, and any needed upgrades to off-site water lines and facilities. The capacity of the existing sewer lines serving the site and the sewer system of the Los Angeles Bureau of Sanitation will be discussed in the Draft EIR, based on the existing and proposed utility infrastructure plans, and any needed upgrades to off-site sewer lines and facilities. These potential impacts will be analyzed further in the Draft EIR.

c) Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

Potentially Significant Impact. The Project would increase impervious areas on the Project site, which may result in increased runoff rates and volumes. The capacity of the existing storm drain lines serving the Project site and downstream storm drainage facilities will be discussed in the Draft EIR, based on the existing and proposed utility infrastructure plans, the hydrology study, and any needed upgrades to off-site storm drain lines and facilities. These potential impacts will be analyzed further in the Draft EIR.

d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

Potentially Significant Impact. The Project proposes to develop approximately 920 residential units, including 17 live-work units, approximately 17,941 sf of neighborhood-serving retail uses, and 5,465 sf of leasing offices, which would increase the demand for water greater than what would be required to serve a 500-unit residential development. Therefore, the Project is required to assess the availability of water supplies in accordance with Senate Bill 610. A Water Supply Assessment (WSA) will be prepared to determine if the Los Angeles Department of Water and Power has adequate water supplies to serve the Project. These potential impacts will be analyzed further in the Draft EIR.

e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

Potentially Significant Impact. See Threshold 18(b) above. Consultation with the Los Angeles Bureau of Sanitation on any needed upgrades to off-site sewer lines and facilities will be discussed in the Draft EIR.

f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?

Potentially Significant Impact. Demolition and construction activities at the Project site would generate solid wastes that would require disposal at area landfills. Occupancy and operation of the Project would also generate solid wastes requiring landfill disposal. An analysis of the proposed Project's impacts on the local landfill system will be provided in the Draft EIR, including an estimate of on-site waste generation and available capacities at landfills likely to be used by the Project construction and operation. These potential impacts will be analyzed further in the Draft EIR.

g) Comply with federal, state, and local statutes and regulations related to solid waste?

Potentially Significant Impact. See Threshold 18(f) above. The proposed Project would increase solid-waste generation at the Project site and would be required to comply with applicable local, state, and federal solid-waste disposal requirements, including but not limited to the California Integrated Waste Management Act of 1989 (AB 939); state requirements for diversion of construction and demolition debris; the City's Solid Waste Integration Resources Plan (SWIRP), and other applicable diversion plans and goals. These potential impacts will be analyzed further in the Draft EIR.

19. MANDATORY FINDINGS OF SIGNIFICANCE

a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

Potentially Significant Impact. See Thresholds 4(a) through 4(f) above, which state that the Project would not have potentially significant impacts on biological resources. Thus, the Project would not have the potential to substantially reduce the habitat of fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or reduce the number or restrict the range of a rare or endangered plant or animal. However, Thresholds 5(a) through 5(d) state that the Project may have potentially significant impacts on cultural resources that will be further analyzed in the Draft EIR. Thresholds 17(a) and 17(b) above indicate a potential for significant impacts on tribal cultural resources. Also, potential impacts on Air Quality, Geology and Soils, GHG Emissions, and Hydrology and Water Quality would have the potential to degrade the quality of the environment. Because of the potential for significant adverse effects on these issues, a Draft EIR will be prepared for the Project.

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects).

Potentially Significant Impact. The Draft EIR will include an analysis of environmental impacts where the Project may contribute to significant environmental effects that are individually limited, but cumulatively considerable when evaluated in connection with past, present, and future projects.

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Potentially Significant Impact. The Project has the potential for significant impacts related to aesthetics, air quality, cultural resources, GHG emissions, hazards and hazardous materials, land use and planning, noise, population and housing, public services, recreation, transportation/circulation, and utilities that may cause substantial adverse effects on human beings, either directly or indirectly. These potential effects will be analyzed in the Draft EIR.

DISCUSSION OF THE ENVIRONMENTAL EVALUATION			
As noted above, the Lead Agency has determined that the proposed project may result in a significant effect on the environment and an environmental impact report is required.			
Prepared by: Erin Strelich	Title: City Planning Associate	Telephone No.: (213) 978-1351	Date: 10/31/2017

REFERENCES

California Department of Conservation, Division of Mines and Geology (CDMG). 1979. Generalized Aggregate Resource Classification Map, San Fernando Valley and Adjacent Production-Consumption Regions – Special Report 143. Sacramento, CA: CDMG.

California Department of Conservation, Farmland Mapping and Monitoring Program (FMMP). 2017 (July). Los Angeles County Important Farmland 2016. Sacramento, CA: FMMP. ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2016/los16.pdf.

California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR). 2017. DOGGR Well Finder. Sacramento, CA: DOGGR. https://secure.conservation.ca.gov/WellSearch/Details?api=03716588.

California Department of Forestry and Fire Protection (CalFire). 2011 (September). *Los Angeles County – Very High Fire Hazard Severity Zones in LRA*. Sacramento, CA: CalFire.

California Department of Transportation (Caltrans). 2011 (September 7). California Scenic Highway Mapping System– Los Angeles County. Sacramento, CA: Caltrans. http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/index.htm.

Federal Emergency Management Agency (FEMA). 2008 (August 26). *Flood Insurance Rate Map – Map Number 06037C1628F*. Washington, D.C.: FEMA.

Geotechnologies, Inc. 2015 (July 8*). Geotechnical Engineering Investigation, Proposed Mixed Use T.O.D. Development, Cornfield Site, 1251 North Spring Street, Los Angeles California.* Glendale, CA: Geotechnologies.

Los Angeles, City of. 2017 (May 15, current through). *Official City of Los Angeles Municipal Code.* Cincinnati, OH: American Legal Corporation for the City. http://library.amlegal.com/nxt/gateway.dll?f=templates&fn=default.htm&vid=amlegal:la_all_mc.

———. 2015 (March 3). *Official City of Los Angeles Charter*. Cincinnati, OH: American Legal Corporation for the City. http://library.amlegal.com/nxt/gateway.dll?f=templates&fn=default.htm&vid=amlegal:la_all_mc.

———. 2004 (March 31). Methane and Methane Buffer Zones. Los Angeles, CA: the City.

———. 2000 (December 15). Central City North Community Plan Update. Los Angeles, CA: the City. https://planning.lacity.org/complan/pdf/ccncptxt.pdf.

———. 2001 (re-adopted). *The Citywide General Plan Framework, An Element of the City of Los Angeles General Plan.* Los Angeles, CA: the City. http://cityplanning.lacity.org/cwd/framwk/fwhome0.htm.

———. 1996 (November 26). *Safety Element, An Element of the City of Los Angeles General Plan.* Los Angeles, CA: the City. https://planning.lacity.org/cwd/gnlpln/saftyelt.pdf.

Los Angeles County Airport Land Use Commission (ALUC). 2004 (December 1). *Los Angeles County Airport Land Use Plan.* Los Angeles, CA: ALUC.

Los Angeles Department of City Planning. 2016 (Adopted September 7). *Mobility Plan 2035.* Los Angeles, CA: Los Angeles Department of City Planning. https://planning.lacity.org/documents/policy/mobilityplnmemo.pdf.

Los Angeles County Department of Public Works (DPW). 2014. (May) Disaster Route Maps By City: City of Los Angeles Central Area. https://dpw.lacounty.gov/dsg/DisasterRoutes/map/Los%20Angeles%20Central%20Area.pdf. Los Angeles, CA: DRP.

Los Angeles County Department of Regional Planning (DRP). 2014. (January) *Los Angeles County General Plan 2035.* Los Angeles, CA: DRP.

———. 2004. *Los Angeles County Airport Land Use Plan*. Los Angeles, CA: DRP.

Rand McNally. 2003. *The Thomas Guide – Los Angeles County Street Guide.* Chicago, IL: Rand McNally.

The Tree Resource. 2016 (October). *Tree Report.* Los Angeles, CA: The Tree Resource.

U.S. Forest Service (USFS). 2017 (March 22, access date). National Forest Locator Map. Washington, D.C.: USFS. https://www.fs.fed.us/locatormap/.

APPENDIX A

TREE REPORT

TREE REPORT

PREPARED FOR

Lincoln Property Company

915 Wilshire Blvd #2050

Los Angeles, CA 90017

PROPERTY

1251 N. Spring Street

Los Angeles, CA 90012

CONTACT

Samson E. Kawjaree, Fuscoe Engineering

213-988-8802

skawjaree@fuscoe.com

October 31, 2016

PREPARED BY

LISA SMITH, **THE TREE RESOURCE**

REGISTERED CONSULTING ARBORIST #464

ISA CERTIFIED ARBORIST #WE3782

ISA TREE RISK ASSESSOR QUALIFIED

MEMBER OF AMERICAN SOCIETY OF CONSULTING ARBORISTS

P.O. BOX 49314, LOS ANGELES, CA 90049

T 310-663-2290 **E** queenpalm@earthlink.net

TABLE OF CONTENTS

TREE REPORT

1251 N. Spring Street
Los Angeles, CA 90012

SUMMARY

This Tree Report was prepared at the request of the property owner, Lincoln Property Company. The owner is preparing to build a mixed-used development project called the Elysian Park Lofts. The proposed project consists of a total of six (6) buildings and 923 units. The subject property is approximately eight (8) acres and is located in the Chinatown neighborhood of downtown Los Angeles. It is currently a narrow vacant lot along the railroad tracks and just north of the State's Cornfields. The total floor area of the proposed residential development is 1,159,800 square feet.

PROTECTED TREES, URBAN FORESTRY DIVISION

This property is under the jurisdiction of the City of Los Angeles and guided by the Native Tree Protection Ordinance No. 177,404. **Protected Trees** are defined by this ordinance as Oaks (*Quercus* sp) indigenous to California but excluding the scrub oak (*Quercus dumosa*); Southern California black walnut (*Juglans californica* var. californica); Western sycamore *(Platanus racemosa)* and California bay laurel (*Umbellularia californica*) trees with a diameter at breast height (DBH) of four inches (4") or greater.

There are NO trees on this property that would be considered protected within the City of Los Angeles Native Tree Protection Ordinance.

NON-PROTECTED SIGNIFICANT TREES, DEPARTMENT OF CITY PLANNING

The Department of City Planning requires the identification of the location, size, type and condition of all existing trees on the site with a DBH of 8 inches (8") or greater. These trees will be identified as **Non-Protected Significant Trees.**

At this time, I observed twenty (20) **Non-Protected Significant Trees** on the property. All twenty (20) of these trees will be impacted by construction and are recommended for removal and mitigation to the satisfaction of the City of Los Angeles Department of City Planning.

Eighteen (18) of the twenty (20) trees are Canary Island Palms. The other two remaining palms are Washingtonia robusta and W. filifera varities. All of these trees will be impacted by the footprint of the project and require removal.

ASSIGNMENT

The Assignment included a field observation and inventory of the trees on site. A Tree Location Plot Map is included in Appendix A. Photographs of the subject trees are included in Appendix B.

TREE CHARACTERISTICS AND SITE CONDITIONS

Detailed information with respect to size, condition, species and recommendations are included in the Summary of Field Inspections in Appendix C. The trees are numbered on the Tree Location Map in Appendix A.

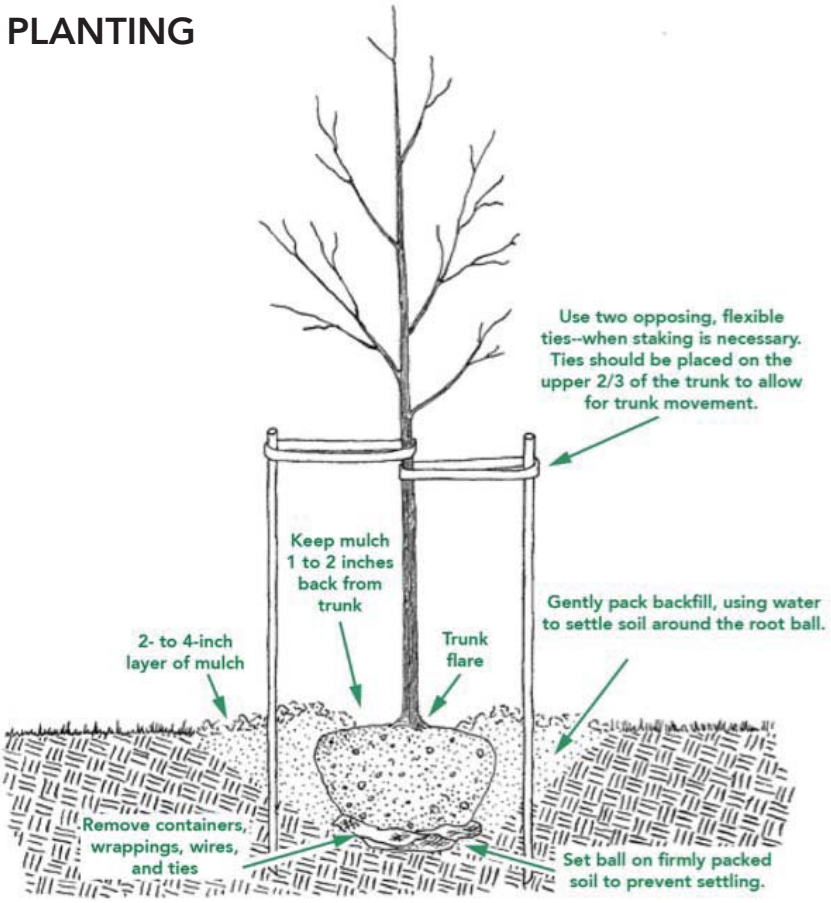
IMPACT ANALYSIS AND SPECIFIC RECOMMENDATIONS

The proposed construction for this project will require extensive grading and soil work to the site. Due to the narrow nature of the site, all the trees on site will be impacted by the proposed construction. These trees are recommended for removal and mitigation to the satisfaction of the City of Los Angeles.

All (20) twenty trees are recommended for removal due to the proposed footprint of the new project combined with the required grading and soil work.

GENERAL RECOMMENDATIONS

NEW TREE PLANTING



The ideal time to plant trees and shrubs is during the dormant season, in the fall after leaf drop or early spring before budbreak. Weather conditions are cool and allow plants to establish roots in the new location before spring rains and summer heat stimulate new top growth. Before you begin planting your tree, be sure you have had all underground utilities located prior to digging.

If the tree you are planting is balled or bare root, it is important to understand that its root system has been reduced by 90 to 95 percent of its original size during transplanting. As a result of the trauma caused by the digging process, trees commonly exhibit what is known as transplant shock. Containerized trees may also experience transplant shock, particularly if they have circling roots that must be cut. Transplant shock is indicated by slow growth and reduced vigor following transplanting. Proper site preparation before and during planting coupled with good follow-up care reduces the amount of time the plant experiences transplant shock and allows the tree to quickly establish in its new location. Carefully follow nine simple steps, and you can significantly reduce the stress placed on the plant at the time of planting.

NEW TREE PLANTING, continued

1. Dig a shallow, broad planting hole. Make the hole wide, as much as three times the diameter of the root ball but only as deep as the root ball. It is important to make the hole wide because the roots on the newly establishing tree must push through surrounding soil in order to establish. On most planting sites in new developments, the existing soils have been compacted and are unsuitable for healthy root growth. Breaking up the soil in a large area around the tree provides the newly emerging roots room to expand into loose soil to hasten establishment.

2. Identify the trunk flare. The trunk flare is where the roots spread at the base of the tree. This point should be partially visible after the tree has been planted (see diagram). If the trunk flare is not partially visible, you may have to remove some soil from the top of the root ball. Find it so you can determine how deep the hole needs for proper planting.

3. Remove tree container for containerized trees. Carefully cutting down the sides of the container may make this easier. Inspect the root ball for circling roots and cut or remove them. Expose the trunk flare, if necessary.

4. Place the tree at the proper height. Before placing the tree in the hole, check to see that the hole has been dug to the proper depth and no more. The majority of the roots on the newly planted tree will develop in the top 12 inches of soil. If the tree is planted too deeply, new roots will have difficulty developing because of a lack of oxygen. It is better to plant the tree a little high, 1-2 inches above the base of the trunk flare, than to plant it at or below the original growing level. This planting level will allow for some settling.

5. Straighten the tree in the hole. Before you begin backfilling, have someone view the tree from several directions to confirm that the tree is straight. Once you begin backfilling, it is difficult to reposition the tree.

6. Fill the hole gently but firmly. Fill the hole about one-third full and gently but firmly pack the soil around the base of the root ball. Be careful not to damage the trunk or roots in the process. Fill the remainder of the hole, taking care to firmly pack soil to eliminate air pockets that may cause roots to dry out. To avoid this problem, add the soil a few inches at a time and settle with water. Continue this process until the hole is filled and the tree is firmly planted. It is not recommended to apply fertilizer at time of planting.

7. Stake the tree, if necessary. If the tree is grown properly at the nursery, staking for support will not be necessary in most home landscape situations. Studies have shown that trees establish more quickly and develop stronger trunk and root systems if they are not staked at the time of planting. However, protective staking may be required on sites where lawn mower damage, vandalism, or windy conditions are concerns. If staking is necessary for support, there are three methods to choose among: staking, guying, and ball stabilizing. One of the most common methods is staking. With this method, two stakes used in conjunction with a wide, flexible tie material on the lower half of the tree will hold the tree upright, provide flexibility, and minimize injury to the trunk (see diagram). Remove support staking and ties after the first year of growth.

8. Mulch the base of the tree. Mulch is simply organic matter applied to the area at the base of the tree. It acts as a blanket to hold moisture, it moderates soil temperature extremes, and it reduces competition from grass and weeds. A 2- to 3-inch layer is ideal. More than 3 inches may cause a problem with oxygen and moisture levels. When placing mulch, be sure that the actual trunk of the tree is not covered. Doing so may cause decay of the living bark at the base of the tree. A mulch-free area, 1 to 2 inches wide at the base of the tree, is sufficient to avoid moist bark conditions and prevent decay.

TREE MAINTENANCE AND PRUNING

Some trees do not generally require pruning. The occasional removal of dead twigs or wood is typical. Occasionally a tree has a defect or structural condition that would benefit from pruning. Any pruning activity should be performed under the guidance of a certified arborist or tree expert.

Because each cut has the potential to change the growth of the tree, no branch should be removed without a reason. Common reasons for pruning are to remove dead branches, to remove crowded or rubbing limbs, and to eliminate hazards. Trees may also be pruned to increase light and air penetration to the inside of the tree's crown or to the landscape below. In most cases, mature trees are pruned as a corrective or preventive measure.

Routine thinning does not necessarily improve the health of a tree. Trees produce a dense crown of leaves to manufacture the sugar used as energy for growth and development. Removal of foliage through pruning can reduce growth and stored energy reserves. Heavy pruning can be a significant health stress for the tree.

Yet if people and trees are to coexist in an urban or suburban environment, then we sometimes have to modify the trees. City environments do not mimic natural forest conditions. Safety is a major concern. Also, we want trees to complement other landscape plantings and lawns. Proper pruning, with an understanding of tree biology, can maintain good tree health and structure while enhancing the aesthetic and economic values of our landscapes.

Pruning Techniques – From the I.S.A. Guidelines

Specific types of pruning may be necessary to maintain a mature tree in a healthy, safe, and attractive condition.

Cleaning is the removal of dead, dying, diseased, crowded, weakly attached, and low- vigor branches from the crown of a tree.

Thinning is the selective removal of branches to increase light penetration and air movement through the crown. Thinning opens the foliage of a tree, reduces weight on heavy limbs, and helps retain the tree's natural shape.

Raising removes the lower branches from a tree to provide clearance for buildings, vehicles, pedestrians, and vistas.

Reduction reduces the size of a tree, often for clearance for utility lines. Reducing the height or spread of a tree is best accomplished by pruning back the leaders and branch terminals to lateral branches that are large enough to assume the terminal roles (at least one-third the diameter of the cut stem). Compared to topping, reduction helps maintain the form and structural integrity of the tree.

TREE MAINTENANCE AND PRUNING, continued

How Much Should Be Pruned?

Mature trees should require little routine pruning. A widely accepted rule of thumb is never to remove more than one-quarter of a tree's leaf-bearing crown. In a mature tree, pruning even that much could have negative effects. Removing even a single, large- diameter limb can create a wound that the tree may not be able to close. The older and larger a tree becomes, the less energy it has in reserve to close wounds and defend against decay or insect attack. Pruning of mature trees is usually limited to removal of dead or potentially hazardous limbs.

Wound Dressings

Wound dressings were once thought to accelerate wound closure, protect against insects and diseases, and reduce decay. However, research has shown that dressings do not reduce decay or speed closure and rarely prevent insect or disease infestations. Most experts recommend that wound dressings not be used.

DISEASES AND INSECTS

Continual observation and monitoring of your tree can alert you to any abnormal changes. Some indicators are: excessive leaf drop, leaf discoloration, sap oozing from the trunk and bark with unusual cracks. Should you observe any changes, you should contact a Tree specialist or Certified Arborist to review the tree and provide specific recommendations. Trees are susceptible to hundreds of pests, many of which are typical and may not cause enough harm to warrant the use of chemicals. However, diseases and insects may be indication of further stress that should be identified by a professional.

GRADE CHANGES

The growing conditions and soil level of trees are subject to detrimental stress should they be changed during the course of construction. Raising the grade at the base of a tree trunk can have long-term negative consequences. This grade level should be maintained throughout the protected zone. This will also help in maintaining the drainage in which the tree has become accustomed.

INSPECTION

The property owner should establish an inspection calendar based on the recommendation provided by the tree specialist. This calendar of inspections can be determined based on several factors: the maturity of the tree, location of tree in proximity to high-use areas vs. low-use area, history of the tree, prior failures, external factors (such as construction activity) and the perceived value of the tree to the homeowner.

Assumptions and Limiting Conditions

No warranty is made, expressed or implied, that problems or deficiencies of the trees or the property will not occur in the future, from any cause. The Consultant shall not be responsible for damages or injuries caused by any tree defects, and assumes no responsibility for the correction of defects or tree related problems.

The owner of the trees may choose to accept or disregard the recommendations of the Consultant, or seek additional advice to determine if a tree meets the owner's risk abatement standards.

The Consulting Arborist has no past, present or future interest in the removal or retaining of any tree. Opinions contained herein are the independent and objective judgments of the consultant relating to circumstances and observations made on the subject site.

The recommendations contained in this report are the opinions of the Consulting Arborist at the time of inspection. These opinions are based on the knowledge, experience, and education of the Consultant. The field inspection was a visual, grade level tree assessment.

The Consulting Arborist shall not be required to give testimony, perform site monitoring, provide further documentation, be deposed, or to attend any meeting without subsequent contractual arrangements for this additional employment, including payment of additional fees for such services as described by the Consultant.

The Consultant assumes no responsibility for verification of ownership or locations of property lines, or for results of any actions or recommendations based on inaccurate information.

This Arborist report may not be reproduced without the express permission of the Consulting Arborist and the client to whom the report was issued. Any change or alteration to this report invalidates the entire report.

Should you have any further questions regarding this property, please contact me at (310) 663-2290.

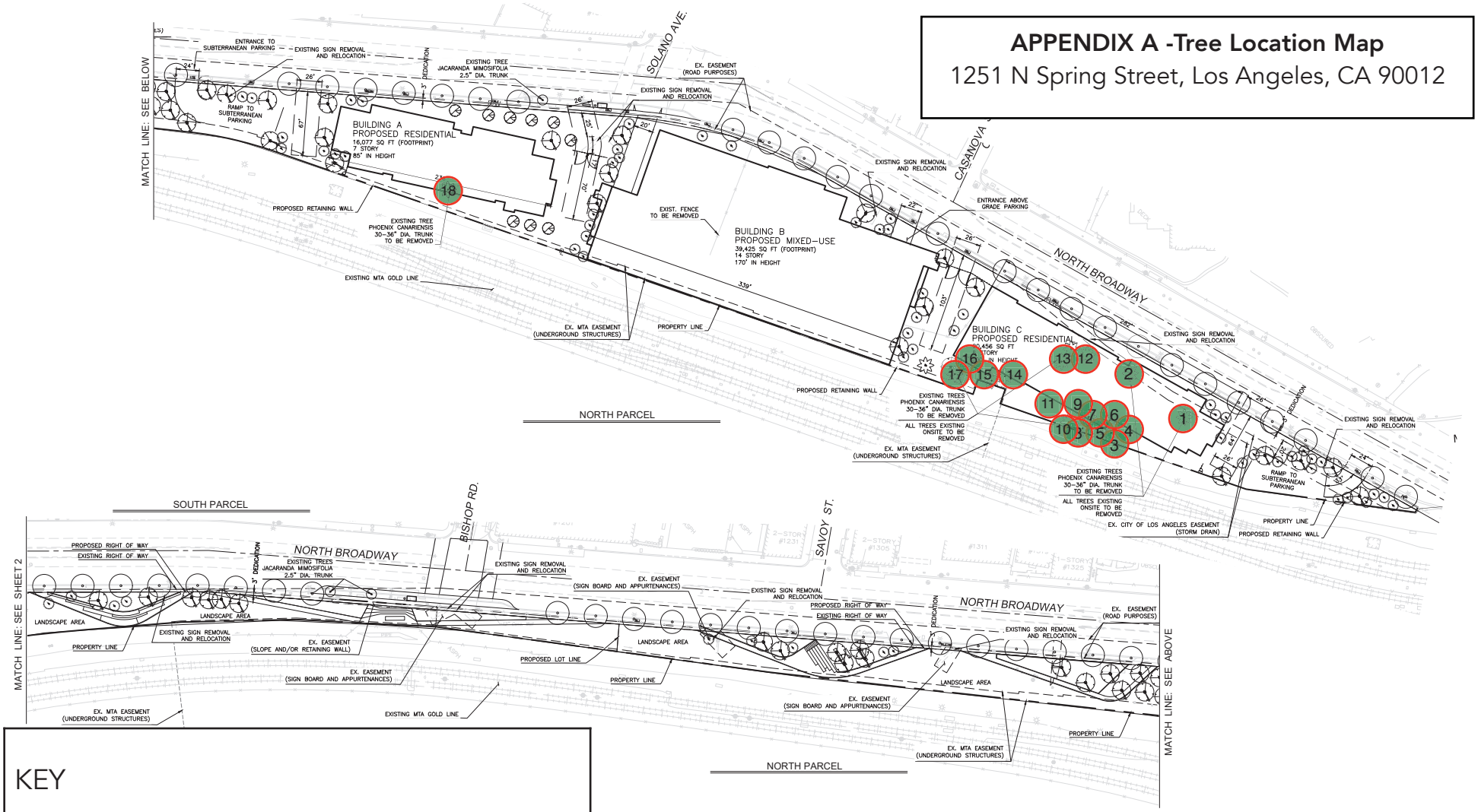
Respectfully submitted,

Lisa Smith

Registered Consulting Arborist #464
ISA Certified Arborist #WE3782
ISA Tree Risk Assessor Qualified
American Society of Consulting Arborists, Member

APPENDIX A -Tree Location Map

1251 N Spring Street, Los Angeles, CA 90012



KEY

\# — Non-Protected Tree For Removal

AT THE SOUTH PARCEL, PROPOSED ARE 4 MIXED–USE BUILDING STRUCTURES WITH 3 LEVELS OF SUBTERRANEAN PARKING, AND SITE ACCESS VIA SPRING STREET. THE MULTI–STORY BUILDINGS RANGE FROM 2 TO 13 LEVELS. THE NORTH AND SOUTH PARCELS ARE CONNECTED BY OPEN SPACE AREA.

ASSESSOR'S PARCEL MAP INFORMATION

APN: 5414–016–002

NOTE:

ALL EXISTING WALLS, FENCES, TREES (VEGETATION) AND BUILDINGS TO BE DEMOLISHED WITHIN PROJECT BOUNDARY.

NORTH PARCEL:	STUDIO	ONE BED	LIVE/WORK 1 BED	2 BEDS	ALL UNITS
BUILDING A		63	7	20	90
BUILDING B		184	0	64	248
BUILDING C		98	3	30	131
TOTAL	0	345	10	114	469

SOUTH PARCEL:	STUDIO	ONE BED	LIVE/WORK 2 BED	2 BEDS	ALL UNITS
BUILDING A	28	13	7	5	53
BUILDING B	21	72	0	32	125
BUILDING C	65	143	0	68	276
TOTAL	114	228	7	105	454

PROPOSED PARKING LOCATION

NORTH PARCEL: 2 LEVEL STRUCTURE ABOVE PODIUM LEVEL PARKING LOCATED AT BUILDING B.
3 LEVEL SUBTERRANEAN PARKING LOCATED THROUGHOUT THE NORTH PARCEL FOOTPRINT.

SOUTH PARCEL: 3 LEVEL SUBTERRANEAN PARKING LOCATED THROUGHOUT THE SOUTH PARCEL FOOTPRINT.
7 PARKING STALLS LOCATED AT PODIUM LEVEL AT THE NORTH BROADWAY ENTRANCE ADJACENT TO THE COTTAGE HOME STREET INTERSECTION.

40' 0' 20' 40'
SCALE: 1" = 40'

NO.	REVISIONS	APP'D.	DATE

FUSCOE ENGINEERING
6500 Wilshire, Suite 1470 Los Angeles, California 90017
t 213.988.8552 • f 213.988.8803 • www.fuscoe.com

REGISTERED PROFESSIONAL ENGINEER — No.C49881 — CIVIL — STATE OF CALIFORNIA

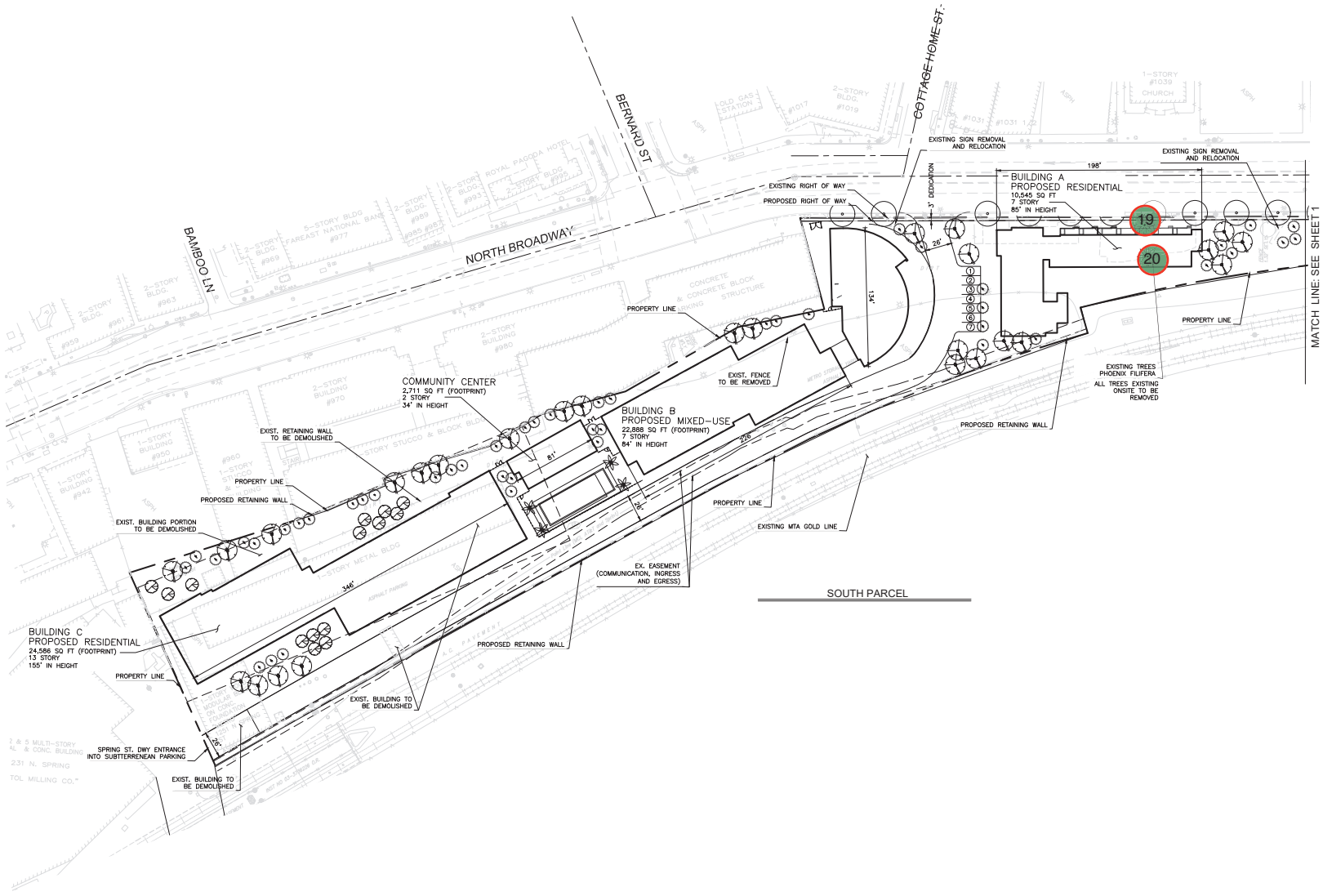
SEP 15, 2016
Name Date

PLOT PLAN
TRACT NO. 74548
ELYSIAN PARK LOFTS

DRAWN:	SEK
DESIGN:	SEK
CHECKED:	AJW
SCALE:	AS SHOWN
JOB NO.:	1380.001
DATE:	09/15/16

SHEET 1 OF 2

F:\PROJECTS\1380\001\EXHIBITS\PLOT PLAN\1380–001PLOT PLANDWG (09–15–16 1:09:01PM) Plotted by: Samson Kasjarae



NO.	REVISIONS	APP'D.	DATE

FUSCOE ENGINEERING
6210 Wilshire, Suite 1470 Los Angeles, California 90017
t 213.988.8472 • f 213.988.8803 • www.fuscoe.com

Name Date

REGISTERED PROFESSIONAL ENGINEER — ROBERT JEFFERSON WEBB — No. C49881 — CIVIL — STATE OF CALIFORNIA

PLOT PLAN
TRACT NO. 74548
ELYSIAN PARK LOFTS

DRAWN:	SEK
DESIGN:	SEK
CHECKED:	AJW
SCALE:	AS SHOWN
JOB NO.:	1380.001
DATE:	09/15/16

SHEET 2 OF 2

F:\PROJECTS\1380\001\EXHIBITS\PLOT PLAN\1380-001PLOT PLAN.DWG (09-15-16 1:10:25PM) Plotted by: Samson Kwejorwe

APPENDIX B - PHOTOGRAPHS

PHOTO 1. shows the subject property and the Canary Island palms on the property.

APPENDIX C - SUMMARY OF FIELD INSPECTION

Tree #	Location	Species	Status	DBH (")	Height (')	Retain or Remove
1	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	30	20	REMOVE
2	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	10+	REMOVE
3	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	25+	REMOVE
4	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	10	REMOVE
5	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	55	REMOVE
6	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	25	REMOVE
7	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	15	REMOVE
8	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	55	REMOVE
9	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	10	REMOVE

APPENDIX C - SUMMARY OF FIELD INSPECTION

Tree #	Location	Species	Status	DBH (")	Height (')	Retain or Remove
10	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	45	REMOVE
11	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	10	REMOVE
12	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	35	REMOVE
13	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	35	REMOVE
14	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	50	REMOVE
15	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	25	REMOVE
16	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	25	REMOVE
17	B/w the Bridge and Casanova on N. Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	15	REMOVE
18	Solano and Broadway	Canary Island Palm Phoenix canariensis	Non-Protected	24	15	REMOVE

APPENDIX C - SUMMARY OF FIELD INSPECTION

Tree #	Location	Species	Status	DBH (")	Height (')	Retain or Remove
19	close to Cottage Home on Broadway	Mexican Fan Palm *Washingtonia robusta*	Non-Protected	24	55	REMOVE
20	close to Cottage Home on Broadway	California Fan Palm *Washingtonia filifera*	Non-Protected	24	55	REMOVE

APPENDIX B

GEOTECHNICAL ENGINEERING INVESTIGATION

Geotechnologies, Inc.
Consulting Geotechnical Engineers

439 Western Avenue
Glendale, California 91201-2837
818.240.9600 • Fax 818.240.9675

July 8, 2015
File Number 20921

Lincoln Property Company
915 Wilshire Avenue
Los Angeles, California 90017

Attention: Matthew Howell

Subject: Geotechnical Engineering Investigation
Proposed Mixed Use T.O.D. Development
Cornfield Site, 1251 North Spring Street, Los Angeles California

Ladies and Gentlemen:

This letter transmits the Geotechnical Engineering Investigation for the subject site prepared by Geotechnologies, Inc. This report provides geotechnical recommendations for the development of the site, including earthwork, seismic design, retaining walls, excavations, shoring and foundation design. Engineering for the proposed project should not begin until approval of the geotechnical investigation is granted by the local building official. Significant changes in the geotechnical recommendations may result due to the building department review process.

The validity of the recommendations presented herein is dependent upon review of the geotechnical aspects of the project during construction by this firm. The subsurface conditions described herein have been projected from limited subsurface exploration and laboratory testing. The exploration and testing presented in this report should in no way be construed to reflect any variations which may occur between the exploration locations or which may result from changes in subsurface conditions.

Should you have any questions please contact this office.

Respectfully submitted,
GEOTECHNOLOGIES, INC.

EDWARD F. HILL
G.E. 2126, C.E.G. 1403

EFH:km

Distribution: (5) Addressee

Email to: [matt.howell@lpc.com], Attn: Matthew Howell

TABLE OF CONTENTS

TABLE OF CONTENTS

SECTION **PAGE**

TABLE OF CONTENTS

TABLE OF CONTENTS

SECTION **PAGE**

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED MIXED USE T.O.D. DEVELOPMENT
1251 NORTH SPRING STREET, CORNFIELD SITE
LOS ANGELES, CALIFORNIA

INTRODUCTION

This report presents the results of the geotechnical engineering investigation performed on the subject site. The purpose of this investigation was to identify the distribution and engineering properties of the geologic materials underlying the site, and to provide geotechnical recommendations for the design of the proposed development.

This investigation included three borings and four test pits, collection of representative samples, laboratory testing, engineering analysis, review of published geologic data and the preparation of this report. The exploratory excavation locations are shown on the enclosed Plot Plan. The results of the exploration and the laboratory testing are presented in the Appendix of this report.

This office prepared a geotechnical engineering investigation for a proposed development on the subject site in 2007 (File Number 19557, dated November 29, 2007). That report was based on 21 borings and extensive laboratory testing. The report not submitted to the City of Los Angeles Department of Building and Safety Grading Division for approval. This report utilizes the information developed for that investigation. Boring logs and laboratory results are included in the Appendix.

PROPOSED DEVELOPMENT

Information concerning the proposed development was furnished by Matt Howell of Lincoln Property Company. Preliminary design sketches by Johnson Fain Architects were provided for reference. The site is proposed to be developed with five to seven mixed use structures that will

extend over the Metro Gold Line tracks. Each of the structures will be separated by a paseo that will be equal in elevation to North Broadway. The structures and paseos will be located over an easterly descending slope, the structures will have entrances at the North Broadway elevation and at the lower Metro Gold Line elevation.

The development is in its early planning stages since several different building configurations and site layouts are being considered. The structures will range from 4 to 9 stories (40 to 90 feet) in height as measured from North Broadway and 70 to 120 feet as measured from the Metro tracks below. Column loads are estimated to range from 100 to 400 kips for the 4 story structures and 200 to 900 kips for the 9 story structures. Wall loads are estimated to range from 2 to 7 kips per lineal foot for the 4 story structures and 5.2 to 16 kips per lineal foot for the 9 story structures. Excavations into the slopes below North Broadway may reach a height of 50 feet.

Any changes in the design of the project or location of any structure, as outlined in this report, should be reviewed by this office. The recommendations contained in this report should not be considered valid until reviewed and modified or reaffirmed, in writing, subsequent to such review.

SITE CONDITIONS

The site is located in the vicinity of 1251 North Sping Street, in the City of Los Angeles, California. The site is bounded by North Broadway to the northwest Metro rail tracks to the southeast, commercial buildings with paved parking to the west. The site can be described as a broad and narrow area. It is over 0.7 mile in length and approximately 8.2 acres in area. The site is shown relative to nearby topographic features on the attached Vicinity Map. The attached Plot Plan shows the site layout relative to property lines. Due to the range of topographic and geologic conditions, the site is described as a south portion and a north portion.

South Portion

The south portion of the bowtie-shaped site which terminates near the extension of Bishops Road. The southern half is widest at its southern end and narrows to the north. The ground surface descends to the southeast from elevation 330 feet along North Broadway to 291 feet at the southern corner adjacent to the Metro easement for a total elevation difference of 39 feet. Currently, the wider, southern portion of the site is a paved parking lot used as a staging area for large tractor-trailer trucks. Moving to the north, the south portion is vacant land, vegetated with annual grasses and small shrubs.

Site improvements only include overhead billboards.

North Portion

The north portion is widest at its northern end and narrows to the south. The ground surface descends to the south from elevation 348 feet along North Broadway to 301 feet at the Metro easement for a total elevation difference of 47 feet. A south to north descending, unpaved, access road connects the terrace at the North Broadway elevation to the Metro easement elevation. The terrace area is currently used for staging of construction equipment. The north portion narrows to the south and is vegetated with annual grasses and a few trees.

Site improvements include only overhead billboards.

METROPOLITAN TRANSIT AUTHORITY (MTA) EASEMENT

Development over the existing Metro easement is being considered. This area was not investigated with subsurface borings. This easement is roughly a curved, rectangular shape that forms the southeast boundary of the site. The area is relatively flat, ranging in elevation from 310 feet at the northeast end to 290 feet at the southwest end. The easement is asphalt paved and

has multiple tracks used by the Gold Line. The easement is bordered on the southeast side by a relatively flat, undeveloped area. This area has been used in the past as an agricultural "Cornfield".

LOCAL GEOLOGY

The site is located in the Elysian Park Hills which form the northeast border of the Los Angeles Basin. The Elysian Park Hills are composed primarily of upper Miocene and Pliocene-age sedimentary rocks. The site is underlain by the upper Puente Formation that is composed well bedded siltstone, clayey siltstone, and sandstone. Structurally, the Elysian Park Hills are located on the southern limb of the Elysian Park Anticline. Bedding in the site vicinity dips to the south and southwest at slight to moderate inclinations of 40 to 55 degrees (Lamar, 1970 and Dibblee, 1989). The geology of the site vicinity is presented on the Local Geologic Map-Lamar included in this report.

The Los Angeles River is located approximately 1,000 feet to the east of the site. Currently the river is constrained by concrete channel wall. Prehistorically, the Los Angeles River meandered between the Elysian Park Hills on the west and the Repetto Hills on the east. An ancient meander edge was likely defined by North Broadway. The Los Angeles River is the source for the alluvium that underlies the site.

Three small canyons drained from the Elysian Park Hills, (on the west) into the Los Angeles River (to the east). The thalweg of one canyon is defined by Solano Avenue which is located near the center of the north portion. Another canyon thalweg is defined by Bishops Road, located near the center of the southern portion. The third thalweg is at the southern edge of the southern portion aligned with Bamboo Lane. The significance of these cross-cutting, drainage channels is that a greater depth to bedrock may occur and may be the location of water seepage into the site excavations.

Local Faults

Geologic mapping as indicated by Yerkes, et. al (1977) indicates two unnamed faults cut across the site. The faults are queried indicating the locations are doubtful. The geologic map by Lamar, (1970) and Dibblee (1989) do not show these faults on the site. Evidence of faulting was not observed in the samples taken from the boring logs. If these faults exist, they are not considered active and therefore are not considered a seismic risk to the site. The unnamed faults are shown on the attached Local Geologic Map-Yerkes.

Los Angeles City Oil Field

The site is located at the eastern edge of the Los Angeles City Oil Field (Dibblee, 1970). The Los Angeles City Oil Field is an east-west trending zone that still has active oil withdrawal. The attached Local Geologic Map-Lamar indicates one oil well on the north and one oil well on south portions. The wells are indicated to have been dry (no oil) and abandoned.

Based on review of the Oil Well Location Map for the Los Angeles City Oil Field (DOGGR, 2001) two oil wells are shown on the south portion. One of the wells is indicated as drilled by "Ventura Oil Company "well. No further information is given. The other is indicated as drilled by "Paul McKenzie" in 1956 to depth of 2674 feet. Both of these wells are indicated as plugged and abandoned. The map does not provide coverage of the north portion. A copy of this map (DOGGR, 2001) is attached to this report, as the Oil Well Location Map.

PREVIOUS WORK

This firm prepared a Geotechnical Engineering Investigation for the site date November 29, 2007 (File No. 19557). At the time, a development was proposed similar in scope and scale to the one that is currently being considered.

The site was explored on October 15 through 18, 2007 by drilling 24 exploratory borings with the aid of a truck-mounted drilling rig using 8-inch diameter hollowstem augers and a 24-inch diameter bucket auger. The borings varied in depth from 11 to 70 feet. The boring locations are shown on the Plot Plan and the Geologic Map. The geologic materials encountered are logged on Plates A-1 through A-24. No borings were drilled on the METRO easement. The boring logs and laboratory results are included in the Appendix. The findings of that investigation are incorporated into this report.

GEOTECHNICAL EXPLORATION

FIELD EXPLORATION

The site was explored on March 18 and 19, 2015 by excavating 3 borings and 4 test pits. The borings were drilled with truck mounted, 8-inch diameter, hollowstem auger and a 24-inch diameter bucket auger drilling rigs. The hollowstem auger borings were sampled with a California-modified split spoon sampler advanced with a 140-pound weight dropped from a height of 30 inches. The bucket auger drilling rig was sampled with a California–modified, split spoon sampler advanced with a telescopic Kelly bar dropped from a height of 12 inches. The test pits were excavated with hand tools to a 30-inch diameter to depths ranging from 14 to 15 feet. The test pits were sampled with a hand sampler. The exploration locations are shown on the Plot Plan and the geologic materials encountered are logged on Plates A-25 through A-31.

The boring locations were determined by measurement from hardscape features shown on the attached Geologic Map. Elevations of the borings were determined by interpolation from the site survey that forms the basis for the Geologic Map. The location and elevation of the exploratory excavations should be considered accurate only to the degree implied by the method used.

Geologic Materials

The geologic materials underlying the site include fill soils, alluvium, and sedimentary bedrock of the Puente Formation. The area distribution of the geologic materials is shown on the attached Geologic Map while the subsurface distribution is shown on Cross Sections A-A', B-B', and C-C'. The materials are discussed in the following paragraphs.

Fill Soils

Fill soils consist of silty sand and some brick fragments. The fill is generally dark brown, reddish brown to light gray in color, dense to moderately dense, and moist. The fill was likely generated during construction or widening of North Broadway. On the southern portion of the site, the fill thickness is relatively consistent, varying from 2 to 8 feet. On the northern portion, the fill varies in thickness from ½ to 30 feet. The fill on the northern portion was deepest near the intersection of Solano Street and North Broadway, on the unpaved terrace. The boring was terminated due to obstructions.

Alluvium

The alluvium consists of primarily of sand and gravelly sand, however, silty sand and clayey sand were encountered. The alluvium ranges in color from dark brown to yellowish brown and grayish brown. The alluvium is also dense to very dense, and moist to wet.

On the southern parcel the alluvium, the base of the fill was not encountered. Two borings were drilled on the southern portion to a depth of 70 feet (equivalent to elevation 223) and did not encounter the base of the alluvial soils. On the northern portion, the alluvium ranged in thickness from 0 to a maximum confirmed depth of 37.5 feet. Thicker accumulations of alluvium can be expected across from the former southeast draining canyons, across from Solano Avenue, Bishops road and Cottage Home Street.

Bedrock (Puente Formation)

Sedimentary bedrock of the Puente Formation consists of interbedded sandstone, siltstone and minor quantities of claystone. The bedrock is yellowish brown, yellow, olive brown and gray in color. The rock is moist and moderately hard to hard. The rock is well bedded, but near the surface, the bedding is obscured by weathering. As observed in the borings, bedding dips to the southwest from 42 to 65 degrees. This dip is consistent with the attitudes shown on the attached Local Geologic Map-Lamar. Bedding will be daylighted on cuts along North Broadway on the northern parcel. Fracturing and joints in the rock were not common.

Groundwater

Groundwater was encountered in Borings 3, 6 and 25 at depths of 30, 29, and 20 feet, respectively. These depths correlate with elevations of 263, 264, and 275 feet. The water was identified in the coarse grained alluvium, which will transmit water readily. Water was also encountered in Boring 18 at a depth of 66 feet (equivalent to elevation 382), but water in this boring occurred as seepage from the bedrock and is not considered correlatable with the water elevation in the other borings.

The historic high groundwater level was identified by review the Seismic Hazard Report for the Los Angeles, 7.5 Minute Quadrangle (CDMG, 2006). This report indicates that the historically highest groundwater level is approximately 20 feet below grade. A copy of this map is included in the Appendix.

Fluctuations in the level of groundwater may occur due to variations in rainfall, temperature, and other factors not evident at the time of the measurements reported herein. Fluctuations also may occur across the site. High groundwater levels can result in changed conditions.

Caving

Caving was not encountered in the borings drilled with the 24-inch diameter bucket auger. The borings drilled with the hollowstem auger in the cohesionless alluvium did not experience caving due to the continuously-cased design of the auger. Based on the experience of this firm, caving should be expected in large diameter borings drilled below the groundwater surface when cohesionless silt, sand, or gravel is encountered.

Methane

The site is located in the methane zone according to the City of Los Angeles Methane and Methane Buffer Zones Map (City of Los Angeles, 2003). Appropriate methane mitigation measures should be considered by an experienced methane consultant. A copy of this map is included as the Methane Zones Risk Map.

SEISMIC EVALUATION

REGIONAL GEOLOGIC SETTING

The subject site is located in the northern portion of the Peninsular Ranges Geomorphic Province in the Los Angeles Basin. The Peninsular Ranges are characterized by northwest-trending blocks of mountain ridges and sediment-floored valleys. The dominant geologic structural features are northwest trending fault zones that either die out to the northwest or terminate at east-trending reverse faults that form the southern margin of the Transverse Ranges.

The Los Angeles Basin is located at the northern end of the Peninsular Ranges Geomorphic Province. The basin is bounded by the east and southeast by the Santa Ana Mountains and San Joaquin Hills, to the northwest by the Santa Monica Mountains. Over 22 million years ago the Los Angeles basin was a deep marine basin formed by tectonic forces between the North

American and Pacific plates. Since that time, over 5 miles of marine and non-marine sedimentary rock as well as intrusive and extrusive igneous rocks have filled the basin. During the last 2 million years, defined by the Pleistocene and Holocene epochs, the Los Angeles basin and surrounding mountain ranges have been uplifted to form the present day landscape. Erosion of the surrounding mountains has resulted in deposition of unconsolidated sediments in low-lying areas by rivers such as the Los Angeles River. Areas that have experienced subtle uplift have been eroded with gullies.

REGIONAL FAULTING

Based on criteria established by the California Division of Mines and Geology (CDMG) now called California Geologic Survey (CGS), faults may be categorized as active, potentially active, or inactive. Active faults are those which show evidence of surface displacement within the last 11,000 years (Holocene-age). Potentially-active faults are those that show evidence of most recent surface displacement within the last 1.6 million years (Quaternary-age). Faults showing no evidence of surface displacement within the last 1.6 million years are considered inactive for most purposes, with the exception of design of some critical structures.

Buried thrust faults are faults without a surface expression but are a significant source of seismic activity. They are typically broadly defined based on the analysis of seismic wave recordings of hundreds of small and large earthquakes in the southern California area. Due to the buried nature of these thrust faults, their existence is usually not known until they produce an earthquake. The risk for surface rupture potential of these buried thrust faults is inferred to be low (Leighton, 1990). However, the seismic risk of these buried structures in terms of recurrence and maximum potential magnitude is not well established. Therefore, the potential for surface rupture on these surface-verging splays at magnitudes higher than 6.0 cannot be precluded.

SEISMIC HAZARDS AND DESIGN CONSIDERATIONS

The primary geologic hazard at the site is moderate to strong ground motion (acceleration) caused by an earthquake on any of the local or regional faults. The potential for other earthquake-induced hazards was also evaluated including surface rupture, liquefaction, dynamic settlement, inundation and landsliding.

Surface Rupture

In 1972, the Alquist-Priolo Special Studies Zones Act (now known as the Alquist-Priolo Earthquake Fault Zoning Act) was passed into law. The Act defines "active" and "potentially active" faults utilizing the same aging criteria as that used by California Geological Survey (CGS). However, established state policy has been to zone only those faults which have direct evidence of movement within the last 11,000 years. It is this recency of fault movement that the CGS considers as a characteristic for faults that have a relatively high potential for ground rupture in the future.

Based on research of available literature and results of site reconnaissance, no known active or potentially active faults underlie the subject site. The subject site is not located within an Alquist-Priolo Earthquake Fault Zone. The nearest such zone has been established for the Hollywood Fault, located 3.48 miles to the north. Based on these considerations, the potential for surface ground rupture at the subject site is considered low.

Liquefaction

Liquefaction is a phenomenon in which saturated silty to cohesionless soils below the groundwater table are subject to a temporary loss of strength due to the buildup of excess pore pressure during cyclic loading conditions such as those induced by an earthquake. Liquefaction-

related effects include loss of bearing strength, amplified ground oscillations, lateral spreading, and flow failures.

The Seismic Hazards Maps of the State of California (CDMG, 1999), classifies the site as part of the potentially "Liquefiable" area. This determination is based on groundwater depth records, soil type and distance to a fault capable of producing a substantial earthquake.

A site-specific liquefaction analysis was performed based on the SPT results, Boring 25 which was drilled to a depth of 70 feet. The sampling followed the Recommended Procedures for Implementation of the California Geologic Survey Special Publication 117A, Guidelines for Analyzing and Mitigating Seismic Hazards in California (CGS, 2008), and the EERI Monograph (MNO-12) by Idriss and Boulanger (2008). The enclosed liquefaction analysis was performed using the spreadsheet template LIQ2_30.WQ1 developed by Thomas F. Blake (Blake, 1996). This program utilizes the 1996 NCEER method of analysis. This semi-empirical method is based on a correlation between measured values of Standard Penetration Test (SPT) resistance and field performance data.

Groundwater was encountered during exploration at a depth of 20 feet below the ground surface. According to the Seismic Hazard Zone Report for the Los Angeles 7½-Minute Quadrangle (CDMG, 1998, Revised 2006), the historic-high groundwater level for the site was also at a depth of 20 feet below the ground surface.

The peak ground acceleration (PGA) and modal magnitude were obtained from the USGS websites, using the Probabilistic Seismic Hazard Deaggregation program (USGS, 2008) and the U.S. Seismic Design Maps tool (USGS, 2013). A Site Class "D" (Stiff Soil Profile) and a published shear wave velocity of 360 meters per second were utilized for Vs30 (Tinsley and Fumal, 1985) in the USGS seismic programs. A modal magnitude (M_W) of 6.6 is obtained using the USGS Probabilistic Seismic Hazard Deaggregation program (USGS, 2008). A peak ground

acceleration of 0.50g was obtained using the USGS Probabilistic Seismic Hazard Deaggregation program. These parameters are used in the enclosed liquefaction analyses.

Standard Penetration Test (SPT) data were collected at 5-foot intervals. Samples of the collected materials were conveyed to the laboratory for testing and analysis. The percent passing a Number 200 sieve, Atterberg Limits, and the plasticity index (PI) of representative samples of the soils encountered in the exploratory boring are presented on the enclosed E-Plate and F-Plate. Based on CGS Special Publication 117A (CDMG, 2008), the vast majority of liquefaction hazards are associated with sandy soils and silty soils of low plasticity. Furthermore, cohesive soils with PI between 7 and 12 and moisture content greater than 85 percent of the liquid limit are susceptible to liquefaction.

The procedure presented in the SP117A guidelines was followed in analyzing the liquefaction potential of the subject site. The SP 117A guidelines were developed based on a paper titled, "Assessment of the Liquefaction Susceptibility of Fine-Grained Soils", by Bray and Sancio (2006). According to the SP117A, soils having a Plastic Index greater than 18 exhibit clay-like behavior, and the liquefaction potential of these soils are considered to be low. Therefore, where the results of Atterberg Limits testing showed a Plastic Index greater than 18, the soils would be considered non-liquefiable, and the analysis of these soil layers was turned off in the liquefaction susceptibility column.

Based on CGS Special Publication 117A (CDMG, 2008), a factor of safety against the occurrence of liquefaction greater than about 1.3 can be considered an acceptable level of risk where high-quality, site-specific penetration resistance and geotechnical laboratory data is collected. Based on the enclosed liquefaction analysis, the lowest factor of safety calculated for soil layers considered susceptible to the occurrence of liquefaction is 0.89 between the depths of 45 to 47 feet. The amount of settlement is estimated to be 0.48 inch; differential settlement is anticipated to on the order of 0.3 inch due to liquefaction.

Surface Manifestation

It has been shown in recent studies by O'Rourke and Pease (1997) and Youd and Garris (1995), building upon work by Ishihara (1985), that the visible effects of liquefaction on the ground surface are only manifested if the relative and absolute thicknesses of liquefiable soils to overlying non-liquefiable surface material fall within a certain range. On the subject site, given the relatively deep groundwater level, the relative thicknesses of liquefiable soils to overlying non-liquefiable surface material fall well outside the bounds within which surface effects of liquefaction have been observed during past earthquakes. As a result, the likelihood that surface effects of liquefaction would occur on the subject site would be considered very low to non-existent. Therefore, it is the opinion of Geotechnologies, Inc. that, should liquefaction occur within the potentially liquefiable zones, there would be a negligible effect on the proposed structures.

The study by Ishihara (1985) presents data from three separate earthquakes where subsurface information was available regarding the absolute and relative thicknesses of liquefiable earth materials and overlying non-liquefiable materials. Information was obtained from sites where the surface effects of liquefaction were observed, and from sites where there were no visible surface effects. From this data, Ishihara (1985) graphs the liquefiable soil thickness vs. the overlying non-liquefiable thickness, and presents bounds identifying a zone within which surface effects of liquefaction were observed.

Youd and Garris (1995) build upon the work by Ishihara (1985), compiling data from 308 borings taken at sites shaken by 15 different earthquakes, ranging in magnitude from 5.3 to 8.0. They find that the boundaries presented by Ishihara relating the thicknesses of non-liquefiable surface layers to underlying potentially liquefiable layers remain valid for this extensive set of data, with very few exceptions. The particular site conditions which contributed to the few exceptional cases are not present on the subject site.

O'Rourke and Pease (1997) also compare the liquefiable vs. non-liquefiable thickness bounds initially proposed by Ishihara (1985) with data obtained from areas of San Francisco where the surface effects of liquefaction were observed during the 1989 Loma Prieta earthquake. They find general agreement with the previous findings of Ishihara (1985) and Youd and Garris (1995).

Lateral Spreading

Lateral spreading is the most pervasive type of liquefaction-induced ground failure. During lateral spread, blocks of mostly intact, surficial soil displace downslope or towards a free face along a shear zone that has formed within the liquefied sediment. Due to the relatively great depths (45 feet) to the liquefiable layer the potential of lateral spreading during the design earthquake is considered remote.

Dynamic Dry Settlement

Seismically-induced settlement or compaction of dry or moist, cohesionless soils can be an effect related to earthquake ground motion. Such settlements are typically most damaging when the settlements are differential in nature across the length of structures.

Some seismically-induced settlement of the proposed structures should be expected as a result of strong ground-shaking, however, due to the uniform nature of the underlying geologic materials, excessive differential settlements are not expected to occur.

Tsunamis, Seiches and Flooding

Tsunamis are large ocean waves generated by sudden water displacement caused by a submarine earthquake, landslide, or volcanic eruption. Review of the County of Los Angeles Flood and

Inundation Hazards Map, Leighton (1990), indicates the site does not lie within the mapped tsunami inundation boundary.

Seiches are oscillations generated in enclosed bodies of water which can be caused by ground shaking associated with an earthquake. Review of the County of Los Angeles Flood and Inundation Hazards Map, Leighton (1990), indicates the site lies within mapped inundation boundaries of the Devils Gate, Hanson Dam and Sepulveda Dam if breached by a seiche.

A determination of whether a higher site elevation would remove the site from the potential inundation zones is beyond the scope of this investigation.

Landsliding

The site is not located on or adjacent to a mapped landslide (Lamar, 1970, Yerkes, et al., 1977, and Dibblee, 1999). In addition, no indication of slope instability was noted during the subsurface exploration of the site. As part of the proposed development, the slopes in the building areas will be removed and replaced with the proposed structures. Therefore landsliding is not considered and issue.

CONCLUSIONS AND RECOMMENDATIONS

Based upon the exploration, laboratory testing, and research, it is the finding of Geotechnologies, Inc. that construction of the proposed mixed use structures are considered feasible from a geotechnical engineering standpoint provided the advice and recommendations presented herein are followed and implemented during construction.

The proposed development will be consist of several, multistory, mixed use structures located along the east side of North Broadway. The structures will be between 4 and 9 stories in height above the street elevation and descend approximately 30 to 50 feet to the Metro easement below.

The levels below the street elevation will be cut into the easterly-descending hillside. The proposed structures may be constructed over the Metro easement. It should be noted that the subsurface exploration described in this report did not extend into the Metro easement.

The southern portion of the site is underlain by fill soils that are up to 8 feet thick which are in turn, underlain by dense alluvium that extends to a depth of at least 70 feet. Bedrock may occur at a shallower depth near North Broadway but was not encountered in any of the borings. Groundwater was identified at depths of approximately 20 feet which corresponds to an elevation of 275 feet. The historically highest groundwater level occurred near the elevation of 273 feet.

The northern portion of the site is underlain by fill soils, alluvium, and sedimentary bedrock of the Puente Formation. The fill soils extend to a depth of as much as 30 feet below the ground surface and contain brick pieces and some concrete. Alluvium was identified below the fill. Bedrock was found to be as shallow at 1 foot in Borings 21, 22 and 24, and is exposed occurs on the east side of the site. Groundwater was identified in Boring 18 (in the bedrock) at a depth of 66 feet which is equivalent to an elevation of 282 feet. It is the opinion of this firm that this water elevation is due to perched water contained in bedrock fractures or sandstone beds.

A liquefaction analysis was performed in Boring 25, located on the southern portion of the site. The analysis identified a liquefiable layer at depths between 45 and 47 feet below the ground surface which is equivalent to elevations 250 to 247 feet. Liquefaction settlement on the order of 0.5 inch total and 0.3 inch differential across any building is anticipated. This settlement should be added to static settlement when considering foundation design. In some areas on the north portion of the site, alluvium will be exposed that is derived from the canyons and drainages from the west. This elevated alluvium is not considered liquefiable since the base of the alluvium is above the groundwater level identified at elevation 273 feet.

The existing fill materials are not suitable for support of the proposed foundations, floor slabs or additional fill. Excavation of the proposed subterranean levels will remove most of the unsuitable materials in the building areas.

For the southern portion of the site, where bedrock was not identified within the depth explored, a mat foundation should be used to accommodate the combined static and liquefaction settlement. However, if the proposed structures can be designed to accommodate both the static and liquefaction settlement anticipated to be up to 1½ inches and differential settlement of ¾ inch, then conventional foundations may be utilized.

Conventional foundations may be used for proposed structures on the northern portion where they will bear on the bedrock. At the subgrade elevation, siltstone bedrock, granular alluvium and fill soil will be exposed. The foundations should bear exclusively in the bedrock. Where alluvium or fill is exposed at the subgrade elevation, deepened footings or friction piles bearing in the rock may be necessary. If a geologic contact occurs across the slab it should be placed on a uniform compacted fill blanket at least 2 feet thick that is bearing on the alluvium or the bedrock slabs may be poured over bedrock or alluvium, but not a combination of both.

The site is located adjacent to the City of Los Angles Oil Field, which terminates on the west side of North Broadway. Two oil wells have been drilled and subsequently abandoned on the parcels according to available maps. Additional wells not shown on the map may be present and should be further investigated by an environmental consultant.

The site is located in the methane zone according to the City of Los Angeles Methane and Methane Buffer Zones Map (City of Los Angeles, 2003). Appropriate methane mitigation measures should be considered by a methane consultant.

The site is located within an area that is subject to flooding in the event of breach in the Devils Gate, Hansen Dam or Sepulveda Dam.

SEISMIC DESIGN CONSIDERATIONS

2013 California Building Code Seismic Parameters

According to Table 20.3-1 presented in ASCE 7-10, the southern portion of the site is classified as Site Class F due to the liquefiable nature of the underlying soils. According to Section 20.3.1 (site class definition for Site Class F) found in Chapter 20, titled "Site Classification Procedure for Seismic Design", ASCE 7-10, Minimum Design Loads for Buildings and Other Structures, an exception is provided under Site Classification F.

EXCEPTION: *For structures having fundamental periods of vibration equal to or less than 0.5 s, site-response analysis is not required to determine spectral accelerations for liquefiable soils. Rather, a site class is may be determined in accordance with Section 20.3 and the corresponding values of F_a and F_v determined from Tables 11.4-1 and 11.4-2.*

The proposed structures are between four and nine stories in height. The soils underlying the subject site does not fall under any other characteristics of Site Class E, but falls within the characteristics of Site Class D. Therefore, the subject site may be classified as Site Class D, which corresponds to a "Stiff Soil" Profile, in accordance with the ASCE 7 standard.

Based on information derived from the subsurface investigation, the southern portion of the subject site is classified as Site Class D where the structures will be supported on alluvium or compacted fill soils. The north portion of the site is classified as Site Class C, since the proposed structures will be supported on bedrock. This information and the site coordinates were input into the USGS U.S. Seismic Design Maps tool (Version 3.1.0) to calculate the ground motions for the site. The following table summarizes the design parameters for both types of underlying geologic materials.

2013 CALIFORNIA BUILDING CODE SEISMIC PARAMETERS		
Portion of Site	Southern	Northern
Site Class	D - Stiff Soil Profile	C - Soft Rock
Mapped Spectral Acceleration at Short Periods (S_S)	2.592g	2.592
Site Coefficient (F_a)	1.0	1.0
Maximum Considered Earthquake Spectral Response for Short Periods (S_{MS})	2.592g	2.592g
Five-Percent Damped Design Spectral Response Acceleration at Short Periods (S_{DS})	1.728g	1.728g
Mapped Spectral Acceleration at One-Second Period (S_1)	0.909g	0.909g
Site Coefficient (F_v)	1.0	1.3
Maximum Considered Earthquake Spectral Response for One-Second Period (S_{M1})	1.364g	1.182g
Five-Percent Damped Design Spectral Response Acceleration for One-Second Period (S_{D1})	0.909g	0.788g

FILL SOILS

The maximum depth of fill encountered on the site was 30 feet. This material and any fill generated during demolition should be removed during the excavation of the subterranean levels and removed from the site. The fill soils contain construction debris such as brick and concrete and may be used only if the deleterious materials are removed.

EXPANSIVE SOILS

The onsite geologic materials, both the alluvium and bedrock, are in the very low expansion index range. The Expansion Index was found to range from 8 to 18 for bulk samples of the alluvium and bedrock, remolded to 90 percent of the laboratory maximum density. Reinforcing beyond the minimum required by the City of Los Angeles Department of Building and Safety is not required.

WATER-SOLUBLE SULFATES

The portland cement portion of concrete is subject to attack when exposed to water-soluble sulfates. Usually the two most common sources of exposure are from soil and marine environments. The source of natural sulfate minerals in soils include the sulfates of calcium, magnesium, sodium, and potassium. When these minerals interact and dissolve in subsurface water, a sulfate concentration is created, which will react with the exposed concrete. Over time sulfate attack will destroy improperly proportioned concrete well before the end of its intended service life.

The water-soluble sulfate content of the onsite geologic materials was tested by California Test 417. The water-soluble sulfate content was determined to be less than 0.1% percentage by weight for the alluvium and greater than 0.2 % for the siltstone bedrock. Based on the 1997 Uniform Building Code, Table 19-A-4, the sulfate exposure is considered to be negligible for geologic materials with less than 0.1% and Type I cement may be utilized for concrete foundations in contact with the alluvium, and maximum water-cementitious ratio of 0.5 and a minimum concrete compressive strength of 3,000 psi should be used.

However, for concrete in contact with the bedrock, the sulfate exposure is considered to be severe. The bedrock has a sulfate concentration greater than 0.2%, therefore and Type V cement should be utilized. In addition, a maximum water-cementitious ratio of 0.45 and a minimum compressive strength of 4,500 psi should be used.

DEWATERING

The historic high groundwater level was identified by review of Seismic Hazard Zone Report for the Los Angeles 7.5-Minute Quadrangle (CDMG, 1998). The historically highest groundwater level is approximately 20 feet below grade which is equivalent to an elevation of 273 feet. As most of the structure will be above elevation 304 feet, the structure will not require dewatering.

GRADING GUIDELINES

Site Preparation

- A thorough search should be made for possible underground utilities and/or structures. Any existing or abandoned utilities or structures located within the footprint of the proposed grading should be removed or relocated as appropriate.
- All vegetation, existing fill, and soft or disturbed geologic materials should be removed from the areas to receive controlled fill. All existing fill materials and any disturbed geologic materials resulting from grading operations shall be completely removed and properly recompacted prior to foundation excavation.
- Any vegetation or associated root system located within the footprint of the proposed structures should be removed during grading.
- Subsequent to the indicated removals, the exposed grade shall be scarified to a depth of six inches, moistened to optimum moisture content, and recompacted in excess of the minimum required comparative density.
- The excavated areas shall be observed by the geotechnical engineer prior to placing compacted fill.

Compaction

Fill, consisting of soil approved by a representative of this firm shall be placed in loose lifts not more than 8 inches in thickness. The loose materials shall be compacted with suitable

compaction equipment. Once a layer has been adequately compacted, the next loose lift may be placed.

Fill materials shall be moisture conditioned to within 3 percent of optimum moisture content and sufficiently blended prior to placement as controlled fill. Materials larger than six inches in maximum dimension shall not be used in the fill.

All fill shall be compacted to at least 95 percent of the maximum laboratory density for the materials used. The maximum density shall be determined by the laboratory operated by Geotechnologies, Inc. using test method ASTM D 1557 (latest version) or equivalent.

Field observation and testing shall be performed by a representative of the geotechnical engineer during grading to assist the contractor in obtaining the required degree of compaction and the proper moisture content. Where compaction is less than required, additional compactive effort shall be made with adjustment of the moisture content, as necessary, until a minimum of 95 percent compaction is obtained.

Acceptable Materials

The excavated alluvium or fill (once deleterious materials have been removed) are considered satisfactory for reuse in the controlled fills as long as any debris and/or organic matter is removed.

The bedrock should not be reused as fill in building areas due to the high sulfate concentration. Blending of the bedrock and alluvial soils may be considered but should be verified by this firm.

Any imported materials shall be observed and tested by the representative of the geotechnical engineer prior to use in fill areas. Imported materials should contain sufficient fines so as to be relatively impermeable and result in a stable subgrade when compacted. Any required import

materials should consist of relatively non-expansive soils with an expansion index of less than 30. The water-soluble sulfate content of the import materials should be less than 0.1% percentage by weight.

Imported materials should be free from chemical or organic substances which could affect the proposed development. A competent professional should be retained in order to test imported materials and address environmental issues and organic substances which might affect the proposed development.

Utility Trench Backfill

Utility trenches should be backfilled with controlled fill. The utility should be bedded with clean sands at least one foot over the crown. The remainder of the backfill may be onsite soil compacted to 95 percent of the laboratory maximum density. All cobbles greater than 6 inches in diameter should be removed from the fill. Utility trench backfill should be tested by representatives of this firm in accordance with the most recent revision of ASTM D-1557.

Wet Soils

At the time of exploration, the soils which will be exposed at the bottom of the excavation were near the optimum moisture content. It is anticipated that the excavated material to be placed as compacted fill, and the materials exposed at the bottom of excavated plane will require some water application prior to recompaction.

Shrinkage

Shrinkage results when a volume of soil removed at one density is compacted to a higher density. A shrinkage factor between 5 and 10 percent should be anticipated when excavating and

recompacting the existing fill and alluvium. Bulking of 5 to 10 percent should be anticipated for areas where the bedrock is used as compacted fill.

Weather Related Grading Considerations

When rain is forecast, all fill that has been spread and awaits compaction shall be properly compacted prior to stopping work for the day or prior to stopping due to inclement weather. These fills, once compacted, shall have the surface sloped to drain to an area where water can be removed.

Temporary drainage devices should be installed to collect and transfer excess water to the street in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundation or retaining wall. Drainage should not be allowed to flow uncontrolled over any descending slope.

Work may start again, after a period of rainfall, once the site has been reviewed by a representative of this office. Any soils saturated by the rain shall be removed and aerated so that the moisture content will fall within three percent of the optimum moisture content.

Surface materials previously compacted before the rain shall be scarified, brought to the proper moisture content and recompacted prior to placing additional fill, if considered necessary by a representative of this firm.

Abandoned Seepage Pits

No abandoned seepage pits were encountered during exploration. In addition, none are known to exist on the site. Should such a structure be encountered during grading, options to permanently abandon seepage pits include complete removal and backfill of the excavation with compacted fill, drilling out the loose materials and backfilling to within a few feet of grade with slurry,

followed by a compacted fill cap, or placing a structural cap over the seepage pit, and then capping with compacted fill.

If the subsurface structures are to be removed by grading, the entire structure should be demolished. The resulting void may be refilled with compacted soil. Concrete and brick generated during the seepage pit removal may be reused in the fill as long as all fragments are less than 6 inches in longest dimension and the debris comprises less than 15 percent of the fill by volume. All grading should comply with the recommendations of this referenced report.

Where the seepage pit structure is to be left in place, the seepage pits should cleaned of all soil and debris. This may be accomplished by drilling. The pits should be filled with minimum 1-1/2 sack concrete slurry to within 5 feet of the bottom of the proposed foundations. In order to provide a more uniform foundation condition, the remainder of the void should be filled with controlled fill.

The structural cap method involves placing a structural concrete cap over the abandoned pit, thereby spanning the pit and loose fills below to allow the placement of compacted fill and site improvements above. The structural cap should consist of a 12-inch thick mat of concrete which is reinforced with two layers of #4 steel bars on 12-inch centers each way. There should be 3-inches of concrete cover over the steel at the top, bottom and sides of the mat, and the concrete should have a minimum strength of 2,000 psi. The concrete cap should extend a minimum of 2 feet beyond the edge of the seepage pit. The top of the concrete cap should be a minimum of 3 feet below the bottom of future foundations. Compacted fill would then be placed on top of the concrete cap to bring the area up to the future subgrade level. Prior to pouring the concrete cap, at least the surface of the fill in the pit should be tamped to create a firm surface on which to pour concrete.

Geotechnical Observations and Testing During Grading

Geotechnical observations and testing during grading are considered to be a continuation of the geotechnical investigation. It is critical that the geotechnical aspects of the project be reviewed by representatives of Geotechnologies, Inc. during the construction process. Compliance with the design concepts, specifications or recommendations during construction requires review by this firm during the course of construction. Any fill which is placed should be observed, tested, and verified if used for engineered purposes. Please advise this office at least twenty-four hours prior to any required site visit.

LEED Considerations

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System encourages adoption of sustainable green building and development practices. Credit for LEED Certification can be assigned for reuse of construction waste and diversion of materials from landfills in new construction.

In an effort to provide the design team with a viable option in this regard, demolition debris could be crushed onsite in order to use it in the ongoing grading operations. The environmental ramifications of this option, if any, should be considered by the team.

The demolition debris should be limited to concrete, asphalt and other non-deleterious materials. All deleterious materials should be removed including, but not limited to, paper, garbage, ceramic materials and wood.

For structural fill applications, the materials should be crushed to 2 inches in maximum dimension or smaller. The crushed materials should be thoroughly blended and mixed with onsite soils prior to placement as compacted fill. The amount of crushed material should not exceed 20 percent. The blended and mixed materials should be tested by this office prior to

placement to insure it is suitable for compaction purposes. The blended and mixed materials should be tested by Geotechnologies, Inc. during placement to insure that it has been compacted in a suitable manner.

Hillside Grading Issues

Sidehill fills should have a key placed at the toe of the proposed fill slope. This key should be cut a minimum of 3 feet into the alluvium or bedrock. The base of the key shall be sloped back into the hill. Where slopes are steeper than 5:1 (5 horizontal to 1 vertical), horizontal benches shall be cut into natural soils or rock in order to provide both lateral and vertical stability.

Sidehill fills shall have backdrains installed at the compacted fill contact to prevent future pore water pressure buildup. Backdrains shall consist of four inch perforated pipes; placed with perforations down. The pipe should be encased with at least one foot of gravel. The minimum cover on the pipe should be one foot. The gravel should consist of three-quarter inch to one inch crushed rock.

The first drain shall be placed no higher than three feet above the front cut of the key excavation. Additional backdrains shall be placed at intervals roughly equivalent to 15 feet of vertical rise in elevation or where considered necessary by the representative of this firm.

Each drain shall be placed into a trench excavated along the back of a horizontal bench at the compacted fill/ alluvium or bedrock contact. The trench bottom shall slope downward to each exit drain with a minimum gradient of two percent. The exit pipe shall consist of a four inch diameter non-perforated pipe. This pipe need not be encased in gravel. It shall exit at a minimum gradient of two percent to the finish face of the fill slope. A cutoff wall consisting of concrete or soil cement shall be placed at the junction of the perforated pipe and the exit drains to stop seepage and force the water being removed into the perforated pipe.

Materials excavated uphill from where fills are to be placed, shall not be cast over the slope into the fill area. Materials shall be channeled down a ramp to the area to receive compacted fill and then spread in horizontal layers. As compacted fills are placed, this ramp will be trimmed out to expose the dense, tight materials approved by the soils engineer. The minimum vertical height of bench in approved materials shall be three feet. This will maintain the proper benching, as fill is placed up the slope. The ramp will be shifted periodically during the grading operations to allow for complete removal of the loose fill materials and for the proper benching.

A minimum compaction of 95 percent out to the finish face of fill slopes will be required. Compaction on slopes may be achieved by over building the slope and cutting back to the compacted core or by direct compaction of the slope face with suitable equipment. Direct compaction on the slope faces shall be accomplished by back-rolling the slopes in three foot to four foot increments of elevation gain.

FOUNDATION DESIGN

Conventional

Conventional foundations may bear in a uniform compacted fill blanket on the southern portion of the site and in the bedrock on the northern portion. All conventional foundations for a structure should bear in the same material.

Compacted Fill

Continuous foundations may be designed for a bearing value of 2,500 pounds per square foot in the compacted fill. The footings should be a minimum of 12 inches in width, 18 inches in depth below the lowest adjacent grade and 18 inches into the recommended bearing material. Column foundations in the compacted fill may be designed for a bearing value of 2,800 pounds per

square foot, and should be a minimum of 24 inches in width, 18 inches in depth below the lowest adjacent grade and 18 inches into the recommended bearing material.

The bearing value increases in the compacted fill and the bedrock for each additional foot of width is 200 pounds per square foot. The bearing value increase for each additional foot of depth is 500 pounds per square foot. The maximum recommended bearing value is 5,000 pounds per square foot in the compacted fill.

Foundations bearing in controlled fill which are to be constructed adjacent to property lines and/or existing structures should be deepened, as appropriate, to bear below a 1:1 plane of foundation action projected up from the toe of the newly placed controlled fill. Foundations bearing in controlled fill which are to be constructed immediately adjacent to property lines and/or existing structures should be deepened to bear solely in native soils.

Bedrock

Continuous foundations may be designed for a bearing value of 5,000 pounds per square foot in the compacted fill. The footings should be a minimum of 12 inches in width, 18 inches in depth below the lowest adjacent grade and 18 inches into the recommended bearing material. Column foundations in the compacted fill may be designed for a bearing value of 4,200 pounds per square foot, and should be a minimum of 24 inches in width, 18 inches in depth below the lowest adjacent grade and 18 inches into the recommended bearing material.

The bearing value increases in the compacted fill and the bedrock for each additional foot of width is 200 pounds per square foot. The bearing value increase for each additional foot of depth is 500 pounds per square foot. The maximum recommended bearing value is 5,000 pounds per square foot in the compacted fill.

The bearing values indicated above are for the total of dead and frequently applied live loads, and may be increased by one third for short duration loading, which includes the effects of wind or seismic forces.

Miscellaneous Foundations

Conventional foundations for structures such as privacy walls or trash enclosures which will not be rigidly connected to the proposed structures may bear in the alluvium. Continuous footings may be designed for a bearing value of 2,000 pounds per square foot, and should be a minimum of 12 inches in width, 18 inches in depth below the lowest adjacent grade and 18 inches into the recommended bearing material. No bearing value increases are recommended.

Since the recommended bearing value is a net value, the weight of concrete in the foundations may be taken as 50 pounds per cubic foot and the weight of the soil backfill may be neglected when determining the downward load on the foundations.

Foundation Reinforcement

All foundations should be reinforced with a minimum of four #4 steel bars. Two should be placed near the top of the foundation, and two should be placed near the bottom.

Lateral Design

Resistance to lateral loading may be provided by friction acting at the base of foundations and by passive earth pressure. An allowable coefficient of friction of 0.35 may be used with the dead load forces in both the compacted fill and bedrock.

Passive earth pressure for the sides of foundations poured against fill or bedrock soil may be computed as an equivalent fluid having a density of 500 pounds per cubic foot with a maximum earth pressure of 5,000 pounds per square foot.

When combining passive and friction for lateral resistance, the passive component should be reduced by one third. A one-third increase in the passive value may be used for wind or seismic loads.

Foundation Settlement

Fill

Settlement of the foundation system is expected to occur on initial application of loading. The maximum settlement in the compacted fill is expected to be 1 inch and occur below the heaviest loaded columns. Differential settlement is not expected to exceed ½ inch.

Bedrock

The maximum settlement in the bedrock is expected to be ½ inch and occur below the heaviest loaded columns. Differential settlement is not expected to exceed 1/4 inch.

Foundation Observations

It is critical that all foundation excavations are observed by a representative of this firm to verify penetration into the recommended bearing materials. The observation should be performed prior to the placement of reinforcement. Foundations should be deepened to extend into satisfactory earth materials, if necessary.

Foundation excavations should be cleaned of all loose soils prior to placing steel and concrete. Any required foundation backfill should be mechanically compacted, flooding is not permitted.

FOUNDATION DESIGN - MAT FOUNDATION

Mat Foundation

Due to the potential for buoyancy pressures on the structure with the one level basement and the potential for liquefaction below the proposed at-grade building, a mat foundation is recommended for both structures. The mat should be founded exclusively in the natural alluvial soils for the structure with the basement, and in a newly-compacted fill for the at-grade structure.

The bottom of the mat foundation should be a minimum of 18 inches in depth below the lowest adjacent grade at the perimeter of the structure. The mat should be founded exclusively in a compacted fill blanket or alluvial soils. An allowable bearing pressure of 3,500 pounds per square foot may be utilized in the design of the proposed mat foundation. The mat foundation may be designed utilizing a modulus of subgrade reaction (K) of 375 pounds per cubic inch. This value should be reduced by the following equation:

$$K_R = K([B+1]/2B)^2$$

Where: K = Unit Subgrade Modulus
K_R = Reduced Subgrade Modulus
B = Equivalent Foundation Width

Lateral Design for Mat Foundation

Resistance to lateral loading may be provided by soil friction, and by the passive resistance of the soils. A coefficient of friction of 0.35 may be used with the dead load forces between footings and the underlying supporting soils.

Passive earth pressure for the sides of footings poured against undisturbed soil may be computed as an equivalent fluid having a density of 500 pounds per cubic foot, with a maximum earth pressure of 5,000 pounds per square foot. When combining passive and friction for lateral resistance, the passive component should be reduced by one third. A one-third increase in the passive value may be used for wind or seismic loads. A minimum safety factor of 2 has been utilized in determining the allowable passive pressure.

Foundation Settlement (Static)

The majority of the foundation settlement is expected to occur on initial application of loading. The maximum settlement is not expected to exceed approximately 0.5 inch, and will occur below the most heavily loaded area of the mat foundation. Differential settlement is not expected to exceed 0.25 inch. This settlement will occur primarily during construction and should be considered separate from liquefaction settlement described in this report.

FOUNDATION DESIGN - FRICTION PILES

Vertical Capacities

A deepened foundation system consisting of friction piles should be utilized for support of the proposed structure where the depth to bedrock makes deepened conventional foundations impracticable. The capacities of drilled cast-in-place piles are shown on the enclosed "Friction Pile Capacity Chart" in the Appendix. Capacities based on dead plus live load are indicated. A one-third increase may be used for transient loading such as wind or seismic forces. The capacities presented are based on the strength of the soils. The compressive and tensile strength of the pile sections should be checked to verify the structural capacity of the piles.

Piles in groups should be spaced at least 2-1/2 diameters on center. If the piles are so spaced, no reduction in the downward or upward capacities need be considered due to group action.

Lateral Design

Lateral loads may be resisted by the piles, and by the passive resistance of the soils against the pile caps. The passive resistance of the pile caps and grade beams against compacted fill, alluvium, or bedrock may be assumed to be equal to the pressure developed by a fluid with a density of 500 pounds per cubic foot. A one-third increase in this value may be used for wind or seismic loads. The resistance of the piles and the passive resistance of the soils against pile caps and grade beams may be combined without reduction in determining the total lateral resistance.

Analysis of the proposed piles using a varying shear load was performed using the program LPILE Plus (version 4.0) included in the Appendix of this report. The printouts show the calculated shear, moment, and deflection of the proposed piles. The analysis was performed for 24-inch drilled cast-in-place friction piles deriving support from the bedrock. Assumed as part of these lateral capacity calculations are:

- A fixed head Condition
- A 100 kip vertical load
- A concrete modulus of elasticity of 3,604,000 pounds per square inch (psi)
- Lateral shear loads of 10, 20, 30, 40, and 50 kips
- Two geologic conditions: Alluvium depths of 10 and 20 feet over bedrock.

Pile Installation

Due to the relatively low cohesion of the alluvium, some caving is anticipated during drilling of the proposed piles above the water table. Significant caving should be anticipated below the water level, if encountered. Where the bottom of the proposed piles will be below the water level, casing or the use of drilling mud will be required in order to achieve the required depth and maintain an open hole to allow the placement of the steel and concrete. If casing is used, extreme care should be employed so that the pile is not pulled apart as the casing is withdrawn. At no time should the distance between the surface of the concrete and the bottom of the casing be less than 5 feet.

Closely spaced piles should be drilled and filled alternately, with the concrete permitted to set at least overnight before drilling an adjacent hole. Pile excavations should be filled with concrete as soon after drilling and inspection as possible; the shafts should not be left open overnight.

Settlement

The maximum settlement of pile-supported foundations is not expected to exceed ½ inch. Differential settlement is expected to be 1/4 inch.

RETAINING WALL DESIGN

Cantilever Retaining Walls

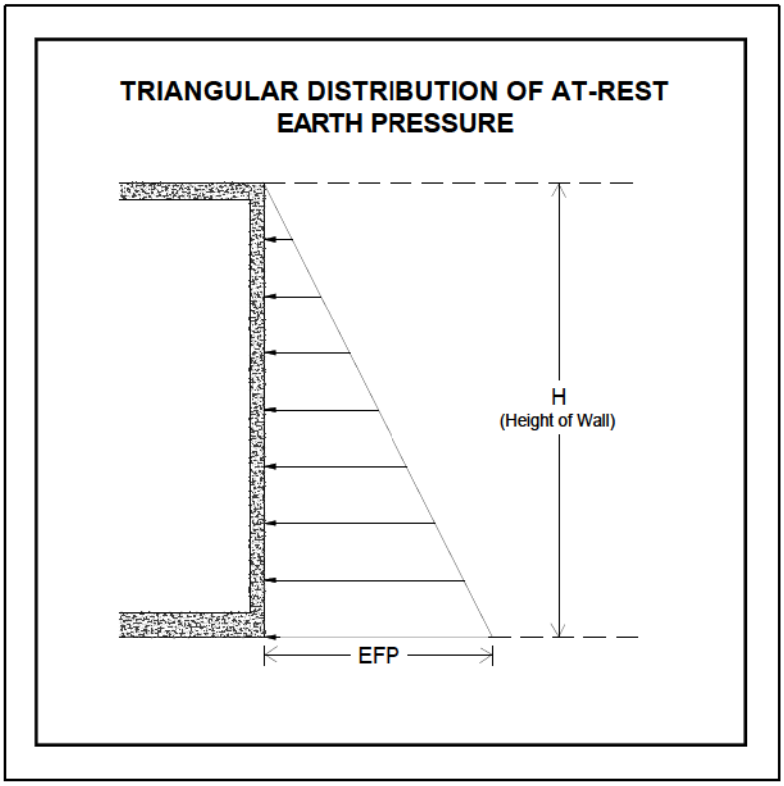
Retaining walls supporting a level backslope may be designed utilizing a triangular distribution of pressure. Since multiple geologic conditions will be encountered in the cuts along North Broadway retaining walls may be designed utilizing the following table:

HEIGHT OF WALL (feet)	EQUIVALENT FLUID PRESSURE (pounds per cubic foot)	
	Alluvium and Bedrock (Bedding Favorable)	Bedrock (Bedding Adverse)
Up to 10	23	28
10 to 20	40	55

For these equivalent fluid pressures to be valid, walls which are to be restrained at the top should be backfilled prior to the upper connection being made. Additional active pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent structures.

Restrained Drained Retaining Walls

Restrained retaining walls may be designed to resist a triangular pressure distribution of at-rest earth pressure as indicated in the diagram below. The at-rest pressure for retaining walls supporting alluvium or bedrock with favorable-oriented bedding is 64 pounds per square foot. The at-rest pressure for retaining walls supporting bedrock that is adversely oriented is 101 pounds per square foot. Additional earth pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent structures. The pressure distribution is as follows:



In addition to the recommended earth pressure, the upper ten feet of the retaining wall adjacent to streets, driveways or parking areas should be designed to resist a uniform lateral pressure of 100 pounds per square foot, acting as a result of an assumed 300 pounds per square foot surcharge behind the walls due to normal street traffic. If the traffic is kept back at least ten feet from the retaining walls, the traffic surcharge may be neglected.

The lateral earth pressures recommended above for retaining walls assume that a permanent drainage system will be installed so that external water pressure will not be developed against the walls. Also, where necessary, the retaining walls should be designed to accommodate any surcharge pressures that may be imposed by existing buildings on the adjacent property.

Dynamic (Seismic) Lateral Forces

The maximum dynamic active pressure is equal to the sum of the initial static pressure and the dynamic (seismic) pressure increment. The seismic increment in lateral earth pressure on the retaining side of the structure is applied to check the overall sliding resistance of the structure. This pressure is typically applicable where there is a differential of more than six feet in the height of the retained earth against opposite sides of the subterranean building level.

Should a seismic increment of lateral earth pressure be desired for incorporation into the design, the pressure may be designed utilizing a triangular distribution. The recommended dynamic active pressure is 28 pounds per square foot.

Retaining Wall Drainage

Retaining walls should be provided with a subdrain covered with a minimum of 12 inches of gravel, and a compacted fill blanket or other seal at the surface. The onsite geologic materials are acceptable for use as retaining wall backfill as long as they are compacted to a minimum of 90 or 95 percent of the maximum density as determined by the most recent revision of ASTM D 1557.

Certain types of subdrain pipe are not acceptable to the various municipal agencies, it is recommended that prior to purchasing subdrainage pipe, the type and brand is cleared with the proper municipal agencies. Subdrainage pipes should outlet to an acceptable location.

Where retaining walls are to be constructed adjacent to property lines, there is usually not enough space for emplacement of a standard pipe and gravel drainage system. Under these circumstances, the use of a flat drainage product is acceptable. However, the City of Los Angeles requires the use of a wall backdrain if a flat drainage product is used.

Where shoring will not allow the installation of a standard subdrainage system outside the wall, rock pockets may be utilized. The rock pockets with should drain through the wall. The pockets should be a minimum of 12 inches in length, width and depth. The pocket should be filled with gravel. The rock pockets should be no more than 8 feet on center.

Sump Pump Design

The purpose of the recommended retaining wall backdrainage system is to relieve hydrostatic pressure. Groundwater was encountered in the alluvial soils at elevations ranging from 263 to 275 feet. These elevations are below the base of the Metro easement elevation and below the lowest proposed finis floor elevation of the structures. Therefore the only water which could affect the proposed retaining walls would be irrigation waters and precipitation. Additionally, the proposed site grading is such that all drainage is directed to the street and the structure has been designed with adequate non-erosive drainage devices.

Based on these considerations the retaining wall backdrainage system is not expected to experience an appreciable flow of water, and in particular, no groundwater will affect it. However, for the purposes of design, a flow of 5 gallons per minute may be assumed for each proposed structure.

Surcharge from Adjacent Structures

As indicated herein, additional active pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent structures for retaining walls and shoring design.

The following surcharge equation provided in the LADBS Information Bulletin Document No. P/BC 2008-83, may be utilized to determine the surcharge loads on basement walls and shoring system for existing structures located within the 1:1 (h:v) surcharge influence zone of the excavation and basement.

Resultant lateral force: $R = (0.3*P*h^2)/(x^2+h^2)$

Location of lateral resultant: $d = x*[(x^2/h^2+1)*\tan^{-1}(h/x)-(x/h)]$

where:

R	=	resultant lateral force measured in pounds per foot of wall width.
P	=	resultant surcharge loads of continuous or isolated footings measured in pounds per foot of length parallel to the wall.
x	=	distance of resultant load from back face of wall measured in feet.
h	=	depth below point of application of surcharge loading to top of wall footing measured in feet.
d	=	depth of lateral resultant below point of application of surcharge loading measure in feet.
$\tan^{-1}(h/x)$	=	the angle in radians whose tangent is equal to h/x.

The structural engineer and shoring engineer may use this equation to determine the surcharge loads based on the loading of the adjacent structures located within the surcharge influence zone.

Waterproofing

Moisture effecting retaining walls is one of the most common post construction complaints. Poorly applied or omitted waterproofing can lead to efflorescence or standing water inside the building. Efflorescence is a process in which a powdery substance is produced on the surface of the concrete by the evaporation of water. The white powder usually consists of soluble salts such as gypsum, calcite, or common salt. Efflorescence is common to retaining walls and does not affect their strength or integrity.

It is recommended that retaining walls be waterproofed. Waterproofing design and inspection of its installation is not the responsibility of the geotechnical engineer. A qualified waterproofing

consultant should be retained in order to recommend a product or method which would provide protection to below grade walls.

Retaining Wall Backfill

Any required backfill should be mechanically compacted in layers not more than 8 inches thick, to at least 90 or 95 percent of the maximum density obtainable by the most recent revision of ASTM D 1557 method of compaction. Flooding should not be permitted. Compaction within 5 feet, measured horizontally, behind a retaining structure should be achieved by use of light weight, hand operated compaction equipment.

Proper compaction of the backfill will be necessary to reduce settlement of overlying walks and paving. Some settlement of required backfill should be anticipated, and any utilities supported therein should be designed to accept differential settlement, particularly at the points of entry to the structure.

TEMPORARY EXCAVATIONS

Excavations up to 50 feet in vertical height will be required for the cuts into the east-facing slope. The excavations are expected to expose fill, alluvium, and bedrock with both favorable and adversely-oriented bedding. The fill, alluvium and favorably-oriented bedrock are suitable for vertical excavations up to 5 feet where not surcharged by adjacent traffic or structures. Adversely oriented bedrock should be cut at the angle of bedding. Excavations which will be surcharged by adjacent traffic or structures should be shored.

Where sufficient space is available, temporary unsurcharged embankments the exposed fill; alluvium and favorably oriented rock could be cut at a uniform 1 to 1 slope gradient up to a height of 15 feet. A uniform sloped excavation is sloped from bottom to top and does not have a vertical component.

Where sloped embankments are utilized, the tops of the slopes should be barricaded to prevent vehicles and storage loads near the top of slope within a horizontal distance equal to the depth of the excavation. If the temporary construction embankments are to be maintained during the rainy season, berms are strongly recommended along the tops of the slopes to prevent runoff water from entering the excavation and eroding the slope faces. Water should not be allowed to pond on top of the excavation nor to flow towards it.

Excavation Observations

It is critical that the soils exposed in the cut slopes are observed by a representative of Geotechnologies, Inc. during excavation so that modifications of the slopes can be made if variations in the geologic material conditions occur. Many building officials require that temporary excavations should be made during the continuous observations of the geotechnical engineer. All excavations should be stabilized within 30 days of initial excavation.

SHORING DESIGN

The following information on the design and installation of the shoring is as complete as possible at this time. It is suggested that Geotechnologies, Inc. review the final shoring plans and specifications prior to bidding or negotiating with a shoring contractor.

The soldier piles may be designed as cantilevers or laterally braced utilizing drilled tied-back anchors or raker braces. One method of shoring would consist of steel soldier piles, placed in drilled holes and backfilled with concrete. Another method of shoring consists of steel soldier piles vibrated into place. Either of these methods is acceptable to Geotechnologies, Inc.

If vibrated piles are used, predrilling may not extend deeper than the excavated plane of the foundation and the diameter of the predrilling may not be greater than the dimension of the web. Appropriate precautions, such as vibration monitoring should be taken to not affect nearby structures.

Soldier Piles

Drilled cast-in-place soldier piles should be placed no closer than 2 diameters on center. The minimum diameter of the piles is 18 inches. Structural concrete should be used for the soldier piles below the excavation; lean-mix concrete may be employed above that level. As an alternative, lean-mix concrete may be used throughout the pile where the reinforcing consists of a wideflange section. The slurry must be of sufficient strength to impart the lateral bearing pressure developed by the wideflange section to the geologic materials. For design purposes, an allowable passive value for the geologic materials below the bottom plane of excavation may be assumed to be 400 pounds per square foot per foot. To develop the full lateral value, provisions should be implemented to assure firm contact between the soldier piles and the undisturbed geologic materials.

Groundwater was encountered during exploration at a depth of 275 feet below grade in the alluvium. Proposed piles may extend to this elevation and may encounter water. Piles placed below the water level require the use of a tremie to place the concrete into the bottom of the hole. A tremie shall consist of a water-tight tube having a diameter of not less than 10 inches with a hopper at the top. The tube shall be equipped with a device that will close the discharge end and prevent water from entering the tube while it is being charged with concrete. The tremie shall be supported so as to permit free movement of the discharge end over the entire top surface of the work and to permit rapid lowering when necessary to retard or stop the flow of concrete. The discharge end shall be closed at the start of the work to prevent water entering the tube and shall be entirely sealed at all times, except when the concrete is being placed. The tremie tube shall be kept full of concrete. The flow shall be continuous until the work is completed and the resulting concrete seal shall be monolithic and homogeneous. The tip of the tremie tube shall always be kept about five feet below the surface of the concrete and definite steps and safeguards should be taken to insure that the tip of the tremie tube is never raised above the surface of the concrete.

A special concrete mix should be used for concrete to be placed below water. The design shall provide for concrete with a strength p.s.i. of 1,000 over the initial job specification. An admixture that reduces the problem of segregation of paste/aggregates and dilution of paste shall be included. The slump shall be commensurate to any research report for the admixture, provided that it shall also be the minimum for a reasonable consistency for placing when water is present.

Casing may be required should caving be experienced in the granular (saturated) geologic materials. If casing is used, extreme care should be employed so that the pile is not pulled apart as the casing is withdrawn. At no time should the distance between the surface of the concrete and the bottom of the casing be less than 5 feet.

The frictional resistance between the soldier piles and retained geologic material may be used to resist the vertical component of the anchor load. The coefficient of friction may be taken as 0.3 based on uniform contact between the steel beam and lean-mix concrete and retained earth. The portion of soldier piles below the plane of excavation may also be employed to resist the downward loads. The downward capacity may be determined using a frictional resistance of 250 pounds per square foot. The minimum depth of embedment for shoring piles is 5 feet below the bottom of the footing excavation or 7 feet below the bottom of excavated plane whichever is deeper.

Lagging

Soldier piles and anchors should be designed for the full anticipated pressures. Due to arching in the geologic materials, the pressure on the lagging will be less. It is recommended that the lagging should be designed for the full design pressure but be limited to a maximum of 400 pounds per square foot. It is recommended that a representative of this firm observe the installation of lagging to insure uniform support of the excavated embankment.

Tied-Back Anchors

Tied-back anchors may be used to resist lateral loads. Friction anchors are recommended. For design purposes, it may be assumed that the active wedge adjacent to the shoring is defined by a plane drawn 35 degrees with the vertical through the bottom plane of the excavation. Friction anchors should extend a minimum of 20 feet beyond the potentially active wedge.

Drilled friction anchors may be designed for a skin friction of 300 pounds per square foot. Only the frictional resistance developed beyond the active wedge would be effective in resisting lateral loads. This skin friction is based on 15 foot high shoring, a tied back anchor elevation 6 feet below grade and a minimum twenty foot embedment beyond the potentially active wedge yielding an overburden of 12½ feet below ground surface. Where belled anchors are utilized, the capacity of belled anchors may be designed by applying the skin friction over the surface area of the bonded anchor shaft. The diameter of the bell may be utilized as the diameter of the bonded anchor shaft when determining the surface area. This implies that in order for the belled anchor to fail, the entire parallel soil column must also fail.

Depending on the techniques utilized, and the experience of the contractor performing the installation, it is anticipated that a skin friction of 2,000 pounds per square foot could be utilized for post-grouted anchors. Only the frictional resistance developed beyond the active wedge would be effective in resisting lateral loads.

Anchors should be placed at least 6 feet on center to be considered isolated. It is recommended that at least 3 of the initial anchors have their capacities tested to 200 percent of their design capacities for a 24-hour period to verify their design capacity.

The total deflection during this test should not exceed 12 inches. The anchor deflection should not exceed 0.75 inches during the 24 hour period, measured after the 200 percent load has been applied. All anchors should be tested to at least 150 percent of design load. The total deflection during this test should not exceed 12 inches.

The rate of creep under the 150 percent test load should not exceed 0.1 inch over a 15 minute period in order for the anchor to be approved for the design loading. After a satisfactory test, each anchor should be locked-off at the design load. This should be verified by rechecking the load in the anchor. The load should be within 10 percent of the design load. Where satisfactory tests are not attained, the anchor diameter and/or length should be increased or additional anchors installed until satisfactory test results are obtained. The installation and testing of the anchors should be observed by the geotechnical engineer. Minor caving during drilling of the anchors should be anticipated.

Anchor Installation

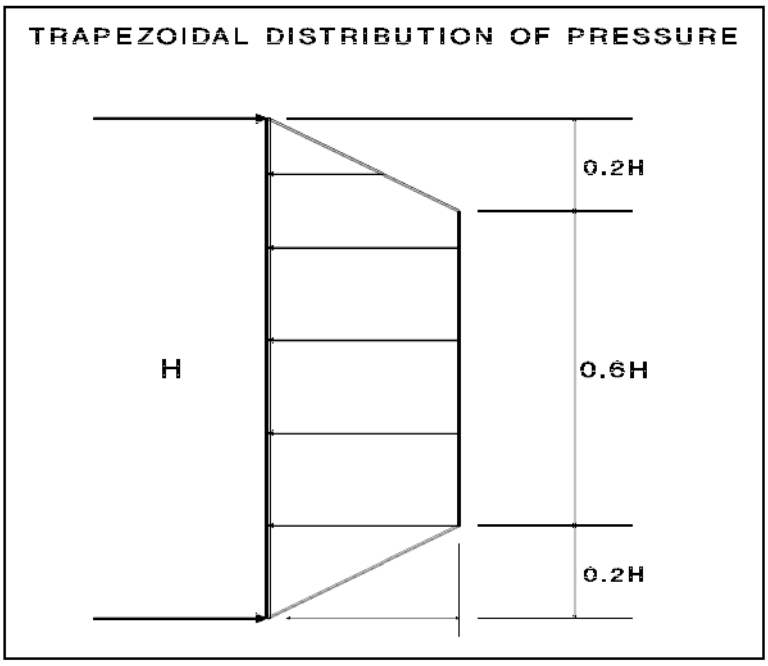
Tied-back anchors may be installed between 20 and 40 degrees below the horizontal. Caving of the anchor shafts, particularly within sand deposits, should be anticipated and the following provisions should be implemented in order to minimize such caving. The anchor shafts should be filled with concrete by pumping from the tip out, and the concrete should extend from the tip of the anchor to the active wedge. In order to minimize the chances of caving, it is recommended that the portion of the anchor shaft within the active wedge be backfilled with sand before testing the anchor. This portion of the shaft should be filled tightly and flush with the face of the excavation. The sand backfill should be placed by pumping; the sand may contain a small amount of cement to facilitate pumping.

Lateral Pressures

Cantilevered shoring supporting a level backslope may be designed utilizing a triangular distribution of pressure as indicated in the following table. Geologic conditions are variable along north Broadway. For clarification of the type of geologic materials and the appropriate lateral load, this office should be contacted.

HEIGHT OF WALL (feet)	EQUIVALENT FLUID PRESSURE (pounds per cubic foot)	
	Alluvium and Bedrock (Bedding Favorable)	Bedrock (Bedding Adverse)
10 to 20	-	28
Up to 20	30	45
20 to 30	37	60
30 to 40	41	67
40 to 50	43	72

A trapezoidal distribution of lateral earth pressure would be appropriate where shoring is to be restrained at the top by bracing or tie backs, with the trapezoidal distribution as shown in the diagram below.



Restrained shoring supporting a level backslope may be designed utilizing a trapezoidal distribution of pressure as indicated in the following table:

HEIGHT OF WALL (feet)	EQUIVALENT FLUID PRESSURE Where H is the height of the Wall (pounds per cubic foot)	
	Alluvium and Bedrock (Bedding Favorable)	Bedrock (Bedding Adverse)
10 to 20	-	18H
Up to 20	19H	28H
20 to 30	23H	38H
30 to 40	26H	42H
40 to 50	29H	45H

Where a combination of sloped embankment and shoring is utilized, the pressure will be greater and must be determined for each combination. Additional active pressure should be applied where the shoring will be surcharged by adjacent traffic or structures. Where a combination of sloped embankment and shoring is utilized, the pressure will be greater and must be determined for each combination.

Deflection

It is difficult to accurately predict the amount of deflection of a shored embankment. It should be realized that some deflection will occur. It is estimated that the deflection could be on the order of one inch at the top of the shored embankment. If greater deflection occurs during construction, additional bracing may be necessary to minimize settlement of adjacent buildings and utilities in adjacent street and alleys. If desired to reduce the deflection, a greater active pressure could be used in the shoring design. Where internal bracing is used, the rakers should be tightly wedged to minimize deflection. The proper installation of the raker braces and the wedging will be critical to the performance of the shoring.

The City of Los Angeles Department of Building and Safety requires limiting shoring deflection to ½ inch at the top of the shored embankment where a structure is within a 1:1 plane projected

up from the base of the excavation. A maximum deflection of 1-inch has been allowed provided there are no structures within a 1:1 plane drawn upward from the base of the excavation.

Monitoring

Because of the depth of the excavation, some means of monitoring the performance of the shoring system is suggested. The monitoring should consist of periodic surveying of the lateral and vertical locations of the tops of all soldier piles and the lateral movement along the entire lengths of selected soldier piles. Also, some means of periodically checking the load on selected anchors will be necessary, where applicable.

Some movement of the shored embankments should be anticipated as a result of the relatively deep excavation. It is recommended that photographs of the existing buildings on the adjacent properties be made during construction to record any movements for use in the event of a dispute.

Shoring Observations

It is critical that the installation of shoring is observed by a representative of Geotechnologies, Inc. Many building officials require that shoring installation should be performed during continuous observation of a representative of the geotechnical engineer. The observations insure that the recommendations of the geotechnical report are implemented and so that modifications of the recommendations can be made if variations in the geologic material or groundwater conditions warrant. The observations will allow for a report to be prepared on the installation of shoring for the use of the local building official, where necessary.

SLABS ON GRADE

Concrete Slabs-on Grade

Concrete floor slabs should be a minimum of 4 inches in thickness. Slabs-on-grade should be cast over undisturbed natural geologic materials or properly controlled fill materials. Any geologic materials loosened or over-excavated should be wasted from the site or properly compacted to 90 or 95 percent of the maximum dry density.

Outdoor concrete flatwork should be a minimum of 4 inches in thickness. Outdoor concrete flatwork should be cast over undisturbed natural geologic materials or properly controlled fill materials. Any geologic materials loosened or over-excavated should be wasted from the site or properly compacted to 90 or 95 percent of the maximum dry density.

Design of Slabs That Receive Moisture-Sensitive Floor Coverings

Geotechnologies, Inc. does not practice in the field of moisture vapor transmission evaluation and mitigation. Therefore it is recommended that a qualified consultant be engaged to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. The qualified consultant should provide recommendations for mitigation of potential adverse impacts of moisture vapor transmission on various components of the structure.

Where dampness would be objectionable, it is recommended that the floor slabs should be waterproofed. A qualified waterproofing consultant should be retained in order to recommend a product or method which would provide protection for concrete slabs-on-grade.

All concrete slabs-on-grade should be supported on vapor retarder. The design of the slab and the installation of the vapor retarder should comply with the most recent revisions of ASTM E 1643 and ASTM E 1745. The vapor retarder should comply with ASTM E 1745 Class A requirements.

Where a vapor retarder is used, a low-slump concrete should be used to minimize possible curling of the slabs. The barrier can be covered with a layer of trimable, compactible, granular fill, where it is thought to be beneficial. See ACI 302.2R-32, Chapter 7 for information on the placement of vapor retarders and the use of a fill layer.

Groundwater was encountered on the subject site at elevations below 275 feet. Proposed concrete slabs-on-grade do not need to be supported on a layer of compacted aggregate to provide a capillary break.

Concrete Crack Control

The recommendations presented in this report are intended to reduce the potential for cracking of concrete slabs-on-grade due to settlement. However even where these recommendations have been implemented, foundations, stucco walls and concrete slabs-on-grade may display some cracking due to minor soil movement and/or concrete shrinkage. The occurrence of concrete cracking may be reduced and/or controlled by limiting the slump of the concrete used, proper concrete placement and curing, and by placement of crack control joints at reasonable intervals, in particular, where re-entrant slab corners occur.

For standard control of concrete cracking, a maximum crack control joint spacing of 15 feet should not be exceeded. Lesser spacings would provide greater crack control. Joints at curves and angle points are recommended. The crack control joints should be installed as soon as practical following concrete placement. Crack control joints should extend a minimum depth of one-fourth the slab thickness. Construction joints should be designed by a structural engineer.

Complete removal of the existing fill soils beneath outdoor flatwork such as walkways or patio areas, is not required, however, due to the rigid nature of concrete, some cracking, a shorter design life and increased maintenance costs should be anticipated. In order to provide uniform

support beneath the flatwork it is recommended that a minimum of 12 inches of the exposed subgrade beneath the flatwork be scarified and recompacted to 90 percent relative compaction.

Slab Reinforcing

Concrete slabs-on-grade should be reinforced with a minimum of #4 steel bars on 16-inch centers each way.

Outdoor flatwork should be reinforced with a minimum of #3 steel bars on 24-inch centers each way.

PAVEMENTS

Prior to placing paving, the existing grade should be scarified to a depth of 12 inches, moistened as required to obtain optimum moisture content, and recompacted to 90 percent of the maximum density as determined by the most recent revision of ASTM D 1557. The client should be aware that removal of all existing fill in the area of new paving is not required, however, pavement constructed in this manner will most likely have a shorter design life and increased maintenance costs. An R-Value of 30 was assumed for the paving thicknesses described below. The following pavement sections are recommended:

Service	Asphalt Pavement Thickness Inches	Base Course Inches
Passenger Cars (TI=5)	3	4
Moderate Truck (TI=6)	4	6

Aggregate base should be compacted to a minimum of 95 percent of the most recent revision of ASTM D 1557 laboratory maximum dry density. Base materials should conform with Sections 200-2.2 or 200-2.4 of the "Standard Specifications for Public Works Construction", (Green Book), 1991 Edition.

The performance of pavement is highly dependent upon providing positive surface drainage away from the edges. Ponding of water on or adjacent to pavement can result in saturation of the subgrade materials and subsequent pavement distress. If planter islands are planned, the perimeter curb should extend a minimum of 12 inches below the bottom of the aggregate base.

Concrete paving may be used on the project. Based on the highway design manual, for Traffic Index of 7, concrete paving should be 8 inches of concrete over 4 inches of compacted base.

The occurrence of concrete cracking may be reduced and/or controlled by limiting the slump of the concrete used, proper concrete placement and curing, and by placement of crack control joints at reasonable intervals, in particular, where re-entrant slab corners occur.

For standard control of concrete cracking, a maximum crack control joint spacing of 12 feet should not be exceeded. Lesser spacings would provide greater crack control. Joints at curves and angle points are recommended. The crack control joints should be installed as soon as practical following concrete placement. Crack control joints should extend a minimum depth of one-fourth the slab thickness. Construction joints should be designed by a structural engineer. Concrete paving should be reinforced with a minimum of #3 steel bars on 18-inch centers each way.

For crack control, steel reinforcement may be considered in rigid (PCC) pavements, typically consisting of No. 3 bars at a maximum spacing of 24-inches in each direction. Reinforcing bars, if used, should be placed at mid-height of the concrete slab and maintained at mid height during placement of concrete.

The management of pavement wear primarily is focused on the distress caused by vertical loads. The reduction of vertical loading from large vehicles is assisted by increasing the number of axles. Multi-axle groups reduce the peak vertical loading and, when closely spaced, reduce the magnitude of the strain cycles to which the pavement is subjected. However, where tight low-

speed turns are executed, non-steering axle groups lead to transverse shear forces (scuffing) at the pavement-tire interface.

With asphaltic concrete pavements, tensile shear stresses from tires can cause surface cracking and raveling, thus, the increased use of non-steering axle groups results in increased pavement wear in the vicinity of intersections and turnarounds where tight low speed turns are executed.

When designing intersections and turnarounds the turn radius should be as large as possible. This will lead to reduced "scuffing" forces. Where tight radius turns are unavoidable, the pavement surface design should take into account the high level of "scuffing" forces that will occur and thickened pavement and subgrade and base course keyways should be considered to assist in the reduction of lateral deflection.

SITE DRAINAGE

Proper surface drainage is critical to the future performance of the project. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Proper site drainage should be maintained at all times.

All site drainage, with the exception of any required to disposed of onsite by stormwater regulations, should be collected and transferred to the street in non-erosive drainage devices. The proposed structure should be provided with roof drainage. Discharge from downspouts, roof drains and scuppers should not be permitted on unprotected soils within five feet of the building perimeter. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundation or retaining wall. Drainage should not be allowed to flow uncontrolled over any descending slope. Planters which are located within a distance equal to the depth of a retaining wall should be sealed to prevent moisture adversely affecting the wall. Planters which are located within five feet of a foundation should be sealed to prevent moisture affecting the earth materials supporting the foundation.

STORMWATER DISPOSAL

Introduction

Recently regulatory agencies have been requiring the disposal of a certain amount of stormwater generated on a site by infiltration into the site soils. Increasing the moisture content of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. This means that any overlying structure, including buildings, pavements and concrete flatwork, could sustain damage due to saturation of the subgrade soils. Structures serviced by subterranean levels could be adversely impacted by stormwater disposal by increasing the design fluid pressures on retaining walls and causing leaks in the walls. Proper site drainage is critical to the performance of any structure in the built environment.

Potential stormwater percolation sites have not yet been identified for this project, therefore, percolation testing was not performed as part of this investigation. In general, the siltstone bedrock and the fill soils are not suitable for stormwater disposal. Only the alluvial soils are suitable for stormwater disposal. The southern portion of the site and the lower portion of the site along the Metro easement are location where such materials may be found.

The Proposed System

The locations for potential stormwater disposal have not been specifically addressed on this site. It is the opinion of this office that stormwater infiltration is possible, however until the development plan achieves more definition, and this office can address the impacts, stormwater infiltration recommendations cannot be provided.

Recommendations

The design and construction of stormwater infiltration facilities is not the responsibility of the geotechnical engineer. However, based on the experience of this firm, it is recommended that several aspects of the use of such facilities should be considered by the design and construction team:

- Open infiltration basins have many negative associated issues. Such a design must consider attractive nuisance, impacts to growing vegetation, impacts to air quality and vector control.
- All infiltration devices should be provided with overflow protection. Once the device is full of water, additional water flowing to the device should be diverted to another acceptable disposal area, or disposed offsite in an acceptable manner.
- All connections associated with stormwater infiltration devices should be sealed and water-tight. Water leaking into the subgrade soils can lead to loss of strength, piping, erosion, settlement and/or expansion of the effected earth materials.
- Excavations proposed for the installation of stormwater facilities should comply with the "Temporary Excavations" sections of this (the referenced) reports well as CalOSHA Regulations where applicable.

DESIGN REVIEW

Engineering of the proposed project should not begin until approval of the geotechnical report by the Building Official is obtained in writing. Significant changes in the geotechnical recommendations may result during the building department review process.

It is recommended that the geotechnical aspects of the project be reviewed by this firm during the design process. This review provides assistance to the design team by providing specific recommendations for particular cases, as well as review of the proposed construction to evaluate whether the intent of the recommendations presented herein are satisfied.

CONSTRUCTION MONITORING

Geotechnical observations and testing during construction are considered to be a continuation of the geotechnical investigation. It is critical that this firm review the geotechnical aspects of the project during the construction process. Compliance with the design concepts, specifications or recommendations during construction requires review by this firm during the course of construction. All foundations should be observed by a representative of this firm prior to placing concrete or steel. Any fill which is placed should be observed, tested, and verified if used for engineered purposes. Please advise Geotechnologies, Inc. at least twenty-four hours prior to any required site visit.

If conditions encountered during construction appear to differ from those disclosed herein, notify Geotechnologies, Inc. immediately so the need for modifications may be considered in a timely manner.

It is the responsibility of the contractor to ensure that all excavations and trenches are properly sloped or shored. All temporary excavations should be cut and maintained in accordance with applicable OSHA rules and regulations.

EXCAVATION CHARACTERISTICS

The exploration performed for this investigation is limited to the geotechnical excavations described. Direct exploration of the entire site would not be economically feasible. The owner, design team and contractor must understand that differing excavation and drilling conditions may be encountered based on boulders, gravel, oversize materials, groundwater and many other conditions. Fill materials, especially when they were placed without benefit of modern grading codes, regularly contain materials which could impede efficient grading and drilling. Southern California sedimentary bedrock is known to contain variable layers which reflect differences in depositional environment. Such layers may include abundant gravel, cobbles and boulders.

Similarly bedrock can contain concretions. Concretions are typically lenticular and follow the bedding. They are formed by mineral deposits. Concretions can be very hard. Excavation and drilling in these areas may require full size equipment and coring capability. The contractor should be familiar with the site and the geologic materials in the vicinity.

CLOSURE AND LIMITATIONS

The purpose of this report is to aid in the design and completion of the described project. Implementation of the advice presented in this report is intended to reduce certain risks associated with construction projects. The professional opinions and geotechnical advice contained in this report are sought because of special skill in engineering and geology and were prepared in accordance with generally accepted geotechnical engineering practice.

Geotechnologies, Inc. has a duty to exercise the ordinary skill and competence of members of the engineering profession. Those who hire Geotechnologies, Inc. are not justified in expecting infallibility, but can expect reasonable professional care and competence.

The scope of the geotechnical services provided did not include any environmental site assessment for the presence or absence of organic substances, hazardous/toxic materials in the soil, surface water, groundwater, or atmosphere, or the presence of wetlands.

Proper compaction is necessary to reduce settlement of overlying improvements. Some settlement of compacted fill should be anticipated. Any utilities supported therein should be designed to accept differential settlement. Differential settlement should also be considered at the points of entry to the structure.

The City of Los Angeles does not require corrosion testing. However, if corrosion sensitive improvements are planned, it is recommended that a comprehensive corrosion study should be

commissioned. The study will develop recommendations to avoid premature corrosion of buried pipes and concrete structures in direct contact with the soils.

GEOTECHNICAL TESTING

Classification and Sampling

The soil is continuously logged by a representative of this firm and classified by visual examination in accordance with the Unified Soil Classification system. The field classification is verified in the laboratory, also in accordance with the Unified Soil Classification System. Laboratory classification may include visual examination, Atterberg Limit Tests and grain size distribution. The final classification is shown on the excavation logs.

Samples of the geologic materials encountered in the exploratory excavations were collected and transported to the laboratory. Undisturbed samples of soil are obtained at frequent intervals. Unless noted on the excavation logs as an SPT sample, samples acquired while utilizing a hollow-stem auger drill rig are obtained by driving a thin-walled, California Modified Sampler with successive 30-inch drops of a 140-pound hammer. Samples from bucket-auger drilling are obtained utilizing a California Modified Sampler with successive 12-inch drops of a kelly bar, whose weight is noted on the excavation logs. The soil is retained in brass rings of 2.50 inches outside diameter and 1.00 inch in height. The central portion of the samples are stored in close fitting, waterproof containers for transportation to the laboratory. Samples noted on the excavation logs as SPT samples are obtained in accordance with the most recent revision of ASTM D 1586. Samples are retained for 30 days after the date of the geotechnical report.

Grain Size Distribution

These tests cover the quantitative determination of the distribution of particle sizes in soils. Sieve analysis is used to determine the grain size distribution of the soil larger than the Number 200 sieve.

The most recent revision of ASTM D 422 is used to determine particle sizes smaller than the Number 200 sieve. A hydrometer is used to determine the distribution of particle sizes by a sedimentation process.

The grain size distributions are plotted on the E-Plates presented in the Appendix of this report.

Moisture and Density Relationships

The field moisture content and dry unit weight are determined for each of the undisturbed soil samples, and the moisture content is determined for SPT samples by the most recent revision of ASTM D 4959 or ASTM D 4643. This information is useful in providing a gross picture of the soil consistency between exploration locations and any local variations. The dry unit weight is determined in pounds per cubic foot and shown on the "Excavation Logs", A-Plates. The field moisture content is determined as a percentage of the dry unit weight.

Direct Shear Testing

Shear tests are performed by the most recent revision of ASTM D 3080 with a strain controlled, direct shear machine manufactured by Soil Test, Inc. or a Direct Shear Apparatus manufactured by GeoMatic, Inc. The rate of deformation is approximately 0.025 inches per minute. Each sample is sheared under varying confining pressures in order to determine the Mohr-Coulomb shear strength parameters of the cohesion intercept and the angle of internal friction. Samples are generally tested in an artificially saturated condition. Depending upon the sample location

and future site conditions, samples may be tested at field moisture content. The results are plotted on the "Shear Test Diagram," B-Plates.

The most recent revision of ASTM 3080 limits the particle size to 10 percent of the diameter of the direct shear test specimen. The sheared sample is inspected by the laboratory technician running the test. The inspection is performed by splitting the sample along the sheared plane and observing the soils exposed on both sides. Where oversize particles are observed in the shear plane, the results are discarded and the test run again with a fresh sample.

Consolidation Testing

Settlement predictions of the soil's behavior under load are made on the basis of the consolidation tests using the most recent revision of ASTM D 2435. The consolidation apparatus is designed to receive a single one-inch high ring. Loads are applied in several increments in a geometric progression, and the resulting deformations are recorded at selected time intervals. Porous stones are placed in contact with the top and bottom of each specimen to permit addition and release of pore fluid. Samples are generally tested at increased moisture content to determine the effects of water on the bearing soil. The normal pressure at which the water is added is noted on the drawing. Results are plotted on the "Consolidation Test," C-Plates.

Expansion Index Testing

The expansion tests performed on the remolded samples are in accordance with the Expansion Index testing procedures, as described in the most recent revision of ASTM D4829. The soil sample is compacted into a metal ring at a saturation degree of 50 percent. The ring sample is then placed in a consolidometer, under a vertical confining pressure of 1 lbf/square inch and inundated with distilled water. The deformation of the specimen is recorded for a period of 24 hour or until the rate of deformation becomes less than 0.0002 inches/hour, whichever occurs

first. The expansion index, EI, is determined by dividing the difference between final and initial height of the ring sample by the initial height, and multiplied by 1,000.

Laboratory Compaction Characteristics

The maximum dry unit weight and optimum moisture content of a soil are determined by use of the most recent revision of ASTM D 1557. A soil at a selected moisture content is placed in five layers into a mold of given dimensions, with each layer compacted by 25 blows of a 10 pound hammer dropped from a distance of 18 inches subjecting the soil to a total compactive effort of about 56,000 pounds per cubic foot. The resulting dry unit weight is determined. The procedure is repeated for a sufficient number of moisture contents to establish a relationship between the dry unit weight and the water content of the soil. The data when plotted represent a curvilinear relationship known as the compaction curve. The values of optimum moisture content and modified maximum dry unit weight are determined from the compaction curve.

REFERENCES

Applied Technology Council (1978), Tentative Provisions for Development of Seismic Regulations for Buildings: ATC Publication ATC 3-06, NBS Special Publication 510, NSF Publication 78-8.

Blake, T.F. (1996), Spreadsheet Template LIQ2_30.WQ1 - A Computer Program for the Determination of Liquefaction Potential.

California Division of Mines and Geology, 1998, Seismic Hazard Evaluation Report for the Hollywood 7.5-Minute Quadrangle, Los Angeles County, California, Seismic Hazard Zone Report 026.

California Division of Mines and Geology, 1997, Seismic Hazard Zone Map, map scale 1:24,000.

California Geological Survey, 2008, Guidelines for Evaluating and Mitigation of Seismic Hazards in California, Special Publication 117A.

City of Los Angeles, Department of Public Works, 2003, Methane and Methane Buffer Zones, map scale 1:63,360.

Dibblee, T.W. Jr. 1991, Geologic Map of the Los Angeles, Quadrangle, DMG Map #DF-22, map scale 1: 24,000.

Division of Oil, Gas, and Geothermal Resources, 2001, Oil Well Location Map, City of Los Angeles Oil Field, map scale 1:4,800.

Hart, E.W. and Bryant, W.A., 1999 (updated 2005), Fault Rupture Zones in California, Division of Mines and Geology, Special Publication 42, 25pp.

Hauksson, E., 1992, Seismicity, Faults, and Earthquake Potential in Los Angeles, Southern California: Engineering Geology Practice in Southern California, Special Publication No. 4, Association of Engineering Geologists.

Ishihara, K., 1985, Stability of Natural Soil Deposits During Earthquakes, Eleventh International Conference on Soil Mechanics and Foundation Engineering, Volume 1, A.A. Balkema, Rotterdam, The Netherlands, 321-376.

Idriss, I.M., and Boulanger, R.W., 2008, Soil Liquefaction During Earthquakes, Earthquake Engineering Research Institute, ER RI Publication MNO-12.

Jennings, Charles W., 1994, Fault Activity Map of California and Adjacent Areas, California Division of Mines and Geology.

REFERENCES - continued

Lamar, D.L., 1970, Geology of the Elysian Park-Repetto Hills Area, Los Angeles County, California, California Division of Mines and Geology Special Report 101, 45 pp, map scale 1:24,000.

Leighton and Associates, Inc., 1990, Technical Appendix to the Safety Element of the Los Angeles County General Plan: Hazard Reduction in Los Angeles County.

National Flood Insurance Rate Program, 2008, Los Angeles County and Incorporated Areas, Map #06037C1605F.

O'Rourke, T.D., Pease, J.W., 1997, Mapping Liquefiable Layer Thickness for Seismic Hazard Assessment, Journal of the Geotechnical Engineering Division, American Society of Civil Engineers, vol. 123, no. 1, pp. 46-56.

Seed, H.B. , Idriss, I.M., and Arango, I., 1983, Evaluation of Liquefaction Potential Using Field Performance Data, Journal of the Geotechnical Engineering Division, American Society of Civil Engineers, vol. 109, no. 3, pp. 458-482.

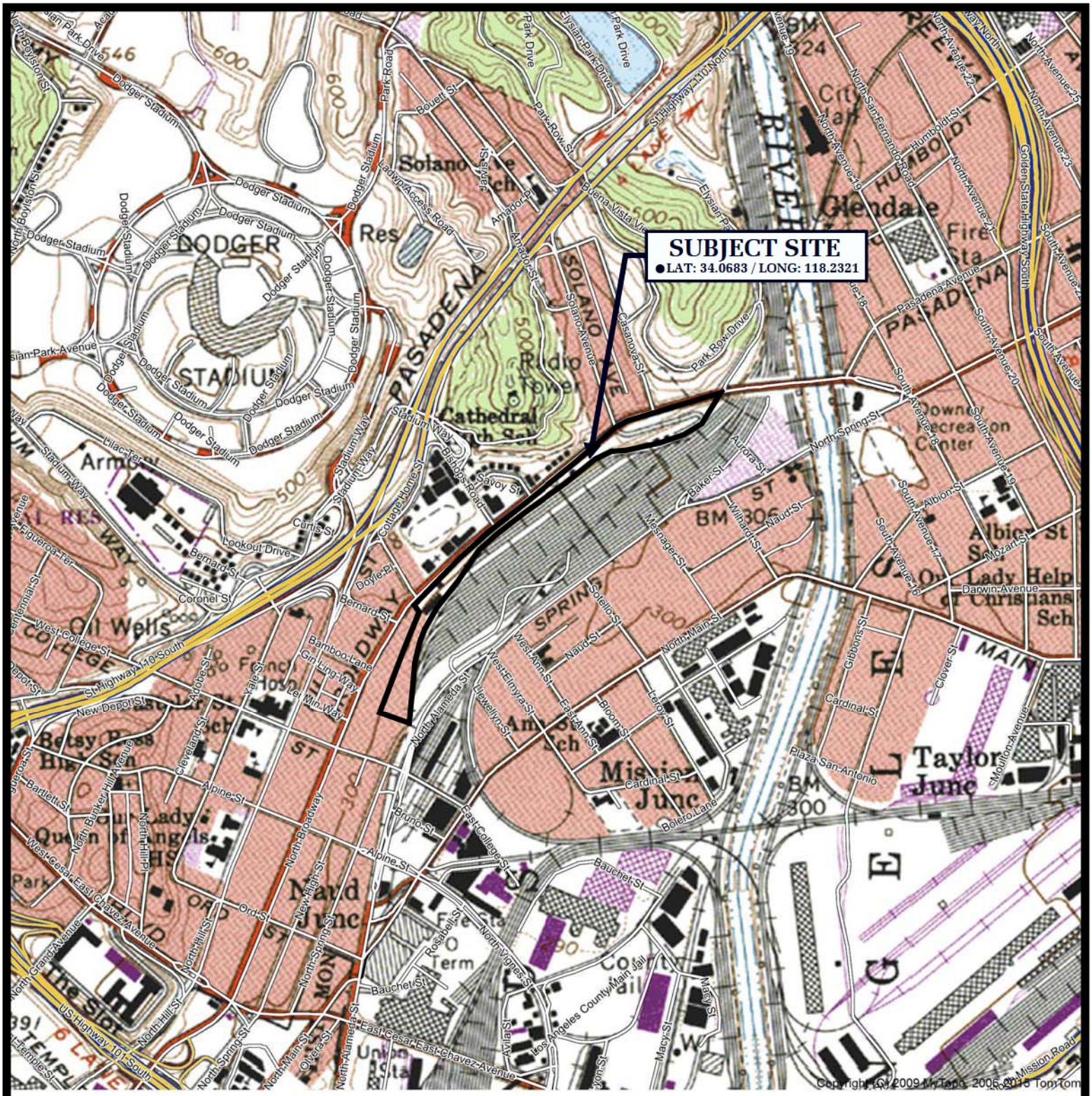
Tokimatsu, K., and Yoshimi, Y., 1983, Empirical Correlation of Soil Liquefaction Based on SPT N-Value and Fines Content, Soils and Foundations, Japanese Society of Soil Mechanics and Foundation Engineering, vol. 23, no. 4, pp. 56-74.

United States Geological Survey, 2008, U.S.G.S. Interactive Deaggregation Program, http://eqintacr.usgs.gov/geaggint/2008/index.php.

United States Geological Survey, 2005, U.S.G.S. Seismic Design Maps Tool (Version 3.1.0), http://earthquake.usgs.gov/designmaps/us/applications.phD.

Yerkes, R.F., Tinsley, J.C., Williams, K.M., 1977, Geologic Aspects of Tunneling in the Los Angeles Area, United States Geological Survey, Miscellaneous Field Studies Map MF-866.

Youd, T.L., and Garris, L.T., 1995, Liquefaction-Induced Ground Surface Disruption, Journal of Geotechnical Engineering, ASCB, vol. 121, no. 11, pp 805-809.



SCALE 1:12000

0.0 0.1 0.2 0.3 0.4 0.5 0.6
MILES
0 1000 2000 3000
FFFT

REFERENCE: U.S.G.S. TOPOGRAPHIC MAPS, 7.5 MINUTE SERIES,
LOS ANGELES, CA QUADRANGLE

VICINITY MAP

Geotechnologies, Inc.
Consulting Geotechnical Engineers

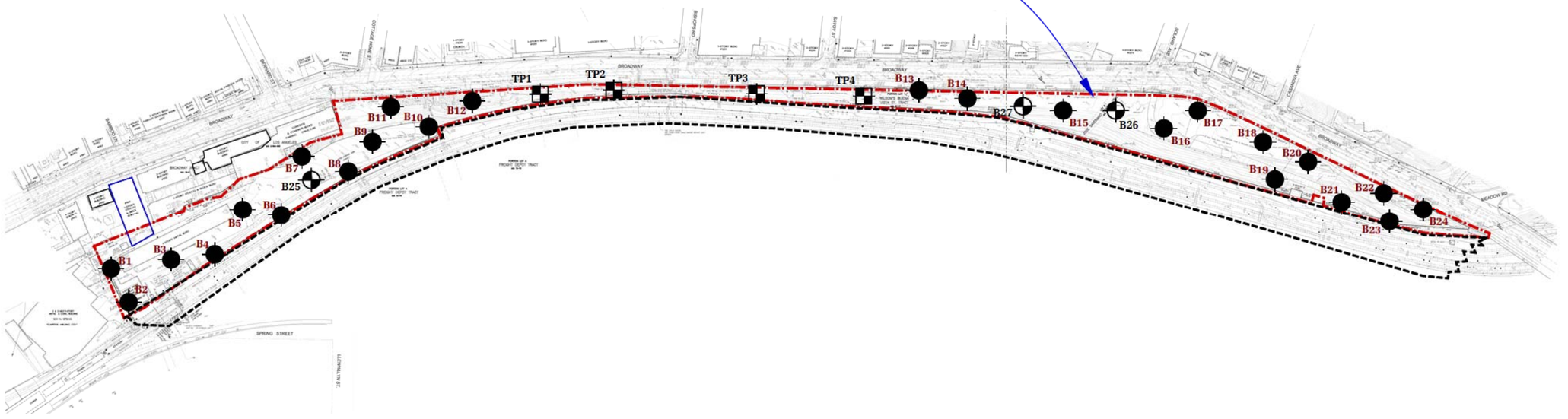
LINCOLN PROPERTIES

FILE NO. 20921

SCALE IN FEET

0 100 300 600

SUBJECT SITE



REFERENCE: ALTA/ACSM LAND TITLE SURVEY (SHEETS 2 & 3) BY THE MOLLENHAUER GROUP JANUARY 5, 2015

LEGEND

B27 — LOCATION & NUMBER OF BORING THIS INVESTIGATION

TP4 — LOCATION & NUMBER OF TEST PIT THIS INVESTIGATION

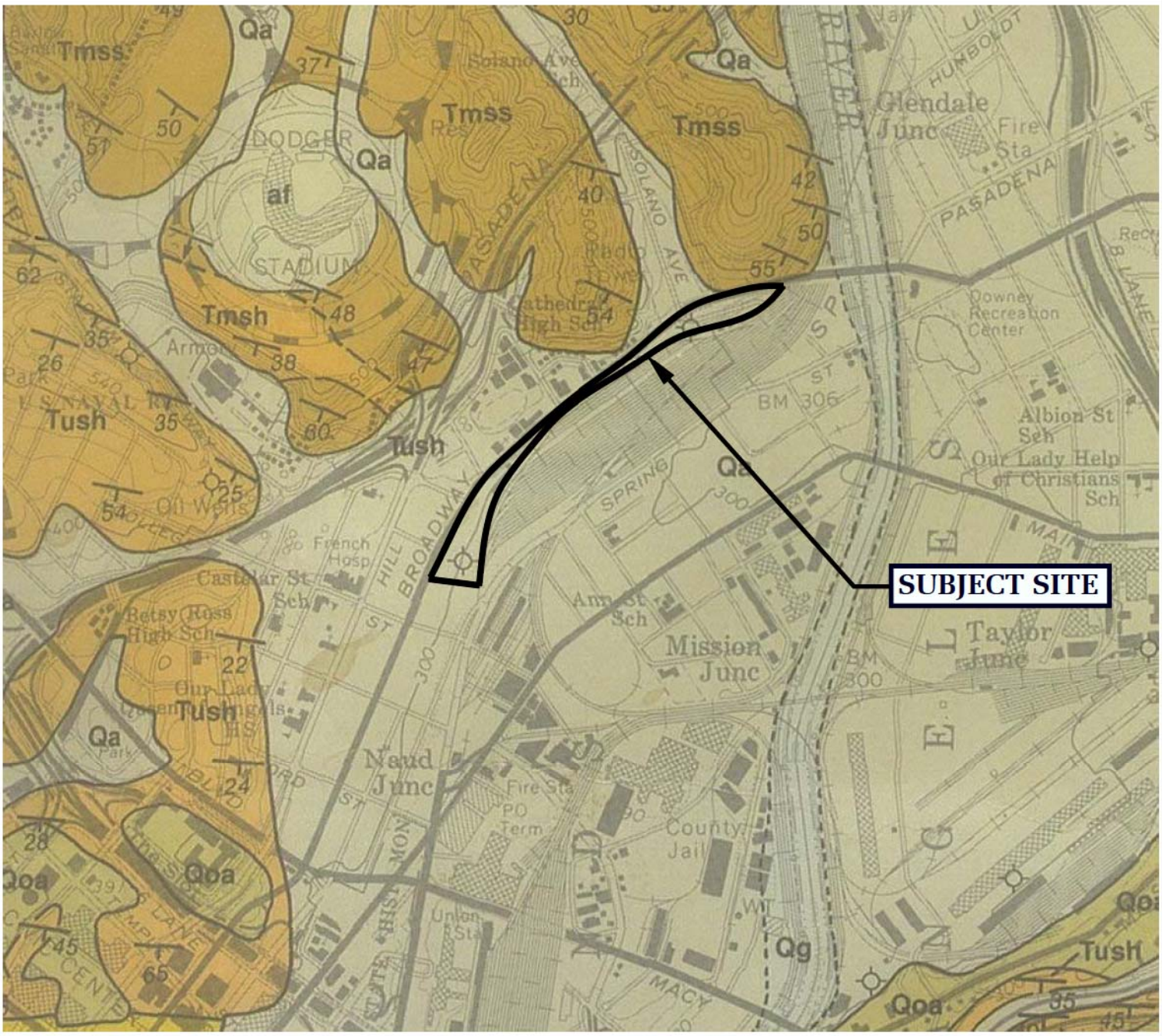
B24 — LOCATION & NUMBER OF BORING (PREVIOUS INVESTIGATION, DATED APRIL 2015)

PLOT PLAN

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

File No.: 20921		DRAWN BY: TC
DATE: July '15		SHEET: 1 of 1



SCALE IN FEET

0 500 1000 2000

LEGEND

- **af:** Surficial Sediments: artificial cut & fill
- **Qa:** Surficial Sediments: alluvium, unconsolidated floodplain deposits of silt, sand and gravel
- **Qg:** Surficial Sediments: stream channel deposits of gravel, sand and silt
- **Qoa:** Older Dissected Surficial Sediments: remanants of older weakly consolidated alluvial deposits of gravel, sand and silt
- **Tmsh:** Monterey Formation: white-weathering, thin bedded, platy, siliceous shale, locally porcelaneous and silty; Mohnian Stage
- **Tmss:** Monterey Formation: tan to light gray semi-friable arkosic sandstone; includes some interbedded silty shale
- **Tush:** Unnamed Shale: gray to light brown, thin bedded, silty clay shale, locally contains scattered large calcareous nodules; in places contains thin lenses of light tan, platy, semi-siliceous or diatomaceous shale

N

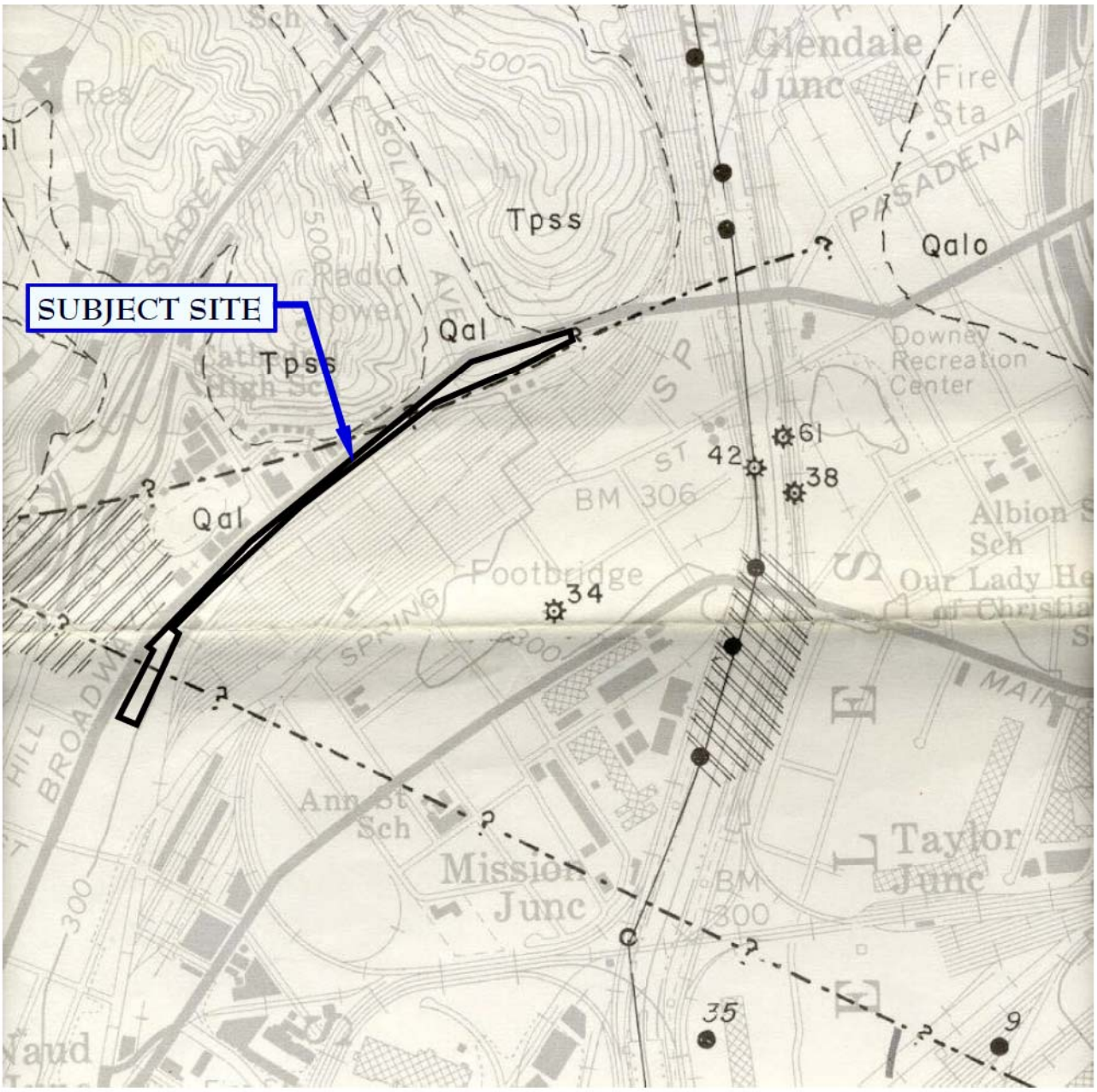
REFERENCE: DIBBLEE, T.W., (1989) GEOLOGIC MAP OF THE LOS ANGELES QUADRANGLES (#DF-22)

LOCAL GEOLOGIC MAP - DIBBLEE

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921



SCALE IN FEET

0 500 1000 2000

LEGEND

Qal: Alluvium - Silt, Sand and Gravel
Qalo: Old alluvium - terrace deposits
Tpss: Sandstone, hard and well cemented
Oil field
Unamed fault, queried where location doubtful

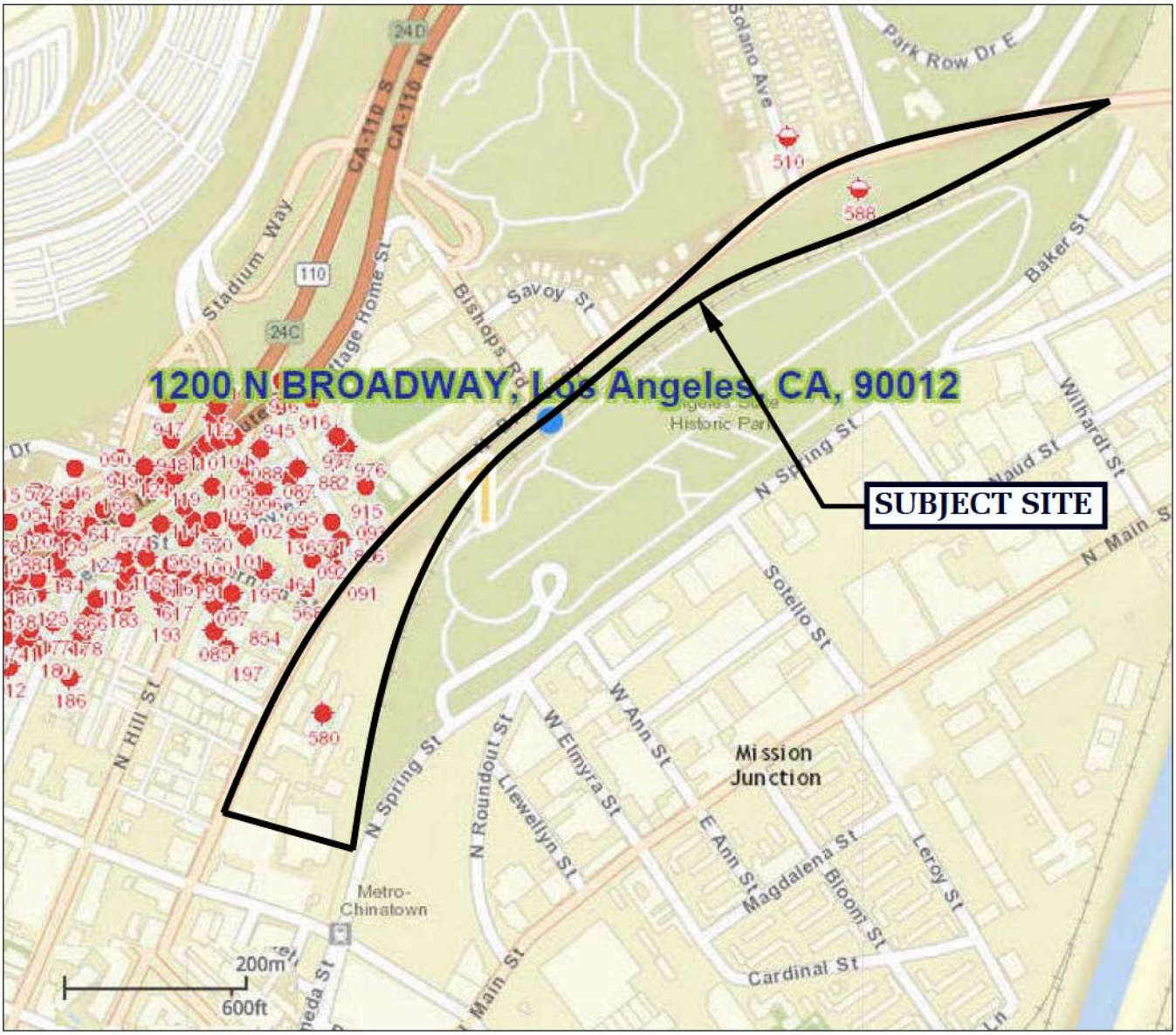
REFERENCE: YERKES, TINSLEY, WILLIAMS, McMANUS; ASPECTS OF TUNNELING (DEPTH OF BEDROCK), 1977 (USCG MF-866, SHEET 2 OF 5)

LOCAL GEOLOGIC MAP - YERKES

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921



OIL WELL LEGEND

API NO.	OPERATOR, WELL NO.
588	Ventura Oil Co., "Freight Depot", #1
580	Paul F. McKenzie, T-2

N

REFERENCE: DIVISION OF OIL, GAS & GEOTHERMAL RESOURCES WELL FINDER, STATE OF CALIFORNIA, 2014

OIL WELL LOCATION MAP

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921

LEGEND

- B27 — LOCATION & NUMBER OF BORING THIS INVESTIGATION
- TP4 — LOCATION & NUMBER OF TEST PIT THIS INVESTIGATION
- B24 — LOCATION & NUMBER OF BORING (PREVIOUS INVESTIGATION, DATED APRIL 2015)
- af — ARTIFICIAL FILL
- Qal — ALLUVIUM
- Tp — BEDROCK (PUENTE FORMATION) - WELL BEDDED SILTSTONE AND SANDSTONE
- GEOLOGIC CONTACT
- @ 16 / 65 — ORIENTATION OF BEDDING AND DEPTH
- SUBJECT SITE
- C — C' — LOCATION OF CROSS SECTION

NOTE: GEOLOGIC MATERIALS SHOWN WHERE THICKNESS EXCEEDS 5 FEET

SUBJECT SITE

BERNARD ST

COTTAGE HOME ST.

BAMBOO LN

BROADWAY

BROADWAY TRACT

CITY OF LOS ANGELES

PORTION LOT A FREIGHT DEPOT TRACT M.B. 72-75

METRO EASEMENT

SPRING STREET

BISHOPS RD

MATCHLINE- SEE BELOW

MATCHLINE- SEE ABOVE

MATCHLINE- SEE SHHET 3

2 & 5 MULTI-STORY METAL & CONC. BUILDING 1231 N. SPRING "CAPITOL MILLING CO."

THE ZANJA MADRE; SEE PAGES FROM ZANJA MADRE REPORT 2007 HEREON

SCALE IN FEET

0 30 50 100 150 200

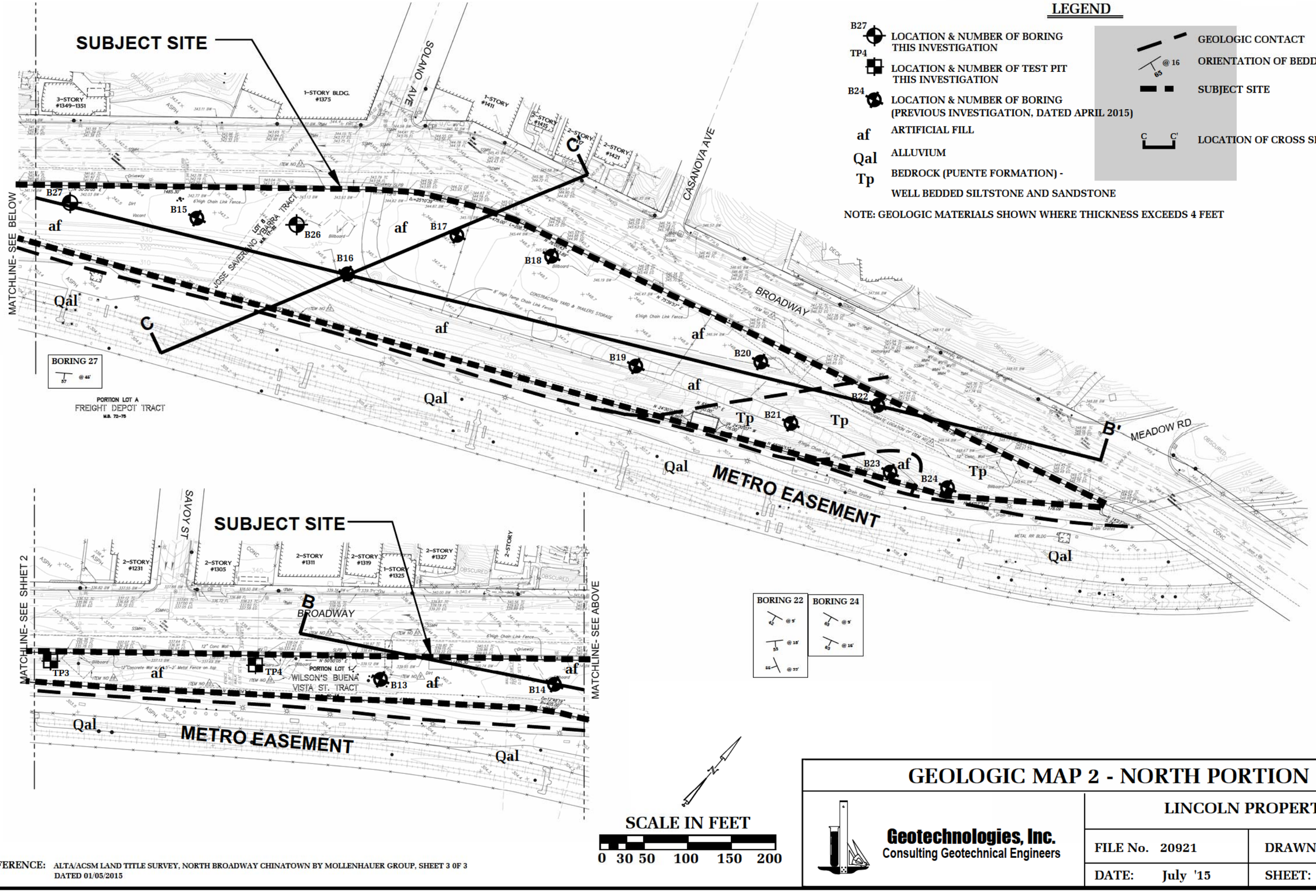
REFERENCE: ALTA/ACSM LAND TITLE SURVEY, NORTH BROADWAY CHINATOWN BY MOLLENHAUER GROUP, SHEET 2 0F 3 DATED 01/05/2015

GEOLOGIC MAP 1 - SOUTH PORTION

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE No. 20921	DRAWN BY: SA
DATE: July '15	SHEET: 1 of 2



LEGEND

- B27 — LOCATION & NUMBER OF BORING THIS INVESTIGATION
- TP4 — LOCATION & NUMBER OF TEST PIT THIS INVESTIGATION
- B24 — LOCATION & NUMBER OF BORING (PREVIOUS INVESTIGATION, DATED APRIL 2015)
- af — ARTIFICIAL FILL
- Qal — ALLUVIUM
- Tp — BEDROCK (PUENTE FORMATION) - WELL BEDDED SILTSTONE AND SANDSTONE
- GEOLOGIC CONTACT
- @ 16, 65 — ORIENTATION OF BEDDING AND DEPTH
- SUBJECT SITE
- C — C' — LOCATION OF CROSS SECTION

NOTE: GEOLOGIC MATERIALS SHOWN WHERE THICKNESS EXCEEDS 4 FEET

SCALE IN FEET

0 30 50 100 150 200

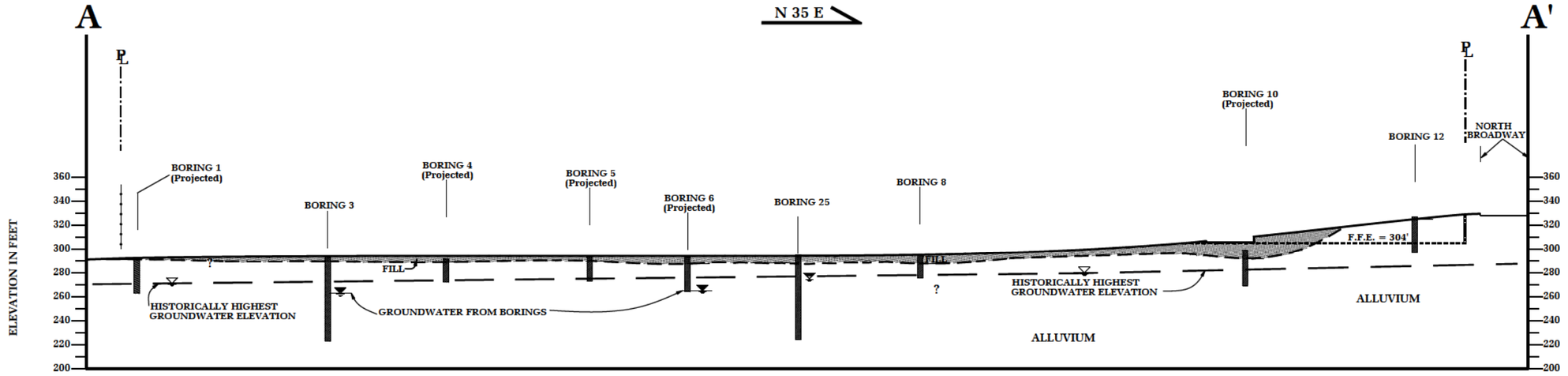
REFERENCE: ALTA/ACSM LAND TITLE SURVEY, NORTH BROADWAY CHINATOWN BY MOLLENHAUER GROUP, SHEET 3 0F 3 DATED 01/05/2015

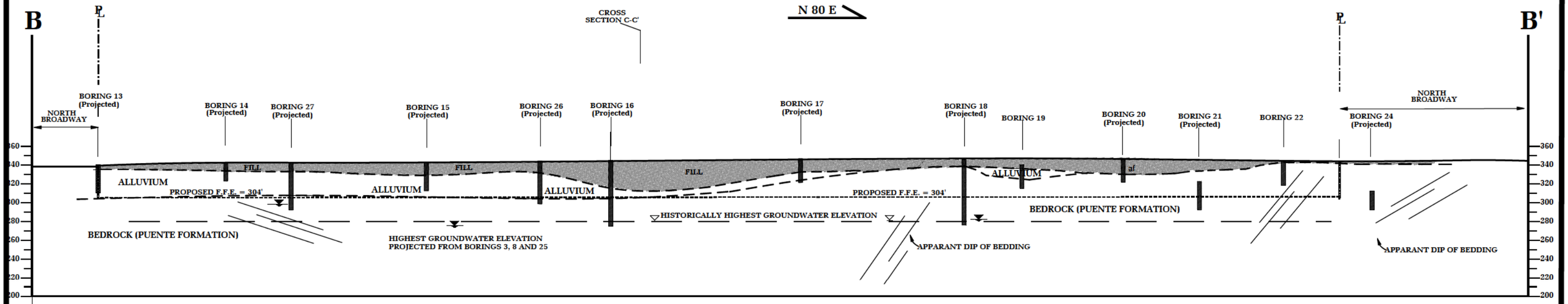
GEOLOGIC MAP 2 - NORTH PORTION

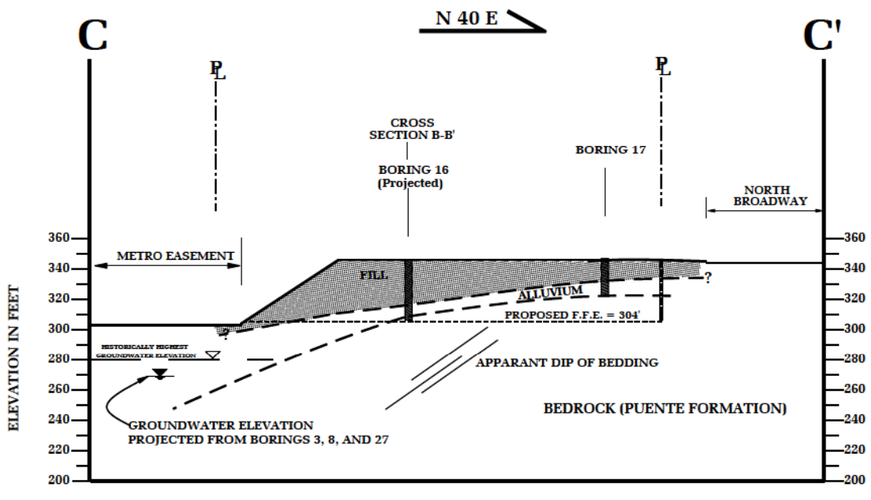
Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE No. 20921	DRAWN BY: SA
DATE: July '15	SHEET: 2 of 2







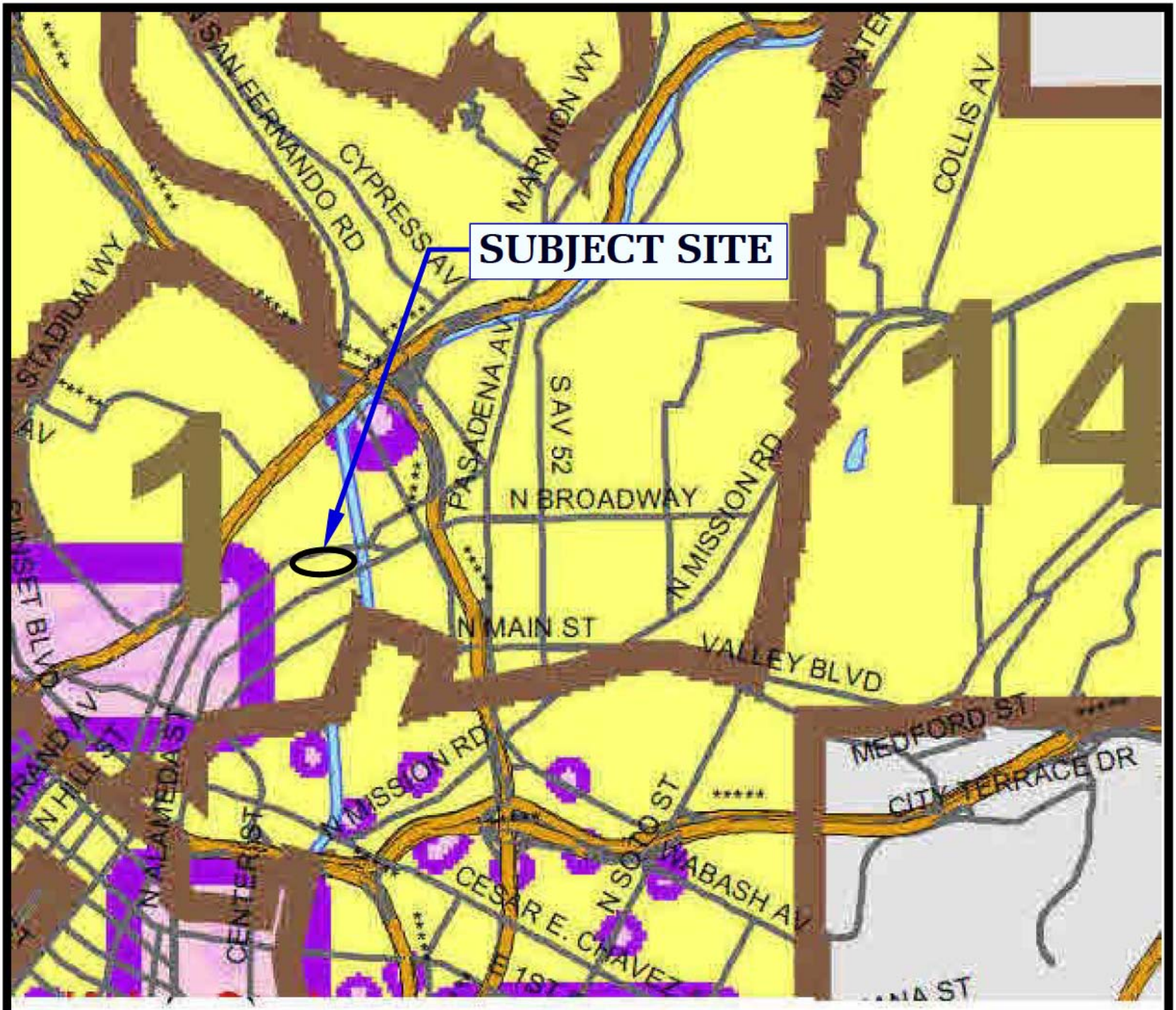
SCALE IN FEET
0 30 50 100 150 200

CROSS SECTION'S A-A', B-B', & C-C'

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LI NCOLN PROPERTIES

FILE No. 20921	DRAWN BY: RTK
DATE: jULY 2015	



0 0.2 0.4 0.8 1.2 1.6 2 2.4 2.8 Miles

LEGEND

- Methane Zone
- Methane Buffer Zone
- Council District Boundary

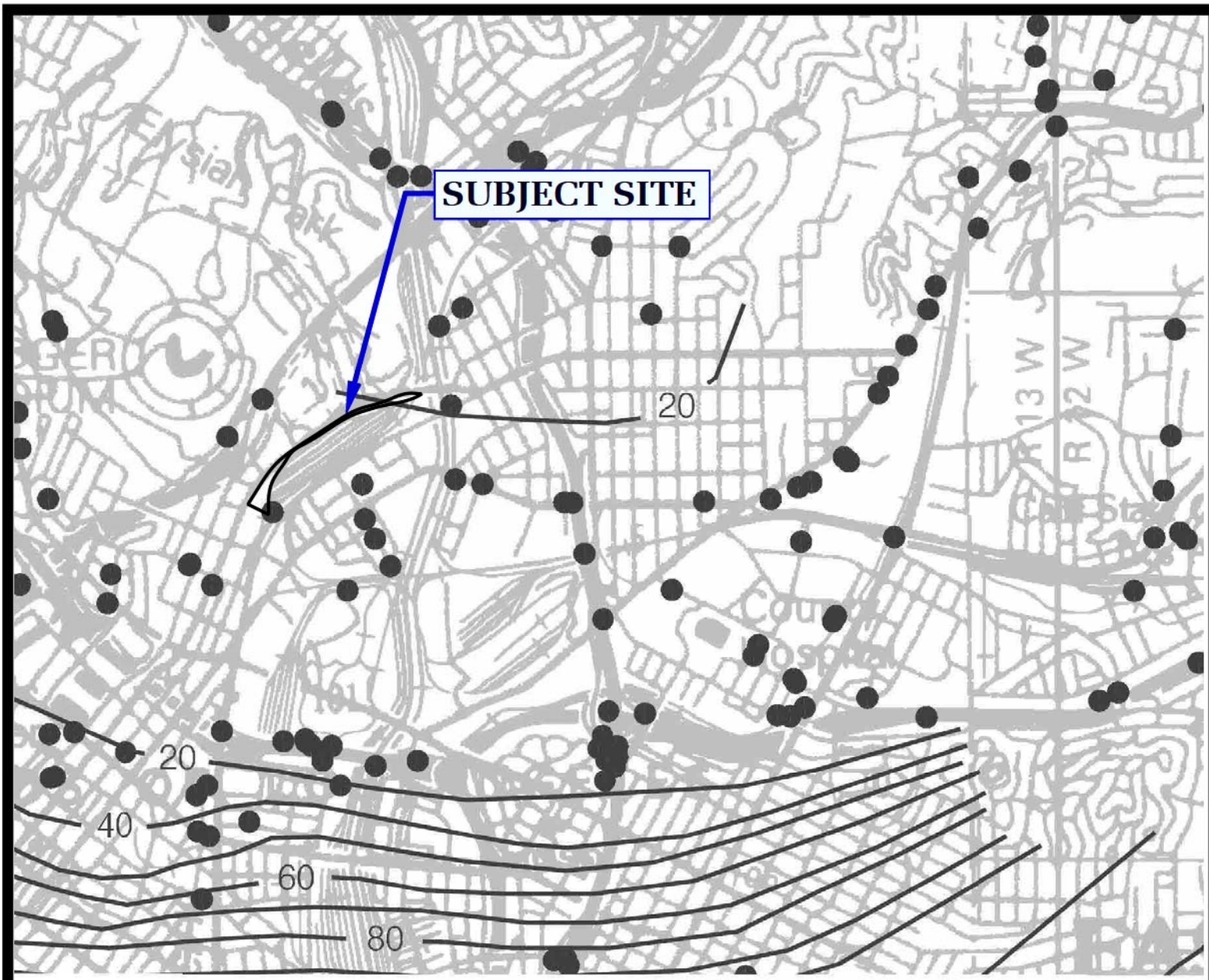
REFERENCE: GIS Mapping, Bureau of Engineering, Department fo Public Works - 09/24/03

METHANE ZONE RISK MAP

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921



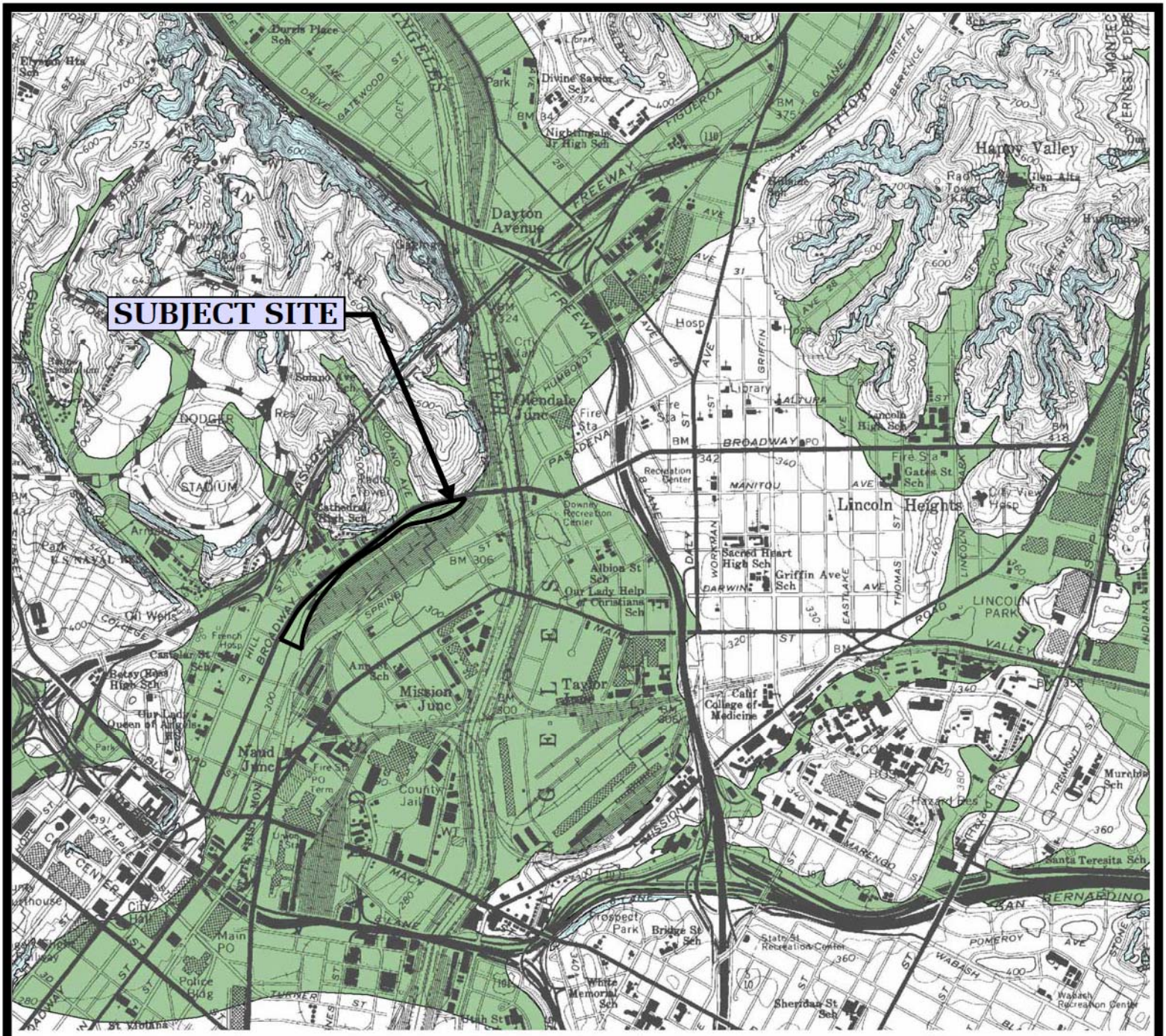
REFERENCE: CDMG, SEISMIC HAZARD ZONE REPORT, 029
LOS ANGELES 7.5 - MINUTE QUADRANGLE, LOS ANGELES COUNTY, CALIFORNIA (1998, REVISED 2006)

HISTORICALLY HIGHEST GROUNDWATER LEVELS

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921



LIQUEFACTION AREA

REFERENCE: SEISMIC HAZARD ZONES, LOS ANGELES QUADRANGLE OFFICIAL MAP (CDMG, 1999)

SEISMIC HAZARD ZONE MAP

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid values, zone 11
- 6000000 FT — 5000-foot grid ticks: California State Plane coordinate system, V zone (FIPSZONE 0405), Lambert Conformal Conic
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

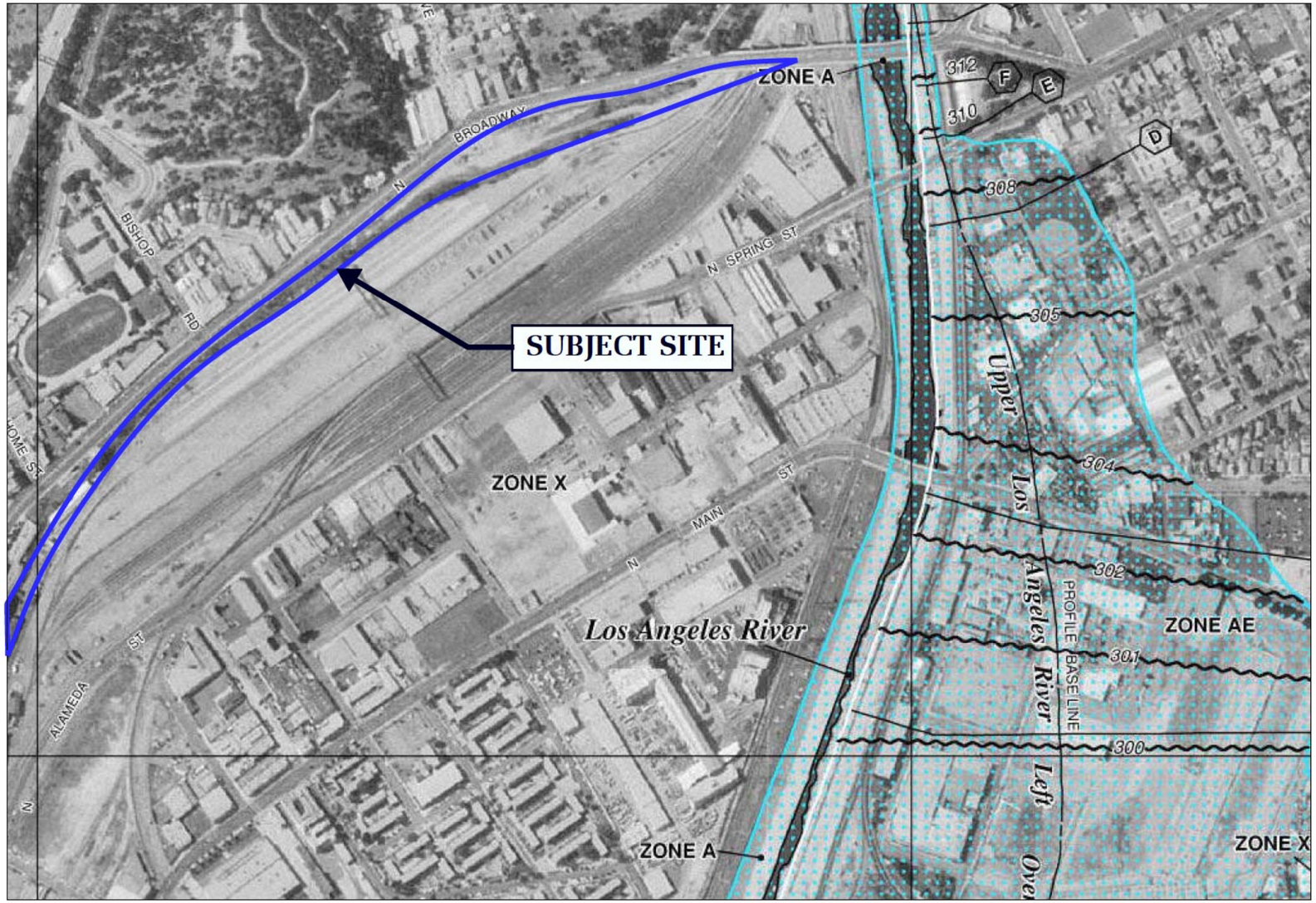
MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 26, 2008
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS



NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1628F

FIRM
FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 1628 OF 2350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES, CITY OF	060137	1628	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06037C1628F

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

FLOOD INSURANCE RATE MAP

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE No. 20921

USGS Design Maps Summary Report

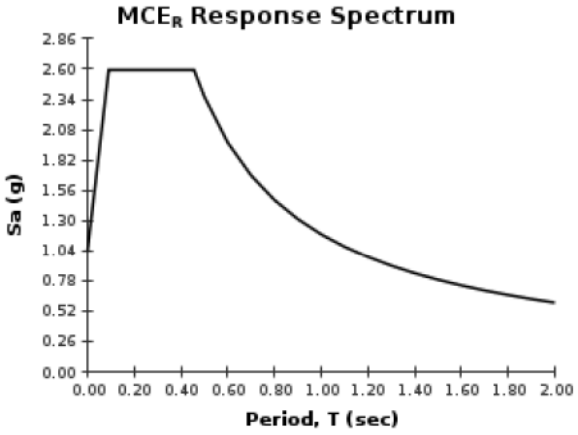
User–Specified Input

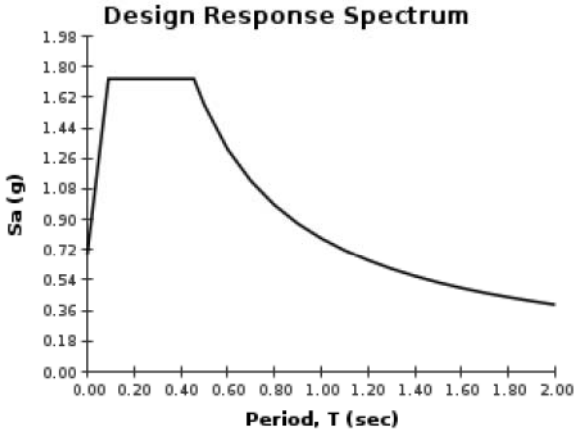
Report Title	File No. 20921 - Lincoln Properties Wed July 8, 2015 00:02:14 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	34.0683°N, 118.2327°W
Site Soil Classification	Site Class C – "Very Dense Soil and Soft Rock"
Risk Category	I/II/III

USGS–Provided Output

S_S =	2.592 g	S_{MS} =	2.592 g	S_{DS} =	1.728 g
S_1 =	0.909 g	S_{M1} =	1.182 g	S_{D1} =	0.788 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

USGS Design Maps Summary Report

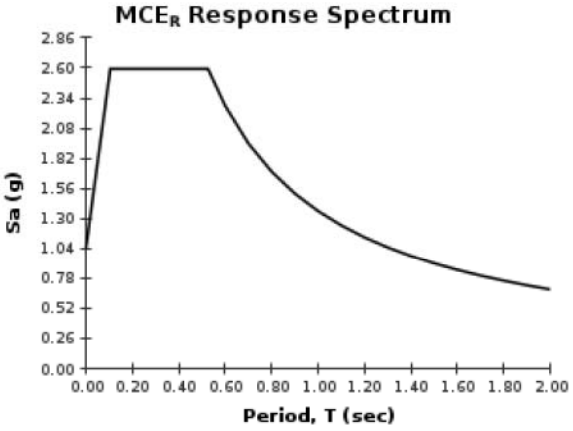
User–Specified Input

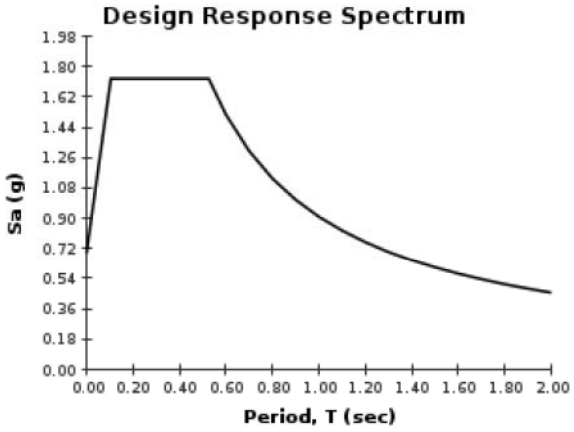
Report Title	File No. 20921 - Lincoln Properties Wed July 8, 2015 00:04:50 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	34.0683°N, 118.2327°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

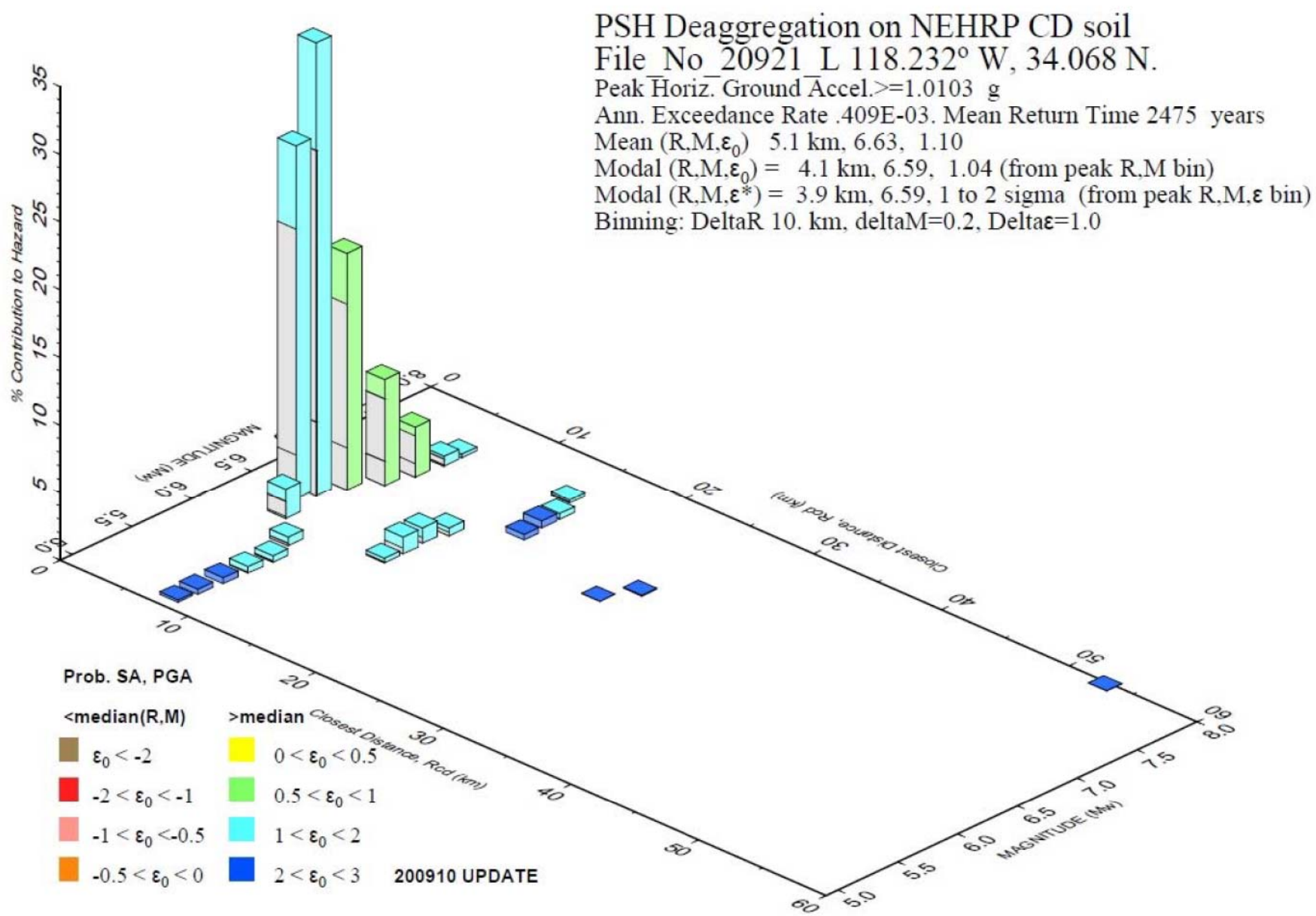
S_S =	2.592 g	S_{MS} =	2.592 g	S_{DS} =	1.728 g
S_1 =	0.909 g	S_{M1} =	1.364 g	S_{D1} =	0.909 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.



GMT 2015 Jul 6 15:18:19 Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted

BORING LOG NUMBER 1

Drilling Date: 10/15/07 **Elevation: 293'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				0		Surface Conditions: Flat Asphalt Parking Lot
						3-inch Asphalt, No Base
1	21	13.8	108.6	1		FILL: Silty Sand, dark brown, moist, medium dense, fine grained, minor brick fragments
				2		
3	70	2.3	123.3	3	SM	ALLUVIUM: Silty Sand, dark to yellowish-brown, moist, medium dense, fine grained
				4	SM/SW	Silty Sand to Sand with Gravel, grayish-brown, dense, fine to coarse grained
5	80	2.6	123.2	5		
				6	SW	Sand to Gravelly Sand, gray, very dense, fine to coarse grained
7	85/9"	1.1	Disturbed	7		
				8		
				9		
10	100/6"	4.4	107.8	10		
				11	SP	Sand, yellowish-brown, fine to medium grained
				12		
				13		
				14		
15	87/9"	3.9	99.5	15		yellowish to grayish-brown, slightly moist to moist
				16		
				17		
				18		
				19		
20	80	3.7	114.1	20		
				21		
				22		
				23		
				24		
25	79/8"	4.2	103.7	25		

BORING LOG NUMBER 1

Project: File No. 19557 **Forest City Development**

ra

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				26		
				27		
				28		
				29		
30	90/10"	36.4	84.9	30	SM/CL	Silty Sand to Silty Clay, yellow and olive-brown mottling, moist, very dense, fine grained to very stiff
				31		
				32		Total depth: 30 feet No Water Fill to 2 feet
				33		
				34		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				35		
				36		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
				37		
				38		
				39		
				40		
				41		
				42		
				43		
				44		
				45		
				46		
				47		
				48		
				49		
				50		

BORING LOG NUMBER 2

Drilling Date: 10/15/07 **Elevation: 291'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				0		Surface Conditions: Flat Parking Lot
						5-inch Asphalt over 3-inch Base
				1		FILL: Silty Sand with brick fragments, dark brown, moist, medium dense, fine grained
2	67	13.6	116.9	2		dark to yellowish-brown, moist, dense, fine grained, minor cobbles
4	75/7"	3.0	115.2	4	SP/SW	ALLUVIUM: Sand with Cobbles, yellowish-brown, slightly moist, very dense, fine to coarse grained
7	80	3.1	Disturbed	7		
10	64	3.7	111.5	10	SP	Sand, moist, fine to medium grained
15	70	4.9	113.3	15		
20	83	2.2	120.6	20		Total depth: 20 feet No Water Fill to 4 feet NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted

BORING LOG NUMBER 3

Drilling Date: 10/15/07 **Elevation: 293'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				0		Surface Conditions: Flat Parking Lot
						4-inch Asphalt over 6-inch Base
				1		FILL: Silty Sand, dark brown, moist, medium dense
2	37	14.6	118.5	2		
				3		Silty to Clayey Sand, dark brown, moist, medium dense, fine grained
				4	SM/SC	ALLUVIUM: Silty to Clayey Sand, dark brown, moist, medium dense to dense, fine grained
5	50/5"	0.5	SPT	5		
				6	SW	Sand with Cobbles, yellowish-brown, very dense, fine to coarse grained
7.5	100/5"	2.2	117.6	7		
				8		
				9		
10	50/6"	3.0	SPT	10		
				11		
				12		
12.5	100/7"	6.4	118.6	13	SP	Sand, fine to medium grained
				14		
15	70	4.1	SPT	15		
				16		
				17		
17.5	70/7"	18.1	94.8	18		
				19		
20	50/5"	4.4	SPT	20		
				21		
				22		
22.5	100/6"	6.7	121.0	23		fine grained
				24		
25	50/5"	3.4	SPT	25		

BORING LOG NUMBER 3

Project: File No. 19557 **Forest City Development**

ra

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				26		
				27		
27.5	100/6"	26.7	111.5	28	SP/SW	Sand, very moist, fine to coarse grained
				29		
30	50/6"	7.1	SPT	30	SW	Sand with Gravel, wet
				31		
				32		
32.5	75/7"	10.4	122.7	33		
				34		
35	50/6"	7.2	SPT	35	SM	Silty Sand, yellowish and olive brown mottling, moist, dense, fine grained
				36		
				37		
37.5	80	21.3	109.7	38	SP	Sand, grayish-brown, wet
				39		
40	50/6"	19.2	SPT	40		
				41		
				42		
42.5	90	15.4	114.5	43		
				44		
45	75	13.5	SPT	45		
				46		
				47		
47.5	65	17.8	108.1	48		
				49		
50	80	No Recovery		50		

BORING LOG NUMBER 3

Project: File No. 19557 **Forest City Development**

ra

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				51		
				52		
52.5	75/11"	13.1	117.3	53		gray to dark grayish-brown, very moist to wet
				54		
55	50/5"	15.4	SPT	55		
				56		
57.5	80	16.1	112.7	57		
				58		
				59		
60	50/5"	18.7	SPT	60		
				61		
62.5	50	16.5	Disturbed	62		
				63		
				64		
65	70	18.4	SPT	65		
				66		
67.5	50	14.2	118.8	67		
				68		
				69		
70	70/11"	13.2	SPT	70		
				71		Total depth: 70 feet Water at 30 feet Fill to 3.5 feet
				72		
				73		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				74		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop
				75		Modified California Sampler used unless otherwise noted
						SPT=Standard Penetration Test

BORING LOG NUMBER 4

Drilling Date: 10/15/07 **Elevation: 292'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				0		Surface Conditions: Flat Parking Lot 2-inch Asphalt, No Base
				1		FILL: Silty Sand, dark brown, moist, medium dense, fine grained
2	20	18.1	92.1	2		
				3	SM	ALLUVIUM: Silty Sand, dark brown, moist, medium dense, fine grained
4	41	3.7	118.7	4		
				5	SP/SW	Sand with Cobbles, yellowish to light brown
				6		
7	80	3.4	119.9	7		
				8		
				9		
10	75/7"	29.5	90.5	10	SP	Sand, yellowish and olive-brown, very dense, fine to medium grained
				11		
				12		
				13		
				14		
15	100/6"	5.9	108.3	15		
				16		
				17		
				18		
				19		
20	80	6.2	102.6	20		Total depth: 20 feet No Water Fill to 3 feet
				21		
				22		
				23		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				24		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
				25		

BORING LOG NUMBER 5

Drilling Date: 10/15/07 **Elevation: 293'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				0		Surface Conditions: Flat Parking Lot 7-inch Asphalt, No Base
1	80	9.8	112.8	1		FILL: Silty Sand, dark brown, moist, medium dense, fine grained, minor asphalt fragments
				2		
3	40	2.3	113.7	3	SW	ALLUVIUM: Sand with Cobbles, yellowish-brown, slightly moist, medium dense, fine to coarse grained
				4		
5	64	2.2	112.0	5		
				6		
7	47	3.3	94.5	7		
				8		
				9		
10	70	2.0	118.0	10		very dense
				11		
				12		
				13		
				14		
15	100/6"	6.2	111.0	15	SP	Sand, very dense, fine to medium grained
				16		
				17		
				18		
				19		
20	70	4.9	104.4	20		Total depth: 20 feet No Water Fill to 3 feet
				21		
				22		
				23		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				24		
				25		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted

BORING LOG NUMBER 6

Drilling Date: 10/17/07 **Elevation: 293'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Flat Parking Lot
				0		6-inch Asphalt, No Base
				1		FILL: Silty Sand, dark and yellowish-brown, moist, medium dense, fine grained
2	40	15.1	106.2	2		
				3		
4	62	16.4	107.4	4		
				5		Sandy to Silty Clay to Sand with Gravel, grayish to yellowish-brown, medium stiff to dense
				6	SW	ALLUVIUM: Sand with Gravel, yellowish-brown, slightly moist, medium dense to dense, fine to coarse grained
7	78	1.6	120.0	7		
				8		
				9		
10	100/7"	5.6	117.3	10		
				11		
				12		
				13		
				14		
15	90/9"	3.3	111.8	15		
				16		
				17		
				18		
				19		
20	94/10"	6.5	103.2	20		
				21	SP	Sand, olive to yellowish-brown, very dense, fine to medium grained
				22		
				23		
				24		
25	95/9"	4.0	102.9	25		

BORING LOG NUMBER 6

Project: File No. 19557 **Forest City Development**

ra

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				26		
				27		
				28		
				29		
30	75/7"	14.1	107.8	30		
				31		Total depth: 30 feet Water at 29 feet Fill to 5.5 feet
				32		
				33		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				34		
				35		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
				36		
				37		
				38		
				39		
				40		
				41		
				42		
				43		
				44		
				45		
				46		
				47		
				48		
				49		
				50		

BORING LOG NUMBER 7

Drilling Date: 10/17/07 **Elevation: 295'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				0		Surface Conditions: Flat Parking Lot 5-inch Asphalt, No Base
1	22	13.4	113.7	1		FILL: Silty Sand, dark brown, moist, medium dense, fine grained
				2		
3	13	31.9	73.2	3	SM	ALLUVIUM: Silty Sand, dark to yellowish-brown, moist, medium dense, fine grained
				4	ML	Sandy Silt, yellowish to grayish-brown mottling, medium stiff
5	13	15.0	101.5	5		Sandy to Clayey Silt, yellowish and reddish-brown mottling
				6		
7	58	1.4	Disturbed	7	SW	Sand with Cobbles, yellowish-brown, slightly moist, dense, fine to coarse grained
				8		
				9		
10	100/7"	2.1	123.3	10		
				11		
				12		
				13		
				14		
15	100/6"	4.4	113.2	15	SP	Sand, very dense, fine to medium grained
				16		
				17		
				18		
				19		
20	80/11"	4.2	97.0	20		Total depth: 20 feet No Water Fill to 2 feet
				21		
				22		
				23		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				24		
				25		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted

BORING LOG NUMBER 8

Drilling Date: 10/17/07 **Elevation: 295'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				0		Surface Conditions: Flat Parking Lot
						2-inch Asphalt, No Base
				1		FILL: Silty Sand, dark brown, moist, medium dense, fine grained
2	80	6.6	109.9	2		minor asphalt fragments
				3		
4	32	11.0	102.1	4		
				5		
				6		
7	56	1.2	113.7	7		
				8		
				9	SP	ALLUVIUM: Sand, yellowish-brown, slightly moist, dense, fine to medium grained
10	80	1.3	109.5	10		very dense
				11		
				12		
				13		
				14		
15	70	1.6	108.5	15		fine grained
				16		
				17		
				18		
				19		
20	76	4.5	95.6	20		
				21		Total depth: 20 feet No Water Fill to 8 feet
				22		
				23		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				24		
				25		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted

BORING LOG NUMBER 9

Drilling Date: 10/17/07 **Elevation: 298'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Flat Parking Lot
				0		3-inch Asphalt, No Base
1	46	7.8	97.9	1		FILL: Silty Sand, dark brown, moist, medium dense, fine grained
				2		
3	80	7.0	107.2	3	SM	ALLUVIUM: Silty Sand, dark brown, moist, very dense, fine grained, minor gravel
				4		
5	50	1.8	106.2	5	SW	Sand with Gravel, yellowish-brown, slightly moist, medium dense, fine to coarse grained
				6		
7	31	16.3	101.3	7	SM	Silty Sand, dark and reddish-brown mottling, moist, fine grained
				8		
				9		
10	77	7.0	98.0	10	SW/SP	Silty Sand, olive and yellowish-brown mottling, very dense
				11		
				12		
				13		
				14		
15	90/8"	No Recovery		15		
16	72	16.9	101.1	16	SM/SW	Silty Sand interbedded with Sand with Cobbles, fine to coarse grained
				17		
				18		
				19		
20	100/7"	4.6	109.6	20		Total depth: 20 feet No Water Fill to 3 feet
				21		
				22		
				23		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				24		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
				25		

BORING LOG NUMBER 10

Drilling Date: 10/17/07 **Elevation: 299'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				0		Surface Conditions: Flat Parking Lot 3-inch Asphalt, No Base
				1		FILL: Silty Sand, dark brown, moist, medium dense, fine grained
2	80	7.3	107.0	2		dark to yellowish-brown, very dense, minor gravel
4	75/7"	5.6	110.4	4		dark brown
7	75/11"	3.6	110.7	7	SP	ALLUVIUM: Sand, yellowish-brown, slightly moist, very dense, fine to medium grained
10	83	3.3	109.9	10	SP/SW	Sand with Cobbles, fine to coarse grained
15	75/7"	15.6	114.6	15	SM/SW	Silty Sand to Sand with Cobbles, olive to yellowish-brown, moist, fine grained
20	75/7"	6.4	108.2	20	SP	Sand, yellowish-brown, slightly moist, fine to medium grained
25	100/7"	3.7	110.8	25		olive-brown, moist

BORING LOG NUMBER 10

Project: File No. 19557 **Forest City Development**

ra

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				26		
				27		
				28		
				29		
30	95/9"	2.5	108.1	30		
				31		Total depth: 30 feet No Water Fill to 7 feet
				32		
				33		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				34		
				35		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
				36		
				37		
				38		
				39		
				40		
				41		
				42		
				43		
				44		
				45		
				46		
				47		
				48		
				49		
				50		

BORING LOG NUMBER 11

Drilling Date: 10/17/07 **Elevation: 322'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
				0		FILL: Silty Sand, dark brown, moist, medium dense, fine grained, minor gravel
1	43	10.5	105.2	1		
				2		
3	23	13.2	108.5	3		
				4	ML	ALLUVIUM: Sandy to Clayey Silt, dark to medium brown, moist, medium stiff
5	29	9.9	103.3	5		
				6	SM	Silty Sand, medium to reddish-brown, medium dense, fine grained
7	16	11.8	94.0	7		
				8	SM/ML	Silty Sand to Sandy Silt, dark brown, stiff
				9		
10	34	12.2	102.8	10		
				11		
				12		
				13		
				14		
15	50	9.6	100.3	15		
				16	SM	Silty Sand, yellowish-brown
				17		
				18		
				19		
20	47	8.0	101.6	20		
				21		Total depth: 20 feet No Water Fill to 3 feet
				22		
				23		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				24		
				25		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted

BORING LOG NUMBER 12

Drilling Date: 10/17/07 **Elevation: 327'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
				0		FILL: Silty Sand, dark to medium brown, moist, medium dense, fine grained
				1		
2	20	12.0	85.4	2	SM	ALLUVIUM: Silty Sand, dark and reddish-brown mottling, moist, medium dense, fine grained
				3		
4	30	9.6	93.5	4		
				5		
				6		
7	27	10.2	106.4	7		yellowish-brown, slightly porous
				8		
				9		
10	35	11.6	91.6	10		
				11		
				12		
				13		
				14		
15	47	10.9	106.0	15		dark brown
				16		
				17		
				18		
				19		
20	70/11"	6.4	101.7	20	SM/SP	Silty Sand to Sand, olive-brown, very dense
				21		
				22		
				23		
				24		
25	100/5"	1.0	Disturbed	25	SW	Sand with Cobbles, yellowish-brown, slightly moist, fine to coarse grained

BORING LOG NUMBER 12

Project: File No. 19557 **Forest City Development**

ra

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				26		
				27		
				28		
				29		
30	100/6"	1.0	121.2	30		
				31		Total depth: 30 feet No Water Fill to 2 feet
				32		
				33		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				34		
				35		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
				36		
				37		
				38		
				39		
				40		
				41		
				42		
				43		
				44		
				45		
				46		
				47		
				48		
				49		
				50		

BORING LOG NUMBER 13

Drilling Date: 10/18/07 **Elevation: 340'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				0		Surface Conditions: Flat Parking Lot
						1-inch Asphalt over 2-inch Base
				1		FILL: Silty Sand, dark brown, moist, medium dense, fine grained
2	22	7.9	85.9	2		
				3		
4	23	7.5	91.0	4		
				5		
				6	SM	ALLUVIUM: Silty Sand, dark brown, moist, medium dense, fine grained
7	27	7.7	95.2	7		
				8		
				9		
10	37	7.6	100.1	10		
				11		
				12		
				13		
				14		
15	49	11.2	112.3	15		
				16		
				17		
				18		
				19		
20	85/8"	11.5	101.8	20		
				21	SW	Sand, yellowish-brown, slightly moist, very dense, fine grained, with cobbles
				22		
				23		
				24		
25	100/6"	2.1	122.8	25		
						fine to coarse grained

BORING LOG NUMBER 13

Project: File No. 19557 **Forest City Development**

ra

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				26		
				27		
				28		
				29		
30	100/6"	1.3	123.2	30		Total depth: 30 feet No Water Fill to 5 feet NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
				31		
				32		
				33		
				34		
				35		
				36		
				37		
				38		
				39		
				40		
				41		
				42		
				43		
				44		
				45		
				46		
				47		
				48		
				49		
				50		

BORING LOG NUMBER 14

Drilling Date: 10/18/07 **Elevation: 341'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
				0		FILL: Silty Sand, dark brown, moist, medium dense, fine grained
				1		
2	71	3.8	116.5	2		yellowish-brown, very dense
				3		
4	70	5.1	114.1	4		medium brown, minor brick fragments
				5		
				6		
7	26	15.7	110.8	7		
				8	CL	ALLUVIUM: Sandy to Silty Clay, dark brown, moist, medium stiff
				9		
10	37	14.7	113.1	10		
				11	CL	Clayey Sand
				12		
				13		
				14		
15	58	13.8	112.7	15	SM	Silty Sand, medium dense to dense, fine grained
				16		
				17		
				18		
				19		
20	80	2.8	113.7	20	SW	Sand, yellowish-brown, very dense, fine to coarse grained
				21		Total depth: 20 feet No Water Fill to 8 feet
				22		
				23		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				24		
				25		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted

BORING LOG NUMBER 15

Drilling Date: 10/18/07 **Elevation: 343'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
				0		FILL: Silty Sand, medium brown, moist, medium dense, fine grained
1	70			1		
				2		yellowish and dark brown mottling, very dense, fine grained with gravel
				3		
				4		
5	74/11"	No Recovery		5		
				6		
7	86	12.3	88.6	7		disturbed sample
				8	SC	ALLUVIUM: Clayey Sand, dark brown, moist, dense, fine grained
				9		
10	87	10.2	107.3	10	SM	Silty Sand to Clayey Sand, medium dense, fine grained
				11		
				12		
				13		
				14		
15	35	12.9	111.4	15	SM/SC	Silty Sand to Clayey Sand, medium dense, fine grained
				16		
				17		
				18		
				19		
20	70	13.8	105.1	20	SM	Silty Sand, dense
				21		
				22		
				23		
				24		
25	100/6"	2.6	121.8	25	SW	Sand with Cobbles, yellowish-brown, very dense, fine to coarse grained

BORING LOG NUMBER 15

Project: File No. 19557 **Forest City Development**

ra

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				26		
				27		
				28		
				29		
30	100/6"	3.0	Disturbed	30		
				31		Total depth: 30 feet No Water Fill to 8 feet
				32		
				33		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				34		
				35		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
				36		
				37		
				38		
				39		
				40		
				41		
				42		
				43		
				44		
				45		
				46		
				47		
				48		
				49		
				50		

BORING LOG NUMBER 16

Drilling Date: 10/16/07 **Elevation: 346'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
				0		FILL: Silty Sand, yellowish-brown, moist, medium dense, fine grained
1	67/12"	7.0	114.1	1		
				2		slight gravel Sandstone, yellowish-brown with light gray mottling, hard
3	75/7"	12.7	106.5	3		
				4		light gray with white mottling to medium brown, very hard
5	100/6"	8.1	117.0	5		
				6		Silty Sand, light grayish-brown, moist, very dense, fine to medium grained, slight gravel
7	100/6"	6.0	113.3	7		
				8		
				9		
10	54	4.2	115.3	10		
				11		Silty Sand to Sand, yellowish-brown, medium dense to dense, fine to coarse grained
				12		
				13		
				14		
15	64	9.4	95.7	15		
				16		Silty Sand, dark and medium brown, dense, fine grained
				17		
				18		
				19		
20	82	4.0	106.6	20		
				21		
				22		
22.5	66	12.9	106.2	23		Silty Sand to Sandy Silt, dark brown and dark gray mottling, stiff
				24		
25	90/10"	6.2	100.9	25		minor brick and asphalt fragments

BORING LOG NUMBER 16

Project: File No. 19557 **Forest City Development**

ra

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				26		
				27		
27.5	74	17.6	105.9	28		
				29		
30	77/11"	4.5	113.9	30		
				31	SP	ALLUVIUM: Sand with Gravel, yellowish-brown, slightly moist, very dense, fine grained
				32		
				33		
				34		
35	93/11"	7.8	116.8	35		
				36	SP/SW	Sand with Gravel, dark brown, very moist
				37		
37.5	75	19.8	105.5	38		BEDROCK: (PUENTE FORMATION): Siltstone, gray to dark gray, moderately hard, well bedded
				39		
40	75/11"	20.1	107.1	40		Total depth: 40 feet No Water Fill to 30 feet NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
				41		
				42		
				43		
				44		
				45		
				46		
				47		
				48		
				49		
				50		

BORING LOG NUMBER 17

Drilling Date: 10/16/07 **Elevation: 347'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
				0		FILL: Silty Sand, yellowish-brown, moist, medium dense, fine to medium grained
				1		
2	46	19.7	104.2	2		yellowish, grayish-brown with light gray mottling to brown, fine grained
				3		
4	38	17.6	107.2	4		Sandy Clay, medium brown with dark gray mottling, medium stiff
				5		
				6		
7	85/11"	19.8	103.4	7		Silty Sand, medium brown with gray mottling to dark gray, very dense, fine with medium grained, slight gravel
				8		
				9		
10	30	11.7	112.8	10		dark gray
				11		
				12		
				13		
				14		
15	85/11"	15.2	117.5	15	SC	ALLUVIUM: Clayey Sand, greenish-gray with dark gray mottling, moist, medium stiff
				16		
				17		
17.5	80/11"	15.8	113.4	18		weathered bedrock, Sandstone, yellowish-brown with light gray mottling, medium dense, fine grained
				19		
20	85/12"	11.7	115.4	20		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
				21		
				22		
				23		
				24		BEDROCK (PUENTE FORMATION): Sandstone, gray to greenish-gray with medium brown, moderately hard, well bedded
25	57	20.4	98.0	25		Total depth: 25 feet; No Water; Fill to 15 feet

BORING LOG NUMBER 18

Drilling Date: 10/16/07 **Elevation: 348'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	Description Surface Conditions: Gravel Road
				0	FILL: Silty Sand, dark brown, moist, medium dense, fine grained
				1	
2	75/11"	9.7	102.1	2	
				3	
				4	
5	35	5.8	SPT	5	Silty Sand to Sand, dark and grayish-brown mottling, medium dense to dense
				6	
				7	
7.5	59	6.7	110.0	8	Silty Sand, dark brown, minor brick fragments
				9	
10	20	7.8	SPT	10	BEDROCK (PUENTE FORMATION): interbedded Siltstone and Sandstone, yellowish and light yellow mottling, moist, moderately hard, well bedded
				11	
				12	
12.5	52	11.7	107.4	13	
				14	
15	43	10.3	SPT	15	
				16	
				17	
17.5	80	21.2	116.4	18	Sandstone interbedded with Siltstone, yellowish and light brown mottling, less weathered
				19	
20	80/11"	22.2	SPT	20	minor caliche
				21	
				22	
22.5	83/12"	26.6	92.7	23	Clayey Siltstone
				24	
25	80/11"	25.3	SPT	25	

BORING LOG NUMBER 18

Project: File No. 19557 **Forest City Development**

ra

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	Description
				26	
				27	
27.5	75/7"	14.1	110.1	28	Sandstone, olive-brown
				29	
30	50/6"	16.9	SPT	30	
				31	
				32	
32.5	75/7"	37.8	85.0	33	Siltstone interbedded with Sandstone, yellow and olive-brown
				34	
35	50/6"	17.6	SPT	35	Silty Sandstone, olive-brown
				36	
				37	
37.5	100/6"	23.9	101.3	38	Siltstone to Sandstone, grayish-brown
				39	
40	80/12"	42.6	SPT	40	
				41	
				42	
42.5	100/6"	13.9	113.6	43	
				44	
45	75/7"	33.9	SPT	45	
				46	
				47	
47.5	75/7"	35.2	83.5	48	
				49	
50	50/6"	19.7	SPT	50	Sandstone, gray and dark brown

BORING LOG NUMBER 18

Project: File No. 19557 **Forest City Development**

ra

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	Description
				51	
				52	
52.5	75/7"	35.6	85.6	53	
				54	
55	80/11"	31.6	SPT	55	
				56	
				57	
57.5	100/6"	20.8	101.9	58	dark brown, wet
				59	
60	50/6'	17.5	SPT	60	Siltstone interbedded with Sandstone, dark brown and grayish-brown, moist
				61	
				62	
62.5	100/7"	27.8	94.8	63	grayish-brown
				64	
65	50/3"	17.0	SPT	65	Sandstone, dark and grayish-brown, fine grained
				66	
				67	
67.5	75/8"	30.7	89.3	68	
				69	
70	50/6"	18.2	SPT	70	Total depth: 70 feet
				71	Water at 66 feet
				72	Fill to 10 feet
				73	NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				74	
				75	Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted

BORING LOG NUMBER 19

Drilling Date: 10/18/07 **Elevation: 339'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Paved and Inclined Access Road
				0		2-inch Asphalt, No Base
				1		FILL: Silty Sand, reddish-brown, moist, medium dense, fine grained
2	70/12"	8.0	103.7	2		very dense
				3	SM	ALLUVIUM: Silty Sand, reddish-brown, moist, dense, fine grained
4	42	7.2	108.8	4		
				5		
				6		
7	40	8.5	Disturbed	7		
				8		
				9		
10	38	10.9	116.3	10		
				11	SM/ML	Silty Sand to Sandy Silt, dark and yellowish-brown, moist, medium dense, medium stiff
				12		
				13		
				14		
15	46	12.7	111.6	15		
				16		
				17		
				18		
				19		
20	80	41.3	84.9	20		
				21		BEDROCK (PUENTE FORMATION): Clayey Siltstone, gray and white mottling, moderately hard, well bedded
				22		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				23		
				24		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
25	70/11"	27.7	92.9	25		
						Total depth: 25 feet; No Water; Fill to 3 feet

BORING LOG NUMBER 20

Drilling Date: 10/18/07 **Elevation: 347'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				0		Surface Conditions: Gravel Road FILL: Silty Sand, dark brown, moist, medium dense, fine grained
				1		
2	75/11'	Disturbed		2		very dense
				3		
4	34	6.4	102.4	4		medium dense
				5		
				6		
7	15	4.9	92.4	7		
				8		
				9		
10	30	5.9	105.3	10		
				11		
				12		
				13		
				14		
15	35	16.7	Disturbed	15		
				16		
				17		
17.5	80	15.0	129.8	18		BEDROCK (PUENTE FORMATION): Sandstone, yellowish and grayish-brown mottling, moderately hard, well bedded
				19		
20	90/9"	9.9	97.4	20		
				21		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				22		
				23		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
				24		
25	215/12"	20.8	103.9	25		
						Total depth: 25 feet; No Water; Fill to 17.5 feet

BORING LOG NUMBER 21

Drilling Date: 10/18/07 **Elevation: 320'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				0		Surface Conditions: Inclined Access Road 4-inch Asphalt over 5-inch Base
1	80/11"	9.0	113.8	1		FILL: Silty Sand, light gray, moist, medium dense, fine grained
				2		BEDROCK (PUENTE FORMATION): Sandstone, yellowish to light brown, moist, moderately hard, well bedded
3	87/11"	8.7	116.7	3		
				4		
5	85	12.0	113.2	5		
				6		
7	86	15.4	108.2	7		
				8		
				9		
10	89/11"	16.4	110.0	10		yellowish and reddish-brown
				11		
				12		
				13		
				14		
15	80/12"	24.4	99.0	15		gray
				16		
				17		
				18		
				19		
20	80/9"	26.9	99.5	20		Siltstone
				21		
				22		
				23		
				24		
25	83	21.9	100.4	25		Sandstone, gray and yellowish-brown mottling

BORING LOG NUMBER 21

Project: File No. 19557 **Forest City Development**

ra

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				26		
				27		
				28		
				29		
30	93/11"	23.2	104.5	30		
				31		Total depth: 30 feet No Water Fill to 1.5 feet
				32		
				33		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				34		
				35		Used 8-inch diameter Hollow-Stem Auger 140-lb. Slide Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
				36		
				37		
				38		
				39		
				40		
				41		
				42		
				43		
				44		
				45		
				46		
				47		
				48		
				49		
				50		

BORING LOG NUMBER 22

Drilling Date: 10/16/07 **Elevation: 347'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
				0		FILL: Silty Sand, yellowish-brown, moist, medium dense, fine grained
				1		
2	8/12"	15.6	98.8	2		BEDROCK (PUENTE FORMATION): Siltstone and Sandstone, yellowish-brown with white mottling, fine grained, moderately hard, moist, well bedded
				3		weathered
				4		yellow to light brown
5	9/12"	24.9	86.8	5		
				6		
7	8/12"	29.3	81.3	7		reddish-orange with white mottling, less weathered
				8		
				9		@ 9' Bedding: [N60W, 42SW]
10	2/12"	23.0	109.5	10		yellowish-orange with white mottling
				11		
				12		
				13		
				14		
15	6/12"	17.4	104.0	15		yellowish-brown with reddish-brown mottling
				16		
				17		@ 18' Bedding: [N85E, 55S]
				18		gray
				19		
20	11/12"	14.9	114.4	20		Silty Sandstone interbedded with Silty Claystone, light gray with gray mottling, stiff, slight gravel
				21		
				22		@ 22' Bedding: [N30W, 55SW]
				23		
				24		
25	6/12"	26.3	95.6	25		

BORING LOG NUMBER 22

Project: File No. 19557 **Forest City Development**

ra

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				26		Total depth: 26 feet by refusal of silicified rock No Water Fill to 6 inches
				27		
				28		
				29		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				30		
				31		Used 24-inch diameter Bucket Auger with Modified California Sampler Kelly Weights: 1590# 0' - 27' Boring Downhole logged by Geologist
				32		
				33		
				34		
				35		
				36		
				37		
				38		
				39		
				40		
				41		
				42		
				43		
				44		
				45		
				46		
				47		
				48		
				49		
				50		

BORING LOG NUMBER 23

Drilling Date: 10/18/07 **Elevation: 311'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				0		Surface Conditions: Inclined Paved Access Road
						3-inch Asphalt over 6-inch Base
				1		FILL: Silty Sand with rock fragments, dark brown, moist, medium grained
				2		
				3		
				4		
				5	SM	Silty Sand, dark brown and olive-brown, moist, dense, fine grained
5	18/12"	10.6	110.8			
				6		
				7		
				8		
				9		
				10		
10	20/12"	10.2	110.3			
				11		Silty Sand with rock fragments, dark gray and gray mottling, moist, very dense, fine grained, petroleum odor
				12		Total depth: 11 feet by refusal No Water Bottom of Fill not identified
				13		
				14		
				15		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				16		Used 24-inch diameter Bucket Auger with Modified California Sampler
				17		Kelly Weights: 1590# 0' - 27' Boring Downhole logged by Geologist
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		

BORING LOG NUMBER 24

Drilling Date: 10/16/07 **Elevation: 347'***

Project: File No. 19557 **Forest City Development**

ra

*reference: Topographic Survey by Surveying and Drafting Services, dated 01/21/02

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
				0		FILL: Silty Sand, dark brown, moist, medium dense, fine grained, minor asphalt fragments
				1		
				2		
3	11/12"	6.0	107.4	3		
				4		BEDROCK (PUENTE FORMATION): Siltstone, weathered, poorly bedded, dark gray to yellowish-brown, moist, moderately hard
				5		
6	10/12"	20.7	97.5	6		Sandstone interbedded with Siltstone, light to dark gray
				7		
				8		
				9		less weathered, @ 9' Bedding: [N60W, 65SW]
10	15/12"	16.1	107.9	10		Sandstone, gray to dark gray, moderately well bedded
				11		
				12		
				13		
				14		
15	18/12"	20.0	99.7	15		
				16		@ 16' Bedding: [N65W, 65SW]
				17		
				18		
				19		
20	8/12"	22.1	101.1	20		
				21		Total depth: 20 feet No Water Fill to 3.5 feet
				22		
				23		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				24		Used 24-inch diameter Bucket Auger with Modified California Sampler
				25		Kelly Weights: 1590# 0' - 27' Boring Downhole logged by Geologist

BORING LOG NUMBER 25

Lincoln Property Company **Date: 03/18/15** **Elevation: 295'***

File No. 20921 **Method: 8-inch diameter Hollow Stem Auger**

km *Reference: Plan by Surveying and Drafting Services

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Asphalt
				0		3-inch Asphalt, No Base
				1		FILL: Silty Sand, dark brown, moist, medium dense, fine grained, some gravel
				2		
2.5	31	7.0	117.0			
				3		Silty Sand, dark brown, moist, medium dense, fine grained
				4		
5	5	8.0	SPT	5		
				6		Silty Sand to Sand, dark to yellowish brown, moist, medium dense, fine grained
				7		
7.5	33	2.7	103.9			
				8	SP	ALLUVIUM: Sand, yellowish brown, moist, medium dense, fine grained
				9		
10	7	7.0	SPT	10		
				11		Sand, dark and yellowish brown, moist, medium dense, fine grained
				12		
12.5	27	4.5	98.6			
				13		
				14		
15	32	1.7	SPT	15		
				16		Sand, dark and yellowish brown, moist, medium dense to dense, fine to coarse grained
				17		
17.5	75	2.3	113.1			
				18		Sand, light brown and yellow, slightly moist, very dense, fine to medium grained
				19		
20	32	2.9	SPT	20		
				21		
				22		
22.5	100/10"	4.3	114.9			
				23		Sand, yellow and olive brown, moist, very dense, fine to medium grained
				24		
25	68	5.0	SPT	25		
					SW	Gravelly Sand, yellow and olive brown, moist, very dense, fine grained

BORING LOG NUMBER 25

Lincoln Property Company

File No. 20921

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				26		
				27		
27.5	27 50/5"	3.3	108.0	28	SP	Sand, yellow and olive brown, moist, very dense, fine to medium grained
				29		
30	39	6.2	SPT	30		Sand, yellow and olive brown, moist to wet, medium dense, fine to medium grained
				31		
32.5	48	19.0	102.9	32		
				33		
				34		
35	21	19.2	SPT	35	SM/SP	Silty Sand to Sand, dark and grayish brown, moist, medium dense, fine grained
				36		
				37	SM/ML	Silty Sand to Sandy Silt, dark and grayish brown, moist, stiff, medium dense, fine grained
37.5	70	22.5	108.4	38		
				39		
40	17	19.4	SPT	40	SP	Sand, dark and grayish brown, moist to wet, medium dense, fine to medium grained
				41		
				42		
42.5	16	32.4	90.5	43	ML	Sandy Silt, gray to dark gray, moist to very moist, stiff
				44		
45	14	32.0	SPT	45	ML/SP	Sandy Silt to Sand, gray to dark gray, moist, stiff, medium dense, fine grained
				46		
				47		
47.5	24 50/5"	13.7	117.9	48	SP	Sand, gray to dark gray, wet, very dense, fine to medium grained, minor gravel
				49		
50	75	13.4	SPT	50		Sand, gray to dark gray, wet, very dense, fine to medium grained

BORING LOG NUMBER 25

Lincoln Property Company

File No. 20921

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				51		
				52		
52.5	100/11"	9.0	129.2	53		
				54		
55	45 50/5"	7.4	SPT	55		
				56		
				57		
57.5	30 50/4"	21.6	110.8	58	SM/SP	Silty Sand to Sand, gray to dark gray, moist to wet, very dense, fine to medium grained
				59		
60	74	9.6	SPT	60	SP	Sand, gray to dark gray, wet, very dense, fine to medium grained
				61		
				62		
62.5	100/8"	16.9	122.6	63		Sand, gray and dark gray, wet, very dense, fine to medium grained
				64		
65	82	9.1	SPT	65		
				66		
				67		
67.5	25 50/4"	15.1	117.4	68		
				69		
70	49 50/5"	10.3	SPT	70		Total Depth 70 feet Water at 20 feet Fill to 7½ feet
				71		
				72		
				73		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual.
				74		
				75		Used 8-inch diameter Hollow-Stem Auger 140-lb. Automatic Hammer, 30-inch drop Modified California Sampler used unless otherwise noted
						SPT=Standard Penetration Test

BORING LOG NUMBER 26

Lincoln Property Company **Date: 03/18/15** **Elevation: 344'***

File No. 20921 **Method: 8-inch diameter Hollow Stem Auger**

km

*Reference: Plan by Surveying and Drafting Services

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
				0		FILL: Silty Sand, dark brown, moist, medium dense, fine grained, minor gravel
				1		
				2		
2.5	52	4.0	114.4			
				3		Silty Sand, dark brown, moist, medium dense, fine grained, minor rock fragments
				4		
5	36	11.3	114.9	5		
				6		
				7		
7.5	38	7.6	109.8			
				8		Silty Sand with rock, asphalt, brick fragments, dark brown, moist, medium dense, fine grained
				9		
10	14	7.1	112.6	10		
				11		
				12		
12.5	7	8.7	100.3			
				13	SM	ALLUVIUM: Silty Sand, dark brown, moist, medium dense, fine grained
				14		
15	11	10.4	103.7	15		
				16		
				17		
				18		
				19		
20	42	6.5	132.5	20		
					SP	Sand, yellowish brown, moist, medium dense, fine grained
				21		
				22		
				23		
				24		
25	75	5.4	116.7	25		
					SW	Gravelly Sand, dark brown, moist, very dense, fine to coarse grained

BORING LOG NUMBER 26

Lincoln Property Company

File No. 20921

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				26		
				27		
				28		
				29		
30	45 50/3"	4.4	118.8	30		
				31		
				32		
				33		
				34		
35	82	24.6	98.6	35		BEDROCK (PUENTE FORMATION): Siltstone, yellow and grayish brown, laminated, moist, medium hard
				36		
				37		
				38		
				39		
40	75	28.1	92.4	40		
				41		
				42		
				43		
				44		
						Siltstone, gray to dark gray, moist, medium hard to hard
45	52 50/5"	19.7	103.4	45		
				46		Total Depth 45 feet No Water Fill to 12½ feet Rock at 35 feet
				47		
				48		
				49		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual.
				50		Used 8-inch diameter Hollow-Stem Auger 140-lb. Automatic Hammer, 30-inch drop Modified California Sampler used unless otherwise noted

BORING LOG NUMBER 27

Lincoln Property Company **Date: 03/19/15** **Elevation: 345'***

File No. 20921 **Method: 24-inch diameter Bucket Auger**

km

*Reference: Plan by Surveying and Drafting Services

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
				0		FILL: Silty Sand, dark brown, moist, medium dense, fine grained, minor brick and concrete fragments
				1		
				2		
				3		
				4		
5	4/12"	7.9	116.3	5		
				6		
				7		
				8		
				9		
10	7/12"	10.2	116.9	10		
				11		Silty Sand to Sandy Silt, dark brown, moist, medium dense to dense, fine grained, stiff
				12		
				13		
				14		
15	7/12"	12.4	111.6	15		
				16	SM	ALLUVIUM: Silty Sand, dark brown, moist, medium dense to dense, fine grained
				17		
				18		
				19		
20	4/12"	6.2	105.6	20		
				21	SM/SP	Silty Sand to Sand, dark brown, moist, medium dense, fine grained
				22		
				23		
				24		
25	30/7"	5.1	111.3	25		
					SP/SW	Sand to Cobbley Sand, dark and yellowish brown, moist, dense, fine to coarse grained

BORING LOG NUMBER 27

Lincoln Property Company

File No. 20921

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				26		
				27		
				28		
				29		
30	20/12"	23.4	112.7	30		Sand to Cobbley Sand, gray to dark gray, moist, dense, fine to coarse grained
				31		
				32		
				33		seepage water
				34		
35	5/12"	24.5	94.8	35		BEDROCK (PUENTE FORMATION): Siltstone, yellow and grayish brown, moist, medium hard, laminated
				36		
				37		
				38		@ 40' Bedding [N85W, 57SW]
				39		
40	5/12"	24.7	95.8	40		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual. Boring Downhole logged by Geologist Kelley weights 0-24' 2400 lbs. 24-46' 1550 lbs. 46-66' 850 lbs. Modified California Sampler used unless otherwise noted
				41		
				42		
				43		
				44		
45	30/12"	25.7	98.5	45		Siltstone, gray to dark gray, moist, medium hard to hard
				46		
				47		
				48		
				49		
50	45/12"	15.2	105.7	50		Silicified Siltstone, grayish brown, moist, hard Total Depth 50 feet Water at 45 feet Fill to 15 feet

LOG OF TEST PIT NUMBER 1

Lincoln Property Company **Drilling Date: 03/19/15** **Elevation: 331'***

File No. 20921 **Method: Hand Dug**

km

*Reference: Plan by Surveying and Drafting Services

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
			0		FILL: Sandy Silt, dark brown, moist, stiff
1	6.3	99.0	1	ML	ALLUVIUM: Sandy Silt, dark brown, moist, stiff
			2		
3	7.4	107.3	3	SM/ML	Silty Sand to Sandy Silt, dark brown, moist, stiff, medium dense, fine grained
			4		
5	8.1	109.4	5	SM	Silty Sand, dark brown, moist, medium dense, fine grained
			6		
7	9.0	113.9	7		Silty Sand, dark and medium brown, moist, medium dense, fine grained
			8		
			9		
10	10.6	107.4	10		
			11		
			12		
			13		
			14		
15	10.4	110.8	15		Total Depth 15 feet No Water Fill to 1 foot
			16		
			17		
			18		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual.
			19		
			20		Used 4-inch diameter Hand-Augering Equipment; Hand Sampler
			21		
			22		
			23		
			24		
			25		

LOG OF TEST PIT NUMBER 2

Lincoln Property Company **Drilling Date: 03/19/15** **Elevation: 333'***

File No. 20921 **Method: Hand Dug**

km

*Reference: Plan by Surveying and Drafting Services

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
			0		FILL: Sandy Silt, dark brown, moist, stiff
			1		
2	7.6	110.1	2	SM/ML	ALLUVIUM: Silty Sand to Sandy Silt
			3		
			4		
5	7.4	100.4	5	SM	Silty Sand, dark brown and medium brown, moist, medium dense, fine grained
			6		
			7		
			8		
			9		
10	13.4	101.8	10	SM/ML	Silty Sand to Sandy Silt, dark brown, moist, medium dense, fine grained, stiff
			11		
			12		
			13		
			14	SM	Silty Sand, dark brown, moist, medium dense, fine grained
15	8.4	123.0	15		Total Depth 15 feet No Water Fill to 2 feet
			16		
			17		
			18		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual.
			19		
			20		Used 4-inch diameter Hand-Augering Equipment; Hand Sampler
			21		
			22		
			23		
			24		
			25		

LOG OF TEST PIT NUMBER 3

Lincoln Property Company **Drilling Date: 03/19/15** **Elevation: 336'***

File No. 20921 **Method: Hand Dug**

km

*Reference: Plan by Surveying and Drafting Services

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
			0		FILL: Silty Sand, dark brown, moist, medium dense, fine grained
1	1.8	111.0	1		
			2		
3	19.7	76.5	3		
			4		
5	5.8	112.5	5		
			6		Silty Sand, gray and dark brown, moist, medium dense, fine grained, brick concrete and asphalt fragments
7	5.1	108.7	7		
			8		Silty Sand, dark and yellowish brown, moist, medium dense, fine grained
			9		Silty Sand, dark brown, moist, dense, fine grained
10	12.9	98.4	10		
			11		Silty Sand to Sand, yellow and grayish brown, moist, medium dense, fine grained, minor brick fragments
			12		
			13		
					Silty Sand to Sand, yellow and grayish brown, moist, dense, fine grained
14	No Recovery		14		
			15		Total Depth 14 feet by refusal No Water Bottom of Fill not encountered
			16		
			17		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual.
			18		
			19		Used 4-inch diameter Hand-Augering Equipment; Hand Sampler
			20		
			21		
			22		
			23		
			24		
			25		

LOG OF TEST PIT NUMBER 4

Lincoln Property Company **Drilling Date: 03/19/15** **Elevation: 338'***

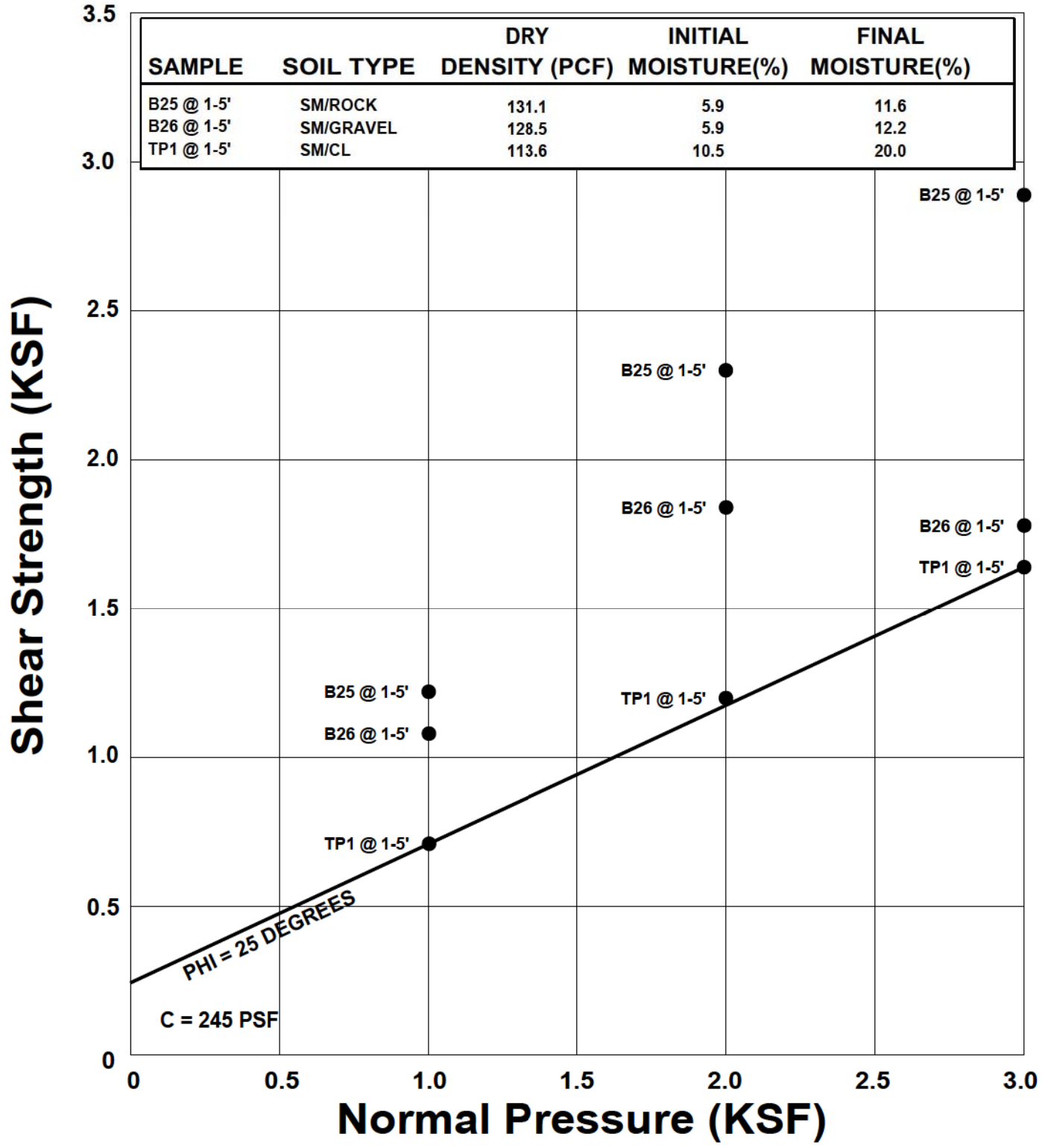
File No. 20921 **Method: Hand Dug**

km *Reference: Plan by Surveying and Drafting Services

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
			0		FILL: Silty Sand, dark to yellowish brown, moist, medium dense, fine grained, minor rock fragments
1	4.9	112.9	1		
			2		
3	3.8	100.7	3		
			4		
5	4.8	135.4	5		
			6		
7	10.7	120.0	7		Silty Sand, dark brown, moist, medium dense, fine grained, minor brick fragments
			8	SM	ALLUVIUM: Silty Sand, dark brown, moist, medium dense, fine grained
			9		
10	11.7	114.1	10		
			11		
			12		
			13		
			14		
15	8.9	126.9	15		Total Depth 15 feet No Water Fill to 8 feet
			16		
			17		
			18		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual.
			19		
			20		Used 4-inch diameter Hand-Augering Equipment; Hand Sampler
			21		
			22		
			23		
			24		
			25		

BULK SAMPLE REMOLDED TO 90 PERCENT OF THE MAXIMUM LABORATORY DENSITY

SAMPLE	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE(%)	FINAL MOISTURE(%)
B25 @ 1-5'	SM/ROCK	131.1	5.9	11.6
B26 @ 1-5'	SM/GRAVEL	128.5	5.9	12.2
TP1 @ 1-5'	SM/CL	113.6	10.5	20.0



● Direct Shear, Saturated

SHEAR TEST DIAGRAM

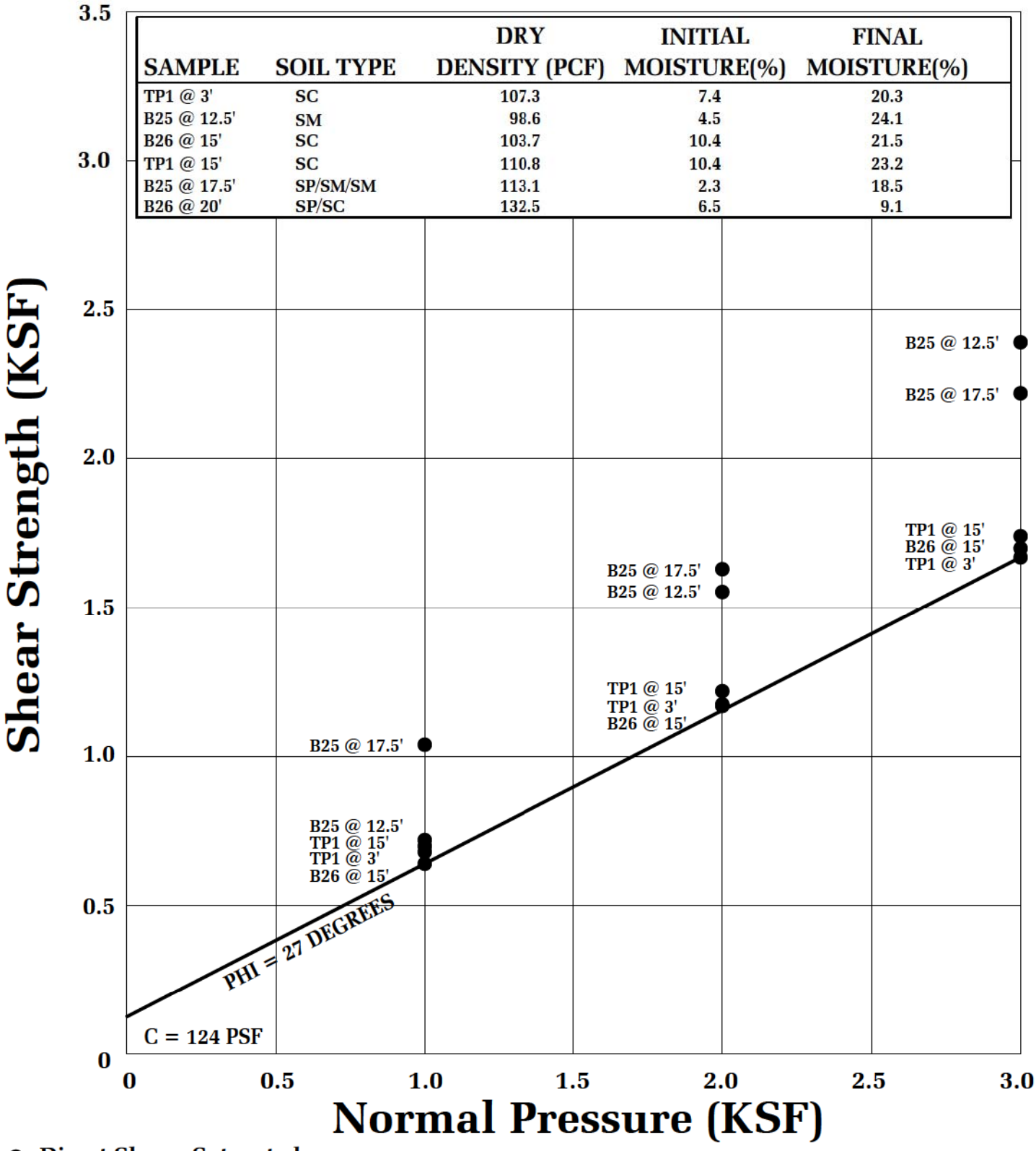
Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921 | PLATE: B-1

ALLUVIUM

SAMPLE	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE(%)	FINAL MOISTURE(%)
TP1 @ 3'	SC	107.3	7.4	20.3
B25 @ 12.5'	SM	98.6	4.5	24.1
B26 @ 15'	SC	103.7	10.4	21.5
TP1 @ 15'	SC	110.8	10.4	23.2
B25 @ 17.5'	SP/SM/SM	113.1	2.3	18.5
B26 @ 20'	SP/SC	132.5	6.5	9.1



● Direct Shear, Saturated

SHEAR TEST DIAGRAM

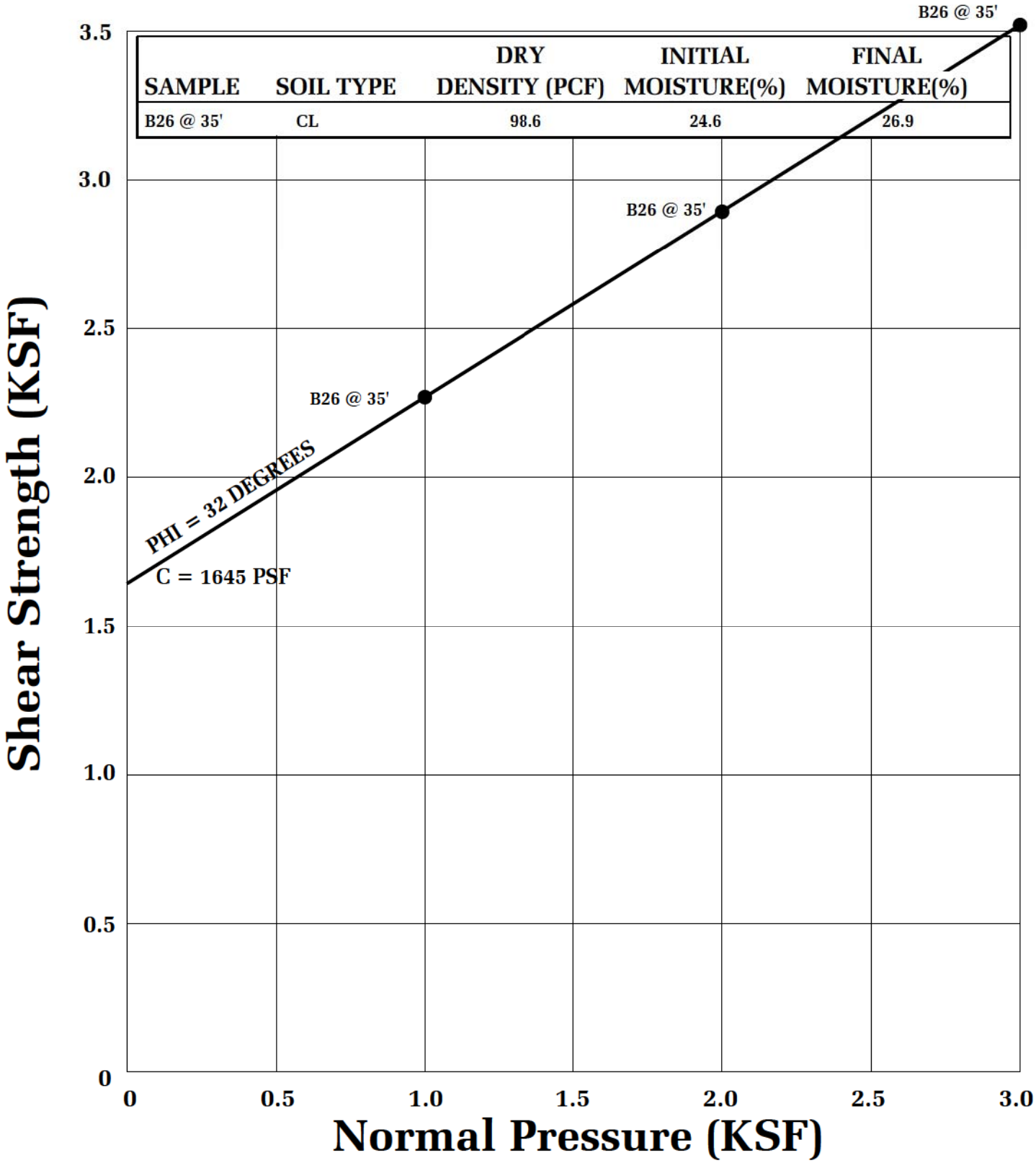
Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921 | PLATE: B-2

BEDROCK

SAMPLE	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE(%)	FINAL MOISTURE(%)
B26 @ 35'	CL	98.6	24.6	26.9



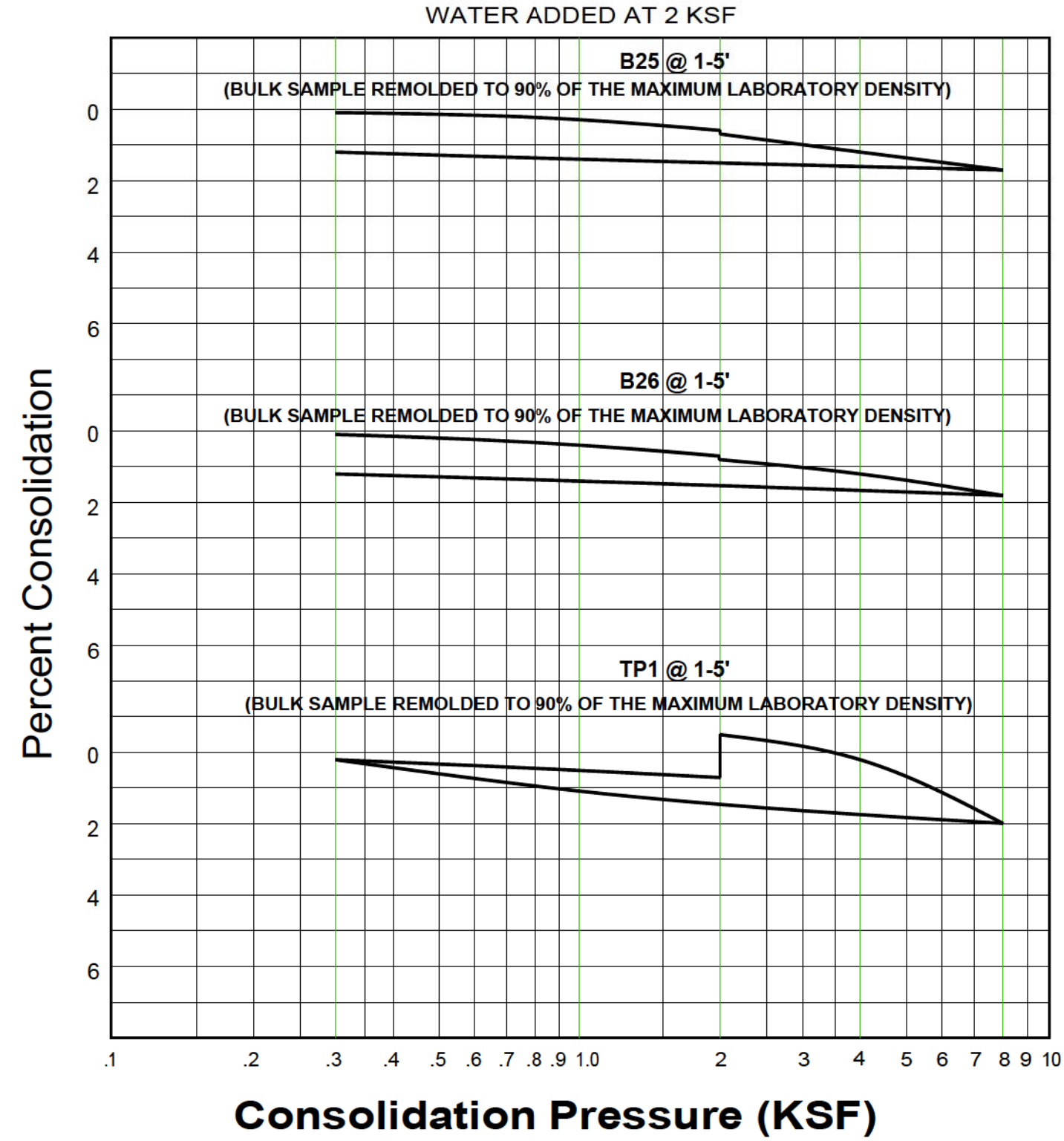
● Direct Shear, Saturated

SHEAR TEST DIAGRAM

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921 | PLATE: B-3



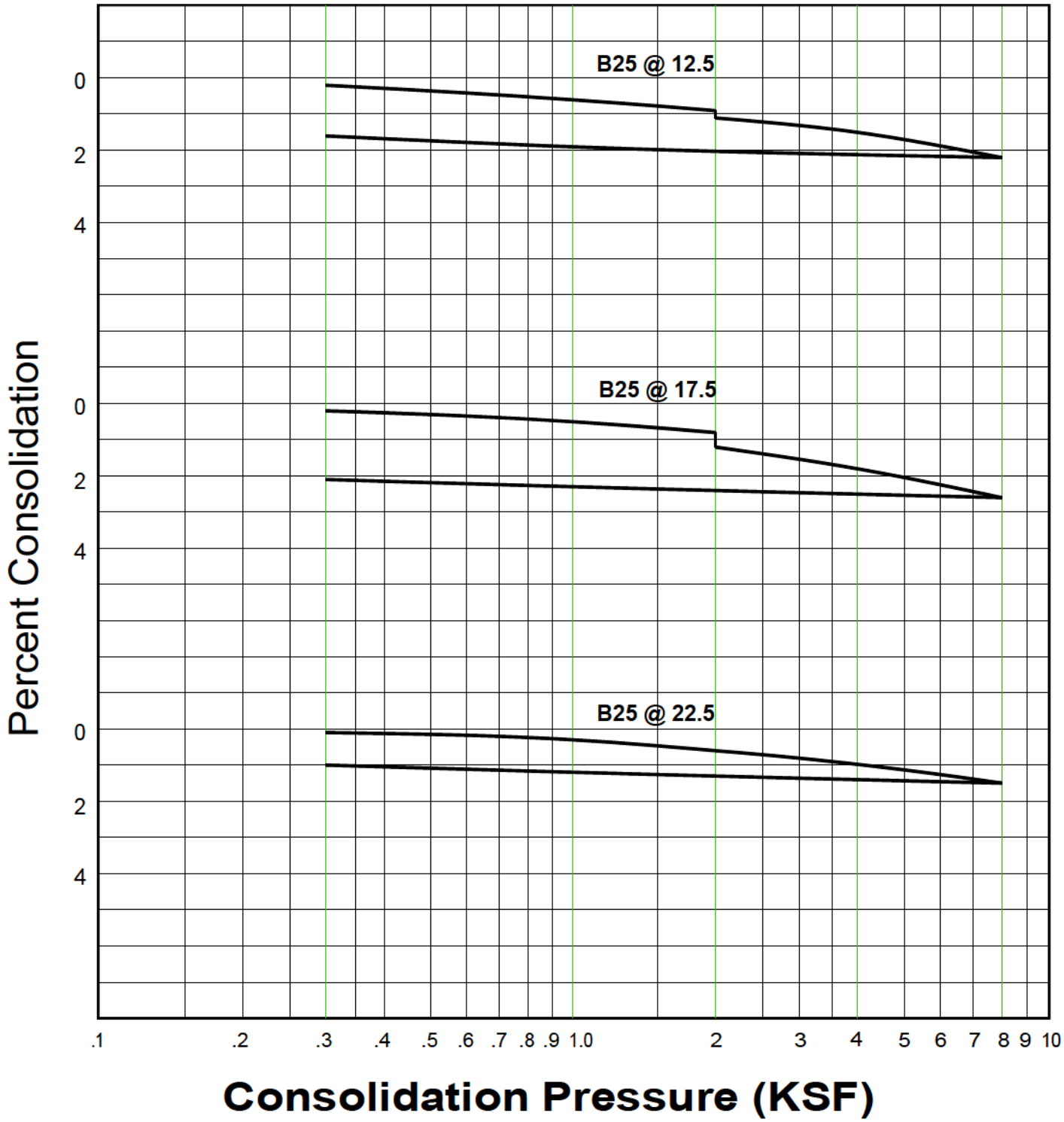
CONSOLIDATION TEST

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921 | PLATE: C-1

WATER ADDED AT 2 KSF



CONSOLIDATION TEST

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921 | PLATE: C-2

ASTM D 1557

SAMPLE	B25 @ 1- 5'	B26 @ 1-5'	TP1 @ 1-5'
SOIL TYPE:	SM/ROCK	SM/GRAVEL	SM/CL
MAXIMUM DENSITY pcf.	145.7	142.8	126.2
OPTIMUM MOISTURE %	5.9	5.9	10.5

ASTM D 4829

SAMPLE	B25 @ 1- 5'	B26 @ 1-5'	TP1 @ 1-5'
SOIL TYPE:	SM/ROCK	SM/GRAVEL	SM/CL
EXPANSION INDEX UBC STANDARD 18-2	2	2	86
EXPANSION CHARACTER	VERY LOW	VERY LOW	MODERATE

SULFATE CONTENT

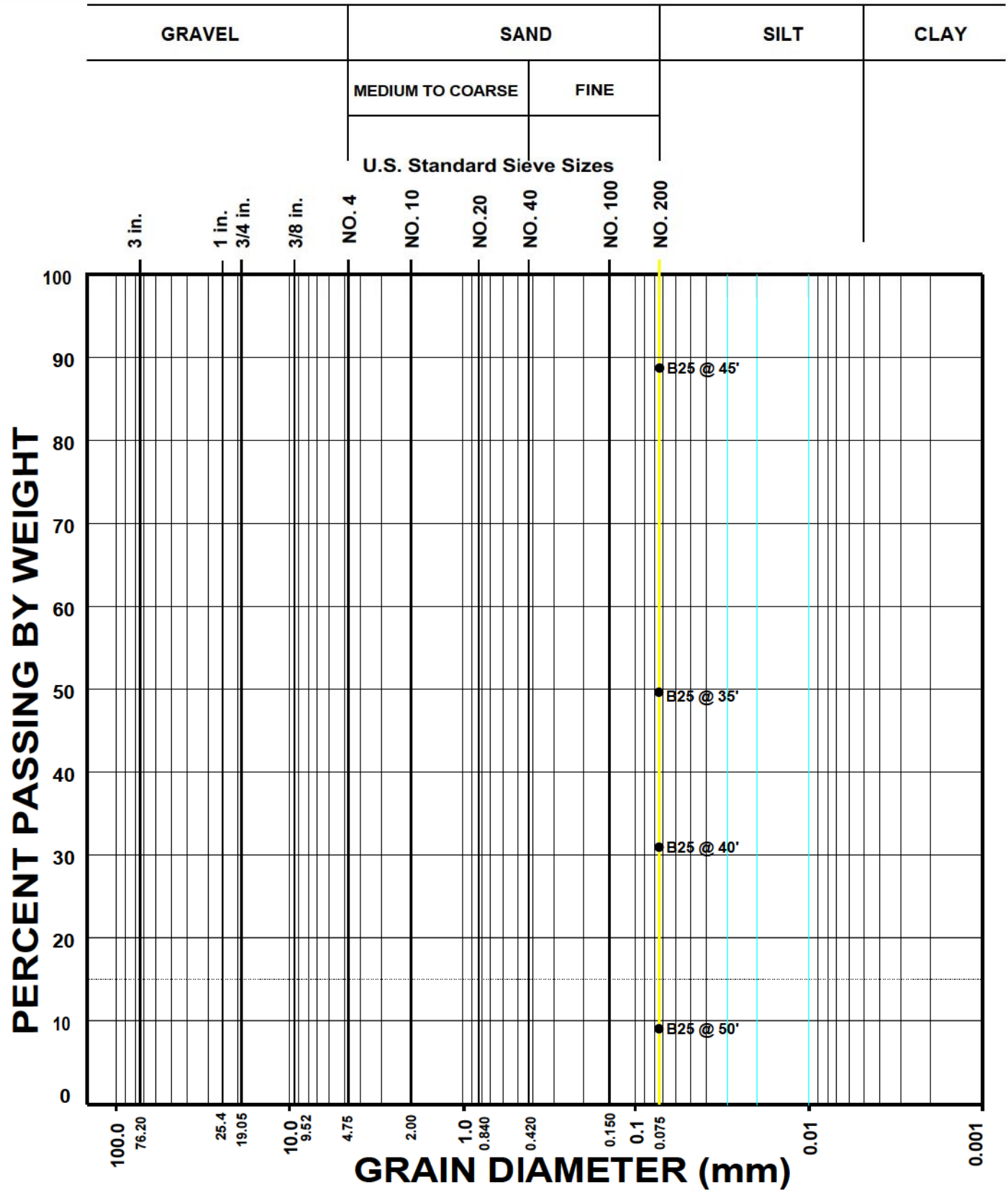
SAMPLE	B25 @ 1- 5'	B26 @ 1-5'	TP1 @ 1-5'
SULFATE CONTENT: (percentage by weight)	< 0.10%	< 0.10%	< 0.10%

COMPACTION/EXPANSION DATA SHEET

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921 | PLATE: D



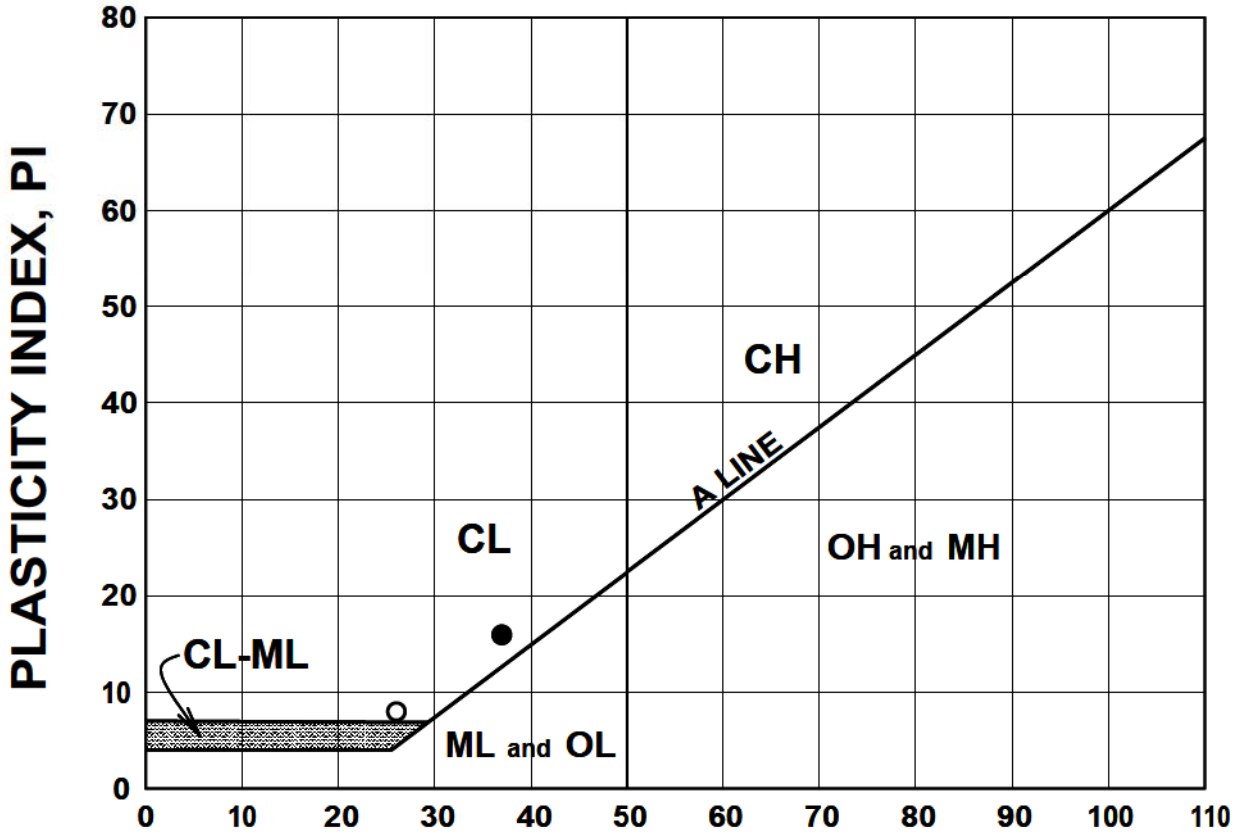
GRAIN SIZE DISTRIBUTION

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921 | PLATE: E

ASTM D4318



BORING NUMBER	DEPTH (FEET)	TEST SYMBOL	LL	PL	PI	DESCRIPTION
B25	35	○	26	18	8	CL
B25	45	●	37	21	16	CL

ATTERBERG LIMITS DETERMINATION

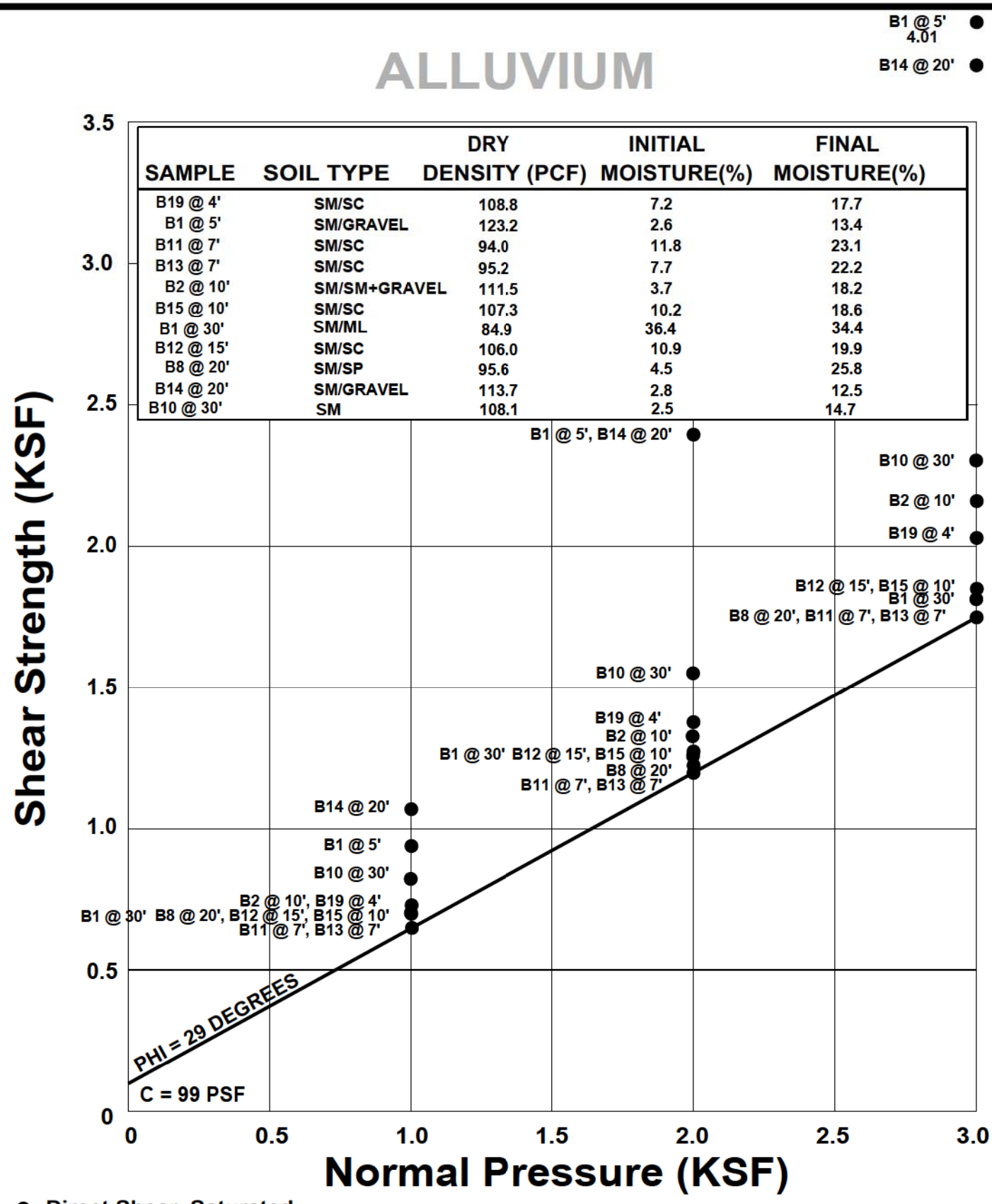
Geotechnologies, Inc.
Consulting Geotechnical Engineers

LINCOLN PROPERTIES

FILE NO. 20921 | PLATE: F

ALLUVIUM

SAMPLE	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE(%)	FINAL MOISTURE(%)
B19 @ 4'	SM/SC	108.8	7.2	17.7
B1 @ 5'	SM/GRAVEL	123.2	2.6	13.4
B11 @ 7'	SM/SC	94.0	11.8	23.1
B13 @ 7'	SM/SC	95.2	7.7	22.2
B2 @ 10'	SM/SM+GRAVEL	111.5	3.7	18.2
B15 @ 10'	SM/SC	107.3	10.2	18.6
B1 @ 30'	SM/ML	84.9	36.4	34.4
B12 @ 15'	SM/SC	106.0	10.9	19.9
B8 @ 20'	SM/SP	95.6	4.5	25.8
B14 @ 20'	SM/GRAVEL	113.7	2.8	12.5
B10 @ 30'	SM	108.1	2.5	14.7



● Direct Shear, Saturated

SHEAR TEST DIAGRAM

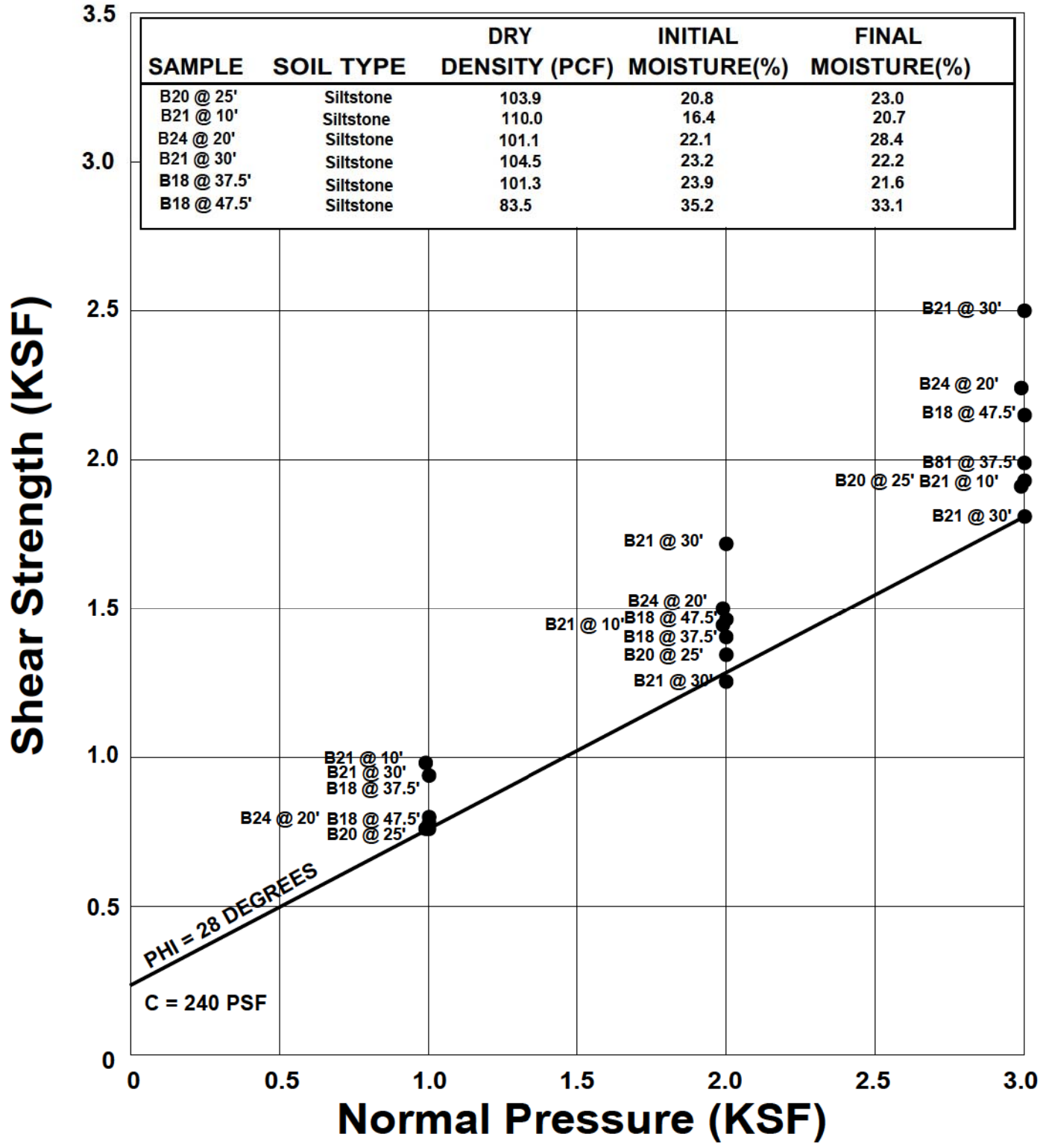
Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: B-1

BEDROCK - PUENTE FORMATION

SAMPLE	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE(%)	FINAL MOISTURE(%)
B20 @ 25'	Siltstone	103.9	20.8	23.0
B21 @ 10'	Siltstone	110.0	16.4	20.7
B24 @ 20'	Siltstone	101.1	22.1	28.4
B21 @ 30'	Siltstone	104.5	23.2	22.2
B18 @ 37.5'	Siltstone	101.3	23.9	21.6
B18 @ 47.5'	Siltstone	83.5	35.2	33.1



● Direct Shear, Saturated

SHEAR TEST DIAGRAM

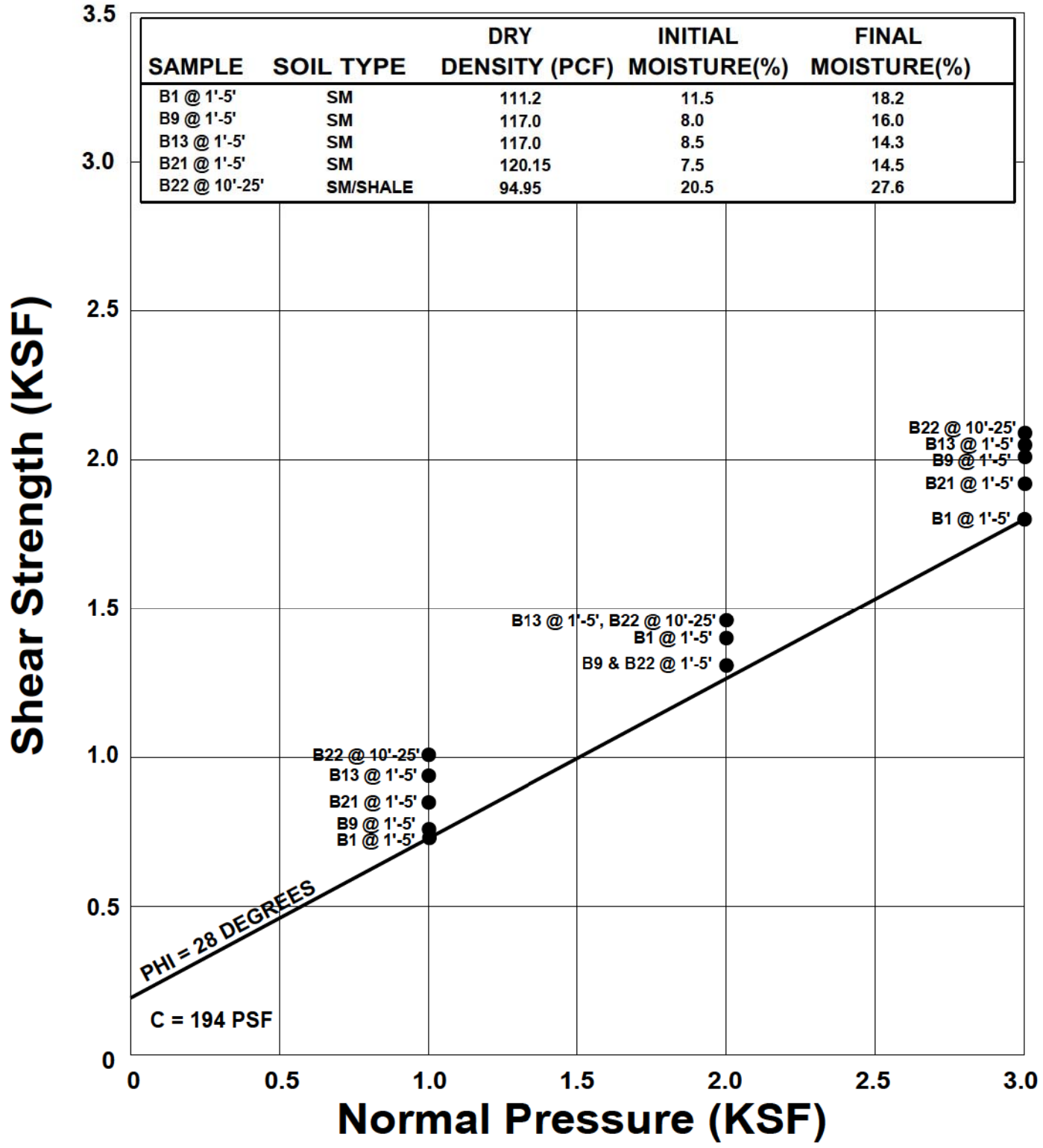
Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: B-2

BULK SAMPLE REMOLDED TO 90 PERCENT OF THE MAXIMUM LABORATORY DENSITY

SAMPLE	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE(%)	FINAL MOISTURE(%)
B1 @ 1'-5'	SM	111.2	11.5	18.2
B9 @ 1'-5'	SM	117.0	8.0	16.0
B13 @ 1'-5'	SM	117.0	8.5	14.3
B21 @ 1'-5'	SM	120.15	7.5	14.5
B22 @ 10'-25'	SM/SHALE	94.95	20.5	27.6



● Direct Shear, Saturated

SHEAR TEST DIAGRAM

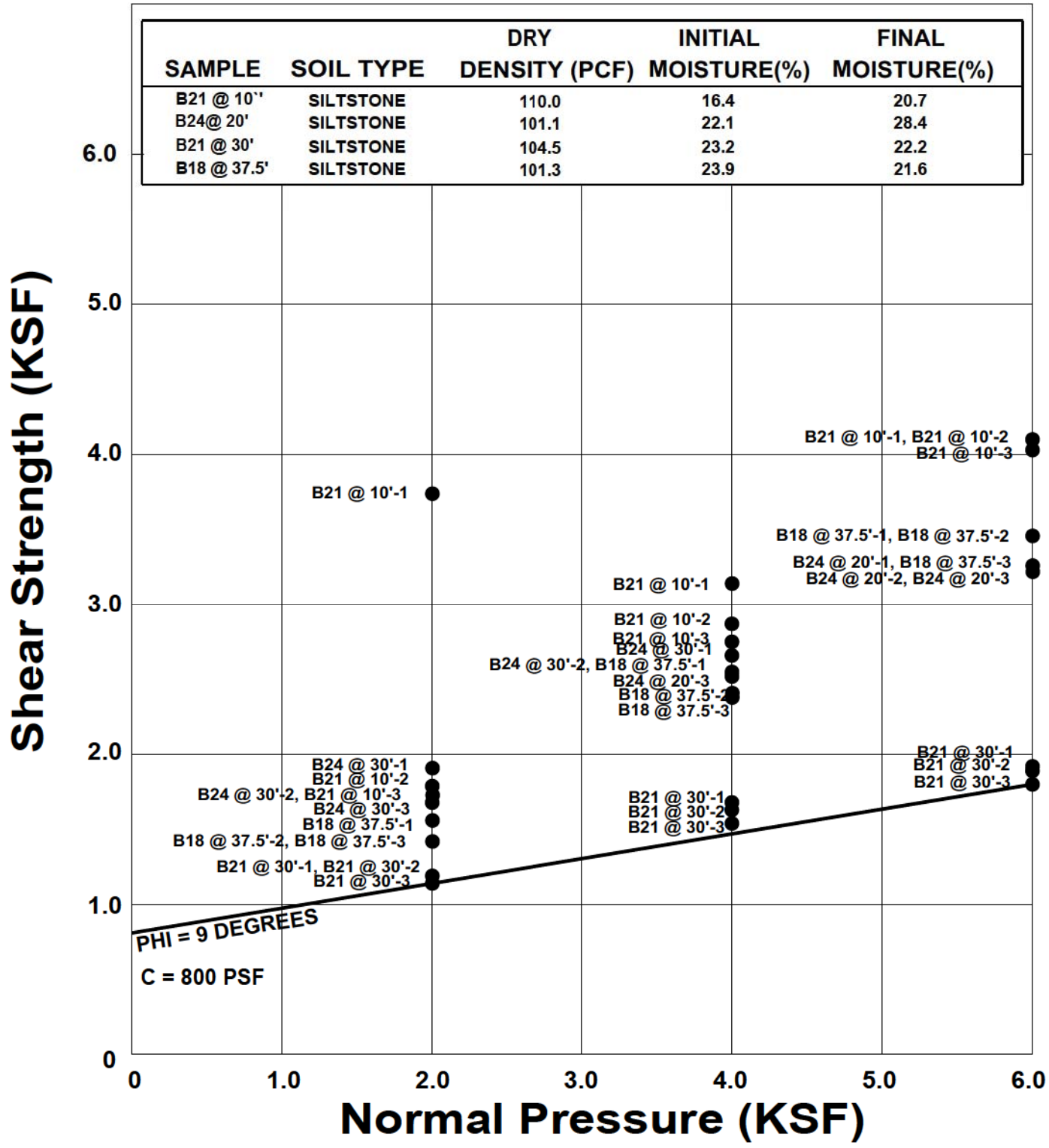
Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: B-3

REPEATEDLY SHEARED BEDROCK

SAMPLE	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE(%)	FINAL MOISTURE(%)
B21 @ 10`'	SILTSTONE	110.0	16.4	20.7
B24@ 20'	SILTSTONE	101.1	22.1	28.4
B21 @ 30'	SILTSTONE	104.5	23.2	22.2
B18 @ 37.5'	SILTSTONE	101.3	23.9	21.6



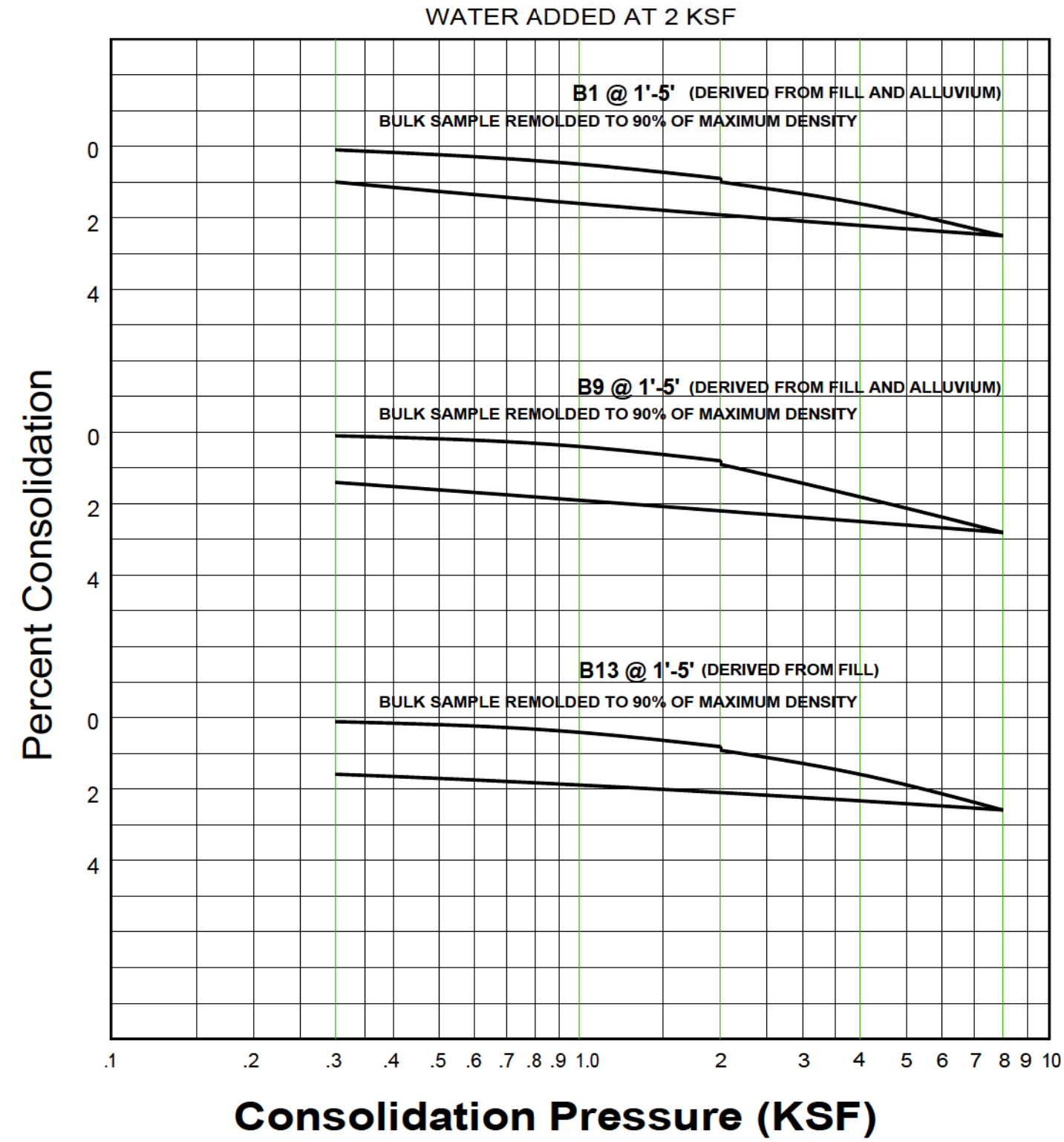
● Direct Shear, Saturated

SHEAR TEST DIAGRAM

Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: B-4

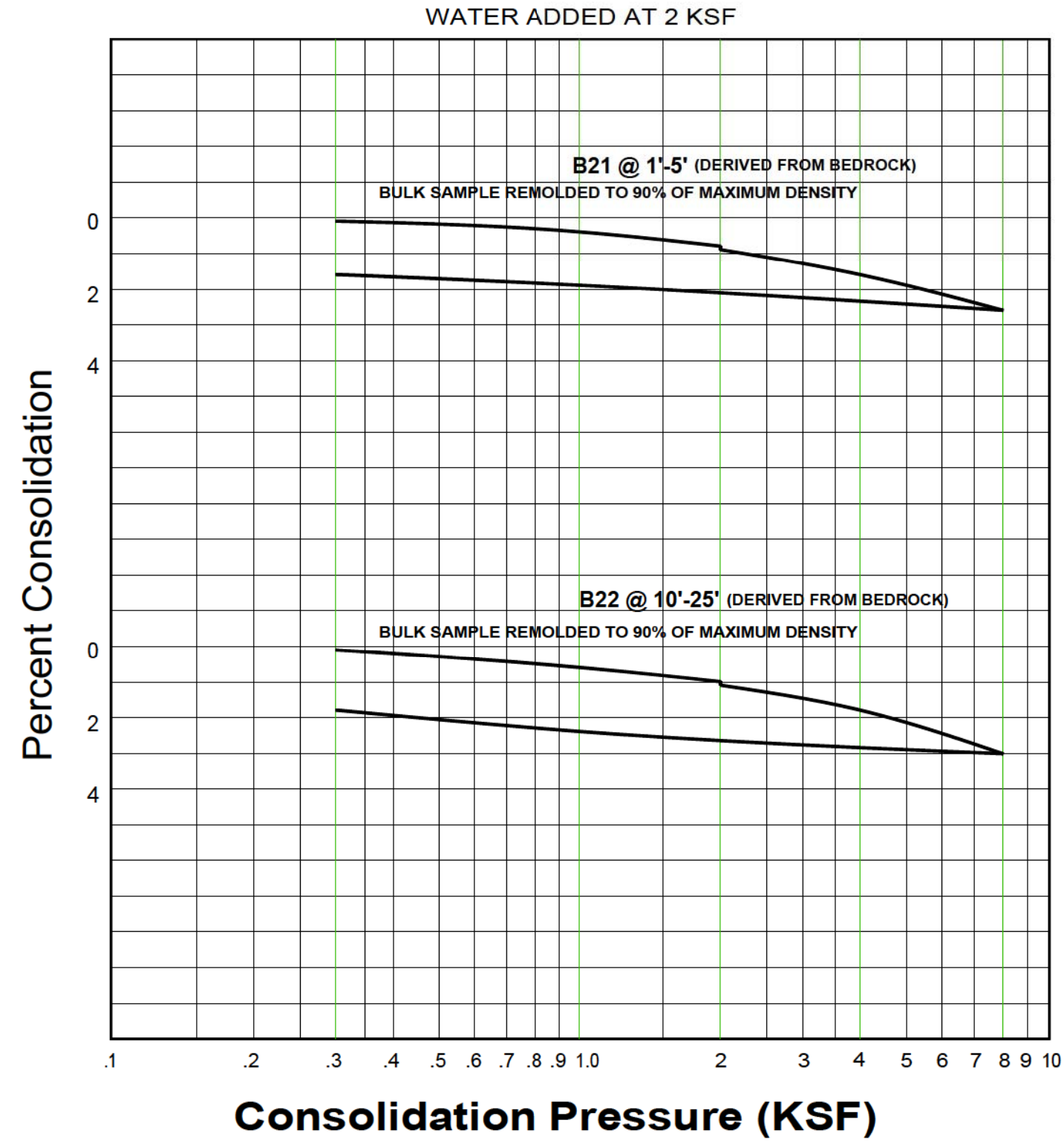


CONSOLIDATION TEST

Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: C-1

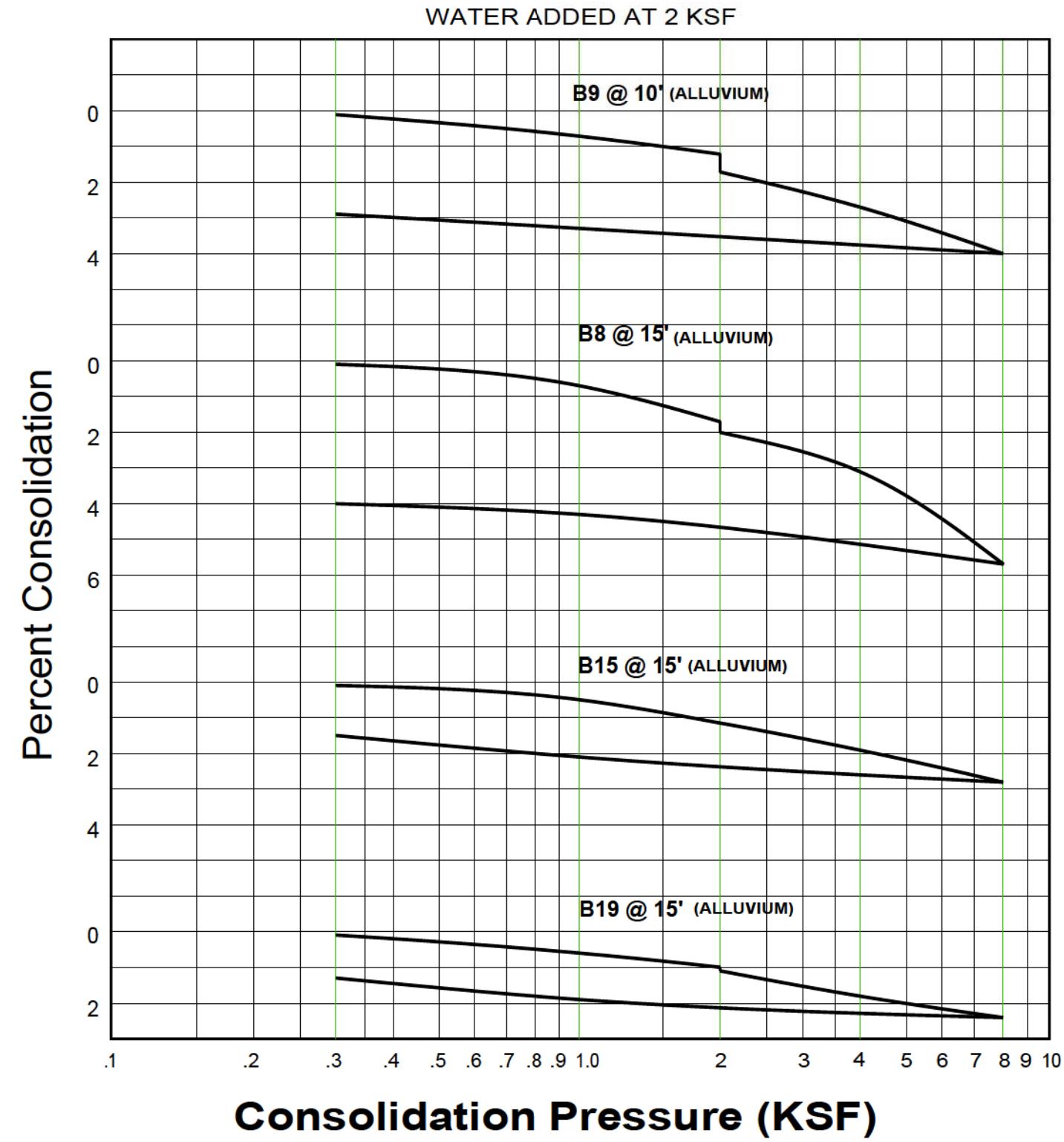


CONSOLIDATION TEST

Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: C-2

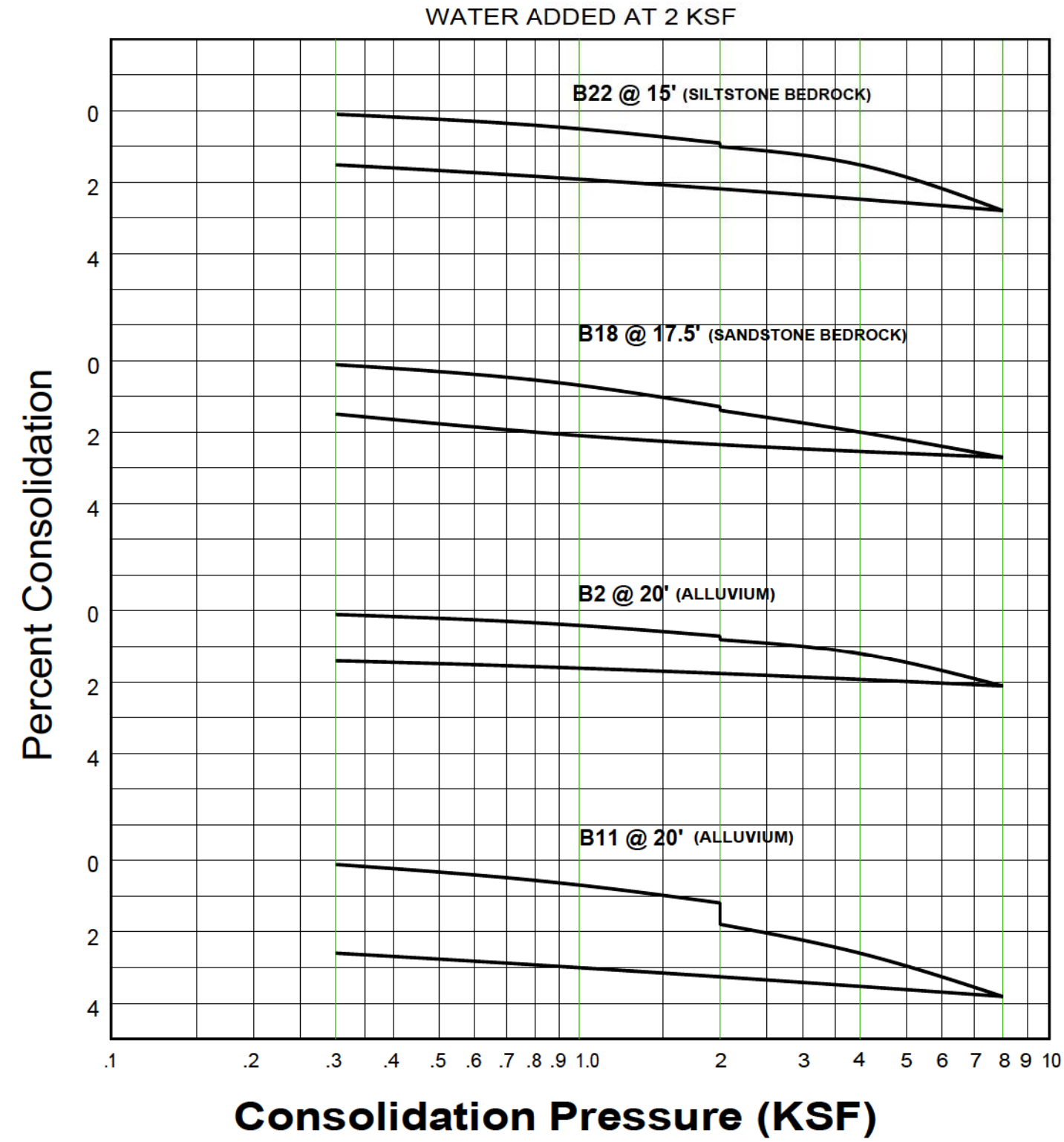


CONSOLIDATION TEST

Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: C-3



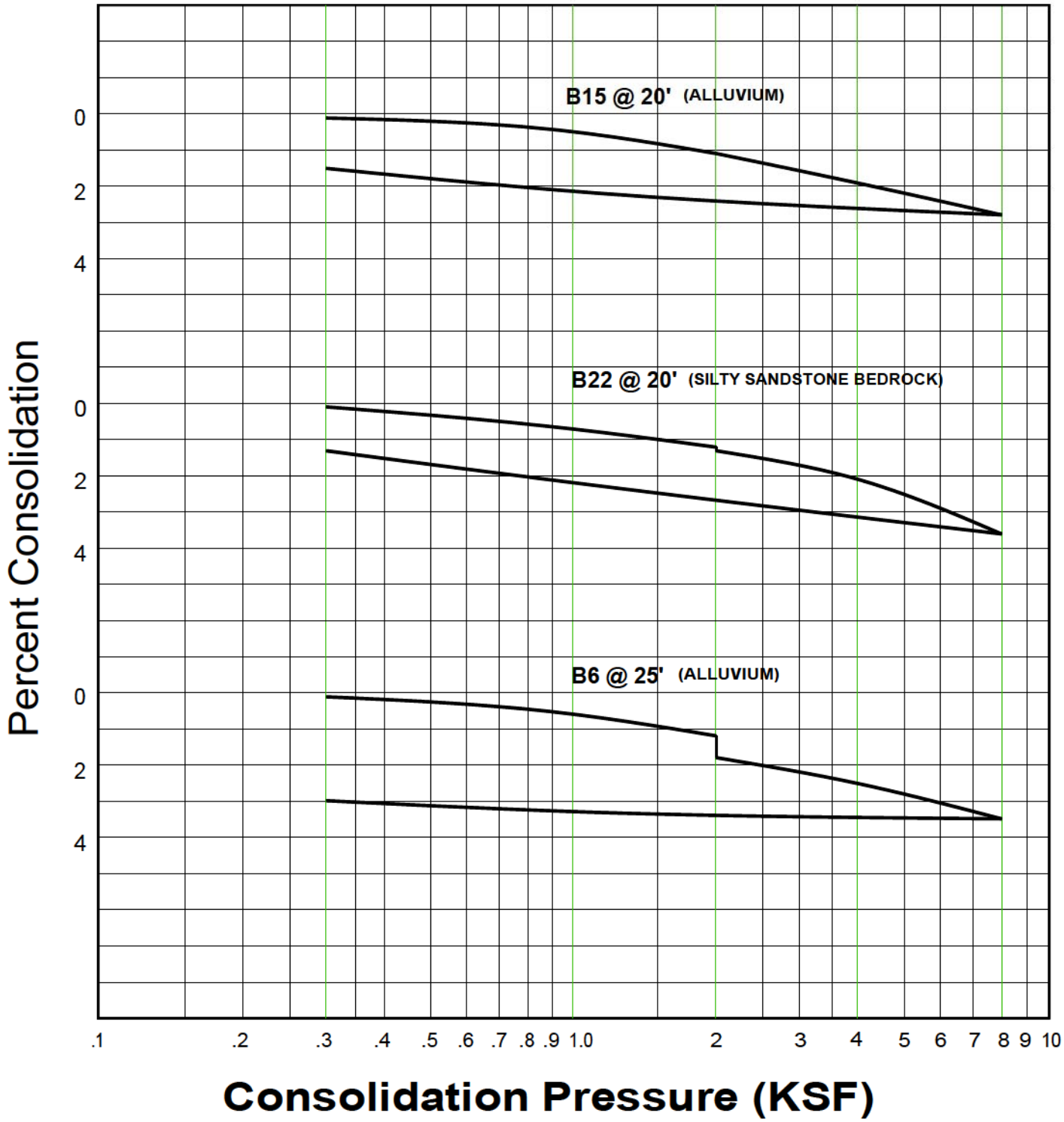
CONSOLIDATION TEST

Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: C-4

WATER ADDED AT 2 KSF

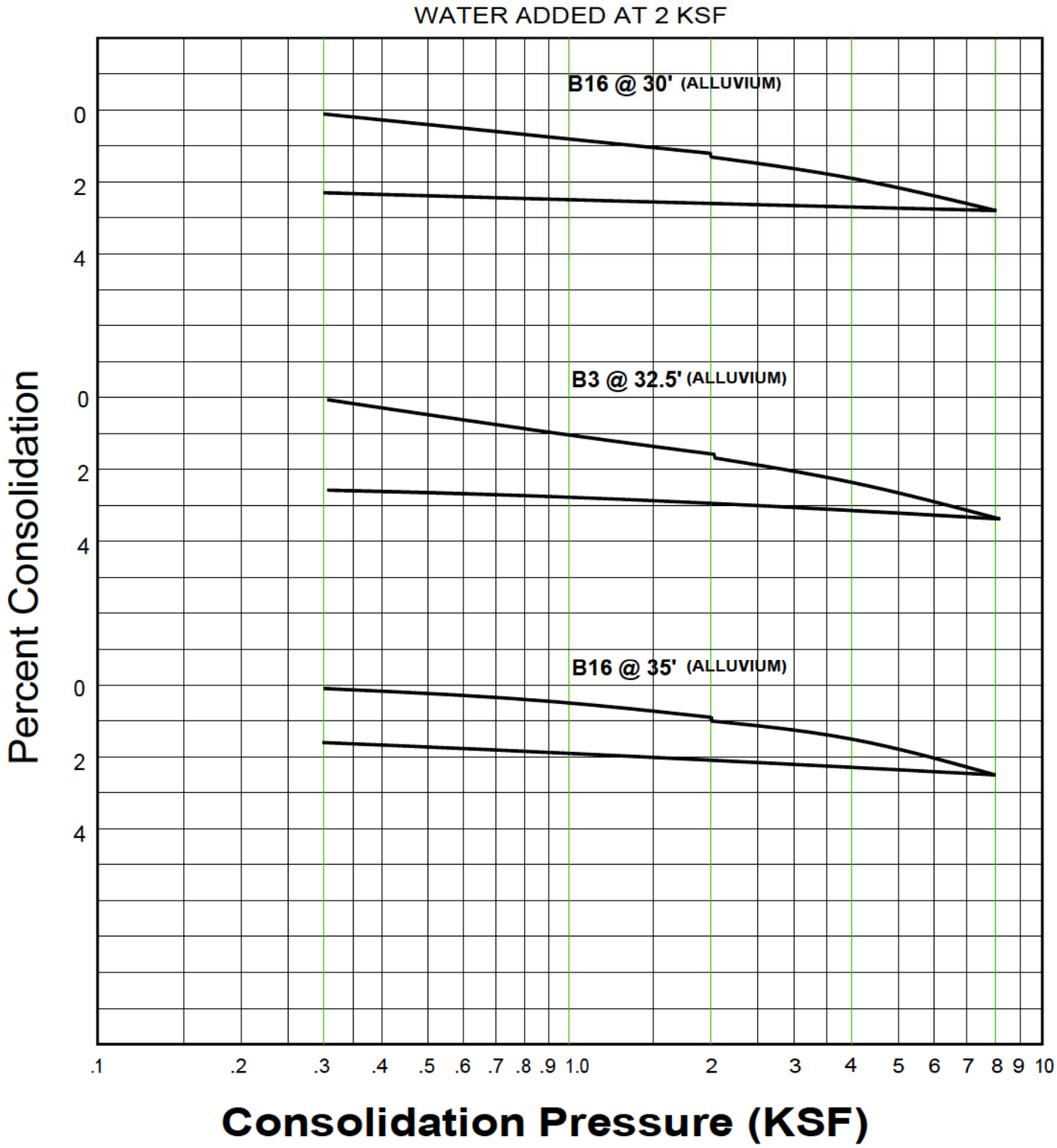


CONSOLIDATION TEST

Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: C-5

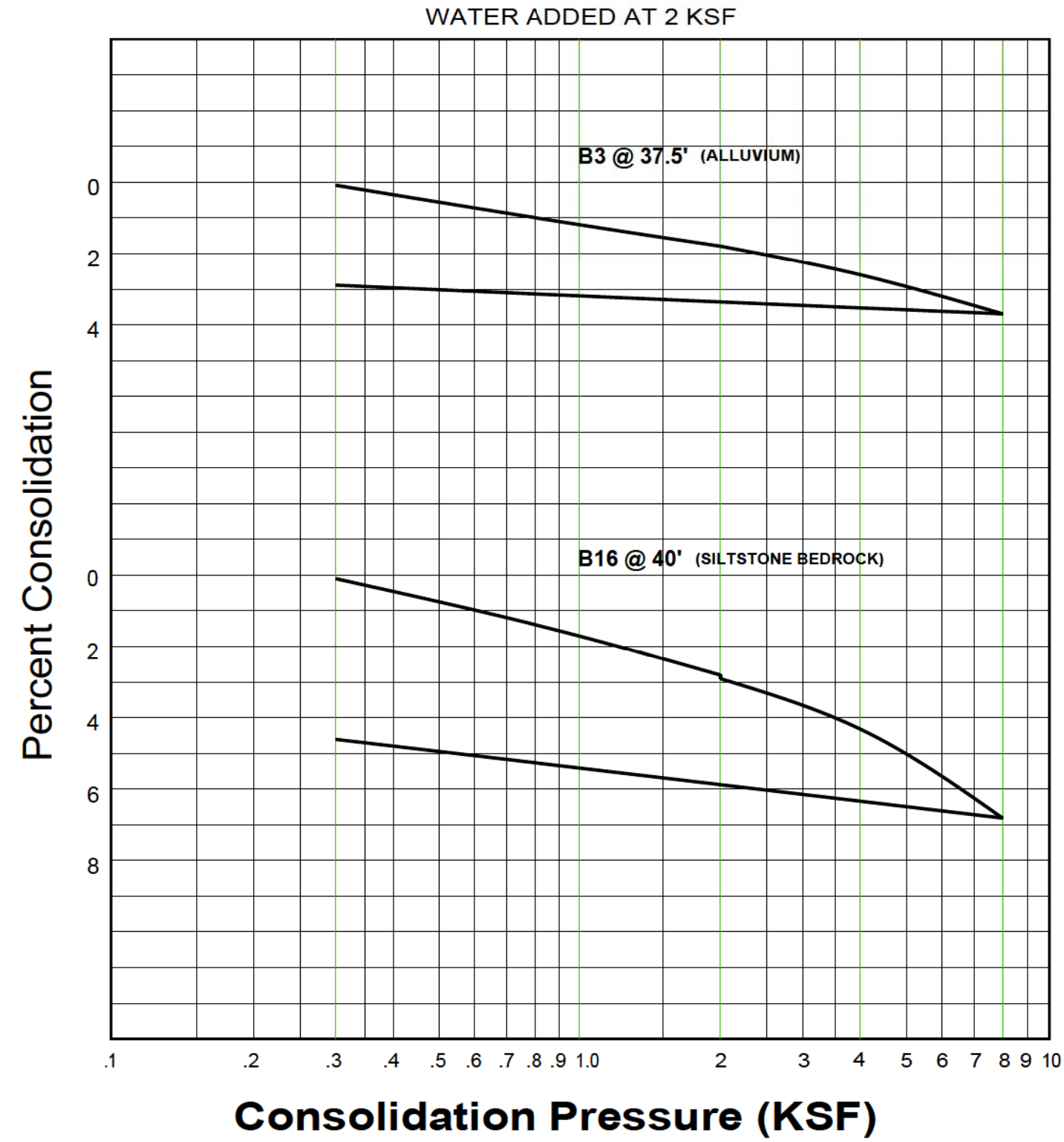


CONSOLIDATION TEST

Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: C-6

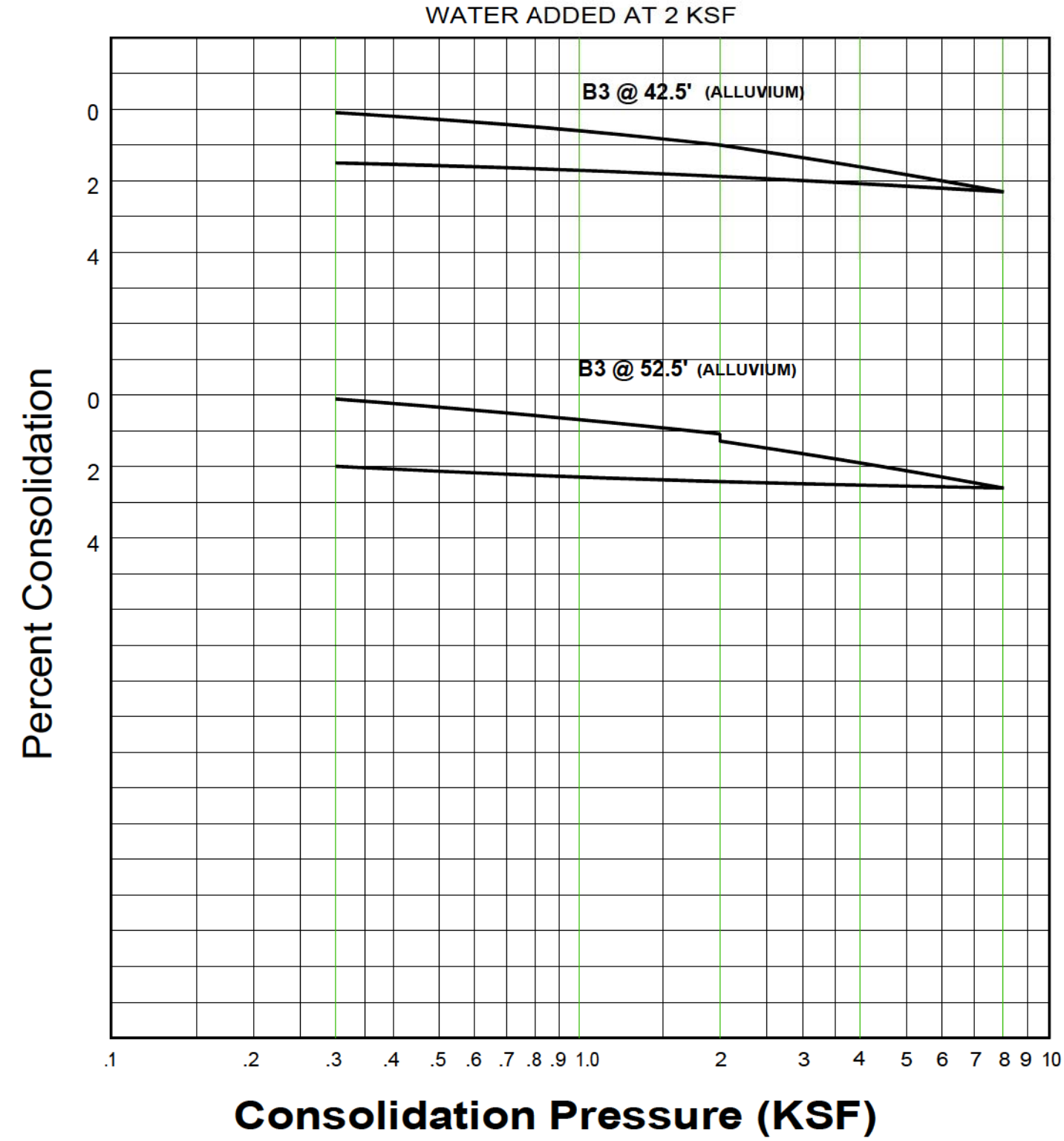


CONSOLIDATION TEST

Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: C-7



CONSOLIDATION TEST

Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: C-8

ASTM D 1557-02

SAMPLE	B1 @ 1- 5'	B9 @ 1-5'	B13 @ 1-5'
SOIL TYPE:	SM	SM	SM
MAXIMUM DENSITY pcf.	123.5	130.0	130.0
OPTIMUM MOISTURE %	11.5	8.0	8.5

ASTM D 4829-03

SAMPLE	B1 @ 1- 5'	B9 @ 1-5'	B13 @ 1-5'
SOIL TYPE:	SM	SM	SM
EXPANSION INDEX UBC STANDARD 18-2	16	10	8
EXPANSION CHARACTER	VERY LOW	VERY LOW	VERY LOW

SULFATE CONTENT

SAMPLE	B1 @ 1- 5'	B9 @ 1-5'	B13 @ 1-5'
SULFATE CONTENT: (percentage by weight)	< 0.10%	< 0.10%	> 0.20%

COMPACTION/EXPANSION DATA SHEET

Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: D-1

ASTM D-1557

SAMPLE	B21 @ 1- 5'	B22 @ 10-25'
SOIL TYPE:	SM	SM/SHALE
MAXIMUM DENSITY pcf.	133.5	105.5
OPTIMUM MOISTURE %	7.5	20.5

ASTM D 4829-03

SAMPLE	B21 @ 1- 5'	B22 @ 10-25'
SOIL TYPE:	SM	SM/SHALE
EXPANSION INDEX UBC STANDARD 18-2	13	18
EXPANSION CHARACTER	VERY LOW	VERY LOW

SULFATE CONTENT

SAMPLE	B21 @ 1- 5'	B22 @ 0-25'
SULFATE CONTENT: (percentage by weight)	> 0.20%	> 0.20%

COMPACTION/EXPANSION/SULFATE DATA SHEET

Geotechnologies, Inc.
Consulting Geotechnical Engineers

FOREST CITY DEVELOPMENT

FILE NO. 19557 | PLATE: D-2

Geotechnologies, Inc.

Project: Lincoln Property Company
File No.: 20921
Description: Liquefaction Analysis (10% Exceedance at 50 years)
Boring Number: 25

EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL

NCEER (1996) METHOD — By Thomas F. Blake (1994-1996) — LIQ2_30.WQ1

EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.6
Peak Horiz. Acceleration (g):	0.50
Calculated Mag.Wtg.Factor:	0.724

GROUNDWATER INFORMATION:

Current Groundwater Level (ft):	20.0
Historic Highest Groundwater Level* (ft):	20.0
Unit Wt. Water (pcf):	62.4

* Based on California Geological Survey Seismic Hazard Evaluation Report

ENERGY & ROD CORRECTIONS:

Energy Correction (CE) for N60:	1.30
Rod Len.Corr.(CR)(0-no or 1-yes):	1.0
Bore Dia. Corr. (CB):	1.00
Sampler Corr. (CS):	1.20
Use Ksigma (0 or 1):	1.0

LIQUEFACTION CALCULATIONS:

Depth to Base (ft)	Total Unit Wt. (pcf)	Current Water Level (0 or 1)	FIELD SPT (N)	Depth of SPT (ft)	Liq.Sus. (0 or 1)	-200 (%)	Est. Dr (%)	CN Factor	Corrected $(N_1)_{60}$	Resist. CRR	rd Factor	Induced CSR	Liquefac. Safe.Fact.
1.0	130.0	0	NA	1.0	0	0.0		2.000	0.0	~	0.998	0.237	~
2.0	130.0	0	NA	1.0	0	0.0		########	#VALUE!	~	0.993	0.236	~
3.0	130.0	0	NA	1.0	0	0.0		########	#VALUE!	~	0.989	0.235	~
4.0	130.0	0	NA	1.0	0	0.0		########	#VALUE!	~	0.984	0.234	~
5.0	130.0	0	NA	1.0	0	0.0		########	#VALUE!	~	0.979	0.233	~
6.0	130.0	0	NA	1.0	0	0.0		########	#VALUE!	~	0.975	0.232	~
7.0	130.0	0	NA	1.0	0	0.0		########	#VALUE!	~	0.970	0.231	~
8.0	106.8	0	7.0	10.0	0	0.0		1.341	11.0	~	0.966	0.230	~
9.0	106.8	0	7.0	10.0	0	0.0		1.341	11.0	~	0.961	0.229	~
10.0	106.8	0	7.0	10.0	0	0.0		1.341	11.0	~	0.957	0.227	~
11.0	106.8	0	7.0	10.0	0	0.0		1.341	11.0	~	0.952	0.226	~
12.0	106.8	0	7.0	10.0	0	0.0		1.341	11.0	~	0.947	0.225	~
13.0	103.0	0	7.0	10.0	0	0.0		1.341	11.0	~	0.943	0.224	~
14.0	103.0	0	7.0	10.0	0	0.0		1.341	11.0	~	0.938	0.223	~
15.0	103.0	0	32.0	15.0	0	0.0		1.115	44.9	~	0.934	0.222	~
16.0	103.0	0	32.0	15.0	0	0.0		1.115	44.9	~	0.929	0.221	~
17.0	103.0	0	32.0	15.0	0	0.0		1.115	44.9	~	0.925	0.220	~
18.0	115.7	0	32.0	15.0	0	0.0		1.115	44.9	~	0.920	0.219	~
19.0	115.7	0	32.0	15.0	0	0.0		1.115	44.9	~	0.915	0.218	~
20.0	115.7	1	32.0	20.0	1	0.0	98	0.977	43.6	Infin.	0.911	0.220	Non-Liq.
21.0	115.7	1	32.0	20.0	1	0.0	98	0.977	43.6	Infin.	0.906	0.224	Non-Liq.
22.0	115.7	1	32.0	20.0	1	0.0	98	0.977	43.6	Infin.	0.902	0.229	Non-Liq.
23.0	119.6	1	32.0	20.0	1	0.0	98	0.977	43.6	Infin.	0.897	0.233	Non-Liq.
24.0	119.6	1	32.0	20.0	1	0.0	98	0.977	43.6	Infin.	0.893	0.237	Non-Liq.
25.0	119.6	1	68.0	25.0	1	0.0	138	0.921	93.4	Infin.	0.888	0.240	Non-Liq.
26.0	119.6	1	68.0	25.0	1	0.0	138	0.921	93.4	Infin.	0.883	0.243	Non-Liq.
27.0	119.6	1	68.0	25.0	1	0.0	138	0.921	93.4	Infin.	0.879	0.246	Non-Liq.
28.0	111.5	1	39.0	30.0	1	0.0	101	0.876	53.3	Infin.	0.874	0.249	Non-Liq.
29.0	111.5	1	39.0	30.0	1	0.0	101	0.876	53.3	Infin.	0.870	0.252	Non-Liq.
30.0	111.5	1	39.0	30.0	1	0.0	101	0.876	53.3	Infin.	0.865	0.255	Non-Liq.
31.0	111.5	1	39.0	30.0	1	0.0	101	0.876	53.3	Infin.	0.861	0.257	Non-Liq.
32.0	111.5	1	39.0	30.0	1	0.0	101	0.876	53.3	Infin.	0.856	0.259	Non-Liq.
33.0	122.4	1	39.0	30.0	1	0.0	101	0.876	53.3	Infin.	0.851	0.261	Non-Liq.
34.0	122.4	1	39.0	30.0	1	0.0	101	0.876	53.3	Infin.	0.847	0.263	Non-Liq.
35.0	122.4	1	21.0	35.0	1	49.6	72	0.835	34.4	Infin.	0.842	0.264	Non-Liq.
36.0	132.8	1	21.0	35.0	1	49.6	72	0.835	34.4	Infin.	0.838	0.265	Non-Liq.
37.0	132.8	1	21.0	35.0	1	49.6	72	0.835	34.4	Infin.	0.833	0.266	Non-Liq.
38.0	132.8	1	21.0	35.0	1	49.6	72	0.835	34.4	Infin.	0.829	0.267	Non-Liq.
39.0	132.8	1	21.0	35.0	1	49.6	72	0.835	34.4	Infin.	0.824	0.268	Non-Liq.
40.0	132.8	1	17.0	40.0	1	30.9	63	0.791	27.0	0.302	0.819	0.269	1.13
41.0	132.8	1	17.0	40.0	1	30.9	63	0.791	27.0	0.302	0.815	0.269	1.12
42.0	132.8	1	17.0	40.0	1	30.9	63	0.791	27.0	0.302	0.810	0.269	1.12
43.0	119.8	1	17.0	40.0	1	30.9	63	0.791	27.0	0.302	0.806	0.270	1.12
44.0	119.8	1	17.0	40.0	1	30.9	63	0.791	27.0	0.302	0.801	0.270	1.12
45.0	119.8	1	14.0	45.0	1	88.7	56	0.756	23.5	0.240	0.797	0.271	0.89
46.0	119.8	1	14.0	45.0	1	88.7	56	0.756	23.5	0.240	0.792	0.271	0.89
47.0	119.8	1	14.0	45.0	1	88.7	56	0.756	23.5	0.240	0.787	0.271	0.89
48.0	134.1	1	75.0	50.0	1	9.1	125	0.725	85.8	Infin.	0.783	0.271	Non-Liq.
49.0	134.1	1	75.0	50.0	1	9.1	125	0.725	85.8	Infin.	0.778	0.271	Non-Liq.
50.0	134.1	1	75.0	50.0	1	9.1	125	0.725	85.8	Infin.	0.774	0.271	Non-Liq.
51.0	134.1	1	75.0	50.0	1	9.1	125	0.725	85.8	Infin.	0.769	0.271	Non-Liq.
52.0	134.1	1	75.0	50.0	1	9.1	125	0.725	85.8	Infin.	0.765	0.270	Non-Liq.
53.0	140.9	1	75.0	50.0	1	9.1	125	0.725	85.8	Infin.	0.760	0.270	Non-Liq.
54.0	140.9	1	75.0	50.0	1	9.1	125	0.725	85.8	Infin.	0.755	0.269	Non-Liq.
55.0	140.9	1	50.0	55.0	1	0.0	99	0.694	54.1	Infin.	0.751	0.268	Non-Liq.
56.0	140.9	1	50.0	55.0	1	0.0	99	0.694	54.1	Infin.	0.746	0.268	Non-Liq.
57.0	140.9	1	50.0	55.0	1	0.0	99	0.694	54.1	Infin.	0.742	0.267	Non-Liq.
58.0	134.7	1	50.0	55.0	1	0.0	99	0.694	54.1	Infin.	0.737	0.266	Non-Liq.
59.0	134.7	1	50.0	55.0	1	0.0	99	0.694	54.1	Infin.	0.733	0.265	Non-Liq.
60.0	143.3	1	74.0	60.0	1	0.0	117	0.666	76.8	Infin.	0.728	0.265	Non-Liq.
61.0	143.3	1	74.0	60.0	1	0.0	117	0.666	76.8	Infin.	0.723	0.264	Non-Liq.
62.0	143.3	1	74.0	60.0	1	0.0	117	0.666	76.8	Infin.	0.719	0.263	Non-Liq.
63.0	143.3	1	74.0	60.0	1	0.0	117	0.666	76.8	Infin.	0.714	0.262	Non-Liq.
64.0	143.3	1	74.0	60.0	1	0.0	117	0.666	76.8	Infin.	0.710	0.261	Non-Liq.
65.0	143.3	1	82.0	65.0	1	0.0	120	0.639	81.7	Infin.	0.705	0.259	Non-Liq.
66.0	143.3	1	82.0	65.0	1	0.0	120	0.639	81.7	Infin.	0.701	0.258	Non-Liq.
67.0	143.3	1	82.0	65.0	1	0.0	120	0.639	81.7	Infin.	0.696	0.257	Non-Liq.
68.0	135.2	1	82.0	65.0	1	0.0	120	0.639	81.7	Infin.	0.691	0.256	Non-Liq.
69.0	135.2	1	82.0	65.0	1	0.0	120	0.639	81.7	Infin.	0.687	0.255	Non-Liq.
70.0	135.2	1	50.0	70.0	1	0.0	91	0.617	48.1	Infin.	0.682	0.254	Non-Liq.

Geotechnologies, Inc.

Project: Lincoln Property Company
File No.: 20921
Description: Liquefaction Analysis (10% Exceedance at 50 years)
Boring Number: 25

LIQUEFACTION SETTLEMENT ANALYSIS

REF: TOKIMATSU & SEED (1987)

EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.6
Peak Horiz. Acceleration (g):	0.5
Calculated Mag.Wtg.Factor:	0.724

GROUNDWATER INFORMATION:

Current Groundwater Level (ft):	20.0
Historic Highest Groundwater Level* (ft):	20.0
Unit Wt. Water (pcf):	62.4

* Based on California Geological Survey Seismic Hazard Evaluation Report

Table 4-3

SETTLEMENT CALCULATIONS:

Depth to Base (feet)	Field Blowcount N	Wet Density (pcf)	Total Stress σ (tsf)	Effective Stress σ' (tsf)	Relative Density D_r (%)	Corrected Blowcount $(N_1)_{60}$	T_{SD}/σ'	Factor of Safety Against Liquefaction	Volumetric Strain ε_v (%)	Liquefaction Settlement S (inches)
1.0	NA	130.0	0.033	0.033		0.0	0.328	~		0.00
2.0	NA	130.0	0.098	0.098		#VALUE!	0.328	~		0.00
3.0	NA	130.0	0.163	0.163		#VALUE!	0.328	~		0.00
4.0	NA	130.0	0.228	0.228		#VALUE!	0.328	~		0.00
5.0	NA	130.0	0.293	0.293		#VALUE!	0.328	~		0.00
6.0	NA	130.0	0.358	0.358		#VALUE!	0.328	~		0.00
7.0	NA	130.0	0.423	0.423		#VALUE!	0.328	~		0.00
8.0	7.0	106.8	0.482	0.482		11.0	0.328	~		0.00
9.0	7.0	106.8	0.535	0.535		11.0	0.328	~		0.00
10.0	7.0	106.8	0.589	0.589		11.0	0.328	~		0.00
11.0	7.0	106.8	0.642	0.642		11.0	0.328	~		0.00
12.0	7.0	106.8	0.695	0.695		11.0	0.328	~		0.00
13.0	7.0	103.0	0.748	0.748		11.0	0.328	~		0.00
14.0	7.0	103.0	0.799	0.799		11.0	0.328	~		0.00
15.0	32.0	103.0	0.851	0.851		44.9	0.328	~		0.00
16.0	32.0	103.0	0.902	0.902		44.9	0.328	~		0.00
17.0	32.0	103.0	0.954	0.954		44.9	0.328	~		0.00
18.0	32.0	115.7	1.008	1.008		44.9	0.328	~		0.00
19.0	32.0	115.7	1.066	1.066		44.9	0.328	~		0.00
20.0	32.0	115.7	1.124	1.109	98	43.6	0.333	Non-Liq.		0.00
21.0	32.0	115.7	1.182	1.135	98	43.6	0.342	Non-Liq.		0.00
22.0	32.0	115.7	1.240	1.162	98	43.6	0.350	Non-Liq.		0.00
23.0	32.0	119.6	1.299	1.189	98	43.6	0.358	Non-Liq.		0.00
24.0	32.0	119.6	1.358	1.218	98	43.6	0.366	Non-Liq.		0.00
25.0	68.0	119.6	1.418	1.247	138	93.4	0.373	Non-Liq.		0.00
26.0	68.0	119.6	1.478	1.275	138	93.4	0.380	Non-Liq.		0.00
27.0	68.0	119.6	1.538	1.304	138	93.4	0.387	Non-Liq.		0.00
28.0	39.0	111.5	1.596	1.330	101	53.3	0.394	Non-Liq.		0.00
29.0	39.0	111.5	1.651	1.355	101	53.3	0.400	Non-Liq.		0.00
30.0	39.0	111.5	1.707	1.380	101	53.3	0.406	Non-Liq.		0.00
31.0	39.0	111.5	1.763	1.404	101	53.3	0.412	Non-Liq.		0.00
32.0	39.0	111.5	1.819	1.429	101	53.3	0.418	Non-Liq.		0.00
33.0	39.0	122.4	1.877	1.456	101	53.3	0.423	Non-Liq.		0.00
34.0	39.0	122.4	1.938	1.486	101	53.3	0.428	Non-Liq.		0.00
35.0	21.0	122.4	2.000	1.516	72	34.4	0.433	Non-Liq.		0.00
36.0	21.0	132.8	2.063	1.549	72	34.4	0.437	Non-Liq.		0.00
37.0	21.0	132.8	2.130	1.584	72	34.4	0.441	Non-Liq.		0.00
38.0	21.0	132.8	2.196	1.619	72	34.4	0.445	Non-Liq.		0.00
39.0	21.0	132.8	2.263	1.654	72	34.4	0.449	Non-Liq.		0.00
40.0	17.0	132.8	2.329	1.689	63	27.0	0.452	1.13		0.00
41.0	17.0	132.8	2.395	1.725	63	27.0	0.456	1.12		0.00
42.0	17.0	132.8	2.462	1.760	63	27.0	0.459	1.12		0.00
43.0	17.0	119.8	2.525	1.792	63	27.0	0.462	1.12		0.00
44.0	17.0	119.8	2.585	1.820	63	27.0	0.466	1.12		0.00
45.0	14.0	119.8	2.645	1.849	56	23.5	0.469	0.89	1.33	0.16
46.0	14.0	119.8	2.705	1.878	56	23.5	0.473	0.89	1.33	0.16
47.0	14.0	119.8	2.764	1.906	56	23.5	0.476	0.89	1.33	0.16
48.0	75.0	134.1	2.828	1.939	125	85.8	0.479	Non-Liq.		0.00
49.0	75.0	134.1	2.895	1.975	125	85.8	0.481	Non-Liq.		0.00
50.0	75.0	134.1	2.962	2.010	125	85.8	0.484	Non-Liq.		0.00
51.0	75.0	134.1	3.029	2.046	125	85.8	0.486	Non-Liq.		0.00
52.0	75.0	134.1	3.096	2.082	125	85.8	0.488	Non-Liq.		0.00
53.0	75.0	140.9	3.165	2.120	125	85.8	0.490	Non-Liq.		0.00
54.0	75.0	140.9	3.235	2.159	125	85.8	0.492	Non-Liq.		0.00
55.0	50.0	140.9	3.306	2.198	99	54.1	0.494	Non-Liq.		0.00
56.0	50.0	140.9	3.376	2.237	99	54.1	0.495	Non-Liq.		0.00
57.0	50.0	140.9	3.447	2.277	99	54.1	0.497	Non-Liq.		0.00
58.0	50.0	134.7	3.516	2.314	99	54.1	0.499	Non-Liq.		0.00
59.0	50.0	134.7	3.583	2.351	99	54.1	0.500	Non-Liq.		0.00
60.0	74.0	143.3	3.652	2.389	117	76.8	0.502	Non-Liq.		0.00
61.0	74.0	143.3	3.724	2.429	117	76.8	0.503	Non-Liq.		0.00
62.0	74.0	143.3	3.796	2.470	117	76.8	0.504	Non-Liq.		0.00
63.0	74.0	143.3	3.867	2.510	117	76.8	0.506	Non-Liq.		0.00
64.0	74.0	143.3	3.939	2.551	117	76.8	0.507	Non-Liq.		0.00
65.0	82.0	143.3	4.011	2.591	120	81.7	0.508	Non-Liq.		0.00
66.0	82.0	143.3	4.082	2.632	120	81.7	0.509	Non-Liq.		0.00
67.0	82.0	143.3	4.154	2.672	120	81.7	0.510	Non-Liq.		0.00
68.0	82.0	135.2	4.224	2.710	120	81.7	0.511	Non-Liq.		0.00
69.0	82.0	135.2	4.291	2.747	120	81.7	0.513	Non-Liq.		0.00
70.0	50.0	135.2	4.359	2.783	91	48.1	0.514	Non-Liq.		0.00
								Total Liquefaction Settlement (inches):		**0.48**

Geotechnologies, Inc.

Project: Lincoln Properties
File No.: 20921
Description: Bedrock
1/28/2015

Friction and End Bearing Pile Capacity Calculation

Input Data:

Unit Weight of Overlying Soil Layer	γ_1	120 pcf
Thickness of Overlying Soil Layer	H_1	28 feet
Unit Weight of Bearing Strata	γ_2	120 pcf
Friction Angle of Bearing Strata	ϕ_2	28 degrees
Cohesion of Bearing Strata	c_2	240 psf
Minimum Embedment into Bearing Strata	H_2	10 feet
Unit Weight of Water	γ_w	62.4 pcf
Depth to Groundwater from Pile Cap	H_w	50 feet

Pile Design:

driven <<Driven/Drilled
Circular <<Circular/Square Pile

Pile Dimension:

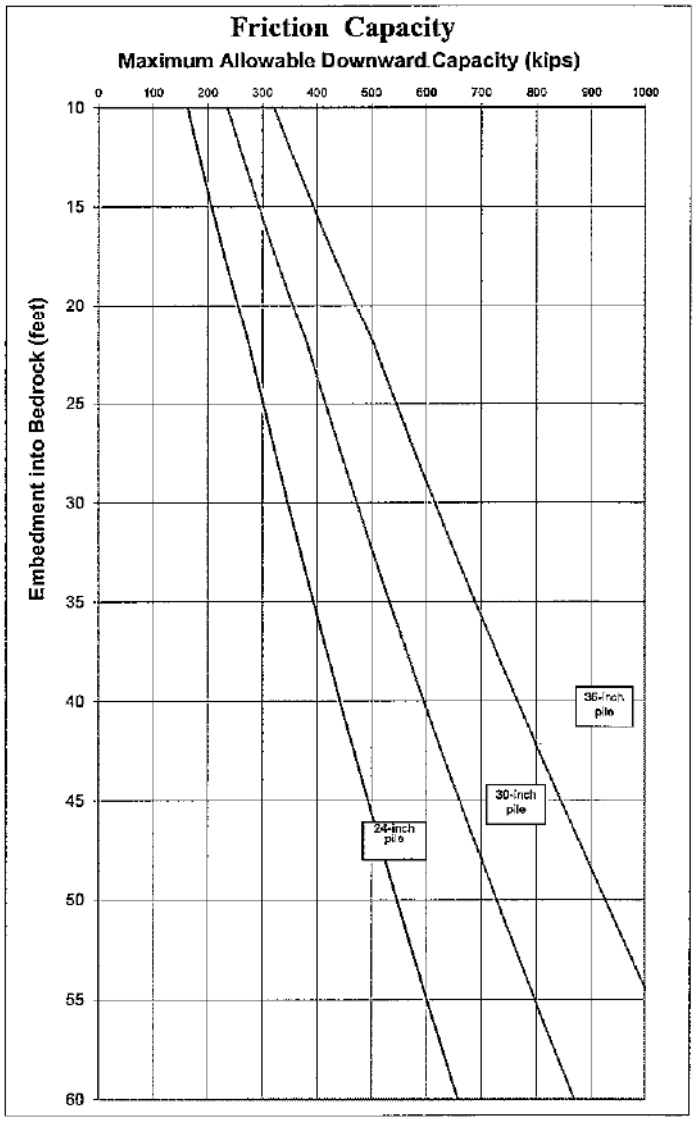
24	in. Diam.	3.14 ft^2 Area
30	in. Diam.	4.91 ft^2 Area
36	in. Diam.	7.07 ft^2 Area

Critical Depth Limit (Dc):
30 B

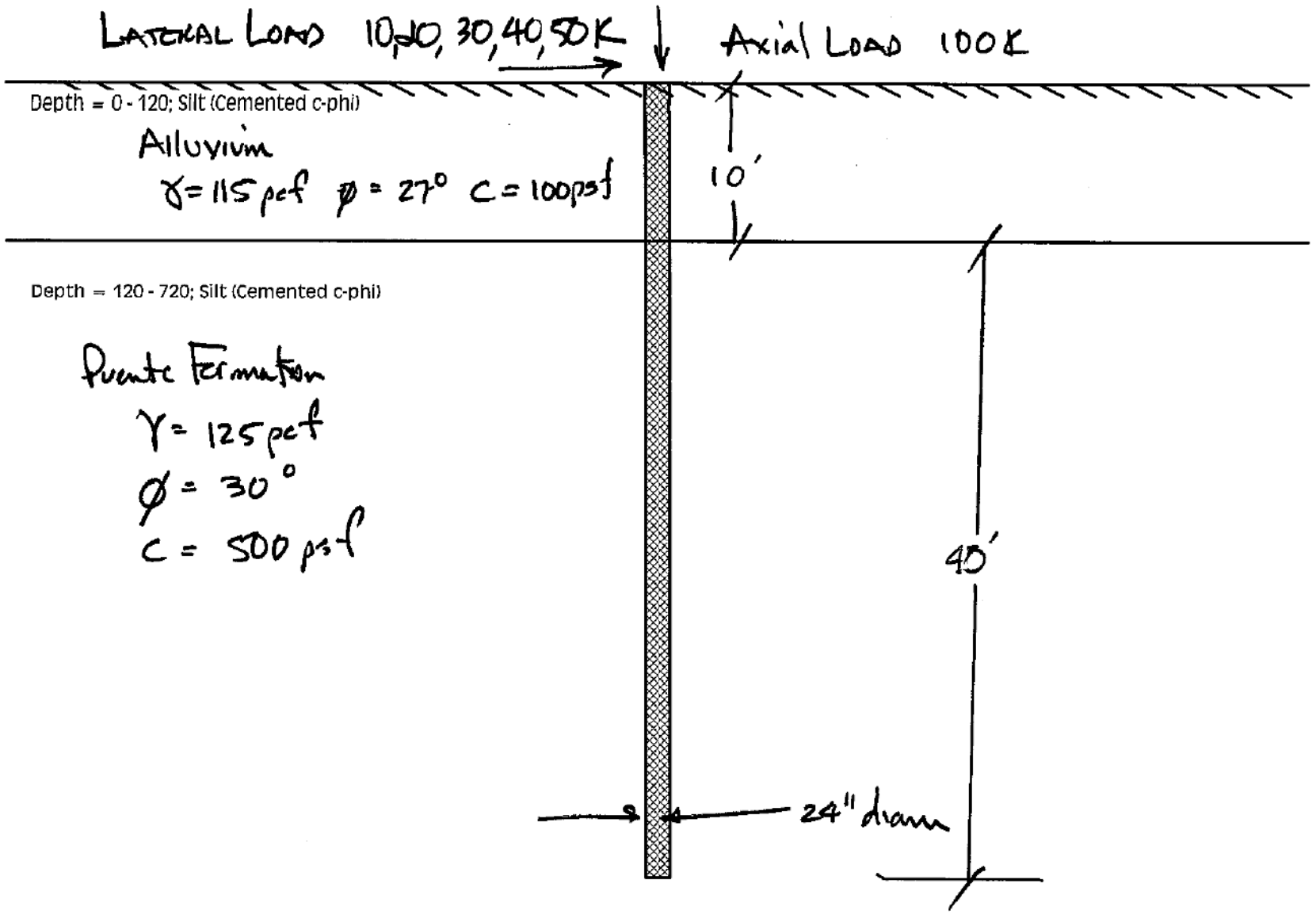
Lateral Earth Pressure Coefficient: $K_c = 0.80$
Applied Factor of Safety: $FS = 2$
Factored Skin Friction $f_{ult} = [c_2 + K_c * \sigma'_v * (\tan \phi_2)]/FS$
$f_{allow} = f_{ult}/FS$

Pile Capacity:

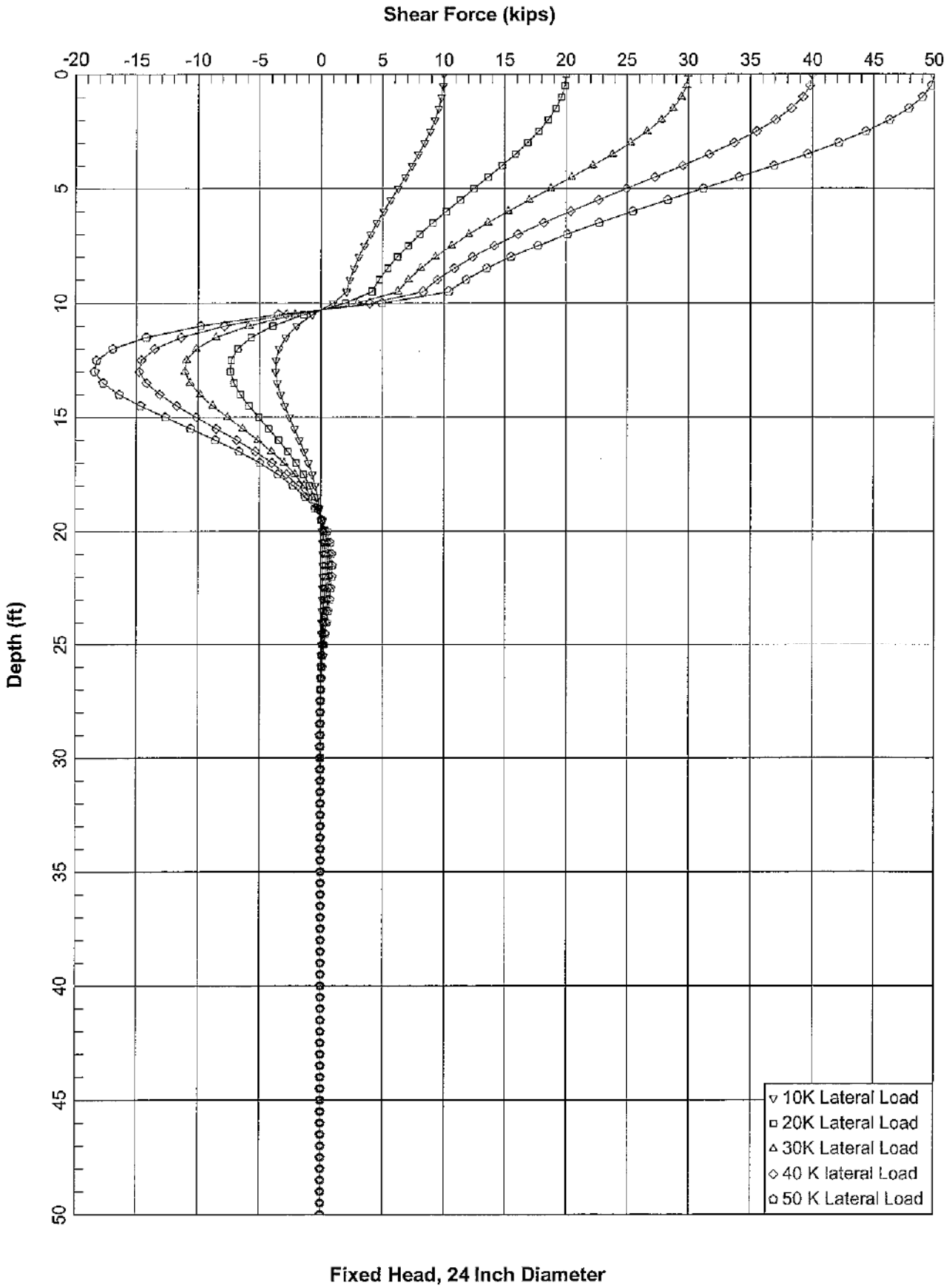
Total Depth of Pile (feet)	Depth of Embedment into Bearing Strata (feet)	Maximum Allowable Downward Pile Capacity: Capacity of 24 inch diameter pile (kips)	Capacity of 30 inch diameter pile (kips)	Capacity of 36 inch diameter pile (kips)
38	10	163.1	235.9	321.6
39	11	171.6	247.0	335.5
40	12	180.2	258.3	349.6
41	13	189.0	269.8	364.0
42	14	198.0	281.5	378.6
43	15	207.1	293.4	393.5
44	16	216.4	305.5	408.6
45	17	225.8	317.8	423.9
46	18	235.4	330.3	439.5
47	19	245.2	343.0	455.3
48	20	255.1	355.9	471.3
49	21	265.2	369.0	487.6
50	22	275.5	382.2	504.2
51	23	284.1	393.3	517.7
52	24	292.8	404.4	531.3
53	25	301.6	415.6	545.1
54	26	310.5	427.0	559.0
55	27	319.4	438.4	572.9
56	28	328.5	449.9	587.0
57	29	337.6	461.5	601.2
58	30	346.7	473.2	615.6
59	31	356.0	485.0	630.0
60	32	365.3	496.9	644.6
61	33	374.7	508.9	659.2
62	34	384.2	521.0	674.0
63	35	393.8	533.2	688.9
64	36	403.4	545.5	704.0
65	37	413.1	557.8	719.1
66	38	422.9	570.3	734.3
67	39	432.8	582.9	749.7
68	40	442.8	595.6	765.2
69	41	452.8	608.3	780.8
70	42	462.9	621.2	796.5
71	43	473.1	634.1	812.3
72	44	483.3	647.2	828.3
73	45	493.7	660.3	844.3
74	46	504.1	673.6	860.5
75	47	514.6	686.9	876.8
76	48	525.1	700.4	893.2
77	49	535.8	713.9	909.7
78	50	546.5	727.5	926.4
79	51	557.3	741.3	943.1
80	52	568.1	755.1	960.0
81	53	579.1	769.0	977.0
82	54	590.1	783.0	994.1
83	55	601.2	797.1	1011.3
84	56	612.4	811.3	1028.6
85	57	623.7	825.6	1046.1
86	58	635.0	840.0	1063.6
87	59	646.4	854.5	1081.3
88	60	657.9	869.1	1099.1



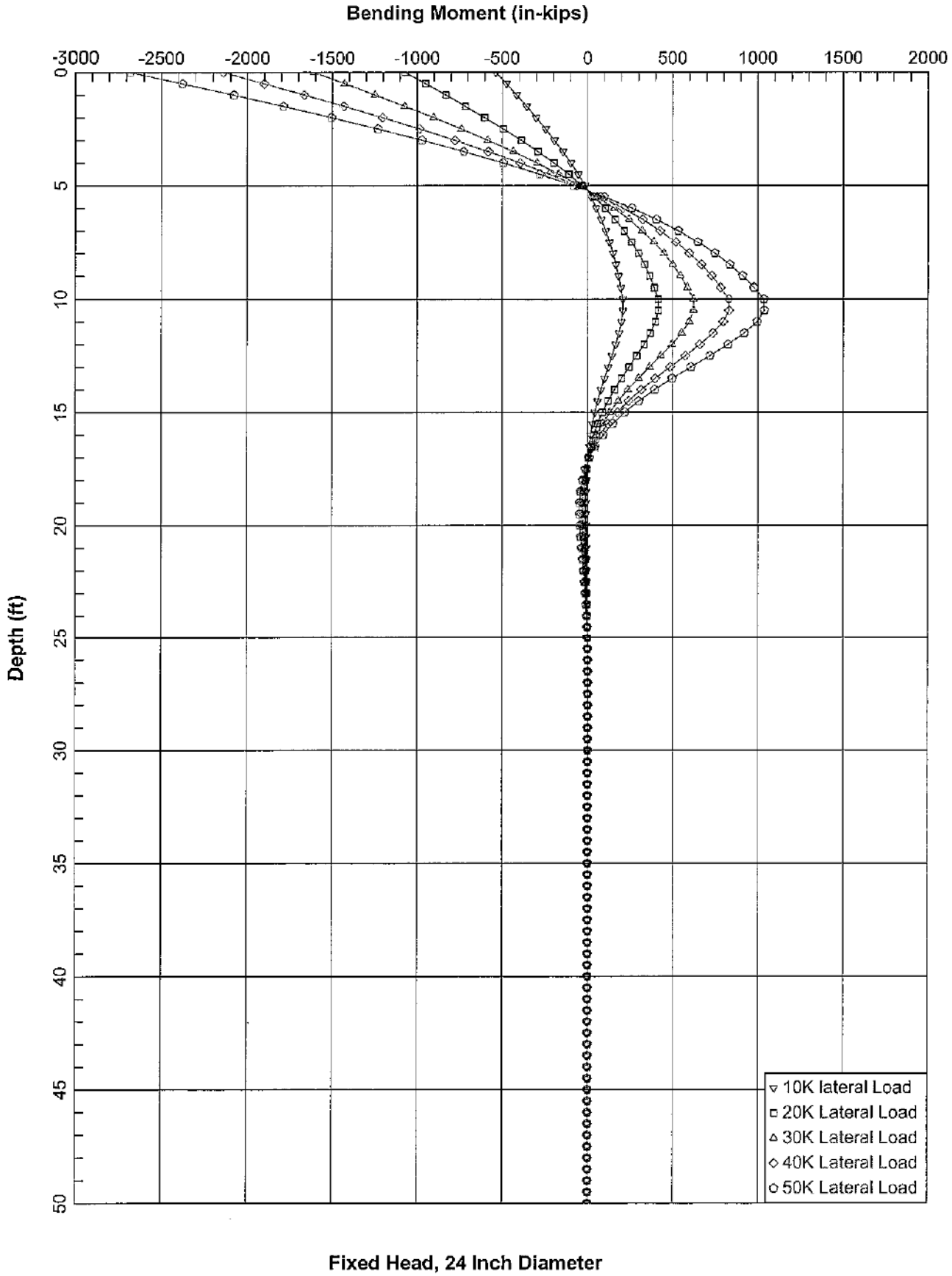
Note: 1. Minimum pile embedment depth of 20 feet
2. Uplift capacity may be designed using 50% of the downward capacity
3. Pile should be spaced a minimum of 2-1/2 diameters on center
4. See text of report for pile details and installation recommendations



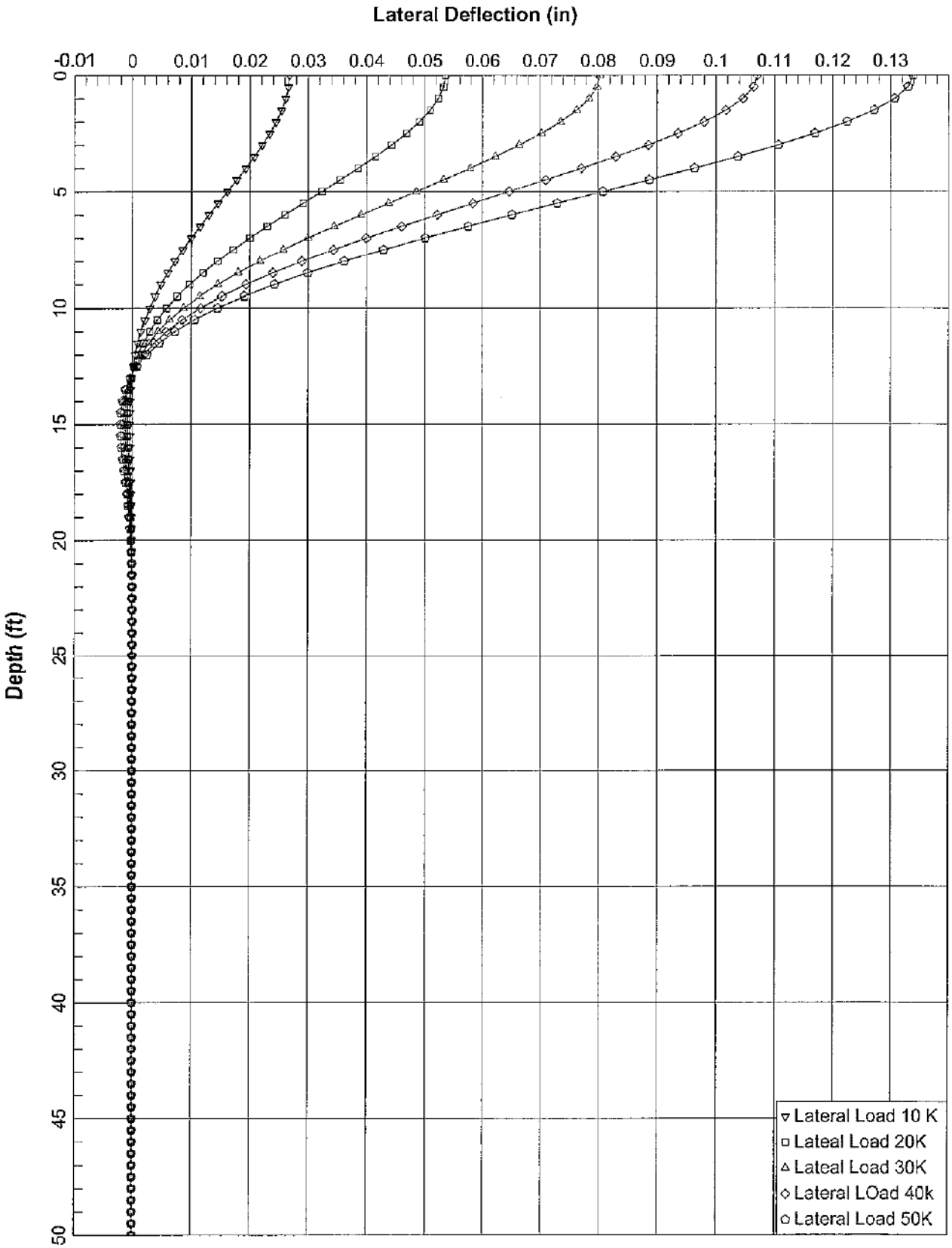
Fixed Head, 24" diam. pile
10' Alluvium over Bedrock



Fixed Head, 24 Inch Diameter



Fixed Head, 24 Inch Diameter



Fixed Head, 24 inch diameter

LPILE Plus for Windows, Version 4.0 (4.0.8)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

This program is licensed to:

Staff
Geotechnologies, Inc.

Path to file locations: F:\rktemp\Lpile files\20921 LIncoln Riboli\
Name of input data file: 20921.24.10.lpd
Name of output file: 20921.24.10.lpo
Name of plot output file: 20921.24.10.lpp
Name of runtime file: 20921.24.10.lpr

Time and Date of Analysis

Date: July 7, 2015 Time: 9:56:30

Problem Title

File No. 20921 Lincoln Properties

Program Options

Units Used in Computations - US Customary Units, inches, pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100

- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length = 600.00 in
Depth of ground surface below top of pile = .00 in
Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	24.000	16286.0000	452.0000	3604000.000
2	600.0000	24.000	16286.0000	452.0000	3604000.000

Soil and Rock Layering Information

The soil profile is modelled using 2 layers

Layer 1 is silt with cohesion and friction
Distance from top of pile to top of layer = .000 in
Distance from top of pile to bottom of layer = 120.000 in
p-y subgrade modulus k for top of soil layer = 100.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 100.000 lbs/in**3

Layer 2 is silt with cohesion and friction
Distance from top of pile to top of layer = 120.000 in
Distance from top of pile to bottom of layer = 720.000 in
p-y subgrade modulus k for top of soil layer = 1000.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 1000.000 lbs/in**3

(Depth of lowest layer extends 120.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth is defined using 4 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	.00	.06650
2	120.00	.06650
3	120.00	.07230
4	720.00	.07230

Shear Strength of Soils

Distribution of shear strength parameters with depth
defined using 4 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	.000	.86800	27.00	.01000	.0
2	120.000	.86800	27.00	.01000	.0
3	120.000	3.47000	30.00	.00500	.0
4	720.000	3.47000	30.00	.00500	.0

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves

---

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 5

Load Case Number 1

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Shear force at pile head = 10000.000 lbs
Slope at pile head = .000 in/in
Axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head condition)

Load Case Number 2

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Shear force at pile head = 20000.000 lbs
Slope at pile head = .000 in/in
Axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head condition)

Load Case Number 3

Pile-head boundary conditions are Shear and Slope (BC Type 2)

Shear force at pile head = 30000.000 lbs
Slope at pile head = .000 in/in
Axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head condition)

Load Case Number 4

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Shear force at pile head = 40000.000 lbs
Slope at pile head = .000 in/in
Axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head condition)

Load Case Number 5

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Shear force at pile head = 50000.000 lbs
Slope at pile head = .000 in/in
Axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head condition)

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Specified shear force at pile head = 10000.000 lbs
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res p lbs/in
0.000	.026774	-535459.4963	10000.0000	2.891E-19	615.7811	0.0000
6.000	.026609	-475443.0753	9952.1030	-5.167E-05	571.5593	-15.9657
12.000	.026154	-415972.2576	9810.0529	-9.723E-05	527.7394	-31.3844
18.000	.025443	-357605.7636	9578.5093	-1.368E-04	484.7333	-45.7968
24.000	.024512	-300866.0220	9264.6296	-1.704E-04	442.9258	-58.8297
30.000	.023398	-246225.6979	8877.5622	-1.984E-04	402.6652	-70.1927
36.000	.022132	-194097.2096	8427.9613	-2.209E-04	364.2554	-79.6742
42.000	.020747	-144825.0887	7927.5285	-2.382E-04	327.9503	-87.1367
48.000	.019273	-98681.0070	7388.5854	-2.507E-04	293.9500	-92.5110
54.000	.017739	-55861.2679	6823.6827	-2.586E-04	262.3992	-95.7899
60.000	.016170	-16486.5401	6245.2462	-2.623E-04	233.3867	-97.0222
66.000	.014592	19396.3990	5665.2629	-2.621E-04	235.5308	-96.3056
72.000	.013025	51811.1481	5095.0055	-2.585E-04	259.4149	-93.7802
78.000	.011490	80846.6313	4544.7968	-2.517E-04	280.8091	-89.6227
84.000	.010005	106650.7392	4023.8095	-2.421E-04	299.8223	-84.0397
90.000	.008585	129422.8751	3539.9010	-2.300E-04	316.6015	-77.2631
96.000	.007244	149405.6016	3099.4780	-2.158E-04	331.3253	-69.5446
102.000	.005995	166875.5600	2707.3881	-1.996E-04	344.1977	-61.1521
108.000	.004849	182133.8090	2366.8332	-1.818E-04	355.4404	-52.3662
114.000	.003814	195495.7022	2079.3004	-1.625E-04	365.2859	-43.4780
120.000	.002899	207280.3954	993.3701	-1.419E-04	373.9692	-318.4987

126.000	.002111	207586.4209	-695.9506	-1.207E-04	374.1947	-244.6082
132.000	.001451	199073.8203	-1960.1158	-9.991E-05	367.9223	-176.7802
138.000	9.12E-04	184184.9215	-2840.3738	-8.032E-05	356.9518	-116.6391
144.000	4.87E-04	165085.7186	-3385.7713	-6.247E-05	342.8789	-65.1601
150.000	1.63E-04	143630.6276	-3649.4659	-4.669E-05	327.0702	-22.7381
156.000	-7.35E-05	121348.1541	-3685.5093	-3.314E-05	310.6518	10.7237
162.000	-2.35E-04	99444.2899	-3546.1927	-2.186E-05	294.5124	35.7152
168.000	-3.36E-04	78820.0740	-3279.9940	-1.275E-05	279.3159	53.0177
174.000	-3.88E-04	60099.6595	-2930.1229	-5.648E-06	265.5221	63.6060
180.000	-4.04E-04	43665.3766	-2533.6229	-3.443E-07	253.4129	68.5606
186.000	-3.92E-04	29696.5976	-2120.9694	3.405E-06	243.1203	68.9906
192.000	-3.63E-04	18209.6579	-1716.0815	5.854E-06	234.6563	65.9720
198.000	-3.22E-04	9096.5950	-1336.6630	7.250E-06	227.9416	60.5008
204.000	-2.76E-04	2161.0025	-994.7825	7.825E-06	222.8312	53.4594
210.000	-2.28E-04	-2850.1847	-697.6115	7.790E-06	223.3390	45.5976
216.000	-1.82E-04	-6219.6831	-448.2455	7.326E-06	225.8218	37.5244
222.000	-1.40E-04	-8237.9223	-246.5453	6.587E-06	227.3089	29.7090
228.000	-1.03E-04	-9186.1320	-89.9487	5.697E-06	228.0075	22.4899
234.000	-7.19E-05	-9324.1431	25.7851	4.751E-06	228.1092	16.0881
240.000	-4.62E-05	-8882.4116	105.9229	3.820E-06	227.7838	10.6245
246.000	-2.60E-05	-8057.6518	156.2114	2.954E-06	227.1761	6.1383
252.000	-1.08E-05	-7011.4199	182.4412	2.184E-06	226.4052	2.6050
258.000	1.83E-07	-5870.9780	190.1201	1.525E-06	225.5648	-.045385
264.000	7.54E-06	-4731.8098	184.2448	9.836E-07	224.7255	-1.9131
270.000	1.20E-05	-3661.2212	169.1614	5.546E-07	223.9366	-3.1147
276.000	1.42E-05	-2702.5390	148.4986	2.293E-07	223.2302	-3.7728
282.000	1.47E-05	-1879.5126	125.1601	-4.882E-09	222.6238	-4.0067
288.000	1.41E-05	-1200.6123	101.3595	-1.623E-07	222.1236	-3.9268
294.000	1.28E-05	-663.0043	78.6870	-2.576E-07	221.7275	-3.6307
300.000	1.10E-05	-256.0591	58.1936	-3.045E-07	221.4276	-3.2005
306.000	9.14E-06	35.6841	40.4835	-3.158E-07	221.2652	-2.7029
312.000	7.25E-06	230.1214	25.8078	-3.022E-07	221.4085	-2.1890
318.000	5.51E-06	345.7403	14.1528	-2.728E-07	221.4937	-1.6960
324.000	3.98E-06	400.2826	5.3191	-2.347E-07	221.5339	-1.2486
330.000	2.69E-06	409.8506	-1.0109	-1.932E-07	221.5409	-.8614
336.000	1.66E-06	388.3837	-5.2170	-1.524E-07	221.5251	-.5407
342.000	8.64E-07	347.4291	-7.6988	-1.148E-07	221.4949	-.2866
348.000	2.81E-07	296.1360	-8.8434	-8.195E-08	221.4571	-.094965
354.000	-1.20E-07	241.4060	-9.0048	-5.447E-08	221.4168	.041190
360.000	-3.73E-07	188.1441	-8.4901	-3.252E-08	221.3776	.1304
366.000	-5.10E-07	139.5633	-7.5546	-1.577E-08	221.3418	.1815
372.000	-5.62E-07	97.5073	-6.4003	-3.648E-09	221.3108	.2033
378.000	-5.54E-07	62.7635	-5.1794	4.543E-09	221.2852	.2037
384.000	-5.07E-07	35.3494	-3.9993	9.558E-09	221.2650	.1896
390.000	-4.39E-07	14.7602	-2.9300	1.212E-08	221.2498	.1668
396.000	-3.62E-07	.1742	-2.0109	1.288E-08	221.2391	.1396
402.000	-2.84E-07	-9.3857	-1.2576	1.241E-08	221.2459	.1115
408.000	-2.13E-07	-14.9320	-.6691	1.117E-08	221.2499	.084695
414.000	-1.50E-07	-17.4284	-.2328	9.515E-09	221.2518	.060757
420.000	-9.87E-08	-17.7364	.070874	7.717E-09	221.2520	.040452
426.000	-5.78E-08	-16.5872	.2644	5.963E-09	221.2512	.024049
432.000	-2.71E-08	-14.5711	.3709	4.371E-09	221.2497	.011448
438.000	-5.38E-09	-12.1420	.4121	3.005E-09	221.2479	.002303
444.000	8.93E-09	-9.6292	.4074	1.892E-09	221.2460	-.003872
450.000	1.73E-08	-7.2553	.3729	1.029E-09	221.2443	-.007622
456.000	2.13E-08	-5.1553	.3216	3.951E-10	221.2427	-.009487
462.000	2.21E-08	-3.3965	.2632	-4.200E-11	221.2414	-.009972
468.000	2.08E-08	-1.9965	.2048	-3.176E-10	221.2404	-.009512
474.000	1.83E-08	-.9388	.1508	-4.677E-10	221.2396	-.008469
480.000	1.52E-08	-.1859	.1041	-5.252E-10	221.2391	-.007124
486.000	1.20E-08	.3105	.065616	-5.188E-10	221.2392	-.005689
492.000	8.94E-09	.6021	.035631	-4.721E-10	221.2394	-.004306
498.000	6.29E-09	.7386	.013507	-4.036E-10	221.2395	-.003068

504.000	4.09E-09	.7647	-.001762	-3.268E-10	221.2395	-.002022
510.000	2.37E-09	.7179	-.011377	-2.510E-10	221.2395	-.001183
516.000	1.08E-09	.6284	-.016568	-1.822E-10	221.2394	-5.470E-04
522.000	1.81E-10	.5193	-.018487	-1.235E-10	221.2393	-9.262E-05
528.000	-4.01E-10	.4067	-.018142	-7.620E-11	221.2392	2.077E-04
534.000	-7.33E-10	.3017	-.016366	-3.999E-11	221.2392	3.842E-04
540.000	-8.81E-10	.2104	-.013813	-1.382E-11	221.2391	4.668E-04
546.000	-8.99E-10	.1359	-.010967	3.880E-12	221.2390	4.819E-04
552.000	-8.34E-10	.078788	-.008165	1.485E-11	221.2390	4.521E-04
558.000	-7.21E-10	.037925	-.005624	2.082E-11	221.2390	3.951E-04
564.000	-5.85E-10	.011281	-.003467	2.333E-11	221.2389	3.238E-04
570.000	-4.41E-10	-.003708	-.001755	2.372E-11	221.2389	2.469E-04
576.000	-3.00E-10	-.009808	-5.051E-04	2.303E-11	221.2389	1.697E-04
582.000	-1.65E-10	-.009798	2.865E-04	2.203E-11	221.2389	9.418E-05
588.000	-3.55E-11	-.006396	6.306E-04	2.120E-11	221.2389	2.053E-05
594.000	8.97E-11	-.002255	5.351E-04	2.076E-11	221.2389	-5.238E-05
600.000	2.14E-10	0.0000	0.0000	2.064E-11	221.2389	-1.260E-04

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.02677367 in
Computed slope at pile head	=	2.89121E-19
Maximum bending moment	=	-535459.496 lbs-in
Maximum shear force	=	10000.000 lbs
Depth of maximum bending moment	=	0.000 in
Depth of maximum shear force	=	0.000 in
Number of iterations	=	5
Number of zero deflection points	=	6

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Specified shear force at pile head = 20000.000 lbs
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res p lbs/in
0.000	.053547	-1.071E+06	20000.0000	5.782E-19	1010.3233	0.0000
6.000	.053219	-950886.1506	19904.2060	-1.033E-04	921.8796	-31.9313
12.000	.052307	-831944.5151	19620.1057	-1.945E-04	834.2399	-62.7687
18.000	.050885	-715211.5272	19157.0186	-2.735E-04	748.2277	-91.5937
24.000	.049025	-601732.0440	18529.2591	-3.409E-04	664.6127	-117.6595
30.000	.046795	-492451.3958	17755.1243	-3.968E-04	584.0915	-140.3854
36.000	.044263	-388194.4192	16855.9226	-4.418E-04	507.2719	-159.3485
42.000	.041494	-289650.1773	15855.0569	-4.764E-04	434.6616	-174.2734
48.000	.038546	-197362.0139	14777.1708	-5.013E-04	366.6610	-185.0220
54.000	.035478	-111722.5357	13647.3653	-5.171E-04	303.5594	-191.5799

60.000	.032341	-32973.0801	12490.4924	-5.245E-04	245.5345	-194.0444
66.000	.029184	38792.7980	11330.5257	-5.242E-04	249.8226	-192.6111
72.000	.026050	103622.2961	10190.0110	-5.169E-04	297.5909	-187.5604
78.000	.022980	161693.2626	9089.5935	-5.034E-04	340.3793	-179.2454
84.000	.020009	213301.4784	8047.6190	-4.842E-04	378.4057	-168.0795
90.000	.017170	258845.7502	7079.8020	-4.601E-04	411.9640	-154.5262
96.000	.014488	298811.2031	6198.9560	-4.316E-04	441.4118	-139.0891
102.000	.011991	333751.1199	5414.7763	-3.992E-04	467.1565	-122.3041
108.000	.009697	364267.6180	4733.6664	-3.636E-04	489.6419	-104.7325
114.000	.007628	390991.4044	4158.6007	-3.250E-04	509.3328	-86.9561
120.000	.005798	414560.7909	1986.7401	-2.838E-04	526.6994	-636.9975
126.000	.004222	415172.8419	-1391.9013	-2.414E-04	527.1504	-489.2163
132.000	.002901	398147.6407	-3920.2316	-1.998E-04	514.6057	-353.5605
138.000	.001824	368369.8430	-5680.7475	-1.606E-04	492.6646	-233.2782
144.000	9.73E-04	330171.4371	-6771.5425	-1.249E-04	464.5189	-130.3201
150.000	3.25E-04	287261.2551	-7298.9318	-9.338E-05	432.9014	-45.4763
156.000	-1.47E-04	242696.3081	-7371.0186	-6.629E-05	400.0647	21.4473
162.000	-4.70E-04	198888.5799	-7092.3853	-4.372E-05	367.7858	71.4304
168.000	-6.72E-04	157640.1479	-6559.9881	-2.550E-05	337.3928	106.0353
174.000	-7.76E-04	120199.3190	-5860.2458	-1.130E-05	309.8053	127.2121
180.000	-8.07E-04	87330.7532	-5067.2458	-6.887E-07	285.5868	137.1212
186.000	-7.85E-04	59393.1953	-4241.9387	6.811E-06	265.0016	137.9811
192.000	-7.25E-04	36419.3158	-3432.1630	1.171E-05	248.0738	131.9441
198.000	-6.44E-04	18193.1900	-2673.3260	1.450E-05	234.6442	121.0016
204.000	-5.52E-04	4322.0051	-1989.5650	1.565E-05	224.4235	106.9188
210.000	-4.56E-04	-5700.3694	-1395.2230	1.558E-05	225.4391	91.1952
216.000	-3.65E-04	-12439.3662	-896.4910	1.465E-05	230.4046	75.0488
222.000	-2.80E-04	-16475.8447	-493.0907	1.317E-05	233.3788	59.4180
228.000	-2.06E-04	-18372.2639	-179.8975	1.139E-05	234.7762	44.9797
234.000	-1.44E-04	-18648.2863	51.5702	9.501E-06	234.9795	32.1762
240.000	-9.24E-05	-17764.8232	211.8459	7.640E-06	234.3286	21.2491
246.000	-5.20E-05	-16115.3037	312.4228	5.908E-06	233.1132	12.2766
252.000	-2.15E-05	-14022.8399	364.8824	4.368E-06	231.5714	5.2100
258.000	3.66E-07	-11741.9560	380.2401	3.051E-06	229.8908	-.090770
264.000	1.51E-05	-9463.6196	368.4895	1.967E-06	228.2120	-3.8261
270.000	2.40E-05	-7322.4424	338.3227	1.109E-06	226.6343	-6.2295
276.000	2.84E-05	-5405.0780	296.9973	4.586E-07	225.2216	-7.5456
282.000	2.95E-05	-3759.0253	250.3201	-9.763E-09	224.0087	-8.0134
288.000	2.83E-05	-2401.2247	202.7189	-3.246E-07	223.0082	-7.8537
294.000	2.56E-05	-1326.0087	157.3740	-5.151E-07	222.2160	-7.2613
300.000	2.21E-05	-512.1182	116.3872	-6.091E-07	221.6163	-6.4010
306.000	1.83E-05	71.3683	80.9669	-6.316E-07	221.2915	-5.4058
312.000	1.45E-05	460.2429	51.6156	-6.044E-07	221.5781	-4.3780
318.000	1.10E-05	691.4806	28.3056	-5.456E-07	221.7484	-3.3920
324.000	7.96E-06	800.5652	10.6381	-4.693E-07	221.8288	-2.4972
330.000	5.39E-06	819.7012	-2.0218	-3.865E-07	221.8429	-1.7228
336.000	3.32E-06	776.7673	-10.4341	-3.049E-07	221.8113	-1.0813
342.000	1.73E-06	694.8581	-15.3976	-2.297E-07	221.7509	-.5732
348.000	5.62E-07	592.2720	-17.6869	-1.639E-07	221.6753	-.1899
354.000	-2.40E-07	482.8120	-18.0095	-1.089E-07	221.5947	.082380
360.000	-7.45E-07	376.2882	-16.9803	-6.503E-08	221.5162	.2607
366.000	-1.02E-06	279.1266	-15.1093	-3.153E-08	221.4446	.3630
372.000	-1.12E-06	195.0145	-12.8007	-7.297E-09	221.3826	.4066
378.000	-1.11E-06	125.5270	-10.3587	9.087E-09	221.3314	.4074
384.000	-1.01E-06	70.6987	-7.9986	1.912E-08	221.2910	.3793
390.000	-8.78E-07	29.5203	-5.8601	2.424E-08	221.2607	.3336
396.000	-7.24E-07	.3485	-4.0217	2.577E-08	221.2392	.2792
402.000	-5.69E-07	-18.7714	-2.5152	2.482E-08	221.2528	.2229
408.000	-4.26E-07	-29.8640	-1.3382	2.234E-08	221.2609	.1694
414.000	-3.01E-07	-34.8568	-.4655	1.903E-08	221.2646	.1215
420.000	-1.97E-07	-35.4729	.1417	1.543E-08	221.2651	.080903
426.000	-1.16E-07	-33.1743	.5288	1.193E-08	221.2634	.048098
432.000	-5.43E-08	-29.1422	.7417	8.741E-09	221.2604	.022896

438.000	-1.08E-08	-24.2839	.8242	6.010E-09	221.2568	.004606
444.000	1.79E-08	-19.2584	.8148	3.785E-09	221.2531	-.007745
450.000	3.47E-08	-14.5106	.7459	2.059E-09	221.2496	-.015243
456.000	4.26E-08	-10.3105	.6432	7.902E-10	221.2465	-.018975
462.000	4.41E-08	-6.7930	.5265	-8.399E-11	221.2439	-.019944
468.000	4.15E-08	-3.9930	.4096	-6.353E-10	221.2419	-.019024
474.000	3.65E-08	-1.8776	.3017	-9.353E-10	221.2403	-.016937
480.000	3.03E-08	-.3718	.2081	-1.050E-09	221.2392	-.014249
486.000	2.39E-08	.6210	.1312	-1.038E-09	221.2394	-.011378
492.000	1.79E-08	1.2042	.071261	-9.443E-10	221.2398	-.008613
498.000	1.26E-08	1.4773	.027014	-8.072E-10	221.2400	-.006136
504.000	8.19E-09	1.5293	-.003524	-6.536E-10	221.2401	-.004043
510.000	4.73E-09	1.4358	-.022754	-5.020E-10	221.2400	-.002367
516.000	2.16E-09	1.2569	-.033136	-3.644E-10	221.2399	-.001094
522.000	3.62E-10	1.0386	-.036974	-2.471E-10	221.2397	-1.852E-04
528.000	-8.02E-10	.8135	-.036284	-1.524E-10	221.2395	4.153E-04
534.000	-1.47E-09	.6033	-.032733	-7.999E-11	221.2394	7.685E-04
540.000	-1.76E-09	.4208	-.027626	-2.764E-11	221.2392	9.335E-04
546.000	-1.80E-09	.2718	-.021934	7.760E-12	221.2391	9.638E-04
552.000	-1.67E-09	.1576	-.016330	2.971E-11	221.2391	9.042E-04
558.000	-1.44E-09	.075849	-.011247	4.164E-11	221.2390	7.901E-04
564.000	-1.17E-09	.022562	-.006934	4.667E-11	221.2390	6.475E-04
570.000	-8.82E-10	-.007417	-.003510	4.744E-11	221.2389	4.939E-04
576.000	-6.00E-10	-.019615	-.001010	4.606E-11	221.2390	3.394E-04
582.000	-3.29E-10	-.019595	5.730E-04	4.406E-11	221.2390	1.884E-04
588.000	-7.11E-11	-.012792	.001261	4.240E-11	221.2389	4.106E-05
594.000	1.79E-10	-.004511	.001070	4.152E-11	221.2389	-1.048E-04
600.000	4.27E-10	0.0000	0.0000	4.129E-11	221.2389	-2.520E-04

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

Pile-head deflection	=	.05354733 in
Computed slope at pile head	=	5.78241E-19
Maximum bending moment	=	-1070918.993 lbs-in
Maximum shear force	=	20000.000 lbs
Depth of maximum bending moment	=	0.000 in
Depth of maximum shear force	=	0.000 in
Number of iterations	=	5
Number of zero deflection points	=	6

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 3

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Specified shear force at pile head = 30000.000 lbs
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res p lbs/in

0.000	.080321	-1.606E+06	30000.0000	1.272E-17	1404.8655	0.0000
6.000	.079828	-1.426E+06	29856.3089	-1.550E-04	1272.1999	-47.8970
12.000	.078461	-1.248E+06	29430.1586	-2.917E-04	1140.7404	-94.1531
18.000	.076328	-1.073E+06	28735.5279	-4.103E-04	1011.7220	-137.3905
24.000	.073537	-902598.0659	27793.8887	-5.113E-04	886.2995	-176.4892
30.000	.070193	-738677.0937	26632.6865	-5.952E-04	765.5178	-210.5782
36.000	.066395	-582291.6288	25283.8840	-6.627E-04	650.2884	-239.0227
42.000	.062241	-434475.2660	23782.5854	-7.147E-04	541.3730	-261.4102
48.000	.057819	-296043.0209	22165.7561	-7.520E-04	439.3721	-277.5329
54.000	.053217	-167583.8036	20471.0480	-7.757E-04	344.7196	-287.3698
60.000	.048511	-49459.6202	18735.7386	-7.868E-04	257.6822	-291.0667
66.000	.043775	58189.1970	16995.7886	-7.863E-04	264.1144	-288.9167
72.000	.039075	155433.4442	15285.0165	-7.754E-04	335.7668	-281.3407
78.000	.034470	242539.8939	13634.3903	-7.551E-04	399.9494	-268.8681
84.000	.030014	319952.2177	12071.4285	-7.263E-04	456.9891	-252.1192
90.000	.025754	388268.6253	10619.7029	-6.901E-04	507.3266	-231.7893
96.000	.021733	448216.8047	9298.4340	-6.474E-04	551.4982	-208.6337
102.000	.017986	500626.6799	8122.1644	-5.989E-04	590.1153	-183.4562
108.000	.014546	546401.4270	7100.4996	-5.454E-04	623.8435	-157.0987
114.000	.011442	586487.1067	6237.9011	-4.875E-04	653.3798	-130.4341
120.000	.008697	621841.1863	2980.1102	-4.257E-04	679.4297	-955.4962
126.000	.006333	622759.2628	-2087.8519	-3.621E-04	680.1061	-733.8245
132.000	.004352	597221.4610	-5880.3474	-2.997E-04	661.2891	-530.3407
138.000	.002737	552554.7645	-8521.1213	-2.410E-04	628.3774	-349.9173
144.000	.001460	495257.1557	-10157.3138	-1.874E-04	586.1589	-195.4802
150.000	4.88E-04	430891.8827	-10948.3977	-1.401E-04	538.7326	-68.2144
156.000	-2.21E-04	364044.4622	-11056.5279	-9.943E-05	489.4775	32.1710
162.000	-7.06E-04	298332.8698	-10638.5780	-6.558E-05	441.0593	107.1456
168.000	-.001008	236460.2219	-9839.9821	-3.825E-05	395.4697	159.0530
174.000	-.001164	180298.9785	-8790.3687	-1.694E-05	354.0885	190.8181
180.000	-.001211	130996.1298	-7600.8688	-1.033E-06	317.7607	205.6818
186.000	-.001177	89089.7929	-6362.9081	1.022E-05	286.8829	206.9717
192.000	-.001088	54628.9737	-5148.2445	1.756E-05	261.4912	197.9161
198.000	-9.66E-04	27289.7849	-4009.9890	2.175E-05	241.3468	181.5024
204.000	-8.27E-04	6483.0076	-2984.3474	2.347E-05	226.0158	160.3781
210.000	-6.84E-04	-8550.5542	-2092.8345	2.337E-05	227.5392	136.7928
216.000	-5.47E-04	-18659.0494	-1344.7366	2.198E-05	234.9875	112.5731
222.000	-4.21E-04	-24713.7670	-739.6360	1.976E-05	239.4488	89.1270
228.000	-3.10E-04	-27558.3959	-269.8462	1.709E-05	241.5448	67.4696
234.000	-2.16E-04	-27972.4294	77.3553	1.425E-05	241.8498	48.2642
240.000	-1.39E-04	-26647.2348	317.7688	1.146E-05	240.8734	31.8736
246.000	-7.81E-05	-24172.9555	468.6342	8.862E-06	239.0503	18.4148
252.000	-3.23E-05	-21034.2598	547.3236	6.552E-06	236.7376	7.8150
258.000	5.49E-07	-17612.9340	570.3602	4.576E-06	234.2167	-.1362
264.000	2.26E-05	-14195.4294	552.7343	2.951E-06	231.6985	-5.7392
270.000	3.60E-05	-10983.6636	507.4841	1.664E-06	229.3320	-9.3442
276.000	4.26E-05	-8107.6170	445.4959	6.879E-07	227.2129	-11.3185
282.000	4.42E-05	-5638.5379	375.4802	-1.464E-08	225.3936	-12.0201
288.000	4.24E-05	-3601.8370	304.0784	-4.869E-07	223.8929	-11.7805
294.000	3.84E-05	-1989.0130	236.0610	-7.727E-07	222.7045	-10.8920
300.000	3.31E-05	-768.1773	174.5808	-9.136E-07	221.8050	-9.6015
306.000	2.74E-05	107.0524	121.4504	-9.474E-07	221.3178	-8.1086
312.000	2.18E-05	690.3643	77.4234	-9.067E-07	221.7476	-6.5670
318.000	1.65E-05	1037.2209	42.4584	-8.184E-07	222.0032	-5.0879
324.000	1.19E-05	1200.8478	15.9572	-7.040E-07	222.1238	-3.7458
330.000	8.08E-06	1229.5519	-3.0327	-5.797E-07	222.1449	-2.5842
336.000	4.98E-06	1165.1510	-15.6511	-4.573E-07	222.0975	-1.6220
342.000	2.59E-06	1042.2872	-23.0964	-3.445E-07	222.0069	-.8598
348.000	8.43E-07	888.4080	-26.5303	-2.458E-07	221.8935	-.2849
354.000	-3.59E-07	724.2181	-27.0143	-1.634E-07	221.7726	.1236
360.000	-1.12E-06	564.4322	-25.4704	-9.755E-08	221.6548	.3911
366.000	-1.53E-06	418.6899	-22.6639	-4.730E-08	221.5474	.5444

372.000	-1.69E-06	292.5218	-19.2010	-1.095E-08	221.4545	.6099
378.000	-1.66E-06	188.2905	-15.5381	1.363E-08	221.3777	.6111
384.000	-1.52E-06	106.0481	-11.9980	2.867E-08	221.3171	.5689
390.000	-1.32E-06	44.2805	-8.7901	3.636E-08	221.2716	.5003
396.000	-1.09E-06	.5227	-6.0326	3.865E-08	221.2393	.4188
402.000	-8.53E-07	-28.1570	-3.7728	3.724E-08	221.2597	.3344
408.000	-6.39E-07	-44.7960	-2.0073	3.351E-08	221.2719	.2541
414.000	-4.51E-07	-52.2852	-.6983	2.854E-08	221.2775	.1823
420.000	-2.96E-07	-53.2093	.2126	2.315E-08	221.2781	.1214
426.000	-1.73E-07	-49.7615	.7931	1.789E-08	221.2756	.072148
432.000	-8.14E-08	-43.7132	1.1126	1.311E-08	221.2711	.034345
438.000	-1.61E-08	-36.4259	1.2364	9.016E-09	221.2658	.006909
444.000	2.68E-08	-28.8877	1.2222	5.677E-09	221.2602	-.011617
450.000	5.20E-08	-21.7658	1.1188	3.088E-09	221.2550	-.022865
456.000	6.38E-08	-15.4658	.9648	1.185E-09	221.2503	-.028462
462.000	6.62E-08	-10.1895	.7897	-1.260E-10	221.2464	-.029916
468.000	6.23E-08	-5.9895	.6143	-9.529E-10	221.2434	-.028536
474.000	5.48E-08	-2.8164	.4525	-1.403E-09	221.2410	-.025406
480.000	4.55E-08	-.5578	.3122	-1.575E-09	221.2393	-.021373
486.000	3.59E-08	.9315	.1968	-1.556E-09	221.2396	-.017066
492.000	2.68E-08	1.8063	.1069	-1.416E-09	221.2403	-.012919
498.000	1.89E-08	2.2159	.040521	-1.211E-09	221.2406	-.009204
504.000	1.23E-08	2.2940	-.005286	-9.804E-10	221.2406	-.006065
510.000	7.10E-09	2.1536	-.034131	-7.530E-10	221.2405	-.003550
516.000	3.24E-09	1.8853	-.049704	-5.466E-10	221.2403	-.001641
522.000	5.43E-10	1.5578	-.055461	-3.706E-10	221.2401	-2.779E-04
528.000	-1.20E-09	1.2202	-.054426	-2.286E-10	221.2398	6.230E-04
534.000	-2.20E-09	.9050	-.049099	-1.200E-10	221.2396	.001153
540.000	-2.64E-09	.6312	-.041440	-4.146E-11	221.2394	.001400
546.000	-2.70E-09	.4078	-.032901	1.164E-11	221.2392	.001446
552.000	-2.50E-09	.2364	-.024495	4.456E-11	221.2391	.001356
558.000	-2.16E-09	.1138	-.016871	6.246E-11	221.2390	.001185
564.000	-1.75E-09	.033843	-.010401	7.000E-11	221.2390	9.713E-04
570.000	-1.32E-09	-.011125	-.005265	7.116E-11	221.2389	7.408E-04
576.000	-9.00E-10	-.029423	-.001515	6.909E-11	221.2390	5.091E-04
582.000	-4.94E-10	-.029393	8.595E-04	6.609E-11	221.2390	2.826E-04
588.000	-1.07E-10	-.019189	.001892	6.360E-11	221.2390	6.159E-05
594.000	2.69E-10	-.006766	.001605	6.228E-11	221.2389	-1.571E-04
600.000	6.41E-10	0.0000	0.0000	6.193E-11	221.2389	-3.779E-04

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 3:

Pile-head deflection	=	.08032100 in
Computed slope at pile head	=	1.27213E-17
Maximum bending moment	=	-1606378.489 lbs-in
Maximum shear force	=	30000.000 lbs
Depth of maximum bending moment	=	0.000 in
Depth of maximum shear force	=	0.000 in
Number of iterations	=	5
Number of zero deflection points	=	6

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 4

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Specified shear force at pile head = 40000.000 lbs
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res p lbs/in
0.000	.107095	-2.142E+06	40000.0000	1.156E-18	1799.4077	0.0000
6.000	.106438	-1.902E+06	39808.4119	-2.067E-04	1622.5203	-63.8627
12.000	.104615	-1.664E+06	39240.2115	-3.889E-04	1447.2409	-125.5375
18.000	.101771	-1.430E+06	38314.0371	-5.471E-04	1275.2164	-183.1873
24.000	.098050	-1.203E+06	37058.5182	-6.817E-04	1107.9864	-235.3190
30.000	.093590	-984902.7916	35510.2486	-7.936E-04	946.9441	-280.7709
36.000	.088527	-776388.8384	33711.8453	-8.836E-04	793.3049	-318.6969
42.000	.082987	-579300.3547	31710.1139	-9.529E-04	648.0843	-348.5469
48.000	.077092	-394724.0279	29554.3415	-.001003	512.0831	-370.0439
54.000	.070956	-223445.0715	27294.7306	-.001034	385.8798	-383.1597
60.000	.064681	-65946.1602	24980.9848	-.001049	269.8300	-388.0889
66.000	.058367	77585.5960	22661.0514	-.001048	278.4063	-385.2223
72.000	.052100	207244.5922	20380.0219	-.001034	373.9428	-375.1209
78.000	.045960	323386.5252	18179.1871	-.001007	459.5196	-358.4907
84.000	.040019	426602.9569	16095.2379	-9.684E-04	535.5724	-336.1590
90.000	.034339	517691.5004	14159.6039	-9.202E-04	602.6891	-309.0524
96.000	.028977	597622.4062	12397.9120	-8.632E-04	661.5846	-278.1783
102.000	.023981	667502.2398	10829.5525	-7.985E-04	713.0741	-244.6082
108.000	.019395	728535.2360	9467.3329	-7.271E-04	758.0450	-209.4650
114.000	.015255	781982.8089	8317.2015	-6.499E-04	797.4267	-173.9122
120.000	.011596	829121.5818	3973.4802	-5.676E-04	832.1599	-1273.9949
126.000	.008444	830345.6838	-2783.8025	-4.828E-04	833.0619	-978.4327
132.000	.005802	796295.2814	-7840.4632	-3.996E-04	807.9725	-707.1209
138.000	.003649	736739.6860	-11361.4951	-3.213E-04	764.0902	-466.5564
144.000	.001947	660342.8742	-13543.0850	-2.499E-04	707.7988	-260.6403
150.000	6.50E-04	574522.5102	-14597.8636	-1.868E-04	644.5639	-90.9526
156.000	-2.94E-04	485392.6163	-14742.0372	-1.326E-04	578.8904	42.8947
162.000	-9.41E-04	397777.1598	-14184.7706	-8.744E-05	514.3328	142.8608
168.000	-.001343	315280.2958	-13119.9762	-5.099E-05	453.5467	212.0707
174.000	-.001553	240398.6379	-11720.4916	-2.259E-05	398.3717	254.4242
180.000	-.001614	174661.5065	-10134.4917	-1.377E-06	349.9346	274.2425
186.000	-.001569	118786.3905	-8483.8774	1.362E-05	308.7642	275.9623
192.000	-.001451	72838.6316	-6864.3260	2.342E-05	274.9086	263.8882
198.000	-.001288	36386.3799	-5346.6519	2.900E-05	248.0495	242.0032
204.000	-.001103	8644.0102	-3979.1299	3.130E-05	227.6081	213.8375
210.000	-9.13E-04	-11400.7389	-2790.4460	3.116E-05	229.6393	182.3905
216.000	-7.29E-04	-24878.7325	-1792.9821	2.930E-05	239.5703	150.0975
222.000	-5.61E-04	-32951.6894	-986.1814	2.635E-05	245.5187	118.8360
228.000	-4.13E-04	-36744.5278	-359.7949	2.279E-05	248.3134	89.9594
234.000	-2.87E-04	-37296.5726	103.1403	1.900E-05	248.7201	64.3523
240.000	-1.85E-04	-35529.6464	423.6918	1.528E-05	247.4182	42.4982
246.000	-1.04E-04	-32230.6073	624.8455	1.182E-05	244.9874	24.5531
252.000	-4.31E-05	-28045.6798	729.7649	8.736E-06	241.9038	10.4200
258.000	7.32E-07	-23483.9120	760.4802	6.102E-06	238.5426	-.1815
264.000	3.01E-05	-18927.2392	736.9790	3.934E-06	235.1851	-7.6522
270.000	4.79E-05	-14644.8848	676.6454	2.218E-06	232.0297	-12.4590
276.000	5.68E-05	-10810.1560	593.9946	9.173E-07	229.2042	-15.0913
282.000	5.90E-05	-7518.0505	500.6403	-1.953E-08	226.7785	-16.0268
288.000	5.65E-05	-4802.4494	405.4378	-6.493E-07	224.7775	-15.7073
294.000	5.12E-05	-2652.0173	314.7481	-1.030E-06	223.1930	-14.5226
300.000	4.42E-05	-1024.2363	232.7743	-1.218E-06	221.9936	-12.8020

306.000	3.65E-05	142.7366	161.9339	-1.263E-06	221.3441	-10.8115
312.000	2.90E-05	920.4858	103.2312	-1.209E-06	221.9172	-8.7560
318.000	2.20E-05	1382.9612	56.6113	-1.091E-06	222.2579	-6.7839
324.000	1.59E-05	1601.1303	21.2762	-9.386E-07	222.4187	-4.9944
330.000	1.08E-05	1639.4025	-4.0436	-7.730E-07	222.4469	-3.4455
336.000	6.64E-06	1553.5346	-20.8682	-6.098E-07	222.3836	-2.1626
342.000	3.45E-06	1389.7163	-30.7952	-4.594E-07	222.2629	-1.1464
348.000	1.12E-06	1184.5440	-35.3738	-3.278E-07	222.1117	-.3799
354.000	-4.79E-07	965.6241	-36.0191	-2.179E-07	221.9504	.1648
360.000	-1.49E-06	752.5763	-33.9606	-1.301E-07	221.7935	.5214
366.000	-2.04E-06	558.2531	-30.2186	-6.306E-08	221.6503	.7259
372.000	-2.25E-06	390.0291	-25.6014	-1.459E-08	221.5263	.8131
378.000	-2.22E-06	251.0540	-20.7175	1.817E-08	221.4239	.8148
384.000	-2.03E-06	141.3974	-15.9973	3.823E-08	221.3431	.7586
390.000	-1.76E-06	59.0406	-11.7202	4.848E-08	221.2824	.6671
396.000	-1.45E-06	.6969	-8.0435	5.153E-08	221.2395	.5584
402.000	-1.14E-06	-37.5427	-5.0304	4.965E-08	221.2666	.4459
408.000	-8.51E-07	-59.7280	-2.6764	4.468E-08	221.2829	.3388
414.000	-6.02E-07	-69.7136	-.9310	3.806E-08	221.2903	.2430
420.000	-3.95E-07	-70.9458	.2835	3.087E-08	221.2912	.1618
426.000	-2.31E-07	-66.3486	1.0575	2.385E-08	221.2878	.096197
432.000	-1.09E-07	-58.2843	1.4835	1.748E-08	221.2819	.045793
438.000	-2.15E-08	-48.5679	1.6485	1.202E-08	221.2747	.009212
444.000	3.57E-08	-38.5169	1.6297	7.570E-09	221.2673	-.015490
450.000	6.93E-08	-29.0211	1.4917	4.118E-09	221.2603	-.030486
456.000	8.51E-08	-20.6211	1.2864	1.580E-09	221.2541	-.037950
462.000	8.83E-08	-13.5860	1.0529	-1.680E-10	221.2489	-.039887
468.000	8.31E-08	-7.9860	.8191	-1.271E-09	221.2448	-.038048
474.000	7.30E-08	-3.7552	.6033	-1.871E-09	221.2417	-.033874
480.000	6.06E-08	-.7437	.4162	-2.101E-09	221.2395	-.028497
486.000	4.78E-08	1.2420	.2625	-2.075E-09	221.2399	-.022755
492.000	3.57E-08	2.4084	.1425	-1.889E-09	221.2407	-.017226
498.000	2.52E-08	2.9545	.054029	-1.614E-09	221.2411	-.012272
504.000	1.64E-08	3.0587	-.007048	-1.307E-09	221.2412	-.008087
510.000	9.47E-09	2.8715	-.045508	-1.004E-09	221.2411	-.004733
516.000	4.33E-09	2.5138	-.066272	-7.288E-10	221.2408	-.002188
522.000	7.24E-10	2.0771	-.073948	-4.941E-10	221.2405	-3.705E-04
528.000	-1.60E-09	1.6270	-.072568	-3.048E-10	221.2401	8.307E-04
534.000	-2.93E-09	1.2067	-.065465	-1.600E-10	221.2398	.001537
540.000	-3.52E-09	.8416	-.055253	-5.529E-11	221.2396	.001867
546.000	-3.60E-09	.5437	-.043869	1.552E-11	221.2393	.001928
552.000	-3.34E-09	.3152	-.032660	5.942E-11	221.2392	.001808
558.000	-2.88E-09	.1517	-.022494	8.328E-11	221.2390	.001580
564.000	-2.34E-09	.045124	-.013868	9.334E-11	221.2390	.001295
570.000	-1.76E-09	-.014833	-.007020	9.489E-11	221.2389	9.878E-04
576.000	-1.20E-09	-.039231	-.002021	9.212E-11	221.2390	6.788E-04
582.000	-6.59E-10	-.039190	.001146	8.811E-11	221.2390	3.767E-04
588.000	-1.42E-10	-.025585	.002523	8.480E-11	221.2390	8.213E-05
594.000	3.59E-10	-.009021	.002140	8.304E-11	221.2389	-2.095E-04
600.000	8.54E-10	0.0000	0.0000	8.257E-11	221.2389	-5.039E-04

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

Pile-head deflection = .10709467 in
Computed slope at pile head = 1.15648E-18
Maximum bending moment = -2141837.985 lbs-in
Maximum shear force = 40000.000 lbs
Depth of maximum bending moment = 0.000 in

Depth of maximum shear force = 0.000 in
Number of iterations = 5
Number of zero deflection points = 6

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 5

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Specified shear force at pile head = 50000.000 lbs
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth x in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res p lbs/in
0.000	.133868	-2.677E+06	50000.0000	-6.939E-18	2193.9498	0.0000
6.000	.133047	-2.377E+06	49760.5149	-2.583E-04	1972.8406	-79.8284
12.000	.130768	-2.080E+06	49050.2643	-4.862E-04	1753.7414	-156.9218
18.000	.127213	-1.788E+06	47892.5464	-6.839E-04	1538.7107	-228.9841
24.000	.122562	-1.504E+06	46323.1478	-8.521E-04	1329.6733	-294.1487
30.000	.116988	-1.231E+06	44387.8108	-9.919E-04	1128.3703	-350.9636
36.000	.110659	-970486.0480	42139.8066	-.001104	936.3214	-398.3711
42.000	.103734	-724125.4433	39637.6424	-.001191	754.7957	-435.6836
48.000	.096366	-493405.0348	36942.9269	-.001253	584.7942	-462.5549
54.000	.088694	-279306.3393	34118.4133	-.001293	427.0400	-478.9497
60.000	.080852	-82432.7003	31226.2310	-.001311	281.9778	-485.1111
66.000	.072959	96981.9950	28326.3143	-.001311	292.6981	-481.5278
72.000	.065125	259055.7403	25475.0274	-.001292	412.1188	-468.9011
78.000	.057450	404233.1565	22723.9838	-.001258	519.0897	-448.1134
84.000	.050024	533253.6961	20119.0474	-.001211	614.1558	-420.1987
90.000	.042924	647114.3754	17699.5049	-.001150	698.0517	-386.3155
96.000	.036221	747028.0078	15497.3900	-.001079	771.6710	-347.7228
102.000	.029976	834377.7998	13536.9406	-9.981E-04	836.0328	-305.7603
108.000	.024244	910669.0450	11834.1661	-9.089E-04	892.2465	-261.8312
114.000	.019069	977478.5111	10396.5018	-8.124E-04	941.4736	-217.3902
120.000	.014495	1.036E+06	4966.8503	-7.095E-04	984.8902	-1592.4937
126.000	.010555	1.038E+06	-3479.7532	-6.035E-04	986.0176	-1223.0408
132.000	.007253	995369.1017	-9800.5791	-4.995E-04	954.6559	-883.9011
138.000	.004561	920924.6075	-14201.8688	-4.016E-04	899.8031	-583.1955
144.000	.002434	825428.5928	-16928.8563	-3.123E-04	829.4388	-325.8004
150.000	8.13E-04	718153.1378	-18247.3295	-2.334E-04	750.3951	-113.6907
156.000	-3.68E-04	606740.7703	-18427.5465	-1.657E-04	668.3032	53.6184
162.000	-.001176	497221.4497	-17730.9633	-1.093E-04	587.6062	178.5760
168.000	-.001679	394100.3698	-16399.9702	-6.374E-05	511.6236	265.0883
174.000	-.001941	300498.2974	-14650.6145	-2.824E-05	442.6549	318.0302
180.000	-.002018	218326.8831	-12668.1146	-1.722E-06	382.1086	342.8031
186.000	-.001961	148482.9881	-10604.8468	1.703E-05	330.6455	344.9529
192.000	-.001814	91048.2895	-8580.4075	2.927E-05	288.3260	329.8602
198.000	-.001610	45482.9749	-6683.3149	3.625E-05	254.7521	302.5039
204.000	-.001379	10805.0127	-4973.9124	3.912E-05	229.2004	267.2969
210.000	-.001141	-14250.9236	-3488.0575	3.895E-05	231.7394	227.9881
216.000	-9.11E-04	-31098.4156	-2241.2276	3.663E-05	244.1532	187.6219
222.000	-7.01E-04	-41189.6117	-1232.7267	3.294E-05	251.5886	148.5450
228.000	-5.16E-04	-45930.6598	-449.7437	2.848E-05	255.0820	112.4493
234.000	-3.59E-04	-46620.7157	128.9254	2.375E-05	255.5904	80.4404

240.000	-2.31E-04	-44412.0580	529.6147	1.910E-05	253.9630	53.1227
246.000	-1.30E-04	-40288.2592	781.0569	1.477E-05	250.9245	30.6914
252.000	-5.39E-05	-35057.0997	912.2061	1.092E-05	247.0700	13.0250
258.000	9.16E-07	-29354.8900	950.6003	7.627E-06	242.8685	-.2269
264.000	3.77E-05	-23659.0490	921.2238	4.918E-06	238.6716	-9.5653
270.000	5.99E-05	-18306.1060	845.8068	2.773E-06	234.7274	-15.5737
276.000	7.10E-05	-13512.6950	742.4932	1.147E-06	231.1955	-18.8641
282.000	7.37E-05	-9397.5631	625.8003	-2.441E-08	228.1633	-20.0335
288.000	7.07E-05	-6003.0617	506.7973	-8.116E-07	225.6622	-19.6342
294.000	6.39E-05	-3315.0216	393.4351	-1.288E-06	223.6815	-18.1533
300.000	5.52E-05	-1280.2954	290.9679	-1.523E-06	222.1823	-16.0025
306.000	4.57E-05	178.4207	202.4173	-1.579E-06	221.3704	-13.5144
312.000	3.63E-05	1150.6072	129.0390	-1.511E-06	222.0867	-10.9450
318.000	2.75E-05	1728.7016	70.7641	-1.364E-06	222.5127	-8.4799
324.000	1.99E-05	2001.4129	26.5953	-1.173E-06	222.7136	-6.2430
330.000	1.35E-05	2049.2531	-5.0545	-9.662E-07	222.7489	-4.3069
336.000	8.30E-06	1941.9183	-26.0852	-7.622E-07	222.6698	-2.7033
342.000	4.32E-06	1737.1453	-38.4939	-5.742E-07	222.5189	-1.4329
348.000	1.41E-06	1480.6800	-44.2172	-4.097E-07	222.3299	-.4748
354.000	-5.99E-07	1207.0301	-45.0239	-2.724E-07	222.1283	.2060
360.000	-1.86E-06	940.7204	-42.4507	-1.626E-07	221.9321	.6518
366.000	-2.55E-06	697.8164	-37.7732	-7.883E-08	221.7531	.9074
372.000	-2.81E-06	487.5364	-32.0017	-1.824E-08	221.5982	1.0164
378.000	-2.77E-06	313.8175	-25.8969	2.272E-08	221.4702	1.0185
384.000	-2.54E-06	176.7468	-19.9966	4.779E-08	221.3692	.9482
390.000	-2.20E-06	73.8008	-14.6502	6.060E-08	221.2933	.8339
396.000	-1.81E-06	.8711	-10.0543	6.441E-08	221.2396	.6981
402.000	-1.42E-06	-46.9284	-6.2881	6.206E-08	221.2735	.5574
408.000	-1.06E-06	-74.6600	-3.3455	5.584E-08	221.2939	.4235
414.000	-7.52E-07	-87.1419	-1.1638	4.757E-08	221.3031	.3038
420.000	-4.93E-07	-88.6822	.3544	3.859E-08	221.3043	.2023
426.000	-2.89E-07	-82.9358	1.3219	2.982E-08	221.3000	.1202
432.000	-1.36E-07	-72.8554	1.8543	2.185E-08	221.2926	.057241
438.000	-2.69E-08	-60.7099	2.0606	1.503E-08	221.2837	.011514
444.000	4.46E-08	-48.1461	2.0371	9.462E-09	221.2744	-.019362
450.000	8.66E-08	-36.2764	1.8647	5.147E-09	221.2657	-.038108
456.000	1.06E-07	-25.7764	1.6080	1.975E-09	221.2579	-.047437
462.000	1.10E-07	-16.9825	1.3161	-2.100E-10	221.2515	-.049859
468.000	1.04E-07	-9.9825	1.0239	-1.588E-09	221.2463	-.047560
474.000	9.13E-08	-4.6940	.7542	-2.338E-09	221.2424	-.042343
480.000	7.58E-08	-.9296	.5203	-2.626E-09	221.2396	-.035622
486.000	5.98E-08	1.5525	.3281	-2.594E-09	221.2401	-.028444
492.000	4.47E-08	3.0105	.1782	-2.361E-09	221.2412	-.021532
498.000	3.14E-08	3.6931	.067536	-2.018E-09	221.2417	-.015340
504.000	2.05E-08	3.8233	-.008810	-1.634E-09	221.2418	-.010108
510.000	1.18E-08	3.5894	-.056885	-1.255E-09	221.2416	-.005917
516.000	5.41E-09	3.1422	-.082840	-9.110E-10	221.2413	-.002735
522.000	9.05E-10	2.5964	-.092436	-6.177E-10	221.2409	-4.631E-04
528.000	-2.00E-09	2.0337	-.090710	-3.810E-10	221.2404	.001038
534.000	-3.67E-09	1.5083	-.081831	-2.000E-10	221.2400	.001921
540.000	-4.40E-09	1.0520	-.069066	-6.911E-11	221.2397	.002334
546.000	-4.50E-09	.6796	-.054836	1.940E-11	221.2394	.002410
552.000	-4.17E-09	.3939	-.040825	7.427E-11	221.2392	.002261
558.000	-3.61E-09	.1896	-.028118	1.041E-10	221.2391	.001975
564.000	-2.92E-09	.056405	-.017335	1.167E-10	221.2390	.001619
570.000	-2.21E-09	-.018542	-.008775	1.186E-10	221.2390	.001235
576.000	-1.50E-09	-.049038	-.002526	1.152E-10	221.2390	8.484E-04
582.000	-8.23E-10	-.048988	.001432	1.101E-10	221.2390	4.709E-04
588.000	-1.78E-10	-.031981	.003153	1.060E-10	221.2390	1.027E-04
594.000	4.49E-10	-.011276	.002675	1.038E-10	221.2389	-2.619E-04
600.000	1.07E-09	0.0000	0.0000	1.032E-10	221.2389	-6.299E-04

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 5:

Pile-head deflection	=	.13386833 in
Computed slope at pile head	=	-6.93889E-18
Maximum bending moment	=	-2677297.481 lbs-in
Maximum shear force	=	50000.000 lbs
Depth of maximum bending moment	=	0.000 in
Depth of maximum shear force	=	0.000 in
Number of iterations	=	5
Number of zero deflection points	=	6

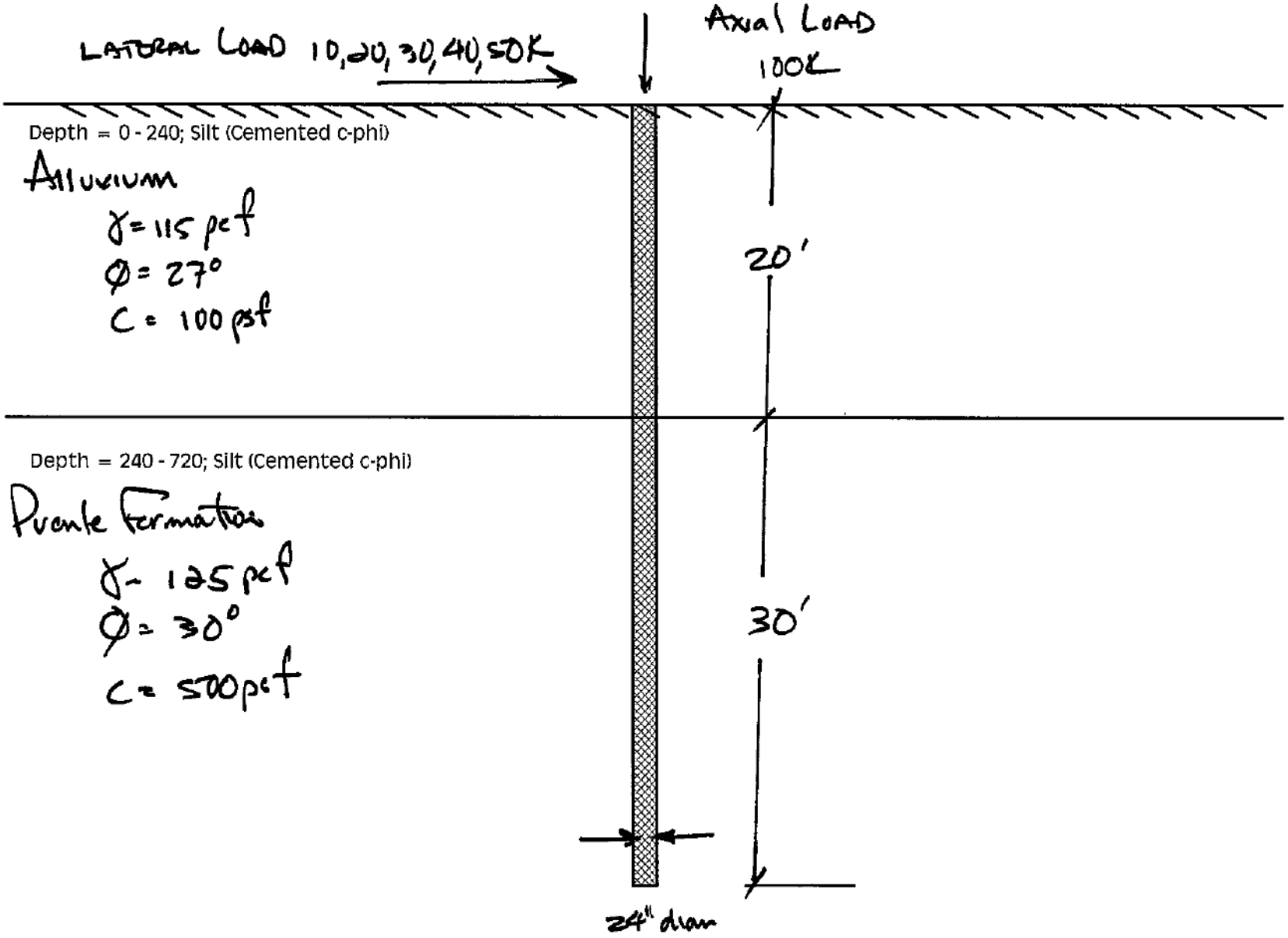
Summary of Pile-head Response

Definition of symbols for pile-head boundary conditions:

y = pile-head displacment, in
M = pile-head moment, lbs-in
V = pile-head shear force, lbs
S = pile-head slope, radians
R = rotational stiffness of pile-head, in-lbs/rad

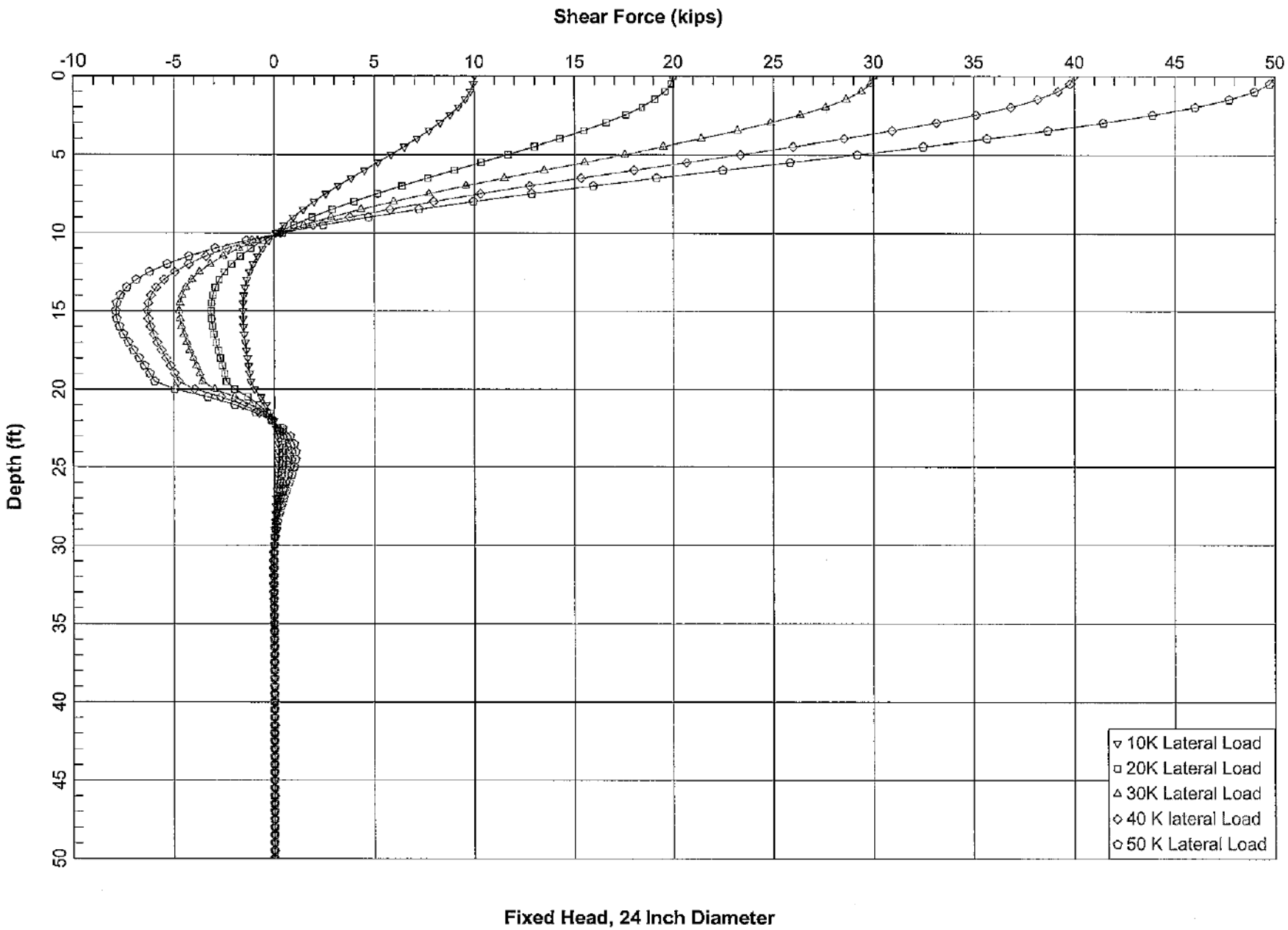
BC Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
2	V= 10000.000	S= 0.000	100000.0000	.026774	-535459.4963	10000.0000
2	V= 20000.000	S= 0.000	100000.0000	.053547	-1.071E+06	20000.0000
2	V= 30000.000	S= 0.000	100000.0000	.080321	-1.606E+06	30000.0000
2	V= 40000.000	S= 0.000	100000.0000	.1071	-2.142E+06	40000.0000
2	V= 50000.000	S= 0.000	100000.0000	.1339	-2.677E+06	50000.0000

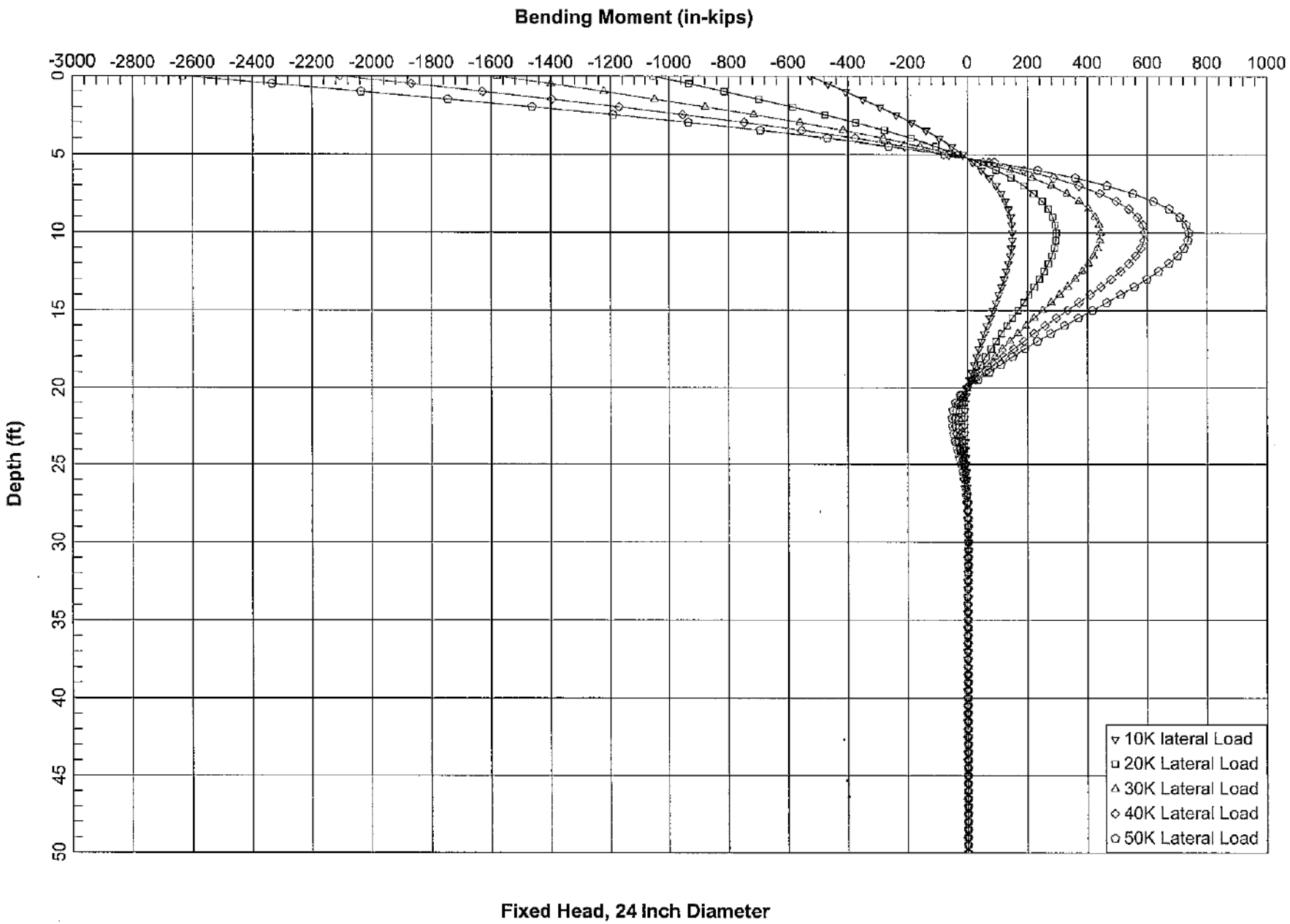
The analysis ended normally.

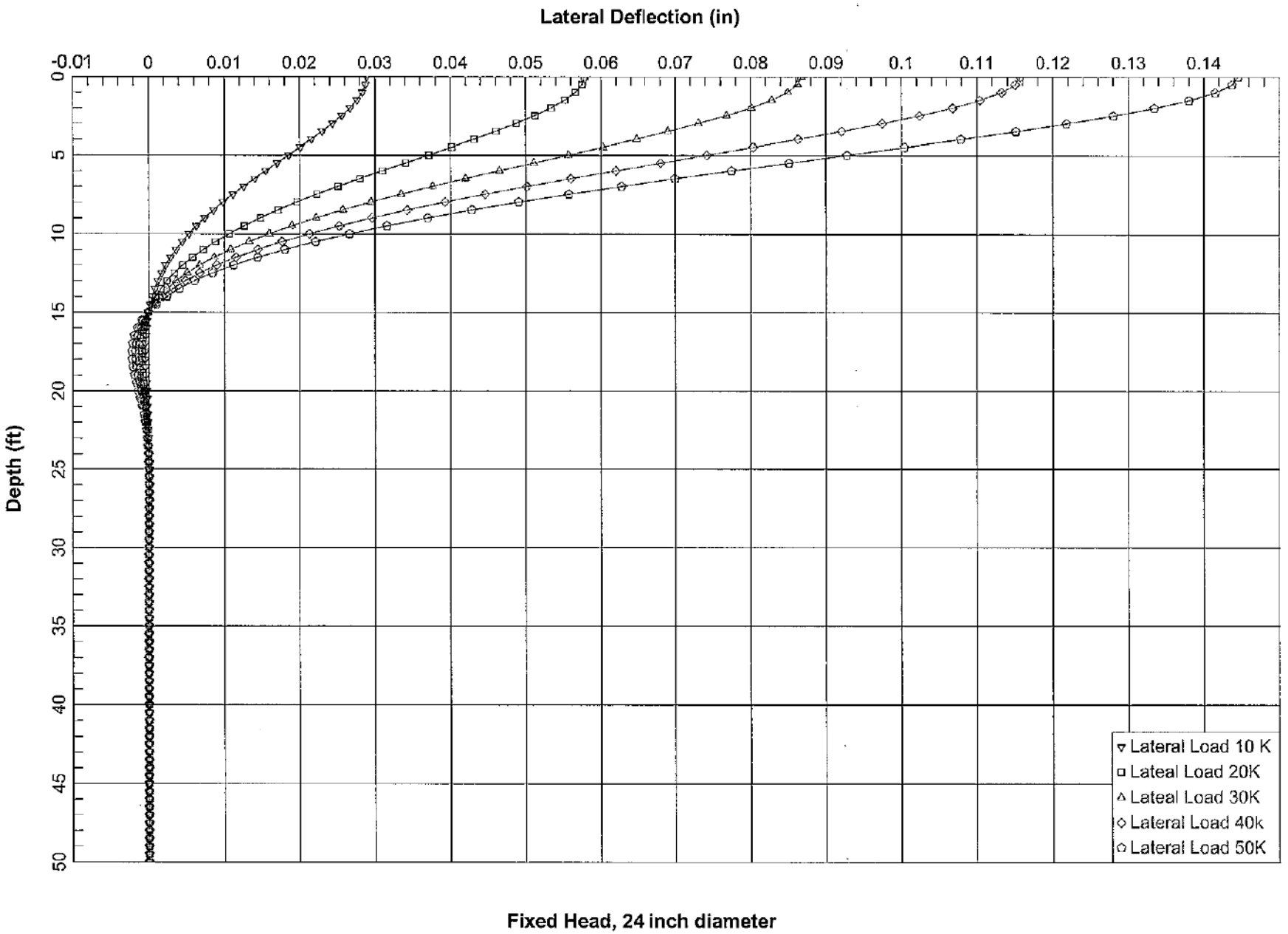


Fixed Head., 24" diam Pile

20' Alluvium over Bedrock


Shear Force (kips)
-10
-5
0
5
10
15
20
25
30
35
40
45
50
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
10K Lateral Load
20K Lateral Load
30K Lateral Load
40 K lateral Load
50 K Lateral Load
Fixed Head, 24 Inch Diameter


Bending Moment (in-kips)
-3000 -2800 -2600 -2400 -2200 -2000 -1800 -1600 -1400 -1200 -1000 -800 -600 -400 -200 0 200 400 600 800 1000
Depth (ft)
0 5 10 15 20 25 30 35 40 45 50
10K lateral Load
20K Lateral Load
30K Lateral Load
40K Lateral Load
50K Lateral Load
Fixed Head, 24 Inch Diameter


Lateral Deflection (in)
-0.01
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.1
0.11
0.12
0.13
0.14
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
Lateral Load 10 K
Lateal Load 20K
Lateal Load 30K
Lateral Load 40k
Lateral Load 50K
Fixed Head, 24 inch diameter

LPILE Plus for Windows, Version 4.0 (4.0.8)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

This program is licensed to:

Staff
Geotechnologies, Inc.

Path to file locations: F:\rktemp\Lpile files\20921 LIncoln Riboli\
Name of input data file: 20921.24.20.lpd
Name of output file: 20921.24.20.lpo
Name of plot output file: 20921.24.20.lpp
Name of runtime file: 20921.24.20.lpr

Time and Date of Analysis

Date: July 7, 2015 Time: 10:31:31

Problem Title

New Pile

Program Options

Units Used in Computations - US Customary Units, inches, pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100

- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length = 600.00 in
Depth of ground surface below top of pile = .00 in
Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point No.	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	24.000	16286.0000	452.0000	3604000.000
2	600.0000	24.000	16286.0000	452.0000	3604000.000

Soil and Rock Layering Information

The soil profile is modelled using 2 layers

Layer 1 is silt with cohesion and friction
Distance from top of pile to top of layer = .000 in
Distance from top of pile to bottom of layer = 240.000 in
p-y subgrade modulus k for top of soil layer = 100.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 100.000 lbs/in**3

Layer 2 is silt with cohesion and friction
Distance from top of pile to top of layer = 240.000 in
Distance from top of pile to bottom of layer = 720.000 in
p-y subgrade modulus k for top of soil layer = 1000.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 1000.000 lbs/in**3

(Depth of lowest layer extends 120.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth
is defined using 4 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	.00	.06650
2	240.00	.06650
3	240.00	.07230
4	720.00	.07230

Shear Strength of Soils

Distribution of shear strength parameters with depth
defined using 4 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	.000	.86800	27.00	.01000	.0
2	240.000	.86800	27.00	.01000	.0
3	240.000	3.47000	30.00	.00500	.0
4	720.000	3.47000	30.00	.00500	.0

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 5

Load Case Number 1

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Shear force at pile head = 10000.000 lbs
Slope at pile head = .000 in/in
Axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head condition)

Load Case Number 2

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Shear force at pile head = 20000.000 lbs
Slope at pile head = .000 in/in
Axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head condition)

Load Case Number 3

Pile-head boundary conditions are Shear and Slope (BC Type 2)

Shear force at pile head = 30000.000 lbs
Slope at pile head = .000 in/in
Axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head condition)

Load Case Number 4

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Shear force at pile head = 40000.000 lbs
Slope at pile head = .000 in/in
Axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head condition)

Load Case Number 5

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Shear force at pile head = 50000.000 lbs
Slope at pile head = .000 in/in
Axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head condition)

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Specified shear force at pile head = 10000.000 lbs
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res p lbs/in
0.000	.028909	-526644.0530	10000.0000	5.782E-19	609.2856	0.0000
6.000	.028748	-466627.9024	9948.2544	-5.077E-05	565.0640	-17.2485
12.000	.028300	-407204.0788	9794.6293	-9.543E-05	521.2788	-33.9598
18.000	.027602	-348977.8334	9543.6969	-1.341E-04	478.3760	-49.6843
24.000	.026691	-292518.8185	9202.4697	-1.669E-04	436.7753	-64.0581
30.000	.025600	-238347.9544	8779.8957	-1.940E-04	396.8607	-76.7999
36.000	.024363	-186927.2669	8286.3773	-2.157E-04	358.9724	-87.7062
42.000	.023011	-138652.5393	7733.3189	-2.324E-04	323.4022	-96.6466
48.000	.021574	-93848.5836	7132.7096	-2.443E-04	290.3893	-103.5566
54.000	.020080	-52766.9076	6496.7453	-2.518E-04	260.1191	-108.4315
60.000	.018553	-15585.5308	5837.4933	-2.553E-04	232.7228	-111.3191
66.000	.017017	17589.3134	5166.6013	-2.551E-04	234.1993	-112.3115
72.000	.015491	46719.8638	4495.0525	-2.519E-04	255.6635	-111.5381
78.000	.013995	71832.1781	3832.9658	-2.458E-04	274.1670	-109.1575
84.000	.012542	93010.4161	3189.4407	-2.374E-04	289.7717	-105.3508
90.000	.011146	110390.3192	2572.4455	-2.270E-04	302.5777	-100.3142
96.000	.009818	124152.1391	1988.7446	-2.150E-04	312.7179	-94.2527
102.000	.008566	134513.2457	1443.8634	-2.018E-04	320.3522	-87.3743
108.000	.007397	141720.6269	942.0866	-1.877E-04	325.6628	-79.8846
114.000	.006314	146043.4686	486.4847	-1.729E-04	328.8480	-71.9826
120.000	.005321	147765.9774	78.9669	-1.579E-04	330.1172	-63.8566

126.000	.004419	147180.5856	-279.6460	-1.429E-04	329.6859	-55.6810
132.000	.003607	144581.6491	-589.5322	-1.279E-04	327.7709	-47.6144
138.000	.002884	140259.7273	-851.7666	-1.134E-04	324.5864	-39.7971
144.000	.002247	134496.5078	-1068.2097	-9.934E-05	320.3399	-32.3506
150.000	.001692	127560.4164	-1241.3921	-8.594E-05	315.2292	-25.3768
156.000	.001215	119702.9356	-1374.3960	-7.331E-05	309.4396	-18.9578
162.000	8.12E-04	111155.6320	-1470.7383	-6.151E-05	303.1417	-13.1563
168.000	4.77E-04	102127.8835	-1534.2565	-5.060E-05	296.4897	-8.0164
174.000	2.05E-04	92805.2796	-1568.9995	-4.064E-05	289.6206	-3.5645
180.000	-1.05E-05	83348.6599	-1579.1245	-3.164E-05	282.6527	.1895
186.000	-1.75E-04	73893.7512	-1568.8022	-2.360E-05	275.6860	3.2512
192.000	-2.94E-04	64551.3541	-1542.1291	-1.652E-05	268.8023	5.6398
198.000	-3.73E-04	55408.0319	-1503.0478	-1.039E-05	262.0652	7.3873
204.000	-4.18E-04	46527.2529	-1455.2760	-5.183E-06	255.5216	8.5366
210.000	-4.35E-04	37950.9394	-1402.2426	-8.655E-07	249.2023	9.1412
216.000	-4.29E-04	29701.3808	-1347.0296	2.592E-06	243.1238	9.2631
222.000	-4.04E-04	21783.4734	-1292.3214	5.224E-06	237.2896	8.9729
228.000	-3.66E-04	14187.2557	-1240.3570	7.062E-06	231.6925	8.3485
234.000	-3.19E-04	6890.7145	-1192.8869	8.140E-06	226.3162	7.4749
240.000	-2.68E-04	-137.1547	-991.6273	8.485E-06	221.3400	59.6117
246.000	-2.18E-04	-5018.9947	-663.9219	8.221E-06	224.9371	49.6234
252.000	-1.70E-04	-8114.0829	-395.8159	7.550E-06	227.2176	39.7452
258.000	-1.27E-04	-9777.8457	-185.1160	6.636E-06	228.4435	30.4881
264.000	-9.02E-05	-10343.4381	-27.0738	5.607E-06	228.8603	22.1927
270.000	-5.97E-05	-10109.4605	84.6672	4.562E-06	228.6879	15.0544
276.000	-3.55E-05	-9332.9059	157.2812	3.568E-06	228.1157	9.1503
282.000	-1.69E-05	-8226.3675	198.1314	2.671E-06	227.3004	4.4664
288.000	-3.42E-06	-6958.5336	214.2979	1.894E-06	226.3662	.9224
294.000	5.82E-06	-5657.0666	212.2485	1.250E-06	225.4072	-1.6055
300.000	1.16E-05	-4413.0518	197.6347	7.349E-07	224.4906	-3.2657
306.000	1.46E-05	-3286.3315	175.1914	3.414E-07	223.6604	-4.2154
312.000	1.57E-05	-2311.1644	148.7178	5.527E-08	222.9419	-4.6091
318.000	1.53E-05	-1501.7843	121.1203	-1.396E-07	222.3455	-4.5900
324.000	1.40E-05	-857.5537	94.4965	-2.602E-07	221.8708	-4.2845
330.000	1.22E-05	-367.5138	70.2449	-3.228E-07	221.5097	-3.7993
336.000	1.01E-05	-14.2275	49.1852	-3.423E-07	221.2494	-3.2206
342.000	8.07E-06	223.1194	31.6804	-3.317E-07	221.4033	-2.6144
348.000	6.15E-06	366.3358	17.7515	-3.015E-07	221.5089	-2.0286
354.000	4.45E-06	436.4994	7.1797	-2.605E-07	221.5606	-1.4953
360.000	3.02E-06	452.8044	-.4060	-2.150E-07	221.5726	-1.0332
366.000	1.87E-06	431.8849	-5.4578	-1.698E-07	221.5572	-.6507
372.000	9.83E-07	387.5151	-8.4539	-1.279E-07	221.5245	-.3480
378.000	3.34E-07	330.5918	-9.8591	-9.123E-08	221.4825	-.1204
384.000	-1.12E-07	269.3151	-10.0976	-6.057E-08	221.4374	.040883
390.000	-3.93E-07	209.4936	-9.5368	-3.610E-08	221.3933	.1460
396.000	-5.45E-07	154.9164	-8.4808	-1.747E-08	221.3531	.2060
402.000	-6.02E-07	107.7448	-7.1691	-4.047E-09	221.3183	.2313
408.000	-5.93E-07	68.8920	-5.7810	4.981E-09	221.2897	.2315
414.000	-5.42E-07	38.3674	-4.4421	1.046E-08	221.2672	.2148
420.000	-4.68E-07	15.5738	-3.2334	1.322E-08	221.2504	.1881
426.000	-3.84E-07	-.4491	-2.1993	1.399E-08	221.2393	.1566
432.000	-3.00E-07	-10.8346	-1.3570	1.342E-08	221.2469	.1242
438.000	-2.23E-07	-16.7486	-.7037	1.201E-08	221.2513	.093575
444.000	-1.56E-07	-19.2929	-.2237	1.016E-08	221.2532	.066408
450.000	-1.01E-07	-19.4453	.1062	8.185E-09	221.2533	.043551
456.000	-5.77E-08	-18.0287	.3126	6.269E-09	221.2522	.025258
462.000	-2.56E-08	-15.7017	.4224	4.545E-09	221.2505	.011356
468.000	-3.12E-09	-12.9649	.4607	3.080E-09	221.2485	.001404
474.000	1.14E-08	-10.1768	.4494	1.897E-09	221.2464	-.005192
480.000	1.96E-08	-7.5749	.4065	9.899E-10	221.2445	-.009078
486.000	2.33E-08	-5.2994	.3466	3.318E-10	221.2428	-.010888
492.000	2.36E-08	-3.4156	.2804	-1.136E-10	221.2415	-.011201
498.000	2.19E-08	-1.9347	.2152	-3.871E-10	221.2404	-.010513

504.000	1.90E-08	-.8322	.1560	-5.285E-10	221.2396	-.009227
510.000	1.56E-08	-.061861	.1054	-5.742E-10	221.2390	-.007655
516.000	1.21E-08	.4329	.064338	-5.552E-10	221.2393	-.006023
522.000	8.90E-09	.7109	.032816	-4.968E-10	221.2395	-.004484
528.000	6.13E-09	.8273	.009981	-4.181E-10	221.2395	-.003128
534.000	3.88E-09	.8311	-.005407	-3.334E-10	221.2396	-.002001
540.000	2.13E-09	.7628	-.014751	-2.519E-10	221.2395	-.001113
546.000	8.55E-10	.6544	-.019446	-1.795E-10	221.2394	-4.516E-04
552.000	-2.08E-11	.5297	-.020768	-1.189E-10	221.2393	1.111E-05
558.000	-5.72E-10	.4054	-.019808	-7.115E-11	221.2392	3.089E-04
564.000	-8.75E-10	.2921	-.017448	-3.550E-11	221.2392	4.775E-04
570.000	-9.98E-10	.1960	-.014363	-1.055E-11	221.2391	5.509E-04
576.000	-1.00E-09	.1198	-.011034	5.587E-12	221.2390	5.587E-04
582.000	-9.31E-10	.063603	-.007782	1.496E-11	221.2390	5.251E-04
588.000	-8.22E-10	.026349	-.004802	1.956E-11	221.2390	4.684E-04
594.000	-6.96E-10	.005955	-.002194	2.121E-11	221.2389	4.011E-04
600.000	-5.67E-10	0.0000	0.0000	2.151E-11	221.2389	3.301E-04

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.02890907 in
Computed slope at pile head	=	5.78241E-19
Maximum bending moment	=	-526644.053 lbs-in
Maximum shear force	=	10000.000 lbs
Depth of maximum bending moment	=	0.000 in
Depth of maximum shear force	=	0.000 in
Number of iterations	=	5
Number of zero deflection points	=	5

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Specified shear force at pile head = 20000.000 lbs
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth x in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res p lbs/in
0.000	.057818	-1.053E+06	20000.0000	1.156E-18	997.3323	0.0000
6.000	.057495	-933255.8047	19896.5088	-1.015E-04	908.8890	-34.4971
12.000	.056600	-814408.1576	19589.2586	-1.909E-04	821.3186	-67.9197
18.000	.055205	-697955.6668	19087.3938	-2.682E-04	735.5130	-99.3686
24.000	.053382	-585037.6370	18404.9393	-3.337E-04	652.3117	-128.1162
30.000	.051200	-476695.9087	17559.7914	-3.880E-04	572.4824	-153.5998
36.000	.048726	-373854.5337	16572.7546	-4.315E-04	496.7059	-175.4125
42.000	.046022	-277305.0786	15466.6378	-4.648E-04	425.5654	-193.2931
48.000	.043149	-187697.1672	14265.4191	-4.885E-04	359.5397	-207.1131
54.000	.040160	-105533.8151	12993.4906	-5.035E-04	298.9993	-216.8631

60.000	.037106	-31171.0617	11674.9865	-5.105E-04	244.2067	-222.6382
66.000	.034034	35178.6268	10333.2026	-5.103E-04	247.1596	-224.6231
72.000	.030983	93439.7275	8990.1050	-5.037E-04	290.0881	-223.0761
78.000	.027989	143664.3562	7665.9315	-4.916E-04	327.0950	-218.3150
84.000	.025084	186020.8322	6378.8814	-4.748E-04	358.3045	-210.7017
90.000	.022292	220780.6385	5144.8910	-4.540E-04	383.9166	-200.6285
96.000	.019636	248304.2783	3977.4891	-4.300E-04	404.1968	-188.5055
102.000	.017132	269026.4914	2887.7268	-4.035E-04	419.4655	-174.7486
108.000	.014793	283441.2538	1884.1731	-3.753E-04	430.0867	-159.7693
114.000	.012629	292086.9372	972.9694	-3.459E-04	436.4571	-143.9653
120.000	.010643	295531.9549	157.9339	-3.159E-04	438.9955	-127.7132
126.000	.008838	294361.1712	-559.2920	-2.857E-04	438.1328	-111.3621
132.000	.007214	289163.2981	-1179.0644	-2.559E-04	434.3029	-95.2287
138.000	.005768	280519.4546	-1703.5332	-2.268E-04	427.9339	-79.5942
144.000	.004493	268993.0155	-2136.4195	-1.987E-04	419.4408	-64.7013
150.000	.003384	255120.8329	-2482.7842	-1.719E-04	409.2194	-50.7537
156.000	.002430	239405.8711	-2748.7919	-1.466E-04	397.6402	-37.9156
162.000	.001624	222311.2639	-2941.4766	-1.230E-04	385.0444	-26.3126
168.000	9.54E-04	204255.7671	-3068.5131	-1.012E-04	371.7405	-16.0329
174.000	4.10E-04	185610.5591	-3137.9989	-8.128E-05	358.0022	-7.1291
180.000	-2.11E-05	166697.3197	-3158.2490	-6.328E-05	344.0664	.3791
186.000	-3.50E-04	147787.5023	-3137.6045	-4.720E-05	330.1331	6.5024
192.000	-5.87E-04	129102.7082	-3084.2582	-3.305E-05	316.3656	11.2797
198.000	-7.46E-04	110816.0638	-3006.0955	-2.079E-05	302.8914	14.7745
204.000	-8.37E-04	93054.5059	-2910.5521	-1.037E-05	289.8042	17.0733
210.000	-8.71E-04	75901.8788	-2804.4851	-1.731E-06	277.1657	18.2824
216.000	-8.58E-04	59402.7615	-2694.0592	5.185E-06	265.0086	18.5263
222.000	-8.08E-04	43566.9467	-2584.6428	1.045E-05	253.3403	17.9459
228.000	-7.32E-04	28374.5113	-2480.7140	1.412E-05	242.1461	16.6970
234.000	-6.39E-04	13781.4289	-2385.7738	1.628E-05	231.3935	14.9497
240.000	-5.37E-04	-274.3094	-1983.2545	1.697E-05	221.4411	119.2234
246.000	-4.35E-04	-10037.9893	-1327.8438	1.644E-05	228.6352	99.2469
252.000	-3.40E-04	-16228.1657	-791.6318	1.510E-05	233.1963	79.4904
258.000	-2.54E-04	-19555.6913	-370.2321	1.327E-05	235.6481	60.9761
264.000	-1.80E-04	-20686.8763	-54.1477	1.121E-05	236.4816	44.3853
270.000	-1.19E-04	-20218.9209	169.3344	9.124E-06	236.1368	30.1087
276.000	-7.09E-05	-18665.8119	314.5624	7.136E-06	234.9925	18.3006
282.000	-3.38E-05	-16452.7350	396.2628	5.341E-06	233.3618	8.9328
288.000	-6.83E-06	-13917.0673	428.5957	3.789E-06	231.4934	1.8448
294.000	1.16E-05	-11314.1331	424.4969	2.499E-06	229.5755	-3.2111
300.000	2.32E-05	-8826.1035	395.2695	1.470E-06	227.7423	-6.5314
306.000	2.93E-05	-6572.6630	350.3828	6.827E-07	226.0819	-8.4308
312.000	3.14E-05	-4622.3288	297.4356	1.105E-07	224.6448	-9.2183
318.000	3.06E-05	-3003.5687	242.2405	-2.792E-07	223.4521	-9.1801
324.000	2.80E-05	-1715.1073	188.9931	-5.204E-07	222.5027	-8.5691
330.000	2.44E-05	-735.0276	140.4898	-6.456E-07	221.7805	-7.5987
336.000	2.03E-05	-28.4551	98.3704	-6.847E-07	221.2599	-6.4411
342.000	1.61E-05	446.2389	63.3609	-6.633E-07	221.5677	-5.2287
348.000	1.23E-05	732.6716	35.5030	-6.030E-07	221.7788	-4.0572
354.000	8.90E-06	872.9988	14.3593	-5.210E-07	221.8822	-2.9907
360.000	6.04E-06	905.6088	-.8121	-4.301E-07	221.9062	-2.0665
366.000	3.74E-06	863.7698	-10.9155	-3.396E-07	221.8754	-1.3013
372.000	1.97E-06	775.0302	-16.9078	-2.559E-07	221.8100	-.6961
378.000	6.69E-07	661.1836	-19.7183	-1.825E-07	221.7261	-.2407
384.000	-2.23E-07	538.6301	-20.1952	-1.211E-07	221.6358	.081766
390.000	-7.85E-07	418.9871	-19.0737	-7.220E-08	221.5477	.2921
396.000	-1.09E-06	309.8327	-16.9616	-3.494E-08	221.4672	.4120
402.000	-1.20E-06	215.4896	-14.3382	-8.095E-09	221.3977	.4625
408.000	-1.19E-06	137.7840	-11.5619	9.962E-09	221.3405	.4629
414.000	-1.08E-06	76.7348	-8.8843	2.093E-08	221.2955	.4296
420.000	-9.36E-07	31.1477	-6.4668	2.644E-08	221.2619	.3762
426.000	-7.68E-07	-.8982	-4.3986	2.799E-08	221.2396	.3132
432.000	-6.00E-07	-21.6693	-2.7139	2.683E-08	221.2549	.2484

438.000	-4.46E-07	-33.4973	-1.4073	2.401E-08	221.2636	.1871
444.000	-3.12E-07	-38.5858	-.4474	2.033E-08	221.2674	.1328
450.000	-2.02E-07	-38.8906	.2123	1.637E-08	221.2676	.087102
456.000	-1.15E-07	-36.0574	.6252	1.254E-08	221.2655	.050515
462.000	-5.12E-08	-31.4034	.8449	9.090E-09	221.2621	.022712
468.000	-6.24E-09	-25.9298	.9214	6.160E-09	221.2580	.002807
474.000	2.28E-08	-20.3536	.8987	3.794E-09	221.2539	-.010384
480.000	3.93E-08	-15.1499	.8131	1.980E-09	221.2501	-.018155
486.000	4.65E-08	-10.5989	.6933	6.637E-10	221.2467	-.021776
492.000	4.73E-08	-6.8312	.5608	-2.272E-10	221.2440	-.022402
498.000	4.38E-08	-3.8695	.4305	-7.741E-10	221.2418	-.021026
504.000	3.80E-08	-1.6645	.3120	-1.057E-09	221.2402	-.018454
510.000	3.11E-08	-.1237	.2107	-1.148E-09	221.2390	-.015310
516.000	2.42E-08	.8659	.1287	-1.110E-09	221.2396	-.012047
522.000	1.78E-08	1.4217	.065633	-9.935E-10	221.2400	-.008967
528.000	1.23E-08	1.6546	.019962	-8.363E-10	221.2402	-.006256
534.000	7.76E-09	1.6623	-.010814	-6.667E-10	221.2402	-.004002
540.000	4.27E-09	1.5257	-.029502	-5.038E-10	221.2401	-.002227
546.000	1.71E-09	1.3088	-.038892	-3.589E-10	221.2399	-9.032E-04
552.000	-4.16E-11	1.0594	-.041535	-2.379E-10	221.2397	2.221E-05
558.000	-1.14E-09	.8107	-.039615	-1.423E-10	221.2395	6.178E-04
564.000	-1.75E-09	.5842	-.034896	-7.100E-11	221.2394	9.551E-04
570.000	-2.00E-09	.3920	-.028726	-2.110E-11	221.2392	.001102
576.000	-2.00E-09	.2395	-.022068	1.117E-11	221.2391	.001117
582.000	-1.86E-09	.1272	-.015565	2.992E-11	221.2390	.001050
588.000	-1.64E-09	.052698	-.009604	3.911E-11	221.2390	9.368E-04
594.000	-1.39E-09	.011911	-.004387	4.242E-11	221.2389	8.022E-04
600.000	-1.13E-09	0.0000	0.0000	4.302E-11	221.2389	6.603E-04

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

Pile-head deflection	=	.05781814	in
Computed slope at pile head	=	1.15648E-18	
Maximum bending moment	=	-1053288.106	lbs-in
Maximum shear force	=	20000.000	lbs
Depth of maximum bending moment	=	0.000	in
Depth of maximum shear force	=	0.000	in
Number of iterations	=	5	
Number of zero deflection points	=	5	

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 3

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Specified shear force at pile head = 30000.000 lbs
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res p lbs/in

0.000	.086727	-1.580E+06	30000.0000	5.782E-18	1385.3791	0.0000
6.000	.086243	-1.400E+06	29844.7632	-1.523E-04	1252.7141	-51.7456
12.000	.084900	-1.222E+06	29383.8879	-2.863E-04	1121.3585	-101.8795
18.000	.082807	-1.047E+06	28631.0907	-4.022E-04	992.6501	-149.0529
24.000	.080073	-877556.4556	27607.4090	-5.006E-04	867.8481	-192.1743
30.000	.076800	-715043.8631	26339.6871	-5.820E-04	748.1041	-230.3996
36.000	.073089	-560781.8006	24859.1319	-6.472E-04	634.4393	-263.1187
42.000	.069033	-415957.6178	23199.9567	-6.971E-04	527.7286	-289.9397
48.000	.064723	-281545.7507	21398.1287	-7.328E-04	428.6901	-310.6697
54.000	.060240	-158300.7227	19490.2358	-7.553E-04	337.8795	-325.2946
60.000	.055660	-46756.5925	17512.4798	-7.658E-04	255.6906	-333.9574
66.000	.051051	52767.9403	15499.8039	-7.654E-04	260.1199	-336.9346
72.000	.046474	140159.5913	13485.1575	-7.556E-04	324.5126	-334.6142
78.000	.041984	215496.5343	11498.8973	-7.374E-04	380.0231	-327.4725
84.000	.037625	279031.2483	9568.3221	-7.121E-04	426.8373	-316.0525
90.000	.033438	331170.9577	7717.3364	-6.809E-04	465.2554	-300.9427
96.000	.029454	372456.4174	5966.2337	-6.450E-04	495.6757	-282.7582
102.000	.025698	403539.7371	4331.5903	-6.053E-04	518.5788	-262.1229
108.000	.022190	425161.8807	2826.2597	-5.630E-04	534.5106	-239.6539
114.000	.018943	438130.4058	1459.4541	-5.188E-04	544.0662	-215.9479
120.000	.015964	443297.9323	236.9008	-4.738E-04	547.8738	-191.5698
126.000	.013257	441541.7568	-838.9379	-4.286E-04	546.5798	-167.0431
132.000	.010821	433744.9472	-1768.5967	-3.838E-04	540.8349	-142.8431
138.000	.008652	420779.1819	-2555.2998	-3.401E-04	531.2813	-119.3913
144.000	.006740	403489.5233	-3204.6292	-2.980E-04	518.5418	-97.0519
150.000	.005075	382681.2493	-3724.1762	-2.578E-04	503.2096	-76.1305
156.000	.003646	359108.8067	-4123.1879	-2.199E-04	485.8408	-56.8734
162.000	.002436	333466.8959	-4412.2149	-1.845E-04	466.9471	-39.4689
168.000	.001432	306383.6506	-4602.7696	-1.518E-04	446.9914	-24.0493
174.000	6.15E-04	278415.8387	-4706.9984	-1.219E-04	426.3839	-10.6936
180.000	-3.16E-05	250045.9796	-4737.3735	-9.491E-05	405.4801	.5686
186.000	-5.24E-04	221681.2535	-4706.4067	-7.080E-05	384.5802	9.7537
192.000	-8.81E-04	193654.0623	-4626.3873	-4.957E-05	363.9289	16.9195
198.000	-.001119	166224.0958	-4509.1433	-3.118E-05	343.7177	22.1618
204.000	-.001255	139581.7588	-4365.8281	-1.555E-05	324.0869	25.6099
210.000	-.001306	113852.8182	-4206.7277	-2.597E-06	305.1290	27.4235
216.000	-.001287	89104.1423	-4041.0888	7.777E-06	286.8935	27.7894
222.000	-.001213	65350.4201	-3876.9641	1.567E-05	269.3910	26.9188
228.000	-.001098	42561.7670	-3721.0710	2.119E-05	252.5997	25.0456
234.000	-9.58E-04	20672.1434	-3578.6607	2.442E-05	236.4708	22.4246
240.000	-8.05E-04	-411.4641	-2974.8818	2.545E-05	221.5421	178.8351
246.000	-6.53E-04	-15056.9840	-1991.7656	2.466E-05	232.3334	148.8703
252.000	-5.09E-04	-24342.2486	-1187.4477	2.265E-05	239.1750	119.2356
258.000	-3.81E-04	-29333.5370	-555.3481	1.991E-05	242.8527	91.4642
264.000	-2.71E-04	-31030.3144	-81.2215	1.682E-05	244.1030	66.5780
270.000	-1.79E-04	-30328.3814	254.0016	1.369E-05	243.5858	45.1631
276.000	-1.06E-04	-27998.7178	471.8437	1.070E-05	241.8692	27.4510
282.000	-5.07E-05	-24679.1024	594.3942	8.012E-06	239.4232	13.3992
288.000	-1.02E-05	-20875.6009	642.8936	5.683E-06	236.6207	2.7672
294.000	1.74E-05	-16971.1997	636.7454	3.749E-06	233.7438	-4.8166
300.000	3.47E-05	-13239.1553	592.9042	2.205E-06	230.9939	-9.7971
306.000	4.39E-05	-9858.9944	525.5743	1.024E-06	228.5033	-12.6462
312.000	4.70E-05	-6933.4931	446.1534	1.658E-07	226.3477	-13.8274
318.000	4.59E-05	-4505.3530	363.3608	-4.188E-07	224.5586	-13.7701
324.000	4.20E-05	-2572.6610	283.4896	-7.806E-07	223.1345	-12.8536
330.000	3.65E-05	-1102.5414	210.7347	-9.685E-07	222.0513	-11.3980
336.000	3.04E-05	-42.6826	147.5556	-1.027E-06	221.2704	-9.6617
342.000	2.42E-05	669.3583	95.0413	-9.950E-07	221.7321	-7.8431
348.000	1.84E-05	1099.0075	53.2545	-9.046E-07	222.0487	-6.0859
354.000	1.34E-05	1309.4981	21.5390	-7.815E-07	222.2038	-4.4860
360.000	9.06E-06	1358.4131	-1.2181	-6.451E-07	222.2399	-3.0997
366.000	5.61E-06	1295.6547	-16.3733	-5.095E-07	222.1936	-1.9520

372.000	2.95E-06	1162.5453	-25.3617	-3.838E-07	222.0955	-1.0441
378.000	1.00E-06	991.7754	-29.5774	-2.737E-07	221.9697	-.3611
384.000	-3.35E-07	807.9452	-30.2927	-1.817E-07	221.8343	.1226
390.000	-1.18E-06	628.4807	-28.6105	-1.083E-07	221.7020	.4381
396.000	-1.63E-06	464.7491	-25.4424	-5.242E-08	221.5814	.6179
402.000	-1.81E-06	323.2344	-21.5073	-1.214E-08	221.4771	.6938
408.000	-1.78E-06	206.6760	-17.3429	1.494E-08	221.3912	.6944
414.000	-1.63E-06	115.1023	-13.3264	3.139E-08	221.3237	.6444
420.000	-1.40E-06	46.7215	-9.7002	3.966E-08	221.2734	.5643
426.000	-1.15E-06	-1.3473	-6.5979	4.198E-08	221.2399	.4698
432.000	-9.00E-07	-32.5039	-4.0709	4.025E-08	221.2629	.3726
438.000	-6.68E-07	-50.2459	-2.1110	3.602E-08	221.2760	.2807
444.000	-4.68E-07	-57.8787	-.6711	3.049E-08	221.2816	.1992
450.000	-3.02E-07	-58.3360	.3185	2.455E-08	221.2819	.1307
456.000	-1.73E-07	-54.0861	.9378	1.881E-08	221.2788	.075773
462.000	-7.67E-08	-47.1051	1.2673	1.364E-08	221.2736	.034068
468.000	-9.36E-09	-38.8947	1.3822	9.240E-09	221.2676	.004211
474.000	3.42E-08	-30.5304	1.3481	5.692E-09	221.2614	-.015576
480.000	5.89E-08	-22.7248	1.2196	2.970E-09	221.2557	-.027233
486.000	6.98E-08	-15.8983	1.0399	9.955E-10	221.2507	-.032664
492.000	7.09E-08	-10.2467	.8411	-3.408E-10	221.2465	-.033603
498.000	6.57E-08	-5.8042	.6457	-1.161E-09	221.2432	-.031538
504.000	5.70E-08	-2.4967	.4681	-1.585E-09	221.2408	-.027681
510.000	4.67E-08	-.1856	.3161	-1.723E-09	221.2391	-.022966
516.000	3.63E-08	1.2988	.1930	-1.666E-09	221.2399	-.018070
522.000	2.67E-08	2.1326	.098449	-1.490E-09	221.2405	-.013451
528.000	1.84E-08	2.4820	.029943	-1.254E-09	221.2408	-.009384
534.000	1.16E-08	2.4934	-.016222	-1.000E-09	221.2408	-.006004
540.000	6.40E-09	2.2885	-.044253	-7.557E-10	221.2406	-.003340
546.000	2.57E-09	1.9633	-.058338	-5.384E-10	221.2404	-.001355
552.000	-6.24E-11	1.5891	-.062303	-3.568E-10	221.2401	3.332E-05
558.000	-1.72E-09	1.2161	-.059423	-2.134E-10	221.2398	9.267E-04
564.000	-2.62E-09	.8763	-.052345	-1.065E-10	221.2396	.001433
570.000	-2.99E-09	.5880	-.043088	-3.166E-11	221.2394	.001653
576.000	-3.00E-09	.3593	-.033102	1.676E-11	221.2392	.001676
582.000	-2.79E-09	.1908	-.023347	4.488E-11	221.2391	.001575
588.000	-2.47E-09	.079047	-.014406	5.867E-11	221.2390	.001405
594.000	-2.09E-09	.017866	-.006581	6.362E-11	221.2390	.001203
600.000	-1.70E-09	0.0000	0.0000	6.454E-11	221.2389	9.904E-04

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 3:

Pile-head deflection	=	.08672721 in
Computed slope at pile head	=	5.7824lE-18
Maximum bending moment	=	-1579932.159 lbs-in
Maximum shear force	=	30000.000 lbs
Depth of maximum bending moment	=	0.000 in
Depth of maximum shear force	=	0.000 in
Number of iterations	=	5
Number of zero deflection points	=	5

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 4

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Specified shear force at pile head = 40000.000 lbs
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res p lbs/in
0.000	.115636	-2.107E+06	40000.0000	2.313E-18	1773.4258	0.0000
6.000	.114990	-1.867E+06	39793.0175	-2.031E-04	1596.5392	-68.9942
12.000	.113199	-1.629E+06	39178.5172	-3.817E-04	1421.3983	-135.8393
18.000	.110410	-1.396E+06	38174.7876	-5.363E-04	1249.7871	-198.7372
24.000	.106764	-1.170E+06	36809.8786	-6.675E-04	1083.3845	-256.2325
30.000	.102400	-953391.8175	35119.5827	-7.760E-04	923.7258	-307.1995
36.000	.097451	-747709.0674	33145.5092	-8.630E-04	772.1728	-350.8250
42.000	.092044	-554610.1571	30933.2756	-9.295E-04	629.8919	-386.5862
48.000	.086297	-375394.3343	28530.8383	-9.771E-04	497.8404	-414.2262
54.000	.080320	-211067.6302	25986.9811	-.001007	376.7597	-433.7262
60.000	.074213	-62342.1233	23349.9731	-.001021	267.1744	-445.2765
66.000	.068068	70357.2537	20666.4052	-.001021	273.0802	-449.2461
72.000	.061966	186879.4550	17980.2101	-.001007	358.9372	-446.1523
78.000	.055978	287328.7124	15331.8630	-9.832E-04	432.9511	-436.6301
84.000	.050167	372041.6644	12757.7628	-9.495E-04	495.3701	-421.4033
90.000	.044584	441561.2770	10289.7819	-9.079E-04	546.5942	-401.2569
96.000	.039272	496608.5566	7954.9782	-8.600E-04	587.1546	-377.0110
102.000	.034264	538052.9828	5775.4537	-8.071E-04	617.6921	-349.4972
108.000	.029587	566882.5076	3768.3463	-7.506E-04	638.9345	-319.5386
114.000	.025257	584173.8744	1945.9387	-6.918E-04	651.6753	-287.9306
120.000	.021286	591063.9097	315.8678	-6.317E-04	656.7521	-255.4264
126.000	.017677	588722.3424	-1118.5839	-5.714E-04	655.0267	-222.7242
132.000	.014429	578326.5963	-2358.1289	-5.118E-04	647.3668	-190.4575
138.000	.011535	561038.9092	-3407.0664	-4.535E-04	634.6288	-159.1883
144.000	.008986	537986.0311	-4272.8389	-3.974E-04	617.6427	-129.4025
150.000	.006767	510241.6657	-4965.5683	-3.438E-04	597.1999	-101.5073
156.000	.004861	478811.7422	-5497.5838	-2.932E-04	574.0414	-75.8312
162.000	.003248	444622.5278	-5882.9532	-2.460E-04	548.8498	-52.6252
168.000	.001909	408511.5341	-6137.0261	-2.024E-04	522.2422	-32.0657
174.000	8.19E-04	371221.1182	-6275.9978	-1.626E-04	494.7655	-14.2582
180.000	-4.21E-05	333394.6394	-6316.4980	-1.266E-04	466.8938	.7581
186.000	-6.99E-04	295575.0047	-6275.2090	-9.440E-05	439.0272	13.0049
192.000	-.001175	258205.4164	-6168.5163	-6.610E-05	411.4922	22.5593
198.000	-.001492	221632.1277	-6012.1911	-4.157E-05	384.5440	29.5491
204.000	-.001674	186109.0118	-5821.1042	-2.073E-05	358.3695	34.1466
210.000	-.001741	151803.7576	-5608.9703	-3.462E-06	333.0924	36.5647
216.000	-.001715	118805.5231	-5388.1184	1.037E-05	308.7783	37.0526
222.000	-.001617	87133.8935	-5169.2855	2.090E-05	285.4417	35.8918
228.000	-.001465	56749.0227	-4961.4280	2.825E-05	263.0533	33.3941
234.000	-.001278	27562.8578	-4771.5476	3.256E-05	241.5481	29.8994
240.000	-.001074	-548.6188	-3966.5091	3.394E-05	221.6432	238.4468
246.000	-8.70E-04	-20075.9786	-2655.6875	3.289E-05	236.0315	198.4938
252.000	-6.79E-04	-32456.3314	-1583.2636	3.020E-05	245.1537	158.9809
258.000	-5.08E-04	-39111.3827	-740.4642	2.654E-05	250.0573	121.9523
264.000	-3.61E-04	-41373.7526	-108.2954	2.243E-05	251.7243	88.7706
270.000	-2.39E-04	-40437.8418	338.6688	1.825E-05	251.0347	60.2174
276.000	-1.42E-04	-37331.6238	629.1249	1.427E-05	248.7460	36.6013
282.000	-6.77E-05	-32905.4699	792.5256	1.068E-05	245.4846	17.8656
288.000	-1.37E-05	-27834.1346	857.1914	7.578E-06	241.7479	3.6896
294.000	2.33E-05	-22628.2663	848.9938	4.998E-06	237.9121	-6.4221
300.000	4.63E-05	-17652.2070	790.5390	2.940E-06	234.2456	-13.0628

306.000	5.85E-05	-13145.3259	700.7657	1.365E-06	230.9248	-16.8616
312.000	6.27E-05	-9244.6575	594.8712	2.211E-07	228.0507	-18.4365
318.000	6.12E-05	-6007.1373	484.4811	-5.584E-07	225.6652	-18.3602
324.000	5.60E-05	-3430.2146	377.9861	-1.041E-06	223.7664	-17.1382
330.000	4.87E-05	-1470.0551	280.9796	-1.291E-06	222.3221	-15.1974
336.000	4.05E-05	-56.9101	196.7408	-1.369E-06	221.2809	-12.8822
342.000	3.23E-05	892.4777	126.7218	-1.327E-06	221.8965	-10.4574
348.000	2.46E-05	1465.3433	71.0060	-1.206E-06	222.3186	-8.1145
354.000	1.78E-05	1745.9975	28.7187	-1.042E-06	222.5254	-5.9813
360.000	1.21E-05	1811.2175	-1.6242	-8.601E-07	222.5735	-4.1330
366.000	7.48E-06	1727.5396	-21.8310	-6.793E-07	222.5118	-2.6027
372.000	3.93E-06	1550.0604	-33.8155	-5.117E-07	222.3811	-1.3922
378.000	1.34E-06	1322.3672	-39.4365	-3.649E-07	222.2133	-.4815
384.000	-4.47E-07	1077.2602	-40.3903	-2.423E-07	222.0327	.1635
390.000	-1.57E-06	837.9743	-38.1473	-1.444E-07	221.8564	.5841
396.000	-2.18E-06	619.6655	-33.9232	-6.989E-08	221.6955	.8239
402.000	-2.41E-06	430.9792	-28.6764	-1.619E-08	221.5565	.9250
408.000	-2.37E-06	275.5680	-23.1238	1.992E-08	221.4420	.9258
414.000	-2.17E-06	153.4697	-17.7685	4.185E-08	221.3520	.8593
420.000	-1.87E-06	62.2953	-12.9335	5.288E-08	221.2848	.7524
426.000	-1.54E-06	-1.7964	-8.7972	5.597E-08	221.2403	.6264
432.000	-1.20E-06	-43.3385	-5.4278	5.367E-08	221.2709	.4968
438.000	-8.91E-07	-66.9945	-2.8146	4.803E-08	221.2883	.3743
444.000	-6.24E-07	-77.1716	-.8948	4.066E-08	221.2958	.2656
450.000	-4.03E-07	-77.7813	.4247	3.274E-08	221.2962	.1742
456.000	-2.31E-07	-72.1148	1.2504	2.508E-08	221.2921	.1010
462.000	-1.02E-07	-62.8068	1.6897	1.818E-08	221.2852	.045425
468.000	-1.25E-08	-51.8596	1.8429	1.232E-08	221.2771	.005615
474.000	4.55E-08	-40.7071	1.7974	7.589E-09	221.2689	-.020767
480.000	7.86E-08	-30.2998	1.6262	3.960E-09	221.2613	-.036310
486.000	9.31E-08	-21.1978	1.3866	1.327E-09	221.2546	-.043552
492.000	9.45E-08	-13.6623	1.1215	-4.544E-10	221.2490	-.044804
498.000	8.76E-08	-7.7389	.8610	-1.548E-09	221.2446	-.042051
504.000	7.59E-08	-3.3289	.6241	-2.114E-09	221.2414	-.036908
510.000	6.22E-08	-.2474	.4215	-2.297E-09	221.2391	-.030621
516.000	4.84E-08	1.7317	.2574	-2.221E-09	221.2402	-.024093
522.000	3.56E-08	2.8434	.1313	-1.987E-09	221.2410	-.017935
528.000	2.45E-08	3.3093	.039923	-1.673E-09	221.2414	-.012513
534.000	1.55E-08	3.3245	-.021629	-1.333E-09	221.2414	-.008005
540.000	8.53E-09	3.0514	-.059004	-1.008E-09	221.2412	-.004453
546.000	3.42E-09	2.6177	-.077784	-7.179E-10	221.2409	-.001806
552.000	-8.32E-11	2.1188	-.083070	-4.758E-10	221.2405	4.442E-05
558.000	-2.29E-09	1.6214	-.079230	-2.846E-10	221.2401	.001236
564.000	-3.50E-09	1.1684	-.069793	-1.420E-10	221.2398	.001910
570.000	-3.99E-09	.7841	-.057451	-4.221E-11	221.2395	.002204
576.000	-4.00E-09	.4790	-.044135	2.235E-11	221.2393	.002235
582.000	-3.72E-09	.2544	-.031130	5.984E-11	221.2391	.002100
588.000	-3.29E-09	.1054	-.019208	7.823E-11	221.2390	.001874
594.000	-2.79E-09	.023821	-.008774	8.483E-11	221.2390	.001604
600.000	-2.27E-09	0.0000	0.0000	8.605E-11	221.2389	.001321

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

Pile-head deflection = .11563628 in
Computed slope at pile head = 2.31296E-18
Maximum bending moment = -2106576.212 lbs-in
Maximum shear force = 40000.000 lbs
Depth of maximum bending moment = 0.000 in

Depth of maximum shear force = 0.000 in
Number of iterations = 5
Number of zero deflection points = 5

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 5

Pile-head boundary conditions are Shear and Slope (BC Type 2)
Specified shear force at pile head = 50000.000 lbs
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 100000.000 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res p lbs/in
0.000	.144545	-2.633E+06	50000.0000	9.252E-18	2161.4725	0.0000
6.000	.143738	-2.333E+06	49741.2719	-2.538E-04	1940.3642	-86.2427
12.000	.141499	-2.036E+06	48973.1465	-4.772E-04	1721.4382	-169.7991
18.000	.138012	-1.745E+06	47718.4845	-6.704E-04	1506.9242	-248.4215
24.000	.133454	-1.463E+06	46012.3483	-8.343E-04	1298.9209	-320.2906
30.000	.128000	-1.192E+06	43899.4784	-9.700E-04	1099.3476	-383.9994
36.000	.121814	-934636.3343	41431.8866	-.001079	909.9063	-438.5312
42.000	.115055	-693262.6964	38666.5945	-.001162	732.0551	-483.2328
48.000	.107871	-469242.9179	35663.5479	-.001221	566.9908	-517.7828
54.000	.100400	-263834.5378	32483.7264	-.001259	415.6399	-542.1577
60.000	.092766	-77927.6542	29187.4663	-.001276	278.6583	-556.5956
66.000	.085084	87946.5671	25833.0065	-.001276	286.0405	-561.5577
72.000	.077457	233599.3188	22475.2626	-.001259	393.3617	-557.6903
78.000	.069973	359160.8905	19164.8288	-.001229	485.8792	-545.7876
84.000	.062709	465052.0805	15947.2035	-.001187	563.9029	-526.7542
90.000	.055730	551951.5962	12862.2274	-.001135	627.9330	-501.5712
96.000	.049090	620760.6957	9943.7228	-.001075	678.6335	-471.2637
102.000	.042831	672566.2285	7219.3171	-.001009	716.8054	-436.8715
108.000	.036984	708603.1346	4710.4328	-9.383E-04	743.3584	-399.4232
114.000	.031571	730217.3429	2432.4234	-8.647E-04	759.2844	-359.9132
120.000	.026607	738829.8872	394.8347	-7.896E-04	765.6304	-319.2830
126.000	.022096	735902.9280	-1398.2299	-7.143E-04	763.4737	-278.4052
132.000	.018036	722908.2453	-2947.6611	-6.397E-04	753.8988	-238.0719
138.000	.014419	701298.6365	-4258.8330	-5.669E-04	737.9762	-198.9854
144.000	.011233	672482.5389	-5341.0486	-4.967E-04	716.7437	-161.7531
150.000	.008459	637802.0822	-6206.9604	-4.297E-04	691.1901	-126.8841
156.000	.006076	598514.6778	-6871.9798	-3.665E-04	662.2420	-94.7890
162.000	.004061	555778.1598	-7353.6915	-3.075E-04	630.7525	-65.7816
168.000	.002386	510639.4176	-7671.2826	-2.530E-04	597.4930	-40.0822
174.000	.001024	464026.3978	-7844.9973	-2.032E-04	563.1471	-17.8227
180.000	-5.26E-05	416743.2993	-7895.6225	-1.582E-04	528.3076	.9477
186.000	-8.74E-04	369468.7559	-7844.0112	-1.180E-04	493.4743	16.2561
192.000	-.001469	322756.7704	-7710.6454	-8.262E-05	459.0555	28.1992
198.000	-.001865	277040.1596	-7515.2389	-5.197E-05	425.3702	36.9363
204.000	-.002092	232636.2647	-7276.3802	-2.592E-05	392.6521	42.6832
210.000	-.002176	189754.6971	-7011.2128	-4.328E-06	361.0557	45.7059
216.000	-.002144	148506.9038	-6735.1480	1.296E-05	330.6632	46.3157
222.000	-.002021	108917.3668	-6461.6069	2.612E-05	301.4924	44.8647
228.000	-.001831	70936.2783	-6201.7850	3.531E-05	273.5069	41.7426
234.000	-.001597	34453.5723	-5964.4345	4.070E-05	246.6253	37.3743

240.000	-.001342	-685.7735	-4958.1364	4.242E-05	221.7442	298.0584
246.000	-.001088	-25094.9733	-3319.6094	4.111E-05	239.7296	248.1172
252.000	-8.49E-04	-40570.4143	-1979.0795	3.775E-05	251.1324	198.7261
258.000	-6.35E-04	-48889.2283	-925.5802	3.318E-05	257.2619	152.4404
264.000	-4.51E-04	-51717.1907	-135.3692	2.804E-05	259.3457	110.9633
270.000	-2.99E-04	-50547.3023	423.3360	2.281E-05	258.4837	75.2718
276.000	-1.77E-04	-46664.5297	786.4061	1.784E-05	255.6227	45.7516
282.000	-8.46E-05	-41131.8374	990.6571	1.335E-05	251.5461	22.3321
288.000	-1.71E-05	-34792.6682	1071.4893	9.472E-06	246.8752	4.6120
294.000	2.91E-05	-28285.3328	1061.2423	6.248E-06	242.0804	-8.0277
300.000	5.79E-05	-22065.2588	988.1737	3.675E-06	237.4973	-16.3285
306.000	7.32E-05	-16431.6574	875.9571	1.707E-06	233.3463	-21.0770
312.000	7.84E-05	-11555.8219	743.5889	2.764E-07	229.7536	-23.0457
318.000	7.65E-05	-7508.9217	605.6013	-6.981E-07	226.7717	-22.9502
324.000	7.00E-05	-4287.7683	472.4826	-1.301E-06	224.3983	-21.4227
330.000	6.09E-05	-1837.5689	351.2245	-1.614E-06	222.5929	-18.9967
336.000	5.06E-05	-71.1377	245.9260	-1.712E-06	221.2914	-16.1028
342.000	4.03E-05	1115.5972	158.4022	-1.658E-06	222.0609	-13.0718
348.000	3.07E-05	1831.6791	88.7575	-1.508E-06	222.5886	-10.1431
354.000	2.23E-05	2182.4969	35.8983	-1.302E-06	222.8471	-7.4766
360.000	1.51E-05	2264.0219	-2.0302	-1.075E-06	222.9071	-5.1662
366.000	9.35E-06	2159.4245	-27.2888	-8.491E-07	222.8301	-3.2533
372.000	4.92E-06	1937.5754	-42.2694	-6.397E-07	222.6666	-1.7402
378.000	1.67E-06	1652.9590	-49.2956	-4.562E-07	222.4569	-.6018
384.000	-5.58E-07	1346.5753	-50.4879	-3.029E-07	222.2311	.2044
390.000	-1.96E-06	1047.4679	-47.6842	-1.805E-07	222.0107	.7302
396.000	-2.72E-06	774.5818	-42.4041	-8.736E-08	221.8097	1.0299
402.000	-3.01E-06	538.7240	-35.8455	-2.024E-08	221.6359	1.1563
408.000	-2.97E-06	344.4600	-28.9048	2.490E-08	221.4927	1.1573
414.000	-2.71E-06	191.8371	-22.2107	5.232E-08	221.3803	1.0741
420.000	-2.34E-06	77.8692	-16.1669	6.610E-08	221.2963	.9405
426.000	-1.92E-06	-2.2455	-10.9965	6.997E-08	221.2406	.7830
432.000	-1.50E-06	-54.1732	-6.7848	6.708E-08	221.2789	.6210
438.000	-1.11E-06	-83.7431	-3.5183	6.003E-08	221.3006	.4679
444.000	-7.79E-07	-96.4646	-1.1185	5.082E-08	221.3100	.3320
450.000	-5.04E-07	-97.2266	.5309	4.092E-08	221.3106	.2178
456.000	-2.88E-07	-90.1435	1.5630	3.135E-08	221.3054	.1263
462.000	-1.28E-07	-78.5084	2.1122	2.273E-08	221.2968	.056781
468.000	-1.56E-08	-64.8245	2.3036	1.540E-08	221.2867	.007019
474.000	5.69E-08	-50.8839	2.2468	9.486E-09	221.2764	-.025959
480.000	9.82E-08	-37.8747	2.0327	4.949E-09	221.2668	-.045388
486.000	1.16E-07	-26.4972	1.7332	1.659E-09	221.2585	-.054440
492.000	1.18E-07	-17.0779	1.4019	-5.680E-10	221.2515	-.056005
498.000	1.10E-07	-9.6737	1.0762	-1.935E-09	221.2461	-.052564
504.000	9.49E-08	-4.1612	.7801	-2.642E-09	221.2420	-.046135
510.000	7.78E-08	-.3093	.5269	-2.871E-09	221.2392	-.038276
516.000	6.05E-08	2.1647	.3217	-2.776E-09	221.2405	-.030117
522.000	4.45E-08	3.5543	.1641	-2.484E-09	221.2416	-.022419
528.000	3.07E-08	4.1366	.049904	-2.091E-09	221.2420	-.015641
534.000	1.94E-08	4.1556	-.027036	-1.667E-09	221.2420	-.010006
540.000	1.07E-08	3.8142	-.073755	-1.260E-09	221.2417	-.005567
546.000	4.28E-09	3.2721	-.097230	-8.973E-10	221.2413	-.002258
552.000	-1.04E-10	2.6485	-.1038	-5.947E-10	221.2409	5.553E-05
558.000	-2.86E-09	2.0268	-.099038	-3.557E-10	221.2404	.001544
564.000	-4.37E-09	1.4605	-.087241	-1.775E-10	221.2400	.002388
570.000	-4.99E-09	.9801	-.071814	-5.276E-11	221.2397	.002755
576.000	-5.01E-09	.5988	-.055169	2.794E-11	221.2394	.002794
582.000	-4.65E-09	.3180	-.038912	7.480E-11	221.2392	.002625
588.000	-4.11E-09	.1317	-.024010	9.778E-11	221.2390	.002342
594.000	-3.48E-09	.029776	-.010968	1.060E-10	221.2390	.002005
600.000	-2.84E-09	0.0000	0.0000	1.076E-10	221.2389	.001651

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 5:

Pile-head deflection	=	.14454536 in
Computed slope at pile head	=	9.25186E-18
Maximum bending moment	=	-2633220.265 lbs-in
Maximum shear force	=	50000.000 lbs
Depth of maximum bending moment	=	0.000 in
Depth of maximum shear force	=	0.000 in
Number of iterations	=	5
Number of zero deflection points	=	5

Summary of Pile-head Response

Definition of symbols for pile-head boundary conditions:

y = pile-head displacment, in
M = pile-head moment, lbs-in
V = pile-head shear force, lbs
S = pile-head slope, radians
R = rotational stiffness of pile-head, in-lbs/rad

BC Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
2	V= 10000.000 S=	0.000	100000.0000	.028909	-526644.0530	10000.0000
2	V= 20000.000 S=	0.000	100000.0000	.057818	-1.053E+06	20000.0000
2	V= 30000.000 S=	0.000	100000.0000	.086727	-1.580E+06	30000.0000
2	V= 40000.000 S=	0.000	100000.0000	.1156	-2.107E+06	40000.0000
2	V= 50000.000 S=	0.000	100000.0000	.1445	-2.633E+06	50000.0000

The analysis ended normally.

Geotechnologies, Inc.

Project: Lincoln Riboli

File No.: 20921

Seismically Induced Lateral Soil Pressure on Retaining Wall

Input:

Height of Retaining Wall:	(H)	50.0 feet
Retained Soil Unit Weight:	(γ)	120.0 pcf
Short Duration Acceleration	(SDs)	1.728 g
Horizontal Ground Acceleration: (1/2 of Sds/2.5)	(k_h)	0.35 g

Seismic Increment (ΔP_{AE}):

$\Delta P_{AE} = (0.5*\gamma*H^2)*(0.75*k_h)$

ΔP_{AE} = 38880.0 lbs/ft

Force applied at 0.6H above the base of the wall
Transfer load to 2/3 of the height of the wall

$T*(2/3)*H = \Delta P_{AE}*0.6*H$

T = 34992.0 lbs/ft

$EFP = 2*T/H^2$

EFP = 28.0 pcf Triangular shape

Geotechnologies, Inc.

Project: Lincoln Properties, Riboli
File No.: 20921
Geologic Material Bedrock Favorable, alluvium

Soil Weight	γ	120 pcf
Internal Friction Angle	ϕ	28 degrees
Cohesion	c	240 psf
Height of Retaining Wall	H	50 feet

Cantilever Retaining Wall Design based on At Rest Earth Pressure

$\sigma'_h = K_o\sigma'_v$

$K_o = 1 - \sin\phi$	0.531	
$\sigma'_v = \gamma H$	6000.0 psf	
$\sigma'_h =$	3183.2 psf	
EFP =	63.7 pcf	
$P_o =$	79579.3 lbs/ft	(based on a triangular distribution of pressure)

Design wall for an EFP of 64 pcf

Restrained Wall Design based on At Rest Earth Pressure

$P_o =$	79579.3 lbs/ft	
$\sigma'_{h,\,max} =$	39.8 H	(based on a trapezoidal distribution of pressure)
$\sigma'_{h,\,max} =$	1591.6 psf	

Design restrained wall for 40 H

Geotechnologies, Inc.

Project: Lincoln Properties, Riboli
File No.: 20921
Geologic Material Bedrock - Daylighted

Soil Weight	γ	120 pcf
Internal Friction Angle	ϕ	9 degrees
Cohesion	c	400 psf
Height of Retaining Wall	H	50 feet

Cantilever Retaining Wall Design based on At Rest Earth Pressure

$\sigma'_h = K_o \sigma'_v$

$K_o = 1 - \sin\phi$	0.844	
$\sigma'_v = \gamma H$	6000.0 psf	
$\sigma'_h =$	5061.4 psf	
EFP =	101.2 pcf	
$P_o =$	126534.8 lbs/ft	(based on a triangular distribution of pressure)

Design wall for an EFP of 101 pcf

Restrained Wall Design based on At Rest Earth Pressure

$P_o =$	126534.8 lbs/ft	
$\sigma'_{h,max} =$	63.3 H	(based on a trapezoidal distribution of pressure)
$\sigma'_{h,max} =$	2530.7 psf	

Design restrained wall for 63.3 H

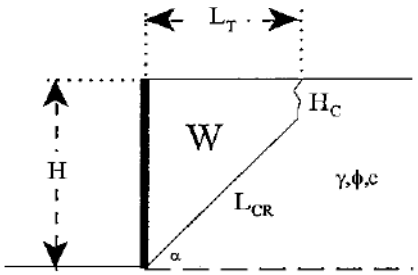
Geotechnologies, Inc.

Project: Lincolmn Properties
File No.: 20921
Description: ~~Alluvium~~ Between-Favorable Orientation/Alluvium

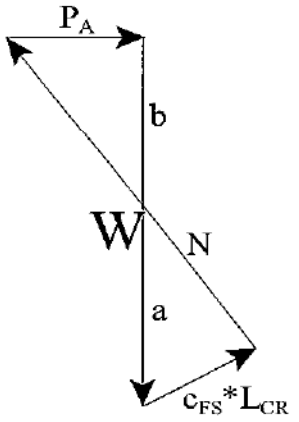
Retaining Wall Design with Level Backfill
(Vector Analysis)

Input:

Retaining Wall Height	(H)	10.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	28.0 degrees
Cohesion of Retained Soils	(c)	240.0 psf
Factor of Safety	(FS)	1.50
Factored Parameters:	(ϕ_{FS})	19.5 degrees
	(c_{FS})	160.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
40	4.7	46	5578.8	8.3	3561.4	2017.4	753.5
41	4.5	46	5475.1	8.3	3422.8	2052.4	807.7
42	4.4	45	5360.4	8.3	3287.4	2073.1	857.9
43	4.3	44	5237.6	8.3	3156.3	2081.4	904.2
44	4.2	43	5108.9	8.3	3030.2	2078.8	946.6
45	4.1	41	4976.1	8.3	2909.4	2066.7	985.0
46	4.1	40	4840.4	8.3	2794.0	2046.4	1019.5
47	4.0	39	4703.0	8.2	2684.1	2018.9	1050.1
48	3.9	38	4564.5	8.2	2579.4	1985.0	1077.0
49	3.9	37	4425.6	8.1	2479.8	1945.7	1100.0
50	3.9	36	4286.7	8.0	2385.1	1901.6	1119.3
51	3.8	35	4148.3	7.9	2294.9	1853.3	1134.9
52	3.8	33	4010.5	7.9	2209.1	1801.4	1146.8
53	3.8	32	3873.5	7.8	2127.2	1746.3	1155.1
54	3.8	31	3737.5	7.7	2049.1	1688.4	1159.6
55	3.8	30	3602.6	7.6	1974.5	1628.2	1160.6
56	3.8	29	3468.8	7.5	1903.0	1565.8	1157.9
57	3.8	28	3336.2	7.4	1834.5	1501.7	1151.5
58	3.8	27	3204.7	7.3	1768.6	1436.0	1141.5
59	3.8	26	3074.2	7.2	1705.1	1369.1	1127.9
60	3.9	25	2944.9	7.1	1643.8	1301.1	1110.5
61	3.9	23	2816.5	7.0	1584.4	1232.1	1089.4
62	4.0	22	2689.1	6.8	1526.6	1162.5	1064.5
63	4.0	21	2562.4	6.7	1470.2	1092.2	1035.9
64	4.1	20	2436.5	6.6	1414.9	1021.6	1003.3
65	4.2	19	2311.2	6.4	1360.4	950.8	966.9



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ 1160.6 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of wall)

$EFP = 2*P_A/H^2$

EFP 23.2 pcf

Design Wall for an Equivalent Fluid Pressure: 23 pcf

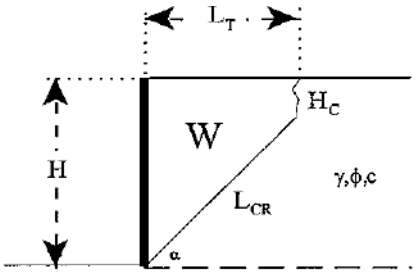
Geotechnologies, Inc.

Project: Lincolmn Properties
File No.: 20921
Description: ~~Alluvium~~ Bedrock - Favorable orientation / Alluvium

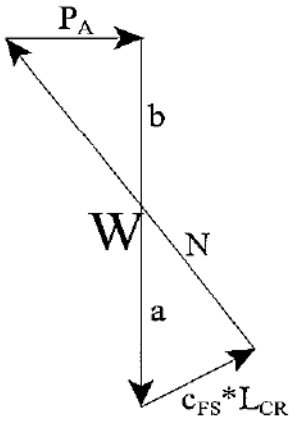
Retaining Wall Design with Level Backfill
(Vector Analysis)

Input:

Retaining Wall Height	(H)	20.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	28.0 degrees
Cohesion of Retained Soils	(c)	240.0 psf
Factor of Safety	(FS)	1.50
Factored Parameters:	(ϕ_{FS})	19.5 degrees
	(c_{FS})	160.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) $feet^2$	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
40	4.7	225	27030.3	23.8	10266.3	16764.1	6261.8
41	4.5	218	26181.8	23.6	9699.7	16482.1	6486.5
42	4.4	211	25351.5	23.3	9181.2	16170.3	6692.0
43	4.3	205	24540.3	23.0	8705.7	15834.5	6879.1
44	4.2	198	23748.5	22.7	8268.8	15479.7	7048.6
45	4.1	191	22976.1	22.4	7866.6	15109.5	7201.0
46	4.1	185	22222.8	22.2	7495.5	14727.4	7337.0
47	4.0	179	21488.2	21.9	7152.5	14335.8	7457.0
48	3.9	173	20771.7	21.6	6834.8	13937.0	7561.5
49	3.9	167	20072.7	21.3	6540.0	13532.7	7650.8
50	3.9	162	19390.5	21.1	6266.0	13124.6	7725.4
51	3.8	156	18724.4	20.8	6010.7	12713.6	7785.4
52	3.8	151	18073.6	20.6	5772.6	12301.0	7831.1
53	3.8	145	17437.5	20.3	5550.1	11887.4	7862.7
54	3.8	140	16815.3	20.1	5341.7	11473.6	7880.3
55	3.8	135	16206.4	19.8	5146.2	11060.2	7883.9
56	3.8	130	15610.0	19.6	4962.5	10647.5	7873.6
57	3.8	125	15025.5	19.3	4789.5	10236.0	7849.3
58	3.8	120	14452.3	19.1	4626.3	9826.0	7810.9
59	3.8	116	13889.7	18.9	4472.1	9417.6	7758.3
60	3.9	111	13337.2	18.6	4326.1	9011.1	7691.3
61	3.9	107	12794.1	18.4	4187.5	8606.6	7609.6
62	4.0	102	12259.8	18.2	4055.6	8204.2	7513.0
63	4.0	98	11733.9	17.9	3929.8	7804.1	7401.1
64	4.1	93	11215.7	17.7	3809.5	7406.2	7273.5
65	4.2	89	10704.8	17.5	3694.1	7010.7	7129.7



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ 7883.9 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of wall)

$EFP = 2*P_A/H^2$

EFP 39.4 pcf

Design Wall for an Equivalent Fluid Pressure: 40 pcf

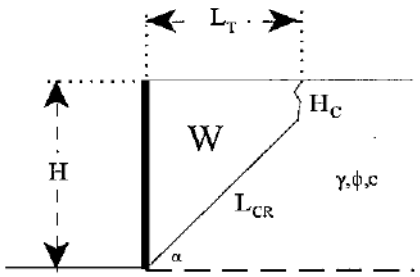
Geotechnologies, Inc.

Project: Lincoln Properties
File No.: 20921
Description: Bedrock Daylighted (Adverse Bedding)

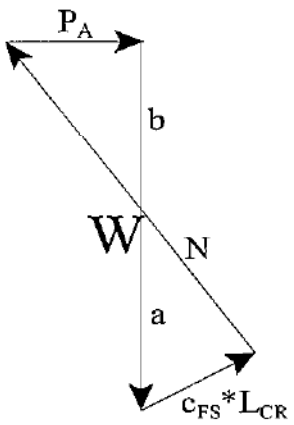
Retaining Wall Design with Level Backfill
(Vector Analysis)

Input:

Retaining Wall Height	(H)	10.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	9.0 degrees
Cohesion of Retained Soils	(c)	400.0 psf
Factor of Safety	(FS)	1.50
Factored Parameters:	(ϕ_{FS})	6.0 degrees
	(c_{FS})	266.7 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) $feet^2$	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
40	5.2	44	5244.7	7.5	3571.5	1673.2	1127.4
41	5.1	43	5100.8	7.5	3449.5	1651.4	1155.1
42	5.1	41	4955.8	7.4	3331.3	1624.5	1179.0
43	5.0	40	4810.1	7.3	3217.0	1593.0	1199.2
44	5.0	39	4664.2	7.2	3106.6	1557.6	1215.7
45	5.0	38	4518.5	7.1	2999.9	1518.6	1228.5
46	5.0	36	4373.2	7.0	2896.8	1476.4	1237.7
47	4.9	35	4228.6	6.9	2797.2	1431.5	1243.2
48	4.9	34	4084.9	6.8	2700.8	1384.1	1245.0
49	4.9	33	3942.0	6.7	2607.5	1334.5	1243.3
50	5.0	32	3800.1	6.6	2517.1	1283.1	1237.9
51	5.0	30	3659.2	6.5	2429.3	1230.0	1228.8
52	5.0	29	3519.4	6.4	2343.9	1175.5	1216.1
53	5.0	28	3380.5	6.2	2260.6	1119.8	1199.7
54	5.1	27	3242.5	6.1	2179.3	1063.2	1179.7
55	5.1	26	3105.4	6.0	2099.7	1005.7	1155.8
56	5.2	25	2969.1	5.8	2021.4	947.6	1128.2
57	5.2	24	2833.4	5.7	1944.3	889.1	1096.8
58	5.3	22	2698.4	5.5	1868.1	830.2	1061.6
59	5.4	21	2563.8	5.4	1792.5	771.3	1022.5
60	5.5	20	2429.4	5.2	1717.1	712.4	979.5
61	5.6	19	2295.3	5.1	1641.6	653.7	932.6
62	5.7	18	2161.1	4.9	1565.6	595.4	881.8
63	5.8	17	2026.6	4.7	1488.9	537.7	827.2
64	5.9	16	1891.7	4.5	1410.8	480.9	768.7
65	6.1	15	1756.0	4.3	1330.9	425.1	706.6



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ 1245.0 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of wall)

$EFP = 2*P_A/H^2$

EFP 24.9 pcf

Design Wall for an Equivalent Fluid Pressure: 28 pcf

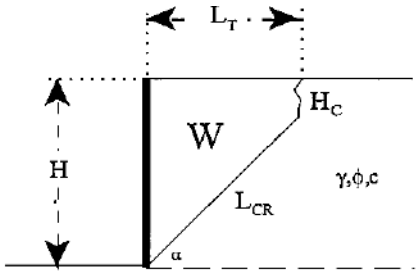
Geotechnologies, Inc.

Project: Lincoln Properties
File No.: 20921
Description: Bedrock Daylighted (Adverse Bedding)

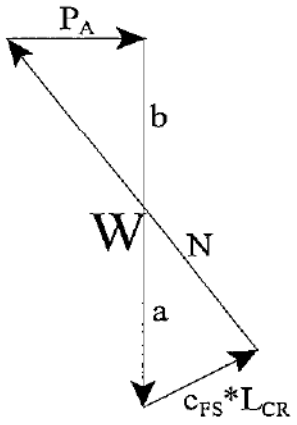
Retaining Wall Design with Level Backfill
(Vector Analysis)

Input:

Retaining Wall Height	(H)	20.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	9.0 degrees
Cohesion of Retained Soils	(c)	400.0 psf
Factor of Safety	(FS)	1.50
Factored Parameters:	(ϕ_{FS})	6.0 degrees
	(c_{FS})	266.7 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
40	5.2	222	26696.3	23.1	10954.6	15741.6	10606.9
41	5.1	215	25807.5	22.7	10501.7	15305.8	10706.3
42	5.1	208	24946.8	22.3	10078.4	14868.4	10791.6
43	5.0	201	24112.7	22.0	9682.4	14430.3	10863.2
44	5.0	194	23303.7	21.6	9311.2	13992.5	10921.3
45	5.0	188	22518.5	21.3	8962.8	13555.6	10966.4
46	5.0	181	21755.6	20.9	8635.4	13120.2	10998.4
47	4.9	175	21013.9	20.6	8327.2	12686.7	11017.7
48	4.9	169	20292.1	20.3	8036.7	12255.4	11024.2
49	4.9	163	19589.2	20.0	7762.4	11826.8	11018.0
50	5.0	158	18903.9	19.6	7503.1	11400.9	10999.1
51	5.0	152	18235.4	19.3	7257.4	10977.9	10967.4
52	5.0	147	17582.5	19.0	7024.4	10558.1	10922.7
53	5.0	141	16944.4	18.8	6803.0	10141.5	10864.9
54	5.1	136	16320.3	18.5	6592.1	9728.1	10793.7
55	5.1	131	15709.1	18.2	6391.0	9318.1	10708.8
56	5.2	126	15110.2	17.9	6198.8	8911.4	10609.8
57	5.2	121	14522.8	17.6	6014.7	8508.0	10496.2
58	5.3	116	13946.0	17.3	5837.9	8108.1	10367.6
59	5.4	111	13379.2	17.1	5667.8	7711.5	10223.3
60	5.5	107	12821.7	16.8	5503.4	7318.3	10062.6
61	5.6	102	12272.8	16.5	5344.3	6928.5	9884.8
62	5.7	98	11731.8	16.2	5189.7	6542.2	9689.1
63	5.8	93	11198.1	15.9	5038.8	6159.2	9474.4
64	5.9	89	10670.8	15.6	4891.0	5779.8	9239.8
65	6.1	85	10149.5	15.3	4745.6	5404.0	8983.9



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ 11024.2 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of wall)

$EFP = 2*P_A/H^2$

EFP 55.1 pcf

Design Wall for an Equivalent Fluid Pressure: 55 pcf

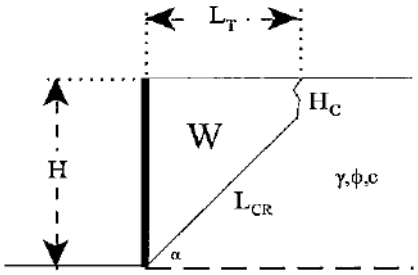
Geotechnologies, Inc.

Project: Lincoln Properties
File No.: 20921
Description: Bedrock Daylighted (Adverse Bedding)

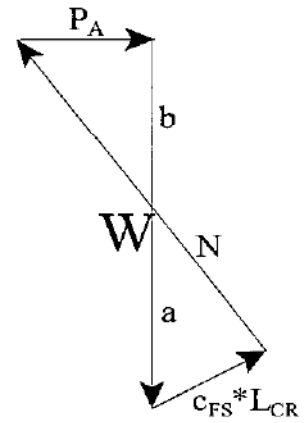
Shoring Design with Level Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	10.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	9.0 degrees
Cohesion of Retained Soils	(c)	400.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	7.2 degrees
	(c_{FS})	320.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) $feet^2$	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
40	6.4	35	4241.0	5.6	3303.4	937.6	603.8
41	6.3	35	4158.6	5.6	3216.1	942.5	630.4
42	6.2	34	4068.2	5.6	3126.6	941.6	653.9
43	6.2	33	3971.2	5.6	3035.8	935.5	674.1
44	6.1	32	3868.9	5.6	2944.4	924.5	691.1
45	6.1	31	3762.2	5.5	2852.9	909.3	704.7
46	6.1	30	3651.8	5.4	2761.7	890.1	715.1
47	6.1	29	3538.5	5.4	2671.2	867.4	722.1
48	6.1	29	3422.8	5.3	2581.3	841.5	725.8
49	6.1	28	3305.1	5.2	2492.3	812.8	726.2
50	6.1	27	3185.8	5.1	2404.2	781.6	723.2
51	6.1	26	3065.0	5.0	2316.9	748.2	716.9
52	6.1	25	2943.1	4.9	2230.3	712.8	707.3
53	6.1	24	2820.2	4.8	2144.4	675.8	694.4
54	6.2	22	2696.3	4.7	2059.0	637.3	678.2
55	6.2	21	2571.6	4.6	1973.9	597.7	658.7
56	6.3	20	2446.0	4.5	1888.9	557.1	635.9
57	6.4	19	2319.6	4.3	1803.8	515.8	609.9
58	6.4	18	2192.3	4.2	1718.2	474.1	580.8
59	6.5	17	2064.1	4.0	1632.0	432.1	548.6
60	6.6	16	1934.7	3.9	1544.7	390.0	513.5
61	6.8	15	1804.2	3.7	1455.9	348.3	475.5
62	6.9	14	1672.3	3.5	1365.3	307.0	434.9
63	7.0	13	1538.8	3.3	1272.3	266.5	391.9
64	7.2	12	1403.5	3.1	1176.3	227.2	346.8
65	7.4	11	1266.0	2.9	1076.8	189.2	300.2



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ 726.2 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP 14.5 pcf

Design Shoring for an Equivalent Fluid Pressure: 28 pcf

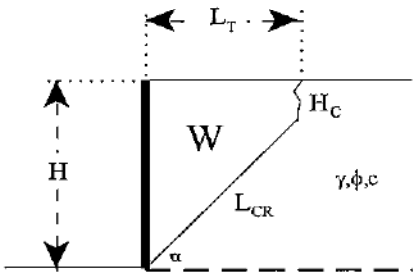
Geotechnologies, Inc.

Project: Lincoln Properties
File No.: 20921
Description: Bedrock Daylighted (Adverse Bedding)

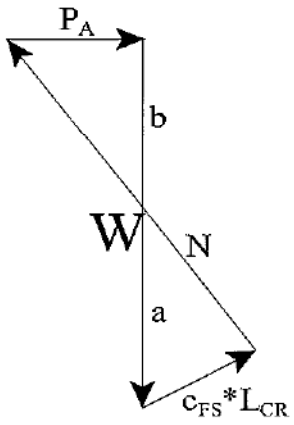
Shoring Design with Level Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	20.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	9.0 degrees
Cohesion of Retained Soils	(c)	400.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	7.2 degrees
	(c_{FS})	320.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_c) feet	Area of Wedge (A) $feet^2$	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
40	6.4	214	25692.6	21.2	12425.8	13266.8	8542.9
41	6.3	207	24865.2	20.9	11919.4	12945.8	8659.5
42	6.2	200	24059.2	20.6	11444.1	12615.1	8760.8
43	6.2	194	23273.9	20.3	10997.5	12276.4	8847.0
44	6.1	188	22508.4	19.9	10577.3	11931.1	8918.7
45	6.1	181	21762.2	19.6	10181.5	11580.7	8976.0
46	6.1	175	21034.2	19.4	9808.1	11226.1	9019.1
47	6.1	169	20323.8	19.1	9455.4	10868.4	9048.3
48	6.1	164	19630.1	18.8	9121.9	10508.2	9063.7
49	6.1	158	18952.3	18.5	8805.8	10146.4	9065.2
50	6.1	152	18289.6	18.2	8506.0	9783.6	9052.9
51	6.1	147	17641.1	17.9	8221.1	9420.1	9026.8
52	6.1	142	17006.3	17.6	7949.8	9056.4	8986.7
53	6.1	137	16384.1	17.4	7691.1	8693.0	8932.6
54	6.2	131	15774.1	17.1	7443.9	8330.2	8864.1
55	6.2	126	15175.3	16.8	7207.1	7968.2	8781.1
56	6.3	122	14587.2	16.5	6979.9	7607.3	8683.2
57	6.4	117	14008.9	16.3	6761.2	7247.7	8570.0
58	6.4	112	13440.0	16.0	6550.3	6889.7	8441.1
59	6.5	107	12879.5	15.7	6346.2	6533.3	8296.0
60	6.6	103	12327.0	15.4	6148.1	6178.9	8134.1
61	6.8	98	11781.8	15.1	5955.2	5826.6	7954.8
62	6.9	94	11243.1	14.8	5766.5	5476.6	7757.4
63	7.0	89	10710.3	14.5	5581.2	5129.0	7541.1
64	7.2	85	10182.7	14.2	5398.5	4784.2	7305.1
65	7.4	80	9659.5	13.9	5217.2	4442.3	7048.4



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ 9065.2 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP 45.3 pcf

Design Shoring for an Equivalent Fluid Pressure: 45 pcf

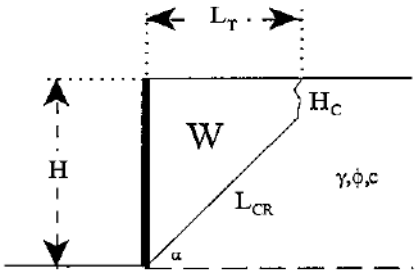
Geotechnologies, Inc.

Project: Lincoln Properties
File No.: 20921
Description: Bedrock Daylighted (Adverse Bedding)

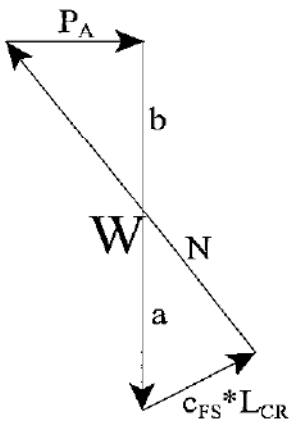
Shoring Design with Level Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	30.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	9.0 degrees
Cohesion of Retained Soils	(c)	400.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	7.2 degrees
	(c_{FS})	320.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) $feet^2$	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
40	6.4	512	61445.2	36.7	21548.2	39897.0	25690.8
41	6.3	495	59376.3	36.1	20622.7	38753.6	25922.4
42	6.2	478	57377.6	35.5	19761.7	37615.9	26123.0
43	6.2	462	55444.9	34.9	18959.3	36485.7	26293.7
44	6.1	446	53574.4	34.3	18210.3	35364.1	26435.2
45	6.1	431	51762.2	33.8	17510.1	34252.1	26548.2
46	6.1	417	50004.9	33.3	16854.5	33150.4	26633.3
47	6.1	402	48299.3	32.7	16239.7	32059.5	26690.8
48	6.1	389	46642.2	32.2	15662.4	30979.8	26721.0
49	6.1	375	45030.9	31.7	15119.4	29911.5	26724.0
50	6.1	362	43462.6	31.3	14607.8	28854.7	26699.8
51	6.1	349	41934.7	30.8	14125.3	27809.4	26648.4
52	6.1	337	40444.8	30.3	13669.3	26775.5	26569.4
53	6.1	325	38990.8	29.9	13237.8	25753.0	26462.6
54	6.2	313	37570.3	29.4	12828.8	24741.6	26327.5
55	6.2	302	36181.5	29.0	12440.3	23741.2	26163.3
56	6.3	290	34822.4	28.6	12070.8	22751.6	25969.4
57	6.4	279	33491.2	28.2	11718.7	21772.5	25744.8
58	6.4	268	32186.0	27.8	11382.4	20803.7	25488.5
59	6.5	258	30905.4	27.4	11060.4	19844.9	25199.1
60	6.6	247	29647.5	27.0	10751.5	18896.0	24875.3
61	6.8	237	28411.0	26.6	10454.4	17956.6	24515.5
62	6.9	227	27194.4	26.2	10167.7	17026.6	24117.7
63	7.0	217	25996.0	25.8	9890.2	16105.8	23680.0
64	7.2	207	24814.6	25.4	9620.6	15194.0	23200.0
65	7.4	197	23648.8	24.9	9357.7	14291.1	22675.1



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ 26724.0 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP 59.4 pcf

Design Shoring for an Equivalent Fluid Pressure: 60 pcf

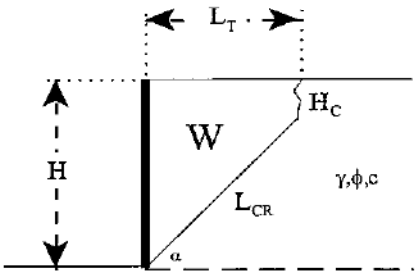
Geotechnologies, Inc.

Project: Lincoln Properties
File No.: 20921
Description: Bedrock Daylighted (Adverse Bedding)

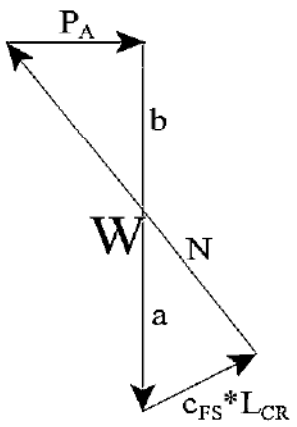
Shoring Design with Level Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	40.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	9.0 degrees
Cohesion of Retained Soils	(c)	400.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	7.2 degrees
	(c_{FS})	320.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
40	6.4	929	111498.8	52.3	30670.6	80828.2	52047.7
41	6.3	897	107691.8	51.4	29326.0	78365.7	52419.1
42	6.2	867	104023.3	50.5	28079.2	75944.1	52740.6
43	6.2	837	100484.4	49.6	26921.0	73563.4	53014.0
44	6.1	809	97066.6	48.7	25843.2	71223.4	53240.6
45	6.1	781	93762.2	47.9	24838.7	68923.5	53421.5
46	6.1	755	90563.8	47.2	23900.9	66663.0	53557.6
47	6.1	729	87464.9	46.4	23024.0	64440.9	53649.5
48	6.1	704	84459.2	45.7	22202.9	62256.3	53697.8
49	6.1	680	81540.9	45.0	21432.9	60108.1	53702.6
50	6.1	656	78704.7	44.3	20709.7	57995.1	53663.9
51	6.1	633	75945.6	43.7	20029.5	55916.1	53581.7
52	6.1	610	73258.8	43.0	19388.8	53870.0	53455.4
53	6.1	589	70640.0	42.4	18784.5	51855.5	53284.5
54	6.2	567	68085.1	41.8	18213.6	49871.5	53068.1
55	6.2	547	65590.2	41.2	17673.6	47916.7	52805.2
56	6.3	526	63151.8	40.7	17161.8	45989.9	52494.5
57	6.4	506	60766.3	40.1	16676.1	44090.1	52134.3
58	6.4	487	58430.5	39.6	16214.4	42216.1	51722.8
59	6.5	468	56141.5	39.0	15774.6	40366.9	51257.9
60	6.6	449	53896.3	38.5	15355.0	38541.3	50737.0
61	6.8	431	51692.0	38.0	14953.6	36738.4	50157.5
62	6.9	413	49526.2	37.5	14568.9	34957.2	49515.9
63	7.0	395	47396.1	37.0	14199.2	33196.9	48808.7
64	7.2	377	45299.4	36.5	13842.8	31456.6	48031.7
65	7.4	360	43233.7	36.0	13498.1	29735.6	47180.3



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ 53702.6 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP 67.1 pcf

Design Shoring for an Equivalent Fluid Pressure: 67 pcf

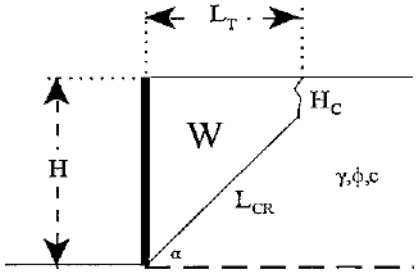
Geotechnologies, Inc.

Project: Lincoln Properties
File No.: 20921
Description: Bedrock Daylighted (Adverse Bedding)

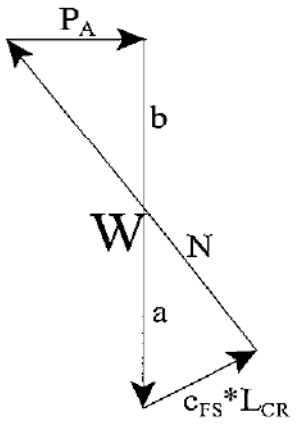
Shoring Design with Level Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	50.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	9.0 degrees
Cohesion of Retained Soils	(c)	400.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	7.2 degrees
	(c_{FS})	320.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
40	6.4	1465	175853.5	67.9	39793.0	136060.5	87613.4
41	6.3	1415	169811.7	66.6	38029.3	131782.3	88149.6
42	6.2	1367	163996.4	65.4	36396.8	127599.6	88613.6
43	6.2	1320	158392.3	64.2	34882.7	123509.6	89008.1
44	6.1	1275	152985.3	63.1	33476.2	119509.1	89334.9
45	6.1	1231	147762.2	62.1	32167.3	115594.9	89595.7
46	6.1	1189	142711.0	61.1	30947.2	111763.8	89791.9
47	6.1	1149	137820.7	60.1	29808.3	108012.4	89924.5
48	6.1	1109	133081.0	59.1	28743.4	104337.6	89994.0
49	6.1	1071	128482.4	58.2	27746.4	100736.0	90001.0
50	6.1	1033	124016.1	57.4	26811.5	97204.6	89945.3
51	6.1	997	119673.9	56.5	25933.7	93740.2	89826.7
52	6.1	962	115448.2	55.7	25108.3	90339.9	89644.7
53	6.1	928	111332.0	54.9	24331.2	87000.7	89398.2
54	6.2	894	107318.4	54.2	23598.5	83719.9	89086.2
55	6.2	862	103401.5	53.4	22906.8	80494.7	88706.9
56	6.3	830	99575.2	52.7	22252.8	77322.4	88258.4
57	6.4	799	95834.3	52.0	21633.6	74200.7	87738.4
58	6.4	768	92173.5	51.4	21046.5	71127.0	87144.1
59	6.5	738	88588.0	50.7	20488.9	68099.1	86472.3
60	6.6	709	85073.2	50.1	19958.4	65114.8	85719.3
61	6.8	680	81624.7	49.4	19452.9	62171.8	84880.7
62	6.9	652	78238.5	48.8	18970.1	59268.3	83951.9
63	7.0	624	74910.5	48.2	18508.1	56402.3	82927.1
64	7.2	597	71637.0	47.6	18064.9	53572.0	81800.2
65	7.4	570	68414.3	47.0	17638.6	50775.7	80563.9



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ 90001.0 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP 72.0 pcf

Design Shoring for an Equivalent Fluid Pressure: 72 pcf

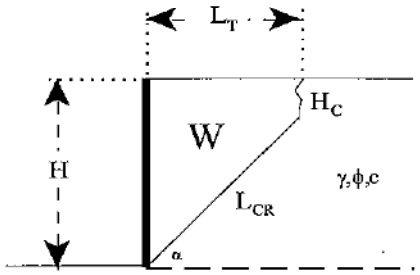
Geotechnologies, Inc.

Project: Lincolmn Properties
File No.: 20921
Description: Alluvium/Bounce Favorable orientation

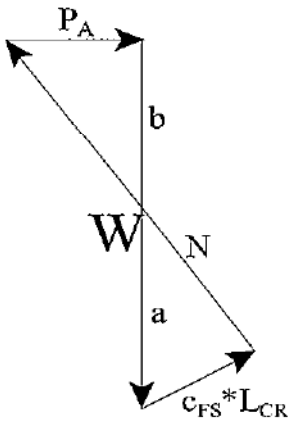
Shoring Design with Level Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	20.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	28.0 degrees
Cohesion of Retained Soils	(c)	240.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	23.0 degrees
	(c_{FS})	192.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
40	6.6	212	25496.6	20.9	12638.2	12858.4	3920.6
41	6.3	207	24845.1	20.8	11942.9	12902.1	4181.4
42	6.1	201	24176.1	20.8	11299.0	12877.1	4423.0
43	5.9	196	23498.4	20.7	10703.5	12794.8	4646.0
44	5.7	190	22818.0	20.6	10152.9	12665.1	4850.7
45	5.6	184	22139.3	20.4	9643.7	12495.6	5037.6
46	5.4	179	21465.5	20.2	9172.5	12293.1	5207.1
47	5.3	173	20798.7	20.1	8735.9	12062.9	5359.8
48	5.2	168	20140.5	19.9	8330.9	11809.5	5496.0
49	5.1	162	19491.7	19.7	7954.8	11536.9	5616.1
50	5.1	157	18853.0	19.5	7604.8	11248.1	5720.5
51	5.0	152	18224.8	19.3	7278.8	10945.9	5809.4
52	4.9	147	17607.1	19.1	6974.5	10632.6	5883.2
53	4.9	142	17000.0	18.9	6690.1	10309.9	5942.0
54	4.9	137	16403.3	18.7	6423.7	9979.6	5986.1
55	4.8	132	15816.8	18.5	6173.8	9642.9	6015.4
56	4.8	127	15240.2	18.3	5939.0	9301.2	6030.3
57	4.8	122	14673.1	18.1	5717.8	8955.3	6030.6
58	4.8	118	14115.2	17.9	5509.1	8606.1	6016.4
59	4.9	113	13566.1	17.7	5311.7	8254.4	5987.6
60	4.9	109	13025.4	17.4	5124.7	7900.7	5944.2
61	4.9	104	12492.6	17.2	4947.0	7545.6	5886.1
62	5.0	100	11967.3	17.0	4777.8	7189.5	5813.0
63	5.0	95	11449.0	16.8	4616.1	6832.9	5724.7
64	5.1	91	10937.3	16.6	4461.2	6476.1	5621.0
65	5.2	87	10431.7	16.3	4312.3	6119.4	5501.5



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ 6030.6 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP 30.2 pcf

Design Shoring for an Equivalent Fluid Pressure: 30 pcf

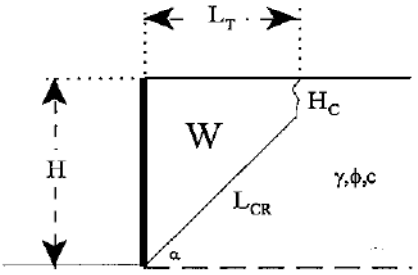
Geotechnologies, Inc.

Project: Lincolmn Properties
File No.: 20921
Description: ~~Alluvium~~ Bedrock - Granite

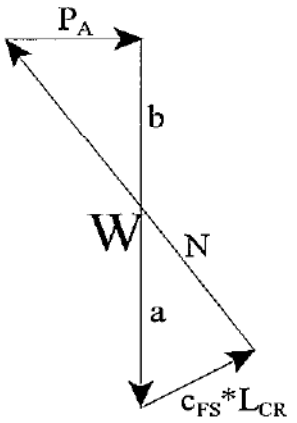
Shoring Design with Level Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	30.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	28.0 degrees
Cohesion of Retained Soils	(c)	240.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	23.0 degrees
	(c_{FS})	192.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
40	6.6	510	61249.3	36.4	22062.8	39186.5	11948.1
41	6.3	495	59356.1	36.1	20678.2	38678.0	12534.9
42	6.1	479	57494.5	35.7	19427.2	38067.3	13075.4
43	5.9	464	55669.4	35.3	18293.8	37375.7	13571.6
44	5.7	449	53883.9	34.9	17264.1	36619.8	14025.2
45	5.6	434	52139.3	34.6	16326.2	35813.1	14437.9
46	5.4	420	50436.2	34.2	15469.7	34966.5	14811.2
47	5.3	406	48774.2	33.8	14685.5	34088.7	15146.4
48	5.2	393	47152.6	33.4	13965.6	33187.0	15444.8
49	5.1	380	45570.3	33.0	13303.4	32266.9	15707.4
50	5.1	367	44026.0	32.6	12692.7	31333.3	15935.3
51	5.0	354	42518.3	32.2	12128.3	30390.0	16129.2
52	4.9	342	41045.7	31.8	11605.6	29440.1	16289.8
53	4.9	330	39606.6	31.4	11120.5	28486.2	16417.8
54	4.9	318	38199.6	31.1	10669.3	27530.3	16513.5
55	4.8	307	36823.0	30.7	10249.0	26574.1	16577.4
56	4.8	296	35475.4	30.3	9856.5	25618.9	16609.6
57	4.8	285	34155.3	30.0	9489.4	24666.0	16610.3
58	4.8	274	32861.3	29.7	9145.3	23716.0	16579.4
59	4.9	263	31591.9	29.3	8822.1	22769.8	16516.9
60	4.9	253	30345.9	29.0	8518.1	21827.8	16422.6
61	4.9	243	29121.9	28.7	8231.3	20890.5	16296.0
62	5.0	233	27918.6	28.3	7960.4	19958.2	16136.8
63	5.0	223	26734.8	28.0	7703.8	19031.0	15944.4
64	5.1	213	25569.3	27.7	7460.1	18109.1	15718.0
65	5.2	204	24420.9	27.4	7228.1	17192.8	15456.9



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ = 16610.3 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP = 36.9 pcf

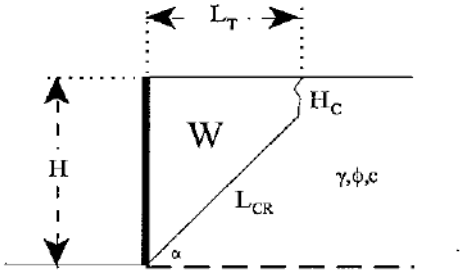
Design Shoring for an Equivalent Fluid Pressure: 37 pcf

Geotechnologies, Inc.

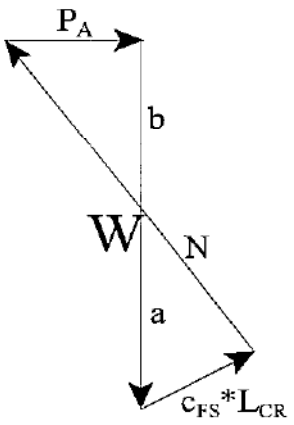
Project: Lincolmn Properties
File No.: 20921
Description: Alluvium Below Footing

Shoring Design with Level Backfill (Vector Analysis)

Input:		
Shoring Height	(H)	40.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	28.0 degrees
Cohesion of Retained Soils	(c)	240.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	23.0 degrees
	(c_{FS})	192.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) $feet^2$	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
40	6.6	928	111302.9	52.0	31487.3	79815.6	24336.1
41	6.3	897	107671.6	51.3	29413.4	78258.2	25362.2
42	6.1	868	104140.2	50.7	27555.3	76584.9	26305.5
43	5.9	839	100708.9	50.0	25884.0	74824.9	27170.0
44	5.7	811	97376.1	49.3	24375.3	73000.8	27959.1
45	5.6	784	94139.3	48.7	23008.8	71130.5	28676.1
46	5.4	758	90995.1	48.1	21766.9	69228.2	29323.9
47	5.3	733	87939.8	47.4	20635.0	67304.8	29905.1
48	5.2	708	84969.5	46.8	19600.3	65369.2	30422.0
49	5.1	684	82080.3	46.2	18652.0	63428.4	30876.7
50	5.1	661	79268.2	45.6	17780.5	61487.7	31271.0
51	5.0	638	76529.2	45.0	16977.7	59551.5	31606.3
52	4.9	615	73859.7	44.5	16236.6	57623.1	31884.0
53	4.9	594	71255.9	44.0	15550.8	55705.1	32105.2
54	4.9	573	68714.4	43.4	14914.9	53799.5	32270.6
55	4.8	552	66231.7	42.9	14324.1	51907.7	32381.0
56	4.8	532	63804.8	42.4	13774.0	50030.8	32436.6
57	4.8	512	61430.5	41.9	13260.9	48169.5	32437.8
58	4.8	493	59105.8	41.4	12781.4	46324.4	32384.5
59	4.9	474	56828.1	41.0	12332.5	44495.6	32276.5
60	4.9	455	54594.6	40.5	11911.4	42683.2	32113.5
61	4.9	437	52402.8	40.1	11515.7	40887.2	31894.8
62	5.0	419	50250.3	39.7	11143.0	39107.3	31619.5
63	5.0	401	48134.8	39.2	10791.4	37343.4	31286.7
64	5.1	384	46054.0	38.8	10459.0	35595.0	30895.0
65	5.2	367	44005.8	38.4	10144.0	33861.8	30443.0



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ 32437.8 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP 40.5 pcf

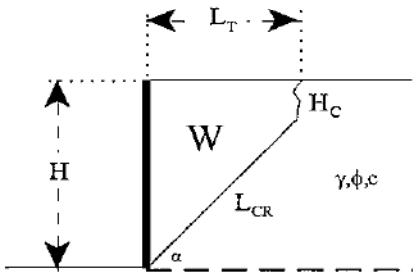
Design Shoring for an Equivalent Fluid Pressure: 41 pcf

Geotechnologies, Inc.

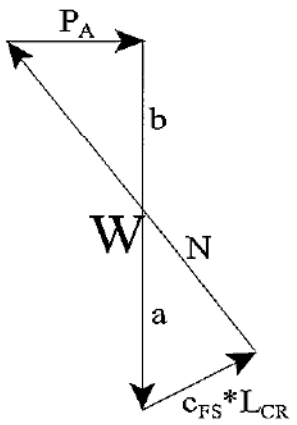
Project: Lincolmn Properties
File No.: 20921
Description: ~~Alluvium~~ Assumed Favorable Orientation

Shoring Design with Level Backfill
(Vector Analysis)

Input:		
Shoring Height	(H)	50.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	28.0 degrees
Cohesion of Retained Soils	(c)	240.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	23.0 degrees
	(c_{FS})	192.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
40	6.6	1464	175657.6	67.5	40911.9	134745.7	41084.5
41	6.3	1415	169791.5	66.6	38148.6	131642.9	42663.3
42	6.1	1368	164113.3	65.6	35683.4	128429.9	44113.4
43	5.9	1322	158616.8	64.7	33474.3	125142.6	45441.0
44	5.7	1277	153294.8	63.7	31486.6	121808.2	46652.1
45	5.6	1234	148139.3	62.8	29691.3	118448.0	47751.9
46	5.4	1193	143142.3	62.0	28064.2	115078.1	48745.1
47	5.3	1152	138295.6	61.1	26584.6	111711.1	49635.8
48	5.2	1113	133591.4	60.3	25235.0	108356.3	50427.7
49	5.1	1075	129021.8	59.5	24000.6	105021.2	51124.0
50	5.1	1038	124579.5	58.7	22868.3	101711.2	51727.6
51	5.0	1002	120257.5	57.9	21827.2	98430.3	52240.9
52	4.9	967	116049.1	57.2	20867.6	95181.5	52665.9
53	4.9	933	111947.8	56.5	19981.2	91966.6	53004.3
54	4.9	900	107947.7	55.8	19160.5	88787.2	53257.4
55	4.8	867	104042.9	55.1	18399.2	85643.8	53426.2
56	4.8	835	100228.2	54.5	17691.5	82536.7	53511.3
57	4.8	804	96498.5	53.8	17032.5	79466.0	53513.1
58	4.8	774	92848.8	53.2	16417.6	76431.1	53431.6
59	4.9	744	89274.6	52.7	15842.9	73431.7	53266.4
60	4.9	715	85771.5	52.1	15304.8	70466.7	53017.0
61	4.9	686	82335.5	51.5	14800.0	67535.5	52682.3
62	5.0	658	78962.7	51.0	14325.7	64637.0	52261.1
63	5.0	630	75649.2	50.4	13879.1	61770.1	51751.7
64	5.1	603	72391.6	49.9	13457.9	58933.7	51152.1
65	5.2	577	69186.4	49.4	13059.9	56126.6	50459.8



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ 53513.1 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP 42.8 pcf

Design Shoring for an Equivalent Fluid Pressure: 43 pcf