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Staff Report: May 27, 2010
Hearing Date: June 9, 2010
Commission Action:

STAFF REPORT: REGULAR CALENDAR

APPLICATION NO.:	**1-09-036**
APPLICANT:	**Robert Lake**
AGENTS:	LACO Associates: Mike Nelson and Becky Dale
PROJECT LOCATION:	575 H Street, Arcata, Humboldt County (APN 021-165-003)
PROJECT DESCRIPTION:	Redevelop an existing commercial property by (1) constructing a new 7,209-square-foot residential apartment building that will contain six apartment units along the west side of the parcel within a portion of the existing parking lot, and (2) remodeling the existing 3,200-square-foot commercial structure and adding 573 square feet of additional commercial floor area on the ground floor along the H Street frontage and a 1,772-square-foot two-bedroom residential unit on the second story.
GENERAL PLAN DESIGNATION:	Central Business District (CBD)
ZONING DESIGNATION:	Coastal Central Business District (C-CBD)

OTHER APPROVALS RECEIVED:	City of Arcata Design Review Approval No. 089-080-DR.
OTHER APPROVALS REQUIRED:	None
SUBSTANTIVE FILE DOCUMENTS:	(1) City of Arcata Local Coastal Program

SUMMARY OF STAFF RECOMMENDATION:

Staff recommends that the Commission find that the proposed project subject to the attached special conditions is consistent with the Chapter 3 policies of the Coastal Act.

The proposed development is located within the central business district of the City of Arcata at 575 H Street and involves: (1) the construction of a new 7,209-square-foot, 25-foot-high residential apartment building that will contain six apartment units along the west side of the parcel within a portion of the existing parking lot, and (2) remodeling an existing commercial structure and adding 573 square feet of additional commercial floor area on the ground floor along the H Street frontage and a 1,772-square-foot two-bedroom residential unit on the second story.

The project site is surrounded by existing development on all sides and has double-frontage on two, fully improved city street rights-of-way with water, sewer, and storm drain infrastructure, and public utilities in place. The redevelopment/in-fill nature of the project together with its location inland from the shoreline of Humboldt Bay within a neighborhood planned and zoned for commercial and multi-family residential use raise few issues of Coastal Act consistency. However, the proposed development does raise geologic hazard and stormwater runoff concerns.

The geotechnical report prepared for the development indicates the site is at risk of liquefaction during earthquakes which could lead to differential settlement endangering the proposed structures and tenants. The geotechnical report recommends certain design recommendations primarily involving foundation design measures to mitigate these hazards. Staff recommends that the Commission attach Special Condition No. 1 to ensure that the final construction plans incorporate these design recommendations.

Construction activities will increase erosion and sedimentation impacts. In addition, although the development will slightly reduce the amount of impervious surfaces on the site from 93% to 86%, the development will increase vehicle usage of the site, resulting in increased deposition of hydrocarbon and other contaminants that would become entrained in stormwater runoff. To reduce these impacts, the applicant has proposed the installation of stormwater runoff treatment facilities including an underground water detention/infiltration system along the western boundary of the development to treat runoff from the new apartment building and a FLoGard Lo Pro trench drain filter system the treat silt, debris, and petroleum hydrocarbons in stormwater runoff from the parking lot. To ensure that these treatment facilities are installed and maintained and that erosion

and sedimentation impacts are addressed so that the development does not contribute to cumulative significant adverse impacts to coastal waterways, staff recommends that the Commission attach Special Condition Nos. 4-5. These recommended conditions would require that: (1) all construction related debris associated with the demolition / site preparation phase of the project be promptly removed from the site and taken to an appropriate disposal facility licensed to receive construction wastes; (2) an erosion and final runoff control plan be submitted for the review and approval of the Executive Director that includes the proposed stormwater treatment facilities and certain water quality best management practices to be used both during construction and during the life of the project to minimize impacts to coastal water quality.

As conditioned, staff believes the proposed project is consistent with the Chapter 3 policies of the Coastal Act and recommends approval of the project with the above-described special conditions.

The Motion to adopt the Staff Recommendation of Approval with Conditions is found on page 3-4 below.

STAFF NOTES

1. Standard of Review

The proposed project is located within the city limits of the City of Arcata within the developed and urbanized "South of Samoa" neighborhood. The City of Arcata has a certified Local Coastal Program, but the proposed project is within an area shown on State Lands Commission maps over which the state retains a public trust interest. Filled former tidelands subject to the public trust are within the Commission's retained coastal development permit jurisdiction. Therefore, the standard of review that the Commission must apply to the project is the Chapter 3 policies of the Coastal Act.

I. MOTION, STAFF RECOMMENDATIONS, & RESOLUTIONS:

The staff recommends that the Commission adopt the following resolution:

Motion:

I move that the Commission approve Coastal Development Permit No. 1-09-036 pursuant to the staff recommendation.

Staff Recommendation of Approval:

Staff recommends a **YES** vote. Passage of this motion will result in approval of the permit as conditioned and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

Resolution to Approve Permit:

The Commission hereby approves a coastal development permit for the proposed development and adopts the findings set forth below on grounds that the development as conditioned will be in conformity with the policies of Chapter 3 of the Coastal Act. Approval of the permit complies with the California Environmental Quality Act because either: (1) feasible mitigation measures and/or alternatives have been incorporated to substantially lessen any significant adverse effects of the development on the environment; or (2) there are no further feasible mitigation measures or alternatives that would substantially lessen any significant adverse impacts of the development on the environment.

I. STANDARD CONDITIONS: See Attachment A.

II. SPECIAL CONDITIONS:

1. Minimization of Geologic Hazards

A. All recommendations of the geologic hazard report titled "Engineering Geologic Foundation and Soils Report, Proposed Multi-Family Residential Development 575 H Street, Arcata, California, Assessor's Parcel number 021-165-003," prepared by LACO Associates and dated August 5, 2009 shall be adhered to including recommendations for site preparation, structural fills, compaction standards, seismic design parameters, foundation design, pavement subgrade preparation, drainage, and all other recommendations. **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT**, the applicant shall submit, for the Executive Director's review and approval, evidence that an appropriate licensed professional has reviewed and approved all final design, construction, grading, and drainage plans and certified that each of those final plans is consistent with all of the recommendations specified in the above-referenced geologic hazard report.

B. The permittee shall undertake development in accordance with the approved final plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

2. Assumption of Risk, Waiver of Liability and Indemnity

By acceptance of this permit, the applicant acknowledges and agrees: (i) that the site may be subject to hazards from liquefaction, subsidence, and earth movement; (ii) to assume the risks to the applicant and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development; (iii) to unconditionally waive any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards; and (iv) to indemnify and hold harmless the Commission, its officers, agents, and employees with respect to the Commission's approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards.

3. State Lands Commission Review

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant shall submit to the Executive Director, for review and approval, a written determination from the State Lands Commission that:

A. No State or public trust lands are involved in the development; or

B. State or public trust lands are involved in the development and all permits required by the State Lands Commission for the approved project as conditioned by the Commission have been obtained; or

C. State or public trust lands may be involved in the development, but pending a final determination, an agreement has been made with the State Lands Commission for the approved project as conditioned by the Commission to proceed without prejudice to that determination.

4. Construction Responsibilities and Debris Removal

The permittee shall comply with the following construction-related requirements:

(a) No construction materials, debris, or waste shall be placed or stored where it may be subject to entering waters of Butchers Slough or Humboldt Bay; and

(b) All construction debris, including general wastes from the demolition of the commercial buildings and excavated asphaltic-concrete paving at the site, shall be removed and disposed of in an upland location outside of the coastal zone or at an approved disposal facility.

5. Erosion and Run-Off Control Plans

A. **PRIOR TO ISSUANCE OF COASTAL DEVELOPMENT PERMIT NO. 1-09-036**, the applicant shall submit, for review and approval of the Executive Director, final plans for erosion and run-off control.

1. EROSION CONTROL PLAN

(a) The erosion control plan shall demonstrate that:

(1) During construction, erosion on the site shall be controlled to avoid adverse impacts on adjacent properties and coastal resources from ground disturbance-related sedimentation;

(2) The following temporary erosion control measures, as described in detail within in the "California Storm Water Best Management Commercial-Industrial and Construction Activity Handbooks, developed by Camp, Dresser & McKee, et al. for the Storm Water Quality Association (http://www.cabmphandbooks.com/), shall be used during construction: Structure Construction and Painting (CA3), Material Delivery and Storage (CA10), Scheduling (ESC1), Mulching (ESC11), Stabilized Construction Entrance (ESC24), Silt Fences (ESC50), Straw Bale Barriers (ESC51), and Storm Drain Inlet Protection (ESC53);

(3) Following construction, erosion on the site shall be controlled to avoid adverse impacts on adjacent properties and coastal resources associated with entrainment of nonpoint-source pollutants from roofs, pavement, sidewalks, and other impervious surfaces; and

(4) The following permanent erosion control measures, as described in detail within in the "California Storm Water Best Management Construction Activity Handbook, developed by Camp, Dresser & McKee, et al. for the Storm Water Quality Association (http://www.cabmphandbooks.com/), shall be installed: Preservation of Existing Vegetation (ESC2), and Seeding and Planting (ESC10).

(b) The plan shall include, at a minimum, the following components:

(1) A narrative report describing all temporary run-off and erosion control measures to be used during construction and all permanent erosion control measures to be installed for permanent erosion control.

(2) A site plan showing the location of all temporary erosion control measures.

(3) A schedule for installation and removal of the temporary erosion control measures.

(4) A site plan showing the location of all permanent erosion control measures.

(5) A schedule for installation and maintenance of the permanent erosion control measures.

2. RUN-OFF CONTROL PLAN

(a) The run-off control plan shall demonstrate that:

(1) Runoff from the project shall not increase sedimentation into coastal waters;

(2) Runoff from all roofs, patios, driveways and other impervious surfaces on the site shall be collected and discharged into an underground water detention/infiltration system along the western boundary of the development to treat runoff from the new apartment building and a FLoGard Lo Pro trench drain filter system the treat silt, debris, and petroleum hydrocarbons in stormwater runoff from the parking lot. The system shall be designed to treat or filter stormwater runoff from each storm, up to and including the 85th percentile, 24-hour storm event. The detention/infiltration system and trench drain filter shall be maintained by the applicant and maintenance shall include, but not be limited to replacing filter media at least once per year;

(3) The following temporary runoff control measures, as described in detail within in the "California Storm Water Best Management Commercial-Industrial and Construction Activity Handbooks, developed by Camp, Dresser & McKee, et al. for the Storm Water Quality Association (http://www.cabmphandbooks.com/), shall be used during construction: Paving Operations (CA2), Structure Construction and Painting (CA3), Material Delivery and Storage (CA10), Solid Waste Management (CA20); Hazardous Waste Management (CA21), Concrete Waste Management (CA23), Sanitary/Septic Waste Management (CA24), Vehicle and Equipment Cleaning (CA30), Vehicle and Equipment Fueling (CA31), and Employee/Subcontractor Training (CA40); and

(4) The following permanent runoff control measures, as described in detail within in the "California Storm Water Best Management Commercial-Industrial and Construction Activity Handbooks, developed by Camp, Dresser & McKee, et al. for the Storm Water Quality Association (http://www.cabmphandbooks.com/), shall be installed: Non-Stormwater Discharges to Drains (SC1), Buildings

and Grounds Maintenance (SC10), Employee Training (SC14), Material Use (CA11), and Spill Prevention and Control (CA12).

(b) The plan shall include, at a minimum, the following components:

(1) A narrative report describing all temporary runoff control measures to be used during construction and all permanent runoff control measures to be installed for permanent runoff control;
(2) A site plan showing the location of all temporary runoff control measures;
(3) A schedule for installation and removal of the temporary runoff control measures;
(4) A site plan showing the location of all permanent runoff control measures;
(5) A schedule for installation and maintenance of the drainage media infiltration interceptor and/or oil/water separators;
(6) A site plan showing finished grades (at 1-foot contour intervals) and drainage improvements; and

B. The permittee shall undertake development in accordance with the approved final plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

6. Landscaping Restrictions

A. No plant species listed as problematic and/or invasive by the California Native Plant Society, the California Invasive Plant Council, or as may be identified from time to time by the State of California, shall be employed or allowed to naturalize or persist on the site. No plant species listed as a "noxious weed" by the governments of the State of California or the United States shall be utilized within the property that is the subject of CDP No. 1-09-036.

B. No rodenticides of any kind shall be utilized within the property that is the subject of CDP No. 1-09-036.

III. FINDINGS AND DECLARATIONS

A. Site Description

The project site is located within the central business district of downtown Arcata, at 575 H Street, at the corner of H and 6th Streets. (See Exhibits 1-4).

The 0.45-acre trapezoidal-shaped parcel is currently developed with a 3,200-square-foot commercial building in the northeast corner of the parcel and a paved parking area that covers most of the rest of the parcel except for a total of 1,670 square feet of existing landscaped area. The commercial building currently houses a thrift store that is owned by Hospice of Humboldt. An existing fence is located along the southern and western property lines. Currently, ingress and egress is from both H Street and 6th.

The subject property is located two blocks south of the central plaza of Arcata. The subject property is designated and zoned Central Business District (CBD) under the City's certified LCP. The parcel borders a residential apartment complex to the south, single-family residences to the west, a PG&E substation across 6th Street to the north, and additional single-family residences and commercial businesses across H Street to the east.

The subject site is approximately half a mile north of the current shoreline of the Arcata Bay lobe of Humboldt Bay. The flat property gently slopes with a gradient of less than two percent toward Arcata Bay. The site is situated at an elevation of approximately 15 feet above mean sea level on a broad, low-relief alluvial surface.

The City of Arcata has a certified LCP, but the site is within an area shown on State Lands Commission maps over which the state retains a public trust interest. The site is on filled former tidelands within the reclaimed former margins of the tidal slough reaches of Jolly Giant Creek / Butchers Slough. In the 1860s, this former tidal slough ran to the base of the Brizzard Company warehouse situated on the present day Arcata Plaza and served as a canal for small vessel drayage alongside the Union Wharf, Rail Track, and Plank Walk Company's railroad trestle that once extended over 1½ miles across the mudflats to the then-deepwater channels of Arcata Bay. The slough has subsequently been tide-gated and channelized, with much of the watercourse now passing through culverts beneath the City's streets, including a culvert that runs underneath the H Street frontage of the property. The completely paved and developed parcel currently contains no environmentally sensitive habitat area.

No coastal access and recreational amenities exist along Jolly Giant Creek or in close proximity to the project site. The Arcata Marsh and Wildlife Sanctuary, the Butcher Slough Restoration Project, and the Arcata Marsh Interpretative Center, the closest nearby access and coastal recreational facilities, are located approximately ¼ mile to the south.

B. Project Description

The proposed project involves: (1) the construction of a new 7,209-square-foot, 25-foot-high residential apartment building that will contain six apartment units along the west side of the parcel within a portion of the existing parking lot, and (2) remodeling the existing commercial structure and adding 573 square feet of additional commercial floor area on the ground floor along the H Street frontage and a 1,772-square-foot two-bedroom residential unit on the second story Street (See Exhibits 5-7).

The six two-bedroom apartment units of the new building will range in size from 921 square feet to 1,110 square feet. Four of the units will be two-level townhouse style units and two will be single-floor units. Three of the units will have attached one-car garages.

In addition to expanding the ground floor commercial space and adding the new apartment unit on the second floor, the remodeling of the existing commercial building involves a complete remodel of the facades of the building, the installation of a new front entry porch, potential sign locations, and improvements to allow the commercial space to be divided into two individual commercial units approximately 1,8325 and 1,686 square feet in size, respectively.

Other proposed improvements include: (1) reconfiguring the parking lot to provide a one-way driveway loop that is entered from H Street and exited on to H Street with 14 off-street parking spaces and 10 bicycle parking spaces; (2) improving the frontage along both H Street and Sixth Street with a new curb, gutter, and sidewall;(3) installing stormwater runoff treatment facilities to treat runoff from the development including an underground water detention/infiltration system along the western boundary of the development to treat runoff from the new apartment building and a FLoGard Lo Pro trench drain filter system the treat silt, debris, and petroleum hydrocarbons in stormwater runoff from the parking lot (See Exhibit 8); (4) adding an additional 1,802 square feet of landscaping to the existing 1,670 square feet of landscaping along the street frontage and within islands in the parking lot; (5) installing a solid waste/recycling area along the south side of the parcel; and (6) connecting the new residential development with water and sewer lines managed by the City and natural gas and electricity provided by PG&E..

C. Locating & Planning New Development

Summary of Coastal Act Policies:

Coastal Act Section 30250 states, in applicable part, the following:

> *(a) New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources. In addition, land divisions, other than leases for agricultural uses, outside existing developed areas shall be permitted only where 50 percent of*

> *the usable parcels in the area have been developed and the created parcels would be no smaller than the average size of surrounding parcels.*

…

Section 30250(a) of the Coastal Act states in part that new development shall be located within or near existing developed areas able to accommodate it or in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources. The intent of this policy is to channel development toward more urbanized areas where services are provided and potential impacts to resources are minimized.

Consistency Analysis

The proposed development is situated within the Coastal Central Business District (C-CBD) where apartments are allowed as a principally-permitted use. The project is located in a developed area that is adequately served with water, sewer, public road infrastructure and other municipal services. In addition, electrical, natural gas, and telecommunication public utilities are available from either of the parcels street frontages.

Based on the above conditions, the proposed development is consistent with Coastal Act Section 30250(a) to the extent that it is located in a developed area with adequate water, sewer, utility, transportation, and other public service capabilities, and as conditioned herein, will not have significant adverse effects, either individually or cumulatively, on coastal resources. Therefore, Commission finds that the proposed project is consistent with Section 30250 of the Coastal Act.

D. Geologic Hazards

Summary of Coastal Act Policies:

Coastal Act Section 30253 states in applicable part:

> *New development shall do all of the following:*
>
> *(1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*

Consistency Analysis:

Coastal Act Section 30253 requires in applicable part that new development minimize risks to life and property in areas of high geologic, flood, and fire hazard and neither create nor contribute significantly to erosion or geologic instability.

The project site is located approximately half a mile north of the current shoreline of the Arcata Bay lobe of Humboldt Bay. The flat property gently slopes with a gradient of less than two percent toward Arcata Bay. The site is situated at an elevation of approximately 15 feet above mean sea level on a broad, low-relief alluvial surface. As discussed above, the site is on filled former tidelands within the reclaimed former margins of the tidal

slough reaches of Jolly Giant Creek / Butchers Slough. Much of the watercourse now passes through culverts buried beneath City streets, including a culvert that runs underneath the H Street frontage of the subject property.

A geotechnical investigation of the site was performed by LACO Associates, which prepared a report dated August 5, 2009 (See Exhibit 9). The geotechnical report indicates that the project site is underlain by unconsolidated Holocene alluvial deposits composed of coarse to fine-grained sand and silt with variable amounts of gravel in areas of the former stream channels. Bay margin deposits composed of clay and interbedded organic-rich silts are present at depths in excess of 24-feet below ground surface. The report indicates that soils within the upper 40-feet of the ground surface are of generally low density and are saturated.

The geotechnical investigation evaluated potential geologic hazards that might affect the site and the geotechnical report indicates the primary geologic hazard affecting the site is the potential for liquefaction. As the subject site is relatively flat, the site is not subject to bluff retreat or landsliding, and the report indicates that the site is not within the 100-year flood zone and not within a predicted tsunami run-up zone. Although the site is within a seismically active region, the project site is not located within an Alquist-Priolo Earthquake fault zone and based on the distance between the project site and nearest fault trace, the potential for surface fault rupture to occur within the boundaries of the property is low.

Liquefaction is the loss of soil strength, resulting in fluid mobility through the soil. Liquefaction typically occurs during earthquakes when uniformly-sized, loose, saturated sands or silts that are subjected to repeated shaking in areas where the groundwater is less than 50 feet below grade surface. The Geotechnical investigation included a qualitative assessment of the potential for liquefaction to occur at the site based on available published mapping, silt hype, the depth-to-groundwater, and the review of previous geotechnical investigations conducted at nearby sites. The assessment indicates that there is a high risk of liquefaction associated with the design basis earthquake. A liquefaction event could lead to dynamic settlement of the soils underlying the buildings.

The geotechnical report indicates that although the risks of seismic shaking, liquefaction, and dynamic settlement are high and have the potential to cause structural damage if left unmitigated, the risks are typical of the Humboldt Bay and north coast region and are assumed by other developments in the area. The report includes a number of recommendations to reduce the potential consequences of the identified geologic hazards. The recommendations address site grading, soil compaction, structural fills, foundation design, seismic design criteria, pavement design, landscaping, and site drainage. The recommendations are found in Section 6 of the geotechnical report, which is reproduced in part, and included as part of Exhibit 9 of the Commission staff report (pages 15-22). The principal recommendations concern foundation design. The report states that due to the high groundwater, the soft to loose soils, and the liquefaction hazards, a standard

"code" foundation design is not appropriate for this site. The report recommends two options for foundation design at the site, including (1) a shallow foundation design consisting of a structural mat supported on a 2.5-foot-thick section of controlled (structural) fill, or (2) a reinforced concrete mat foundation supported on a deep foundation to reduce the risk of slab deformation, settling, and/or tilting during a liquefaction event.

To ensure that the proposed residential structures are developed consistent with the foundation and other recommendations of the geotechnical report to mitigate potential geologic hazards affecting the site, the Commission attaches Special Condition No. 1, which requires that the final construction plans for the development adhere to the design recommendations specified in the geotechnical report. In addition, the condition requires the applicant submit evidence that an appropriate licensed professional has reviewed and approved all final design, construction, grading, and drainage plans and certified that each of those final plans is consistent with all of the recommendations specified in the above-referenced geologic report.

Special Condition No. 2 requires the landowner to assume the risks of extraordinary erosion and geologic hazards of the property and waive any claim of liability on the part of the Commission. Given that the applicants have chosen to implement the project despite these risks, the applicants must assume the risks. In this way, the applicants are notified that the Commission is not liable for damage as a result of approving the permit for development. The condition also requires the applicants to indemnify the Commission in the event that third parties bring an action against the Commission as a result of the failure of the development to withstand hazards.

The Commission thus finds that the proposed development, as conditioned, is consistent with Section 30253 of the Coastal Act as the development as conditioned will minimize risks to life and property of geologic hazards. Only as conditioned is the proposed development consistent with Section 30253 of the Coastal Act.

E. Protection of Marine Resources & Coastal Water Quality

Summary of Coastal Act Policies:

Coastal Act Section 30231 states the following:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Consistency Analysis:

Runoff from the project site flows via "H" Street to Butchers Slough, which in turn flows to Arcata Bay. The proposed development would impact the water quality of these water bodies both during construction and after project completion.

Water Quality Impacts from Project Construction

Excavation of the site to remove pavement for construction of the proposed apartment complex development would expose demolition debris and loosened soil to stormwater runoff. Stormwater runoff flowing across the site could entrain loose soil materials that could in turn drain out onto the adjoining street frontage and eventually enter flow into Butchers Slough and Arcata Bay, adversely affecting water quality.

Therefore, the Commission attaches Special Condition Nos. 4 and 5. Special Condition No. 4 requires that efforts be taken to ensure that in the handling and storage of construction materials, demolition debris, and other wastes no such materials be allowed to enter the waters of Butchers Slough or Humboldt Bay. Special Condition No. 4 further requires that all debris and waste be removed for the project site and disposed of in an upland location outside of the coastal zone or at an approved disposal facility. Special Condition No. 5 requires approval of final erosion and runoff plans prior to permit issuance, incorporating various erosion and runoff control measures. The plans are required to ensure that appropriate best management practices (BMPs) to control runoff and prevent spills are implemented in light of expected precipitation events or construction mishaps. These BMPs include such measures as timing the construction to occur during times with low probability of storm events, use of earthen diking, straw bales and debris fencing barriers to intercept and divert any stormwater runoff that may occur away from the excavation area, mulching and re-seeding the area upon completion of demolition- and construction-related ground disturbing activities, and training of employees in the use of BMPs.

Water Quality Impacts from Completed Project

Currently, approximately 93% of the project site is covered in impervious surfaces in the form of the existing building and the paved parking and driveway areas. Site drainage that does not otherwise infiltrate into these unpaved portions of the site sheet-flows from the roof and parking lot into a curbside gutters along the site's Sixth Street and "H" Street frontages. These flows then continue to the south down South "H" Street, enter a drop-inlet before being discharged through a tide gate into a channel of Butchers Slough at the northeast corner of the Arcata Marsh and Wildlife Sanctuary (AM&WS).

Arcata Bay, its feeder creeks and the surrounding agricultural, public facility, and open space lands provide habitat for a diversity of wildlife. The AM&WS/Butchers Slough Restoration Area is habitat for a wide variety of resident and migratory waterfowl,

shorebirds, wading birds, songbirds, and raptors. A smaller number of mammals, amphibians and reptiles also inhabit the area. Several species of fish are found in the project vicinity including the tidewater goby (Eucyclogobius newberryi), a federally-listed endangered species, coho salmon (Oncorhynchus kisutch), listed as endangered federally and as a threatened species in California, steelhead (Oncorhynchus mykiss) a state-listed threatened species, and coastal cutthroat trout (Oncorhynchus clarki), a California species-of-special-concern. Numerous avian species are known to commonly roost and forage at the site include the northern harrier (Circus cyaneus), white-tailed kite (Elanus leucurus), Great blue heron (Ardea herodias), Snowy egret (Egretta thula), and Black-crowned night heron (Nycticorax nycticorax).

Pollutants within stormwater runoff from multi-family residential uses have the potential to degrade the water quality of the aquatic environment. Parking lots contain pollutants such as heavy metals, oil and grease, and polycyclic aromatic hydrocarbons that deposit on these surfaces from motor vehicle traffic. In addition, outdoor maintenance equipment, routine washing, re-painting, and carpet steam-cleaning have the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the stormwater conveyance system.

Upon completion of construction, impervious coverage of the 19,799-square-foot parcel would be reduced from 18,337 square-feet to 17.054-square-feet or from roughly 93% to approximately 86% of the site by the inclusion of additional landscaping. Although the amount of runoff from the site after project construction will be slightly reduced because of the small reduction in impervious surfaces, the development will significantly increase the number of vehicles using the site and consequently the amount of hydrocarbon and other contaminants that will become entrained in the runoff from the parking lot.

For development projects other than single-family residences where the project improvements would result in stormwater runoff that has the potential to contain entrained pollutants that could adversely impact coastal waters, the Commission generally attaches a special condition to the coastal development permit requiring the permittee to provide appropriate best management practices in the form of on-site infiltration interceptors or retention basins to prevent impacts to coastal water quality.

As proposed, the project includes the installation of such stormwater runoff treatment facilities. An underground water detention/infiltration system will be installed along the western boundary of the development to treat runoff from the new apartment building. In addition, a FLoGard Lo Pro trench drain filter system is proposed near the driveway entrance to the property off of H Street to treat the silt, debris, and petroleum hydrocarbons in the stormwater runoff from the parking lot (See Exhibit 8). Both the detention/infiltration system and the FLoGard Lo Pro trench drain filter system have been designed to treat the volume of runoff that would be generated by the 85th percentile, 24-hour storm event.

Special Condition No. 5 requires approval of final runoff control plans prior to permit issuance to insure that the development incorporates these proposed stormwater runoff treatment facilities. The special condition also requires other appropriate runoff control measures including a requirement that the applicant maintain the detention/infiltration system and trench drain filter system and replace drainage filters at least once per year.

The Commission finds that as conditioned, the project is consistent with Section 30231 as the biological productivity and quality of coastal waters will be maintained.

F. Visual Resources

Summary of Coastal Act Policies:

Section 30251 of the Coastal Act states:

> *The scenic and visual qua1ities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas and, where feasible, to restore and enhance visual qua1ity in visually degraded areas. New development in highly scenic areas…shall be subordinate to the character of its setting.*

Consistency Analysis:

The project is located within an urbanized neighborhood approximately half a mile from Arcata Bay. The neighborhood is developed with a mixture of single- and multi-family residential, general-commercial, professional office, and public facility uses. Structures housing these uses range in size and bulk from single-story homes of approximately 1,000 square-feet to two-story apartment buildings with several thousand square-feet of floor area. Building styles are similar diverse, consisting of an assortment of wood-frame and metal structures topped by flat, gabled, and hip roofs with a variety of exterior finishes. The subject property is currently developed with a small two-story commercial building built many years ago that currently houses a hospice thrift shop.

The proposed project includes: (1) the construction of a new 7,209-square-foot, 25-foot-high residential apartment building that will contain six apartment units along the west side of the parcel within a portion of the existing parking lot, (2) remodeling the existing commercial structure and adding 573 square feet of additional commercial floor area on the ground floor along the H Street frontage and a 1,772-square-foot two-bedroom residential unit on the second story, and (3) associated peripheral private & shared open space amenities, and off-street parking improvements. The proposed wood-framed building apartment building would be constructed with lap-board siding and would be consistent in design theme with the proposed remodeling of the existing commercial building.

The project would approximate in scale and bulk other development in the immediate area. Construction of the site improvements would involve no alteration of natural landforms. Further, the proposed project would result in new and remodeled residential/commercial buildings s of a design and appearance that would be compatible with nearby development. In addition, given the variety of building types and styles in the South of Samoa neighborhood, the character of the surrounding area could best be described as "eclectic." The City of Arcata Historic and Design Review Commission reviewed and approved the development on October 14, 2009. The local Commission made the following finding:

> The Commission finds the infill project to be compatible with the "Central" Conservation Area, based on the project's design, architectural elements, materials, height, and scale, that will be consistent with commercial buildings located in the downtown Arcata business district. The Commission finds that the project design elements, 2-story height, and materials proposed for the residential apartments will contain a design theme that is internally consistent with that of the property's remodeled commercial building. The project's design and height will not adversely impact, or overshadow, the residential scale or setting of the adjacent potential historic structure. The Commission finds that the type, location and proportion of the project's windows, doors, materials, use of bay windows, different siding materials, roof trim and detailing, and overall design theme provides consistency and visual compatibility both with the project site and the surrounding neighborhood.

The Coastal Commission therefore finds that as: (1) views to and along the ocean have been protected through the project being located well inland of the coast; (2) natural landform alteration would be minimized; and (3) the new development would be visually compatible with the character of surrounding areas, the proposed project as conditioned is consistent with Coastal Act Section 30251.

F. Public Trust Lands.

As former tidelands, the project site is located in an area subject to the public trust. Therefore, to ensure that the applicant has the necessary authority to undertake all aspects of the project on these public lands, the Commission attaches Special Condition No. 3, which requires that the project be reviewed and where necessary approved by the State Lands Commission prior to the issuance of a permit.

G. California Environmental Quality Act

The City of Arcata was the lead agency on the project for the purposes of CEQA review. On February 22, 2010, the City determined that the development was categorically

exempt from the need to prepare and Environmental Impact Report pursuant to Sections 15301 New Construction, Class 3, and 15332 In-fill Development Projects, Class 32 of the CEQA Guidelines.

Section 13906 of the Commission's administrative regulation requires Coastal Commission approval of Coastal Development Permit applications to be supported by a finding showing the application, as modified by any conditions of approval, is consistent with any applicable requirements of the California Environmental Quality Act (CEQA). Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are any feasible alternatives or feasible mitigation measures available, which would substantially lessen any significant adverse effect the proposed development may have on the environment.

The Commission incorporates its findings on Coastal Act consistency at this point as if set forth in full. Those findings address and respond to all public comments regarding potential significant adverse environmental effects of the project that were received prior to preparation of the staff report. As discussed above, the proposed project has been conditioned to be consistent with the policies of the Coastal Act. As specifically discussed in these above findings, which are hereby incorporated by reference, mitigation measures that will minimize or avoid all significant adverse environmental impacts have been required. As conditioned, there are no other feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse impacts, which the activity may have on the environment. Therefore, the Commission finds that the proposed project, as conditioned to mitigate the identified impacts, can be found consistent with the requirements of the Coastal Act and to conform to CEQA.

EXHIBITS:

1. Regional Location Map
2. Vicinity Map
3. Parcel Map
4. Aerial Photos
5. Site Plan
6. Building Elevations
7. Floor Plans
8. Stormwater Runoff Treatment Facilities
9. Geologic Report Excerpts

ATTACHMENT A

STANDARD CONDITIONS

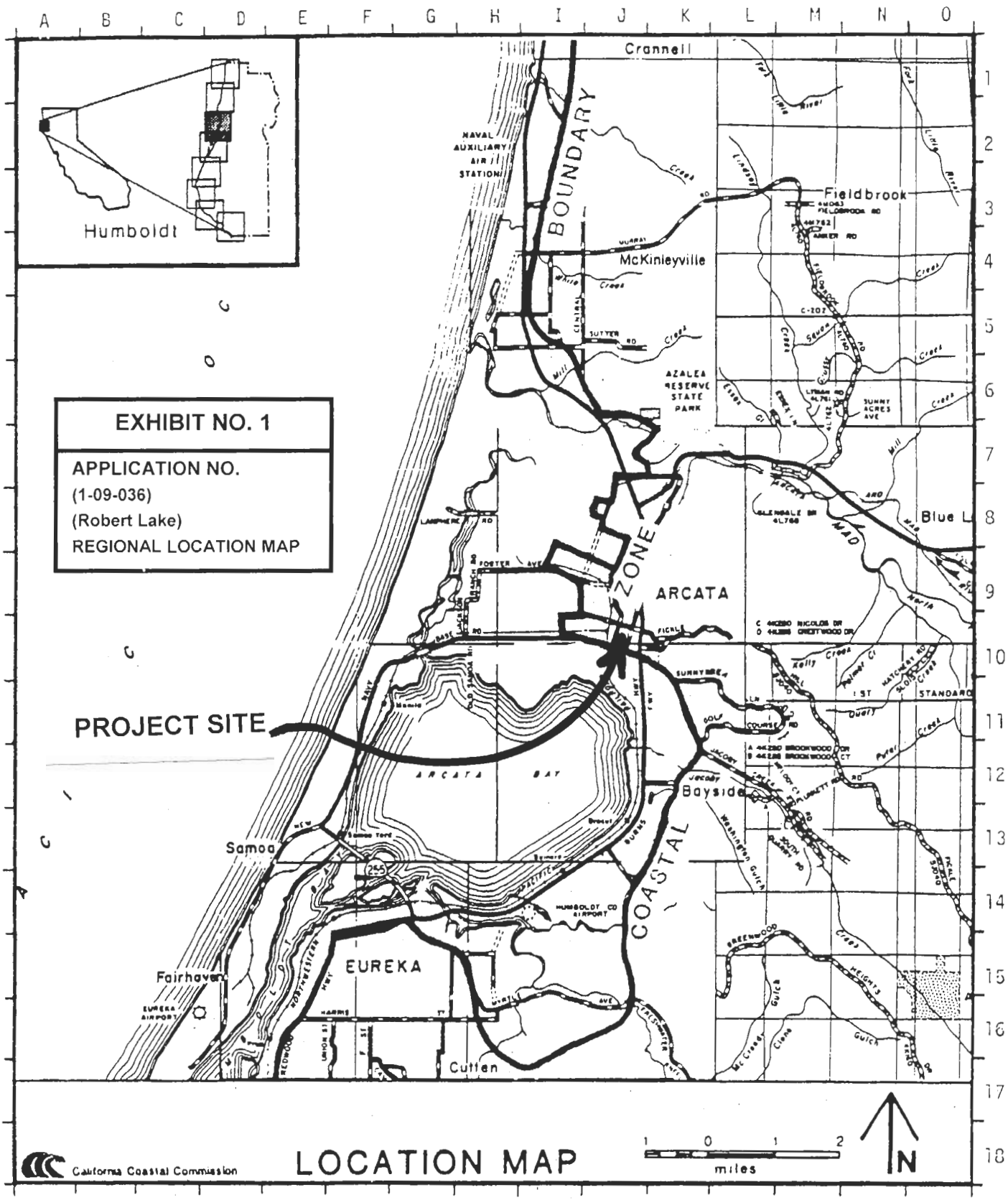
1. Notice of Receipt and Acknowledgement. The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. Expiration. If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable amount of time. Application for extension of the permit must be made prior to the expiration date.

3. Interpretation. Any questions of intent of interpretation of any condition will be resolved by the Executive Director of the Commission.

4. Assignment. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

5. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.



County of Humboldt

LACO ASSOCIATES CONSULTING ENGINEERS 21 W 4TH ST. EUREKA, CA 95501 (707)443-5054	PROJECT	ENGINEERING GEOLOGIC/FOUNDATION AND SOIL REPORT	BY	JB	FIGURE
	CLIENT	ROBERT LAKE	DATE	7/2/09	1
	LOCATION	575 H STREET, ARCATA, CA.	CHKD	GAV	JOB NO
		LOCATION MAP	SCALE	1"=2000'	6933.03

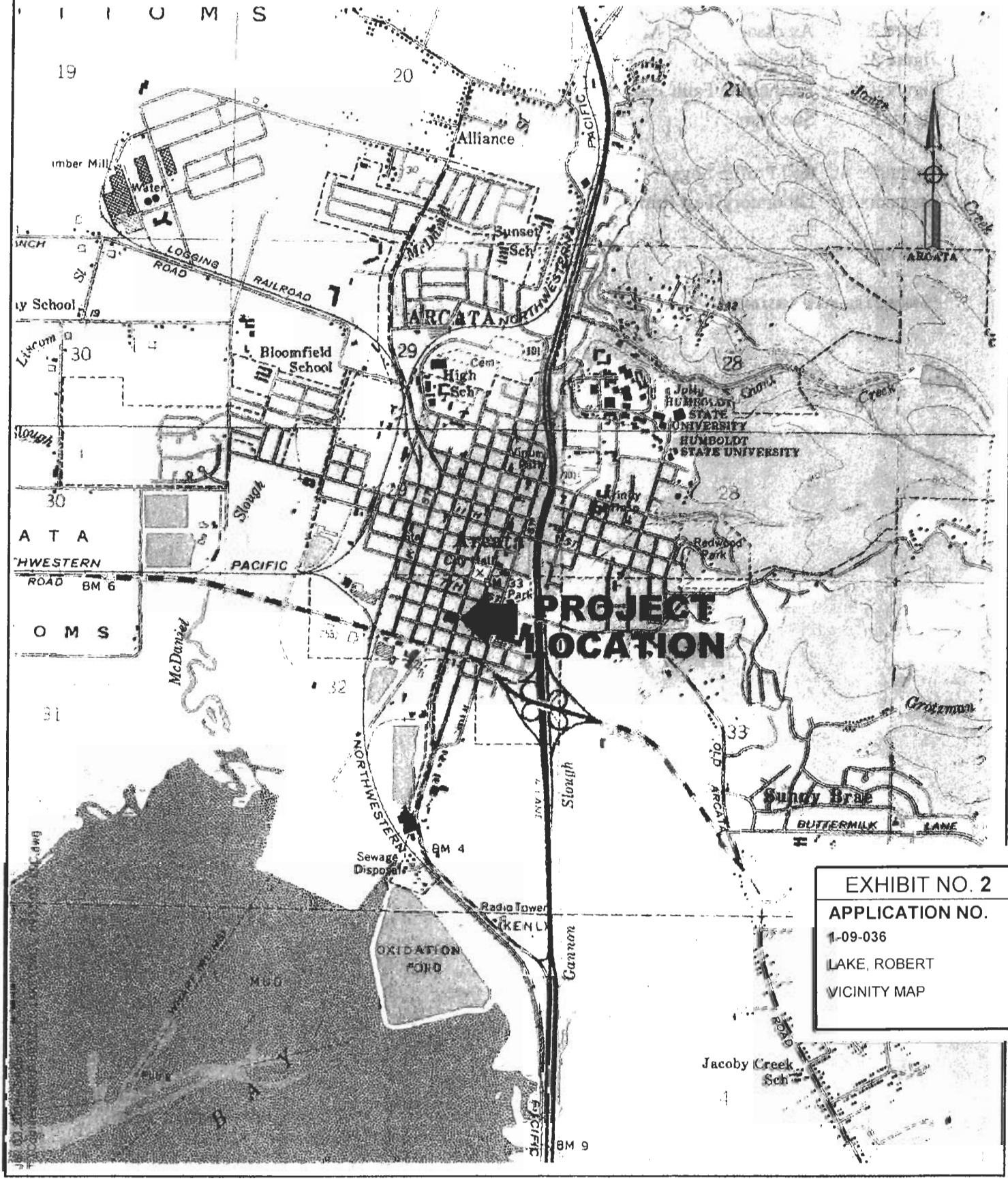


EXHIBIT NO. 2

APPLICATION NO.

1-09-036

LAKE, ROBERT

VICINITY MAP

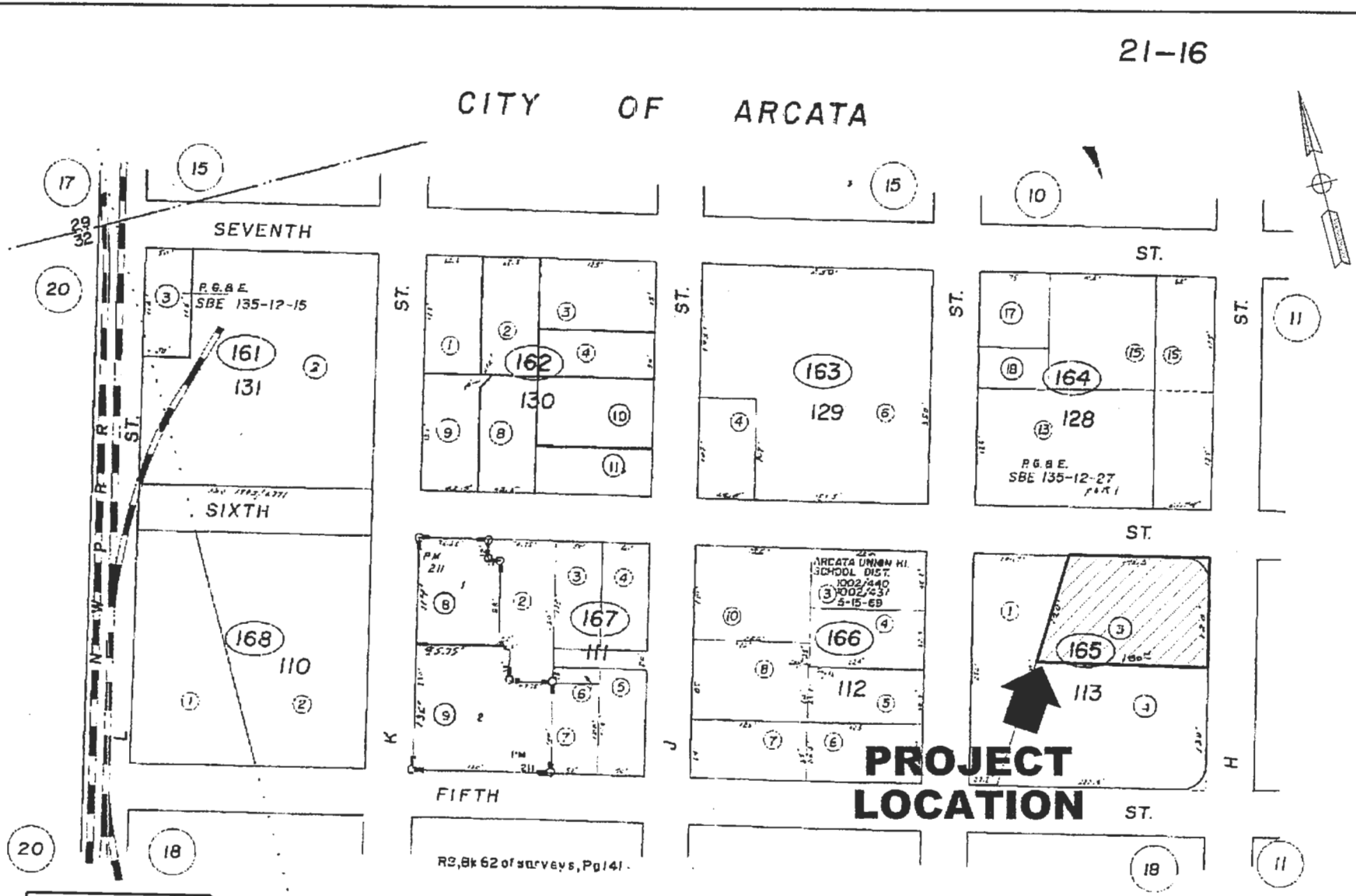


EXHIBIT NO. 3

APPLICATION NO.

1-09-036

LAKE, ROBERT

PARCEL MAP

LACO ASSOCIATES CONSULTING ENGINEERS 21 W 4TH ST. EUREKA, CA 95501 (707)443-5054	PROJECT: ENGINEERING GEOLOGIC/FOUNDATION AND SOIL REPORT	BY: JB	FIGURE: 2
	CLIENT: ROBERT LAKE	DATE: 7/2/09	
	LOCATION: 575 H STREET, ARCATA, CA.	CHECK: GAV	JOB NO: 6933.03
	APN MAP	SCALE: N.T.S.	

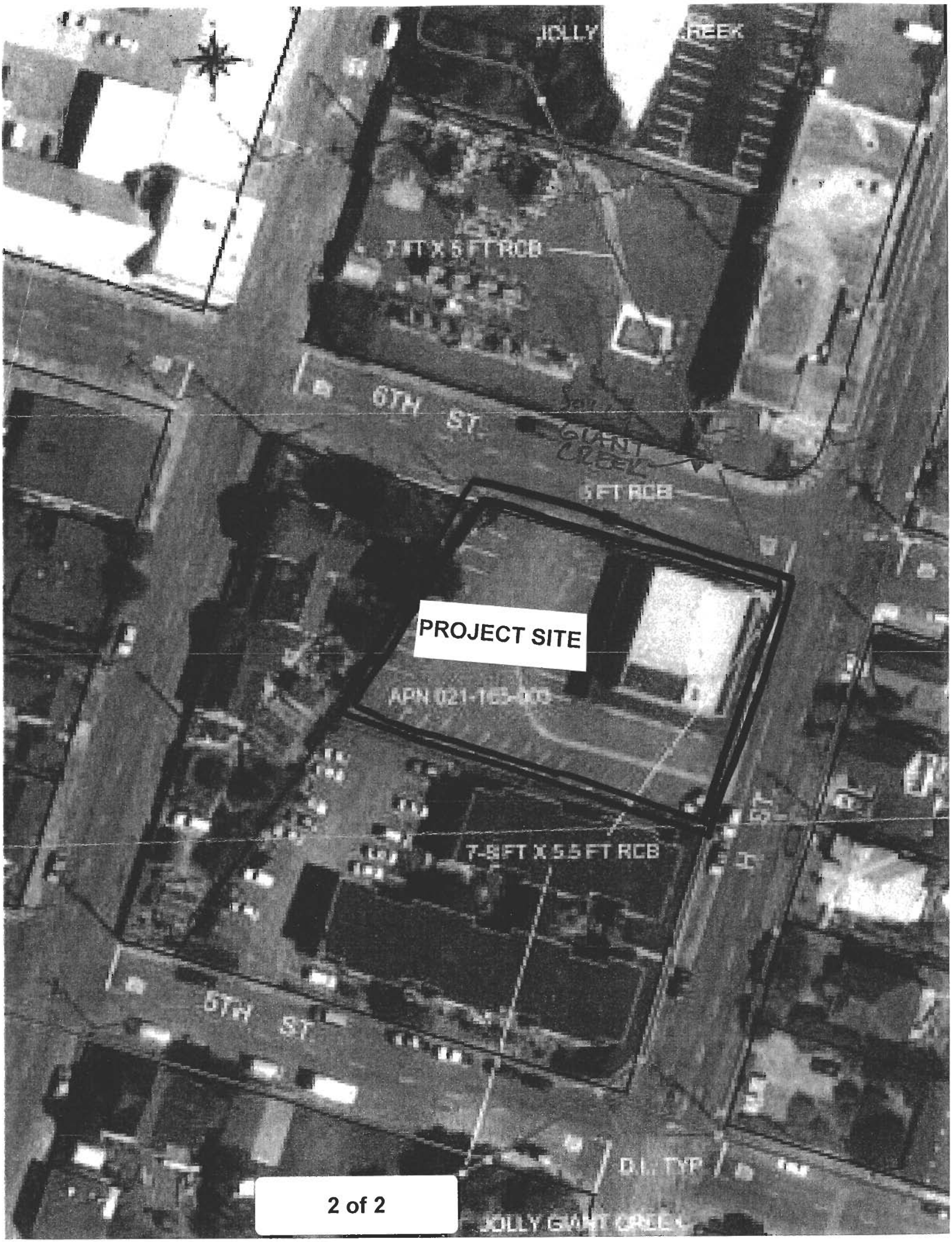
Jul 02,2009-3:39pm
T:\Cadfiles\6900\6933.03 LAKE\dwg\ 6933 AP MAP.dwg

LACO ASSOCIATES
ENGINEERS · GEOLOGISTS · ENVIRONMENTAL CONSULTANTS
21 W. 4th St. · PO Box 1023 · Eureka, CA 95502 · 707.443.5054

PROJECT	Lake Apartments Design Review	BY	TKF	FIGURE
CLIENT	Robert Lake	DATE	09/28/09	1
LOCATION	6th and H Streets, Arcata, CA	CHECK		PROJECT NO.
	Location Map	SCALE	1" = 500'	6933.03

EXHIBIT NO. 4
APPLICATION NO.
1-09-036
LAKE, ROBERT
AERIAL PHOTOS (1 of 2)

P:\6900\6933 Robert Lake\6933.03 575 H St. Arcata\3-Figures and Maps\GIS\6933_Fig1Loc.mxd


JOLLY
CREEK
7 FT X 5 FT RCB
6TH ST.
5 FT RCB
PROJECT SITE
APN 021-165-
7-5FT X 5.5 FT RCB
6TH ST.
D.I. TYP.
JOLLY GIANT CREEK

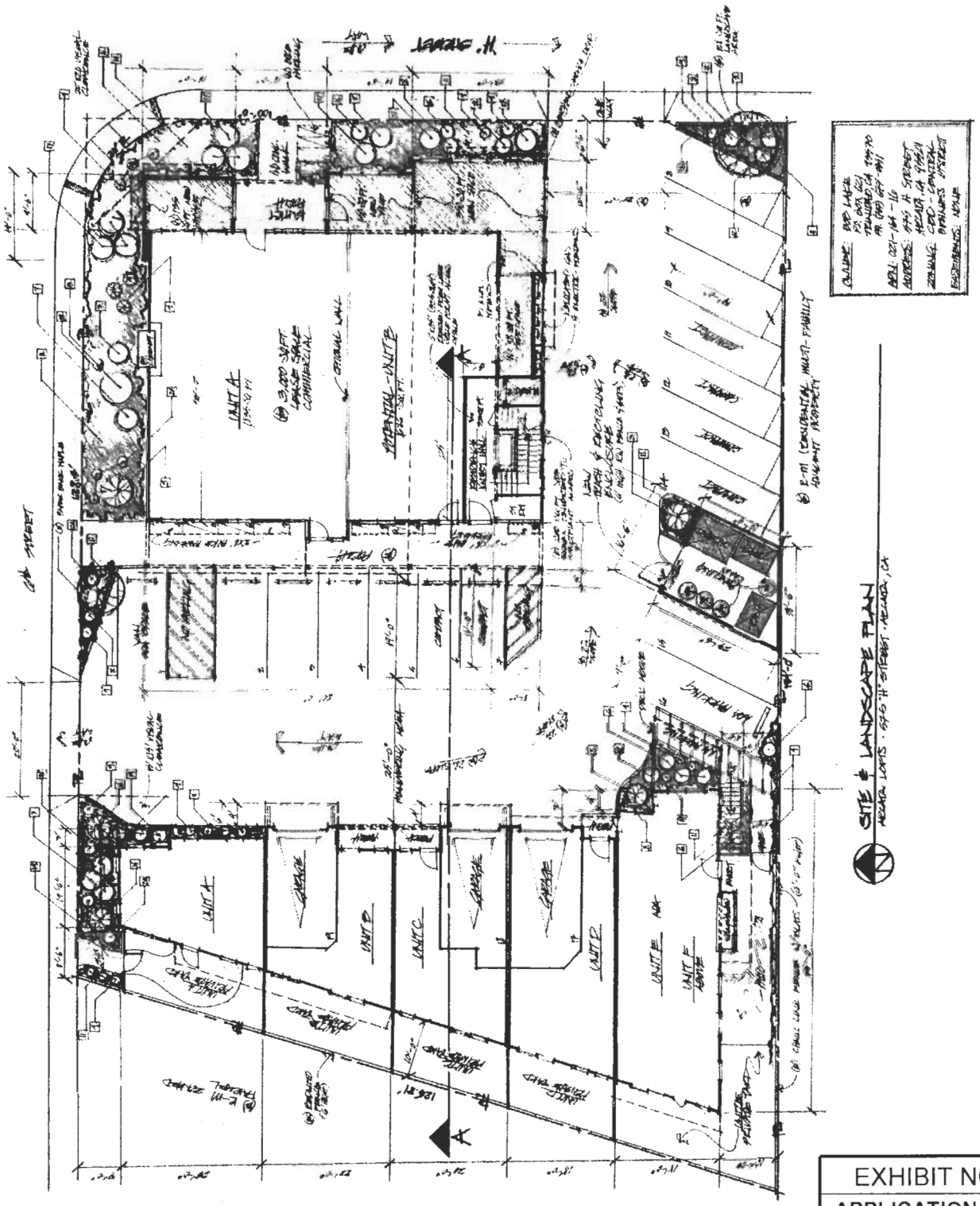


EXHIBIT NO. 5

APPLICATION NO.

1-09-036

LAKE, ROBERT

SITE PLAN

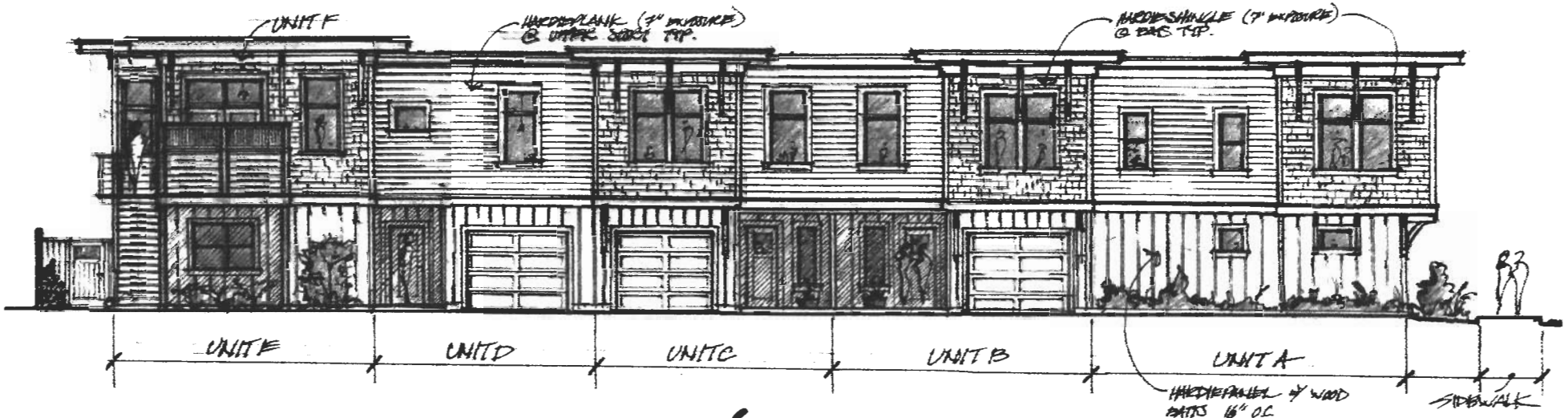
EXHIBIT NO. 6

APPLICATION NO.
1-09-036

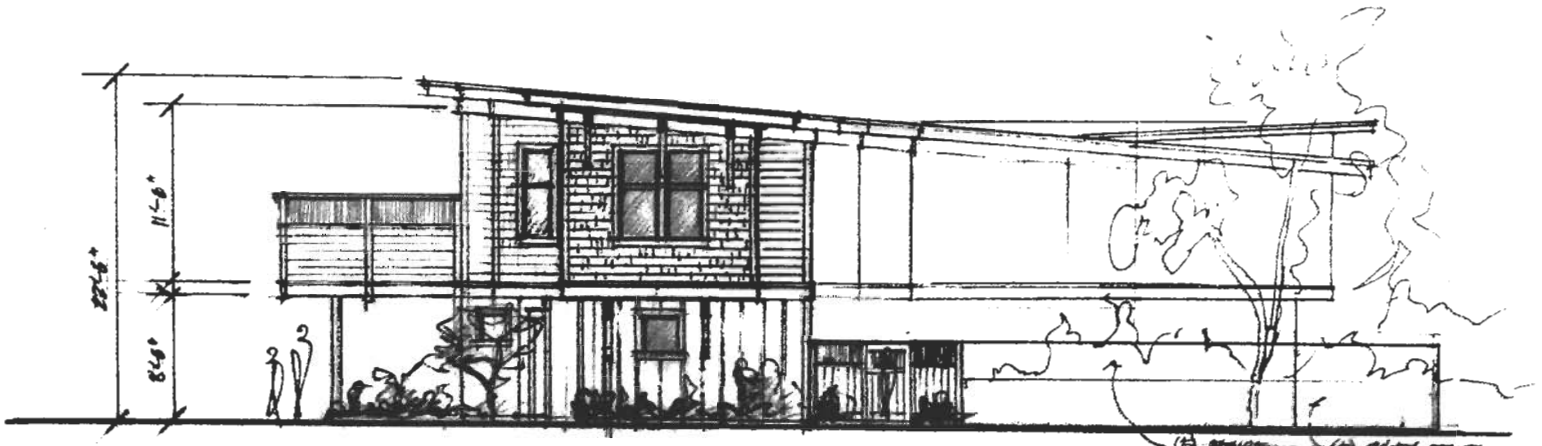
LAKE, ROBERT

BUILDING ELEVATIONS
(1 of 5)

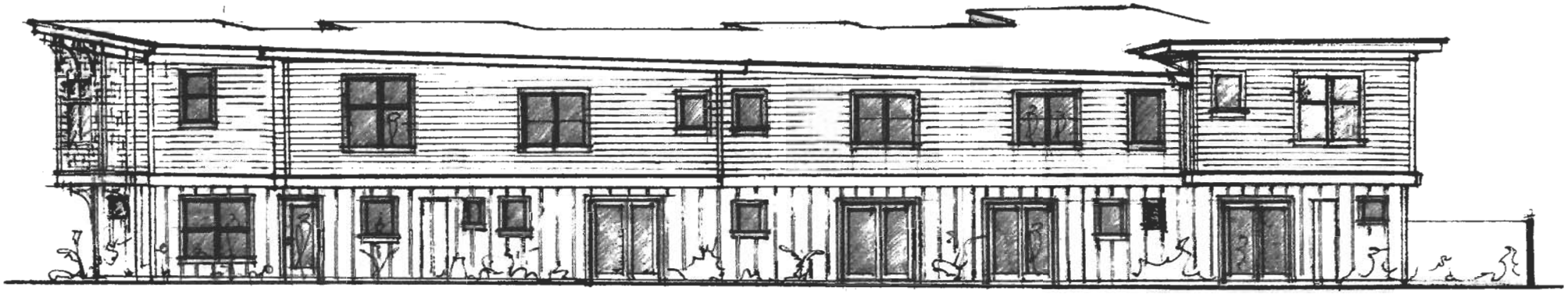
■ SOUTH ELEVATION (NEW APARTMENT BLDG.)
SCALE 1/8"=1'-0"



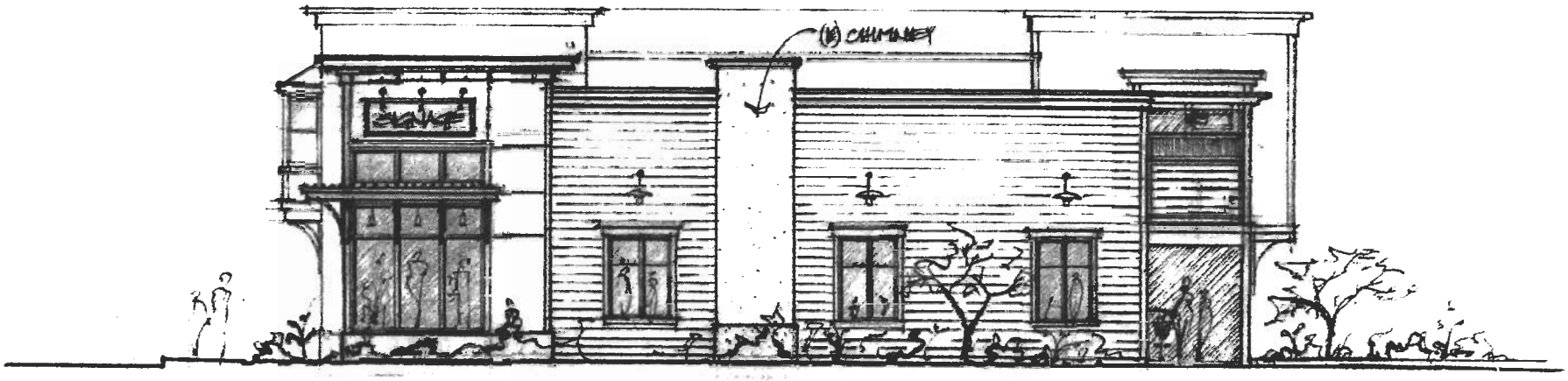
■ EAST ELEVATION (NEW APARTMENT BLDG.)
SCALE 1/8"=1'-0"



■ NORTH ELEVATION (NEW APARTMENT BLDG.)
SCALE 1/8" = 1'-0"

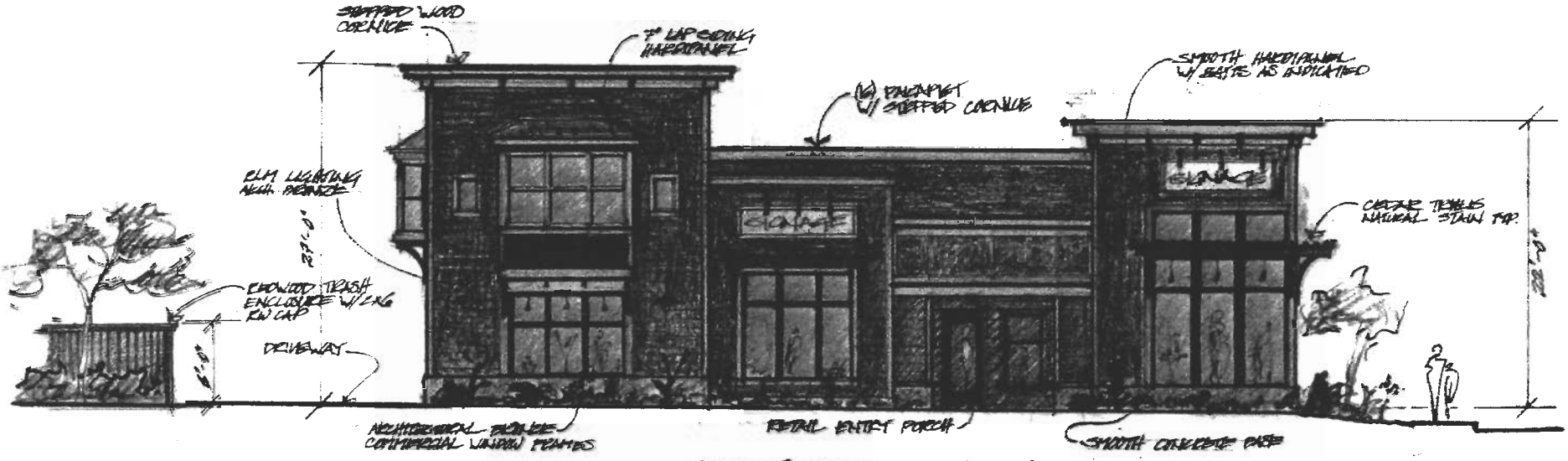


■ WEST ELEVATION (NEW APARTMENT BLDG.)
SCALE 1/8" = 1'-0"



NORTH ELEVATION

SCALE 1/8" = 1'-0"

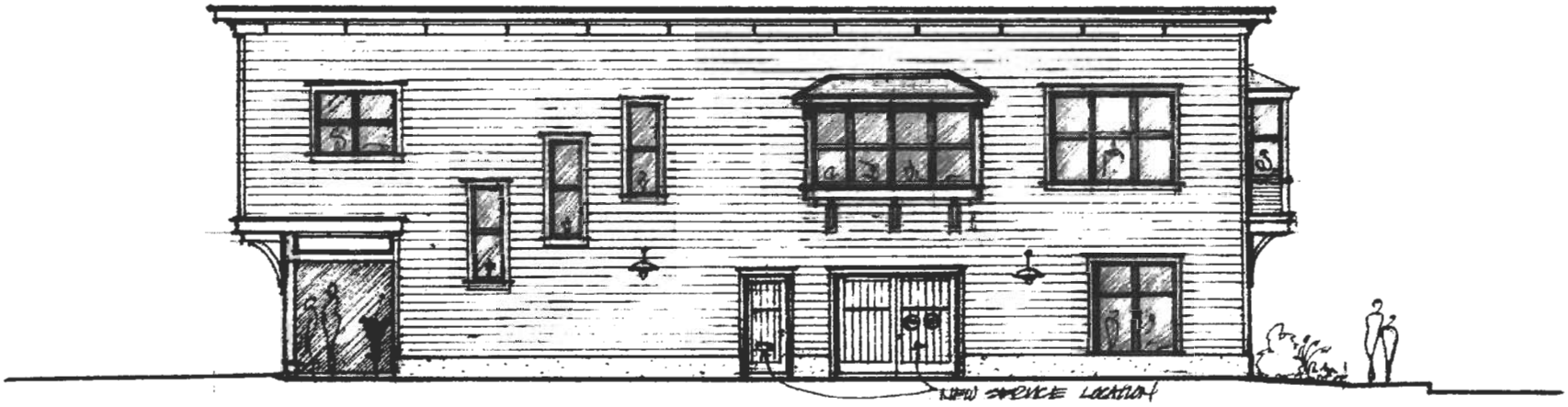


EAST ELEVATION

SCALE 1/8" = 1'-0"

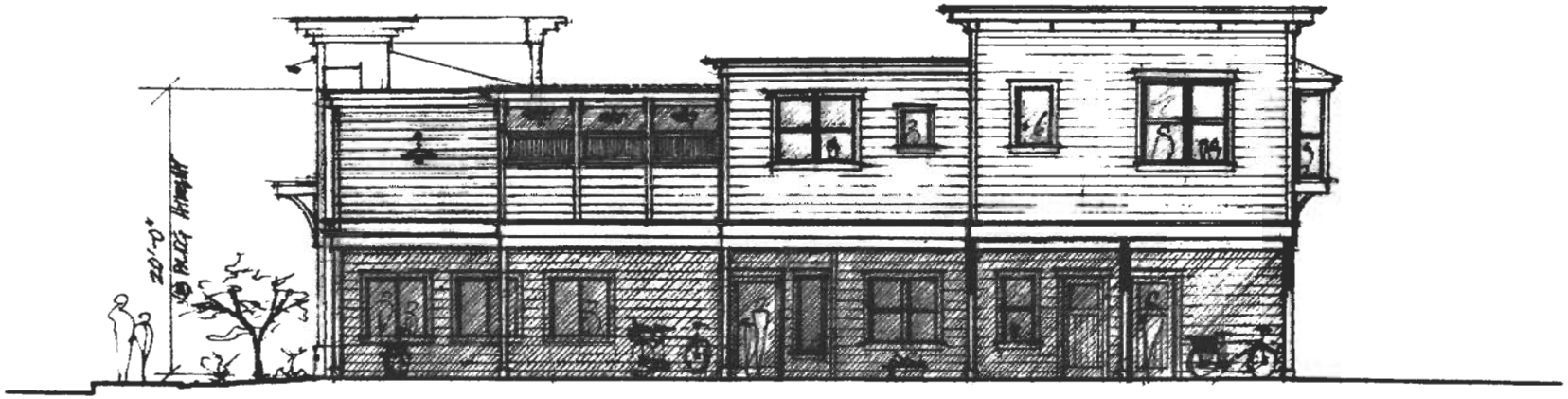
3 & 5

(BUILDING TO BE REMODELED)



SOUTH ELEVATION

SCALE 1/8" = 1'-0"

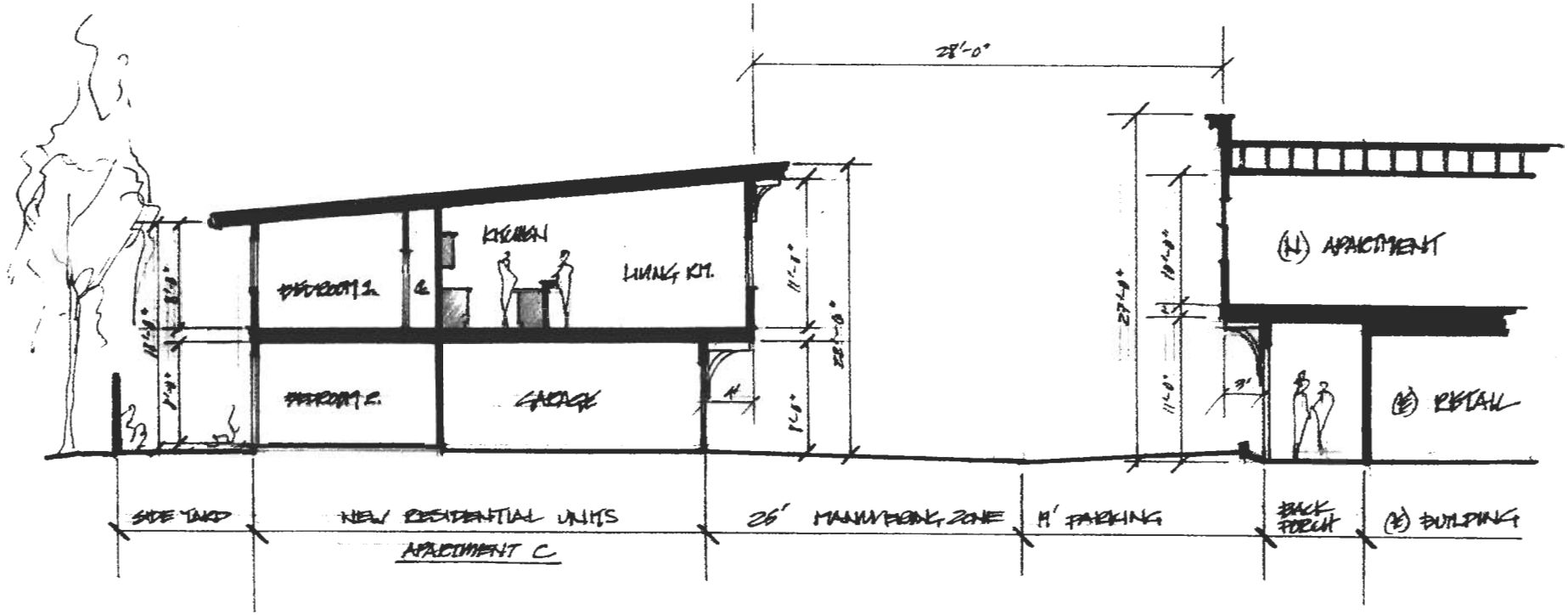


WEST ELEVATION

SCALE: 1/8" = 1'-0"

E 9 5'

(BUILDING TO BE REMODELLED)



SECTION A-A

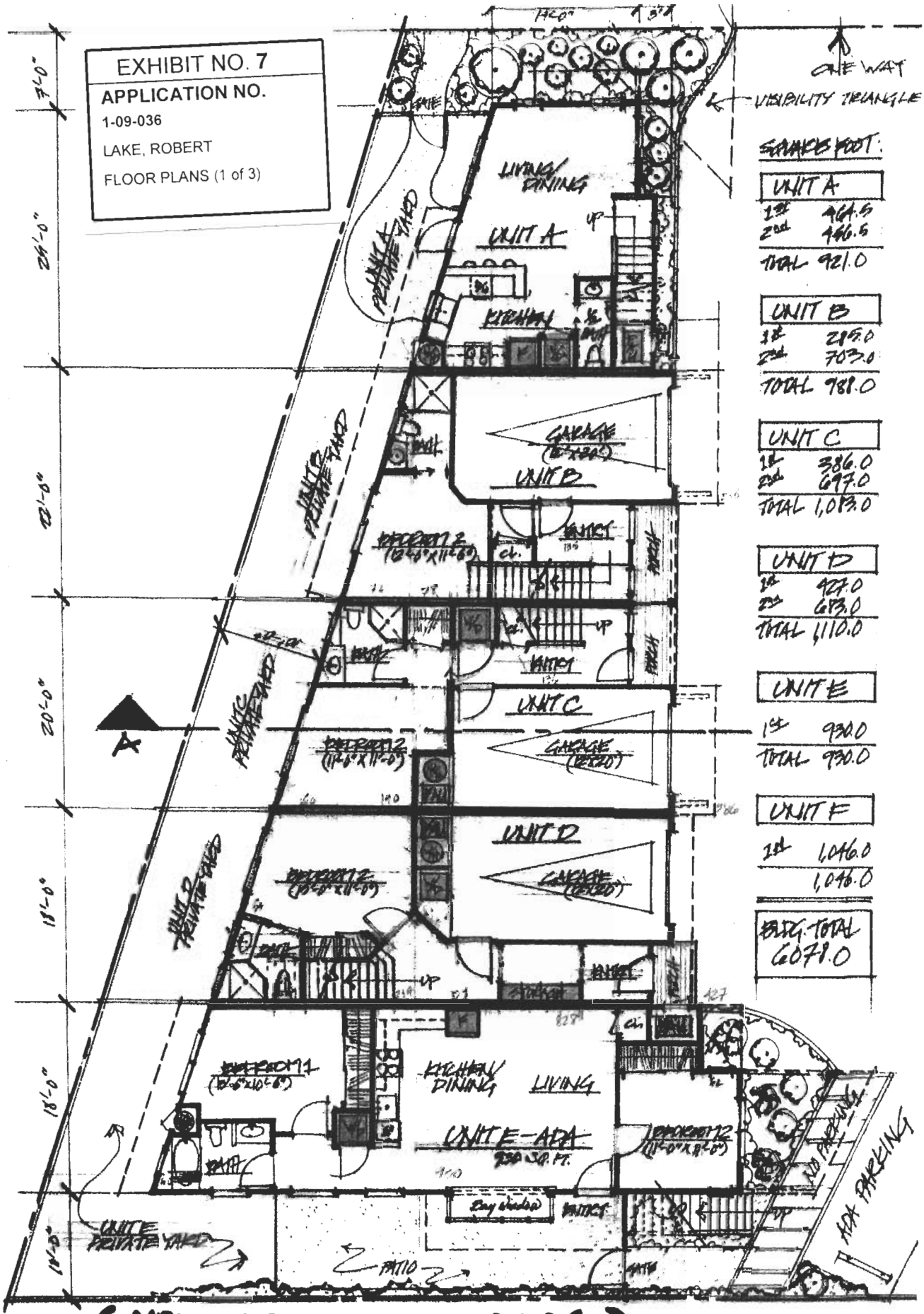
SCALE 1/8" = 1'-0"

EXHIBIT NO. 7

APPLICATION NO.
1-09-036

LAKE, ROBERT

FLOOR PLANS (1 of 3)



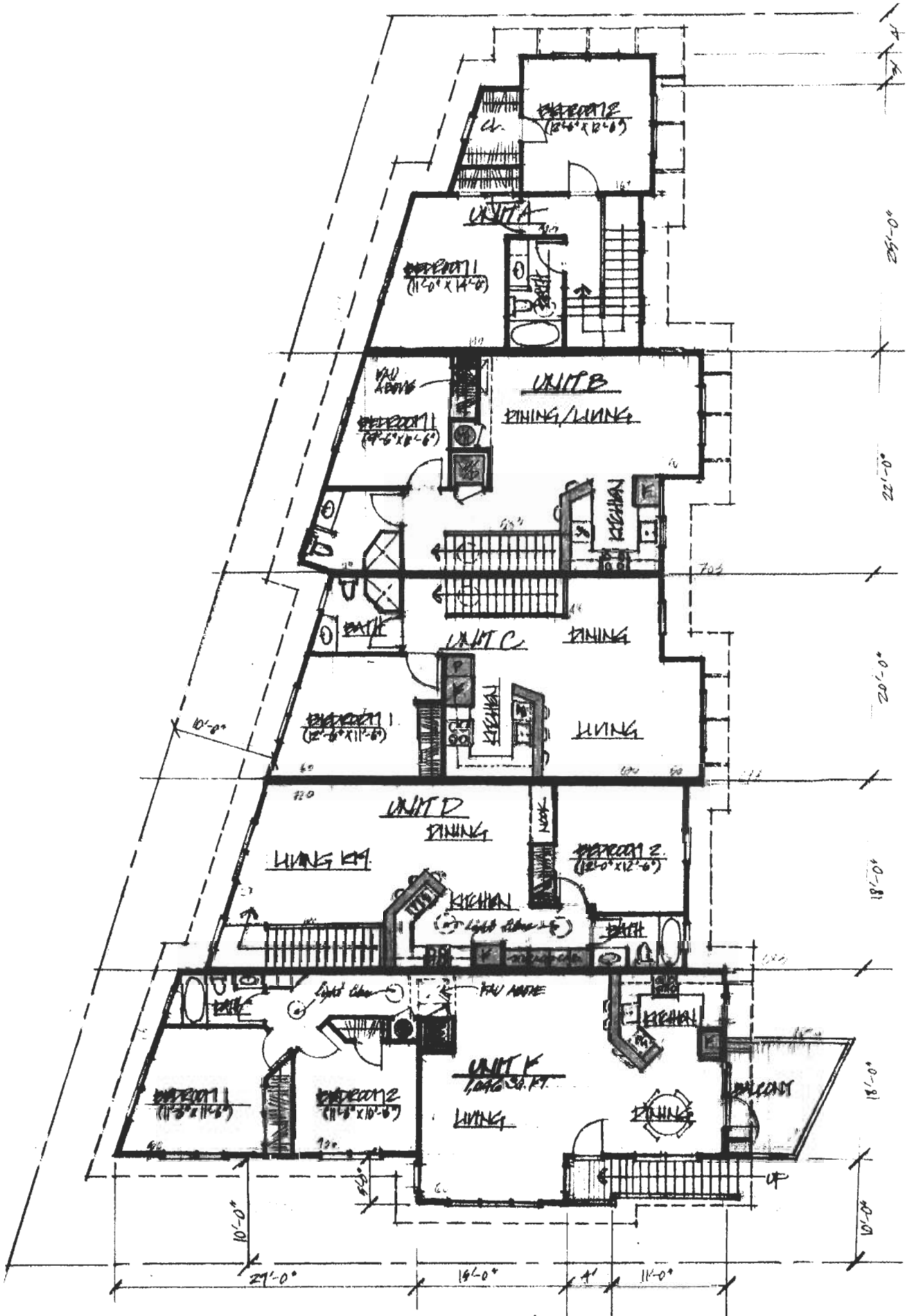
SQUARE FOOT:

UNIT A	
1st	464.5
2nd	456.5
TOTAL	921.0
UNIT B	
1st	295.0
2nd	703.0
TOTAL	998.0
UNIT C	
1st	386.0
2nd	697.0
TOTAL	1,083.0
UNIT D	
1st	427.0
2nd	683.0
TOTAL	1,110.0
UNIT E	
1st	930.0
TOTAL	930.0
UNIT F	
1st	1,046.0
	1,046.0
BLDG. TOTAL	6071.0

(NEW APARTMENT BLDG)

FIRST FLOOR PLAN

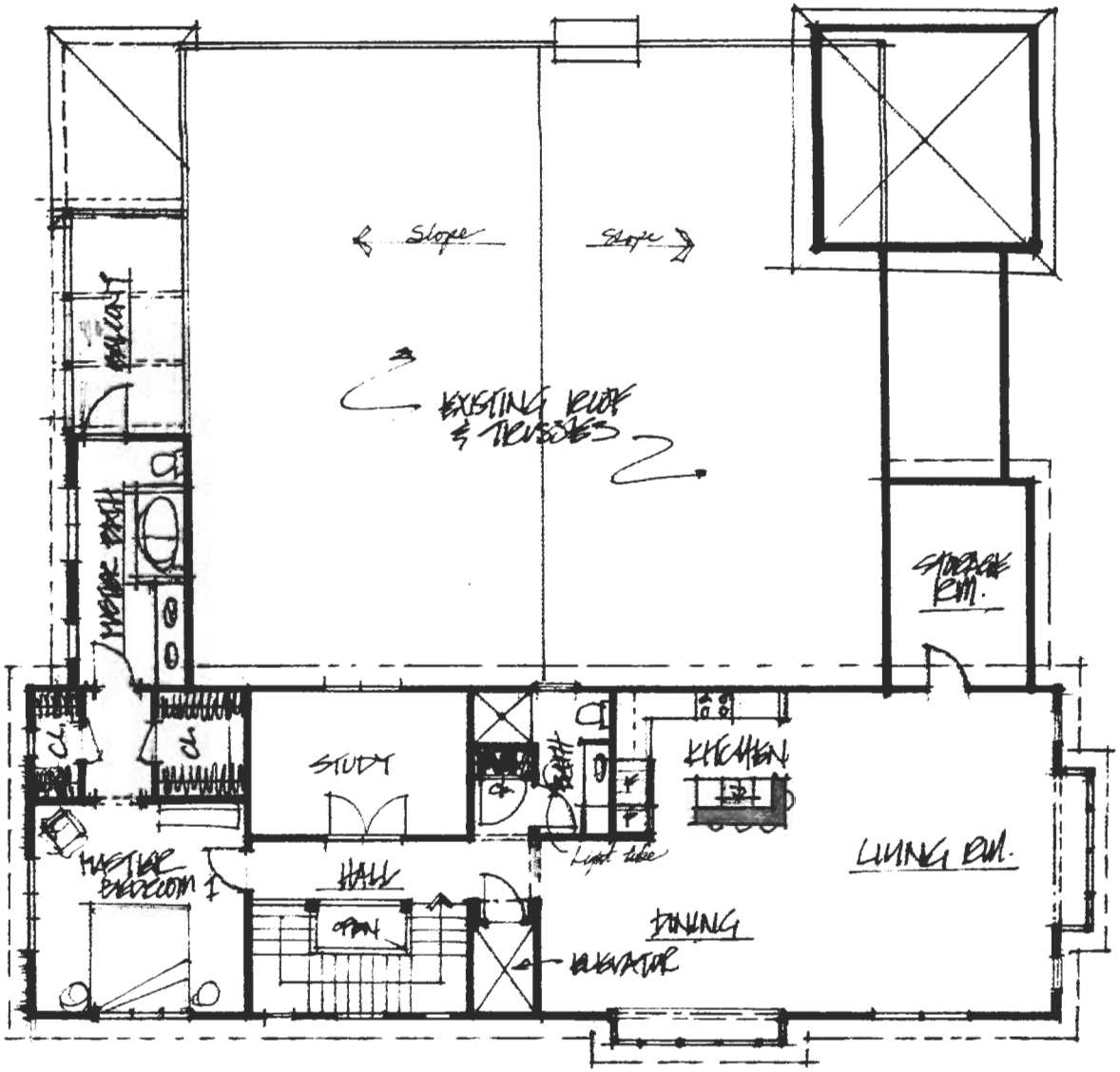
NEGATA LOFTS · 546 H STREET · SCALE 1/8"-1'-0"



SECOND FLOOR PLAN

ARCATA LOFTS : 870 H STREET · SCALE: 1/4"-1'-0"

(NEW APARTMENT BLDG)



APARTMENT SECOND FLOOR PLAN — 1,772 SQ. FT.

375 H STREET SCALE ¼" - 1'-0"

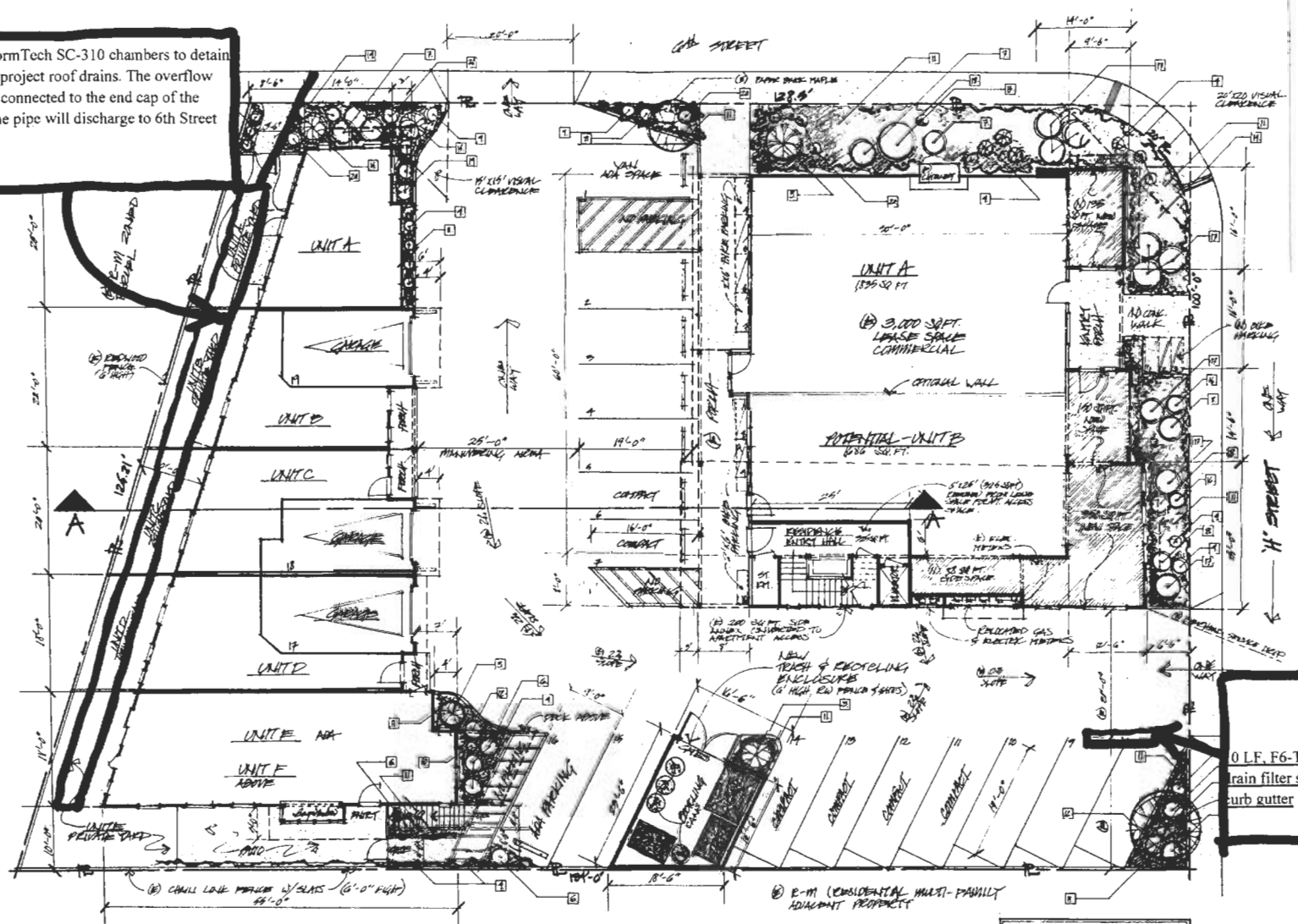
(BUILDING TO BE REMODELLED)

383

EXHIBIT NO. 8

APPLICATION NO.
1-09-036
LAKE, ROBERT
STORMWATER RUNOFF TREATMENT FACILITIES
(1 of 7)

90 LF of StormTech SC-310 chambers to detain runoff from project roof drains. The overflow pipe will be connected to the end cap of the chamber. The pipe will discharge to 6th Street Curb.

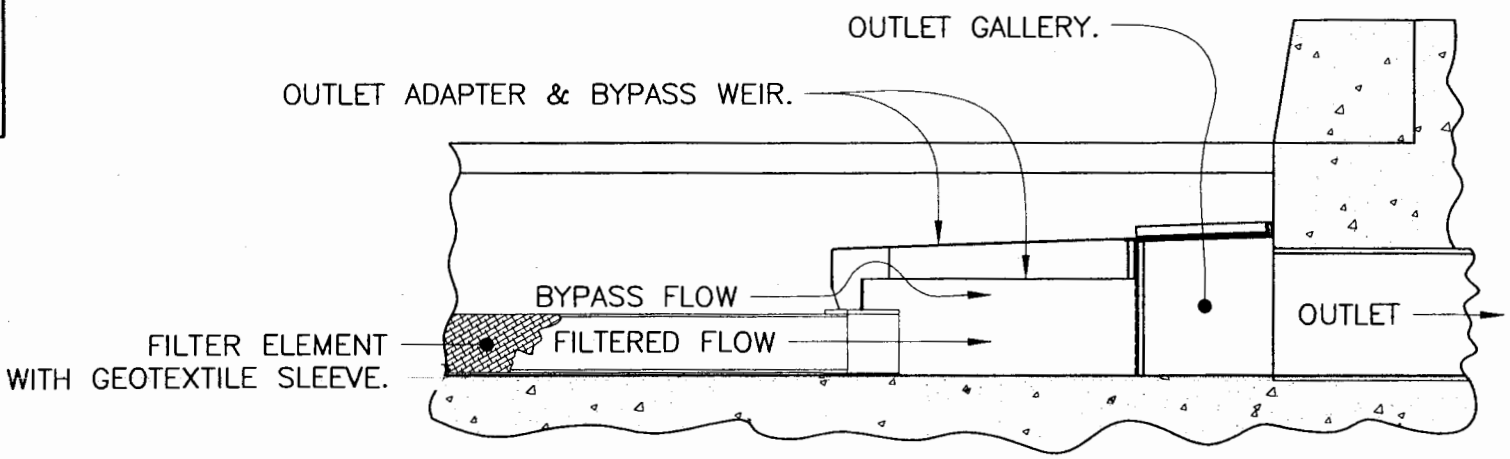


SITE & LANDSCAPE PLAN
ARCATA LOTS · 575 "H" STREET · ARCATA, CA

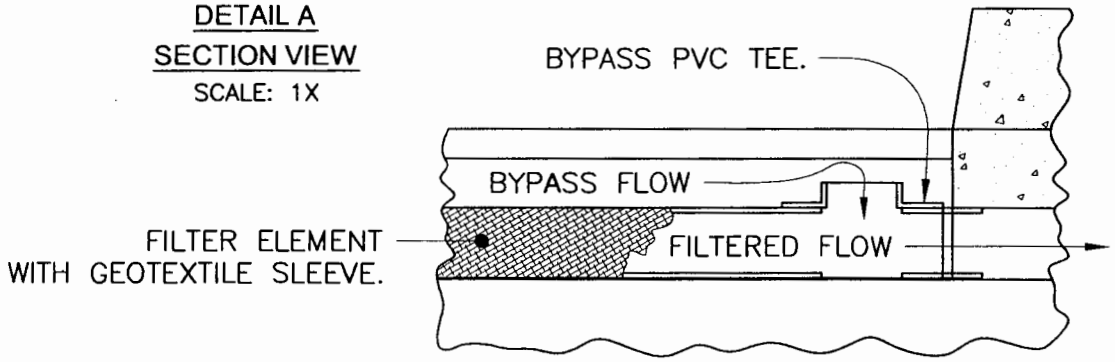
0 LF, F6-TDOF12 FloGard LoPro trench drain filter system, discharge to H street curb gutter

OWNER: BOB LAKE
PO BOX 621
TRINIDAD, CA 95570
PH: (707) 677-0911
APN: 021-164-16
ADDRESS: 575 H STREET
ARCATA, CA 95521
ZONING: CBD - CENTRAL BUSINESS DISTRICT
EASEMENTS: NONE

FG-LP-0002



DETAIL A
SECTION VIEW
SCALE: 1X



DETAIL B
SECTION VIEW
ALTERNATE ADAPTER CONFIGURATION
SCALE: 1X

SPECIFIER CHART

MODEL	FILTER TYPE	TRENCH WIDTH "ID" (CLEAR OPENING)	MINIMUM TRENCH DEPTH (FROM BOTTOM OF GRATE)	SOLIDS STORAGE CAPACITY CUBIC FEET **	FILTERED FLOW CUBIC FEET / SECOND **	TOTAL BYPASS CAPACITY CUBIC FEET /SECOND
FG-TDOF3	PIPE *	3.0	6.5	0.1	0.5	0.1
FG-TDOF4	PIPE *	4.0	6.5	0.2	0.5	0.1
FG-TDOF6	PIPE	6.0	6.5	0.4	0.5	0.2
FG-TDOF8	PIPE	8.0	6.5	0.7	0.5	0.3
FG-TDOF10	PIPE	10.0	6.5	0.9	0.5	0.5
FG-TDOF12	PIPE	12.0	6.5	0.9	1.0	0.6
FG-TDOF18	PIPE	18.0	6.5	1.3	1.5	1.1
FG-TDOF24	PIPE	24.0	6.5	1.8	2.0	1.5
FG-TDOA6	PANEL	6.0	4.5	0.4	0.2	0.2
FG-TDOA8	PANEL	8.0	4.5	0.7	0.2	0.3
FG-TDOA10	PANEL	10.0	4.5	0.8	0.3	0.5
FG-TDOA12	PANEL	12.0	4.5	1.0	0.4	0.6
FG-TDOA18	PANEL	18.0	4.5	1.4	0.8	1.1
FG-TDOA24	PANEL	24.0	4.5	1.8	1.1	1.5

* ALTERNATE ADAPTER CONFIGURATION. SEE DETAIL B.
**CAPACITY PER 4-FT. SEGMENT USED.

247

TITLE

FloGard® LoPro™

TRENCH DRAIN FILTER INSERT

KriStar Enterprises, Inc.
360 Sutton Place, Santa Rosa, CA 95407
Ph: 800.579.8819, Fax: 707.524.8186, www.kristar.com

DRAWING NO.	REV	ECO	DATE	SHEET
FG-LP-0002	E	0059 JPR 12/30/08	JPR 2/21/07	SHEET 2 OF 2

FG-LP-0002

NOTES:

1. Filter outlet adapter shall be constructed from stainless steel Type 304.

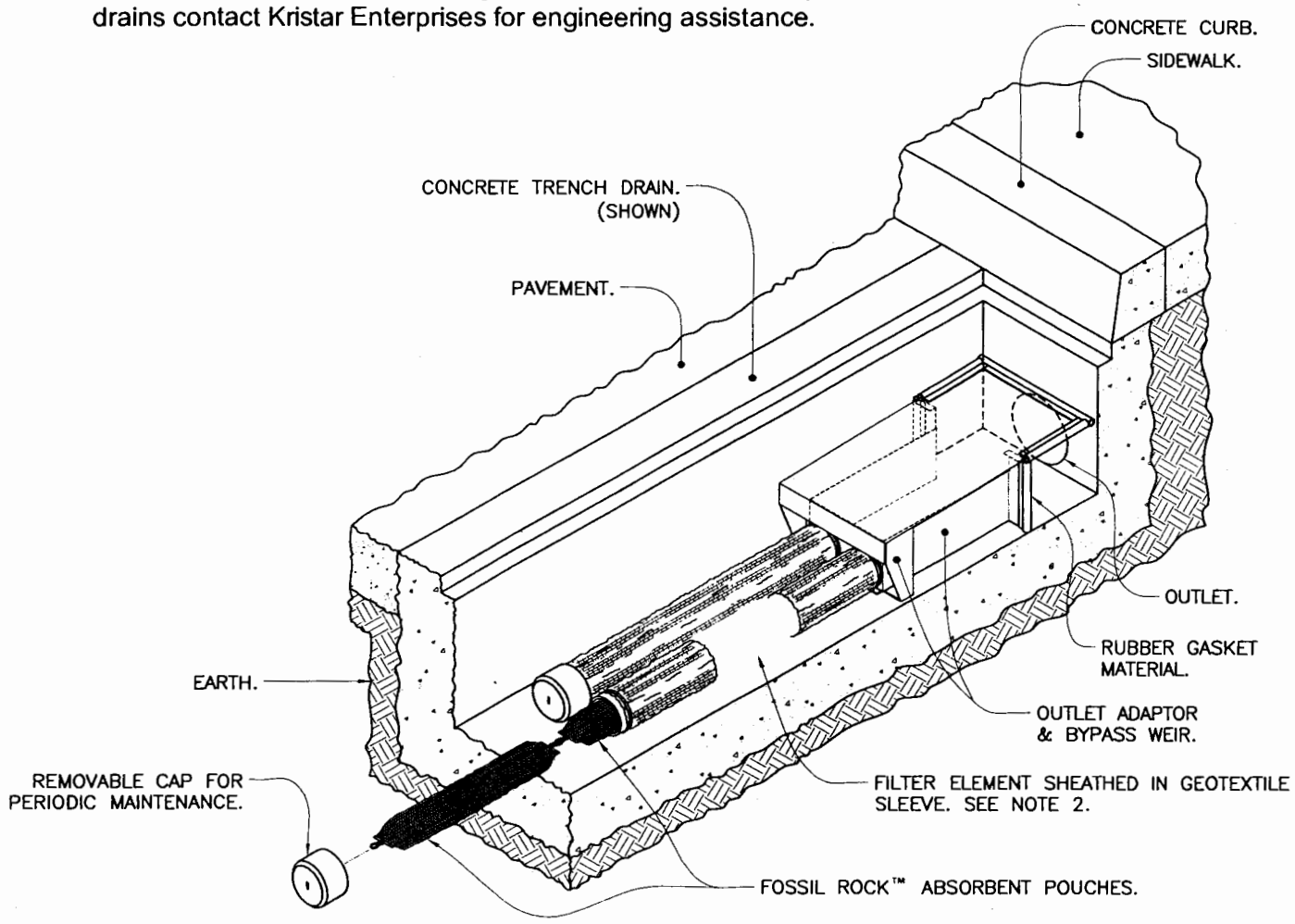
2. Filter element is constructed from polypropylene woven monofilament geotextile surrounding a perforated filter housing. Filter element shall not allow the retention of water between storm events.

3. Filter inserts are supplied with "clip-in" filter pouches utilizing Fossil Rock ™ filter medium for the collection and retention of petroleum hydrocarbons (oils & greases).

4. FloGard® LoPro ™ filter inserts and Fossil Rock ™ filter medium pouches must be maintained in accordance with manufacturer recommendations.

5. Outlet adapter can accommodate outlet openings at right angles and/or bottom outlet openings.

6. For alternate outlet adapter configurations used for extremely shallow trench drains contact Kristar Enterprises for engineering assistance.



3 of 7

TITLE

FloGard® LoPro™

TRENCH DRAIN FILTER INSERT

KriStar Enterprises, Inc.
360 Sutton Place, Santa Rosa, CA 95407
Ph: 800.579.8819, Fax: 707.524.8186, www.kristar.com

DRAWING NO.	REV	ECO	DATE	SHEET
FG-LP-0002	E	0059 JPR 12/30/08	JPR 2/21/07	1 OF 2

GENERAL SPECIFICATIONS FOR MAINTENANCE OF *FLOGARD® LOPRO TRENCH DRAIN FILTERS*

SCOPE:

Federal, State and Local Clean Water Act regulations and those of insurance carriers require that stormwater filtration systems be maintained and serviced on a recurring basis. The intent of the regulations is to ensure that the systems, on a continuing basis, efficiently remove pollutants from stormwater runoff thereby preventing pollution of the nation's water resources. These Specifications apply to the FloGard® LoPro Trench Drain Filter.

RECOMMENDED FREQUENCY OF SERVICE:

Drainage Protection Systems (DPS) recommends that installed FloGard® LoPro Trench Drain Filters be serviced on a recurring basis. Ultimately, the frequency depends on the amount of runoff, pollutant loading and interference from debris (leaves, vegetation, cans, paper, etc.); however, it is recommended that each installation be serviced a minimum of three times per year, with a change of filter medium once per year. DPS technicians are available to do an on-site evaluation, upon request.

RECOMMENDED TIMING OF SERVICE:

DPS guidelines for the timing of service are as follows:

1. For areas with a definite rainy season: Prior to, during and following the rainy season.
2. For areas subject to year-round rainfall: On a recurring basis (at least three times per year).
3. For areas with winter snow and summer rain: Prior to and just after the snow season and during the summer rain season.
4. For installed devices not subject to the elements (wash racks, parking garages, etc.): On a recurring basis (no less than three times per year).

SERVICE PROCEDURES:

1. The trench drain grate(s) shall be removed and set to one side.
2. The service shall commence with collection and removal of sediment and debris (litter, leaves, papers, cans, etc.)
3. The trench drain shall be visually inspected for defects and possible illegal dumping. If illegal dumping has occurred, the proper authorities and property owner representative shall be notified as soon as practicable.
4. Using an industrial vacuum, the collected materials shall be removed from the filter liner. (Note: DPS uses a truck-mounted vacuum for servicing FloGard® LoPro Trench Drain Filters.)
5. When all of the collected materials have been removed, the filter assembly shall be removed from the drainage inlet. The outer filter liner shall be removed from the filter assembly and filter medium pouches shall be removed by unsnapping the tether from the interior ring and set to one side. The filter liner, PVC body and fittings shall be inspected for continued serviceability. Minor damage or defects found shall be corrected on the spot and a notation made on the Maintenance Record. More extensive deficiencies that affect the efficiency of the filter (torn liner, etc.), if approved by the customer representative, will be corrected and a quote submitted to the representative along with the Maintenance Record.
6. The filter liner and filter medium pouches shall be inspected for defects and continued serviceability and replaced as necessary and the pouch tethers re-attached to the PVC body interior ring.
7. The grate(s) shall be replaced.

REPLACEMENT AND DISPOSAL OF EXPOSED FILTER MEDIUM AND COLLECTED DEBRIS

The frequency of filter medium pouch exchange will be in accordance with the existing DPS-Customer Maintenance Contract. DPS recommends that the medium be changed at least once per year. During the appropriate service, or if so determined by the service technician during a non-scheduled service, the filter medium pouches will be replaced. Once the exposed pouches and debris have been placed in the container, DPS has possession and must dispose of it in accordance with local, state and federal agency requirements.

DPS also has the capability of servicing all types of catch basin inserts and catch basins without inserts, underground oil/water separators, stormwater interceptors and other treatment devices. All DPS personnel are highly qualified technicians and are confined space trained and certified. Call us at (888) 950-8826 for further information and assistance.

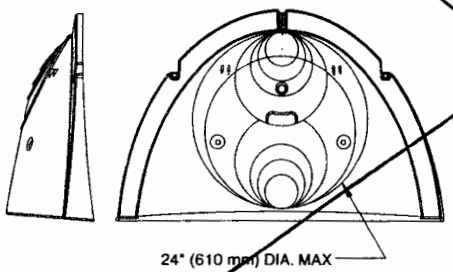
04/07

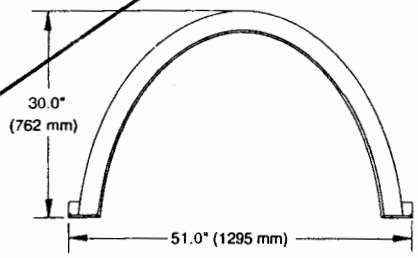
547

Figure 1
StormTech SC-740 Chamber (not to scale)

Nominal Chamber Specifications

Size (W x H x Installed L)	51.0" (1295 mm) x 30.0" (762 mm) x 85.4" (2170 mm)
Chamber Storage	45.9 ft³ (1.3 m³)
Min. Installed Storage*	74.9 ft³ (2.1 m³)
Weight	74 lbs (33.6 kg)





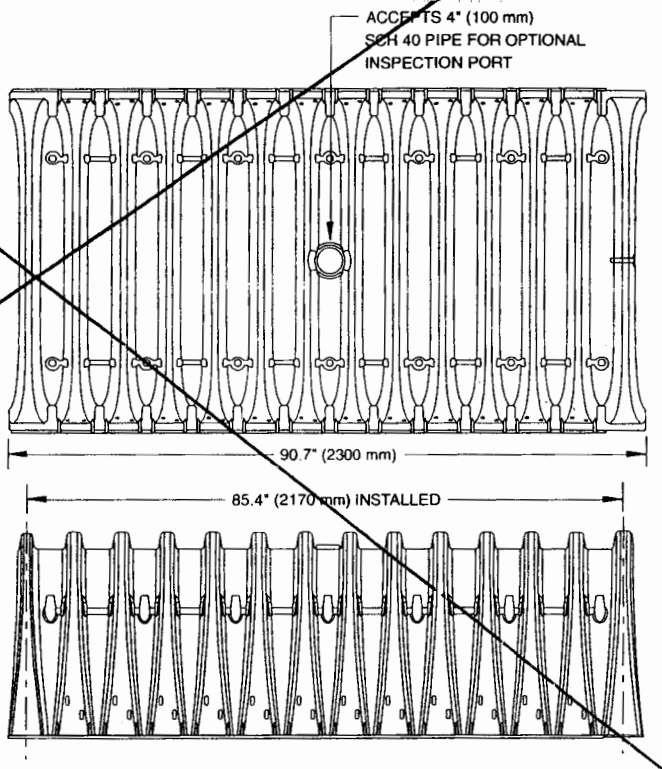
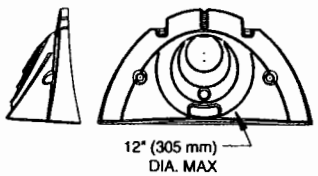
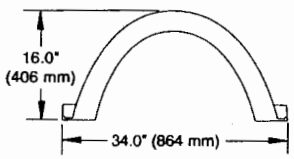


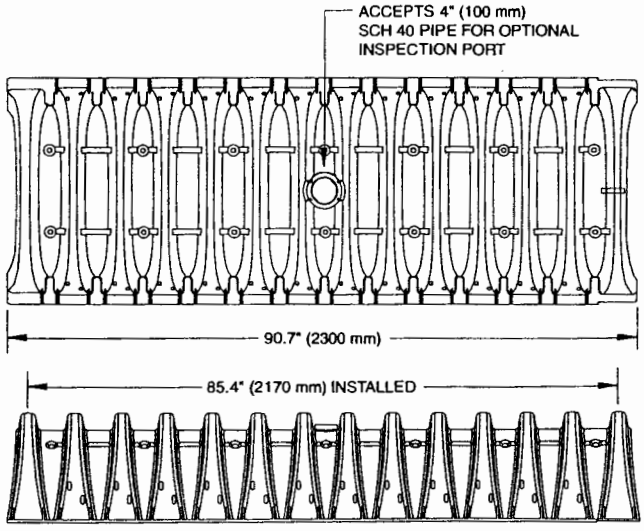
Figure 2
StormTech SC-310 Chamber (not to scale)

Nominal Chamber Specifications

Size (W x H x Installed L)	34.0" (864 mm) x 16.0" (406 mm) x 85.4" (2170 mm)
Chamber Storage	14.7 ft³ (0.4 m³)
Min. Installed Storage*	31.0 ft³ (0.8 m³)
Weight	37 lbs (16.8 kg)







*This assumes a minimum of 6" (150 mm) of stone below, above and between chamber rows and 40% stone porosity.

6 of 7

StormTech
Subsurface Stormwater Management™

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Low Impact Development (LID)

StormTech chambers can be used in conjunction with other technologies and best practices to create low impact development solutions.

StormTech chambers can be placed under bioretention areas, roadside swales, used for downspout collection, and rain gardens.

Installation of the StormTech chambers in bioretention area.

Completed installation.

- Request Free Layout Assistance
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- Contact a Local Rep

797

ENGINEERING GEOLOGIC FOUNDATION AND SOILS REPORT

Proposed Multi-Family Residential Development
575 H Street
Arcata, California

Assessor's Parcel Number 021-165-003

EXHIBIT NO. 9
APPLICATION NO.
1-09-036
LAKE, ROBERT
GEOLOGIC REPORT (EXCERPTS) (1 of 22)

Prepared for:
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August 5, 2009
LACO Project No. 6933.03

TABLE OF CONTENTS

ENGINEERING GEOLOGIC/FOUNDATION AND SOILS REPORT

Prepared for Robert Lake
Proposed Multi-Family Residential Development
575 H Street, Arcata, California
Assessor's Parcel Number 021-165-003
LACO Project No. 6933.03

1.0 INTRODUCTION

1.1 Site and Project Description

This report presents the results of a preliminary foundation and soils investigation conducted on the property located at the corner of H and 6th Street in the City of Arcata, California. The project site is located in the NE ¼ of Section 32, T.6 N, R.1 E, Humboldt Baseline and Meridian of the Arcata South 7.5-minute quadrangle and is identified as Assessor's Parcel Number (APN) 021-165-003 by the County of Humboldt (Figures 1 and 2). Latitude and longitude of the project site are 40.8665°N and -124.0882°W, respectively. The project site consists of an area of approximately 0.45 acres and is currently developed with a commercial building and paved parking area. Ingress and egress is from both H Street and 6th Street.

Included in this report are assessments of the potential geologic hazards associated with the site and recommendations to mitigate potential effects of such hazards. Also provided in this report are recommendations for design professionals (architects and engineers), to utilize for planning and design of site developments.

LACO Associates (LACO) understands that the property owner proposes to develop the site with four to six two-story multi-family residential units at the rear of the property, and one residential unit above the existing commercial structure. Specific design details of the development plan have yet to be determined. Water and sewer services will be provided by the City of Arcata.

1.2 Scope of Work

LACO was retained to investigate and characterize the subsurface soil conditions, assess potential geologic hazards to the site, provide recommended foundation design criteria to be utilized for design and construction of the new developments, and to prepare this report. The specific scope of this investigation included the following:

- Review published geologic maps pertinent to the site and available unpublished geologic reports of this and nearby sites.
- Conduct a field exploration program including direct push continuous core borings and geotechnical test pit excavations within and immediately adjacent to the proposed development.
- Collect disturbed and undisturbed subsurface soil samples from the site.

- Conduct a laboratory testing program of selected soil samples in the LACO materials testing laboratory to characterize relevant soil properties.
- Prepare this foundation and soils report to meet the permit requirements of the City of Arcata Building Department, document the subsurface conditions, and provide foundation and earthwork recommendations to support development of the site with a multi-story apartment complex.

Specifically excluded from our scope of work was an environmental assessment for the presence or absence of any hazardous, toxic, or corrosive materials. Although we have explored subsurface conditions as part of this investigation, we have not conducted any analytical laboratory testing of samples obtained for the presence of hazardous material.

1.3 LIMITATIONS

This report has been prepared for the exclusive use of Mr. Robert Lake, his contractors and sub consultants, and appropriate public authorities for specific application to development of the site. LACO has endeavored to comply with generally accepted geotechnical engineering standard of care common to the local area. LACO makes no other warranty, express or implied.

The analyses and recommendations contained in this report are based on data obtained from subsurface explorations. The methods used indicate subsurface conditions only at specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples can not always be relied on to accurately reflect stratigraphic variations that commonly exist between sampling locations, nor do they necessarily represent conditions at any other time. Results of any analysis of samples obtained during this project will be retained on file in our office. Unless directed otherwise by our client, collected samples will be discarded after 30 days following the issuance of this report.

The recommendations included in this report are based, in part, on assumptions about subsurface conditions that may only be tested during earthwork. Accordingly, the validity of these recommendations is contingent upon LACO being retained to provide a complete professional service. LACO cannot assume responsibility or liability for the adequacy of the recommendations when they are applied in the field unless LACO is retained to observe construction. We will discuss the extent of such observations required to provide assurance of the validity of our recommendations upon request.

Do not apply any of this report's conclusions or recommendations if the nature, design, or location of the facility is changed. If changes are contemplated, LACO should be consulted to review their impact on the applicability of the recommendations in this report. Also note that

LACO is not responsible for any claims, damages, or liability associated with any other party's interpretation of the subsurface data or reuse of this report for other projects or at other locations without our express written authorization.

The scope of our services did not include environmental assessment or an investigation for the presence or absence of hazardous, toxic, or corrosive materials. Although we have explored subsurface conditions as part of this investigation, we have not conducted any analytical laboratory testing of samples obtained for the presence of hazardous material.

LACO's investigations conclude that this site is subject to certain geologic hazards as detailed in this report. Although the recommendations included in this report are intended to reduce the risks to life, safety, and property associated with the identified hazards, they may not reduce risks to a less than significant level. By developing this site, the owner is accepting the geologic hazard risks associated with the site. It is the responsibility of current and/or future property owners to make purchasers and/or residents aware of the hazards and the risks. Depending on the level of mitigation the owner chooses to have engineered into the project, the consequence of the identified hazard(s) at this site may result in structural damage with subsequent impairment of use, or other consequences to life, safety, and property.

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 Field Exploration Program

To assess the *in-situ* soil conditions within the proposed development area, LACO performed a subsurface investigation of the property in June 2009. LACO's investigation utilized both continuous core borings installed with a direct push drilling rig, and backhoe test pits to visually assess the soil profile and collect soil samples for laboratory analysis. Soil profile logs are included as Appendix A.

Soils recovered from the borings and observed in the test pits were logged in the field in general accordance with ASTM standards. Disturbed and "undisturbed" samples of the main stratigraphic units were collected and delivered to the LACO materials testing laboratory for analysis.

2.2 Laboratory Testing

Soil samples collected from the site were submitted to LACO's materials testing laboratory for analysis. The intent of the laboratory analysis was to determine representative index properties of the site soils in support of the design and construction of the foundation elements. The laboratory tests conducted for this investigation included:

- Direct Shear (ASTM D 3080)
- Consolidation (ASTM D 2435)

A summary of the results of LACO's materials testing is presented in Table 1. Laboratory test results are included in Appendix B.

TABLE 1 – SUMMARY OF MATERIALS TESTING AND RESULTS

Sample Location	Material	Test	Results[1]
TP-1 at 3'-4.5'	SM	Direct Shear (ASTM D 3080)	Φ (phi) = 35.3° Cohesion (τ_{max}) = 0 psf Ave. dry density = 109 pcf Ave. moisture content = 16%
TP-2 at 3.3'-4'	SP	Direct Shear (ASTM D 3080)	Φ (phi) = 33.0° Cohesion (τ_{max}) = 0 psf Ave. dry density = 103 pcf Ave. moisture content = 14%
TP-1 at 5'-5.5'	ML	Consolidation (ASTM D 2435)	C_c = 0.1163 C_r = 0.0111 P_c = 3,800 psf

Note: (1) SM – Silty Sand; SP – Poorly Graded Sand; ML – Silt with Sand
(2) Cc – Compression Index, Cr – Recompression index, Pc – Preconsolidation pressure

LACO will archive all samples collected for this project for 30 days following the issuance of this report. Unless directed otherwise by our client, all samples will be discarded after the 30 day archive period.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Topography and Site Conditions

The project site is situated on nearly level ground to gently sloping ground with gradients of less than about two percent directed to the south toward Humboldt Bay. The U.S. Geologic Survey (USGS, 1972), 7.5-minute topographic quadrangle indicates the project site is situated at an elevation of between 10-feet and 20-feet above mean sea-level based on the 1927 North American Datum. The ground surface ascends gradually to the north-northeast toward a fault scarp associated with the Fickle Hill fault, located approximately 500 feet north of the site.

3.2 Geologic Setting

As noted above, the project site is located on a broad, low-relief alluvial surface that descends gradually toward Humboldt Bay. Prior to the area being developed with the construction of dikes around Humboldt Bay, the low-relief surface contained several meandering, low-gradient stream courses that were likely to have been tidally influenced and subject to periodic flooding. Based on a review of the site and published geologic maps (CDMG, 1984; McLaughlin *et al*, 2000), the project site is underlain by unconsolidated Holocene alluvial deposits composed of coarse- to

fine-grained sand and silt with variable amounts of gravel in areas of the former stream channels (Figure 3). Bay margin deposits composed of clay and interbedded organic-rich silts are present at depths in excess of 24-feet below ground surface (bgs).

At some unknown depth, the alluvial and bay margin deposits unconformably overlie moderately cemented alluvial deposits of the early to middle-Pleistocene Falor Formation. Based on the morphology of the slopes in the vicinity, the contact between the unconsolidated bay margin sediments and underlying Falor Formation is likely to be in excess of 100-feet bgs. At even greater depth, the Falor Formation unconformably overlies Jurassic to Cretaceous age Franciscan Complex bedrock.

3.3 Seismicity

This project site is located within California's Northern Coast Ranges Geomorphic Province (CGS, 2002), a seismically active region in which large earthquakes are expected to occur during the economic life span (50 years) of the development.

North of the Mendocino triple junction, the regional tectonic framework is controlled by the Cascadia subduction zone (CSZ) wherein oceanic crust of the Juan de Fuca/Gorda plate is being actively subducted beneath the leading edge of the North American plate. The CSZ in its entirety extends from the Mendocino triple junction to British Columbia. Plate convergence along the Gorda segment of the CSZ is occurring at a rate of approximately 30 to 40 millimeters per year (mm/yr) (Heaton & Kanamori, 1984). Rupture along the entire CSZ boundary may produce an earthquake with a maximum moment magnitude (M_w) of 9.0 or greater (Satake, 2003).

Upper plate crustal deformation associated with the subduction of the Gorda plate is expressed as a 90-kilometer (km) wide fold and thrust belt that comprises the accretionary complex along the North American plate margin (Carver, 1987). Faults associated with the offshore and onshore portions of the CSZ fold and thrust belt include the Little Salmon fault and Mad River fault zone.

The project site is situated near the southern end of the Mad River fault zone. Several fault traces of the Fickle Hill fault are located beginning 500-feet north of the project site (Figure 3). The closest recognized active fault trace to the project site is located less than 1,800-feet to the northeast (Figure 4; CDMG, 1983 and 2000). The Little Salmon fault, another active fault, is located approximately 12 miles south of the site, near southern Humboldt Bay. Both the Fickle Hill and Little Salmon faults are northwest-striking, northeast-dipping, low-angle thrust faults. The upper-bound earthquakes considered likely to occur on the Fickle Hill and Little Salmon faults have an estimated maximum moment magnitude M_w of 6.9 and 7.0, respectively (Petersen et al., 1996).

Based on the record of historical earthquakes (approximately 150 years), faults within the plate boundary zone and internally deforming Gorda Plate have produced numerous small-magnitude and several moderate to large (i.e. magnitude greater than 6) earthquakes affecting the local area. Several active regional seismic sources in addition to the CSZ, Little Salmon, Fickle Hill, and Mad River faults are proximal to the project site and have the potential to produce strong ground motions. These seismic sources include:

- The northern segment of the San Andreas transform fault that represents the boundary between the stable North American plate and the northwest-migrating Pacific plate
- The Mendocino fault, an offshore, high-angle, east-west-trending, right-lateral strike-slip fault that forms the boundary between the Gorda and Pacific plates
- Faults within the internally-deforming Gorda plate consisting of high-angle, northeast-trending, left-lateral, strike-slip faults

3.4 Subsurface Conditions and Description of the Site Soils

Review of unpublished geotechnical investigations previously conducted in the vicinity of the project site (LACO, 2000; BGC, 2005; LACO, 2008) and the subsurface data obtained during the current site investigation (Figure 5) indicate soils within the upper 40-feet of the ground surface to be generally of low density and saturated.

Directly underlying the project site, the soil profile consists of geologically young, unconsolidated, well-stratified fluvial (stream) deposits consisting of sand and fine gravel, interbedded with overbank flood deposits consisting of silt and minor amounts of clay to a depth of 24-feet below grade. These soils were observed to be generally non-cohesive, with non-plastic to low plastic wet consistencies. Soil structure within the upper 9-feet, as observed in the backhoe test pits was typically massive to single grain, indicating the soil structure to be poorly developed which attests to the youthfulness of the deposits. Based on the pronounced lateral variation of the soil types observed in both the test boring and test pit excavations, we interpret these deposits to be interfingered or of variable thickness across the footprints of the proposed new and existing structures.

Underlying the fluvial deposits are stiff fine-grained sediments composed primarily of clay with varying amounts of silt, capped by several thin (<2 inches) organic-rich horizons. We interpret these fine-grained deposits to represent former bay margin sediments associated with the early formation of Humboldt Bay. The overlying fluvial sands and silts are in sharp depositional contact with the fine-grained bay margin sediments due to a rapid change in the depositional environment.

A summary of the generalized soil types underlying the project site is presented in Table 2.

TABLE 2 – SOIL PROFILE SUMMARY

Depth (feet bgs)	Primary Soil Type(s)	Consistency[1]
0-3	ML	soft
3-6	SM	loose
6-8	ML to SP	firm/loose
8-15	SM, SW	---/loose
15-24	SM	---/loose
24+	OL,CL	stiff/---

Note: (1) consistency of cohesive materials/consistency of non-cohesive materials

Detailed descriptions of the soils collected in the continuous core borings and exposed in the test pits are provided in Appendix A.

3.5 Groundwater Conditions

At the time of our field investigation conducted at the beginning of the dry weather season, groundwater was observed at a depth of approximately 8 feet below grade. The soils below this depth are weakly gleyed (reduced), indicating that they are predominantly saturated throughout the year.

Soil mottling, indicative of seasonal saturated conditions was observed beginning at about 3 to 4.5-feet below grade. Therefore, it should be anticipated that groundwater will rise to within 3-feet of the ground surface during the wet season. Additional discussion of the hazard associated with the presence of high groundwater follows in Section 4.6.3 of this report.

4.0 GEOLOGIC AND SOIL HAZARDS

Potential geologic and soil hazards assessed for the site include seismic ground shaking, surface fault rupture, liquefaction and related phenomena, settlement, slope instability, flooding and high groundwater, and swelling or shrinking soils. The assessments for these potential hazards are presented below.

4.1 Seismic Ground Shaking

As noted in Section 3.3, the project site is situated within a seismically active area proximal to multiple seismic sources capable of generating moderate to strong ground motions. Given the proximity of significant active faults (the Fickle Hill fault to the north, Little Salmon fault to the south, and the Cascadia subduction zone offshore), as well as other active faults within and offshore of northern California, there is high probability that the project site will experience strong ground shaking during the economic life span of the proposed development.

The spectral response accelerations prescribed by the 2007 California Building Code are included in the recommendations section of the report.

4.2 Surface Fault Rupture

Multiple traces of the Fickle Hill fault are located beginning 500-feet north of the project site (Figures 3 and 4). The nearest recognized active fault trace associated with the Fickle Hill fault is located 1,800-feet north of the project site (CDMG, 1983 and 2000). The project site, however, is not located within an Alquist-Priolo earthquake fault zone, and is therefore not subject to the Alquist-Priolo Earthquake Fault Zoning Act requiring a trench-based fault rupture hazard evaluation. Based on the distance between the project site and the nearest fault trace, the potential for surface fault rupture to occur within the boundaries of the subject parcel is low.

4.3 Liquefaction

Liquefaction is the loss of soil strength, resulting in fluid mobility through the soil. Liquefaction typically occurs when uniformly-sized, loose, saturated sands or silts that are subjected to repeat shaking in areas where the groundwater is less than 50-feet bgs. In addition to the necessary soil and groundwater conditions, the ground acceleration must be high enough, and the duration of the shaking must be sufficient, for liquefaction to occur.

As presented on Map S-1 of Special Publication 115 (CDMG, 1995), the project site is located in an area with a high liquefaction potential. The Hazards Map compiled by the City of Arcata (2000) indicates the project site to have a moderate to high susceptibility to liquefaction.

A site-specific quantitative evaluation of the liquefaction potential was not performed by our office. Previous geotechnical investigations conducted by our office at 7th and G streets (LACO, 2000), located 300-feet northeast of the project site, and most recently at Samoa Boulevard and Union Street (LACO, 2008) indicate these areas to have a high liquefaction potential. Therefore, without additional data to indicate otherwise, we assume that the subject property also has a high liquefaction potential.

Based on the depth and relative thickness of the potentially liquefiable material consisting of the saturated fluvial sands and silty sands within the upper 24-feet of the soil profile, the consequence of liquefaction at this site will likely be dynamic settlement (see Section 4.4.3).

4.4 Settlement

4.4.1 Differential Settlement

The shallow bearing soils at this project site vary markedly both laterally and vertically. Load bearing structural elements founded on these variable materials will likely be subject to differential settlement. However, the risk of differential settlement can be reduced by appropriate subgrade preparation and foundation design.

4.4.2 Static Settlement

Static settlement is the result of compressive deformation of soil beneath an applied load. The compressive deformation generally results from a reduction in voids within the soil. In dry soils, the compression of the soil occurs relatively rapidly. However, in saturated soils voids are filled with water that must be drained to accommodate the compression. In fine grained soils the rate at which water moves through the soil is relatively slow. As a result, settlement of the saturated fine grained soils occurs at relatively slow rate.

To evaluate the settlement potential of shallow fine grained soils at the site, one representative sample was selected for one-dimensional consolidation testing (ASTM 2435). The following parameters were determined by laboratory testing:

From Consolidation Curves (Appendix B)

	5.0-feet bgs
• Compression Index (C_c)	**0.1163**
• Recompression Index (C_r)	**0.0111**
• Preconsolidation Pressure (P_c)	**3,800 psf**

The consolidation test data show that the shallow subsoils (5-feet bgs) at the site are sensitive to loads in excess of 3,800 pounds per square foot (psf). Beyond 3,800 psf the shallow soils enter into virgin compression.

Our recommendations are intended to provide general guidelines for minimizing the potential for total and differential settlement (see section 6.7, "Foundation Design" below). Provided the recommendations in this report are adhered to, settlement may be controlled and is not anticipated to have detrimental effects on the proposed structure.

4.4.3 Dynamic Settlement and Lateral Spreading

As noted in Section 3.4, the site is underlain by up to 24-feet of unconsolidated alluvium composed of interbedded silt, silty sand, poorly graded sand, and well-graded sand with fine gravel. Based on available published information and geotechnical investigations conducted in

the vicinity of the project site, we estimate a high potential for liquefaction to occur. As a result, the risk of dynamic settlement to occur is also considered high, and will require mitigation through appropriate subgrade preparation and foundation design.

Due to the lack of relief in the area the potential for liquefaction induced lateral spreading to occur is low.

4.5 Landsliding

The project site is located on a nearly level surface. The closest slopes to the site are the gradually ascending foothill slopes of Fickle Hill. According to the Humboldt County Community Development Service, the low gradient slopes on which the site is located is considered "Relatively Stable" and the gradually ascending slopes to the northeast are an area of "Low Instability" (HCCDS, 2004). Additionally, geomorphic mapping of the area by the State indicates that there are no active or dormant landslides in the immediate vicinity of the site (CDMG, 1984).

Based on the lack of relief in the vicinity of the site and the absence of features indicative of slope instability, the potential for slope instability to pose a hazard to the new development at this site is negligible.

4.6 Flooding, Tsunami, and High Groundwater

4.6.1 100-Year Flood Zone

The Arcata General Plan 2020 Hazards Map (City of Arcata, 2000) indicates that the site is not within the 100-year flood zone. Therefore, the potential for flooding to adversely affect this project site is considered low.

4.6.2 Tsunami

Tsunami hazard mapping by the City of Arcata (2000) and the State (CDMG, 1995) indicate that the site is not within a predicated tsunami run-up zone. However, to the best of our knowledge these published hazard maps do not account for the potential for coseismic subsidence to occur at the project site. Coseismic subsidence of the site may increase the potential for tsunami inundation to occur.

Based on the available published tsunami hazard maps the risk of tsunami inundation at the project site is low.

4.6.3 High Groundwater

As noted in Section 3.5, seasonally high groundwater conditions should be anticipated to occur at the project site. Observations made during our field investigation indicates groundwater may rise to within 3- to 4-feet of the ground surface during the winter wet season. Provided all earthwork and subgrade preparation is conducted during the dry season, shallow groundwater conditions are not expected to have an adverse effect on the performance of the foundation.

4.7 Soil Swelling or Shrinkage Potential

The subsurface soils at structural load bearing depths are composed primarily of coarse-grained granular soils with minor amounts of clay. Therefore, the potential for soil swelling or shrinkage typically associated with fine-grained soils is considered low.

5.0 CONCLUSIONS AND DISCUSSION

1) The proposed development site is underlain by unconsolidated, non-cohesive coarse-grained fluvial deposits and interbedded fine-grained overbank flood deposits to a depth of approximately 24 feet below grade. Below 24-feet, the fluvial deposits are in sharp depositional contact with stiff lean clay interpreted to represent former bay margin deposits.
2) Our field investigation conducted at the beginning of the dry weather season found the static groundwater surface at a depth of 8-feet below grade. Soil mottling indicative of seasonal high groundwater conditions indicates the potential for groundwater to rise to within 3- to 4-feet of the ground surface during the winter wet season.
3) A qualitative assessment of the potential for liquefaction to occur at this site, based on available published mapping, soil type, the depth-to-groundwater, and the review of previous geotechnical investigations conducted at nearby sites, indicates that there is a high risk of liquefaction associated with the design basis earthquake. Coincident with a liquefaction event is the potential for dynamic settlement of the soils underlying the building footprint.
4) The closest recognized active fault to the site is the Fickle Hill fault. The active zoned segment of the Fickle Hill fault is located less than 1,800-feet north of the site while a secondary fault trace is located 500-feet to the north of the site. The risk of fault surface rupture at the site, however, is low.
5) Based on the results of our field and laboratory investigation, geologic and soil hazards which may adversely affect the proposed development include settlement, seismic shaking, liquefaction, and dynamic settlement. Although the risks of these hazards are high and have the potential to incur structural damage if left unmitigated, they are typical of the Humboldt Bay and north coast region and are assumed by other developments in

the area. The recommendations included in this report are intended to reduce the potential consequences of the identified hazards.

6) The level of mitigation to reduce the consequences resulting from the dynamic settlement associated with liquefaction and strong earthquake ground shaking is at the discretion of the developer. Mitigation for a liquefaction hazard can range from minor structural improvements to extensive site preparation and foundation design.

6.0 RECOMMENDATIONS

6.1 Site Preparation

All asphalt concrete pavement, concrete foundations, building rubble, sod, topsoil, and any other debris encountered at or below the existing ground surface should be removed from areas supporting structural loads.

The subsoil investigations of the site indicate that groundwater levels fluctuate between approximately 3- to 8-feet during the wet and dry seasons, respectively. Due to the seasonally high groundwater levels, all earthwork, including, but not limited to, site clearing, grubbing, and stripping should be conducted during dry weather conditions after groundwater levels have receded. Failure to comply with these recommendations could result in excessive rutting and mixing of organic debris with the underlying soils.

6.2 Temporary Excavations

All temporary construction slopes should be designed and excavated in strict compliance with applicable local, state, and federal safety regulations including the current OSHA Excavation and Trench Safety Standards.

Construction equipment, building materials, excavated soil, vehicular traffic, and other similar loads should not be allowed near the top of any unshored or unbraced excavation. Where the stability of adjoining buildings, walls, pavements, or other similar improvements may be endangered by excavation operations, support systems such as shoring, bracing, or underpinning may be required to provide structural stability and to protect personnel working in the excavation.

Since excavation operations are dependent on construction methods and scheduling, the contractor shall be solely responsible for the design, installation, maintenance, and performance of all shoring, bracing, underpinning, and other similar systems. Under no circumstances should any comments provided herein be inferred to mean that LACO assumes any responsibility for temporary excavations or the safety thereof, nor does LACO assume any responsibility for the design, installation, maintenance, and performance of any shoring, bracing, underpinning, or other similar systems.

6.3 Cut and Fill Slopes

There is currently no development plan requiring significant unrestrained cut or fill slopes. In the event that unrestrained cut and/or fill slopes with heights in excess of 3-feet are required, they should be constructed in accordance with the Humboldt County Grading Ordinance and Chapter 33 of the 2007 CBC.

6.4 Structural Fills

All structural fills shall be constructed as controlled and compacted engineered fills. Structural engineered fills should be free of organics and composed of low plasticity clay, sand, or gravel. All existing soils with a high organic content derived from stripping of the site, are suitable for reuse as landscape fills only. It is recommended that only granular fill be used within the building footprint and within 5-feet of the building footprint.

All structural fill material should be well graded, imported granular material such as crushed quarry rock or river-run gravels (100% passing 3-inch sieve). Structural fill on sloping ground should be placed on a suitably prepared "benched" subgrade surface and should be compacted mechanically to minimize potential settlement.

Samples of proposed native or imported fill should be submitted to the LACO materials testing laboratory for assessment at least 48 hours prior to placement or importing to the site (whichever is soonest). Approved fill material should be placed in loose lifts no more than 8-inches thick, at uniform moisture content, at or near optimum, and compacted mechanically. Sufficient testing and inspection should be performed to monitor the suitability of fill materials and assure compliance with the recommended compaction standards. Structural fills should be compacted as specified below in the "Compaction Standard" section below.

6.5 Compaction Standard

For granular fill material such as sands and gravels with less than ten percent fines, smooth-drum vibratory compactors should be used. Within shallow excavations, including utility trenches and around manholes, it is recommended that "wacker packers" or vibrating plate compactors be used to achieve the specified compaction standards. Flooding of granular material should never be employed to consolidate backfill in trenches. Where trenches closely parallel a footing and the trench bottom is within a two horizontal to one vertical plane, projected outward and downward from any structural element, grout slurry should be utilized to backfill that portion of the trench below this plane. The use of slurry backfill is not required where a narrow trench crosses a footing at or near a right angle.

It is recommended that the structural fill and backfill material be compacted in accordance with the specifications listed in Table 3 below. A qualified field technician should be present to observe fill placement and perform field density tests at random locations throughout each lift to verify that the specified compaction is being achieved by the contractor.

TABLE 3 – STRUCTURAL FILL PLACEMENT SPECIFICATIONS

Fill Placement Location	Compaction Recommendation (ASTM D1557-Standard Proctor)	Moisture Content (Percent Optimum)
Granular cushion beneath Floor Slab	90%	**-1 to +3 percent**
Structural fill supporting Footings	90%	**-1 to +3 percent**
Structural fill placed within 5-feet beyond the perimeter of the building pad	90%	**-1 to +3 percent**
Roadway fill placed within 2-feet of the base of the Pavement	95%	**-1 to +3 percent**
Structural fill placed below the base of the Pavement Subgrade	95%	**-1 to +3 percent**
Utility trenches within building and pavement areas	95%	**-1 to +3 percent**
Utility trenches beneath landscape and grass areas	90%	**-1 to +3 percent**

6.6 Seismic Design Parameters

Based on the site conditions and an assumption of the soils within 100-feet of the ground surface, we classify the site as Site Class E consisting of a "soft soil profile" (Section 1613.5.2, 2007 CBC). The following parameters are based on this classification and were determined using ASCE Standard 7-05, Minimum design loads for buildings and other structures (USGS, 2008).

TABLE 4 - SPECTRAL RESPONSE ACCELERATIONS

Site Location - Latitude: 40.8665°; Longitude: -124.0882°		
Occupancy Category - II		
Seismic Design Category - E		
Spectral Response Accelerations (Based on F_a=0.9, F_v=2.4):		
Site Class E		
S_{MS},	0.2	**2.190**
S_{M1}	1.0	**2.030**
S_{DS}	0.2	**1.460**
S_{D1}	1.0	**1.353**

6.7 Foundation Design

6.7.1 Discussion

A specific development plan has not been provided to LACO. The following foundation recommendations assume multi-family residential and/or light industrial development for non-critical structures. The foundation design criteria alternatives depend on the risk tolerance of the project site owner and economic considerations.

Due to the presence of seasonally high groundwater, soft to loose soils, and the high liquefaction hazard, a standard "code" foundation design is not appropriate for this site. An engineered solution is necessary to mitigate the identified hazards. A typical method for mitigating these hazards is to design a structural slab foundation that is either supported by a mat of structural fill, deep piers/piles, or a combination of both. The intent behind the structural slab foundation is to reduce the potential for both excessive settlement and to reduce the potential for complete structural failure following a liquefaction event.

Utilization of a deep pile or pier foundation is intended to minimize settlements and preserve the functionality and utility of the structure following seismically induced liquefaction. Ultimately, the appropriate foundation design depends on the development team's decision whether or not continued use of the structure following a liquefaction event is worth the additional cost of a deep foundation system. LACO recommends two options for foundation design at this site.

- Option 1 is a shallow foundation design consisting of a structural mat supported on a 2.5-foot thick section of controlled (structural) fill.
- Option 2 is a reinforced concrete mat foundation supported on a deep foundation to reduce the risk of slab deformation, settling, and/or tilting during a liquefaction event.

6.7.2 Structural Mat Foundation on Structural Fill (Option 1)

To reduce the potential for settlement and liquefaction-induced structural damage, utilize a mat foundation consisting of a structural reinforced concrete slab that is supported on a structural fill. It is recommended that the perimeter foundation and slab on grade be poured monolithically. Due to the unconsolidated nature of the subsoils, the structural fill should rest on a geotextile fabric that in turn rests on undisturbed native subsoil. Be advised that this type of foundation design may not adequately preserve the functionality and utility of the structure following a liquefaction event.

- To construct the structural fill, remove all paving and aggregate base rock. Excavate the underlying native soils to at least 2-feet below the base of the existing roadway fill. Proof roll the resulting surface prior to placement of the geotextile fabric. The limits of the structural fill should extend a minimum of 5-feet outside the perimeter of the proposed structure.

- The total thickness of reinforced fill should at least 2.5-feet. The fill should be composed of compacted select fill consisting of Class 2 aggregate base (AB) (per CalTrans).
- To reduce the possibility of moisture migration through any floor slab-on-grade, a minimum 10-mil plastic membrane (vapor retarder) should be placed on the prepared gravel subgrade. To protect the membrane during steel and concrete placement, and to provide for a better concrete finish, cover the membrane within at least 2-inches of clean sand. Joints between the sheets and utility piping openings should be lapped and taped. Care should be taken during construction to protect the plastic membrane against punctures.
- The soil subgrade should not be allowed to dry excessively, nor be excessively wet before the geotextile fabric and structural fill are placed.

6.7.3 Mat Foundation Supported on Deep Foundation (Option 2)

To maximize the potential for continued use of the structure following a liquefaction event, support a structural mat foundation with either driven piles, or drilled piers. To reduce the potential for liquefaction-induced damage to the structure, the piles or piers must gain support from competent sediments below the liquefiable materials. Based on the soil profile of the site and the consistency of the subsoils, anticipate encountering competent materials at a depth of 24-feet below existing grade.

Where continued use of the development is desired following a liquefaction event, flatwork areas outside of the deep foundation supported structure should be designed to accommodate settlements and/or allow for repair. Flexible utility lines and utility line connections are recommended where underground utilities enter the building.

6.7.4 Floor Slab Subgrade Preparation

To create a suitable subgrade for a floor slab-on-grade, all of the existing topsoil and fill (where present) shall be removed and replaced with structural fill (see Sections 6.4 and 6.5 above). Prior to placing the structural fill beneath a concrete slab, compact the exposed surface of the exposed subgrade to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557. The moisture content should also be controlled to -1 to +3 percent of optimum.

If soft-soil areas are encountered, which can not be adequately compacted in place, these soils should be removed and replaced with compacted engineered fill material placed in accordance with the "Structural Fill" section of this report. Prepared subgrade should be protected from drying or excessive moisture.

6.7.5 Allowable Soil Bearing Pressures

The load bearing soils at this site consist of undisturbed granular subsoils beginning at approximately 2-feet below the base of the existing roadway fill. The composition of the undisturbed subsoils varies laterally from silty sands (SM) to silt with sand (ML). Based on the results of consolidation testing of the shallow site soils (see Section 4.4.2), all load-bearing foundation elements founded on the sandy and silty subsoils described in this report, should be designed with an allowable foundation bearing pressure of 1,500 psf, for dead load and long-term live load. An increase of one-third is permitted (in Section 1605.3.2, 2007 CBC), when using alternate load combinations that include wind or earthquake loads.

At minimum, all footings should be designed and sized in accordance with the 2007 CBC. Where necessary, lateral soil pressures and sliding resistance shall be based on the more conservative of an engineering analysis performed to the standard of care or values presented in the 2007 CBC.

6.8 Pavement

6.8.1 Pavement Design

The pavement structural section should be designed by a qualified design professional to withstand the anticipated traffic loads over the design life of the facility. A flexible paving system may be used for this site consisting of asphalt concrete (AC) placed over compacted Class 2 aggregate base (AB) which in turn rests on an appropriate native subgrade. Based on the high groundwater conditions of the site and the soft consistency of the native subgrade, a woven geotextile fabric is recommended between the subgrade and the pavement structural section.

6.8.2 Pavement Subgrade Preparation

In general, based on our field observations in our test excavations, we estimate that at least 1-foot of native soil material will be required to be removed to reach a suitable subgrade for placement of the roadway structural fill.

Compaction standards for roadway sections should conform to CalTrans Test Methods Cal 216 and 231 with relative compaction as specified in Section 6.5, Table 3 of this report. Roadway subgrade should be visually inspected to verify suitability, and proof-rolled to a firm and unyielding condition as observed and approved by the engineer prior to placement of any structural fill materials. Compressible areas or soft spots may have to be over-excavated and replaced with engineered fill that is placed, compacted, and tested as recommended in this report.

6.9 Drainage and Landscaping

The structural mats beneath the structure must be thick enough to provide positive drainage with a minimum gradient of three percent for a distance of 10-feet away from the foundations. Also, the grading and landscaping should be designed to minimize the potential for water to migrate beneath any structure. Runoff from hardscaped areas, roofs, patios, and other impermeable surfaces should be contained, controlled and collected, and tight-lined to the storm drainage system along both 6th and H Streets.

6.10 Additional Services

6.10.1 Review of Grading, Foundation, and Drainage Plans

The conclusions and recommendations provided in this report are based on the assumption that soil conditions encountered during grading and/or foundation construction will be essentially as exposed during our evaluation, and that the general nature of the grading and use of the property will be as described above. We recommend that final drafts of grading and foundation drawings be reviewed by the authors of this report prior to their approval, or implementation.

6.10.2 Observation and Testing

To assure conformance with the specific recommendations contained within this report, and that assumptions made in the preparation of this report are valid, LACO should be retained for the following:

- Monitor site grading and inspect exposed subgrade prior to placement of geotextile fabrics and/or structural fills
- Inspect foundation excavations prior to placement of any forms or reinforcing steel
- Monitor the placement of structural fill
- Test all structural fill to verify the required relative compaction is achieved

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