City of Pasadena

Caltech Master Development Plan Amendment Project

Final

Environmental Impact Report

November 2006

CALTECH MASTER DEVELOPMENT PLAN AMENDMENT PROJECT

Final
Environmental Impact Report

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Caltech Master Development Plan Amendment Project EIR

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EXECUTIVE SUMMARY

This section summarizes the characteristics of the proposed project and its environmental impacts.

PROJECT SYNOPSIS

Project Applicant

California Institute of Technology
1200 East California Boulevard
Pasadena, California 91125

Project Description

The proposed project involves several amendments to the Caltech Master Development Plan (CMDP). The amendments include four (4) campus development projects and two (2) revisions to the Master Plan design guidelines and design thresholds. The amendments involve:

- Development of a new chemistry and chemical engineering laboratory (CCE lab).

  The CCE Lab is not currently included as a proposed development within the planned academic envelopes identified within the Master Plan (CMDP, pg 48-49). The amendment may require demolition of the existing Mead Laboratory which is listed in the Master Plan as an academic facility to remain on-campus (CMDP, pg 55) or development between the Noyes and Beckman Laboratories which is identified as heavily planted unstructured open space in the Master Plan (CMDP, pg 48). The amendment would revise pages pertinent sections of the CMDP to reflect the above changes.

- Rehabilitation of existing North Undergraduate Houses (Lloyd, Page, and Ruddock House) or construction of new student housing.

  Currently the Master Plan lists the Lloyd, Page, and Ruddock Houses in Table 8: The amendment would allow for the removal and reconstruction of the buildings: thus Table 8 will be revised.

- Development of a new dormitory in place of the existing Braun and Marks houses.

  Currently the Master Plan lists the Braun and Marks Houses in Table 8: Dormitory Facilities to Remain on Campus (page 54). The amendment would allow for the removal and reconstruction of the buildings; thus Table 8 will be revised.

- Development of a new Campus Center in place of the existing Physical Plant offices and shops.

  The building envelope at the site of the existing Physical Plant Offices and Shops is defined in the Master Plan as 3 stories with a setback of 60 feet from

Holliston Avenue (CMDP, pg 87 and pg 89). The amendment would reduce this setback from 60 feet to 41 feet, and would revise pages 87 and 89.

- Revisions to the CMDP design guidelines and thresholds.
  The Master Plan incorporates a section (pages 86-101) outlining the design review responsibilities of the City for various new construction and rehabilitation projects on the Caltech campus. The design guidelines would allow for increased variation in architectural and design styles, and changing the building height measurement index from number of stories to height in feet above grade.

The following discretionary approvals would be required:

- *Certification of the Final SEIR.*
- *Approval of Master Development Plan Amendments*
- *Design review for certain projects according to design thresholds*

ALTERNATIVES

Four alternatives to the proposed project were selected for consideration as follows:

- ***No Project Alternative** – This alternative would involve no change to the site.*
- ***Reduced Massing Alternative** – This alternative would involve redevelopment of the North Undergraduate Housing Facilities within the footprint of the existing buildings and courtyards.*
- ***Limited Location Alternative** - This alternative would involve restricting the development of the CCE Lab to Location 2, the site of the existing Mead Laboratory.*
- ***Reduced Massing and Limited Location Alternative** – This alternative would combine the limitations to massing and location as outlined in the Reduced Massing and Limited Location Alternatives.*

The No Project alternative would involve no change to the environment and would have no environmental impacts. It is therefore considered environmentally superior overall. It should be noted, however, that this alternative would not preclude future development of the sites currently proposed for development. In addition, this alternative fails to achieve the stated project objectives.

Among the development alternatives, the Reduced Massing and Limited Location Alternative would have the least overall impact, as it would reduce and avoid impacts to open space areas, visual corridors, and an art element. This alternative would also avoid removal of up to 49 trees, including at least 18 native and specimen trees, and would reduce potential adverse affects to campus elements that may be eligible for listing as historic resources of national, state or local importance. This alternative would reduce aesthetic and biological, and historic impacts. Thus, the environmentally superior alternative among the development alternatives would be the Reduced Massing and Limited Location Alternative.

The Limited Location Project alternative would reduce impacts due to restriction of the CCE Lab to a previously structured location (Location 2). This alternative would decrease affects to

aesthetic and biological resources by avoiding some protected trees, as well as open space and view corridors and an art element. The Reduced Massing Project alternative would reduce overall impacts, and would preserve aesthetic, biological and historic resources. Overall the benefits from these alternatives would be less than the benefits from the environmentally superior alternative, the Reduced Massing and Limited Location Alternative.

SUMMARY OF IMPACTS AND MITIGATION MEASURES

Table ES-1 summarizes the environmental impacts of the proposed project, proposed mitigation measures, and the level of significance after implementation of mitigation measures. Impacts are categorized by classes. Class I impacts are defined as significant, unavoidable adverse impacts which require a statement of overriding considerations to be issued per Section 15093 of the *State CEQA Guidelines* if the project is approved. There are no Class I impacts for the proposed project. Class II impacts are significant adverse impacts that can be feasibly mitigated to less than significant levels and that require findings to be made under Section 15091 of the *State CEQA Guidelines.* Class III impacts are considered less than significant impacts.

Table ES-1 Summary of Environmental Impacts and Mitigation Measures

AESTHETIC RESOURCES		
Impact	**Mitigation Measures**	**Significance After Mitigation**
Impact AES-1 The proposed Master Plan Amendments could potentially affect scenic resources, such as native and specimen trees, a public art element, and open space within the campus. Impacts to scenic resources are considered Class II, significant but mitigable.	**AES-1(a) Landscaping Plan.** For each building in connection with the proposed amendments, the applicant shall submit a landscape plan that will have as a goal to restore the theme and visual integrity of existing landscaped areas. The design of landscaping at the new buildings should continue to promote integration of open space between existing and new buildings. Landscaped areas between new facilities within building envelopes should be consistent with the general character of the surrounding area and should promote a unified image for the campus. The landscaping plan required under BIO-1 will follow the provisions herein; therefore no significant impacts on aesthetics will result from the proposed amendments. **AES-1(b) Public Art Relocation.** Avoidance of development within Location 1 for Amendment 1 would be the preferred scenario in order to avoid impacts to a scenic resource. If avoidance of Location 1 is not feasible, prior to development the applicant shall consult with the City of Pasadena Arts and Culture Commission as to the deaccession procedures and policy and in compliance with State of California Works of Art Law and the Federal Visual Artists Rights Act (VARA). The Arts Commission may approve removal and relocation of the art piece, in consultation	Less than significant.

Table ES-1 Summary of Environmental Impacts and Mitigation Measures

	with the artist. If relocation is deemed infeasible, the applicant shall replace the art piece with a new piece of equal or greater value. As an alternative, Caltech may voluntarily contribute a like amount to an arts fund administered by the City of Pasadena Arts and Culture Commission: payable in lieu to the Cultural Trust Fund shall be approved by the Arts and Culture Commission. The following measure is recommended to reduce the impacts to scenic resources resulting from development of open space. **AES-1(c) Avoidance of Open Space Encroachment**. Caltech shall avoid encroachment into or obstructing the open space area west of the Atheneaum. Replacement of the North Undergraduate House rather than rehabilitation would avoid this impact and would be the preferred scenario for preservation of the existing open space and preservation of existing visual resources in the area. However, if avoidance of this open space encroachment is not feasible, the rehabilitation scenario shall incorporate a landscape element along the southern building façade. Landscaping should be developed to soften the visual impacts of new development within the existing north-south open space corridor east of the Athenaeum.	
Impact AES-2 The proposed Master Plan Amendments would change the visual character of the Caltech campus. Overall these changes are anticipated to introduce buildings which are primarily visually compatible with the architectural treatment, and materials of nearby buildings. However, the scale of proposed residence halls have a potential to conflict with massing norms at the campus. Impacts are considered Class II, significant but mitigable.	**AES-2(a) Façade Articulation.** Any addition or new construction associated with the residential houses shall be designed in a manner that clearly articulates the massing of the new building as distinct from the existing residential structures. Façades shall be designed in a manner that incorporates changes in relief such that no façade can measure greater than 150 feet without interruption. Articulated fenestration, parapets, and rooflines are encouraged. **AES-2(b) Replacement Landscaping**. Any addition or new construction associated with removal of landscaping and ornamental vegetation shall design and implement replacement landscaping of a suitable nature. Landscaping shall integrate the surrounding landscape design and incorporate the new developments in order to soften the affect of building massing.	Less than significant
Impact AES-3 The proposed revisions to the Caltech Master Development Plan design guidelines and design review thresholds	None required.	Less than significant.

Table ES-1 Summary of Environmental Impacts and Mitigation Measures

would broaden the range of architectural styles and landscape designs utilized for future development within the Caltech campus. Overall, these changes would encourage architectural and landscaping design that would implement the objectives of the Master Plan. Impacts are considered Class III, less than significant.		
AIR QUALITY		
Impact	**Mitigation Measures**	**Significance After Mitigation**
Impact AQ-1 Project construction would generate air pollutant emissions that would exceed SCAQMD thresholds for the ozone precursor ROG (Reactive Organic Gases). This is a Class II, *significant but mitigable* impact.	**AQ-1(a) ROG Control.** The following shall be implemented to minimize daily ROG emissions related to the application of architectural coatings: • *Low VOC architectural and asphalt coatings shall be used on site and shall comply with AQMD Rule 1113-Architectural Coatings.* • *Daily coating use shall be restricted to 65 gallons per day (assuming a VOC content of 1.1 pounds per gallon).* The following additional measure is recommended to further reduce emissions of construction-related ozone precursors (ROG and NOx) to the greatest extent feasible: **AQ-1(b) Ozone Precursor Control.** The following shall be implemented during construction to minimize emissions from construction equipment: • *Equipment engines should be maintained in good condition and in proper tune as per manufacturer's specifications;* • *Lengthen construction periods during the smog season so as to minimize the number of vehicles and equipment operating simultaneously; and* • *Use new technologies to control ozone precursor emissions as they become available.* • *Diesel oxidation catalysts and particulate filters shall be installed on all on and off road construction vehicles.* The following additional measure is recommended to reduce fugitive dust (PM10) to the greatest extent feasible**:**	Less than significant.

Table ES-1 Summary of Environmental Impacts and Mitigation Measures

	AQ-1(c) Fugitive Dust Control. The following shall be implemented during construction to minimize fugitive dust emissions: • *Water trucks shall be used during construction to keep all areas of vehicle movements damp enough to prevent dust from leaving the site. At a minimum, this will require twice daily applications (once in late morning and once at the end of the workday). Increased watering is required whenever wind speed exceeds 15 mph. Grading shall be suspended if wind gusts exceed 25 mph.* • *If importation, exportation and stockpiling of fill material is involved, soil with 5% or greater silt content that is stockpiled for more than two days shall be covered, kept moist, or treated with soil binders to prevent dust generation. Trucks transporting material shall be tarped from the point of origin or shall maintain at least two feet of freeboard.* • *All material excavated or graded shall be sufficiently watered to prevent excessive amounts of dust. Watering should occur at least twice daily with complete coverage, preferably in the late morning and after work is done for the day.* • *All clearing, grading, earth moving, or excavation activities shall cease during periods of high winds (i.e., greater than 20 mph averaged over one hour) so as to prevent excessive amounts of dust.* • *All material transported off-site shall be either sufficiently watered or securely covered to prevent excessive amounts of dust.* • *Face masks shall be used by all employees involved in grading or excavation operations during dry periods to reduce inhalation of dust which may contain the fungus which causes San Joaquin Valley Fever.* • *All active portions of the construction site shall be sufficiently watered to prevent excessive amounts of dust.*	

Table ES-1 Summary of Environmental Impacts and Mitigation Measures

Impact AQ-2 Operation of the proposed project would not generate air pollutant emissions exceeding SCAQMD operational significance thresholds. This is a Class III, *less than significant* impact.	None required.	Less than significant.
Impact AQ-3 Project-generated traffic would incrementally increase traffic congestion and associated carbon monoxide concentrations at area intersections. However, ambient concentrations are well below state and federal standards and the project would not trigger any of the criteria for potential CO impacts. Therefore, project impacts would be Class III, *less than significant*.	None required.	Less than significant.
BIOLOGICAL RESOURCES		
Impact	**Mitigation Measures**	**Significance After Mitigation**
Impact BIO-1 Development of the Master Plan Amendments would require removal of up to 84 trees, of which about 48 are protected as native and specimen trees. This is considered a Class II, *significant but mitigable* impact.	The applicant is required to obtain a permit from the City for the removal of onsite native and specimen trees and comply with the provisions of the permit. Mitigation measure AES-1(a) in Section 4.1, Aesthetics, would require the submittal of a landscape plan that will have as a goal to restore the theme and visual integrity of existing landscaped areas. This measure would promote integration of open space between existing and new buildings and help reduce biological impacts associated with the loss of trees and tree groupings. In addition, the following measure would be required in order to mitigate impacts relating to the disturbance of trees and tree groupings. **BIO-1 Construction Practices**. Construction of individual campus developments associated with the proposed Master Plan amendments shall adhere to the following: • ·No grading or development shall occur within 5 feet from the driplines of mature native or specimen trees that are not to be removed as part of the project, but that occur near the construction area. • ·All mature native or specimen trees within 25 feet of proposed ground disturbances, which are not to be removed as part of the project, shall be temporarily fenced with chain-link or other material satisfactory to the City throughout all grading and construction activities. The fencing shall be installed six feet outside the dripline of each specimen oak tree,	Less than significant.

Table ES-1 Summary of Environmental Impacts and Mitigation Measures

	and shall be staked every six feet. • ·No construction equipment shall be parked, stored or operated within six feet of any mature native or specimen tree dripline. • ·No fill soil, rocks, or construction materials shall be stored or placed within six feet of the dripline of a mature native or specimen tree (pervious paving and other materials are allowed, as approved by the City). • ·Any roots encountered that are one inch in diameter or greater shall be cleanly cut. This shall be done under the direction of a City approved arborist/oak tree consultant. • ·No permanent irrigation shall occur within the critical root zone of any mature native or specimen tree. Drainage plans shall be designed so that tree trunk areas are properly drained to avoid ponding. • ·Any trenching required within the dripline or sensitive root zone of any mature native or specimen tree shall be done by hand. In addition, trenching in the protected zone needs to preserve roots over 1 inch by tunneling. **BIO-1(a) City Trees and Tree Protection Ordinance.** Prior to the issuance of a building permit for each individual building in connection with the proposed amendments, the applicant shall submit a landscape plan including proposed tree removals and replacement, for review and approval by the Planning and Development Director or the Design Commission, according to the review thresholds in the CMDP. Such plan shall show the square feet of tree canopy coverage proposed to be removed within the development site. The area of removed canopy shall be replaced at a ratio of 1:1 through a combination of relocated and new trees planted within areas of the development site that are suitable for new tree planting. While canopy replacement on the development site shall be the first priority, any canopy that cannot be reasonably replaced onsite, shall be replaced within other areas of the campus that are targeted by the CMDP for landscaping. While incorporating a range of species necessary to maintain the landscaping theme existing in the campus, the landscape plan shall also provide for the	

Table ES-1 Summary of Environmental Impacts and Mitigation Measures

	replacement of removed trees with native and specimen trees protected under the Tree Protection Ordinance. Further, replacement trees shall achieve equal or greater canopy than the canopy removed within 5 years of implementation of the landscaping plan. A Tree Protection Plan shall be prepared in accordance with the Tree Protection Guidelines per Chapter 8.52 of the Pasadena Municipal Code. The plan shall detail the protective measures to be used during demolition and construction of each building site proposed in the amendment. The plan shall be reviewed and approved by the Planning staff prior to issuance of any grading or building permits. The applicant shall submit a landscape/planting plans for review and approval as provided in the provisions of the amended Master Plan.	
Impact BIO-2 Removal of up to 84 trees has the potential to affect nesting raptors and migratory birds. This is considered a Class II, significant but mitigable impact.	**BIO-2 Bird Nesting Surveys**. Prior to any earthmoving activities during the breeding and nesting season (typically March 1 to September 1 or as early as February 1 for raptors), the applicant shall have a field survey conducted by a qualified biologist to determine if active nests of breeding birds are present within the area of potential influence of the activity. If nesting birds protected under the Migratory Bird Treaty Act are found within the area of potential influence, an appropriate buffer as determined by the biologist will be recommended and the nest shall not be disturbed until the young have fledged. This survey shall be conducted within three (3) days prior to commencement of grading for each development amendment.	Less than significant.
HISTORIC RESOURCES		
Impact	**Mitigation Measures**	**Significance After Mitigation**
Impact H-1 The proposed campus master development plan amendment includes the removal or reconstruction of five buildings. The buildings were determined to be ineligible for listing as historic resources; therefore, the proposed project's impacts to historic resources would be Class III, less than significant.	None required.	Less than significant.

Table ES-1 Summary of Environmental Impacts and Mitigation Measures

Impact H-2 The potential removal and reconstruction of the North Undergraduate Houses may have an adverse impact on the setting of eligible historic resources on the campus: the Athenaeum, South Undergraduate Houses and the Landscape Design for the Athenaeum. However, implementation of mitigation would reduce the potential for adverse impacts to the historic resources. Therefore, impacts relating to the building's removal and replacement with new construction are considered Class II, significant but mitigable.	In reference to mitigating impacts on historic resources, the CEQA Guidelines state: "Where maintenance, repair, stabilization, rehabilitation, restoration, preservation, conservation or reconstruction of the historical resource will be conducted in a manner consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings (1995), Weeks and Grimmer, the project's impact on the historical resource shall generally be considered mitigated below a level of significance and thus is not significant. (PRC §15126.4(b)(1))." These standards, developed by the National Park Service, represent design guidelines for carrying out historic preservation, restoration and rehabilitation projects. The Secretary's Standards and the supporting literature describe historic preservation principles, including guidelines for new in-fill construction, and offers recommended means for carrying them out. Adhering to the Standards is the only method described within CEQA for reducing project impacts on historic resources to less than significant levels. The buildings proposed for alterations are not eligible for listing on the National Register or the California Register, or as Pasadena Landmarks; however, other buildings and site features, most notably the Athenaeum, South Undergraduate Houses and the landscape design for the Athenaeum, have been identified as significant historic resources. The following measure is recommended to mitigate adverse impacts to significant buildings and site features. **H-2 Design Review**. The design of any construction on the location of the North Undergraduate Houses (either alterations to the existing building or demolition and construction of new buildings) shall be subject to the review by Pasadena Design Commission in order to assure its conformance with the Secretary of Interior's Standards with respect to its potential impacts on the Athenaeum, South Undergraduate Houses, and the landscape features.	Less than significant.

Table ES-1 Summary of Environmental Impacts and Mitigation Measures

TRAFFIC AND CIRCULATION		
Impact	**Mitigation Measures**	**Significance After Mitigation**
Impact TC-1 The proposed project would incrementally increase traffic levels at study area intersections, but would not generate impacts exceeding adopted significance criteria at any intersection. Thus, the proposed project's traffic impacts are considered Class III, less than significant.	None required.	Less than significant.
Impact TC-2 The proposed project would incrementally increase traffic levels along study area roadways. However, the projected increases are less than the adopted thresholds on all road segments. Therefore, impacts are considered Class III, less than significant.	None required.	Less than significant.
Impact TC-3 The proposed project would incrementally reduce the on-campus parking supply; however, with the recent completion of the California Parking Structure, the campus would be expected to have a surplus of parking capacity. Thus, impacts to on-campus parking are considered Class III, less than significant.	None required.	Less than significant.
Impact TC-4 The proposed project would not generate trips exceeding CMP criteria at CMP locations. Thus, impacts to CMP routes are considered Class III, less than significant.	None required.	Less than significant.
UTILITIES AND SERVICE SYSTEMS		
Impact	**Mitigation Measures**	**Significance After Mitigation**
Impact USS-1 Buildout of the proposed Master Development Plan Amendments would generate an estimated increase of approximately 54,295 gallons per day (gpd) of wastewater. The San Jose Creek WRP, Whittier Narrows WRP and Los Coyotes WRP facilities have sufficient capacity to accommodate this level of new development; therefore, impacts would be considered	None required.	Less than significant.
Impact USS-2 Buildout of the proposed Master Development Plan Amendments would generate an estimated increase of approximately 54,295 gallons per day (gpd) of wastewater. The LACSD and Pasadena Department of Public Works have determined the current system has sufficient capacity to support such an increase. Thus, this impact is considered	None required.	Less than significant.

Table ES-1 Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measures	Significance After Mitigation
Impact USS-3 Buildout of the Master Development Plan Amendments would increase demand for water by approximately 60,430 gallons per day. The current water supply and infrastructure has sufficient capacity and availability to accommodate this level of new development; therefore, this impact is considered	None Required.	Less than significant.

1.0 INTRODUCTION

This document is a Draft Supplemental Environmental Impact Report (EIR) for proposed amendments to the California Institute of Technology Master Plan (Caltech), originally approved in 1989 and amended in 1995 and 1999. The proposed project is described in detail in Section 2.0, *Project Description*. This section discusses: (1) the general background of the project; (2) the purpose and legal authority of the EIR; (3) the scope and content of the EIR; (4) lead, responsible, and trustee agencies; (5) the environmental review process required under the California Environmental Quality Act (CEQA); and (6) areas of public controversy.

1.1 PROJECT BACKGROUND

In July 1985, The City of Pasadena established a procedure to assist institutions in planning for future development. Under the terms of this procedure, nonprofit institutions occupying two or more acres and planning 5,000 square feet or more of future construction were advised to submit a Master Development Plan to the City for review and approval.

An Environmental Impact Report (EIR) for the Caltech Master Plan was approved and certified by the City Council in 1989. The City adopted the Master Plan that same year, and subsequently amended the Master Plan in 1995 and 1999. The Master Plan includes the following sections: Concept, Open-Space Strategy, Landscape Guidelines, Circulation and Parking Strategy, Campus Utilities Strategy, Design Guidelines, and Implementation and Phasing Guidelines. The Master Plan presents regulations that cover all aspects of development within the campus boundaries:

- *The type and location of uses on the campus*
- *The amount of new development in identified areas and the extent of changes to existing buildings*
- *The amount and location of future parking and an automobile circulation system*
- *The maximum height and minimum setback of all new structures*
- *Architectural guidelines for new structures*
- *The sequencing of new development and interim development guidelines*

Caltech has submitted a Master Development Plan Amendment application to amend the current Caltech Master Plan to allow for the following elements.

- *Addition of the Following Campus Development Projects, which involved building demolitions not provided for in the current Master Plan:*
  - *Chemistry and Chemical Engineering Laboratory*
  - *North Undergraduate Houses*
  - *Braun & Marks Graduate Houses*
  - *Campus Center*
- *Revisions to the Open-Space Strategy and Design Guidelines for the North Campus Facilities on the East-West Axis*
- *Revisions to the Design Review thresholds established in the Design Guidelines*

1.2 PURPOSE AND LEGAL AUTHORITY

The proposed Master Plan amendment requires review by the City of Pasadena Planning Commission and discretionary approval of the City Council. Pursuant to Section 15060(d) of the State *CEQA Guidelines,* the project is subject to the requirements of the CEQA. In accordance with Section 15121 of the *CEQA Guidelines*, the purpose of this EIR is to serve as an informational document that:

> *"...will inform public agency decision-makers and the public generally of the significant environmental effects of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the project..."*

This EIR has been prepared as a **supplemental EIR** pursuant to Section 15163(a)(2)of the *State CEQA Guidelines*. A supplemental EIR is prepared when minor additions or changes are necessary to make a previously certified EIR adequately apply to the project in the changed situation. This SEIR and the Final EIR for the California Institute of Technology Master Plan Project that was certified in 1989 comprise the environmental review documentation for the proposed project. A copy of the 1989 Final EIR is available for review at the City of Pasadena, 175 North Garfield Avenue, Pasadena, California 91109.

This report is to serve as an informational document for the public and City of Pasadena decision-makers. The environmental review process will culminate with Planning Commission and City Council hearings to consider certification of a Final SEIR and a decision on whether to approve the proposed Master Plan Amendments.

1.3 EIR SCOPE AND CONTENT

Section 15163(b) of the *CEQA Guidelines* states that, "the supplemental EIR need contain only the information necessary to make the previous EIR adequate for the project as revised." Therefore, this SEIR focuses on those issues for which it was determined that the proposed Master Plan amendments would have the potential to create significant impacts beyond those identified in the 1989 Final EIR.

The issues addressed in this SEIR include:

- *Aesthetics/Visual Resources*
- *Air Quality*
- *Biological Resources*
- *Cultural Resources*
- *Transportation/Traffic*
- *Utilities and Service Systems*

This SEIR identifies potentially significant environmental impacts, including site-specific and cumulative effects, of the project in accordance with the provisions set forth in the *State CEQA Guidelines*. In addition, the SEIR recommends feasible mitigation measures, where possible, that would reduce or eliminate adverse environmental effects.

In preparing the SEIR, use was made of pertinent City policies and guidelines, existing EIRs and background documents prepared by the City. A full reference list is contained in Section 7.0 *References and Preparers*, of this SEIR.

Four project alternatives are analyzed in Section 6.0. These include: (1) the CEQA-required "no project" scenario; (2) a reduced massing alternative development scenario that restricts the redevelopment of the North Undergraduate Housing facilities to the current buildings boundaries; (3) an alternative which limits the location of the Chemistry and Chemical Engineering (CCE) Laboratory to the previously structured site; and (4) an alternative development scenario which restricts the redevelopment of the North Undergraduate Housing Facilities and limits the location of the CCE Lab to the previously structured location. Section 6.0 also identifies the "environmentally superior" alternative among the options studied.

The level of detail contained throughout this SEIR is consistent with the requirements of CEQA and applicable court decisions. The *State CEQA Guidelines* provide the standard of adequacy on which this document is based. The Guidelines state:

> *"An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of the proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection, but for adequacy, completeness, and a good faith effort at full disclosure." (Section 15151)*

1.4 LEAD, RESPONSIBLE AND TRUSTEE AGENCIES

The *CEQA Guidelines* require identification of "lead," "responsible" and "trustee" agencies. The City of Pasadena is the lead agency for the project because it has the principal responsibility for approving the project. Discretionary approval of the project is vested with the City of Pasadena.

A responsible agency is a public agency other than the "lead agency" that has discretionary approval over some aspect of the project (the *CEQA Guidelines* define a public agency as a state or local agency, but specifically exclude federal agencies from the definition). There are no responsible agencies for the proposed project.

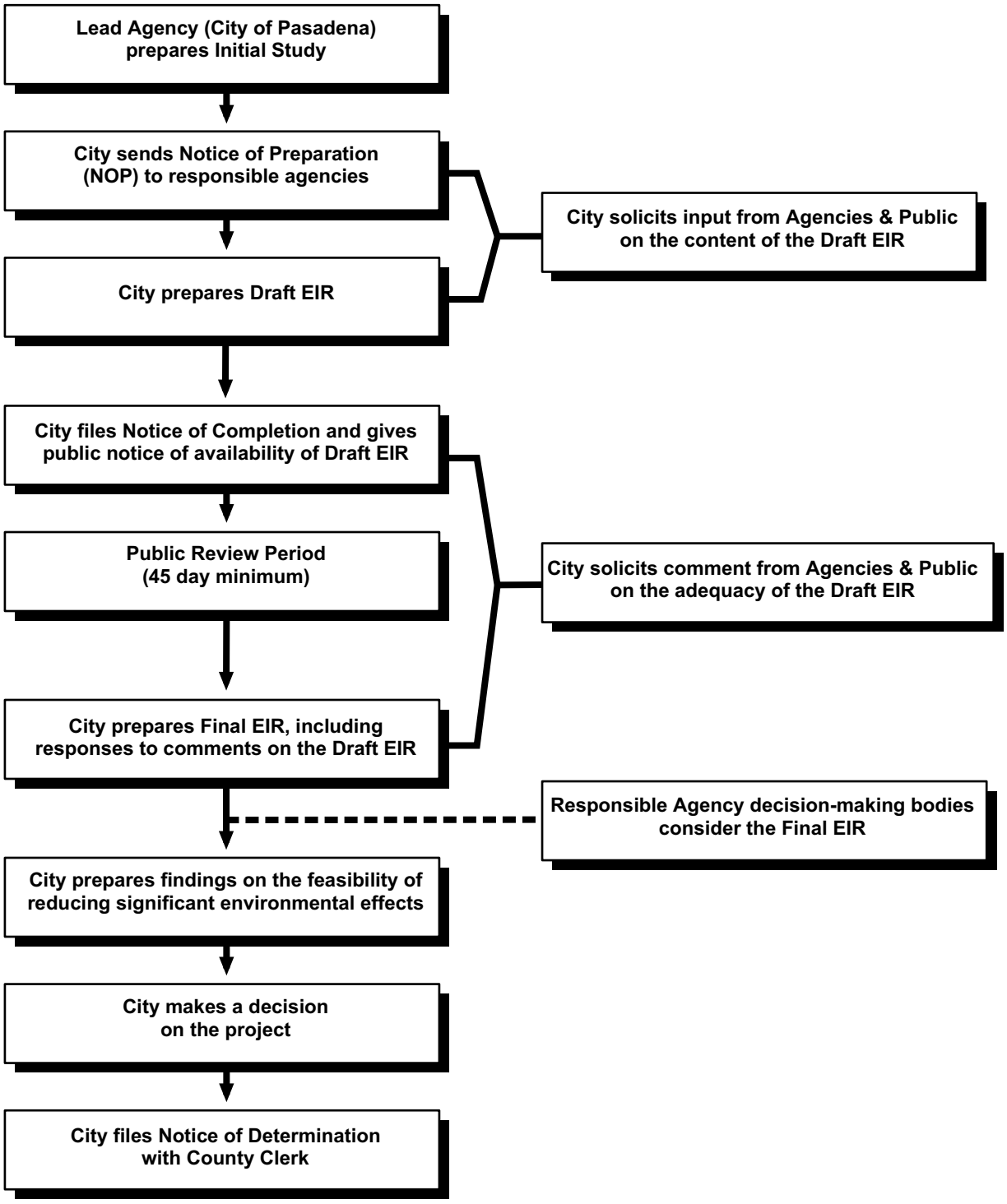
A trustee agency refers to a state agency having jurisdiction by law over natural resources affected by a project. There are no trustee agencies for the proposed project.

1.5 ENVIRONMENTAL REVIEW PROCESS

The environmental review process as required under CEQA is presented below and illustrated generally on Figure 1-1.

1. ***Notice of Preparation (NOP).*** *After deciding that an EIR is required, the lead agency must file an NOP soliciting input on the EIR scope to the State Clearinghouse, other concerned agencies, and parties previously requesting notice in writing (CEQA Guidelines Section 15082; Public Resources Code Section 21092.2).*

THE EIR PROCESS



Environmental Review Process Figure 1-1

The NOP must be posted in the County Clerk's office for 30 days. The NOP is typically accompanied by an Initial Study that identifies the issue areas for which the proposed project could create significant environmental impacts. Typically, the lead agency holds a scoping meeting during the 30-day NOP review period.

2. ***Draft EIR Prepared.*** *The Draft EIR must contain: a) table of contents or index; b) summary; c) project description; d) environmental setting; e) discussion of significant impacts (direct, indirect, cumulative, growth-inducing and unavoidable impacts); f) a discussion of alternatives; g) mitigation measures; and h) discussion of irreversible changes.*

3. ***Notice of Completion.*** *A lead agency must file a Notice of Completion with the State Clearinghouse when it completes a Draft EIR and prepare a Public Notice of Availability of a Draft EIR. The lead agency must place the Notice in the County Clerk's office for 30 days (Public Resources Code Section 21092) and send a copy of the Notice to anyone requesting it (CEQA Guidelines Section 15087). Additionally, public notice of DEIR availability must be given through at least one of the following procedures: a) publication in a newspaper of general circulation; b) posting on and off the project site; and c) direct mailing to owners and occupants of contiguous properties. The lead agency must solicit comments from the public and respond in writing to all written comments received (Public Resources Code Sections 21104 and 21253). The minimum public review period for a DEIR is 30 days. When a Draft EIR is sent to the State Clearinghouse for review, the public review period must be 45 days unless a shorter period is approved by the Clearinghouse (Public Resources Code 21091).*

4. ***Final EIR.*** *A Final EIR (FEIR) must include: a) the Draft EIR, modified through responses to comments; b) copies of comments received during public review; c) list of persons and entities commenting; and d) responses to comments.*

5. ***Certification of FEIR.*** *Prior to making a decision on a proposed project, the lead agency must certify that: a) the FEIR has been completed in compliance with CEQA; b) the EIR was presented to the decision-making body of the lead agency; and c) the decision-making body reviewed and considered the information in the EIR prior to approving a project (CEQA Guidelines Section 15090).*

6. ***Lead Agency Project Decision.*** *A lead agency may: a) disapprove a project because of its significant environmental effects; b) require changes to a project to reduce or avoid significant environmental effects; or c) approve a project despite its significant environmental effects, if the proper findings and statement of overriding considerations are adopted (CEQA Guidelines Sections 15042 and 15043).*

7. ***Findings/Statement of Overriding Considerations.*** *For each significant impact of the project identified in the EIR, the lead or responsible agency must find, based on substantial evidence, that either: a) the project has been changed to avoid or substantially reduce the magnitude of the impact; b) changes to the project are within another agency's jurisdiction and such changes have or should be adopted; or c) specific economic, social, or other considerations make the mitigation measures or project alternatives infeasible (CEQA Guidelines Section 15091). If an agency approves a project with unavoidable significant environmental effects, it must prepare a written Statement of Overriding Considerations that sets forth the specific social, economic, or other reasons supporting the agency's decision.*

8. ***Mitigation Monitoring/Reporting Program.*** *When an agency makes findings on significant effects identified in the EIR, it must adopt a reporting or monitoring program for mitigation measures that were adopted or made conditions of project approval to mitigate significant effects.*

2.0 PROJECT DESCRIPTION

This section describes the proposed project, including the project applicant, project location, current site characteristics, the general characteristics of the proposal, project objectives, and discretionary approvals needed.

2.1 PROJECT APPLICANT

California Institute of Technology
1200 East California Boulevard
Pasadena, California 91125

2.2 PROJECT LOCATION

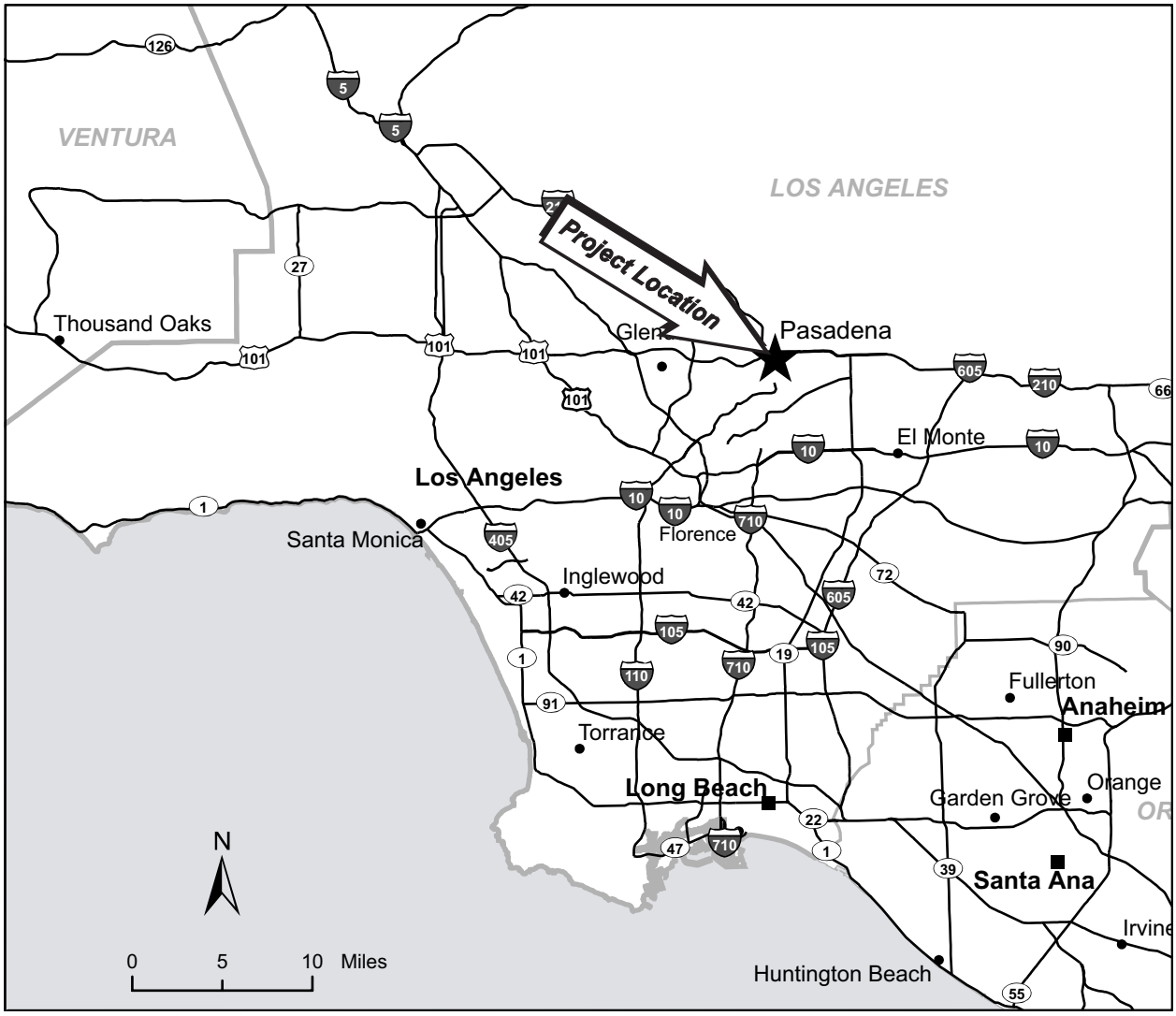
The project site, the California Institute of Technology (Caltech) campus, is located at 1200 East Boulevard in south central Pasadena, south and east of the Lake Avenue and Colorado Boulevard commercial corridors. The campus is generally bordered by Catalina Avenue on the west, Del Mar Boulevard on the north, Hill Avenue on the east, California Boulevard from Hill Avenue to Arden Road on the southeast, and Arden Road, Tournament Park, and Wilson Avenue to the south. Figure 2-1 shows the location of the campus within the region, while Figure 2-2 shows the campus' location within the City of Pasadena.

2.3 EXISTING SITE CHARACTERISTICS

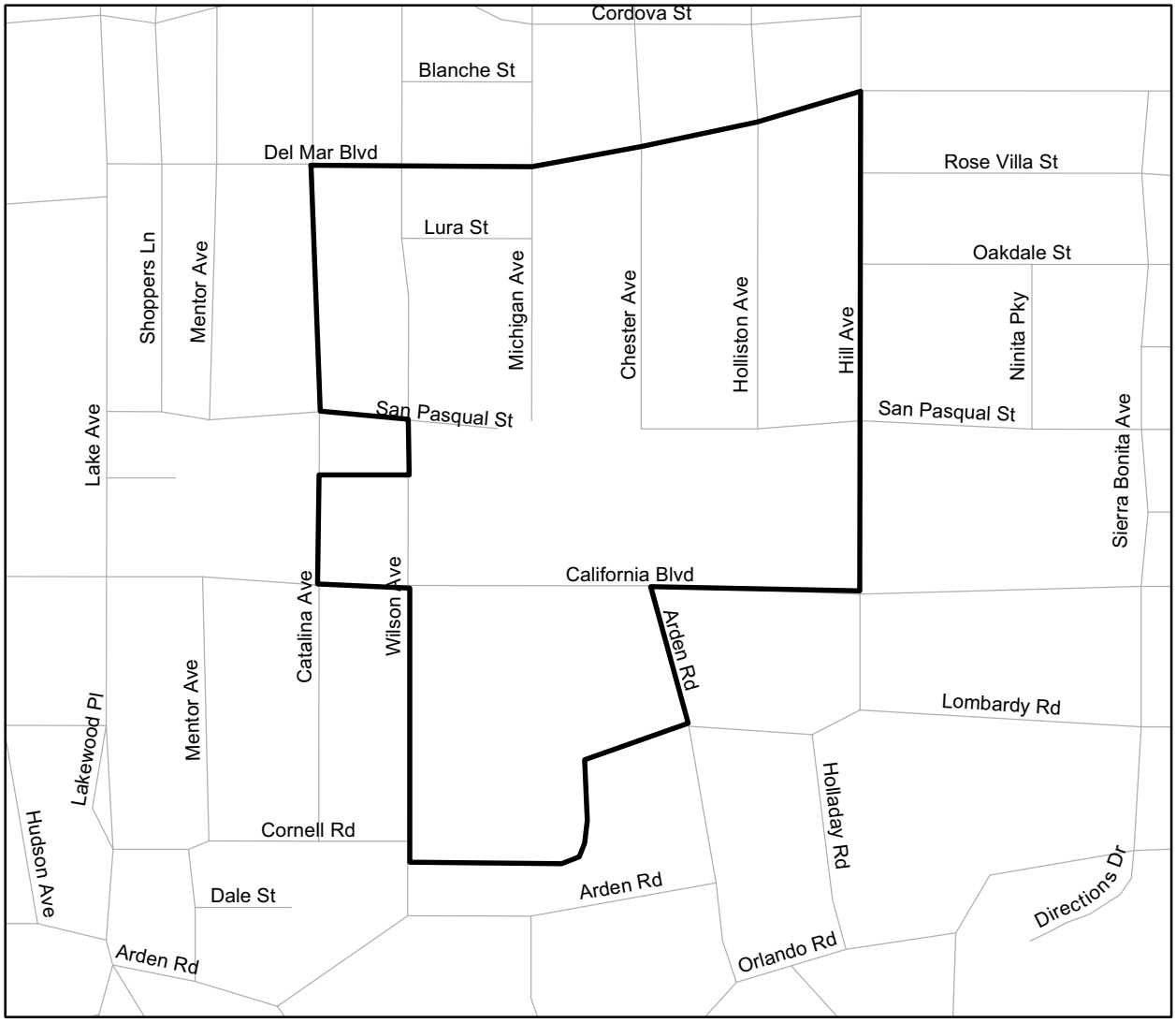
The Caltech campus encompasses approximately 124 acres and currently contains a variety of uses, including academic buildings, administration and support facilities, residences, and athletic facilities. Academic buildings are concentrated in the center of the campus north of California Boulevard and east of Wilson Avenue. Athletic facilities are located south of California Boulevard. Residential uses are located at the campus' edges along Catalina Avenue near Del Mar Boulevard, San Pasqual Street and Holliston Avenue near Hill Avenue, and California Boulevard near Hill Avenue. Figure 2-3 shows the current campus layout.

The campus is bordered on the north and west by two-to three-story apartments and condominiums along the Mentor Avenue-Catalina Avenue and Cordova Street-Del Mar Boulevard corridors. To the south and east of the campus are established single-family neighborhoods that date from the early 1900s. The predominant one-and two-story housing stock in these areas ranges from modest dwellings on smaller lots near Del Mar Boulevard to much larger homes on estate-sized lots in the southern areas of the City.

Caltech owns all campus property with the exception of two residential parcels in the northern portion of the campus. Caltech also owns or operates satellite facilities elsewhere in Pasadena and southern California, which include the Jet Propulsion Laboratory and former St. Luke Hospital in Pasadena; the Palomar Observatory in San Diego County; the Owens Valley Radio Observatory in Big Pine; the Big Bear Solar Observatory at Big Bear Lake; the William G. Kerckhoff Marine Biology Laboratory in Corona del Mar; and the Kresge Building and other satellite facilities outside the campus boundary but within the City of Pasadena.



Regional Location Figure 2-1



Source: US Bureau of the Census TIGER 2000 data.

Project Vicinity

Figure 2-2

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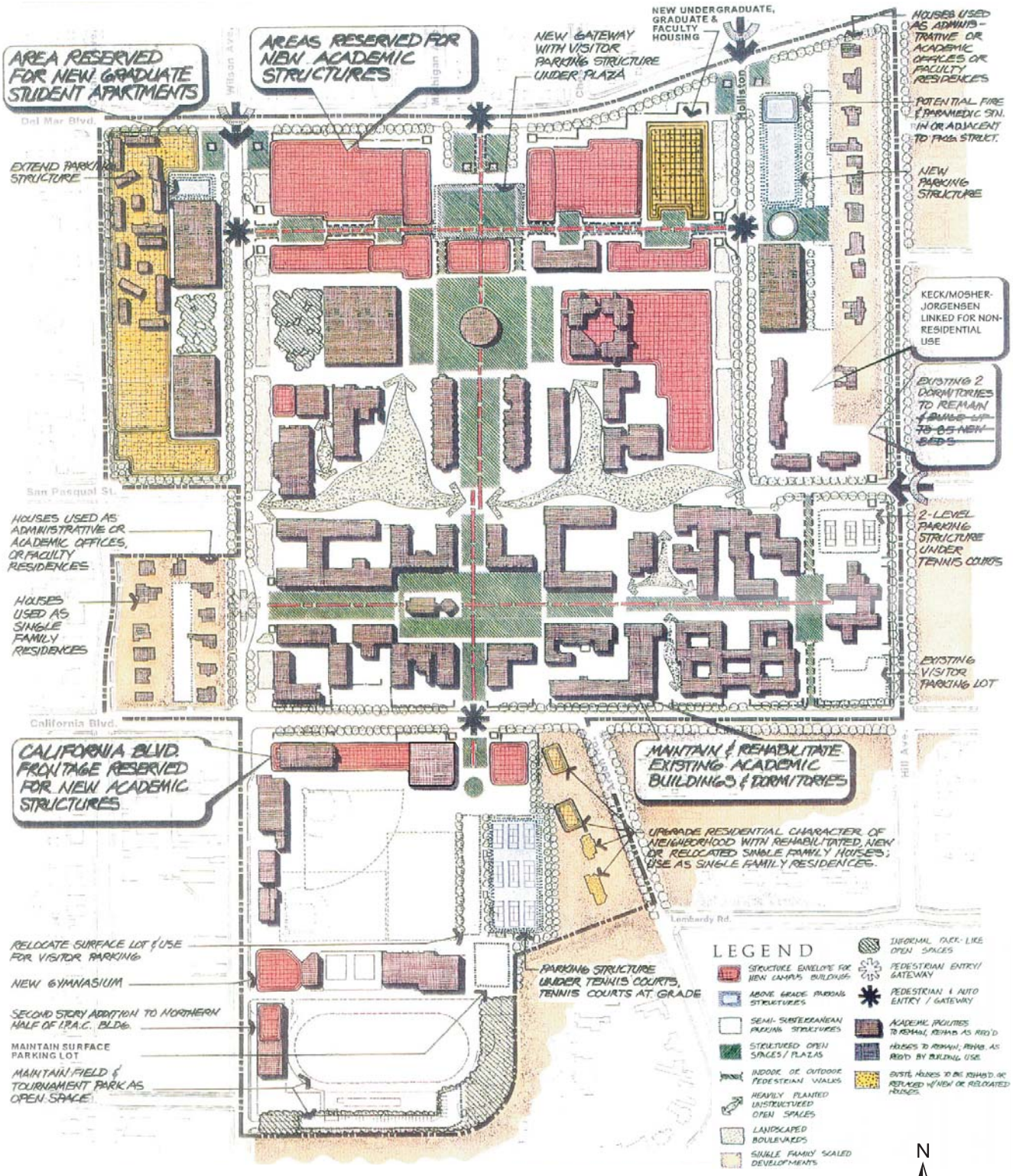

Source: Kurt Meyer Partners, January 2006.

Campus Layout

Figure 2-3

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The Caltech campus has a City of Pasadena General Plan designation of Institutional and is zoned Public and Semi-Public Space (PS). The PS zone allows for the consideration of large public or semi-public uses. The Caltech Master Development Plan serves as the basis for future development on the campus. The Master Plan supersedes all other sections of the Pasadena Municipal Code (PMC), unless otherwise provided in the Master Plan.

2.4 PROJECT CHARACTERISTICS

The proposed project involves several amendments to the Caltech Master Development Plan (CMDP). The amendments include four (4) campus development projects and two (2) revisions to the Master Plan design guidelines and design thresholds. The amendments involve:

- Development of a new chemistry and chemical engineering laboratory (CCE lab).

  The CCE Lab is not currently included as a proposed development within the planned academic envelopes identified within the Master Plan (CMDP, pg 48-49). The amendment may require demolition of the existing Mead Laboratory which is listed in the Master Plan as an academic facility to remain on-campus (CMDP, pg 55) or development between the Noyes and Beckman Laboratories which is identified as heavily planted unstructured open space in the Master Plan (CMDP, pg 48). The amendment would revise pages pertinent sections of the CMDP to reflect the above changes.

- Rehabilitation of existing North Undergraduate Houses (Lloyd, Page, and Ruddock House) or construction of new student housing.

  Currently the Master Plan lists the Lloyd, Page, and Ruddock Houses in Table 8 Dormitory Facilities to Remain on Campus: The amendment would allow for the removal and reconstruction of the buildings: thus Table 8 will be revised.

- Development of a new dormitory in place of the existing Braun and Marks houses.

  Currently the Master Plan lists the Braun and Marks Houses in Table 8: Dormitory Facilities to Remain on Campus (page 54). The amendment would allow for the removal and reconstruction of the buildings; thus Table 8 will be revised.

- Development of a new Campus Center in place of the existing Physical Plant offices and shops.

  The building envelope at the site of the existing Physical Plant Offices and Shops is defined in the Master Plan as 3 stories with a setback of 60 feet from Holliston Avenue (CMDP, pg 87 and pg 89). The amendment would reduce this setback from 60 feet to 41 feet, and would revise pages 87 and 89.

- Revisions to the CMDP design guidelines and thresholds.

  The Master Plan incorporates a section (pages 86-101) outlining the design review responsibilities of the City for various new construction and rehabilitation projects on the Caltech campus. The design guidelines would allow for increased variation in architectural and design styles, and changing

the building height measurement index from number of stories to height in feet above grade.

Table 2-1 summarizes the existing and proposed buildout characteristics of the proposed physical amendments. Figure 2-4 shows the proposed locations of each amendment. Detailed descriptions of each amendment, including the proposed amendments to the design guidelines and thresholds, follow.

Table 2-1 Development Summary

	Amendment 1		Amendment 2		Amendment 3	Amendment 4
Existing Use						
	Mead Lab		**Lloyd, Page, and Ruddock (Dormitory Facilities)**		**Braun & Marks (Dormitory Facilities)**	**Physical Plant Office/Shops**
Sq. Footage	8,000		67,899		21,695	36,648
Footprint	8,000		40,000		9,000	33,340
Stories	1		2		2	1
Number of Beds	-		275		62	-
Proposed Use						
	Chemistry and Chemical Engineering (CCE) Laboratory		**North Undergraduate (Dormitory Facilities)**		**Braun & Marks (Dormitory Facilities)**	**Campus Center**
	Mead Lab Location	**Noyes/Beckman Lab Location**	**(rehabilitation)**	**(replacement)**		
Sq. Footage	80,000	80,000	138,000	138,000	55,000	100,000
Footprint	16-20,000	16,000	71,000	38,000	15,000	20,000
Stories	3	3	2	3	3	3
Number of Beds	-	-	275	275	62	-

Amendment Locations

Figure 2-4

a. Chemistry and Chemical Engineering Laboratory (CCE Lab). Caltech proposed either the construction of a new laboratory in the open space between Beckman Behavioral Biology (BBB) Lab and Noyes Lab, or the construction of the new laboratory on the site of Mead Lab and the building envelope identified in the Master Plan west of Mead.

In the first alternative, the Master Plan shows open space in the area proposed for the new lab. A portion of this open space would be utilized for the new 3-story Chemistry & Chemical Engineering Laboratory.

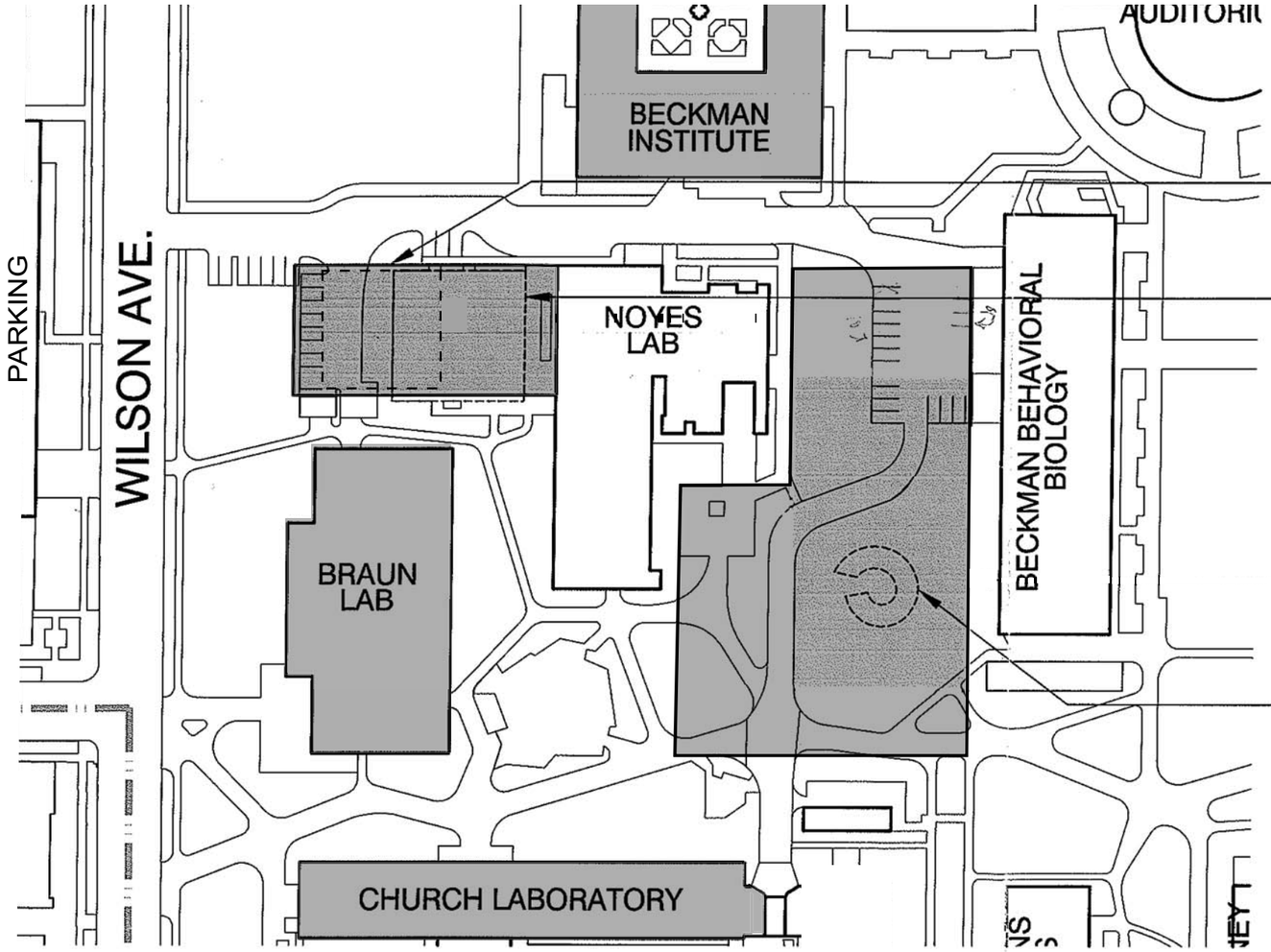
In the second alternative, the Master Plan allows a 3-story addition to Mead Laboratory in the building envelope to the west. However, Caltech proposes to demolish Mead Lab and construct a new 3-story CCE Lab on the site of the demolished Mead Lab and the adjacent building envelope. The proposed building would be set back from Wilson Avenue to match Braun Laboratory, approximately 85 feet. Mead Laboratory, which is used for chemistry laboratory instructional work, is a single story building of 8,000 square feet that was built in 1973. Mead Lab would be added to Table 10 on page 56, "Facilities that may be removed."

In both alternatives, the CCE Lab would be constructed with two basements and three floors above grade. The footprint for Alternative 1 would be 20,000 sf, and the footprint for Alternative 2 would be 20,000 sf. Under both alternatives, the total building square footage is proposed at 80,000 gross square feet. In the first alternative, the proposed building would contain the functions currently in Mead Lab and supplement those with additional laboratory space and offices. The building would be connected to Noyes Laboratory at several floors. In the first alternative, the 16,000 gross square feet of open space that would be lost would be replaced by changing the building envelope west of Mead Lab to open space and by changing another building envelope somewhere else on campus to open space. Mead Lab would remain. The existing public art in the footprint of the first alternative would either be relocated or reconstructed.

b. North Undergraduate Houses. This component of the project involves either the rehabilitation of the North Undergraduate Houses, including additions, or the construction of new undergraduate housing at the site of the existing North Undergraduate Houses, which would be demolished (Figure 2-6). Currently, the Master Plan does not provide for demolition of the North Undergraduate Houses; therefore an amendment would be required. The existing buildings were constructed in 1960. Under both scenarios, the amendment would provide up to 275 beds.

Under the rehabilitation scheme, the existing three houses - Lloyd, Page and Ruddock Houses - would be rehabilitated and small additions would be added to each house on the south side. In addition, a fourth house would be added on the east side. The additions would be a maximum of two stories in height and with a building area of 138,000 gross square feet. The building footprint would be 71,000 square feet. The existing buildings currently occupy a site of approximately 40,000 square feet.

Under the new construction scheme, the three houses would be removed and replaced with four new undergraduate dormitories that would better serve the needs of the students. The four new houses would be a maximum of three stories in height, with a building area of 138,000



LOCATION 2
PROPOSED 3-STORY CCE BUILDING LOCATION
(80,000 SQ.FT., FOOTPRINT 16,000 SQ.FT.)

EXISTING 1-STORY MEAD LAB TO BE REMOVED
(8,010 SQ.FT.)

LOCATION 1
PROPOSED 3-STORY CCE BUILDING LOCATION
(80,000 SQ.FT., FOOTPRINT 20,000 SQ.FT.)

EXISTING PUBLIC ART TO BE RELOCATED OR RECONSTRUCTED.

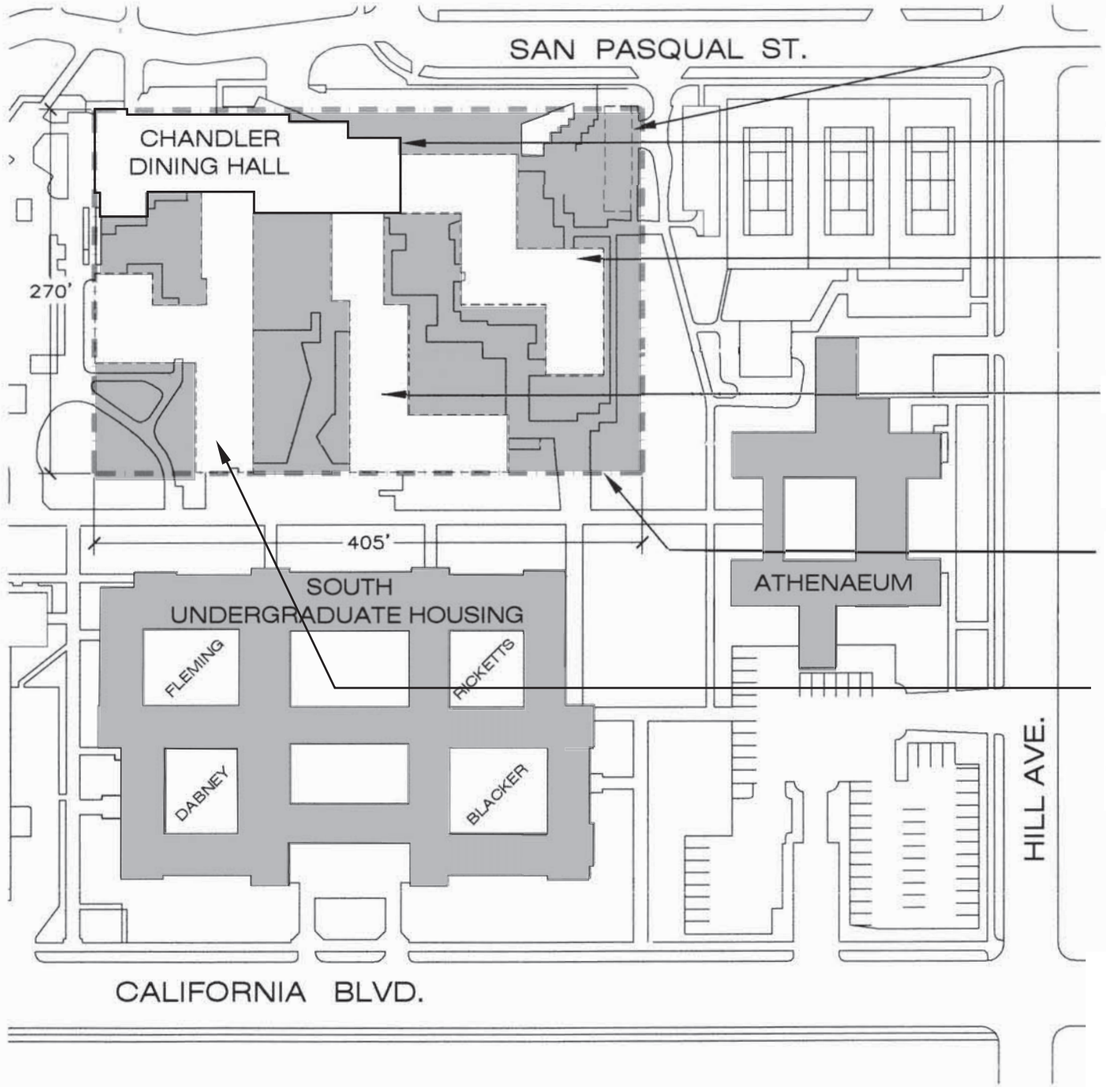
SITE USE CALCULATIONS

LOT SIZE:	**N/A**
PROPOSED GSF:	**80,000 SQ.FT.**
LOT COVERAGE:	**16-20K SQ.FT.**
# OF UNITS:	**N/A**
BEDROOMS/UNIT:	**N/A**
PARKING:	**0**

Proposed New Chemistry and Chemical Engineering Lab at Location 1 (between Noyes and BBB Lab) or Location 2 (Existing Mead Lab)

Source: Caltech, May 2006

Figure 2-5



SITE USE CALCULATIONS	REHIBILITATION	REPLACEMENT
LOT SIZE:	123,048 SQ.FT.	123,048 SQ.FT.
MAX PROPOSED GSF:	138,000 SQ.FT.	138,000 SQ.FT.
LOT COVERAGE:	71,000 SQ.FT. (57%)	38,000 SQ.FT.
# OF UNITS:	275	275
BEDROOMS/UNIT:	275	275
PARKING:	0	0

North Undergraduate Houses

Source: Caltech, October 2006.

Figure 2-6

gross square feet and a building footprint of 38,000 square feet. The existing buildings currently have a total footprint of 40,000 square feet. The new structures would expand to the east by approximately 35 feet as compared to the existing facilities.

c. Braun and Marks Graduate Houses. This component of the project involves the demolition of the existing Braun & Marks Houses at the northeast corner of Holliston Avenue and San Pasqual Street and the construction of a new dormitory in their place. The existing buildings were constructed in 1961, have about 22,000 square feet and a footprint of 9,000 sf, and have roughly 62 beds. As shown on Figure 2-7, the new 55,000 square feet building would have a footprint of 15,000 square feet and a maximum height of three stories. The amendment would provide the same total number of beds (62) as is currently present. The Master Plan provided for these graduate houses to remain on the Caltech campus; thus, an amendment is required for demolition of these dormitory facilities.

d. Campus Center. This component of the project would replace the existing Physical Plant offices and shops building with a Campus Center. The existing building is a one-story, approximately 37,000 square foot structure. The proposed Campus Center would be a 100,000 square foot structure, with three above ground floors and two subterranean levels. The total footprint would be 20,000 square feet, with a 41-foot setback from Holliston Avenue (Figure 2-8). The proposed Campus Center would house multi-purpose student areas, a music hall, music rehearsal and practice facilities, a visitor information center, offices, and a library. The Master Plan established a 60-foot setback for new buildings along the west side of Holliston Avenue. Caltech proposes a reduced setback (41 feet) that is aligned with the existing setback for the Human Resources office; thus the amendment.

e. Revisions to Caltech Master Development Plan Guidelines and Thresholds. In addition to the structural improvements identified above, the proposed amendment would revise the Master Plan's design guidelines and review thresholds.

Revisions to the Open Space Strategy and Design Guidelines for the North Campus Facilities on the East-West Axis. The design guidelines section of the Master Plan states that for all new buildings located on the north campus east-west axis, arcades should be constructed on the façades facing the axis. In addition, the design guidelines state that a pavilion should be constructed at the Wilson Avenue end of this axis. The Master Plan addresses design guidelines for the original campus bounded by San Pasqual Street, California Boulevard, Wilson Avenue, and Hill Avenue as well as California Boulevard to the south and the edges of the campus. Revisions include design guidelines that would guide the design of new facilities at edges and within the campus and south of California Boulevard. Caltech's proposed revisions include altering the design guidelines for the east-west open space axis to modify the arcade dedication and pavilion requirements, allowing for increase variation in architectural and design techniques, and changing the building height measurement from stories to height in feet above grade.

Revisions to the Design Review Thresholds Established in the Design Guidelines. Caltech is also proposing to revise the Master Plan's Design Review thresholds to match the City's current design review procedures. The proposed Design Review thresholds are as follows:

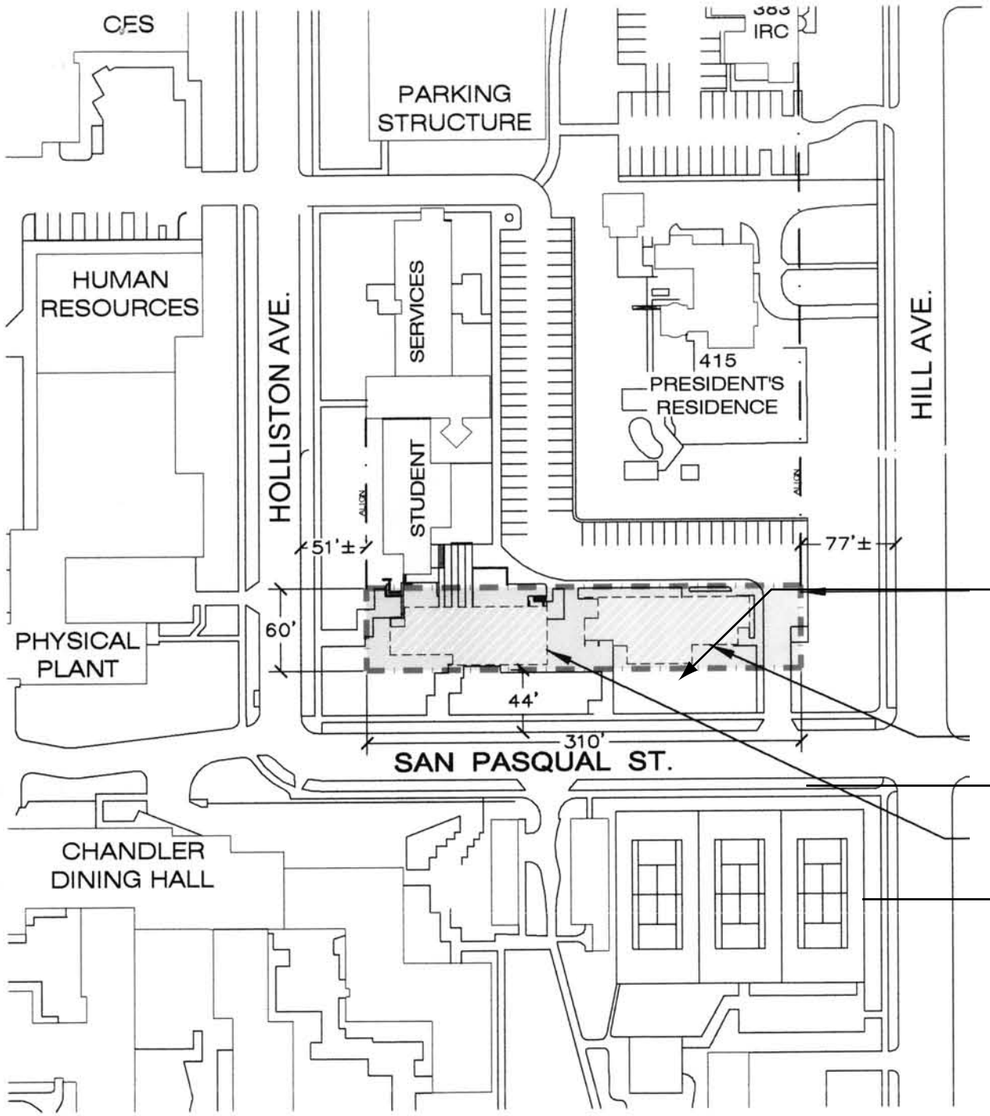
- *Major exterior alteration or major additions to any existing academic or residential facility visible from the public right-of-way, and new campus facilities with a gross floor area between 25,000 square feet and 70,000 square feet will be subject to design review by the City's Planning Director.*

- *New campus developments exceeding 70,000 square feet of gross floor area will be subject to design review by the City's Design Commission.*

- *Major exterior alterations or major additions to the facilities listed in the added Table 13 of the Master Plan will be subject to review by the City's Historic Preservation Commission. In addition, the Secretary of the Interior's Standards for Rehabilitation shall apply to reviews affecting buildings listed in Table 13 of the Master Plan.*

- *Table 13: "Facilities Where Major External Alterations or Additions will be reviewed by the Historic Preservation Commission", will be added to the Master Plan. This table lists the following structures: South Undergraduate Houses, North Mudd Lab, Robinson Lab, Arms Lab, Gates Annex, Kerckhoff Lab, Crellin Lab, Parsons-Gates, Bridge Labs, Bridge Annex, Dabney Hall, Thomas Lab, Guggenheim Lab, Athenaeum, and Beckman Auditorium.*

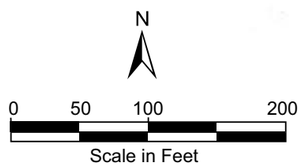
- *Major exterior alterations or major additions to the primary elevations of single-family houses that are visible from Del Mar Boulevard, Wilson Avenue, California Boulevard, Hill Avenue, Catalina Avenue, or Arden Road will be subject to review by the City's Planning Director. Interior alterations or exterior alterations/additions on secondary elevations will not be subject to design review.*



PROPOSED 3 STORY HOUSING LOCATION

EXISTING MARKS U.G. HOUSE TO BE REMOVED (11,267 SQ. FT.)

EXISTING BRAUN GRADUATE HOUSE TO BE REMOVED (10,428 SQ. FT.)

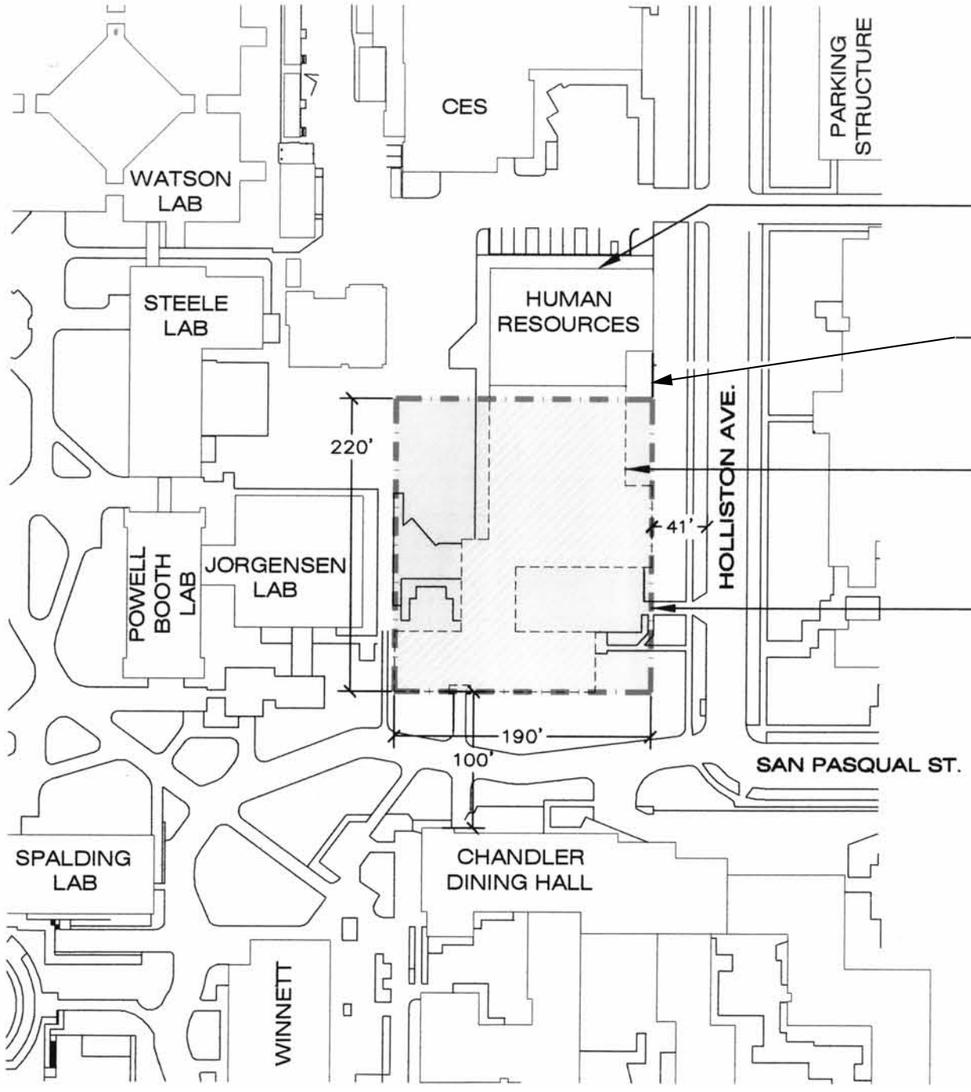


SITE USE CALCULATIONS

LOT SIZE:	**50,631 SQ.FT.**
PROPOSED GSF:	**55,000 SQ.FT.**
LOT COVERAGE:	**15,000 SQ.FT. (30%)**
# OF UNITS:	**62**
BEDROOMS/UNIT:	**62**
PARKING:	**18 SPACES**

Braun & Marks Graduate Houses

Figure 2-7



EXISTING HUMAN RESOURCES BUILDING TO BE RETAINED

ALIGN SETBACK WITH EAST FACE OF HUMAN RESOURCES BUILDING

EXISTING PHYSICAL PLANT OFFICES & SHOPS TO BE REMOVED (36,648 SQ.FT.)

PROPOSED CAMPUS CENTER BUILDING LOCATION (100,000 SQ.FT.)

N

0 50 100 200

Scale in Feet

SITE USE CALCULATIONS

LOT SIZE:	**77,450 SQ. FT.**
PROPOSED GSF:	**100,000 SQ.FT.**
LOT COVERAGE:	**20,000 SQ.FT. (26%)**
# OF UNITS:	**N/A**
BEDROOMS/UNIT:	**N/A**
PARKING:	**0**

Campus Center

Figure 2-8

2.5 PROJECTED ENROLLMENT AND STAFFING

The proposed Campus Master Plan amendments would not directly generate growth in enrollment, faculty, or staffing as they are intended to accommodate the current and future needs of the campus population. Nevertheless, the Caltech campus is anticipated to experience a general growth in onsite students, faculty, and staff over time that would be in part accommodated by the currently proposed facility expansions. Projected growth in the campus population through 2015 is accounted for in cumulative analysis in this EIR, particularly with respect to traffic impacts.

Table 2-2 shows historic enrollment for Caltech, since 1995. It should be noted that these figures are fall term enrollments, the highest of the academic year. As graduate students complete their thesis work early and as undergraduates students either suspend or complete their studies before the end of each academic year (June), student population drops during the course of every year.

Table 2-2 Caltech Enrollment History

Enrollment	Graduate Students	Undergraduate Students	Total
1995-96	1,050	923	1,973
1996-97	1,020	882	1,902
1997-98	1,021	904	1,925
1998-99	957	901	1,858
1999-00	982	907	1,889
2000-01	1,039	929	1,968
2001-02	1,116	942	2,058
2002-03	1,181	939	2,120
2003-04	1,281	891	2,172
2004-05	1,275	896	2,171

It is anticipated that undergraduate and graduate enrollment will remain in the vicinity of 900 and 1,300 students, respectively, with fluctuations in both student campus population categories in any foreseeable year. By 2014-2015, undergraduate student population should remain essentially static, while graduate student population could grow approximately 10% above current enrollment. Table 2-3 presents the forecasted campus population for 2007-2015 based on these growth rates.

Table 2-3 Forecast Student Population

Enrollment	Graduate Students	Undergraduate Students	Total
2004-05	1,275	896	2,171
2007-08	1,300	920	2,220
2014-15	1,400	900	2,300

Faculty-staff projections are no longer consistent with the 1989 Master Plan for several reasons. The main reason is that Caltech in-sourced a number of contracted functions in the 1990s and early part of this decade -- including all of its Security, Dining Services, and Computer Technical Support. This resulted in the inclusion of hundreds of people who had been on campus prior to the in-sourcing, but not counted at the time of the Master Plan's drafting as staff employees. In addition, one consequence of Caltech's conversion to a new internal computer system (at the same time as the whole tech-support staff was in-sourced) in the 1990s is that all former contract workers absorbed into the employment force are retroactively recorded as "employees," for more accurate budgetary comparison purposes.

Another reason for the faculty-staff employee totals appearing much higher than the projections in the Master Plan was the advent of several large projects (unforeseeable at the time of the Master Plan's drafting and review/approval). Notable among them were the Laser Interferometer Gravity-wave Observatory (LIGO), the Spitzer [Infrared Telescope] Science Center, an expansion of the Infrared Processing & Analysis Center (IPAC) precipitated by a separate space mission, and most recently the Thirty-Meter Telescope (TMT) design project, which will be moved off campus in the spring of 2005 to the former St. Luke Hospital site Caltech acquired in 2003.

In sum, the faculty-staff campus population (counting former contractors as employees) grew from 2,727 in 1995 to a high of 3,657 in 2002, and currently stands at 3,534. The professiorial faculty population is expected to continue to grow modestly above its current level (283 as of Oct. 1, 2004, compared to 284 in 1995) and other faculty will fluctuate (365 now, compared to 360 in 1996 -- but having ranged between 333 and 381 during the interim).

Support staff levels are projected to be flat for the next year or more, with about 2% growth thereafter based on a 5-year forecast. However, growth through 2014-15 is not expected to exceed 15% above the current level, due to both physical and foreseeable academic-funding constraints. Additionally, there is the possibility of a decline (if federal funding for research drops as much as expected) and/or a sudden, temporary ramping up in the event that the Institute is awarded a national Science & Technology Center or Engineering Research Center from the National Science Foundation. Several such centers, usually lasting 5-10 years, have affected campus population in the past 15 years. Table 2-4 presents forecasts of campus population for 2007 through 2015.

Table 2-4 Forecast Campus Population

Enrollment	Students Population	Faculty & Staff Population	Total
2004-05	2,171	3,550	5,721
2007-08	2,220	3,550-3,600	5,770-5,820
2014-15	2,300	3,900-4,100	6,200-6,400

The total faculty-staff campus population currently stands as a range between 3,525 and 3,575, with less than 1% growth expected in 2005 and the first half of 2006. Total campus population growth anticipated through 2014-15 is estimated between 350 and 550 persons (approximately 10% to 15%).

2.6 PROJECT OBJECTIVES

The California Institute of Technology is seeking approval of specific Master Development Plan Amendments and environmental review of a development currently included within the Master Development Plan to permit development within its designated campus boundaries. The proposed amendments and resulting developments are intended to meet the four primary objectives of the Master Development Plan. These objectives are as follows:

1. *To provide for the future growth of Caltech's academic divisions;*
2. *To provide an appropriate interface between the campus and surrounding residential neighborhoods;*
3. *To minimize uncertainty about Caltech's future development on the part of its neighbors and the City of Pasadena and at the same time streamline development procedures; and*
4. *To provide a unified, balanced, and attractive plan for future growth.*

2.7 REQUIRED APPROVALS

The proposed project would require the discretionary approval of the City of Pasadena prior to initiating construction. Specifically, the following discretionary approvals would be required:

- *Certification of the Final Supplemental EIR*
- *Approval of Master Development Plan Amendments*
- *Design review for certain projects according to design thresholds*

No discretionary permits from other agencies would be required for the proposed project.

3.0 ENVIRONMENTAL SETTING

This section describes the general historic, current, and projected environmental conditions in the Pasadena community and in and around the California Institute of Technology campus. More detailed descriptions of the setting for individual issue areas can be found in the discussions contained within Section 4.0, *Environmental Impact Analysis*.

3.1 REGIONAL SETTING

Pasadena is located approximately 12 miles, to the north and east of downtown Los Angeles. The city itself is located within the West San Gabriel Valley, at the base of the San Gabriel Mountains. The City is world renowned for several of its architectural landmarks, arts, institutions and events. The city's popular shops and restaurants blend comfortably with tree-lined streets, distinctive neighborhoods, historic buildings and a vibrant cultural scene.

The City of Pasadena is approximately 23 square miles in area. The City also has a designated sphere of influence area adjacent to the southeastern boundaries of the City (generally north of Huntington Drive and west of Rosemead Boulevard) which is about 883 acres in size. According to the 2000 Census, Pasadena's population was 133,936. According to the California Department of Finance, the City's population grew to about 146,600 by 2006, an increase of 12,664 from 2000.

Pasadena is characterized by two open space corridors along the eastern and western perimeters of the City. The open space corridors are situated along two drainages, Arroyo Seco Stream and Eaton Wash. Residential areas bound each of these areas of open space and extend along the northern and southern boundary of the City, surrounding the City's commercial core.

The climate in Pasadena is influenced greatly by the surrounding topography. The City enjoys a subtropical and semi-arid climate. The average daytime and nighttime temperatures are 77 degrees and 52 degrees Fahrenheit, respectively, with summer highs typically in the 80s and winter lows in the 40s. Pasadena receives an average annual rainfall of about 20 inches, which primarily falls between the winter months of November and March.

Regional access to Pasadena is provided by the 110 Freeway, State Route 134, and the 210 Freeway. The 110 Freeway connects the City to the southwest, downtown Los Angeles, Pasadena, and other areas of the southern California region. The SR-134 and 210 Freeway serve as an east/west corridor, providing access to Ventura and Riverside Counties. The Metro Gold Line provides regional rail access. Arroyo Parkway, Colorado Boulevard, and Los Robles Avenue are major arterials with Fair Oak and Lake Avenues minor arterials that provide for local circulation.

3.2 PROJECT SITE SETTING

Caltech is located near the southern and central boundary of the City of Pasadena. The Caltech campus encompasses approximately 124 acres and currently contains a variety of uses, including academic buildings, administration and support facilities, residences, and athletic facilities.

The Caltech campus is bounded by Catalina Avenue on the west, Del Mar Boulevard on the north, Hill Avenue on the east, California Boulevard from Hill Avenue to Arden Road on the southeast, and Arden Road, Tournament Park, and Wilson Avenue to the south (see Figures 2-1 and 2-2 in Section 2.0, *Project Description*). The campus contains a variety of uses including academic buildings, administration and support facilities, residences, and athletic facilities. Academic buildings are concentrated in the center of the campus north of California Boulevard and east of Wilson Avenue. Athletic facilities are located south of California Boulevard. Residential uses are located at the campus' edges along Catalina Avenue near Del Mar Boulevard, San Pasqual Street and Holliston Avenue near Hill Avenue, and California Boulevard near Hill Avenue.

The campus is bordered on the north and west by two-to three-story apartments and condominiums along the Mentor Avenue-Catalina Avenue and Cordova Street-Del Mar Boulevard corridors. To the south and east of the campus are established single-family neighborhoods that date from the early 1900s. The predominant one-and two-story housing stock in these areas ranges from modest dwellings on smaller lots near Del Mar Boulevard to much larger homes on estate-sized lots in the southern areas of the City.

3.3 CUMULATIVE DEVELOPMENT

Cumulative impacts are defined as two or more individual events that, when evaluated together, are significant or would compound other environmental impacts. Cumulative impacts are the changes in the environment that result from the incremental impact of development of the proposed project and other nearby projects. For example, traffic impacts of two nearby projects may be inconsequential when analyzed separately, but could have a substantial impact when analyzed together.

Section 15130 of the *CEQA Guidelines* requires a discussion of cumulative impacts. The discussion of related or cumulative projects may be drawn from either a "list of past, present, and probable future projects producing related or cumulative impacts" or a "summary of projections contained in an adopted general plan or related planning document or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area wide conditions contributing to the cumulative impact."

Planned and pending developments in the site vicinity are listed in Table 3-1. Figure 3-1 shows the locations of planned and pending projects in the area. As indicated, projects in the vicinity of the Caltech campus include approximately 2,980 dwelling units and 1,274,179 square feet of commercial and industrial development.

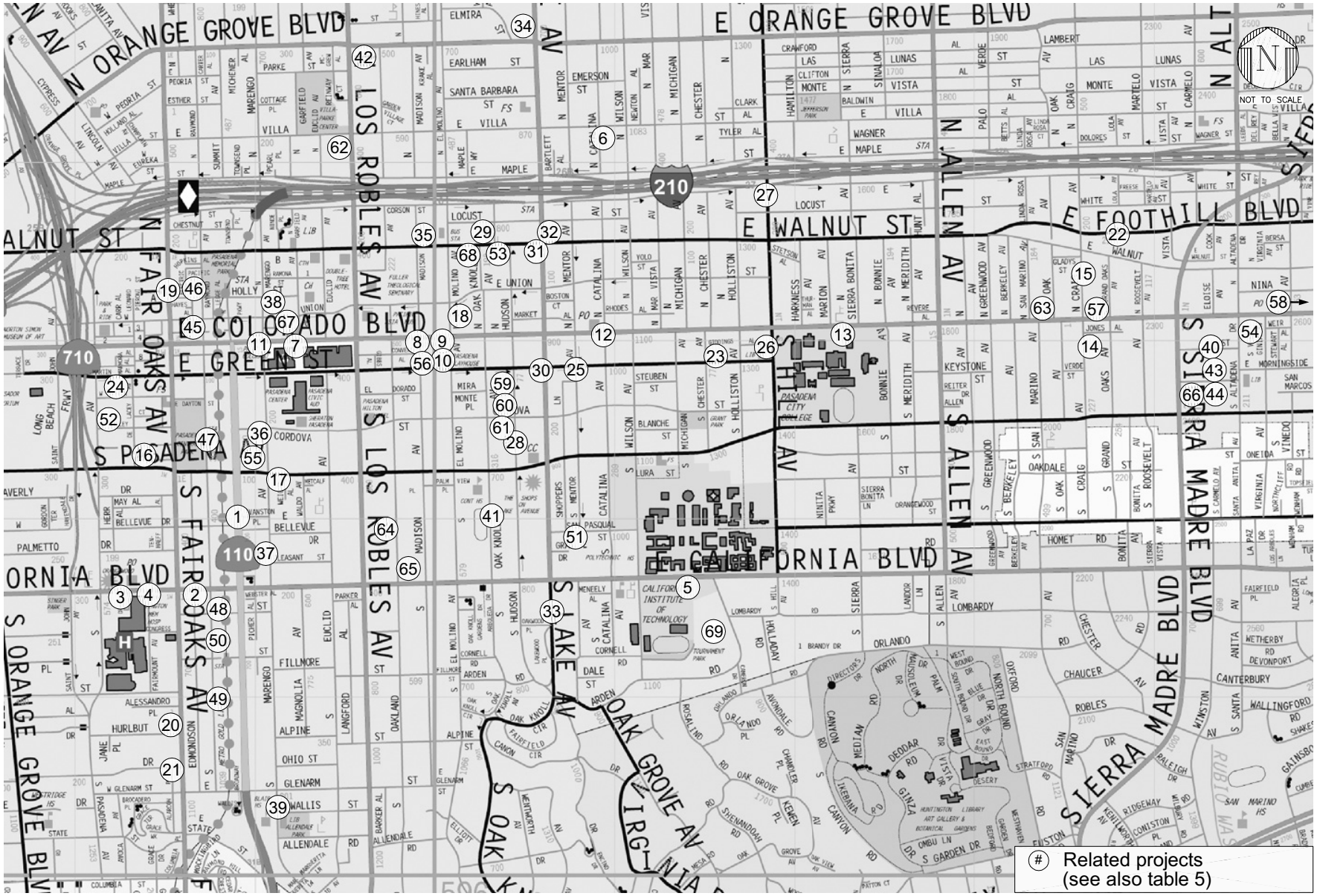
Table 3-1
Planned and Pending Projects in the Site Vicinity

Project Location	Land Use*	Scope**
1. 451-455 S. Arroyo Parkway	Retail	71,000 s.f.
2. 40 E. California Boulevard	Retail	7,200 s.f. (addition)
3. 100 W. California Boulevard	Hospital Wing	152,275 s.f. (addition)
4. 70-100 W. California Boulevard	Commercial	195,000 s.f. (demo:33,607 s.f).
5. 1200 E. California Boulevard	Parking Structure	686 spaces
6. 460 N. Catalina Avenue	M-F Residence (Condominium)	15 units
7. 301 E. Colorado Boulevard	Retail/M-F Residence	8,000 s.f./56 units (luxury condo)
8. 556 E. Colorado Boulevard	Retail/Commercial	12,460 s.f. / 99,370s.f.
9. 621 E. Colorado Boulevard	Mixed Use : M-F Residence/Retail	304 units / 14,602 s.f.
10. 618-630 E. Colorado Boulevard	Mixed Use : M-F Residence/Retail	160 units (condo) / 11,000 s.f.
11. 7137 E. Colorado Boulevard	Restaurant	3,988 s.f.
12. 1010 E. Colorado Boulevard	Commercial	18,236 s.f. (demo: 16,434 s.f.)
13. 1570 E. Colorado Boulevard	Educational	5,000 additional students
14. 54 S. Craig Avenue	M-F Residence	13 unit (condo)
15. 96-110 N. Craig Avenue	M-F Residence	18 units (condo) (demo: 6 S-F Residence)
16. 250 S. De Lacey Avenue	Mixed Use: M-F Residence / Retail	34 units (condo) / 5,000 s.f.
17. 240 E. Del Mar Boulevard	M-F Residence	22 units (condo)
18. 62-100 N. El Molino Avenue	Mixed Use: M-F Residence/Retail	104 units (apt)
19. 130 N. Fair Oaks Avenue	Mixed Use: M-F Residence/Retail/Restaurant	34 units (condo)/1700s.f./ 1700s.f.
20. 909 S. Fair Oaks Avenue	Mixed Use: Commercial/Retail	40,000 s.f. / 78,200 s.f.
21. 951 S. Fair Oaks Avenue	M-F Residence	47 units (assisted living)
22. 2233 E. Foothill Boulevard	Storage	46,200 s.f.
23. 1297-1317 E. Green Street	Mixed Use: M-F Residence/ Restaurant	78 units (affordable) / 1,500 s.f.
24. 100-120 W. Green Street	Mixed Use: M-F Residence/ Retail	61 units (condo) / 8,878 s.f.
25. 936 E. Green Street	Mixed Use: M-F Residence/Retail	46 unit (condo) / 7,700 s.f.
26. 83-155 S. Hill Avenue	Educational	115 additional students
27. 315 N. Hill Avenue	Mixed Use: M-F Residence/Retail	34 units (condo) / 2,940 s.f.
28. 251 S. Hudson Avenue	M-F Residence	17 units (condo)
29. 233 N. Hudson Avenue	Mixed: M-F Residence/Retail	22 units (apt) / 3,000 s.f.
30. 85 S. Lake Avenue	M-F Residence	103 units (apt)
31. 203 N. Lake Avenue	Commercial	212,817 s.f.
32. 220 N. Lake Avenue	Mixed: M-F Residence/Retail	106 units (condo) / 9,200 s.f.
33. 656-662 S. Lake Avenue	M-F Residence	12 units (condo)
34. 701 N. Lake Avenue	Retail	5,120 s.f.
35. 240-255 N. Madison Avenue	Student Housing	180 units
36. 215 S. Marengo Avenue	M-F Residence	31 units (apt)
37. 511 S. Marengo Avenue	M-F Residence	6 units (condo)
38. 78 N. Marengo Avenue	M-F Residence	32 units

Table 3-1
Planned and Pending Projects in the Site Vicinity

39. 1088 S. Marengo Avenue	M-F Residence	11 units (condo)
40. 2425 Mohawk Street	M-F Residence	7 units (condo)
41. 444 Oak Knoll Avenue	M-F Residence	6 units (condo)
42. 466 E. Orange Grove Boulevard	Mixed: M-F Residence/Retail	31 units / 13,146 s.f.
43. 2445 Oswego Street	M-F Residence	9 units (condo) (demo: 3 S-F residences)
44. 2448 Oswego Street	M-F Residence	8 units (condo)
45. 35 N. Raymond Avenue	Mixed: M-F Residence/Restaurant	33 units (condo) / 13,845 s.f.
46. 129 N. Raymond Avenue	Mixed: M-F Residence/Retail	49 units / 11,383 s.f.
47. 240 S. Raymond Avenue	Del Mar Station (mixed res/comm.)	347 apt. units / 11,000 s.f.
48. 620 S. Raymond Avenue	Commercial	59,475 s.f.
49. 766 S. Raymond Avenue	Medical Center/Park & Ride	30,000 s.f. / 250 spaces
50. 686-700 S. Raymond Avenue	Mixed: Commercial/Retail	45,000 s.f. / 4,000
51. 950 San Pasqual Street	M-F Residence	79 units (condo)
52. 169 Valley Street	Mixed: M-F Residence/Retail	832 units / 30,000 s.f.
53. 770 E Walnut Street	Mixed: M-F Residence/Commercial	71 units / 3,783 s.f.
54. 54-62 S Altadena Drive	M-F Residence	12-units (demo: 2 S-F residences)
55. 240-260 S Arroyo Parkway	Mixed: M-F Residence/Retail/Restaurant	68 units/7,000 s.f./10,000 s.f.
56. 592 E Colorado Boulevard	Mixed: M-F Residence/Retail	16 units/3,500 s.f. (demo: 1,440 s.f. retail/400 s.f. restaurant)
57. 2191 E Colorado Boulevard	Mixed: M-F Residence/Retail	44 live/work units/3,900 s.f.
58. 3020 E Colorado Boulevard	Mixed: R&D/Retail	24,400 s.f./24,400 s.f.
59. 141 S Hudson Avenue	Mixed: M-F Residence/ Commercial/Retail	9 units/3,090 s.f./475 s.f.
60. 151 S Hudson Avenue	Mixed: M-F Residence/Commercial	9 units/3,500 s.f.
61. 171 S Hudson Avenue	Mixed: M-F Residence/Commercial	20 units/9,000 s.f. (demo: 6,800 s.f. commecial)
62. 437-445 N Los Robles Avenue	M-F Residence	16 units (demo: 9 units)
63. 41-49 N Oak Avenue	M-F Residence	12 units (demo 2 S-F residence)
64. 445 S Oakland Avenue	M-F Residence	9 units
65. 520 S Oakland Avenue	M-F Residence	6 units
66. 2420 Oswego Street	M-F Residence	8 units
67. 250 E Union Street	M-F Residence	52 units
68. 712 E Walnut Street	Mixed: M-F Residence/Retail	28 units/3,396 s.f.
69. 1200 E California Boulevard	Institutional	94,645 s.f.
Total	**Dwelling Units (single and multi family)**	**3,327 dwelling units**
Total	**Commercial, Institutional**	**1,379 ,824 square feet**

* *M-F = multi-family; S-F = single-family*
***s.f. = square feet*



Source: Kaku Associates, Inc., March 2006.

Planned and Pending Projects in the Caltech Area

Figure 3-1

4.0 ENVIRONMENTAL IMPACT ANALYSIS

This section discusses the possible environmental effects of the proposed project for the specific issue areas that were identified as having the potential to experience significant impacts. "Significant effect" is defined by the *State CEQA Guidelines §15382* as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment, but may be considered in determining whether the physical change is significant."

The assessment of each issue area begins with a discussion of the setting relevant to that issue area. Following the setting is a discussion of the project's impacts relative to the issue area. Within the impact analysis, the first subsection identifies the methodologies used and the "significance thresholds," which are those criteria adopted by the City, other agencies, universally recognized, or developed specifically for this analysis to determine whether potential effects are significant. The next subsection describes each impact of the proposed project, mitigation measures for significant impacts, and the level of significance after mitigation. Each effect under consideration for an issue area is separately listed in bold text, with the discussion of the effect and its significance following. Each bolded impact listing also contains a statement of the significance determination for the environmental impact as follows:

> ***Class I, Unavoidably Significant:*** *An impact that cannot be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires a Statement of Overriding Considerations to be issued if the project is approved.*
>
> ***Class II, Significant but Mitigable:*** *An impact that can be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires findings to be made.*
>
> ***Class III, Not Significant:*** *An impact that may be adverse, but does not exceed the threshold levels and does not require mitigation measures. However, mitigation measures that could further lessen the environmental effect may be suggested if readily available and easily achievable.*
>
> ***Class IV, No Impact or Beneficial:*** *Either the project would not alter environmental conditions or would reduce existing environmental problems or hazards.*

Following each environmental impact discussion is a listing of recommended mitigation measures (if required) and the residual effects or level of significance remaining after the implementation of the measures. In those cases where the mitigation measure for an impact could have a significant environmental impact in another issue area, this impact is discussed as a residual effect.

The impact analysis concludes with a discussion of cumulative effects, which evaluates the impacts associated with the proposed project in conjunction with other future development in the area.

4.1 AESTHETICS

4.1.1 Setting

a. Visual Character of Area. The City of Pasadena is located in the western San Gabriel Valley subregion of southern California. The northernmost portions of the City extend into the San Gabriel Mountains foothills, reaching a maximum elevation of 1,900 feet above mean sea level. The San Rafael Hills along the City's western border rise to about 1,600 feet. The rest of the City generally slopes south from the San Gabriel Mountains, bisected in the western portion by the Arroyo Seco, the prominent drainage feature in the City. The San Gabriel Mountain Range is the most dominant visual feature in the City, followed by the Arroyo Seco. On clear days, the mountains can be viewed from most areas of the City, although major north-south arterials provide the most notable view corridors.

Pasadena retains a rich architectural heritage and a strongly legible urban form. Much of the City developed from the late-1800s to the early 1900s and, as a result, there are numerous examples of architectural styles from this period throughout the City's neighborhoods. Most notable is the City's extensive inventory of craftsman style architecture, for which the City is most famous. The City is generally laid out on a strongly visual north-south east-west street grid street network. This provides dramatic views for northbound and eastbound motorists of the San Gabriel Mountains. The City is also prominently bisected by a discontinuous freeway system. Interstate 210 (the Foothill Freeway), which bisects the City into north and south segments and separates the Arroyo Seco and the San Rafael hill from the majority of the City. State Route 134 (an extension westerly of Interstate 210) bisects the Arroyo Seco and its neighborhoods, and an incomplete portion of Interstate 710 (Long Beach Freeway) bisects neighborhoods in western Pasadena.

b. Visual Character of Caltech Campus and Surroundings. The Caltech campus is located in south central Pasadena, south and east of the Lake Avenue and Colorado Boulevard commercial corridors. The campus is largely surrounded by single-family residential neighborhoods to the south and east and 2-3 story multi-family residences to the north and west. The architecture, height and scale of these surrounding uses bring a unique residential character to the campus area's surroundings.

The campus itself is dominated by stately early 20th Century academic halls, but also contains examples of mid and late 20th century modernist architecture. Unlike the predominant craftsman style of Pasadena's residential neighborhoods, the campus' older structures are generally rendered a uniquely southern California interpretation of the Spanish Colonial Revival style. Most of these structures are presented in cast concrete, with expansive arcades and the prototypical red tile roofs. Most of the grand buildings do not exceed three stories. These buildings frame delicately-scaled pedestrian walkways and courtyards, lending an intimate, human-scaled aesthetic to the institution.

The larger campus includes other features of college campuses, such as administration and support facilities, residences, and athletic facilities. The buildings vary in age, with newer and older buildings of contrasting style and scale throughout the campus. The network of structured open spaces forms the backbone of the campus. The east-west axis begins near Hill Avenue and extends west to Wilson Avenue. The north-south axis begins at California

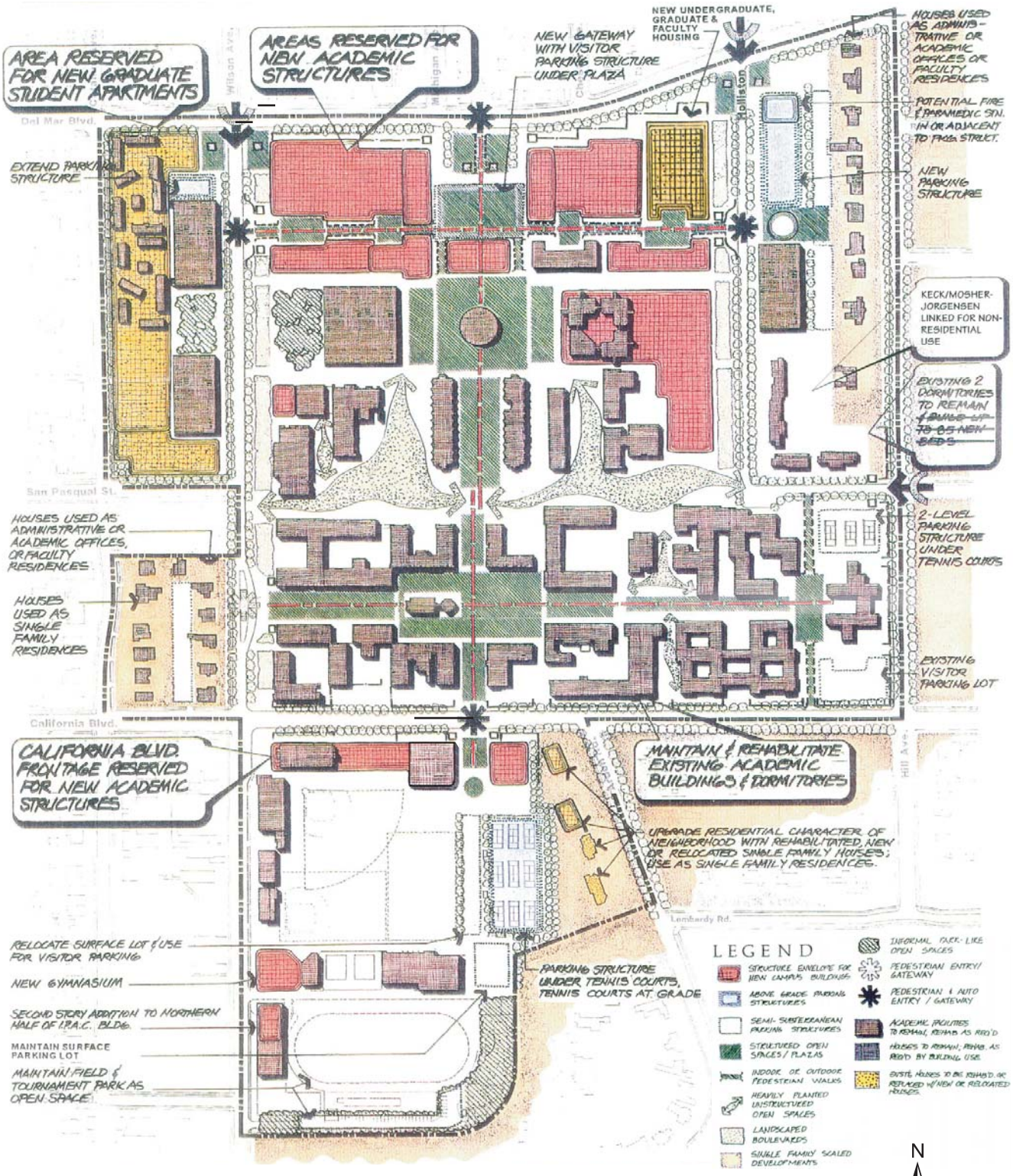
Boulevard and extends north, intersecting with the east-west axis and the Beckman Auditorium, culminating at Del Mar Boulevard (See Figure 4.1-1). South of California Boulevard, the north-south axis is undefined. An existing surface parking lot, access road and tennis courts cover the area the area that would serve to extend the north-south access. In addition, the Cahill Center approved for development at the location of the existing surface parking lot would have a footprint that encroaches on the landscaped setback required to maintain the north-south axis. Thus, the current configuration of structures and landscaping do not emphasize the north-south campus axis. There are several other large heavily planted, unstructured and structured, open spaces that connect the east and west portions of the campus. These are further connected by additional north to south plazas and pedestrian walkways. The two main axes, and the associated open spaces along them, form the major organizing elements for the campus and help to make the spatial legibility of the campus understandable to users. These open spaces also provide important viewing areas within and across the campus and are also important elements of the overall visual character of the area.

An important visual component of the campus area is provided from local streets that border and transverse the campus. Public roadways and sidewalks comprise a majority of the viewing locations of the campus from the surrounding neighborhood. As shown on Figure 4.1-1, the campus is generally bordered by Catalina Avenue on the west, Del Mar Boulevard on the north, Hill Avenue on the east, California Boulevard from Hill Avenue to Arden Road on the southeast, and Arden Road, Tournament Park, and Wilson Avenue to the south. California Boulevard completely intersects the campus north of Arden Road, and the area dominated by athletic facilities, near the southern terminus of the campus. Holliston Avenue and San Pasqual Street carve out the northeastern most corner of the campus, separating several dormitories and a parking structure from the remaining campus area. California and Del Mar Boulevards serve as major arterial streets and are heavily traveled by Caltech-related and community traffic. Additionally, California Boulevard is designated as a Scenic Corridor (unofficial) by the City of Pasadena. Passing motorists' views of the campus are considered important visual perspectives and should be considered as part of the overall visual character within the area.

c. Visual Character of Amendment Locations. As discussed in Section 2.0, *Project Description*, five amendments to the Caltech Master Plan are proposed, four of which pertain to specific developments and one of which pertains to development guidelines. The following is a brief outline of the existing visual conditions at each physical location associated with a proposed Master Plan amendment. Figures 4.1-2 through 4.1-6 illustrate the existing visual character at each of the proposed amendment locations.

Amendment 1. Two locations are being considered for the future construction of the new Chemistry & Chemical Engineering Laboratory (CCE Lab). Location one is the open space between the Beckman Behavioral Biology (BBB) Laboratory and Noyes Laboratory. Location two is within the site of the existing Mead Laboratory and the building envelope identified in the Master Development Plan west of the Mead Laboratory (see Figure 2-4, *Project Description*).

Figure 4.1-2 illustrates the existing conditions within the open space area between Noyes and the BBB Laboratories. This area is currently heavily planted unstructured open space and contains a public art element which would be removed or relocated if development was placed in this location. The existing open space extends to the south of the proposed building location,



Source: Kurt Meyer Partners, January 2006.

Master Plan Concept Summary

Figure 4.1-1

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Photo 1 - View from Location 1 facing west toward Noyes Laboratory.

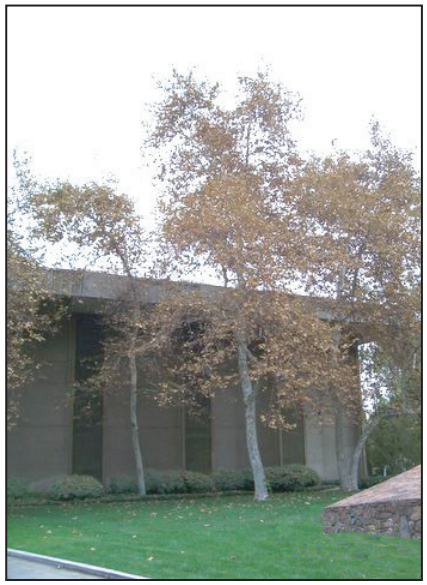

Photo 2 - View from Location 1 facing east toward the southern terminus of the Beckman (BBB) Laboratory.

Photo 3 - View from parking lot north of Location 1 facing east. View of loading parking area and Beckman (BBB) laboratory will form northern boundary of amendment 1 in this location.

Photo 4 - Public Art Element, Moore's Stone Volute, which would be removed for development of Location 1.

Amendment 1 - Existing Conditions
(Open Space Between Noyes and BBB Lab)

Figure 4.1-2

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Photo 1 - View of the Mead Laboratory with Noyes Laboratory in the background. Photo taken from drive way north and west of the Mead, facing east.

Photo 2 - View of Mead Laboratory with Braun Laboratory in the background. Photo taken from driveway north of Mead, facing south.

Photo 3 - View of Mead Laboratory from Wilson Avenue. Photo demonstrates disparity between the size and scale of Mead and surrounding buildings.

Photo 3 - View of Beckman Institute, located north of the Mead Laboratory. Photo also demonstrates disparity between Mead and surrounding buildings.

Amendment 1 - Existing Conditions (Mead Lab)

Figure 4.1-3

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Photo 1 - View of Ruddock House from Holliston Avenue (facing south).

Photo 2 - View of Ruddock House from pedestrian path and driveway entrance at San Pasqual Street (facing southwest).

Photo 3 - View of exterior of the Lloyd House (facing west) from the open space corridor "Olive Walk."

Photo 4 - View of exterior of the Page House (facing east) from unstructured open space west of North Undergraduate Houses and "Olive Walk."

Photo 5 - View of southern facade of North Undergraduate Houses along the open space corridor, "Olive Walk."

Amendment 2 - Existing Conditions (North Undergraduate Housing)

Figure 4.1-4

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Photo 1 - View of Braun House from San Pasqual Street.

Photo 2 - View of northern facade of Marks House from rear parking lot.

Photo 3 - Photo of northern facade of both Braun and Marks Houses showing difference in height and scale as compared with neighboring Mosher-Jorgensen House.

Photo 4 - View of eastern facade of Marks House illustrates the building's lack of architectural character and the adjacent driveway which would be covered with development as part of Amendment 3.

Amendment 3 - Existing Conditions (Braun and Marks Houses)

Figure 4.1-5

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Photo 1 - View of western terminus of Physical Plant Offices illustrates architectural design of nearby development.

Photo 2 - Photo of Physical Plant Shops illustrates existing setbacks, landscaping, and foreground views as seen from Holliston Avenue.

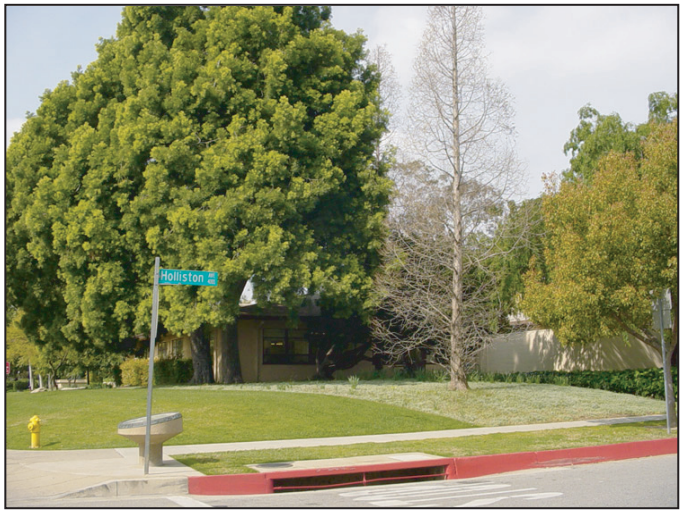

Photo 3 - View of Physical Plant Offices, facing west, demonstrates tree-dominated foreground view for pedestrians traveling along San Pasqual Mall.

Photo 4 - Photo taken from Holliston Avenue illustrates size and scale of existing Plant Offices and Shops.

Amendment 4 - Existing Conditions (Physical Plant Offices and Shops)

Figure 4.1-6

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where it connects with an east-west open space and pedestrian pathway. There are no residential uses or streets adjacent to the proposed building location. As seen in pictures 1 and 2, location one consists mostly of tree plantings, shrubs and grass lawns surrounded by buildings one- to three-stories in height. The BBB Lab lacks windows along the façade adjacent to this open space and views from Noyes Lab are generally covered by trees and other landscape plantings. These surrounding building designs are generally lacking in distinctive architectural features. Picture 3 illustrates the surrounding architecture and views of an adjacent parking area and loading dock located directly north of the open space area. A driveway connects this parking area with a surface driveway south of the Noyes and BBB Labs. Although the area provides open space, the aesthetic quality of the space is degraded by the parking area and paved driveway. On the other hand, the paved pedestrian paths and a large art element within the center lawn serve to enhance the space (see picture 4).

Figure 4.1-3 illustrates existing conditions at Mead Laboratory. The building, constructed in 1972, was designed by John J. Kewell in the late International style. The building is essentially square in plan and constructed in vertically-scored concrete blocks separated by horizontal reveals. It features a prominent, projecting cornice and pairs of massive pilasters. The building is windowless except for the main anodized aluminum entry doors on the western elevation. The building appears to be unaltered on the exterior, except for the addition of a storage area and is in good condition.

The building design is low profile and generally lacking in architectural distinction and is bounded by buildings and land uses of various height and scale. As shown in pictures 1 - 3, Noyes Lab, located east of Mead Lab, and Braun Lab, located south of Mead lab, are each three stories in height and contrast dramatically with adjacent open spaces, and neighboring student housing, and Mead Lab (as seen from Wilson Avenue). Neighboring Beckman Institute is four stories in height and differs in both scale and architectural style from Mead Lab (see Picture 4).

Amendment 2. The existing North Undergraduate Houses (Lloyd, Page, and Ruddock houses), were designed in 1959 by Smith, Powell and Morgridge, and built in 1960. Unlike many of the buildings constructed on the campus during this period, the North Undergraduate Houses were apparently more intentionally designed to relate to earlier buildings nearby in terms of scale, materials and complex plan. In particular, the 1931 Undergraduate Houses (Flemming, Ricketts, Dabney and Blacker Halls) designed by Gordon Kaufmann. Together, these residences form a series of internal courtyards. Along the adjoining walkway, the Smith, Powell and Morgridge design made a direct reference to Kaufmann's arcade, but rendered in stripped-down form. The building is one and two stories in height, and is highly complex in plan (essentially, a series of joined rectangles forming courtyards). The main southern elevation is characterized by the two-story masses of Page and Lloyd halls, joined by a one-story projecting marquee composed of exposed aggregate concrete panels supported by poured-in-place concrete "Sonotube" columns and concrete screen blocks. The roof shapes are low hips covered with Spanish tile with deep closed eaves. Windows are steel casements.

With the exception of the Chandler Dining Hall, the buildings resemble Spanish colonial, or Mission, style architecture with stuccoed exteriors and red-tile roofs. However, modern additions such as a second story walkway, concrete courtyard screening and landscaping borders have altered the original style of the building. The Chandler Dining Hall is typical of a

more modern, block, style architecture. Implementation of this amendment would increase the building height up to three stories.

Figure 4.1-4 illustrates existing conditions at the North Undergraduate Houses. Picture 1 is a south facing view of the Ruddock House. This building fronts San Pasqual Street with a setback of approximately 60 feet; however, this space is broken up by a large vine-covered wall that serves as a physical barrier between the roadway and housing. Picture 2 provides a view of the north-eastern corner of the Ruddock House. Although there is a parking/loading area within this area, the large trees, landscaping, window treatment and overall façade are typical of the North Undergraduate Houses. The southeastern most corner of the Lloyd House is shown in picture 3. As seen in the photo, there is a more formal planting scheme and open space setting south of the existing undergraduate houses. Picture 4, facing east from the southwest corner of the Page House, better demonstrates how these structured plantings form a visual corridor and lend to an outdoor pedestrian walkway, forming the east-west axis of the campus. Picture 4 also provides a partial view of a heavily planted and unstructured open space at the southwest corner of the Page House. Shown in more detail in picture 5, this is another open space connection conducive to outdoor pedestrian movement and providing a park-like environment.

Amendment 3. The existing Braun & Marks Houses, at the northeast corner of Holliston Avenue and San Pasqual Street, were constructed in 1961, have a footprint of 9,000 gross square feet, and are two stories in height. The block style buildings are generally lacking in architectural distinction.

The Braun House was completed in 1961 and designed by Smith, Powell and Morgridge in the International Style. The building is essentially rectangular in plan and features stucco cladding over concrete and a flat roof. Steel casement window pairs are organized within shallow concrete pilasters. An entry stoop on the western end of the southern elevation is covered by a projecting concrete canopy. This building is connected to the adjacent Student Services building via a second-story skyway. The building appears to be unaltered and in good condition.

The Marks House was completed in 1961. It was designed by James H. Van Dyke & Associates, with Smith, Powell and Morgridge, as the coordinating architects. This two-story plastered concrete building is rectangular in plan and features a flat roof and steel casement windows flanked by narrow concrete pilasters. The corners and cornice line are defined by more massive pilasters. The building appears to be unaltered and in good condition.

Figure 4.1-5 illustrates existing conditions at the Braun & Marks Houses. Pictures 1 and 2 provide frontage views of both the Braun and Marks Houses, respectively. Both buildings front San Pasqual Street and are set back approximately 44 ft from the curb. The Braun House is also adjacent to, and set back from, Holliston Avenue. The west face of the Braun House is approximately 60 ft from Holliston Avenue. The setback areas between the houses and San Pasqual Street and Holliston Avenue provide open park-like lawns. These generously landscaped lawns are framed by large trees and landscape plantings which form a tree-lined pedestrian scale promenade.

Picture 3 shows the eastern most façade of the Marks House and the driveway that leads to parking at the rear of the two houses. Picture 4 provides a view of the rear of the two buildings, as well as the related parking area.

Amendment 4. The existing Physical Plant Offices and Shops building is a one-story, 36,648 square foot structure located at the northwest corner of Holliston Avenue and San Pasqual Street. The office and shop building was constructed in 1959 as the campus maintenance shops and related offices. The building features low-pitched hip roof with deep, closed eaves. Wall cladding is stucco, and the windows are primarily steel fixed and sash units. The raised main entrance to the offices is located on the southern elevation. A bank of open loading docks is oriented to the west. This building was evidently designed in 1958 by in-house staff and appears to be unaltered and in good condition.

Figure 4.1-5 illustrates existing conditions at the Physical Plant Offices and Shops. The Physical Plant Offices front a heavily-planted unstructured open space located north of the North Undergraduate Houses and the Winnett Center (see Picture 1). The boulevard serves as a pedestrian walkway and a corridor between the north-south open space axis and Holliston Avenue. This area is heavily used by pedestrians. As seen in picture 2, there is a large surfaced walkway passing in front of the building; however, the building itself is largely obscured from view by landscaping shrubs and trees. From Holliston Avenue the building also appears hidden by large trees and landscaping (see pictures 3 and 4). These buildings would not be characterized as having any notable architectural features and are generally lacking any stylistic distinction.

d. Regulatory Setting. The Caltech Master Development Plan (CMDP, approved in 1989 and amended in 1995 and 1999) serves as the basis for future development on the campus. The Master Plan supersedes all other sections of the Pasadena Municipal Code (PMC) Title 17 Zoning, unless specifically incorporated by reference. Where there is a conflict between provisions of this Master Plan and PMC Title 17, the provisions of the Master Plan shall control. Where uncertainty exists regarding the extent or interpretation of any provision of the Master Plan, the Zoning Administrator shall determine the intent of the provision. Any review or amendment process initiated by either the City or Caltech shall follow the procedure outlined for approval of Master Development Plans in Section 17.61.050I of the Pasadena Municipal Code.

4.1.2 Impact Analysis

a. Methodology and Significance Thresholds. The assessment of aesthetic impacts involves qualitative analysis that is inherently subjective in nature. Viewers react to viewsheds and aesthetic conditions differently based on personal and cultural perspectives. This evaluation measures the proposed Master Plan Amendments against the approved Master Plan, analyzing the nature of the anticipated change with consideration for the existing conditions at the project site. Additionally, as this document serves as a supplemental EIR, it shall address specific view categories included in the previously certified California Institute of Technology Master Plan Project EIR, certified in 1989. Thus, this supplemental EIR considers views from adjacent residences, streetscape views from adjacent streets, and views across the campus in order to address changes that the amendments would have as compared to the impacts identified in the certified Final EIR.

The checklist in Appendix G of the State CEQA Guidelines suggests that significant impacts could occur if a project:

- *Has a substantial adverse effect on a scenic vista;*
- *Substantially damages scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;*
- *Substantially degrades the existing visual character or quality of the site and its surroundings; or*
- *Creates a new source of substantial light or glare which would adversely affect day or nighttime view in the area.*

b. Project Impacts and Mitigation Measures.

Impact AES-1 The proposed Master Plan Amendments could potentially affect scenic resources, such as native and specimen trees, a public art element, and open space within the campus. Impacts to scenic resources are considered Class II, *significant but mitigable*.

Native and Specimen Trees. According to the *City Trees and Tree Protection Ordinance*, "aesthetically, trees offer dimensions in the form of color, shape, texture, scale and variety. Mature trees are often integral components of many historic sites and their presence contributes to the site's cultural and historic significance."

Development of several of the Master Plan Amendments would require the removal of native and specimen trees as specified in Chapter 8.52 of the City's Tree Ordinance. All trees meeting the definition of native or specimen trees in Section 8.52.020 are automatically subject to protection and shall not be injured, or removed without a permit. Furthermore, the CMDP provides that where possible, these trees should be preserved under landscape designs for new and existing open spaces.

Table 4.1-1
Number of Trees Affected by Proposed Campus Master Plan Amendments

Amendment #	Trees	Native Trees	Specimen Trees
1: CCE Lab	49	27	2
2: North Undergraduate Houses	30	10	6
3: Braun and Marks Houses	3	0	1
4: Physical Plant Offices and Shops	2	0	2

As detailed in Section 4.3, *Biological Resources*, up to 84 trees would be removed under buildout of the Master Plan amendment developments, of which at least 48 are protected mature native or specimen trees. As shown in Table 4.1-1, most of the disturbed trees would be affected by

Amenment 1 and 2. Approximately 30 trees planned for removal are currently located immediately adjacent to existing development. An additional 49 trees would be removed from an interior courtyard proposed as Location 1 of Amendment 1, for development of the CCE Lab (please see Appendix E for complete inventory and locations). Trees located near movement corridors, such as those located near Location 1, emphasize the organization of the campus and reinforce the continuity of open space and circulation across these corridors. Landscaping trees surrounding existing development generally soften the appearance of such developments and serve to unify the building with other adjacent buildings. Removal of native and specimen trees would, thus, be considered a potentially significant impact to a scenic resource.

Public Art Element. Currently, a public art element provided by Pasadena's Public Art program is located within the proposed building envelope for Location 1 of Amendment 1 (See Figure 4.1-2). The 1995 art piece, known as *Moore's Stone Volute*, by artist Lloyd Hamrol, is an artwork created by comprised of soil. The piece measures approximately 6 feet by 4 feet by 55 feet and would be removed and potentially relocated prior to development within this location. The Cultural and Recreational Element of the City of Pasadena Comprehensive General Plan recognizes public art as an important scenic resource and has identified the provision of such art as a goal for the City. A CMDP standard further provides that each time an Academic, Administrative or Athletic building over 70,000 square feet of gross floor area is constructed, Caltech shall include in the project a public art component equal to or greater than one percent (1%) of the construction cost. Under this standard, Caltech must consult with the Arts and Culture Commission of the City of Pasadena and follow the procedures outlined in the public art guidelines for new private development in order to meet the public art requirement. Payment in lieu of the cultural trust fund may be approved by the Arts and Culture Commission. As both the City and Caltech recognize public art elements, such as the one located between Noyes and the BBB Lab, as important scenic resources, the potential removal of this public art element would be considered a potentially significant impact.

Open Space. The CMDP provides for the organization of the campus around an existing system of open spaces to include structured open space plazas, heavily planted unstructured open space corridors, landscaped boulevards, and informal park like open spaces. The CMDP provides for a network of open space linkages extending east-west from Holliston Avenue to Wilson Avenue, and north-south past the Beckman Auditorium to a major new entry to the campus at Del Mar Boulevard and south across California Boulevard to the southern athletic facilities (Refer to Figure 2-3, *Project Description*). These connected open spaces may serve as visual corridors and as attractive areas for students to rest or engage in recreational activities. The Master Plan states that the existing open spaces at the campus are to be preserved for the life of the Master Plan, with the exception that minor alterations to the size and design of existing open spaces may occur to accommodate alterations and additions to existing buildings.

Two Master Plan Amendments could potentially obstruct two separate lengths of open space linkages.

Amendment 1. Two scenarios are presented for the future construction of the new Chemistry & Chemical Engineering Laboratory (CCE Lab). Under the first scenario, the CCE Lab would be constructed in the open space between the Beckman Behavioral Biology (BBB) Laboratory and Noyes Laboratory. Buildout of this amendment at Location 1, within the open space area between Noyes and BBB Lab, would place the CCE Lab within a heavily planted and

an informal park-like open space. This open space area links the landscaped pedestrian path along the abandoned San Pasqual Street (San Pasqual Mall) to a surface driveway and pedestrian paths at the southern facade of Beckman Institute. This area is partially developed with a driveway extending the length of the open space and terminating within a parking and loading dock area at the northern boundary of the proposed building envelope. Views through this area of open space are limited to surrounding buildings, a driveway, and a parking lot and, thus, would not be considered significant. Furthermore, development within this location would align the southern terminus of the building envelope with the nearby Braun Lab and San Pasqual Mall, and thus, would not reduce the overall view corridor width along the east-west open space and pedestrian corridor of the San Pasqual Mall. Therefore, visual impacts related to the development of the open space area between Noyes and BBB Lab would not be considered a significant impact to a scenic resource.

Amendment 2. This amendment would involve either the rehabilitation of the existing North Undergraduate Houses (Lloyd, Page, and Ruddock houses), with additions, or the construction of new undergraduate housing at the site of the existing buildings (see Figure 2-5 in Section 2.0, *Project Description*). Rehabilitation of the existing North Undergraduate buildings would expand development to the east by approximately 95 feet along 200 feet of the 270-foot long eastern boundary. This development would extend across a structured open space area, west of the Athenaeum, which serves as a pedestrian walkway between San Pasqual Street and California Boulevard. Extension of development within this area would reduce the width of this corridor, but would not substantially reduce the line of sight from what exists onsite today. The existing northern terminus (and northerly view) of this open space corridor is dominated by the housing office and surrounding dense landscaping. The expansion of the North Undergraduate Houses would reduce the length of this view corridor; however, the northerly view would still be that of development with landscaping. Therefore, the alteration of this viewing corridor would not be considered a significant impact to a scenic resource.

Mitigation Measures. The applicant would be required to obtain a permit from the City and prior to removal of at least 48 native or specimen trees. In addition, implementation of Mitigation Measure BIO-1(b) would ensure that damage to, and removal of, native or specimen trees would be avoided to the extent feasible. The following mitigation measures shall also be required in order to reduce visual impacts related to scenic resources.

AES-1(a) Landscaping Plan. For each building in connection with the proposed amendments, the applicant shall submit a landscape plan that will have as a goal to restore the theme and visual integrity of existing landscaped areas. The design of landscaping at the new buildings should continue to promote integration of open space between existing and new buildings. Landscaped areas between new facilities within building envelopes should be consistent with the general character of the surrounding area and should promote a unified image for the campus. The landscaping plan required under BIO-1 will follow the provisions herein; therefore no significant impacts on aesthetics will result from the proposed amendments.

AES-1(b) Public Art Relocation or Replacement. Avoidance of development within Location 1 for Amendment 1 would be the preferred scenario

in order to avoid impacts to a scenic resource. If avoidance of Location 1 is not feasible, prior to development the applicant shall consult with the City of Pasadena Arts and Culture Commission as to the deaccession procedures and policy and in compliance with State of California Works of Art Law and the Federal Visual Artists Rights Act (VARA). The Arts Commission may approve removal and relocation of the art piece, in consultation with the artist. If relocation is deemed infeasible, the applicant shall replace the art piece with a new piece of equal or greater value. As an alternative, Caltech may voluntarily contribute a like amount to an arts fund administered by the City of Pasadena Arts and Culture Commission: payable in lieu to the Cultural Trust Fund may be approved by the Arts and Culture Commission.

The following measure is recommended to reduce the impacts to scenic resources resulting from development of open space.

AES-1(c) Avoidance of Open Space Encroachment. Caltech shall avoid encroachment into or obstructing the open space area west of the Atheneaum. Replacement of the North Undergraduate House rather than rehabilitation would avoid this impact and would be the preferred scenario for preservation of the existing open space and preservation of existing visual resources in the area. However, if avoidance of this open space encroachment is not feasible, the rehabilitation scenario shall incorporate a landscape element along the southern building façade. Landscaping should be developed to soften the visual impacts of new development within the existing north-south open space corridor east of the Athenaeum.

Significance after Mitigation. Implementation of the required mitigation measures would reduce the visual impacts related to the removal of native or specimen trees, removal of a public art element, and placement of impediments within existing areas of open space, to a level considered less than significant.

Impact AES-2 The proposed Master Plan Amendments would change the visual character of the Caltech campus. Overall, these changes are anticipated to introduce buildings that are primarily visually compatible with the architectural treatment, and materials of nearby buildings. However, the scale of proposed residence halls has the potential to conflict with massing norms at the campus. Impacts are considered Class II, *significant but mitigable*.

The Caltech Master Plan identifies areas for the construction of new academic buildings, student housing, and parking, and defines a network of open spaces around which new facilities will be built. Design guidelines for building height, setback and general architectural character are also provided to ensure the proper balance in new development across the campus. Further, the CMDP requires that the landscape design at each new facility include an

analysis of existing visual resources (both natural and man-made) and their relationship to the new facility. This analysis is to be made the basis for integration of new landscaping into the existing campus. Through implementation of these design guidelines, the CMDP is intended to create a new northern campus that will be similar in scale, open spaces, organization and quality to Caltech's original campus, centered around the Bechtel Mall.

Caltech's original campus was designed with two distinctive architectural styles: that of the academic buildings in the western portion of the original campus and that of the dormitories and Athenaeum at the east end. The academic buildings are seen as scholarly and classic in nature, and are unified with an arcade system to create sheltered courtyards and present a unified architectural statement rather than expressions of individual buildings. The architecture of the Athenaeum was designed to provide a similarly unified architectural environment along the east-west axis (Caltech Master Plan, 2001). However, over the years, Caltech has introduced buildings that represent a variety of styles and have created a gap between the old campus and that of the new campus. Conversely, the dormitories on campus have maintained a more consistent style. This can be seen in the dormitories located along Holliston/San Pasqual and Catalina Avenue.

Development of the proposed amendments would remove several buildings that lack architectural notability and generally inconsistent with the original campus architecture. Replacement of these buildings with improved buildings consistent with the design principles outlined in the CMDP would further implement the intent of the CMDP, "*to provide a unified, balanced, and attractive plan for future growth.*"

The following analysis outlines the anticipated visual changes generated by each proposed Master Plan Amendment, as compared with the approved Master Plan, and consistency with the CMDP.

Amendment 1. Two scenarios are being considered for the future construction of the new Chemistry & Chemical Engineering Laboratory (CCE Lab). The first scenario, Location 1, proposes construction of the CCE Lab in the open space between the Beckman Behavioral Biology (BBB) Laboratory and Noyes Laboratory. The second scenario, Location 2, proposes the construction of the new lab on the site of the existing Mead Laboratory and the building envelope identified in the Master Development Plan west of the Mead Laboratory

Location 1. Development within this location would not alter views for local residences or passing pedestrians and motorists. Additionally, the southern terminus of the building envelope would align with the nearby Braun Lab and San Pasqual Mall, and thus, would not reduce the overall view corridor width along the east-west open space and pedestrian corridor, which is located directly south of the proposed building envelope. There are no windows along the western façade of the BBB Lab; thus, development would have no impact on views from this building. Views from Noyes Lab would be altered; however, the CCE building would simply replace current views of the BBB Lab and would be anticipated to be an aesthetic improvement over a building with no distinctive architectural character.

Although this location would require development within an area of open space, this loss in open space would be offset by changing the building envelope west of the Mead Laboratory to open space and by changing potential buildable areas on the campus that would be generally

comparable for open space. Thus, development of the amendment within this location would not result in a net loss of open space. Development would be expected to follow all applicable guidelines as listed in the Master Plan and thus would utilize architectural treatments and materials which are consistent with the campus' original buildings. Although this amendment would increase building density on campus, this minor increase would be considered similar in scale to that of Caltech's original campus. Thus, the amendment would not be anticipated to have a significant impact with respect to the overall visual character of the campus.

Location 2. Mead Lab is a single story building of approximately 8,000 square feet. The building design is low profile and generally lacking in architectural distinction. Surrounding buildings (Noyes and Braun Labs, and Beckman Institute) are all three stories in height and contrast dramatically with Mead Lab as seen from Wilson Avenue, adjacent open spaces, and neighboring student housing.

The new building would be three stories in height and compatible with nearby buildings in terms of massing and scale. Development would be required to follow all applicable guidelines as listed in the Master Plan and thus would utilize architectural treatments and materials which are consistent with the campus' original buildings. As this amendment would replace a building which is out of character with the surrounding buildings with a building more consistent with the design guidelines of the Master Plan and the mass and scale of surrounding buildings, impacts would be considered beneficial.

Amendment 2. The existing North Undergraduate buildings are two stories in height and resemble Spanish Colonial Revival, or Mission Revival style architecture. However, modern additions such as a second story walkway, concrete courtyard screening and landscaping borders have compromised the integrity of the original style. This amendment consists of two possible scenarios for improving the dormitories, either rehabilitating or replacing the buildings.

Rehabilitation. Under the rehabilitation scheme, the existing three houses (Lloyd, Page and Ruddock Halls) would be rehabilitated and small additions would be added to each house on the south side. In addition, a fourth house would be added on the east side. The additions would be a maximum of two stories in height and occupy a site area of 138,000 square feet. The housing site would expand to the east by approximately 95 feet along 200 feet of the 270-foot long eastern boundary. The rehabilitation scenario would increase density within this area and would exceed the scale to Caltech's original campus. Improvements to this building would be consistent with the applicable guidelines as listed in the Master Plan and would be anticipated to improve the overall visual character of the buildings. Therefore, this amendment would implement the CMDP principle "*to provide a unified, balanced, and attractive plan for future growth.*" Nevertheless, the increased building massing, given the dimensions proposed in the CMDP, has the potential to significantly impact massing patterns.

Replacement. Under the new construction scheme, the three houses would be removed and replaced with four new undergraduate dormitories that would better serve the needs of the students. The four new houses would be a maximum of 3 stories in height, total 138,000 square feet in area, and occupy a footprint of approximately 38,000 square feet. The new structures would expand to the east by approximately 35 feet as compared to the existing facilities. Much like the Rehabilitation scenario, this scenario would increase the building density on campus.

Whereas density would be consistent with the applicable guidelines as listed in the Master Plan and would be anticipated to improve the overall visual character within the area, there remains a potential the increase in overall building envelope may lead to undesirable massing. Therefore, there is potentially significant impact to aesthetic conditions associated with this amendment.

Amendment 3**.** This amendment would develop a 55,000 square foot, three-story, dormitory in place of the existing Braun & Marks Houses, which would be demolished. The proposed replacement housing would utilize nearly the same footprint as the existing buildings and would front San Pasqual Street and Holliston Avenue. New development would be consistent with the CMDP. Thus, the amendment would replace the existing block style buildings, which are generally lacking in architectural distinction, with housing more consistent with Caltech's original campus. The changes to the design and architectural style of the building located within this area would be expected to improve views from adjacent streets and campus facilities. Therefore, this amendment would have a beneficial impact with respect to visual character in the area.

Amendment 4. Development of the Campus Center would replace the existing Physical Plant Offices and Shops (a one-story, 36,648 square foot structure), with a 100,000 square feet building within three above ground floors and two subterranean levels. This larger structure would alter foreground views for passing motorists along San Pasqual Street and Holliston Avenue. Additionally, the heavily planted and unstructured open space corridor south of the building and the landscaped boulevard along Holliston Avenue would be altered such that foreground views would be dominated by the new building and surrounding landscape trees. However, existing views are currently dominated by a number of large trees and plantings. Thus, the change in foreground views would be only minimally reduced due to the new development. Development of the three-story Campus Center building would be consistent with the design guidelines of the CMDP. Its larger size would better articulate its central function to campus life. Thus, development of the Campus Center is not anticipated to generate impacts with respect to the visual character of the campus.

Mitigation Measures. The following measure is proposed to address possible impacts relating to the effect of increased building density for the proposed new residence halls.

AES-2(a) Facade Articulation. Any addition or new construction associated with the residential houses shall be designed in a manner that clearly articulates the massing of the new building as distinct from the existing residential structures. Facades shall be designed in a manner that incorporates changes in relief such that no facade can measure greater than 150 feet without interruption. Articulated fenestration, parapets, and rooflines are encouraged.

AES-2(b) Replacement Landscaping. Any addition or new construction associated with removal of landscaping and ornamental vegetation shall design and implement replacement landscaping of a suitable nature. Landscaping shall integrate the surrounding landscape design and incorporate the the new developments in order to soften the affect of building massing.

Significance After Mitigation. Implementation of this measure will mitigate potential impacts of outscaled massing of new residential structures.

Impact AES-3 The proposed revisions to the Caltech Master Development Plan design guidelines and design review thresholds would broaden the range of architectural styles and landscape designs utilized for future development within the Caltech campus. Overall, these changes would encourage architectural and landscaping design that would implement the objectives of the Master Plan. Impacts are considered Class III, *less than significant*.

As mentioned in Section 2.0, *Project Description*, revisions to the CMDP design guidelines (Appendix F) would guide the design of new facilities at campus edges and within the campus and south of California Boulevard. The revisions would change the design guidelines for the east-west open space axis to modify the arcade dedication and pavilion requirements, allowing for increased variation in architectural and design styles, and changing the building height measurement index from number of stories to height in feet above grade. The amendments would add language allowing Caltech greater flexibility for future development and landscaping that is considered consistent with the principles of design of the original campus.

The most notable change to the original Master Plan is the amendment's direction for development south of California Boulevard. The CMDP requires that any new buildings south of California Boulevard and any physical changes or additions within the original campus "should be sympathetic to and compatible with the scale and architectural style of Caltech's original buildings." The proposed amendment suggests that new buildings south of California Boulevard improve the visual character within the area through construction of significant buildings of quality and distinction, stylistically independent of the existing historic core north of California Boulevard. The following is the amended text as proposed for addition to the CMDP.

> *The area south of California Boulevard was not added to the campus until after WW II. The existing buildings in this area are not good examples of the periods that they were built in. The remaining building sites along California Boulevard should seek to improve the overall appearance of this area with significant buildings of quality and distinction. This can be achieved without relating to the buildings in Caltech's historic core on the north side of California because such an approach could dilute the overall character of the historic core and create a false sense of history.*

Although this would represent a change from the original direction in the Master Plan, the resultant development would be considered an improvement in visual appearance and would meet the Master Plan's overall objectives. As provided in the introduction for the Master Plan Design Guidelines (page 86), the objectives of the Master Plan are to:

- *Maintain and extend the scale and the quality of the existing campus environment; and*
- *Provide for the growth of all academic divisions at Caltech while protecting the surrounding neighborhoods.*

The remaining amendments represent smaller modifications in the original direction of the Master Plan and would also meet the Master Plan objectives. Therefore, the amendments to the design guidelines would be considered consistent with the original spirit of the Master Plan. Consequently, impacts would be considered less than significant.

The change in the measurement tool for height from number of stories to feet above grade is considered a positive modification, from a design perspective. The change recognizes that the latter is a more precise measurement tool, and can therefore better respond to innovative design and contextual setting. Therefore, this change to the design guidelines is considered a beneficial impact to aesthetics.

Mitigation Measures. None required.

Significance After Mitigation. Impacts would be considered less than significant without mitigation.

c. Cumulative Impacts. The Caltech Master Development Plan and the City's General Plan provide a variety of design guidelines specifically intended to ensure that future development occurs in an orderly manner and recognizes the campus' important visual features. Compliance with Master Development Plan principles and guidelines for new development would be expected to achieve the proper balance in new development across the campus. Planned and pending development projects within the vicinity of the Campus include approximately 3,327 dwelling units and 1,379,824 square feet of commercial and industrial development, all of which are subject to the City's design guidelines. Combined with recent modifications at the nearby Pasadena City College campus and ongoing intensification of Pasadena's urban form, the Master Plan Amendment's contribution to cumulative aesthetic impacts would not be cumulatively considerable provided that proposed mitigation measures are implemented. Overall the aesthetic character of the area of Pasadena in which the campus is located would not be greatly affected.

4.2 AIR QUALITY

4.2.1 Setting

a. Climate and Meteorology. The semi-permanent high-pressure system west of the Pacific coast strongly influences California's weather. It creates sunny skies throughout the summer and influences the pathway and occurrence of low-pressure weather systems that bring rainfall to the area during October through April. As a result, wintertime temperatures in Pasadena are generally mild, while summers are warm and dry. The dominant daily wind pattern in the basin is a daily sea breeze followed by a nightly land breeze. These wind patterns are occasionally broken during the winter by storms coming from the north and northwest and by episodic Santa Ana winds. Santa Ana winds are strong northerly to northeasterly winds that originate from high-pressure areas centered over the desert of the Great Basin. These winds are usually warm, very dry, and often full of dust. They are particularly strong in the mountain passes and at the mouths of canyons. The net effect of the dominant daily wind pattern in the Pasadena area is that daytime air pollutant emissions from coastal sources are carried inland and nighttime winds carry the inland pollution to the coastal areas. However, the weak nighttime wind conditions can allow for localized stagnation of pollutants inland.

The City of Pasadena is located in a transitional climate zone which is influenced by both the ocean and warm continental air masses. Pasadena is also located in a thermal belt which means that cold air that occurs during winter nights drains off to lower elevations. Temperatures in the City range from an average annual minimum of 48° Fahrenheit (F) to an average annual maximum of 76° F with a mean annual temperature of 62° F. Precipitation is generally limited to a few storms during the winter season between November and April with annual average rainfall of about 12 to 13 inches per year.

b. Air Pollution Regulation. Air quality is regulated federally by the Environmental Protection Agency, statewide by the California Air Resources Board (CARB). Local control in air quality management is provided by the CARB through county-level Air Pollution Control Districts (APCDs). The CARB has established air quality standards and is responsible for the control of mobile emission sources, while the local APCDs are responsible for enforcing standards and regulating stationary sources. The CARB has established 14 air basins statewide. The nondesert portions of Los Angeles, San Bernardino, and Riverside Counties, together with all of Orange County, comprise the South Coast Air Basin (SCAB), which is controlled by South Coast Air Quality Management District (SCAQMD). The City of Pasadena is located in the SCAB.

Federal and state standards have been established for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulates less than 10 and 2.5 microns in diameter (PM_{10} and $PM_{2.5}$), and lead (Pb) (refer to Table 4.2-1). California has also set standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility reducing particles. The SCAQMD is required to monitor air pollutant levels to assure that air quality standards are met and, in the event they are not, to develop strategies to meet these standards. Depending on whether the standards are met or exceeded, the local air basin is classified as being in "attainment" or "nonattainment."

The South Coast Air basin is a federally designated nonattainment area for ozone, and PM_{10}. The Basin is also classified as a federal non-attainment area for carbon monoxide, but now qualifies for reclassification as an attainment area for the federal CO standard because the federal standard has not been exceeded in the past three years. The last exceedance of federal and state standards within the SCAB occurred once in 2002 at the monitoring station in South Central Los Angeles County (station 12). Current state nonattainment designations within this basin exist for ozone, PM_{10}, and $PM_{2.5}$.

Table 4.2-1 Current Federal and State Ambient Air Quality Standards

Pollutant	Federal Standard	California Standard
Ozone	0.08 ppm (8-hr avg)	0.09 ppm (1-hr avg) 0.07 ppm (8-hr avg)*
Carbon Monoxide	9.0 ppm (8-hr avg) 35.0 ppm (1-hr avg)	9.0 ppm (8-hr avg) 20.0 ppm (1-hr avg)
Nitrogen Dioxide	0.053 ppm (annual avg)	0.25 ppm (1-hr avg)
Sulfur Dioxide	0.03 ppm (annual avg) 0.14 ppm (24-hr avg) 0.5 ppm (3-hr avg)	0.04 ppm (24-hr avg) 0.25 ppm (1-hr avg)
Lead	1.5 $\mu g/m^3$ (annual avg)	1.5 $\mu g/m^3$ (30-day avg)
Particulate Matter (PM_{10})	50 $\mu g/m^3$ (annual avg) 150 $\mu g/m^3$ (24-hr avg)	30 $\mu g/m^3$ (annual avg) 50 $\mu g/m^3$ (24-hr avg)
Particulate Matter ($PM_{2.5}$)	15 $\mu g/m^3$ (annual avg) 65 $\mu g/m^3$ (24-hr avg)	12 $\mu g/m^3$ (annual avg)

ppm= parts per million
$\mu g/m^3$ = micrograms per cubic meter
Source: California Air Resources Board, ww.arb.ca.gov/aqs/aaqs2.pdf, December 2005.

The potential health effects of pollutants for which the South Coast Air Basin is in nonattainment are described below.

Ozone. Ozone is produced by a photochemical reaction (triggered by sunlight) between nitrogen oxides (NO_x) and reactive organic gases (ROG). Nitrogen oxides are formed during the combustion of fuels, while reactive organic gases are formed during combustion and evaporation of organic solvents. Because ozone requires sunlight to form, it is formed primarily between the months of April and October. Ozone is a pungent, colorless toxic gas with direct health effects on humans including respiratory and eye irritation and possible changes in lung functions. Groups most sensitive to ozone include children, the elderly, persons with respiratory disorders, and people who exercise strenuously outdoors.

Suspended Particulates. Atmospheric particulate matter is comprised of finely divided solids and liquids such as dust, soot, aerosols, fumes, and mists. The particulates of primary concern are fine particulate matter less than 10 or 2.5 microns in diameter (PM_{10} and $PM_{2.5}$). These small particles have the greatest likelihood of being inhaled deep into the lungs. Short-

and long-term exposure to PM has been associated with increased mortality and cardiopulmonary disease in a number of epidemiological studies. Major man-made sources of PM_{10} are agricultural operations, industrial processes, combustion of fossil fuels, construction, demolition operations, and entrainment of road dust into the atmosphere. Natural sources include wind blown dust, wildfire smoke, and sea spray salt. The finer $PM_{2.5}$ particles are derived from combustion processes, and are secondary pollutants from chemical processes in the atmosphere.

Carbon Monoxide. Carbon monoxide (CO) is a colorless, odorless, poisonous gas that is only found in high concentrations when very near its source. The major local source CO is automobile traffic. Elevated concentrations are usually only found near areas of high traffic volumes. The adverse effect of CO on human health is a function of its affinity for hemoglobin in the blood. At high concentrations, CO reduces the amount of oxygen in the blood, causing heart difficulties in people with chronic diseases, reduced lung capacity, and impaired mental abilities.

c. Current Ambient Air Quality. The SCAQMD monitors air pollutant concentrations throughout the basin at various monitoring stations. The SCAQMD has divided the basin among 38 separate monitoring stations. The nearest SCAQMD monitoring station is located on the Caltech campus at 752 S Wilson Avenue. Air quality data from this site, the Pasadena-S Wilson station, is presented in Table 4.2-2 and reflects nonattainment pollutants present in and near the Caltech campus, with the exception of PM_{10}. The Pasadena-S Wilson station does not monitor for PM_{10}; therefore, measurements taken at the Los Angeles North Main Street monitoring station are provided in Table 4.2-3 to provide an approximation of PM_{10} levels within the area. The North Main Street station is located at 1630 North Main Street, roughly 10 miles south and west of Pasadena. Tables 4.2-2 and 4.2-3 summarize exceedances of the federal and/or state standards for ozone, $PM_{2.5}$, PM_{10} and CO within the Pasadena, and nearby, area.

Table 4.2-2 Ambient Air Quality Data at the Pasadena-S Wilson Avenue Station

Pollutant	2003	2004	2005
Ozone, ppm - Worst Hour	0.152	0.130	0.145
Number of days of State exceedances (>0.09 ppm)	44	27	11
Number of days of Federal exceedances (>0.12 ppm)	7	1	2
Particulate Matter < 2.5 microns, $\mu g/m^3$ Worst 24 Hours	89.0	59.4	62.8
Number of samples of Federal exceedances (>65 $\mu g/m^3$)	1	0	0
Carbon Monoxide, ppm – Worst 8 Hour	3.73	3.49	2.83
Number of samples of State exceedances (>9.0 ppm)	0	0	0
Number of samples of Federal exceedances (>9.0 ppm)	0	0	0

Source: CARB, 2003, 2004, & 2005 Annual Air Quality Data Summaries available at http://www.arb.ca.gov

Table 4.2-3 Ambient Air Quality Data at the Los Angeles North Main Street Station

Pollutant	2003	2004	2005
Particulate Matter <10 microns, $\mu g/m^3$ Worst 24 Hours	67.0	68.6	70.0
Number of samples of State exceedances (>50 $\mu g/m^3$)	3	1	*
Number of samples of Federal exceedances (>150 $\mu g/m^3$)	0	0	0

Source: CARB, 2003, 2004, & 2005 Annual Air Quality Data Summaries available at http://www.arb.ca.gov
**Insufficient or no data available to determine the value*

As shown in tables 4.2-2 and 4.2-3, state and federal thresholds for ozone were exceeded in Pasadena during the past three years, and state thresholds for $PM_{2.5}$ were exceeded once in the past three years. The state threshold for PM_{10} was exceeded three times in 2003 and once in 2004 in nearby Los Angeles. There were no state or federal exceedances of carbon monoxide standards in the last three years and no exceedances of federal PM_{10} standards.

d. Sensitive Receptors in the Project Area. Certain population groups are considered more sensitive to air pollution than others. Sensitive population groups include children, the elderly, the acutely ill and the chronically ill, especially those with cardio-respiratory diseases. Residential uses are also considered sensitive to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present. Sensitive receptors within the vicinity of the campus include residences surrounding the majority of the campus, which are located as close as 50 feet from the campus boundary.

4.2.2 Impact Analysis

a. Methodology and Significance Thresholds. Emissions estimates for the proposed project were calculated using URBEMIS 2002 (Version 8.7), which was developed by CARB to evaluate construction emissions, area emissions and operational emissions associated with new development. Construction emissions are based on the amount of demolition, grading and building construction that would occur due to project development. Area emissions include natural gas consumption, hearth fuel combustion, landscape fuel combustion, consumer products, and architectural coatings. Operational emissions are associated with motor vehicle trip generation resulting from the project. Trip generation estimates for the project were obtained from Kaku Associates' traffic study (March 2006). The traffic study is included in the attached appendices.

A summary of demolition, area of disturbance, proposed development and soil to be excavated is provided in the URBEMIS results (Appendix B). This information, in addition to traffic estimates, was used to model air quality impacts associated with the proposed project. As Amendments 1 and 2 contain two options for development, modeling utilized the option with greater potential for adverse effects to generate a worst-case scenario analysis.

A significant adverse air quality impact may occur when a project individually or cumulatively interferes with progress toward the attainment of the ozone standard by releasing emissions that equal or exceed the established long term (operation) or short term (construction) quantitative thresholds for pollutants, or causes an exceedance of a state or federal ambient air quality standard for any criteria pollutant. The following significance thresholds are recommended by the SCAQMD for project operations within the South Coast Air Basin:

Table 4.2-4 SCAQMD Air Quality Significance Thresholds

Pollutant	Construction	Operation
NO_x	100 lbs/day	55 lbs/day
ROG	75 lbs/day	55 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
SO_x	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day

Source: SCAQMD, 2006, http://www.aqmd.gov/ceqa/hdbk.html

b. Project Impacts and Mitigation Measures.

Impact AQ-1 Project construction would generate air pollutant emissions that would exceed SCAQMD thresholds for the ozone precursor ROG (Reactive Organic Gases). This is a Class II, *significant but mitigable* impact.

The majority of construction related emissions result from grading, and building, due to use of heavy equipment and architectural coatings, respectively. The ozone precursor NOx is primarily a byproduct of diesel combustion. ROG is released primarily during the finishing phase of construction upon application of paints and varnishes. The URBEMIS computer program calculates construction emissions based on demolition (Phase I), grading (Phase II) and building construction (Phase III).

Project Demolition. Project demolition would likely occur in phases as each of the five components would be undertaken individually rather than simultaneously. However, as the precise construction schedule has not yet been defined, and to analyze worst-case scenario impacts associated with construction of the entire project, a single demolition scenario was analyzed. The demolition scenario assumes that 1,342,420 cubic feet of structures would be demolished and hauled off site to a landfill or recycling facility that is located 10 miles from the project site. The Scholl Canyon Landfill is the designated receiver of solid waste from the City of Pasadena. The Scholl Canyon Landfill is located 9.3 miles from the University campus and accepts non-hazardous solid waste. Additionally, construction waste recycling of asphalt/ brick, cardboard, carpet and/or carpet padding, concrete and/or slump stone, gypsum and

drywall, inerts (rock, sand, gravel, dirt), metal, roofing materials, and wood is available through Downtown Diversion, located approximately 12.5 miles from the project site. Salvage of wood, doors, cabinets, windows, fixtures and hardware is available at Habitat for Humanity, Pasadena, located approximately 3 miles from the project site.

The demolition scenario assumes that project demolition would require three months, with 22 working days/month (total of 66 working days) and that approximately 16 round trips per working day would be required (20 cubic yards of debris per truck) to completely remove the debris associated with demolition (1,036.2 truckloads of debris). In addition, the demolition scenario assumes that one crane, one crusher/processor and one backhoe would be operating simultaneously for eight hours every day during the three month demolition period. It is unlikely that these three pieces of equipment would be the only equipment used, and that they would all be operating simultaneously every day; however, these three pieces of equipment were chosen to represent equipment used on site for the duration of the demolition and debris removal phase. Modeling results for project demolition activities are presented in Table 4.2-5.

Table 4.2-5 Estimated Maximum Daily Air Pollutant Emissions During Demolition

	Unmitigated Emissions (lbs/day)				
	ROG	**NOx**	**CO**	**SO2**	**Total PM_{10}**
2006 Project Demolition	5.87	60.18	39.66	0.52	16.43
SCAQMD Thresholds	*75*	*100*	*550*	*150*	*150*
Threshold Exceeded?	No	No	No	No	No

Source: URBEMIS 2002, Version 8.7, see Appendix B for calculations.
**Indicates and exceedance of SCAQMD thresholds*

Project demolition activities, assuming worst-case scenario impacts associated with demolition Mead Laboratory (Option 2, Amendment 1), North undergraduate houses (option 2, Amendment 2), in addition to demolition of the Braun and Marks houses, and Physical Plant Facilities all commencing in a single demolition phase would not generate a significant adverse impact to air quality, as SCAQMD thresholds would not be exceeded for any pollutant. Therefore, undertaking these projects individually, or developing according to Option 1 under Amendments 1 and 2, would not exceed any significance thresholds.

Project Grading. Impacts related to project grading assume that grading activities include preparation of the building sites, which are surrounded by existing development. Although the area of disturbance is limited to 132,000 square feet (approximately 3.03 acres), an additional 42,223 cubic yards (CY) of soil would need to be excavated for Amendments 1, 4, and 5, which each contain two subterranean levels. It was estimated that six months would be required to complete grading activities (22 working days per month) and remove the excavated soil from the site. Of the construction disposal options identified above, soil could be accepted by the Scholl Canyon Landfill and Downtown Diversion. Of these, Scholl Canyon is located

closer than Downtown Diversion, and was thus utilized as the receiving location in the modeling analysis. It was determined that approximately 17 truckloads per day would be required to completely remove the excavated soil from the site. However, it should be noted that this is a worst-case scenario estimate, and that alternative disposal options may be available either on campus or in the City of Pasadena, whereby fewer miles would be traveled for disposal of excavated soil.

It is presumed that site grading would include one excavator, one tractor/loader/backhoe, and one grader that would be operating simultaneously for eight hours every day during the six month grading period. It is unlikely that these three pieces of equipment would be the only equipment used, and that they would all be operating simultaneously every day; however, these three pieces of equipment were chosen to represent equipment used on site for the duration of the grading and excavation phase. Modeling results for project demolition activities are presented in Table 4.2-6.

Table 4.2-6 Estimated Maximum Daily Air Pollutant Emissions During Grading

	Unmitigated Emissions (lbs/day)				
	ROG	**NOx**	**CO**	**SO2**	**Total PM10**
2006 Project Grading	4.69	36.27	37.06	0.13	11.25
2007 Project Grading	4.65	34.76	37.10	0.01	11.11
SCAQMD Thresholds	*75*	*100*	*550*	*150*	*150*
Threshold Exceeded?	No	No	No	No	No

Source: URBEMIS 2002, Version 8.7, see Appendix B for calculations.
**Indicates and exceedance of SCAQMD thresholds*

Project grading impacts would be the same under Amendments 1 and 2 for both options, as both options have the same area of disturbance under each Amendment (see Air Quality Impact Development Summary Appendix B). The modeling results presented in Table 4.2-6 indicate that maximum daily air pollutant emissions generated during grading activities would not exceed SCAQMD significance thresholds. Since it was assumed that all grading would commence in a single phase, and the worst-case scenario analysis did not result in a significant impact, it can be inferred that undertaking these projects individually would also not exceed any significance thresholds.

Project Building Construction. It was estimated that project building construction would include 373,000 square feet of use, which would require approximately 11.5 months to complete. Building construction was further subdivided into subphases pursuant to URBEMIS 2002 v.8.7 methodology. It was presumed that building construction of 373,000 square feet of use would require 8.5 months, and that application of architectural coatings would require three months. The proposed project does not include laying asphalt, as the structures would be constructed in an area with existing parking and roads.

For the purposes of modeling, it was presumed that building construction would include one crane, two tractor/loader/backhoes, and one trencher that would be operating simultaneously for eight hours every day during the six month construction period. It is unlikely that these four pieces of equipment would be the only equipment used, and that they would all be operating simultaneously all day every day; however, these four pieces of equipment were chosen to represent equipment used on site for the duration of the building construction phase. Modeling results for project building construction activities are presented in Table 4.2-7.

Table 4.2-7 Estimated Maximum Daily Air Pollutant Emissions During Building Construction

	Unmitigated Emissions (lbs/day)				
	ROG	**NOx**	**CO**	**SO2**	**Total PM10**
2007 Building Construction	298.92	25.54	54.39	0.0	1.28
2008 Building Construction	294.11	0.53	11.20	0.0	0.19
SCAQMD Thresholds	75	100	550	150	150
Threshold Exceeded?	**Yes**	No	No	No	No

Source: URBEMIS 2002, Version 8.7, see Appendix B for calculations.

The air quality analysis included a worst-case scenario analysis. The modeling results presented in Table 4.2-7 indicate that maximum daily air pollutant emissions generated during construction activities would produce 445.52 pounds of ROG, which exceeds the 75 pounds/day threshold by 370.52 pounds.

This impact assumes that all 373,000 square feet of new buildings that would be constructed under the project would receive architectural coatings in a single phase that would require three months to complete. However, if application of architectural coatings were to commence in a phased manner upon completion of each structure, the impact would likely not be significant. Nevertheless, mitigation is required to reduce the potential for significant adverse impacts to a level of insignificance.

Mitigation Measures. Project emissions are projected to exceed the SCAQMD threshold of 75 pounds/day for ROG, under the worst-case scenario assumption that all buildings would be constructed and coated in one phase. The architectural coatings phase was projected to require three months to coat all 373,000 square feet of structures. It is more probable that each building would be constructed individually as project development funds are allotted and engineering documents are completed. Nevertheless, since a precise schedule for construction has not yet been determined, worst-case scenario emissions can be mitigated to a level of insignificance through incorporation of Mitigation Measure AQ-1(a). Additionally, although no other SCAQMD thresholds were exceeded, and mitigation is not required for impacts relating

to NOx, CO, SO_2 and PM_{10}, mitigation measures are included as recommendations to reduce impacts to the greatest extent feasible.

AQ-1(a) **ROG Control.** The following shall be implemented to minimize daily ROG emissions related to the application of architectural coatings:

- *Low VOC architectural and asphalt coatings shall be used on site and shall comply with AQMD Rule 1113-Architectural Coatings.*
- *Daily coating use shall be restricted to 65 gallons per day (assuming a VOC content of 1.1 pounds per gallon).*

The following additional measure is recommended to further reduce emissions of construction-related ozone precursors (ROG and NOx) to the greatest extent feasible:

AQ-1(b) **Ozone Precursor Control.** The following shall be implemented during construction to minimize emissions from construction equipment:

- *Equipment engines should be maintained in good condition and in proper tune as per manufacturer's specifications;*
- *Lengthen construction periods during the smog season so as to minimize the number of vehicles and equipment operating simultaneously; and*
- *Use new technologies to control ozone precursor emissions as they become available.*
- *Diesel oxidation catalysts and particulate filters shall be installed on all on and off road construction vehicles.*

The following additional measure is recommended to reduce fugitive dust (PM_{10}) to the greatest extent feasible:

AQ-1(c) **Fugitive Dust Control.** The following shall be implemented during construction to minimize fugitive dust emissions:

- *Water trucks shall be used during construction to keep all areas of vehicle movements damp enough to prevent dust from leaving the site. At a minimum, this will require twice daily applications (once in late morning and once at the end of the workday). Increased watering is required whenever wind speed exceeds 15 mph. Grading shall be suspended if wind gusts exceed 25 mph.*
- *If importation, exportation and stockpiling of fill material is involved, soil with 5% or greater silt content that is stockpiled for more than two days shall be covered, kept moist, or treated with soil binders to prevent dust generation. Trucks transporting material shall be tarped from the point of origin or shall maintain at least two feet of freeboard.*
- *All material excavated or graded shall be sufficiently watered to prevent excessive amounts of dust. Watering should occur at least twice daily*

with complete coverage, preferably in the late morning and after work is done for the day.

- *All clearing, grading, earth moving, or excavation activities shall cease during periods of high winds (i.e., greater than 20 mph averaged over one hour) so as to prevent excessive amounts of dust.*
- *All material transported off-site shall be either sufficiently watered or securely covered to prevent excessive amounts of dust.*
- *Face masks shall be used by all employees involved in grading or excavation operations during dry periods to reduce inhalation of dust which may contain the fungus which causes San Joaquin Valley Fever.*
- *All active portions of the construction site shall be sufficiently watered to prevent excessive amounts of dust.*

Significance After Mitigation. The recommended mitigation measures would reduce construction related emissions to the greatest extent feasible and below SCAQMD thresholds. The impact after mitigation would be less than significant.

Table 4.2-8 Estimated Maximum Daily Construction Emissions After Mitigation

	Mitigated Emissions (lbs/day)				
	ROG	NOx	CO	SO2	Total PM10
2006 Project Demolition	5.87	48.16	39.64	0.52	16.43
2006 Project Grading	4.69	29.02	37.06	0.13	6.25
2007 Project Grading	4.65	27.81	37.10	0.01	6.22
2007 Building Construction	64.35	20.65	54.23	0.00	0.56
2008 Building Construction	59.54	0.52	11.06	0.00	0.19
SCAQMD Thresholds	75	100	550	150	150
Threshold Exceeded?	No	No	No	No	No

Source: URBEMIS 2002, Version 8.7, see Appendix B for calculations.

Impact AQ-2 Operation of the proposed project would not generate air pollutant emissions exceeding SCAQMD operational significance thresholds. This is a Class III, *less than significant* impact.

The proposed project consists of four amendments that would result in construction of 373,000 square feet of development as a worst case scenario estimate. Development under these four amendments would replace 134,242 square feet of existing development. The project would not directly generate students, as the amendments are modifications to the existing Master Plan, including replacement or rehabilitation of residential dormitory style housing with 337 beds. The new number of beds is proposed at 337 under the Master Plan amendments, indicating no increase in student housing. The other facilities proposed for construction are upgrades to existing facilities, and will not generate student growth. The traffic analysis that was produced

for the project included a total trip generation for the Master Plan (including these amendments) at buildout (2015) of 1,461 daily trips.

The project was analyzed for operational impacts assuming that 373,000 square feet of educational use would be constructed and would result in trip generation of 1,461 daily trips. In addition to the 1,461 trips generated by the project, increased electricity and natural gas would be consumed by the net increase of 338,758 square feet of campus development. As such, project operation would increase emissions of air pollutants that contribute to the degradation of regional air quality. Estimates of project emissions are shown in Table 4.2-9. As indicated, overall emissions would not exceed SCAQMD thresholds for ROG, NOx, CO, SO_2, or PM_{10}. Operational impacts are therefore considered less than significant.

Table 4.2-9 Operational Emissions Associated with the Proposed Project (lbs/day)

Emission Source	ROG	NOx	CO	SO2	PM_{10}
Stationary Source	0.12	0.00	0.78	0.00	0.00
Mobile Emissions	10.55	6.30	66.47	0.08	12.72
Total Emissions	**10.67**	**6.30**	**67.25**	**0.08**	**12.72**
SCAQMD Thresholds	*55*	*55*	*550*	*150*	*150*
Threshold Exceeded?	No	No	No	No	No

Source: URBEMIS 2002, Version 8.7, see Appendix B for calculations.

Mitigation Measures. No mitigation required.

Significance after Mitigation. Project operational air quality impacts are less than significant without mitigation.

Impact AQ-3 Project-generated traffic would incrementally increase traffic congestion and associated carbon monoxide concentrations at area intersections. However, ambient concentrations are well below state and federal standards and the project would not trigger any of the criteria for potential CO impacts. Therefore, project impacts would be Class III, *less than significant*.

A project's localized air quality impact is considered significant if CO emissions create a "hot spot" where the California one-hour standard of 20 parts per million (ppm), or eight-hour standard of 9 ppm, is exceeded. Reports from the Pasadena –S Wilson Avenue station indicate that CO level highs over the past three years ranged from 2.83 -3.73 ppm, well below the 9 ppm 8-hour standard. Historical data for maximum hourly CO levels at this station range from 5-7 ppm, well below the 20 ppm hourly standard.

CO "hotspots" typically occur at severely congested intersections (LOS E or F). The traffic analysis that was conducted for this project analyzed operating conditions at nine intersections within the study area under cumulative conditions in the year 2015. According to that analysis, three intersections would operate at LOS E and F during peak travel hours; however, the project's contribution to these cumulative conditions is less than significant per City traffic thresholds.

According to the Transportation Project Level Carbon Monoxide Protocol (UCD-ITS-RR-97-21), because the project is in a region that is in attainment with state designated CO standards, the project requires further analysis if the project would involve the following changes:

a. Increase the percentage of vehicles operating in cold start mode by >2%.
b. Increase the traffic volumes by 5%, or decrease average speeds in conjunction with traffic volume increases of less than 5%.
c. If the project worsens traffic flow by reducing speeds on street segments by 3-50 mph or causing significant delays at intersections.

The CO protocol indicates that the above criteria should be applied to build and no-build scenarios when the highest concentrations of CO would be expected to occur. Thus, these criteria are applied to the intersections listed in Table 4.2-10 under cumulative conditions during peak hour flows.

Table 4.2-10 Project Study Area Intersections Operating at LOS E and F During Peak Hours Under Cumulative Conditions

Intersection	Cumulative Conditions			Cumulative + Project			
	Peak Hour	Cumulative Traffic Volumes 2015	LOS	Project Traffic	Percent Increase due to Project	LOS	Increase in V/C
Lake Avenue and California Boulevard	AM	3,921	F	36	0.9	F	0.006
	PM	4,333	F	36	0.8	F	0.006
Wilson Avenue and California Boulevard	AM	2,523	D	51	2.0	D	0.008
	PM	2,624	D	51	1.9	E	0.009
Hill Avenue and California Boulevard	AM	2,395	D	41	1.7	D	0.015
	PM	2,784	D	41	1.5	E	0.011

Source: Kaku Associates. Traffic and Parking Study for the Caltech Master Development Plan Amendments Pasadena, California. March 2006

Criterion a. The proposed project would not increase the percentage of vehicles operating in cold start mode. The project would add peak hour volumes ranging from 36 to 41 cars to each of the intersections under consideration, but would not increase the percentage of vehicles operating in cold start mode. The project involves redevelopment of existing facilities, consistent with those currently in operation at the campus. The project would not cause a greater proportion of vehicles to cool down to cold start mode. Thus the project would not trigger the need for CO modeling under this criterion.

Criterion b. As indicated in Table 4.2-10, the proposed project would increase traffic volumes at the subject intersections by 0.8-2.0%. Additionally, the project would cause volume to capacity increases of 0.06% to 1.5%. As the percent increases are below 5%, and the V/C increases are less than significant per City traffic thresholds, project-generated traffic would not trigger the need for CO modeling under this criterion.

Criterion c. As indicated in Table 4.2-10, under cumulative conditions, the intersections of California Avenue at Wilson Avenue and California Avenue at Hill Avenue would operate at LOS "D". The addition of project-generated traffic would result in intersection operations of LOS "E" during the PM peak hour at both intersections. The City's significant impact threshold for intersections operating at LOS "D" is a project-generated V/C increase of 0.03. Because the project-generated increases for these intersections range from 0.009 to 0.011, the project's impact is not considered significant and the project is not likely to cause a reduction in speeds ranging from 3-50 mph. Therefore, project generated traffic would not trigger the need for CO modeling under this criterion.

Project-generated traffic would not trigger any of the criteria for performing CO modeling under the Project Level CO Protocol. Moreover, ambient CO concentrations in the area are well below state and federal standards. Therefore, significant CO hotspot impacts are not anticipated.

Mitigation Measures. No exceedances of State or Federal CO standards are anticipated; thus, mitigation is not required.

Significance After Mitigation. CO impacts are less than significant before mitigation and no mitigation is necessary.

c. Cumulative Impacts. Any growth within the Los Angeles metropolitan area contributes to existing exceedances of ambient air quality standards when taken as a whole with existing development in the region. In addition to the proposed project, buildout of the cumulative projects listed in Table 3-1 in Section 3.0, *Environmental Setting*, would involve construction of an estimated 3,327 dwelling units and 1,379,824 square feet of commercial and industrial development. Emissions associated with this development, in combination with other development throughout the South Coast Air Basin, would incrementally contribute to the degradation of regional air quality. It is anticipated that each development would undergo evaluation for air quality impacts at the project level, thereby incorporating mitigation to reduce impacts to the greatest extent feasible. Additionally, it should be noted that regional development is generally envisioned and accounted for in the Air Quality Management Plan for the region. However, increased emissions associated with cumulative development could potentially hinder the attainment of State and Federal air quality standards if numerous individual projects cannot fully mitigate associated emissions. Thus, cumulative impacts to regional air quality may be significant; however, this project's emissions are fully mitigated and are thus not cumulatively considerable.

4.3 BIOLOGICAL RESOURCES

4.3.1 Setting

Caltech is located in the south-central portion of the City of Pasadena. The City and the Caltech campus are located near the toe of the San Gabriel Mountains, directly south of, and adjacent to, Angeles National Forest. Both the City and the Caltech campus are highly urbanized. Within the City there are only three distinct areas of non-urbanized native plant communities. These are found in Eaton Canyon, Arroyo Seco, and the undeveloped hillsides along the western boundary of Pasadena. Although these small stands of natural habitat support a surprisingly rich and diverse level of flora and fauna the campus lies approximately 2 miles from the nearest of these native plant communities, the western City hillsides. Further, the campus is 3.5 miles south and west of Angeles National Forest and roughly 3 miles south and west of Eaton Canyon. Highly urbanized areas surround and essentially isolate the campus from any locally or regionally significant natural habitat.

Caltech encompasses approximately 124 acres and contains numerous structures, roads, parking areas, fields, and gardens associated with the university. The campus is a developed urban area and has been urbanized for many years. Onsite facilities include over 100 buildings with approximately 2.7 million square feet of building area. Vegetation communities within the campus consist of cultivated ornamental and horticultural plants that have been introduced to the area and native tree and shrub species that have been cultivated for landscaping purposes. Properties adjacent to the campus are primarily single-family residential housing with associated components of ornamental landscaping and trees.

The vegetation within the campus area consists primarily of non-native plant species, generally, ornamental in nature. This includes many types of non-native tree species that have been planted on the Campus over the years. While not significant in numbers, the undeveloped areas of the existing campus contain some specimen trees and tree groupings, including native oak and sycamore trees. These native and specimen trees, as defined by the City of Pasadena Municipal Code, are protected by the City's Trees and Tree Protection Ordinance. As discussed in the *Initial Study* (Appendix E), there are no known unique, rare, or endangered plant or animal species or habitats on or near the campus. The campus is not within an area designated as a natural community in the Final Environmental Impact Report for the adopted 1994 Land Use and Mobility Elements. Additionally, there are no streams, drainages, or federally protected wetlands within, or adjacent to, the campus.

a. Plant Communities and Habitat Types. Classification of habitat types or vegetation communities is based generally on the California Wildlife Habitat Relationship System (WHR, October 1988), Holland (1986), and Sawyer and Keeler-Wolf (1995) with modifications to better represent existing conditions in the field. The WHR defines habitats based on the composition and structure of the dominant vegetation of any given area and provides generalized information pertaining to wildlife value and use of these habitat types. As mentioned above, the dominant vegetation within the campus is that of non-native cultivated plants and trees. Thus, there are no WHR habitat types within the campus. Although there are no WHR habitats within the campus, individual and groups of landscape trees, shrubs, and grasses may provide habitat for birds and mammals, and are discussed in further detail.

Developed Habitats. Developed lands cover a large portion of the Caltech campus and include areas such as roadways (paved and unpaved), parking areas, walkways, recreational facilities and building areas. Developed areas are generally surrounded by and may contain a range of plant types, including medium to small flowering shrubs, flowering vines and ground cover, and turf grasses. These areas are generally of limited value to wildlife.

Ornamental Landscape Habitats. Landmark, native, public, and specimen trees and tree groupings are present throughout the campus. A tree inventory conducted on campus identified specimen and native trees near locations to be disturbed by the project, as shown in Table 4.3-1. The tree inventory can be found in Appendix A. There are a range of species near the amendment locations, these include but are not limited to: Engelmann Oak, Coast Live Oak, California Sycamore, Jacaranda, Deodar Cedar, American Sweet Gum, Gold Medallion, Camphor, Aleppo Pine, Mexican Fan Palm, Canary Island Date Palm, Lemon-scented Gum, Coast Redwood, Tipu and Victorian Box Pittosporum. Although several of these species are generally noted for their habitat value for foraging and nesting birds, due to the high level of human activity within the campus these trees generally provide limited habitat for wildlife species.

Wildlife. The developed nature of the campus and human activity present provides minimal natural habitat for wildlife. Wildlife species found on campus are generally well adapted to coexistence with humans and the altered environment. Typical urban-adapted and tolerant species that may be found in this habitat include mockingbird, scrub jay, Anna's hummingbird, house finch, house sparrow and starling, none of which are listed as special status species.

Table 4.3-1 Protected Trees to be Disturbed by Proposed CMDP Amendments

	Amendment Location			
Tree Type (common name)	**CCE Laboratory Alternative 1**	**North Undergraduate Housing**	**Braun and Marks Houses**	**Physical Plant Building**
California Sycamore	26	6	0	0
Coast Live Oak	1	2	0	0
Deodar Cedar	0	4	0	0
Engelmann Oak	0	2	0	0
Jacaranda	5	2	0	0
Victorian Box Pittosporum	0	0	0	1
White Floss Silk Tree	0	0	0	1
Canary Island Pine	1	0	0	0
Unprotected Trees	16	14	3	0

b. Regulatory Setting. Trees located within the Caltech campus are subject to the protection of the City of Pasadena Municipal Code (PMC) *City Trees and Tree Protection Ordinance* and Caltech Master Development Plan (CMDP) design guidelines and principles. As noted in the *City Trees and Tree Protection Ordinance,* "the biological diversity of wildlife and

plant communities is enhanced by the favorable conditions created by trees." Therefore, it is the purpose of the ordinance to preserve and grow Pasadena's canopy cover by protecting landmark, native and specimen trees on specified areas of private property and expanding the protection of street trees and trees on public property. Qualifying trees are automatically subject to protection and shall not be injured, or removed without a permit. Section 8.52.020 of the PMC defines these trees as follows:

> ***Landmark tree*** - a tree with historic or cultural significance and of importance to the community due to any of the following factors: It is one of the largest or oldest trees of the species located in the city; it has historical significance due to an association with a historic building, site, street, person or event; or it is a defining landmark or significant outstanding feature of a neighborhood.
>
> ***Native tree*** - any tree with a trunk more than 8 inches in diameter at a height of 4 ½ feet above natural grade that is one of the following species: Quercus agrifolia (Coast live oak), Quercus engelmannii (Engelmann oak), Quercus chrysolepis (Canyon oak), Platanus racemosa (California sycamore), Juglans californica (California walnut), Quercus berberidifolia (Scrub oak), Quercus lobata (Valley oak), Umbellularia californica (California bay), Populus fremontii (Cottonwood), Alnus rhombifolia (White alder), Populus trichocarpa (Black cottonwood), Salix lasiolepis (Arroyo willow), and Aesculus californica (California buckeye).
>
> ***Public tree*** - a tree located in a place or area under ownership or control of the city including but without limitation streets, parkways, open space, parkland and including city owned property under the operational control of another entity by virtue of a lease, license, operating or other agreement.
>
> ***Specimen tree*** - any tree meeting the criteria established by resolution of the city council by species and size of tree which is thereby presumed to possess distinctive form, size or age, and to be an outstanding specimen of a desirable species and to warrant the protections of this chapter. The City's list of specimen trees is provided in Appendix A.

In addition, the following CMDP general principles apply to the proposed amendments:

- *Where possible specimen trees and tree groupings, identified in the CMDP Tree Inventory, should be preserved under landscape designs for new and existing open spaces.*

4.3.2 Impact Analysis

a. Methodology and Significance Thresholds. This analysis was based on the following: a tree inventory of the amendment locations (Appendix A); an informal field survey of amendment locations; site photos; and aerial photography.

Environmental impacts relative to biological resources may be assessed using impact significance criteria encompassing CEQA guidelines and federal, state and local plans,

regulations, and ordinances. Impacts to flora and fauna may be determined to be significant even if they do not directly affect rare, threatened or endangered species. Given that there are no rare, threatened or endangered species within or near the campus, for the purposes of this analysis, significant impacts to biological resources may occur if a project action would:

- *Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.*

b. Project Impacts and Mitigation Measures.

Impact BIO-1 Development of the Master Plan Amendments would require removal of up to 84 trees, of which about 48 are protected as native and specimen trees. This is considered a Class II, *significant but mitigable* impact.

Development of several of the Master Plan Amendments would require the removal of native and specimen trees as specified in Chapter 8.52 of the City's Tree Ordinance. All trees meeting the definition of native or specimen trees in Section 8.52.020 are automatically subject to protection and shall not be injured, or removed without a permit. Further, the CMDP provides that where possible, these trees should be preserved under landscape designs for new and existing open spaces.

Two preliminary tree inventories were provided for amendment s 1-4. The following analysis outlines the anticipated impacts related to the removal of trees, shown in Table 4.3-1, generated by each proposed Master Plan Amendment, as compared to the approved Master Plan, and consistency with the CMDP.

Amendment 1. There are 49 trees within the building envelope proposed for Location 1 of Amendment 1, of which 23 are specimen or native species that meet the criteria for protection. The building envelope for Alternative 1 depicted on Figure 2-5 shows an area approximately twice as large as the area that would actually be developed, because the precise location of the proposed structure is yet to be determined. As a result, development of the 20,000 sf CCE lab footprint would not impact all of the trees indicated in Table 4.3-1. Nevertheless, development of Amendment 1 within this location could require the removal of some combination of protected trees including one Coast Live Oak (*Quercus agrifolia)*; 26 mature native California Sycamore (*Platanus racemosa*); one Jacaranda (*Jacaranda mimosifolia)* tree, and one Canary Island Pine tree. Thus, removal of any of these 29 trees protected by the City Tree Ordinance would require a permit prior to disturbance or removal. Removal of these protected trees would be considered a potentially significant, but mitigable impact.

Development of Amendment 1 at Location 2 would not result in the removal of any specimen or native trees, thus impacts to biological resources at this location would be considered less than significant.

Amendment 2. Within the footprint of the proposed North Undergraduate Housing rehabilitation/reconstruction development there are approximately 25-30 trees that would potentially be removed. Four of these trees may be disturbed by construction activities within their root zone, the rest are slated for removal. There are 23 trees noted on the City's list for

specimen trees; however, only 16 of these meet the size requirement for protection. The 16 protected trees include four Deodar Cedars (*Cedrus deodara),* two Jacarandas (*Jacaranda mimosifolia),* two Coast Live Oaks (*Quercus agrifolia)*, two Engelmann Oaks (*Quercus engelmannii)*, and six California Sycamores (*Platanus racemosa)*. Thus, 16 specimen and native trees would be protected under the Pasadena City Trees and Tree Protection Ordinance and would require a permit from the City prior to disturbance or removal. Removal of these trees would be considered a potentially significant, but mitigable impact.

Amendment 3. The demolition and reconstruction of the Braun and Marks graduate housing facilities would require the removal of three trees; including a 30-foot tall Coast Redwood (*Sequoia sempervirens*) with a nine-inch diameter at breast height (DBH) which would be protected if DBH exceeds 25"; a 60-foot tall Lemon-scented Gum (*Eucalyptus citriodora*) with a 21" DBH, which would be protected with a DBH 30" or greater; and a 30-foot tall Canary Island Date Palm (*Phoenix canariensis*). None of these trees meet the criteria for specimen trees and are not native species, although their removal may reduce the overall tree cover of the campus, the impact would not be considered significant.

Amendment 4. The demolition of the Physical Plant Offices and Shops building along with the subsequent construction of the Campus Center in its place would necessitate the removal of two trees, both of which satisfy the criteria for designation as specimen trees. A permit from the City would be required to remove the 40-foot tall White Floss Silk Tree (*Chorisia insignis)* and the 30-foot tall Victorian Box Pittosporum (*Pittosporum undulatum)* currently located adjacent to the Physical Plant building. Removal of these protected trees would be considered a potentially significant, but mitigable impact.

Mitigation Measures. The applicant is required to obtain a permit from the City for the removal of onsite native and specimen trees and comply with the provisions of the permit. Mitigation measure AES-1(a) in Section 4.1, *Aesthetics*, would require the submittal of a landscape plan that will have as a goal to restore the theme and visual integrity of existing landscaped areas. This measure would promote integration of open space between existing and new buildings and help reduce biological impacts associated with the loss of trees and tree groupings. In addition, the following measure would be required in order to mitigate impacts relating to the disturbance of trees and tree groupings.

BIO-1 **Construction Practices.** Construction of individual campus developments associated with the proposed Master Plan amendments shall adhere to the following:

- *No grading or development shall occur within 5 feet from the driplines of mature native or specimen trees that are not to be removed as part of the project, but that occur near the construction area.*
- *All mature native or specimen trees within 25 feet of proposed ground disturbances, which are not to be removed as part of the project, shall be temporarily fenced with chain-link or other material satisfactory to the City throughout all grading and construction activities. The fencing shall be installed six feet outside the dripline of each specimen oak tree, and shall be staked every six feet.*

- *No construction equipment shall be parked, stored or operated within six feet of any mature native or specimen tree dripline.*
- *No fill soil, rocks, or construction materials shall be stored or placed within six feet of the dripline of a mature native or specimen tree (pervious paving and other materials are allowed, as approved by the City).*
- *Any roots encountered that are one inch in diameter or greater shall be cleanly cut. This shall be done under the direction of a City approved arborist/oak tree consultant.*
- *No permanent irrigation shall occur within the critical root zone of any mature native or specimen tree. Drainage plans shall be designed so that tree trunk areas are properly drained to avoid ponding.*
- *Any trenching required within the dripline or sensitive root zone of any mature native or specimen tree shall be done by hand. In addition, trenching in the protected zone needs to preserve roots over 1 inch by tunneling.*

BIO-1(a) **City Trees and Tree Protection Ordinance.** Prior to the issuance of a building permit for each individual building in connection with the proposed amendments, the applicant shall submit a landscape plan including proposed tree removals and replacement, for review and approval by the Planning and Development Director or the Design Commission, according to the review thresholds in the CMDP. Such plan shall show the square feet of tree canopy coverage proposed to be removed within the development site. The area of removed canopy shall be replaced at a ratio of 1:1 through a combination of relocated and new trees planted within areas of the development site that are suitable for new tree planting. While canopy replacement on the development site shall be the first priority, any canopy that cannot be reasonable replaced onsite, shall be replaced within other areas of the campus that are targeted by the CMDP for landscaping. While incorporating a range of species necessary to maintain the landscaping theme existing in the campus, the landscape plan shall also provide for the replacement of removed trees with native and specimen trees protected under the Tree Protection Ordinance. Further replacement trees shall achieve equal or greater canopy than the canopy removed within 5 years of implementation of the landscaping plan.

A Tree Protection Plan shall be prepared in accordance with the Tree Protection Guidelines per Chapter 8.52 of the Pasadena Municipal Code. The plan shall detail the protective measures to be used during demolition and construction of each building site proposed in the amendment. The plan shall be reviewed and approved by the Planning staff prior to issuance of any grading or building permits.

The applicant shall submit a landscape/planting plans for review and approval as provided in the provisions of the amended Master Plan.

Significance After Mitigation. Implementation of the recommended mitigation measures would reduce impacts to mature native or specimen trees to a level considered less than significant.

Impact BIO-2 Removal of up to 84 trees has the potential to affect nesting raptors and migratory birds. This is considered a Class II, significant but mitigable impact.

The removal of up to 84 trees within the Caltech campus has the potential to affect nesting birds. These trees may provide potential nesting habitat for raptors such as red-tailed hawks and other common bird species. Raptors and their nests are protected under California Fish and Game Code Section 3503.5, and all other bird nests are protected under Section 3503. It is unlikely that the loss of nesting habitat potentially associated with proposed development would adversely affect raptor populations in the area as similar nesting and foraging habitat is available in off-site areas and the current level of development on campus has reduced foraging habitat. However, construction activity, including tree removal if required, could potentially disturb active nests, which would be a violation of Fish and Game Code and so is considered a significant, but mitigable impact. The Migratory Bird Treaty Act, as well as the Fish and Game Code, also protects nesting birds, eggs and young.

Mitigation Measures. The following mitigation measure would provide for compliance with applicable City requirements and California Fish and Game Code and the Migratory Bird Treaty Act.

BIO-2 **Bird Nesting Surveys.** Prior to any earthmoving activities during the breeding and nesting season (typically March 1 to September 1 or as early as February 1 for raptors), the applicant shall have a field survey conducted by a qualified biologist to determine if active nests of breeding birds are present within the area of potential influence of the activity. If nesting birds protected under the Migratory Bird Treaty Act are found within the area of potential influence, an appropriate buffer as determined by the biologist will be recommended and the nest shall not be disturbed until the young have fledged. This survey shall be conducted within three (3) days prior to commencement of grading for each development amendment.

Significance After Mitigation. The mitigation measures identified above would reduce impacts to nesting birds to a less than significant.

c. Cumulative Impacts. Urban development of the City Pasadena has essentially eliminated many of the natural communities that once existed within the Caltech campus. The proposed Caltech Master Development Plan Amendments, in combination with other development within the City of Pasadena, including the approximately 3,327 dwelling units and 1,379,824 square feet of commercial and industrial development planned and pending development within the vicinity of the campus, would continue to alter an already urban environment, with little to no habitat or wildlife resources. Cumulative impacts to biological resources due to this conversion are considered potentially significant. However, due to the current level of urbanization within the campus, the project's impacts would not be considered

significant. Additionally, the proposed project, as with all cumulative development within the City, would be subject to the regulations of the City, the State, and the Federal government. Compliance with these regulations on all new development proposals would be expected to reduce impacts from individual projects. However, it should be recognized that the gradual urbanization of the region would continue to substantially alter biological conditions.

4.4 HISTORIC RESOURCES

This section evaluates potential impacts to historic resources. The analysis is based upon a historic resources report prepared by San Buenaventura Research Associates (SBRA). That report, dated December 28, 2005, can be found in its entirety in Appendix C.

4.4.1 Setting

a. Historical Setting.

General Historical Context. The City of Pasadena was founded on land that was once part of Rancho el Rincon de San Pasqual. The area's first school district was established in 1878, followed by the first post office in 1882. Taking advantage of the land boom that occurred in the area with the settlement of the Indiana Colony, easterners and Midwesterners settled Pasadena. On January 1, 1890, the Valley Hunt Club initiated a mid-winter festival, which became a yearly tradition and in 1898 was formally sponsored by the Tournament of Roses Association. The landmark Echo Mountain incline railway, including a mountain chalet resort and the Alpine Tavern at Crystal Springs, opened nearby in 1893, quickly becoming a destination hotel for tourists. The city incorporated in 1886 (CityofPasadena.net, 2005).

The population of Pasadena boomed at the turn of the century from 9,117 in 1900 to 30,291 in 1910. The City continued to enjoy a reputation as a tourist center and winter resort for the wealthy, as well as growing culturally with the incorporation of the Pasadena Playhouse, the installation of the Mt. Wilson telescope, the creation of the Pasadena City Junior College District, and the construction of the Rose Bowl and Civic Center.

The Depression was the end of the tourist era for Pasadena and World War II was the start of the industrial shift throughout the city. The military funneled in funding with the purchase of the Vista del Arroyo Hotel for a convalescent hospital for the wounded; as well as with research and development contracts with Caltech and the Jet Propulsion Laboratory. By the 1950s, Pasadena was considered a center for industrial research and light manufacture of scientific and electronic precision instruments. In 1940, the completion of the first freeway in the west, the Arroyo Seco Parkway, provided a direct route from Pasadena to Los Angeles inducing a postwar boom as an attractive place to live for people working in Los Angeles. In the late 1950s and early 1960s, the business district shifted east. This caused the area that was once the heart of the city to become dilapidated, with high vacancy rates and declining property values. As open space in the area became in short supply, major companies moved out of Pasadena due to lack of land for expansion in the early 1960s. Under the direction of the Pasadena Redevelopment Agency, the City went through a period of economic revitalization in the 1970s. The completion of the Conference Center and the Plaza Pasadena retail shopping mall began to persuade large corporations to relocate their headquarters to Pasadena (CityofPasadena.net, 2005).

The 1980s saw the development of neighborhood and preservation groups concerned with preserving of the unique quality of life in Pasadena. These groups stopped the development of high-rise towers downtown, disbanded the Pasadena Redevelopment Agency and passed an initiative to restrict growth. In 1992, the initiative was repealed by voters in conjunction with revising the General Plan to respond to growth management issues. The old downtown

Pasadena was revitalized as a respect for the city's architectural history spread through out the area. The City continued to restore historic resources and redevelop the industrial sector as the desire for residences and corporations to be located in the city continues through today (CityofPasadena.net, 2005).

Pasadena's residential neighborhoods represent a multitude of architectural styles. These range from adobes to Victorian Eastlake and Queen Anne style homes of the nineteenth century through the mid-twentieth century Craftsman, American Colonial, Spanish Colonial and Tudor Revival styles.

Specific Historical Context. The educational institution that would become the California Institute of Technology (Caltech) was founded by wealthy Chicago industrialist and politician, Amos Throop, as a local vocational and manual arts school. In 1880, Throop moved his home from Chicago to Los Angeles. In 1886, he bought property in Pasadena and was soon elected to the city council. He was elected mayor in 1889. Throop established Throop University in downtown Pasadena in 1891. Two years later, the school's name was changed to Throop Polytechnic Institute. Amos Throop died in 1894; however, the school he founded would thrive, growing in enrollment to over 500 students by 1906.

George Ellery Hale, the director and founder of the Mount Wilson Observatory, and a renowned astrophysicist, joined the board of Throop Polytechnic in 1907. Hale immediately began the process of transforming the school into an institution focused on the natural sciences and engineering. He persuaded Arthur A. Noyes and Robert A. Millikan, two important figures in chemistry and physics, to join the faculty of the college. In 1908, Hale brought on James Scherer as president.

In 1910, the university moved from its downtown campus to donated land in the expanding area of Pasadena. The established Pasadena architectural firm of Myron Hunt and Elmer Grey had been hired two years earlier to design a master plan for the new campus. Hunt and Grey developed an axial plan, with the overall architectural style of the campus to be Mission Revival.

The Bertram Goodhue master plan of 1917 followed essentially the axial plan created in the Hunt and Grey plan, but embellished it with the blending of California romanticism and Beaux Arts sensibilities that had become his trademark. Goodhue introduced north-south cross-axial elements, forming a number of landscaped side and interior quadrangles, arched arcades, and a grand campus entrance facing Wilson Avenue flanked by domed pavilions. Many of the Goodhue master plan elements were implemented over the 20 years following plan adoption, with the notable exception of the un-built Memorial Building, which was designed as a key element within his central quadrangle.

The 1920s and 1930s marked the period of maturity for the school, which had changed its name to Throop College of Technology in 1913 and then, in 1920, to the California Institute of Technology. Under the direction of Hale, Millikan and Noyes, Caltech became a recognized force in the world of physics, chemistry and the natural sciences, attracting many of the world's top academic scientists as visiting scholars, including Werner Heisenberg, Hendrik Lorentz, Niels Bohr and Albert Einstein. An endowment secured the university financially.

A number of architects participated in the build-out of the campus during this period, including Mayers, Murray and Phillip (the successor firm to Bertram Goodhue after his death in 1924), Clarence Stein, Gustave Iser, and notable California regionalist, Gordon B. Kaufmann. The campus remained relatively compact, and the general outlines of the Goodhue plan were respected.

The first formal landscape planning efforts, in the late 1920s, were overseen by New York landscape architect Beatrix Farrand. A garden at Dabney Hall was her primary contribution to the landscape design of the campus.

Along with Gordon Kaufmann's design for the Athenaeum in 1930-31 came the noted California landscape architects Florence Yoch and Lucile Council. Yoch and Council designed landscape treatments of the public spaces around the building, including the forecourt on the south side of the building, a row of olive trees along the building's eastern street frontage, the interior courtyard, and an allée of sycamore trees along the building's northern elevation.

Physicist Lee Alvin DuBridge took over as president in 1946, and in 1949, Robert Bacher headed the division of physics, mathematics, and astronomy. During the DuBridge years, from 1946 to 1969, Caltech grew at a rapid pace. The number of faculty doubled and the campus tripled in area. In 1952, the firm of William Pereira and Charles Luckman was hired to plan for the expansion of the campus. This plan instigated a major fund-raising campaign in 1958 and resulted in the construction of multiple residence halls, including the two-story North Undergraduate halls complex, built in 1960. The architects were Smith, Powell and Morgridge, and James H. Van Dyke and Associates of Los Angeles. A new, sprawling one-story Physical Plant complex, designed by in-house staff, was also constructed in 1959 on the basis of the Pereira-Luckman plan, replacing temporary campus maintenance buildings. The Pereira-Luckman Plan represented a distinct shift in the architecture of the campus, from the period revival tone set by the Goodhue plan, to one which was decidedly more modernist.

b. Evaluation of Potential Historic Resources. Following is a discussion of the buildings that are proposed for removal or reconstruction under the proposed amendments to the Master Plan.

Physical Plant. This one-story complex of office and shop buildings was constructed in 1959 as the campus maintenance shops and related offices. The building features low-pitched hip roof with deep, closed eaves. Wall cladding is stucco, and the windows are primarily steel fixed and sash units. The raised main entrance to the offices is located on the southern elevation. A bank of open loading docks is oriented to the west. This building was evidently designed in 1958 by in-house staff and appears to be unaltered and in good condition. However, the building does not appear to be eligible for state, federal or local listing based on the criterion as explained below, under Regulatory Setting.

Braun Graduate House. This two story building is one of four in the graduate housing complex designed in 1960 and completed in 1961 in accordance with the 1952 Pereira Luckman plan, and designed by Smith, Powell and Morgridge in the International Style. The building is essentially rectangular in plan and features stucco cladding over concrete and a flat roof. Steel casement window pairs are organized within shallow concrete pilasters. An entry stoop on the western end of the southern elevation is covered by a projecting concrete canopy. This building is connected to the adjacent Student Services building via a second story skyway. The building

appears to be unaltered and in good condition. However, the building does not appear to be eligible for state, federal or local listing based on the criterion as explained below, under Regulatory Setting.

Marks Graduate House. This building is one of four in the graduate housing complex designed in 1960 and completed in 1961. It was designed by James H. Van Dyke & Associates, with Smith, Powell and Morgridge, as the coordinating architects. It is likely that Smith, Powell and Morgridge handled the site planning for the building, with Van Dyke preparing the architectural plans in the International Style. This two-story plastered concrete building is essentially rectangular in plan and features a flat roof and steel casement windows flanked by narrow concrete pilasters. The corners and cornice line are defined by more massive pilasters. The building appears to be unaltered and in good condition. However, the building does not appear to be eligible for state, federal or local listing based on the criterion as explained below, under Regulatory Setting.

North Undergraduate Houses. This substantial complex of residence halls was designed in 1959 by Smith, Powell and Morgridge, and constructed in 1960. Unlike many of the buildings constructed on the campus during this period, North Undergraduate Houses were apparently more intentionally designed to relate to earlier buildings nearby, in particular, the 1931 Undergraduate Houses (Flemming, Ricketts, Dabney and Blacker halls) designed by Gordon Kaufmann, in terms of scale, materials and complex plan forming a series of internal courtyards. Along the adjoining walkway, the Smith, Powell and Morgridge design made a direct reference to Kaufmann's arcade, but rendered in stripped-down form. The building is one and two stories in height, and is highly complex in plan (essentially, a series of joined rectangles forming courtyards). The main southern elevation is characterized by the two-story masses of Page and Lloyd halls, joined by a one-story projecting marquee composed of exposed aggregate concrete panels supported by poured-in-place concrete "Sonotube" columns and concrete screen blocks. The roof shapes are low hips covered with Spanish tile with deep closed eaves. Windows are steel casements. However, the buildings do not appear to be eligible for state, federal or local listing based on the criterion as explained below, under Regulatory Setting.

Mead Lab (Undergraduate Chemistry Lab). This one story building was constructed in 1972, designed by John J. Kewell in the late International style. An enclosed open storage area was added in 1992. The building is essentially square in plan and constructed in vertically scored concrete blocks separated by horizontal reveals. It features a prominent, projecting cornice and pairs of massive pilasters. The building is windowless except for the main anodized aluminum entry doors on the western elevation. The building appears to be unaltered on the exterior, except for the addition of the storage area, and is in good condition. However, the building does not appear to be eligible for state, federal or local listing based on the criterion as explained below, under Regulatory Setting.

A number of buildings constructed on the Caltech campus during the 1920s and 1930s may be eligible for listing on the NRHP and CRHR either individually or as contributors to an eligible grouping. Notable among these are Gordon Kaufmann's Athenaeum and Undergraduate Houses. In addition, landscape elements and urban design features on the campus representing historically important master planning efforts (particularly, the Goodhue plan of 1917 and the Yoch and Council landscape design for the Athenaeum) may also be eligible. However, a

comprehensive evaluation of the historical significance of the entire Caltech campus is beyond the scope of this project, which is limited to buildings and sections of the campus proposed for disturbance under the Master Plan amendment presently under consideration. These buildings were constructed in accordance with the 1952 Pereira-Luckman master plan, mainly as it was implemented by Smith, Powell and Morgridge during the late 1950s and early 1960s.

As part of the evaluation of existing buildings on the Caltech campus, a historic resources survey was prepared in 1986 inventorying all existing single-family houses within the campus boundaries. The 1989 Campus Master Development Plan EIR also identified existing potentially historic academic, administrative, and student facilities that appear eligible for historic designation within the campus; however, only minor analysis was conducted for these facilities.

c. Regulatory Setting. The California Environmental Quality Act (CEQA) requires evaluation of project impacts on historic resources, including properties "listed in, or determined eligible for listing in, the California Register of Historic Resources [or] included in a local register of historical resources." A resource is eligible for listing on the California Register of Historical Resources (CRHR) if it:

1. *Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;*
2. *Is associated with the lives of persons important in our past;*
3. *Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or*
4. *Has yielded, or may be likely to yield, information important in prehistory or history.*

The California Register may also include properties listed in "local registers" of historic properties. A "local register of historic resources" is broadly defined in §5020.1 (k), as "a list of properties officially designated or recognized as historically significant by a local government pursuant to a local ordinance or resolution." Local registers of historic properties come essentially in two forms: (1) surveys of historic resources conducted by a local agency in accordance with Office of Historic Preservation procedures and standards, adopted by the local agency and maintained as current, and (2) landmarks designated under local ordinances or resolutions (Public Resources Code §§ 5024.1, 21804.1, 15064.5).

By definition, the California Register of Historic Resources also includes all "properties formally determined eligible for, or listed in, the National Register of Historic Places [NRHP]," and certain specified State Historical Landmarks. The majority of "formal determinations" of NRHP eligibility occur when properties are evaluated by the State Office of Historic Preservation in connection with federal environmental review procedures (Section 106 of the National Historic Preservation Act of 1966). Formal determinations of eligibility also occur when properties are nominated to the NRHP, but are not listed due to owner objection.

The criteria for determining eligibility for listing on the National Register of Historic Places have been developed by the National Park Service. Properties may qualify for NRHP listing if they:

A. Are associated with events that have made a significant contribution to the broad patterns of our history; or
B. Are associated with the lives of persons significant in our past; or
C. Embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D. Have yielded, or may be likely to yield, information important in prehistory or history.

According to the NRHP guidelines, the "essential physical features" of a property must be present for it to convey its significance. Further, in order to qualify for the NRHP, a resource must retain its integrity, or "the ability of a property to convey its significance."

The seven aspects of integrity are: (1) Location (the place where the historic property was constructed or the place where the historic event occurred); (2) Design (the combination of elements that create the form, plan, space, structure, and style of a property); (3) Setting (the physical environment of a historic property); (4) Materials (the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property); (5)Workmanship (the physical evidence of the crafts of a particular culture or people during any given period of history or prehistory); (6) Feeling (a property's expression of the aesthetic or historic sense of a particular period of time), and; (7) Association (the direct link between an important historic event or person and a historic property).

The relevant aspects of integrity depend upon the National Register criteria applied to a property. For example, a property nominated under Criterion A (events), would be likely to convey its significance primarily through integrity of location, setting, and association. A property nominated solely under Criterion C (design) would usually rely primarily upon integrity of design, materials, and workmanship. The California Register procedures include similar language with regard to integrity.

The minimum age criterion for the National Register of Historic Places and the California Register of Historic Resources is 50 years. Properties less than 50 years old may be eligible for listing on the NRHP if they can be regarded as "exceptional," as defined by the NRHP procedures, or in terms of the CRHR, "if it can be demonstrated that sufficient time has passed to understand its historical importance" (Chapter 11, Title 14, §4842(d)(2)).

Local Significance and Eligibility. The California Environmental Quality Act defines as historically significant all properties listed in "local registers" of historic properties. Local registers include lists "of properties officially designated or recognized as historically significant by a local government pursuant to a local ordinance or resolution," and surveys of historic resources maintained as current by the local agency. These properties are "presumed to be historically or culturally significant... unless the preponderance of the evidence demonstrates that the resource is not historically or culturally significant." (PRC §§ 5024.1, 21804.1, 15064.5)

The City of Pasadena has established the following criteria for designating historic resources.

Section 17.62.040. Criteria for Designation of Historic Resources

A. **Historic monuments.**

1. A historic monument shall include all historic resources previously designated as historic treasures before adoption of this Chapter, historic resources that are listed in the National Register at the State-wide or Federal level of significance (including National Historic Landmarks) and any historic resource that is significant at a regional, State, or Federal level, and is an exemplary representation of particular type of historic resource and meets one or more of the following criteria:

    a. It is associated with events that have made a significant contribution to the broad patterns of the history of the region, State, or nation.
    b. It is associated with the lives of persons who are significant in the history of the region, State, or nation.
    c. It is exceptional in the embodiment of the distinctive characteristics of a historic resource property type, period, architectural style, or method of construction, or that is an exceptional representation of the work of an architect, designer, engineer, or builder whose work is significant to the region, State, or nations, or that possesses high artistic values that are of regional, State-wide or national significance.
    d. It has yielded, or may be likely to yield, information important in prehistory or history of the region, State, or nation.

2. A historic monument designation may include significant public or semi-public interior spaces and features.

3. When considering an application for designation of a historic monument the Historic Preservation Commission shall apply the criteria according to the National Register of Historic Places Bulletins (National Park Service) for evaluating historic properties.

B. Landmarks.

1. A landmark shall include all properties previously designated a landmark before adoption of this Chapter and any historic resource that is of a local level of significance and meets one or more of the criteria listed in Subparagraph 2., below.

2. A landmark may be the best representation in the City of a type of historic resource or it may be one of several historic resources in the City that have common architectural attribute that represent a particular type of historic resource. A landmark shall meet one or more of the following criteria:

a. It is associated with events that have made a significant contribution to the broad patterns of the history of the City, region, or State.
b. It is associated with the lives of persons who are significant in the history of the City, region, or State.
c. It embodies the distinctive characteristics of a type, architectural style, period, or method of construction, or represents the work of an architect, designer, engineer, or builder whose work is of significance to the City or to the region.
d. It has yielded, or may be likely to yield, information important locally in prehistory or history.

3. When considering an application for designation of a landmark, the Historic Preservation commission shall apply the criteria according to the National Register of Historic Places Bulletins (National Park Service) for evaluating historic properties.

The City of Pasadena landmarks ordinance establishes evaluation criteria that are essentially identical to the NRHP and CRHR criteria. The ordinance does not contain an explicit minimum age criterion, but does state "the Historic Preservation Commission shall apply the criteria according to the National Register of Historic Places Bulletins (National Park Service) for evaluating historic properties." The language establishing the 50-year minimum age for listing on the NRHP, and the exceptions to that minimum, is contained within the National Register bulletins. Therefore, similar standards for judging the eligibility of properties less than 50 years of age generally applies to local landmark designation.

4.1.2 Impact Analysis

a. Methodology and Significance Thresholds. The analysis of impacts to historic resources is based upon a historic resources report prepared by San Buenaventura Research Associates (SBRA). That report, dated December 28, 2005, can be found in its entirety in Appendix C.

According to PRC §21084.1, "a project that may cause a substantial change in the significance of an historical resource is a project that may have a significant effect on the environment." The Public Resources Code broadly defines a threshold for determining if the impacts of a project on an historic property will be significant and adverse. By definition, a substantial adverse change means, "demolition, destruction, relocation, or alterations," such that the significance of an historical resource would be impaired (PRC §5020.1(6)). For purposes of NRHP eligibility, reductions in a resource's integrity (the ability of the property to convey its significance) should be regarded as potentially adverse impacts.

Further, according to the CEQA Guidelines, "an historical resource is materially impaired when a project... [d]emolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register of Historical Resources [or] that account for its inclusion in a local register of historical resources pursuant to section 5020.1(k) of the Public Resources Code or its identification in an historical resources survey meeting the requirements of section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects

of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant."

The lead agency is responsible for the identification of "potentially feasible measures to mitigate significant adverse changes in the significance of an historical resource." The specified methodology for determining if impacts are mitigated to less than significant levels are the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings* and the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (1995), publications of the National Park Service. (PRC §15064.5(b)(3-4))

b. Project Impacts and Mitigation Measures.

Impact H-1 The proposed campus master development plan amendment includes the removal or reconstruction of five buildings. The buildings were determined to be ineligible for listing as historic resources; therefore, the proposed project's impacts to historic resources would be Class III, *less than significant.*

None of the structures proposed for demolition are included on the lists of historic resources in the original Master Plan EIR or the 1986 historic resource survey report. Structures that were previously not considered historic have been re-evaluated by SBRA, who conducted analysis of the structures proposed for demolition under the current policies and ordinances affecting eligibility of historic resources. Therefore, any updated survey was conducted to ensure compliance with CEQA.

Upon review of all available resources and completion of the Historic Resources Report, SBRA concluded under current regulations, guidelines, ordinances, and policies that the proposed amendments to the Master Plan would not affect any buildings eligible for listing as historic resources of national, statewide or local significance. None of the buildings proposed to be removed or renovated by the proposed amendments to the Master Plan were found to be significant. Because the buildings were all constructed after 1956, SBRA applied the criteria for evaluating properties that are less than 50 years old.

In general, according to NRHP literature, eligible "exceptional" properties may include, "resources so fragile that survivors of any age are unusual. [Exceptionalness] may be a function of the relative age of a community and its perceptions of old and new. It may be represented by a building or structure whose developmental or design value is quickly recognized as historically significant by the architectural or engineering profession [or] it may be reflected in a range of resources for which the community has an unusually strong associative attachment." None of the structures studied appear to rise to the exceptional level, either on historical or architectural grounds.

The Physical Plant building is a typical stucco clad, one-story rectangular building. Constructed in 1959, the building is not associated with any notable events, persons, time periods or building styles in the City of Pasadena, Caltech or the State of California. The Braun Graduate House is a generally rectangular, stucco clad, two-story building constructed in 1961. This International style building was designed in accordance with the Pereira-Luckman campus plan

by Smith, Powell and Morgridge; however, it does not meet the minimum age criteria for eligibility for the NRHP, CRHR or local landmarks list, nor does it appear to be an "exceptional" example of the time, style, architect or designers. The Marks Graduate House was designed in the international style in 1960 by James H. Van Dyke & Associates with Smith, Powell and Morgridge as the coordinating architects. Completed in 1961, the two-story plastered concrete, rectangular building does not meet the minimum age requirement, nor does it meet any of the criteria for listing as a historic resource at the national, state or local level, nor does it appear to be an "exceptional" example of style, time period, event or work of notable persons.

The North Undergraduate Housing complex was designed by Smith, Powell and Morgridge and constructed in 1960. Essentially a series of one- and two-story joined rectangular buildings forming courtyards; the housing complex does not appear to meet the criteria for eligibility for listing on the NRHP, CRHR, or the City of Pasadena Landmarks due to its age and lack of connectivity to notable persons, events, or periods in time. The Mead Lab is an international style one-story building constructed in 1972. Essentially square in plan and generally composed of concrete blocks, the windowless building does not meet the minimum age requirement for listing as national, state or local historic resource. Nor does the building exemplify the work of a notable time period, style, event or persons, and does not appear to satisfy the other criteria for eligibility for the NRHP, CRHR, or the City's Landmarks list.

Thus, these buildings should not be regarded as historic resources for the purpose of CEQA. Therefore, no direct adverse impacts to historical resources would occur under the buildout of the campus master plan and amendments. Due to their ineligibility for listing on the NRHP, CRHR, and as City of Pasadena Landmarks, the proposed demolition of the buildings under the Caltech Master Development Plan and amendments would not constitute a significant adverse impacts on historic resources, as defined by CEQA.

Mitigation Measures. None Required.

Significance after Mitigation. Removal and new construction of the five buildings under the proposed Caltech Campus Master Development Plan amendments is a less than significant impact on historical resources.

Impact H-2 **The potential removal and reconstruction of the North Undergraduate Houses may have an adverse impact on the setting of eligible historic resources on the campus: the Athenaeum, South Undergraduate Houses and the Landscape Design for the Athenaeum. However, implementation of mitigation would reduce the potential for adverse impacts to the historic resources. Therefore, impacts relating to the building's removal and replacement with new construction are considered Class II, *significant but mitigable*.**

As discussed above, the buildings slated for removal or reconstruction under the proposed amendments to the Master Plan do not appear to be eligible for listing on the NRHP, CRHR or as City of Pasadena Historic Resources. However, other campus buildings and landscape

features that may be eligible for designation are located in the proximity of some of the proposed activities.

Two buildings constructed during the 1920's and 1930's are located within close proximity of the North Undergraduate Houses. The redevelopment of the Houses would have the potential for adverse impacts to Gordon Kaufmann's Athenaeum and South Undergraduate Houses due to adjacent construction activities and equipment staging area locations. Due to their age and contribution to notable designers and periods of campus history, these buildings appear eligible for listing on the NRHP and CRHR either individually or as contributors to an eligible grouping. Landscape elements and urban design features on the campus representing historically important master planning efforts, particularly the Goodhue plan of 1917 and the Yoch and Council landscape design for the Athenaeum also appear eligible for listing, and would potentially be adversely impacted by the redevelopment of the North Undergraduate Houses. As discussed in Section 4.1, *Aesthetics,* expansion of the North Undergraduate Houses footprints has the potential to encroach upon the surrounding open space, landscaping and views of the Athenaeum and South Undergraduate Houses. The potential eligibility of these buildings and design features, along with their proximity to the redevelopment footprint of the North Undergraduate Houses would create a potentially significant impact. This impact could be reduced to less than significant with the implementation of the following mitigation measure, Measure H-2.

Mitigation Measures. In reference to mitigating impacts on historic resources, the CEQA Guidelines state: "Where maintenance, repair, stabilization, rehabilitation, restoration, preservation, conservation or reconstruction of the historical resource will be conducted in a manner consistent with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings* (1995), Weeks and Grimmer, the project's impact on the historical resource shall generally be considered mitigated below a level of significance and thus is not significant. (PRC §15126.4(b)(1))." These standards, developed by the National Park Service, represent design guidelines for carrying out historic preservation, restoration and rehabilitation projects. The *Secretary's Standards* and the supporting literature describe historic preservation principles, including guidelines for new in-fill construction, and offers recommended means for carrying them out. Adhering to the Standards is the only method described within CEQA for reducing project impacts on historic resources to less than significant levels.

The buildings proposed for alterations are not eligible for listing on the National Register or the California Register, or as Pasadena Landmarks; however, other buildings and site features, most notably the Athenaeum, South Undergraduate Houses and the landscape design for the Athenaeum, have been identified as significant historic resources. The following measure is recommended to mitigate adverse impacts to significant buildings and site features.

H-2 **Design Review.** The design of any construction on the location of the North Undergraduate Hall (either alterations to the existing building or demolition and construction of new buildings) shall be subject to the review by Pasadena Design Commission in order to assure its conformance with the *Secretary of Interior's Standards* with respect to its potential impacts on the Athenaeum, South Undergraduate Houses,

and the landscape features.

Significance After Mitigation. With the above mitigation measure, the proposed project's impacts would be less than significant.

c. Cumulative Impacts. All current and future projects including approximately 3,327 dwelling units and 1,379,824 square feet of commercial and industrial planned and pending development projects within the City of Pasadena would be subject to review under CEQA and by the City of Pasadena's Historic Preservation Commission. As discussed under Section 4.1.2, above, the lead agency is responsible for the identification of "potentially feasible measures to mitigate significant adverse changes in the significance of an historical resource." The specified methodology for determining if impacts are mitigated to less than significant levels are the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings* and the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (1995), publications of the National Park Service. (PRC §15064.5(b)(3-4))

Thus, cumulative impacts to historic resources would be minimized through the City's review process. As all future development would be subject this CEQA review process, compliance with the required measures would avoid significant cumulative impacts to historic resources.

4.5 TRAFFIC AND CIRCULATION

This section evaluates existing conditions and potential impacts to the local circulation system. The analysis summarizes the findings of a traffic impact analysis prepared by Kaku Associates, Inc. dated March 2006 (See Appendix D). The study evaluated the potential for traffic impacts on the local street and highway system and assessed the adequacy of the proposed campus access and parking plan. Traffic volumes were based on traffic count data collected in May 2005.

4.5.1 Setting

a. Existing Traffic Circulation Network. All of the study intersections are within the City limits of Pasadena. The following text describes the general characteristics of the major study area roadways. Figure 4.5-1 shows the locations of the street segments and study intersections relative to the campus and Table 4.5-1 illustrates the existing street characteristics.

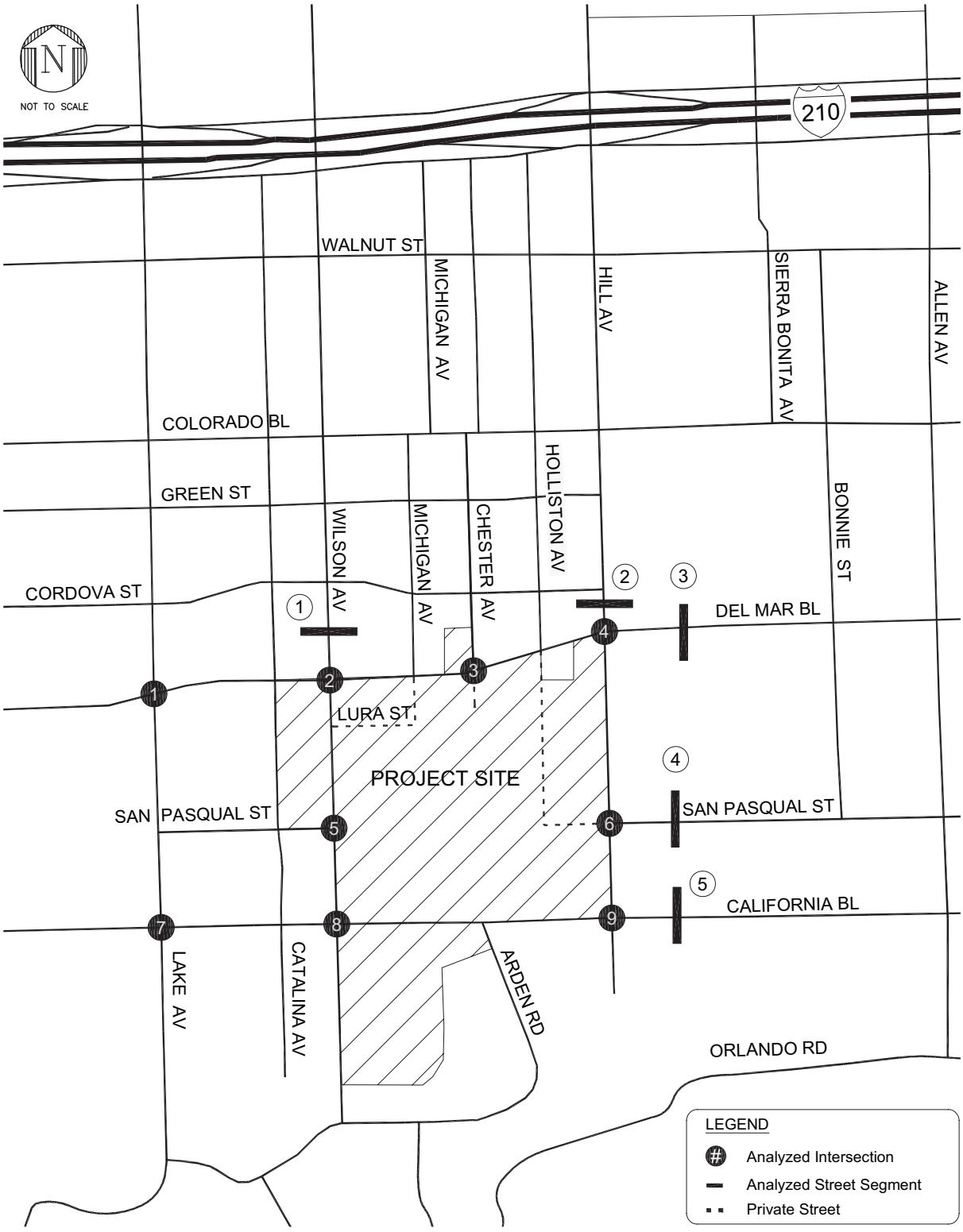
Wilson Avenue is a two-lane roadway that traverses the Project study area on the east. It provides north-south access across the eastern side of the Caltech Campus, generally allows parking with a few restricted areas, and the posted speed limit is 25 miles per hour (m.p.h.) within most segments. On the north, the roadway continues past the 210 Freeway and into Altadena. On the south, the roadway continues to Arden Road, just past the Caltech sports facilities.

Hill Avenue is a two-lane roadway that generally bounds the Project study area on the west. Along the western edge of campus the two travel lanes are divided by a dashed yellow line, parking is allowed and the posted speed limit is 30 m.p.h. To the north of its intersection with Del Mar Boulevard, the roadway has four-travel lanes, no stopping anytime and left turning lane median, with a posted speed limit of 25 m.p.h. The roadway continues north past the 210 Freeway and into Altadena. On the south the roadway terminates at Lombardy Road.

Del Mar Boulevard is a four-lane roadway that is generally the northern boundary of the Caltech Campus. It provides east west access along the north length of the campus with restricted parking and posted speed limits of 30-35 m.p.h. adjacent to the campus. To the east the roadway continues to South Pasadena Avenue. The western terminus of the roadway is Sierra Madre Boulevard.

San Pasqual Street is a two-lane roadway that traverses part of the Caltech Campus in an east-west manner. The roadway enters the campus on the east and becomes part of the walking path at Holliston Avenue, through the center of campus, then continues as a two-lane roadway west of Wilson Avenue terminating at Lake Avenue. The roadway allows restricted parking and has a posted speed limit of 30 m.p.h. at most segments.

California Boulevard is a two-lane roadway that primarily serves as the southern boundary of the Caltech campus with a section of campus to the south of it, including the sports complex and a newly constructed parking garage. The roadway allows parking with some time restrictions, and has a posted speed limit of 30 m.p.h., at most segments. The roadway continues west to South Arroyo Boulevard and terminates on the east at a connection with Sunset Boulevard.



Source: Kaku Associates, Inc., March, 2006.

Location of Study
Street Segments and Intersections

Figure 4.5-1

Table 4.5-1 Existing Street Characteristics

Segment	From	To	Lane		Median Type	Parking Restrictions		Speed Limit
			NB/EB	SB/WB		NB/EB	SB/WB	
Lake Ave	Cordova St	California Blvd	2	2	RM	1hr 9A-6P	1hr 9A-6P	25
	California Blvd	Cornell Rd	2	2	RM	2hr 9A-6P	2hr 9A-6P	25
Catalina Ave	Cordova St	California Blvd	1	1	UD	2hr 9A-6P	2hr 9A-6P	25
	California Blvd	Cornell Rd	1	1	UD	15min 6A-6P/PPO	PPO	15
Wilson Ave	Cordova St	Del Mar Blvd	1	1	SDY	2hr 9A-6P	2hr 9A-6P	25
	Del Mar Blvd	San Pasqual St	1	1	SDY	PA	2hr 9A-6P	25
	San Pasqual St	California Blvd	1	1	RM	PA/NSAT	2hr 9A-6P/NSAT	25
	California Blvd	Cornell Rd	1	1	2LT	PA	NPAT/PPO	25
Michigan Ave	Blanche St	Del Mar Blvd	1	1	UD	2hr 9A-6P	2hr 9A-6P	25
	Del Mar Blvd	Lura St	1	1	UD	CPO	CPO	25
Chester Ave	Cordova St	Del Mar Blvd	1	1	UD	4hr 9A-6P	2hr 9A-6P	25
	Del Mar Blvd	End	1	1	UD	CPO	CPO	25
Holliston Ave	Cordova St	Del Mar Blvd	1	1	UD	NPAT	2hr 9A-6P	25
	Del Mar Blvd	San Pasqual St	1	1	UD	CPO	CPO	25
Hill Ave	Cordova St	Del Mar Blvd	2	2	2LT	NSAT	NSAT	25
	Del Mar Blvd	San Pasqual St	1	1	SDY	2hr 8A-4P	2hr 8A-4P	30
	San Pasqual St	California Blvd	1	1	SDY	2hr 8A-4P	Loading/PA	30
	California Blvd	Lombardy Rd	1	1	UD	2hr 7A-6P	2hr 7A-6P	25
Arden Rd	California Blvd	Cameron Dr	1	1	SDY	2hr 9A-6P	2hr 9A-6P	25
Del Mar Blvd	Hudson Ave	Lake Ave	2	2	2LT	NSAT	NSAT	35
	Lake Ave	Mentor Ave	2	2	SDY	NSAT	NSAT	25
	Mentor Ave	Catalina Ave	2	2	SDY	2hr 9A-6P	2hr 9A-6P	25
	Catalina Ave	Wilson Ave	2	2	DY	NP 7-9A, 4-6P; 2hr 9A-4P	NP 7-9A, 4-6P; 2hr 9A-4P	30
	Wilson Ave	Michigan Ave	2	2	DY	NP 7-9A, 4-6P; 2hr 9A-4P	NP 7-9A, 4-6P; 2hr 9A-4P	35
	Michigan Ave	Hill Ave	2	2	DY	NP 7-9A, 4-6P	NP 7-9A, 4-6P	35
	Hill Ave	Sierra Bonita Ave	2	2	2LT	PPO	NSAT	30
Lura St	Wilson Ave	Michigan Ave	1	1	UD	PA	NSAT	25

Table 4.5-1 Existing Street Characteristics

Segment	From	To	Lane		Median Type	Parking Restrictions		Speed Limit
			NB/EB	SB/WB		NB/EB	SB/WB	
San Pasqual St	Lake Ave	Mentor Ave	1	1	DY	2hr 9A-6P	2hr 9A-6P	30
	Mentor Ave	Wilson Ave	1	1	SDY	2hr 9A-6P	2hr 9A-6P	30
	Holliston Ave	Hill Ave	1	1	UD	CPO	CPO	25
	Hill Ave	Ninita Pkwy	1	1	UD	PPO	PPO	30
California Blvd	Hudson Ave	Lake Ave	2	2	2LT	NSAT	NSAT	30
	Lake Ave	Catalina Ave	1	1	2LT	2hr 9A-6P	2hr 9A-6P	30
	Catalina Ave	Hill Ave	1	1	2LT	PA	PA	30
	Hill Ave	Sierra Bonita Ave	1	1	2LT	2hr 9A-6P	2hr 9A-6P	30

Notes:

MEDIAN TYPE:
- DY = Double Yellow Centerline
- SDY = Single Dashed Yellow Centerline
- 2LT = Dual Left Turn Centerline
- RM = Raised Median
- UD = Undivided Lane

PARKING:
- PA = Parking Allowed
- NSAT = No Stopping Anytime
- NP = No Parking Allowed
- PPO = Permit Parking Only
- CPO = Caltech Parking Only

LANES:
- # = Number of lanes

The following roadways and intersections were identified by the City for inclusion in the traffic analysis. The study area intersections include:

1. *Lake Avenue and Del Mar Boulevard*
2. *Wilson Avenue and Del Mar Boulevard*
3. *Chester Avenue and Del Mar Boulevard*
4. *Hill Avenue and Del Mar Boulevard*
5. *Wilson Avenue and San Pasqual Street*
6. *Hill Avenue and San Pasqual Street*
7. *Lake Avenue and California Boulevard*
8. *Wilson Avenue and California Boulevard*
9. *Hill Avenue and California Boulevard*

Five roadway segments were also included in the study area. The locations of these facilities include:

1. *Wilson Avenue north of Del Mar Boulevard*
2. *Hill Avenue north of Del Mar Boulevard*
3. *Del Mar Boulevard east of Hill Avenue*
4. *San Pasqual Street east of Hill Avenue*
5. *California Boulevard east of Hill Avenue*

b. Existing Intersection Levels of Service. "Level of Service" (LOS) A through F are used to rate roadway operations, with LOS A indicating very good operating conditions and LOS F

indicating poor conditions (more complete definitions of level of service are contained in Appendix D for reference). LOS A through LOS C are generally considered acceptable, while LOS D through LOS F indicate poor conditions.

The Intersection Capacity Utilization (ICU) method of intersection analysis, per the City of Pasadena's requirements for analyzing intersection conditions, was used to determine the intersection volume-to-capacity (V/C) ratio and corresponding LOS for each study intersection. Based on recent field studies of saturation flow through Pasadena intersections, the City has established updated lane capacity criteria for use in intersection capacity calculations. The City has established a capacity of 1,600 vehicles per hour per lane (vphpl) for those isolated intersections that are not connected to the City's Traffic Management Center (TMC), but instead operate independently. A capacity of 1,700 vphpl should be used for traffic signals along interconnected corridors controlled by the City's Traffic Management Center. The City is in the process of implementing upgraded interconnection and computer control strategies along several Intelligent Transportation Systems (ITS) corridors. In the future, streets in these corridors will have higher lane capacities, but because the ITS strategies are not yet in place, a capacity of 1,700 vphpl was assumed in the calculations for the existing conditions.

Table 4.5-2 summarizes the existing level of service (LOS) at study area intersections. Under the existing (year 2005) conditions scenario, six of the study intersections operate at LOS C or better during the weekday a.m. and p.m. peak periods. The lowest LOS value is at the intersection of Lake Avenue/California Boulevard, which has an LOS of E during both a.m. and p.m. peak hours.

Table 4.5-2 Peak Hour Levels of Service – Existing (2005) Conditions

Intersection	AM Peak		PM Peak	
	ICU or delay (sec.)	LOS	ICU or delay (sec.)	LOS
1. Lake Ave and Del Mar Blvd	0.626	B	0.732	C
2. Wilson Ave and Del Mar Blvd	0.574	A	0.725	C
3. Chester Ave and Del Mar Blvd	0.434	A	0.513	A
4. Hill Ave and Del Mar	0.591	A	0.772	C
5. Wilson Ave and San Pasqual St *	9.0	A	9.1	A
6. Hill Ave and San Pasqual St	0.536	A	0.524	A
7. Lake Ave and California Blvd	0.956	E	0.955	E
8. Wilson Ave and California Blvd	0.736	C	0.815	D
9. Hill Ave and California Blvd	0.769	C	0.901	E

** Unsignalized Intersection. Critical delay in seconds is provided, instead of a volume/capacity ratio (V/C).*

Eight of the nine study intersections are controlled by traffic signals. One of the study intersections, Wilson Avenue and San Pasqual Street, is an all-way stop controlled intersection. The level of service at this intersection was evaluated using stop-controlled methodologies from the Highway Capacity Manual (HCM) (Transportation Research Board, 2000).

c. Existing Roadway Segment Operations. Table 4.5-3 summarizes the five daily traffic volume counts utilized for the analysis of roadway segments within the traffic study area.

Table 4.5-3 Existing Daily Roadway Volumes

Roadway Segment	Daily Volume
1. Wilson Avenue north of Del Mar Boulevard	5,226
2. Hill Avenue north of Del Mar Boulevard	24,154
3. Del Mar Boulevard east of Hill Avenue	26,019
4. San Pasqual east of Hill Avenue	2,745
5. California Boulevard east of Hill Avenue	17,009

d. Programmed Roadway Network Improvements. Several key roadway improvements in or near the study area are expected to be completed by 2015. These improvements, whether the result of capital improvement programs or as mitigation for ongoing or entitled related projects, would result in capacity changes at various locations throughout the study area. These changes, which would affect the operations of several study intersections, are as follows:

- *Based on the City of Pasadena's policy for the year 2015 and the General Plan Mobility Element, the city will make ITS improvements as part of the city's 2015 Master Plan of Highways. These improvements will result in increased lane capacities at intersections connected to the TMC and those along Principal Multimodal Corridors. With the implementation of the Mobility Element improvements, lane capacities of 1,785 vphpl for those intersections connected to the TMC intersections (intersections along California Boulevard and Hill Avenue in the study area) and 1820 vphpl for intersections along Principal Multimodal Corridors (intersections along Del Mar Boulevard in the study area) are projected.*

- *With the approved future development at Pasadena Polytechnic School, the southbound approach to the intersection of Wilson Avenue and California Boulevard will be restriped to provide a separate left-turn lane resulting in a left-turn lane and a shared though/right-turn lane as an approved mitigation for that project.*

- *The approved California Boulevard Parking Structure on the Caltech campus identified as mitigation the restriping of the southbound approach at the intersection of Hill Avenue and California Boulevard. This improvement will provide a separate left-turn lane resulting in a left-turn lane and a shared though/right-turn lane, and will modify the traffic signal to provide an eastbound left-turn phase.*

e. Area Transit Service. Pasadena is served by two regional transit service providers, Foothill Transit and the Los Angeles County Metropolitan Transportation Authority (MTA). The

City of Pasadena also operates two Area Rapid Transit Service (ARTS) shuttle bus lines in the vicinity of Caltech. The bus routes are described below:

- ***Foothill 187/189*** *– Line 187/189 provides service between Montclair and Pasadena along Colorado Boulevard. This line travels along Colorado Boulevard in the vicinity of the project site. This line has average headways of 20 minutes during peak periods on weekdays.*

- ***MTA 177*** *– Line 177 provides service between the Jet Propulsion Laboratory site at Flintridge and the Sierra Madre Villa Gold Line Station. This line travels along California Boulevard and Hill Avenue in the study area. This line has average headways of 30 minutes during peak periods on weekdays.*

- ***MTA 180/181*** *– Line 180/181 provides service between Hollywood and Altadena. This line travels along Colorado Boulevard in the vicinity of the project site. This line has average headways of 12 minutes during peak periods on weekdays.*

- ***MTA 256*** *– Line 256 provides service between Commerce and Altadena. This line travels along Arroyo Parkway and Colorado Boulevard in the vicinity of the project site. This line has average headways of 30 minutes during morning peak periods and headways of 30 minutes during afternoon peak periods on weekdays.*

- ***MTA 267*** *– Line 267 provides service between El Monte and Altadena. This line travels along Del Mar Boulevard adjacent to the project site. This line has average headways of 30 minutes during peak periods on weekdays.*

- ***MTA 485*** *– Line 485 provides service between downtown Los Angeles and Altadena with stops at Lake Avenue and California Boulevard just west of the campus. This line travels along Lake Avenue in the study area. This line has average headways of 20 minutes during morning peak periods and headways of 15 minutes during afternoon peak periods on weekdays.*

- ***MTA Metro Gold Line*** *– The Gold Line provides service between downtown Los Angeles and the Sierra Madre Villa Gold Line Station in Pasadena, with the nearest station to the campus located at the Lake Avenue Station, between Maple Street and Corson Street. The Gold Line has an average headway of 10 minutes at this station.*

- ***ARTS 10*** *– Line 10 provides service between Pasadena City College and Allen Gold Line Station. This line travels along Del Mar Boulevard in the study area. This line has average headways of 15 minutes during peak periods on weekdays.*

- ***ARTS 20*** *– Line 20 provides service between northern and southern Pasadena via a two-way loop on Fair Oaks Avenue and Lake Avenue. This line travels along California Boulevard in the study area. This line has average headways of 30 minutes during peak periods on weekdays.*

f. Parking. Caltech has recently undertaken a comprehensive analysis of parking conditions at the campus. This analysis was performed in an effort to review existing parking conditions on the campus, to identify alternatives for increasing the effective utilization of the campus parking supply, to forecast future parking demands and conditions based on projected

campus activity growth during and after planned construction periods, and to develop both short-term and long-term parking plans for the campus. Data from this analysis was utilized to determine the parking demand and supply in 2015, by which time the projects assessed in this study would be completed.

Prior to the recent completion of the California Parking Structure in May 2005, the on-campus parking supply of 2,708 spaces was considered effectively full, operating at 98% occupancy system-wide at the peak time (after 10 a.m. on typical weekdays), with a peak occupancy of 2,914 spaces. As shown in Table 4.5-4, this resulted in an estimated shortfall of slightly more than 200 spaces during peak periods. Overflow parking is accommodated through the use of parking spaces on nearby public streets (including both streets directly adjoining the campus and streets in the vicinity). With the addition of the California Parking Structure in 2005, the parking supply reached a surplus of over 500 spaces. The parking structure combined with future development and campus population would result in an estimated surplus of parking capacity through the year 2015.

Table 4.5-4 Summary of Parking Analysis

Year	Campus Population	Parking Demand	On-Campus Supply	Surplus (Shortfall)
2004	5,793	2,914	2,708	(206)
2005	5,721	2,878	3,394	516
2015	6,400	3,219	3,333	114

Note: The parking demand shown does not include a 6.5% circulation contingency.

4.5.2 Impact Analysis

a. Methodology and Significance Thresholds. Development of future traffic projections for the proposed project involved a three-step process. This process included the estimation of project trip generation, trip distribution, and trip assignment. These future traffic projections were then analyzed under two scenarios, one with the project (cumulative base) and one without the project (cumulative base plus project). Results of these analyses were then compared with existing conditions. Methods for determining existing, cumulative base, and cumulative plus project scenarios are described below.

Project Trip Generation. New empirical trip generation rates were developed for the campus by collecting automatic daily traffic volume counts at seven locations on the perimeter of campus on three mid-week days (May 17–19, 2005). Together these locations captured approximately 75% of the trips into and out of campus, based on the location of existing campus parking facilities. This data is provided in Appendix D. The total trips were factored upward to include additional trips to the parking areas that were not captured in the cordon count. This data was then utilized to estimate project trip generation rates, resulting in an estimated ten-year increase of approximately 1,461 daily trips, 137 a.m. peak hour trips (100 inbound/37

outbound) and 137 p.m. peak hour trips (37 inbound/100 outbound). The projected trip generation rates are shown in Table 4.5-5.

Table 4.5-5 Project Trip Generation Estimates

Scenario	Total Campus Pop.	Non-Resident Campus Pop.	Average Daily Trips	A.M. Peak Hour			P.M. Peak Hour		
				In	Out	Total	In	Out	Total
Existing Trips	5,721	4,532	10,133	696	253	949	261	692	953
Trips Per Person			2.24	73%	27%	0.21	27%	73%	0.21
Net Growth	679	652	1,461	100	37	137	37	100	137
Estimated Trips (2015)	6,400	5,184	11,594	796	290	1,086	298	792	1,090

Project Trip Distribution. The geographic distribution patterns for the proposed Caltech projects were based on the current traffic patterns at the Caltech campus. Based on this and discussions with Pasadena Department of Transportation staff, it was estimated that approximately 35% would come from the north, 10% would come from the south, 20% would come from the west, and 35% would come from the east (see Figure 4.5-2).

Project Trip Assignment. Using the estimated trip generation and the distribution pattern developed above, the traffic generated by the proposed projects was assigned to the street network (see Figure 4.5-3).

Traffic Impact Assessment Scenarios. This study analyzes potential project-generated traffic impacts on the streets surrounding and serving Caltech in accordance with methodology specified by City of Pasadena Department of Transportation staff. The projected completion date of the proposed projects is 2015. The impact analysis examines future conditions both with and without the proposed project. The following traffic scenarios are analyzed in the study:

- ***Existing (Year 2005) Conditions*** *- The analysis of existing traffic conditions provides a basis for the remainder of the study. The existing conditions analysis includes an assessment of streets, traffic volumes, operating conditions, and transit services.*
- ***Year 2015 Cumulative Base (No Project) Conditions*** *- The objective of this scenario is to project future traffic growth and operating conditions that could be expected to result from regional growth and related projects in the vicinity of the project site, without consideration of the proposed projects.*
- ***Year 2015 Cumulative plus Project Conditions*** *- The objective of this scenario is to identify potential impacts of the proposed project on projected future traffic operating conditions with proposed project traffic added to the cumulative base traffic forecasts.*

Project Trip Distribution

Figure 4.5-2

Source: Kaku Associates, Inc., March 2006

Peak Hours Project Trip Distribution

Figure 4.5-3

Source: Kaku Associates, Inc., March 2006

Operational Thresholds. The City of Pasadena Department of Transportation has established threshold criteria for determining whether or not project related traffic may have a significant impact at local intersections. According to these criteria, a project impact would be considered significant if the conditions in Table 4.5-6 were met:

Table 4.5-6
Significant Impact Criteria
for Pasadena Intersections

Existing LOS	Project-related Increase in V/C
A	0.06
B	0.05
C	0.04
D	0.03
E	0.02
F	0.01

For the intersection controlled by stop signs, Wilson Avenue and San Pasqual Street, the HCM stop-controlled methodology is used to evaluate the operating condition of the intersection, and average vehicular delay in seconds is reported rather than V/C ratio. For the purpose of application of City of Pasadena significance criteria, the V/C ratio is reported using the ICU methodology.

Street Segments Thresholds. The City of Pasadena has established criteria for determining significant impacts on street segments. A street segment is deemed significantly impacted based on an increase in the projected ADT volumes, as shown in Table 4.5-7.

Table 4.5-7 Significant Impact Criteria for Pasadena Street Segments

ADT Growth on Street Segment	Required Traffic Mitigation
0.0% - 2.4% ADT Growth	• Staff review
2.5% - 4.9% ADT Growth	• Soft mitigation required • TDM, Rideshare, etc.
5.0% - 7.4% ADT Growth	• Soft mitigation required • Physical mitigation required • Project alternatives considered
7.5% + ADT Growth	• Soft mitigation required • Extensive physical mitigation required • Project alternatives considered

Parking Thresholds. Impacts to on-site parking availability are considered significant if the proposed project would cause a deficiency in parking, or if an individual project does not provide adequate parking for the specific use that is proposed.

b. Project Impacts and Mitigation Measures.

Impact TC-1 The proposed project would incrementally increase traffic levels at study area intersections, but would not generate impacts exceeding adopted significance criteria at any intersection. Thus, the proposed project's traffic impacts are considered Class III, *less than significant*.

In order to evaluate potential impacts of the proposed Caltech projects on the street system, it was necessary to develop estimates of future traffic conditions in the study area both with and without the project. Future (year 2015) traffic volumes were first estimated for the study area without the project. These future forecasts reflect shifts in Caltech traffic due to the recent opening of the California Parking Structure, traffic increases due to general regional growth, and traffic expected to be generated by other specific development projects in the vicinity (Refer to Table 3-1 in Section 3.0, *Environmental Setting*). They represent cumulative base (no project) conditions. The additional amount of traffic expected to result from the proposed project was then estimated and separately assigned to the surrounding street system. The sum of the cumulative base and project-generated traffic represents the cumulative plus project conditions.

The cumulative base traffic projections include three elements. The first element is the estimated shift in Caltech-related traffic due to the opening of the California Parking Structure. The second element is the growth in the existing background traffic volumes, reflecting the effects of overall regional growth and development both inside and outside the study area. The third element is the traffic generated by specific related projects located in or near the study area.

The peak hour traffic counts used in this study were performed on May 18, 2005. The recently completed California Parking structure was opened on May 16, 2005. Some Caltech staff that had been parking at the St. Luke's Campus and taking a Caltech shuttle shifted to the parking structure on opening day (the shuttle was terminated on May 16). Many of the other Caltech students, staff, and faculty, however, did not utilize the structure during the first few days of its operation. Based on traffic count data collected at driveways to Caltech parking lots and structures and available utilization data for the California Parking Structure, a portion of the existing Caltech traffic was assumed to shift to the California Parking Structure in the cumulative base scenario.

The cumulative base traffic projections were estimated for this study based on discussions with Pasadena Department of Transportation staff. Based on their knowledge of the study area, it was determined that an annual growth rate of 1.5% would adequately account for ambient growth. Accordingly, the 2005 existing traffic count data was increased by a total of 15% through 2015.

A total of 68 related projects were identified in the study area and are listed with the relative location of each project in Appendix D. Information regarding potential future projects that are

either under construction, being planned, or proposed for development was obtained from several sources, including recently conducted traffic studies and City of Pasadena files. As summarized in Appendix D, the related projects are expected to generate approximately 4,300 trips during the morning peak hour and 5,250 trips during the evening peak hour. Trips from the related projects were assigned to the roadway system based on distribution patterns from their respective studies and the type and location of the project. It should be noted that these projections are conservative in that they do not in every case account for either the existing uses to be removed or the likely use of non-motorized travel modes (transit, walking, etc.).

The resulting cumulative base traffic volumes, representing future conditions without the project for year 2015, are presented Table 4.5-8. These future projections take into account the estimated shift in existing Caltech traffic, overall growth in the surrounding area, and traffic from known related projects in the study area.

Table 4.5-8
Peak Hour Intersection Operations Future (2015) Ambient Growth Conditions

Intersection	AM Peak		PM Peak	
	ICU value or delay (sec.)	LOS	ICU value or delay (sec.)	LOS
1. Lake Ave and Del Mar Blvd	0.706	C	0.814	D
2. Wilson Ave and Del Mar Blvd	0.570	A	0.726	C
3. Chester Ave and Del Mar Blvd	0.469	A	0.551	A
4. Hill Ave and Del Mar	0.6414	B	0.848	D
5. Wilson Ave and San Pasqual*	9.6	A	9.7	A
6. Hill Ave and San Pasqual	0.553	A	0.537	A
7. Lake Ave and California Blvd	1.096	F	1.091	F
8. Wilson Ave and California Blvd	0.808	D	0.899	D
9. Hill Ave and California Blvd	0.836	D	0.898	D

** Unsignalized Intersection. Critical delay in seconds is provided, instead of a volume/capacity ratio (V/C)*

The cumulative plus project peak hour traffic volumes were analyzed to determine the forecasted 2015 operating conditions with the inclusion of proposed project traffic. The results of the cumulative plus project analysis are presented in Table 4.5-9. Traffic associated with the proposed project would incrementally increase delays at study area intersections. However, the changes in the ICUs and delays would not be significant at any study area intersections based on City criteria.

Mitigation Measures. None required.

Significance After Mitigation. The proposed project would not significantly affect any study area intersections without mitigation.

Table 4.5-9 Year 2015 Future Conditions Intersection Levels of Service

Intersection	Peak Hour	Cumulative Base Year 2015		Cumulative plus Project Year 2015			
		V/C or Delay	LOS	V/C or Delay	LOS	Increase in V/C	Significant Impact
1. Lake Ave and Del Mar Blvd	A.M.	0.706	C	0.709	C	0.003	No
	P.M.	0.814	D	0.816	D	0.002	No
2. Wilson Ave and Del Mar Blvd	A.M.	0.570	A	0.574	A	0.004	No
	P.M.	0.726	C	0.733	C	0.007	No
3. Chester Ave and Del Mar Blvd	A.M.	0.469	A	0.470	A	0.001	No
	P.M.	0.551	A	0.555	A	0.004	No
4. Hill Ave and Del Mar Blvd	A.M.	0.641	B	0.649	B	0.008	No
	P.M.	0.848	D	0.854	D	0.006	No
5. Wilson Ave and San Pasqual St *	A.M.	9.6	A	9.8	A	-	-
	P.M.	9.7	A	9.9	A	-	-
	A.M.	0.396	-	0.410	-	0.014	No
	P.M.	0.426	-	0.441	-	0.015	No
6. Hill Ave and San Pasqual St	A.M.	0.553	A	0.566	A	0.013	No
	P.M.	0.537	A	0.554	A	0.017	No
7. Lake Avenue and California Blvd	A.M.	1.096	F	1.102	F	0.006	No
	P.M.	1.091	F	1.097	F	0.006	No
8. Wilson Avenue and California Blvd	A.M.	0.808	D	0.816	D	0.008	No
	P.M.	0.899	D	0.908	E	0.009	No
9. Hill Avenue and California Blvd	A.M.	0.836	D	0.851	D	0.015	No
	P.M.	0.898	D	0.909	E	0.011	No

** Intersection is controlled by stop sign(s). The top rows show analysis using Highway Capacity Manual (2000) stop-controlled methodology. For the purpose of evaluating the operating condition of the intersection, average vehicular delay in seconds is reported rather than V/C ratio. The bottom rows show analysis using the ICU methodology. For the purpose of City of Pasadena significance criteria application, V/C ratio is reported.*

Impact TC-2 The proposed project would incrementally increase traffic levels along study area roadways. However, the projected increases are less than the adopted thresholds on all road segments. Therefore, impacts are considered Class III, *less than significant*.

The study area street segments were analyzed under existing, cumulative base, and cumulative plus project conditions, much like the intersection analysis. Based on the City of Pasadena requirements, the percentage increase in ADT volumes on study area street roadway segments during the project year that is due to project traffic determines the significance of project impacts. The project ADT volumes are estimated based on the project trip generation shown in Table 4.5-5. As indicated in the table, the net increase in weekday daily traffic generated by the project is estimated at approximately 1,461 trips.

Table 4.5-10 summarizes traffic impacts to study area roadway segments. Using the threshold criteria established by the City of Pasadena, the table shows the daily traffic analysis, which determines the street segment impacts by the proposed project on weekdays. As shown in the table, the proposed project is anticipated to increase daily traffic volumes by less than 2.4% on the analyzed street segments. While this level of increase requires staff review, no physical mitigations are required. Thus, no significant impacts to study area roadway segments are anticipated and impacts would be considered less than significant.

Table 4.5-10 Street Segment Impact Analysis

Street Segments	Weekday 2-Way Daily Volume					Impact Analysis		
	Existing	Ambient Growth	Cumulative Base	Project Only	Cumulative Base plus Project	Increase (%)	Physical Mitigation Threshold	Significant Impact?
Wilson Avenue north of Del Mar Boulevard	5,226	1.5%	5,887	102	5,989	1.7%	5.0%	No
Hill Avenue north of Del Mar Boulevard	24,154	1.5%	27,209	248	27,457	0.9%	5.0%	No
Del Mar Boulevard east of Hill Avenue	26,019	1.5%	29,310	190	29,500	0.6%	5.0%	No
San Pasqual east of Hill Avenue	2,745	1.5%	3,092	58	3,150	1.8%	5.0%	No
California Boulevard east of Hill Avenue	17,009	1.5%	19,161	263	19,424	1.4%	5.0%	No

Mitigation Measures. None required.

Significance After Mitigation. The proposed project's impacts to study area road segments would be less than significant without mitigation.

Impact TC-3 The proposed project would incrementally reduce the on-campus parking supply; however, with the recent completion of the California Parking Structure, the campus would be expected to have a surplus of parking capacity. Thus, impacts to on-campus parking are considered Class III, *less than significant.*

Future parking conditions at Caltech were determined for year 2015, with the proposed campus development projects and the projected increase in the campus population. With an anticipated campus population of 6,400 by year 2015, the projected parking demand would be 3,219 spaces as determined by Caltech's recent comprehensive analysis of parking conditions on campus (parking demand of 0.503 spaces per person). This is an increase of 1,348 spaces over the maximum demand estimated in the 1988 Caltech Master Plan EIR.

Either development scenario for the proposed CCE Laboratory building would eliminate approximately 10 parking spaces. Eighteen parking spaces would be constructed with the

replacement of the Braun and Marks Houses. Thus, the projects now proposed would result in a net reduction in the existing on-campus parking supply of approximately 61 parking spaces.

The projected future supply of on-campus parking includes the existing 3,394 spaces minus the estimated loss of approximately 61 spaces. As shown above in Table 4.5-4, this supply would exceed the future 2015 demand of 3,219 spaces by approximately 114 spaces. This surplus, together with spaces on the public streets immediately adjacent to the campus would provide an allowance for circulation. These calculations are within 2% of the estimated total future parking need for the future campus population, based on the parking ratios presented in the CMDP (3,285 total spaces). Thus, with the forecast growth in campus population and the completion of the proposed projects on campus, the future on-campus parking supply would accommodate the needs of the campus.

It is noted that this analysis is conservative in that it does not make any adjustments for the fact that the former St. Luke's Medical Center, located approximately two miles northeast of campus, was purchased by Caltech and is being developed as a research facility. The transfer of some Caltech employees to this facility would be expected to reduce the demand for parking on the campus itself. It is also noted that the CMDP identifies the potential for the development of three additional parking structures to accommodate future growth on campus beyond what is now proposed, should it become necessary: one north of the existing Holliston Structure, one north of the Athenaeum below the tennis courts and one in the north campus area. Therefore, no significant impacts to on-campus parking supply are anticipated as a result of this project.

Mitigation Measures. None required.

Significance After Mitigation. The proposed project's impacts to on-campus parking would be less than significant without mitigation.

Impact TC-4 The proposed project would not generate trips exceeding CMP criteria at CMP locations. Thus, impacts to CMP routes are considered Class III, *less than significant*.

The Congestion Management Program (CMP) was created statewide from the approval of Proposition 111 and has been implemented locally by the Los Angeles County Metropolitan Transportation Authority (LACMTA). The CMP for Los Angeles County requires that the traffic impact of individual development projects of potentially regional significance be analyzed. A specific system of arterial roadways plus all freeways comprise the CMP system. Per CMP Transportation Impact Analysis (TIA) Guidelines, a traffic impact analysis is conducted where:

- *At CMP arterial monitoring intersections, including freeway on-ramps or off-ramps, where the proposed Project will add 50 or more vehicle trips during either AM or PM weekday peak hours.*
- *At CMP mainline freeway-monitoring locations, where the Project will add 150 or more trips, in either direction, during the either the AM or PM weekday peak hours.*

The nearest CMP monitoring intersection is located at Arroyo Parkway and California Boulevard, and the nearest CMP freeway monitoring locations are located at: I-210 west of Routes 134/710, I-210 at Rosemead Boulevard, and I-110 at Orange Grove Avenue.

The CMP traffic impact analysis guidelines establish that a significant project impact occurs when the following threshold is exceeded:

- *The proposed project increase traffic demand on a CMP facility by 2% of capacity (V/C ≥0.02), causing LOS F (V/C > 1.00)*

- *If the facility is already at LOS F, a significant impact occurs when the proposed project increases traffic demand on a CMP facility by 2% of capacity (V/C ≥ 0.02)*

The proposed project would not create a significant regional impact at the analyzed CMP arterial monitoring intersection, Arroyo Parkway and California Boulevard, as the incremental impact resulting from the addition of project traffic is less than the 2% threshold.

For freeway analysis, projected year 2015 future no project peak hour traffic volumes were based on Caltrans 2004 traffic counts and 2003 data in the 2004 CMP. The 2003 and 2004 traffic volumes were increased by 1% per year to reflect 2005 and 2015 conditions.

This growth rate assumes that the 2015 background traffic is inclusive of the traffic generated by the related projects. The analyzed segments along the I-210 are projected to operate at LOS F in at least one direction during the analyzed peak hours.

Both of the analyzed segments along the I-210 freeway and the SR 134 segment are projected to operate at LOS F during the afternoon peak period in the southbound or eastbound direction. The project is not expected to significantly affect any of the freeway segments because the incremental impact of project traffic on the freeway segments is much less than the 2% CMP criteria or the 1% Caltrans criteria.

Mitigation Measures. None required.

Significance After Mitigation. The proposed project's impacts to the regional transportation system would be less than significant on CMP monitoring intersections and the mainline freeway system without mitigation.

c. Cumulative Impacts. Traffic from related/area projects (projects planned or pending construction or completion) was added to future ambient traffic growth to create the cumulative scenario. As shown in Table 4.5-7 and Table 4.5-10, which summarize the level of service and street segment analysis conducted for this scenario, traffic would incrementally worsen with cumulative + project traffic, but would remain below the respective significance thresholds. Approximately approximately 3,327 dwelling units and 1,379,824 square feet of commercial and industrial development is planned or pending within the vicinity of Caltech's Campus. However, cumulative impacts from such developments combined with planned roadway improvements would not be significant and the project's contribution to the overall change would not be cumulatively considerable.

4.6 UTILITIES AND SERVICE SYSTEMS

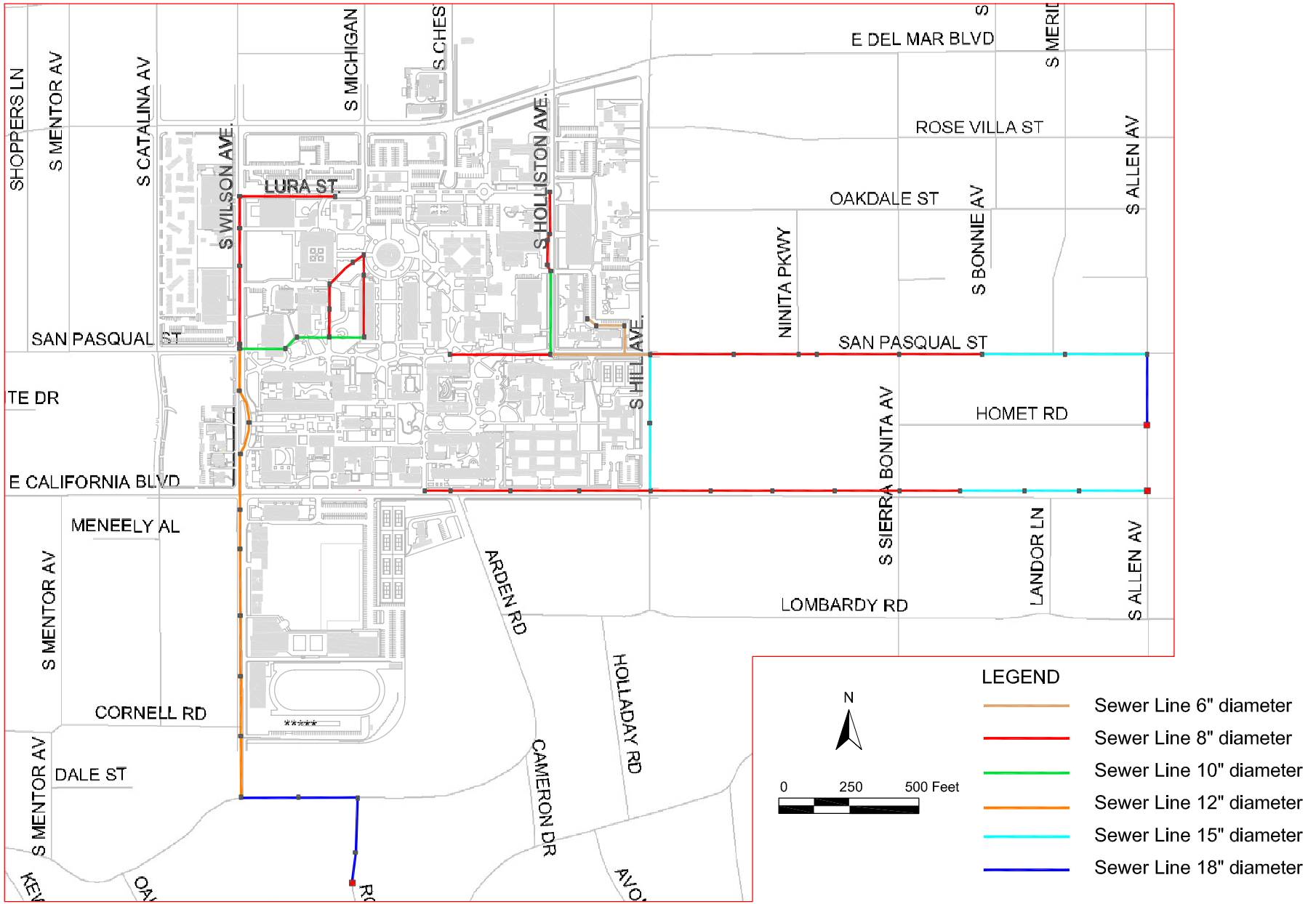
4.6.1 Setting

a. Wastewater. The wastewater flow originating from the Caltech campus first discharges in to local sewer lines, which are maintained by the City of Pasadena Public Works Department. Figure 4.6-1 illustrates the relative location the sewer lines servicing the Caltech campus. The flow is then conveyed to major trunk sewers. The major sewer trunk lines in the City of Pasadena are owned and operated by Los Angeles County Sanitation Districts (LACSD). Wastewater generated in the Caltech area is transported to the San Jose Creek Water Reclamation Plant, the Whittier Narrows Water Reclamation Plant, and the Los Coyotes Water Reclamation Plant for treatment. The San Jose Creek WRP is located about 10 miles southeast of the Caltech campus, and is adjacent to San Jose Creek in unincorporated Los Angeles County, near the City of Industry. The Whittier Narrows WRP is located about 8 miles to the south of the project site adjacent to Legg Lake in the City of El Monte. The Los Coyotes WRP is approximately 20 miles south of the project site in the City of Cerritos.

Existing intake capacity at the San Jose Creek facility is 100 million gallons per day (mgd). Currently, the facility receives between 85 and 90 mgd of wastewater and has additional 10 to 15 mgd of capacity available (LACSD, 2006). Existing intake capacity for the Whittier Narrows Facility is 15 mgd. The facility currently receives about 7 mgd with 7 to 8 mgd of capacity available (LACSD, 2006). The Los Coyotes facility currently has an intake capacity of 37.5 mgd, with an average flow of about 30 mgd, leaving about 7 mgd of capacity available. The estimated capacities are illustrated below in Table 4.6-2. All three Water Reclamation Plants are tertiary treatment plants. Reclaimed water from the plants is used for groundwater recharge; irrigation of landscaped areas at schools, golf courses, parks, nurseries and greenbelts; as well as industrial uses for carpet dying and concrete mixing.

Four Los Angeles County Sanitation Districts Trunk Sewer lines: Allen Avenue Trunk Sewer, sections 1, 2 and 4; San Marino Outfall Trunk Sewer; Chapel Avenue Trunk Sewer, section 2; and Lamanda Park Trunk Sewer; are located within the project area and convey flow from the Caltech campus. The Allen Avenue Trunk sewer line sections are located in Allen Avenue, right of way, Stratford Road, and San Marino Drive from Homet Drive to Euston Road. The trunk lines have a design capacity of 2.6 to 6.0 mgd with peak flows averaging 0.3 to 1.8 mgd when last measured in 2006. San Marino Outfall Trunk sewer line is located in Rosalind Road from Arden Road to Oak Grove Avenue and has a design capacity of 3.8 to 5.1 mgd with a peak flow about 1.3 mgd when last measured in 2006. The Chapel Avenue Trunk sewer line section is located in Los Robles Avenue south of Old Mill Road, with a design capacity of 8.1 mgd and peak flow approximately 0.5 mgd when measured in 2006. Lamanda Park Trunk sewer line is located in Lorain Road at Del Mar Avenue and has a design capacity of 17.2 mgd, with a peak flow about 10.7 mgd when measured in 2006 (All design capacities and peak flow measurements from LACSD, 2005). Table 4.6-3 below, illustrates these capacity values.

b. Water. The Urban Water Management Planning Act (Water Code sections 10610-10657) became effective January 1, 1984 and requires urban water suppliers providing municipal water directly or indirectly to more than 3,000 customers, or supplying more than



Sewer Lines Serving Caltech Campus

Figure 4.6-1

Source: City of Pasadena, Department of Public Works, January 2006

3,000 acre feet of water annually, to prepare, adopt and submit an Urban Water Management Plan (UWMP) to the California Department of Water Resources (DWR) every five years. The City of Pasadena Water and Power Department (PWP) is responsible for providing potable water to the City of Pasadena and unincorporated areas outside the City. In 2005, PWP had to prepare, adopt and submit a UWMP, most of the information in this section pertaining to water supply is derived from that Plan. PWP's water is obtained from three sources: (1) surface water from the Arroyo Seco and Eaton Canyon streams; (2) local groundwater from the Raymond Basin; and (3) imported water purchased from the Metropolitan Water District of Southern California (MWD). Approximately 40% of delivered water is derived from pumping the Raymond Basin and about 60% is purchased from the MWD, all of the surface water diverted from the streams is currently used on spreading areas for groundwater recharge averaging 4,128 acre-feet per year. In 2005, PWP supplied about 13,723 acre-feet from the Raymond Basin and about 21,975 acre-feet imported from MWD.

The Raymond Basin is a large aquifer underlying the City and surrounding areas. It is an alluvial valley approximately 40 square miles in size in eastern Los Angeles County in an area underlain by deposits of gravel, sand, silt and clay. The alluvium yields water to wells readily at rates from a few hundred to several thousand gallons per minute (gpm). The valley is bordered by impervious bedrock and slopes to the south, ranging in elevation from 2,000 feet above mean sea level to between 500 and 700 feet above mean sea level where the basin meets the Raymond Fault. The Basin is estimated to contain about 1,000,000 acre-feet of groundwater storage, of which approximately 400,000 acre-feet is estimated to be unused storage capacity. The "safe yield," or amount of sustainable pumping allowed from the basin by the Raymond Basin Management Board (RBMB), is about 30,000 acre-feet per year. The RBMB was designated Watermaster of the basin by the Department of Water Resources in 1984 and consists of representatives of the 16 different parties that have a right to extract water from the basin. The PWP's decreed right is about 13,000 acre-feet per year, pumped from seven operating wells with a combined production capacity of about 15,000 acre-feet per year. The PWP is allowed to pump about 16,900 acre-feet per year because they receive a credit of approximately 4,000 acre-feet per year for their spreading efforts, which recharge the basin.

The MWD is a public agency formed in 1928 by several Southern California cities following the adoption of the Metropolitan Water District Act by the California legislature. The MWD, created as an authority to set rates and policies necessary to provide a dependable water supply to its member agencies, controls the supply of imported water from the Colorado River Aqueduct and the California State Water Project. The MWD is allocated about 510,000 acre-feet per year from the Colorado River and about one million acre-feet per year is supplied from the State Water Project, which transports water from the northern part of the state through aqueduct systems. MWD supplies 45-60% of the water used in its service area, which includes portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura Counties. In 2005, MWD supplied PWP with about 22,000 acre-feet of water, or approximately 60% of the almost 36,000 acre-feet PWP supplied its users that year.

4.6.2 Impact Analysis

a. Methodology and Significance Thresholds.

Wastewater. The increase in wastewater flows associated with the proposed buildings included as part of the amendments to the Caltech Master Development Plan were estimated from generation factors provided by the LACSD (2005). Impacts to wastewater infrastructure are considered significant if the proposed project would result in sewer line or treatment plant system deficiencies.

Water. The increase in water demand expected with the proposed project was estimated from the wastewater loading factors provided by the LACSD, assuming that wastewater is equal to approximately 90% of total water demand. Impacts to water supply and infrastructure are considered significant if the proposed project would:

- *Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level;*
- *Not have sufficient water supplies available to serve the project from existing entitlements and resources; or*
- *Require new or expanded entitlements.*

b. Project Impacts and Mitigation Measures.

Impact USS-1 Buildout of the proposed Master Development Plan Amendments would generate an estimated increase of approximately 54,295 gallons per day (gpd) of wastewater. The San Jose Creek WRP, Whittier Narrows WRP and Los Coyotes WRP facilities have sufficient capacity to accommodate this level of new development; therefore, impacts would be considered Class III, *less than significant*.

Table 4.6-1 illustrates the anticipated increases in wastewater generation associated with the proposed amendments to the Master Development Plan. As indicated, the proposed project would generate an estimated 84,375 gpd of wastewater and the existing facilities to be removed in conjunction with the proposed project generate an estimated 30,080 gpd. Thus, the net increase in wastewater generation is estimated at 54,295 gpd.

The wastewater generated by buildout under the Master Development Plan and amendments represents about 0.31% of the currently unused 27 million gallons per day (mgd) of excess capacity at the San Jose Creek Water Reclamation Plant, Whittier Narrows Water Reclamation Plant, and Los Coyotes Water Reclamation Plant, as shown in Table 4.6-2. Therefore, existing wastewater treatment facilities have adequate capacity to accommodate the increase in wastewater generation associated with the proposed project. Significant impacts relating to waste water treatment capacity are not anticipated.

Mitigation Measures. None required.

Significance After Mitigation. Buildout of Caltech Master Development Plan amendments would have a less than significant impact with respect to wastewater treatment.

Table 4.6-1
Estimated Waste Water Generation for
Proposed Master Plan Amendments

Development Type	Existing Development to be Demolished (square feet)	Project Development (square feet)	Wastewater Generation (gallons per day)	
			Existing*	Project*
Laboratory	8,000	80,000	1,600	16,000
Undergraduate Housing	67,899	138,000 (275 beds)	13,580	34,125
Braun & Marks Dormitory	21,695 (62 beds)	55,000 (62 beds)	7,500	14,250
Campus Center	36,648	100,000	7,400	20,000
Subtotal			**30,080**	**84,375**
Net Increase in Waste Water Flow (Project – Existing Waste Water Flows)			**54,295**	

** All generation rates from Los Angeles County Sanitation Districts, 2005: 200 gallons/1,000 square feet & 125 gallons/bed)*

Table 4.6-2
Existing and Available Capacity of Waste Water Reclamation Plants
Serving the Caltech Area (million gallons/day)

Plant	Intake Capacity	Existing Intake	Available Capacity
San Jose Creek	100	88.4	11.6
Whittier Narrows	15	6.9	8.1
Los Coyotes	37.5	30.2	7.3
Total	**152.5**	**125.5**	**27**

Source: All estimates from Los Angeles County Sanitation District, 2005 and 2006 Comment Letter

Impact USS-2 Buildout of the proposed Master Development Plan Amendments would generate an estimated increase of approximately 54,295 gallons per day (gpd) of wastewater. The LACSD and Pasadena Department of Public Works have determined the current system has sufficient capacity to support such an increase. Thus, this impact is considered Class III, *less than significant*.

Waste water generated by the proposed new campus facilities would be conveyed via new connections to City of Pasadena Public Works collector lines, which would in turn connect with the existing Los Angeles County trunk sewers located in the project area. As indicated in Table 4.6-3, current average peak flows in trunk sewer lines in the project area are well within the capacities of these lines. According to the LACSD, the trunk sewer lines onsite are anticipated to be able to accommodate the increase in wastewater generated by the new development associated with the Campus Master Development Plan amendments; therefore, the proposed project is not anticipated to require an expansion of trunk sewer wastewater conveyance facilities (Ruth Frazen LACSD, 2005).

Table 4.6-3
Capacity and Average Flow of
LACSD Trunk Sewer Lines Serving Project

Trunk Sewer Line	Capacity (mgd)*	Average Peak Flow (mgd)**
Allen Avenue Trunk (sections 1, 2 & 4)	2.6-6.0	1.0-2.1
San Marino Outfall Trunk	3.8-5.1	1.2
Chapel Avenue Trunk (section 2)	8.1	0.5
Lamanda Park Trunk	17.2	7.9

Source: Los Angeles County Sanitation District (LACSD), 2005.
mgd=million gallons/day
***based on measurements taken in 2002 by LACSD*

The City's Public Works Department has determined the local collector sewer lines serving the Caltech campus have sufficient capacity to support the estimated increase in wastewater. This determination was based on the City's Master Sewer Plan, completed in January 2006. (Wu, Yannie PE, PWP, personal communication, 2006)

Mitigation Measures. None required.

Significance After Mitigation. Buildout under Caltech Master Development Plan amendments would have a less than significant impact with respect to wastewater conveyance infrastructure.

Impact USS-3 Buildout of the Master Development Plan Amendments would increase demand for water by approximately 60,430 gallons per day. The current water supply and infrastructure has sufficient capacity and availability to accommodate this level of new development; therefore, this impact is considered Class III, *less than significant*.

As discussed in the Setting, above, the City has a variety of water sources available, including groundwater, local surface water, and imported water. In 2005, PWP supplied about 13,723 acre-feet from the Raymond Basin and about 21,975 acre-feet imported from MWD. Additional water supplies are also available through optional short term water exchanges with neighboring agencies. Water supply generally consists of 40% groundwater and 60% imported water, although the exact proportion can vary from year to year. PWP has contracted with MWD for deliveries under a purchase order arrangement and has the right to purchase up to 90% of their initial base demand. MWD estimates its supply to be 510,000 acre-feet per year from the Colorado River, and contractually MWD is entitled to 2,011,500 acre-feet per year from the State Water Project (SWP). The PWP's decreed right to groundwater within Raymond Basin is about 13,000 acre-feet per year, pumped from seven operating wells with a combined production capacity of about 15,000 acre-feet per year. The PWP is allowed to pump about 16,900 acre-feet per year because they receive a credit of approximately 4,000 acre-feet per year for their spreading efforts, which recharge the basin. Further, the Raymond Basin has approximately 1,000,000 acre-feet of ground water storage capacity; the PWP has water rights to almost 40% of that water as well as rights to surface water that is not currently being utilized. Thus, the City has available up to 16,900 acre-feet per year of groundwater and up to 90% of its base demand from MWD. Table 4.6-4 illustrates the City's existing and projected demand for water through year 2020.

Table 4.6-4
City of Pasadena's Existing and Estimated Water Demand

Water Supply Sources	2005	2010	2015	2020
Purchased from wholesaler (Imported Water from MWD)	21,957	23,407	24,741	25,374
Groundwater [1]	13,273	12,807	12,807	12,807
Extracted Spreading Credits [2]		4,128	4,128	4,128
Storage Losses		(385)	(385)	(385)
Sales, Transfers and Exchanges	204	0	0	0
Recycled Water	0	0	0	700
Total	35,902	39,957	41,291	42,624

[1] City of Pasadena decreed right (2005 figure is for actual total production and includes some pumping from spreading credits)
[2] Spreading credits originating from surface water diversions at Arroyo Seco and Eaton Canyon. Based on average from 1994-2004.
Note: for 2005, spreading credits are included in "Groundwater Production" as final accounting by RBMB is not yet complete

Source: City of Pasadena 2005 Urban Water Management Plan

Table 4.6-5 shows the anticipated increase in water demand associated with buildout of the Master Development Plan Amendments. The total project-related water demand is estimated at 60,430 gallons, or about 0.19 acre-feet per day. Thus, the annual increase in water demand associated with the proposed project would be about 70 acre-feet per year. This represents about 0.20% of the total amount of water supplied by Pasadena Water and Power to its service area in 2005 (35,902 acre-feet), and 0.18% of the supply projected for 2010, approximately 39,957acre-feet. Thus, the project's contribution of 70 acre-feet per year represents less than 1% of the City's currently projected demand for water over the next 10 years and impacts related to water supply would be considered less than significant.

Table 4.6-5
Estimated Water Demand for Proposed Amendments

Development Type	Existing Water Demand (gallons per day)	Project Water Demand (gallons per day)
Laboratory	1,780	17,760
Undergraduate Housing	15,070	37,950
Bruan & Marks Dormitory	8,340	15,850
Campus Center	8,140	22,200
Subtotal	**33,330**	**93,760**
Net Increase in Water Demand Due to Proposed Project (Project – Existing Water Demand)		**60,430**

Source: Water demand is assumed to be 110% of wastewater generation from Table 4.6-1: 222 gallons/1,000 square feet/day & 139 gallons/bed

Although there is adequate water supply for the proposed Master Development Plan Amendments, the project would still be required to comply with all water system and conservation requirements of the PWP and California Plumbing Code, as adopted by the City of Pasadena. Building development on the Caltech Campus would be required to utilize interior water conserving fixtures, including low flow faucets and low flow toilets. The project would also be required to comply with the Water Shortage Procedures Ordinance in the Pasadena Municipal Code (chapter 13.10), and the Consumption Reduction Methods outlined in the City of Pasadena 2005 Urban Water Management Plan (UWMP), which requires the most efficient use of water feasible in the landscape, which may include planting native drought tolerant vegetation and the use of reclaimed water for landscape irrigation. The UWMP outlines the process and research undertaken by the PWP to secure future reliable sources of reclaimed water for the PWP service area.

Mitigation Measures. None required.

Significance After Mitigation. Buildout of the Caltech Master Development Plan amendments would have a less than significant impact with respect to water demand.

c. Cumulative Impacts.

Wastewater. The Jose Creek Water Reclamation Plant, the Whittier Narrows Water Reclamation Plant, and the Los Coyotes Water Reclamation Plant have a combined excess capacity of about 22 mgd. As shown in Table 4.6-6, buildout of the proposed Master Development Plan Amendments, together with the total Master Development Plan buildout and other development within the project area would cumulatively increase wastewater flow to the Plants by about 849,281 gallons per day. This increase in wastewater represents approximately 4% of the remaining 22 million gallons per day capacity of the existing plant facilities. Wastewater associated with currently planned and pending projects is therefore within the current capacity of the Plants. Implementation of required water conservation measures on all future development would minimize wastewater generation to the degree feasible. Therefore, significant impacts to wastewater treatment capacity are not anticipated.

Table 4.6-6 Cumulative Wastewater Generation

Development Type	Generation Factor (gpd)	Wastewater Generated (gpd)
3,327 Dwelling Units	156 per unit	519,012
1,379,824 square feet Commercial/Industrial	200 per 1000 sf	275,965
Caltech CMP Amendments		54,295
Total		**849,281**

Water. The Pasadena Water and Power Department has developed an Urban Water Management Plan that accounts for the demand for water of current and future projects as far forward as 2030. The PWP does not expect to have any problems supplying enough water to meet the projected demands of the service area. The Raymond Basin has approximately 1,000,000 acre-feet of ground water storage capacity; the PWP has water rights to almost 40% of that water as well as rights to surface water that is not currently being utilized. Implementation of required water conservation measures on all future development would minimize water demand to the degree feasible. Therefore, significant impacts to water supply and infrastructure capacity are not anticipated.

5.0 GROWTH INDUCING EFFECTS

Section 15126(d) of the State *CEQA Guidelines* requires a discussion of a proposed project's potential to foster economic or population growth, including ways in which a project could remove an obstacle to growth. Growth does not necessarily create significant physical changes to the environment. However, depending upon the type, magnitude, and location of growth, it can result in significant adverse environmental effects.

5.1 POPULATION AND ECONOMIC GROWTH

The proposed project involves five campus development projects and two revisions to the Master Plan design guidelines and design thresholds. As noted in Section 2.0, *Project Description*, the proposed Campus Master Plan amendments would not directly generate growth in enrollment, faculty, or staffing as they are intended to accommodate the current and future needs of the campus population. Housing dormitories rehabilitated or reconstructed through the proposed project would provide the same number of beds as the existing uses.

Although the proposed project would not generate an increase in the local population, the Caltech campus is anticipated to experience a general growth in onsite students, faculty, and staff over time that would be in part accommodated by the currently proposed facility expansions. As shown in Tables 2-3 and 2-4 in Section 2.0, *Project Description*, the undergraduate student population is expected to remain essentially static, while the graduate student population could grow approximately 10% above current enrollment, and total faculty-staff campus population could grow between 350 and 550 (approximately 10% to 15%) to 6,100-6,400 by 2014-15..

Theincrease in campus population represents about a 0.04% population increase over the current City of Pasadena population of about 146,600 (City of Pasadena, 2006) and 7%-11% increase over the current campus population. The increase in campus faculty and staff would be within the projected 27.3% increase in occupation estimated by the Southern California Association of Governments. This level of population growth would not change the demographic character of the City or exceed citywide population projections.

5.2 REMOVAL OF OBSTACLES TO GROWTH

The project site is located within a highly urbanized area that is well-served by existing infrastructure. No improvements to water, sewer and drainage infrastructure would be required to accommodate the proposed project. No new roads would be required. Because the project constitutes infill development within an urbanized area, and does not require the extension of new infrastructure through undeveloped areas, project implementation would not remove an obstacle to growth.

6.0 ALTERNATIVES

As required by Section 15126.6 of the *CEQA Guidelines,* this EIR examines a range of reasonable alternatives to the proposed project. Included in this analysis are two alternatives that involve different development configurations on the site and the CEQA-required "no project" alternative. The alternatives are listed below:

- *No Project Alternative*
- *Reduced Massing Alternative*
- *Limited Location Alternative*
- *Reduced Massing and Limited Location*

Each of the various alternatives is described below along with the relative impact analysis. The impact analysis for each alternative is limited to the impacts that would be reduced by the respective alternative as compared with the proposed project. This assumes all other aspects are consistent with the proposed project and any impacts not discussed below are not altered. This section also evaluates the feasibility of similar development at alternative locations and, as required by CEQA, includes a discussion of the "environmentally superior alternative" among those studied. Table 6.1 summarizes the characteristics of the alternatives.

6.1 NO PROJECT ALTERNATIVE

6.1.1 Description

This alternative assumes that there are no new amendments to the Master Plan and that buildout on the campus would continue as provided within the current Master Plan. Thus, the Mead Lab would not be demolished and the open space area between Noyes and Beckman Labs would be preserved; the North Undergraduate Houses would not be demolished; the Braun and Marks Graduate Houses would not be demolished; and the Physical Plant Offices and Shops would not be demolished. Additionally, there would be no amendments to the design guidelines and, thus, no revision to the Master Plan's Design Review thresholds matching them with the City's current design review procedures

6.1.2 Impact Analysis

Because this alternative would not involve a change in land use, no change in environmental conditions would occur. Thus, the project's potentially significant impacts relating to aesthetics, biology, historic resources, , and utilities and service systems would be avoided. Overall, this alternative's impact would be less than that of the proposed project and the mitigation measures recommended for the proposed project would not apply. It should be noted, however, that all of the environmental impacts associated with the proposed project are either insignificant or can be reduced to a less than significant level through implementation of recommended measures. In addition, implementation of the no project alternative at this time would not preclude the future development of the sites where Master Plan amendments are proposed.

Alternative			Amendment					
			1		2		3	4
			Chemistry and Chemical Engineering Lab		North Undergraduate Houses		Braun & Marks	Campus Center
			Location 1	Location 2	Rehab	Recons		
Proposed Project	footprint	(1,000 sf)	16	16	71	38	15	20
	GSF	(1,000 sf)	80	80	138	138	55	100
	setbacks	feet	Match BBB Lab	85 ft from Wilson Ave/ match Braun Lab	expand 95 ft east	expand 35 ft east	27 ft to the east, 15 feet to the west	41 ft from Holliston
No Project	footprint	(1,000 sf)	0	8	40	-	9	33
	GSF	(1,000 sf)	0	8	68	-	22	37
	setbacks	feet	NA	existing	existing	NA	existing	existing -60 ft from Holliston
Reduced Massing	footprint	(1,000 sf)	16	16	40	40	15	20
	GSF	(1,000 sf)	80	80	68	68	55	100
	setbacks	feet	Match BBB Lab	85 feet from Wilson Ave/ match Braun Lab	existing	existing	27 ft to the east, 15 feet to the west	41 ft from Holliston
Limited Location	footprint	(1,000 sf)	NA	16	71	38	15	20
	GSF	(1,000 sf)	NA	80	138	138	55	100
	setbacks	feet	NA	85 feet from Wilson Ave/ match Braun Lab	expand 95 ft east	expand 35 ft east	27 ft to the east, 15 feet to the west	41 ft from Holliston
Reduced Massing and Limited Location	footprint	(1,000 sf)	NA	16	40	40	15	20
	GSF	(1,000 sf)	NA	80	68	68	55	100
	setbacks	feet	NA	85 feet from Wilson Ave/ match Braun Lab	existing	existing	27 ft to the east, 15 feet to the west	41 ft from Holliston

6.2 REDUCED MASSING PROJECT ALTERNATIVE

6.2.1 Description

This alternative would involve reduced massing for the reconstruction/rehabilitation of the North Undergraduate housing facilities. This alternative would restrict reconstruction or rehabilitation of the North Undergraduate facility to its current boundaries and would require that the development not exceed its existing setbacks from adjacent open space and view corridors. Specifically, this alternative would prevent the expansion of the houses to the east, across an existing structured open space and view corridor. Otherwise, this alternative would be identical to the proposed project and would include all other proposed amendments.

6.2.2 Impact Analysis

Because the projected growth in campus population would be the same under this alternative as under the proposed project, this alternative's impacts with respect to traffic, air quality, and utility and service systems would be identical to those of the proposed project. The issues for which this alternative would result in impacts different than those of the proposed project (aesthetics, biological resources, and historic resources) are discussed below.

a. Aesthetics. This alternative would reduce significant impacts to scenic resources such as native and specimen trees, open space and view corridors near the North Undergraduate Housing facilities and nearby buildings such as the Athenaeum. The restriction on development of the North Undergraduate Housing facilities to within the current site coverage and existing setbacks would avoid the removal of approximately 20-25 trees adjacent to the existing structures. This would reduce the impacts associated with the loss of landscaping trees, which generally soften the appearance of such developments and serve to unify adjacent buildings.

By limiting massing and expansion of the North Undergraduate Housing facilities, impacts to adjacent open spaces and view corridors, which serve as pedestrian walkways, student gathering, and lounging areas, would be minimized. This massing reduction would help lessen the impacts to the overall visual character, by maintaining higher consistency with density and scale of Caltech's original campus. The mitigation measures recommended for the proposed project would apply.

b. Biological Resources. This alternative would restrict redevelopment/rehabilitation to the current site coverage area of the North Undergraduate Houses. An estimated 20-25 trees, 16 of which would be considered native or specimen trees, are located within the proposed building envelope for the redevelopment of the facilities. Many of these trees are protected under the Pasadena *City Trees and Tree Protection Ordinance*. Constraining the reconstruction or rehabilitation to within the existing footprint would minimize the impacts of the proposed project on the protected trees adjacent to the current North Undergraduate Housing facilities. This alternative would reduce the effects to native and specimen trees, thus reducing overall impacts to biological resources. The mitigation measures recommended for the proposed project would apply and would reduce this alternative's impacts to a less than significant level.

c. Historic Resources. This alternative would reduce potential adverse affects to buildings and landscape design elements within the proximity of the North Undergraduate Houses. Restricting the redevelopment to within the footprint of the existing facilities would help limit the effects to the South Undergraduate Houses, the Athenaeum and the adjacent landscape design for the Athenaeum, which could be eligible for listing on the NRHP, CRHR or as City of Pasadena Landmarks.

6.3 LIMITED LOCATION PROJECT ALTERNATIVE

6.3.1 Description

This alternative would limit development of the Chemistry and Chemical Engineering Laboratory (CCE Lab) to the area occupied by the Mead Laboratory and adjacent parking lot, Location 2. This would prevent development within the open space area between the Beckman Behavioral Biology (BBB) Laboratory and the Noyes Laboratory, Location 1. Thus, this alternative would avoid impacts related to removal of unstructured, heavily planted open space, an art element, and numerous native and specimen trees. This alternative assumes that all other amendments, guidelines and CMDP developments would be identical to those of the proposed project.

6.3.2 Impact Analysis

Because the projected growth in campus population would be the same under this alternative as under the proposed project, this alternative's impacts with respect to traffic, air quality, and utility and service systems would be identical to those of the proposed project. The issues for which this alternative would result in impacts different than those of the proposed project (aesthetics, biological resources, and historic resources) are discussed below.

a. Aesthetics. Development of the CEE Laboratory at Location 2 would avoid the impacts to native and specimen trees associated with the development of the CEE Lab at Location 1, approximately 12 of which are present at that location. Avoiding development at Location 1 would also avoid the adverse impact to the art element, which is recognized in the Cultural and Recreational Element of the City of Pasadena Comprehensive General Plan and the CMDP as a scenic resource. The impacts to scenic resources associated with the reduction of open space and encroachment into the landscaped boulevard along the axis in which Location 1 is situated would also be avoided by developing the CEE Lab at location 2. Restricting development of the proposed CEE Lab to Location 2 would reduce impacts to scenic resources, including specimen trees, open space, and an art element. By avoiding these adverse effects, this alternative would reduce overall impacts to aesthetic resources. The mitigation measures recommended for the proposed project would apply and would reduce aesthetic impacts to a less than significant level.

b. Biological Resources. This alternative would avoid the impacts to native and specimen trees associated with the construction of the CEE Lab at Location 1. At least 12 native and specimen trees are located within or adjacent to the building envelope proposed for the CEE Lab at Location 1, including one 25 foot tall native Coast Live Oak. This alternative would restrict the development of the CEE Lab to an area of campus that is already structured and paved, and thus does not support any native or specimen trees. By avoiding development at

Location 1, this alternative would reduce impacts to protected native and specimen trees, thus reducing overall impacts to biological resources. The mitigation measures recommended for the proposed project would apply and would reduce this alternative's biological resource impacts to a less than significant level.

c. Historic Resources. This alternative would limit development of the CCE Laboratory to the area occupied by the Mead Laboratory and adjacent parking lot, Location 2. The building does not appear to be eligible for state, federal or local listing based as a historic resource and thus development of this alternative would not have an impact on a historic resource.

6.4 REDUCED MASSING AND LIMITED LOCATION PROJECT ALTERNATIVE

6.4.1 Description

This alternative would combine the Reduced Massing and Limited Location Alternatives. Similar to the Reduced Massing alternative, this alternative would restrict reconstruction or rehabilitation of the the North Undergraduate facility to its current boundaries and would restrict the development to its existing setbacks from adjacent open space and view corridors. Similar to the Limited Location alternative, it would also limit development of the Chemistry and Chemical Engineering Laboratory (CCE Lab) to the area occupied by the Mead Laboratory and adjacent parking lot, Location 2. Otherwise, this alternative would be identical to the proposed project.

6.4.2 Impact Analysis

Because the projected growth in campus population would be the same under this alternative as under the proposed project, this alternative's impacts with respect to traffic, air quality, and utility and service systems would be identical to those of the proposed project. The issues for which this alternative would result in impacts different than those of the proposed project (aesthetics, biological resources, and historic resources) are discussed below.

a. Aesthetics. This alternative would reduce significant impacts to scenic resources such as native and specimen trees, open space and view corridors near the North Undergraduate Housing facilities and the areas between the Noyes and Beckman Laboratory. This alternative would be more sensitive to the original campus' visual character, massing and established open space through the preservation of established areas of open space, view corridors, up to 49 trees, including at least 18 native and specimen trees, and a public art element. The mitigation measures recommended for the proposed project would apply.

b. Biological Resources. This alternative would avoid the impacts to native and specimen trees associated with the construction of the CEE Lab at Location 1 and the North Undergraduate Houses. By reducing massing of the North Undergraduate Houses and limiting development of the CCE Lab to location 1, the alternative would protect an estimated 28 native and specimen trees that would be removed under the proposed project. Thus, this alternative reduces impacts to protected native and specimen trees. The mitigation measures

recommended for the proposed project would apply. This alternative would reduce the effects to native and specimen trees, thus reducing overall impacts to biological resources. With project mitigation measures, this alternative's biological resource impacts would be reduced to a less than significant level.

c. Historic Resources. This alternative would reduce potential adverse affects to buildings and landscape design elements within the proximity of the North Undergraduate Houses. Restricting the redevelopment to within the footprint of the existing facilities would help limit the effects to the South Undergraduate Houses, the Athenaeum and the adjacent landscape design for the Athenaeum, which could be eligible for listing on the NRHP, CRHR or as City of Pasadena Landmarks.

6.5 ALTERNATIVE SITE ANALYSIS

The California Supreme Court, in *Citizens of Goleta Valley v. Board of Supervisors* (1990), indicates that a discussion of alternative sites is needed if the project "may be feasibly accomplished in a successful manner considering the economic, environmental, social, and technological factors involved" at another site.

As suggested in *Goleta,* several criteria form the basis of whether alternative sites need to be considered in detail. These criteria take the form of the following questions:

1. *Could the size and other characteristics of another site physically accommodate the project?*
2. *Is another site reasonably available for acquisition?*
3. *Is the timing of carrying out development on an alternative site reasonable for the applicant?*
4. *Is the project economically feasible on the alternative site?*
5. *Is the land use designation of the alternative site compatible with the project?*
6. *Does the lead agency have jurisdiction over the alternative site?*
7. *Are there any social, technological, or other factors that may make the alternative site infeasible?*

Other sites located throughout Pasadena would potentially meet one or two of the criteria outlined in the *Goleta* decision. However, no other sites that would meet the size, cost, and land use designation criteria needed to accommodate the project are known to be available for acquisition at this time. Moreover, given the time and expense that have already been invested in the project site and the fact that Caltech is an established institution in its current location, implementing the project at another site may not be feasible from a timing or economic standpoint. Consequently, very few other sites could potentially meet any criteria especially criteria 2, 3, 4, or 5. Additionally, because no unavoidably significant impacts have been identified for the proposed project, moving the project to an alternate location would not avoid any impacts that cannot be avoided through imposition of recommended mitigation measures. Therefore, discussion of alternative sites is not warranted.

6.6 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

As required by CEQA, this section identifies the environmentally superior alternative.

The No Project alternative would involve no change to the environment and would have no environmental impacts. It is therefore considered environmentally superior overall. It should be noted, however, that this alternative would not preclude future development of the sites currently proposed for development. In addition, this alternative fails to achieve the stated project objectives.

Among the development alternatives, the Reduced Massing and Limited Location Alternative would have the least overall impact, as it would reduce and avoid impacts to open space areas, visual corridors, an art element, and historic resources. This alternative would avoid removal of up to 49 trees, including at least 18 native and specimen trees, and reduce potential adverse affects to campus elements that may be eligible for listing as historic resources of national, state or local importance. This alternative would reduce aesthetic and biological, and historic impacts. Thus, the environmentally superior alternative among the development alternatives would be the Reduced Massing and Limited Location Alternative.

The Limited Location Project alternative would reduce impacts due to restriction of the CEE Lab to a previously structured location (Location 2). This alternative would decrease affects to aesthetic and biological resources by avoiding some protected trees, as well as open space and view corridors and an art element. The Reduced Massing Project alternative would reduce overall impacts, and would preserve aesthetic, biological and historic resources. Overall the benefits from these alternatives would be less then the benefits from the environmentally superior alternative, the Reduced Massing and Limited Location Alternative. Table 6-2 compares the impacts under the various alternatives.

Table 6-2 Comparison of Alternatives' Impacts

Issue	Proposed Project	Alt 1 (No Project)	Alt 2 Reduced Massing	Alt 3 Limited Location	Alt 4 Reduced Massing & Limited Location
Aesthetics					
Trees	II	IV / +	II / +	II / +	II / +
Public Art Element	II	IV / +	II / =	IV / +	IV / +
Open Space/View Corridor	III	IV / +	III / +	III / +	III / +
Massing	III	IV / +	III / +	III / =	III / +
Air Quality					
Construction	II	IV / +	II / =	II / =	II / =
Operational	III	III / =	III / =	III / =	III / =
Biology					
Native and Specimen Trees	II	IV / +	II / +	II / +	II / +
Historic Resources					
Ineligible Buildings	III	III / +	III / =	III / =	III / =
Potentially Eligible Elements	II	III / +	IV / +	III / =	IV / +
Traffic & Circulation					
Area Intersections	III	III / =	III / =	III / =	III / =
Area Roadways	III	III / =	III / =	III / =	III / =
On-Campus Parking	III	III / =	III / =	III / =	III / =
CMP Routes	III	III / =	III / =	III / =	III / =
Utilities & Service Systems					
Water Reclamation Facilities	III	IV / +	III / =	III / =	III / =
Waste Water Conveyance	III	IV / +	III / =	III / =	III / =
Water Demand	III	IV / +	III / =	III / =	III / =

Key: Class I, unavoidably significant; Class II, significant but mitigable; Class III, less than significant; and Class IV, no impact.
+ Superior to the proposed project; - Inferior to the proposed project; = About the same as the proposed project

7.0 REFERENCES AND REPORT PREPARERS

7.1 REFERENCES

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7.2 REPORT PREPARERS

This EIR was prepared by the City of Pasadena Planning Department with the assistance of Rincon Consultants, Inc. Lanny Woo, Associate Planner, managed the EIR for the City. Consultant staff involved in the preparation of the EIR are listed below.

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Appendix A

Tree Inventory, Protected Tree List

Proposed tree removal for the new CCE Laboratory (Amendment 1)

Tree #	Scientific Name	Common Name	DBH	Height	Spread	Native	Specimen	Comments
1	Platanus racemosa	California Sycamore	16" & 18"	35'	30'	X		
2	Platanus racemosa	California Sycamore	16"	35'	30'	X		
3	Platanus racemosa	California Sycamore	9" & 12"	25'	20'	X		
4	Platanus racemosa	California Sycamore	14"	35'	20'	X		
5	Platanus racemosa	California Sycamore	20"	40'	35'	X		
6	Quercus agrifolia	Coast Live Oak	24"	25'	25'	X		
7	Platanus racemosa	California Sycamore	13"	40'	15'	X		
8	Platanus racemosa	California Sycamore	20"	40'	30'	X		
9	Platanus racemosa	California Sycamore	12"	40'	15'	X		
10	Platanus racemosa	California Sycamore	17"	45'	25'	X		
11	Platanus racemosa	California Sycamore	13" & 17"	45'	30'	X		
12	Jacaranda mimosifolia	Jacaranda	6" & 9"	20'	15'		X	under protected dbh size
13	Jacaranda mimosifolia	Jacaranda	11"	15'	8'		X	under protected dbh size
14	Jacaranda mimosifolia	Jacaranda	12", 13" & 10"	25'	25'		X	
15	Tipuana tipu	Tipu	15" & 18"	35'	25'			
16	Jacaranda mimosifolia	Jacaranda	8" & 9"	20'	15'		X	under protected dbh size
17	Jacaranda mimosifolia	Jacaranda	8" & 10"	25'	15'		X	under protected dbh size
18	Jacaranda mimosifolia	Jacaranda	11"	25'	10'		X	under protected dbh size
19	Jacaranda mimosifolia	Jacaranda	9"	15'	8'		X	under protected dbh size
20	Jacaranda mimosifolia	Jacaranda	8"	20'	10'		X	under protected dbh size
21	Jacaranda mimosifolia	Jacaranda	9" & 10"	25'	20'		X	under protected dbh size
22	Tipuana tipu	Tipu	11"	25'	10'			
23	Tipuana tipu	Tipu	12"	25'	15'			
24	Tipuana tipu	Tipu	13" & 15"	30'	15'			
25	Pinus canariensis	Canary Island Pine	16"	55'	10'		X	under protected dbh size
26	Pinus canariensis	Canary Island Pine	14"	55'	10'		X	under protected dbh size
27	Pinus canariensis	Canary Island Pine	19"	55'	10'		X	under protected dbh size
28	Pinus canariensis	Canary Island Pine	15"	55'	10'		X	under protected dbh size
29	Pinus canariensis	Canary Island Pine	28"	45'	15'		X	
30	Jacaranda mimosifolia	Jacaranda	8"	20'	10'		X	under protected dbh size
31	Jacaranda mimosifolia	Jacaranda	11"	20'	15'		X	under protected dbh size
32	Platanus racemosa	California Sycamore	17"	45'	20'	X		
33	Platanus racemosa	California Sycamore	21"	45'	20'	X		
34	Platanus racemosa	California Sycamore	19"	25'	25'	X		
35	Platanus racemosa	California Sycamore	17"	25'	20'	X		
36	Platanus racemosa	California Sycamore	20"	40'	25'	X		
37	Platanus racemosa	California Sycamore	10" & 15"	30'	20'	X		
38	Platanus racemosa	California Sycamore	12" & 14"	35'	30'	X		
39	Platanus racemosa	California Sycamore	15"	45'	20'	X		

40	Juniperus chinensis 'Torulosa'	Hollywood Juniper	16"	15'	10'			
41	Juniperus chinensis 'Torulosa'	Hollywood Juniper	9"	10'	5'			
42	Platanus racemosa	California Sycamore	14"	30'	25'	X		
43	Platanus racemosa	California Sycamore	11"	25'	15'	X		
44	Platanus racemosa	California Sycamore	15"	25'	15'	X		
45	Platanus racemosa	California Sycamore	16"	30'	25'	X		
46	Platanus racemosa	California Sycamore	22"	35'	20'	X		
47	Platanus racemosa	California Sycamore	20"	45'	30'	X		
48	Platanus racemosa	California Sycamore	15"	20'	15'	X		
49	Platanus racemosa	California Sycamore	20"	30'	20'	X		

Proposed tree removal for the new Braun and Marks Graduate Houses

Tree #	Scientific Name	Common Name	DBH	Height	Spread	Native	Specimen	Comments
3	Sequoia sempervirens	Coast Redwood	9"	30'	15'		X	under protected dbh size
4	Eucalyptus citriodora	Lemon-scented Gum	21"	60'	25'		X	under protected dbh size
5	Phoenix canariensis	Canary Island Date Palm	26"	30'	15'			

Proposed tree removal for the new Campus Center

Tree #	Scientific Name	Common Name	DBH	Height	Spread	Native	Specimen	Comments
1	Chorisia insignis	White Floss Silk Tree	28"	40'	35'		X	
2	Pittosporum undalatum	Victorian Box Pittosporum	13"	30'	20'		X	

Proposed tree removal for the North Undergraduate Houses (reconstruction: 35 feet east)

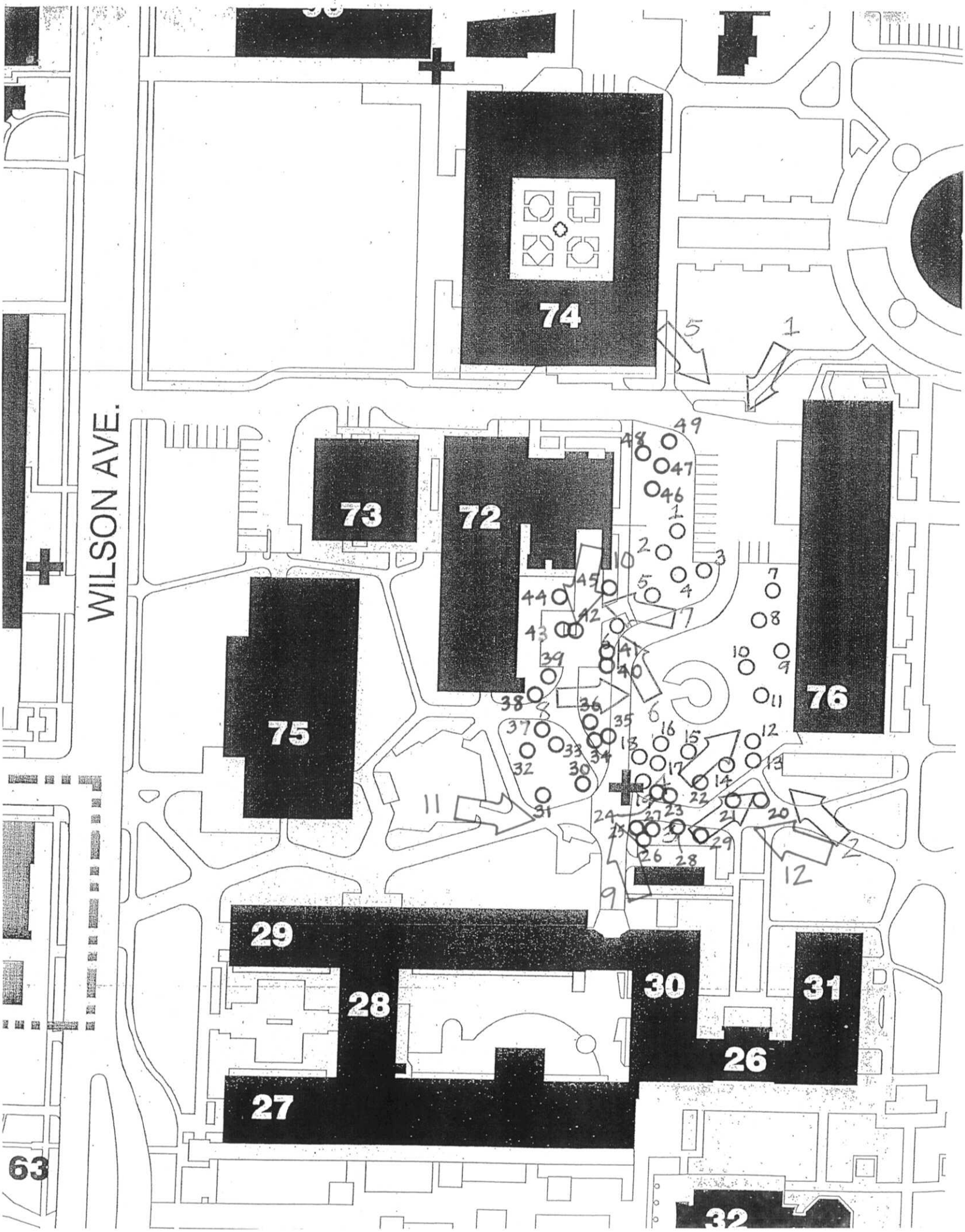
Tree #	Scientific Name	Common Name	DBH	Height	Spread	Native	Specimen	Comments
6	Washingtonia robusta	Mexican Fan Palm	13"	20'	12'			
7	Washingtonia robusta	Mexican Fan Palm	12"	15'	10'			
8	Pinus halepensis	Aleppo Pine	13"	35'	25'		X	under protected dbh size
9	Cedrus deodara	Deodar Cedar	24"	60'	30'		X	under protected dbh size
10	Cedrus deodara	Deodar Cedar	28"	70'	30'		X	
11	Quercus engelmannii	Engelmann Oak	29"	50'	50'	X		
12	Quercus agrifolia	Coast Live Oak	9"	25'	15'	X		
13	Cinnamomum camphora	Camphor Tree	20"	35'	30'		X	under protected dbh size
14	Quercus agrifolia	Coast Live Oak	28"	30'	30'	X		
15	Cedrus deodara	Deodar Cedar	32"	60'	45'		X	
16	Quercus engelmannii	Engelmann Oak	28"	25'	30'	X		
17	Jacaranda mimosifolia	Jacaranda	20"	30'	30'		X	

18	Jacaranda mimosifolia	Jacaranda	16"	20'	20'		X	
19	Jacaranda mimosifolia	Jacaranda	10"	25'	25'		X	under protected dbh size
20	Cassia leptophylla	Gold Medallion Tree	9"	20'	15'			
21	Cassia leptophylla	Gold Medallion Tree	9"	20'	15'			
22	Platanus racemosa	California Sycamore	22"	50'	20'	X		
23	Platanus racemosa	California Sycamore	24"	50'	20'	X		
24	Platanus racemosa	California Sycamore	19"	50'	20'	X		
25	Platanus racemosa	California Sycamore	22"	50'	20'	X		
26	Platanus racemosa	California Sycamore	18"	50'	20'	X		
27	Platanus racemosa	California Sycamore	19"	50'	20'	X		
28	Liquidambar styraciflua	American Sweet Gum	18"	30'	15'			
29	Liquidambar styraciflua	American Sweet Gum	9"	15'	6'			

Proposed tree removal for the North Undergraduate Houses (rehabilitation: 95 feet east)

Tree #	Scientific Name	Common Name	DBH	Height	Spread	Native	Specimen	Comments
6	Washingtonia robusta	Mexican Fan Palm	13"	20'	12'			
7	Washingtonia robusta	Mexican Fan Palm	12"	15'	10'			
8	Pinus halepensis	Aleppo Pine	13"	35'	25'		X	under protected dbh size
9	Cedrus deodara	Deodar Cedar	24"	60'	30'		X	under protected dbh size
10	Cedrus deodara	Deodar Cedar	28"	70'	30'		X	
11	Quercus engelmannii	Englemann Oak	29"	50'	50'	X		
12	Quercus agrifolia	Coast Live Oak	9"	25'	15'	X		
13	Cinnamomum camphora	Camphor Tree	20"	35'	30'		X	under protected dbh size
14	Quercus agrifolia	Coast Live Oak	28"	30'	30'	X		
15	Cedrus deodara	Deodar Cedar	32"	60'	45'		X	
16	Quercus engelmannii	Engelmann Oak	28"	25'	30'	X		
17	Jacaranda mimosifolia	Jacaranda	20"	30'	30'		X	
18	Jacaranda mimosifolia	Jacaranda	16"	20'	20'		X	
19	Jacaranda mimosifolia	Jacaranda	10"	25'	25'		X	under protected dbh size
20	Cassia leptophylla	Gold Medallion Tree	9"	20'	15'			
21	Cassia leptophylla	Gold Medallion Tree	9"	20'	15'			
22	Platanus racemosa	California Sycamore	22"	50'	20'	X		
23	Platanus racemosa	California Sycamore	24"	50'	20'	X		
24	Platanus racemosa	California Sycamore	19"	50'	20'	X		
25	Platanus racemosa	California Sycamore	22"	50'	20'	X		
26	Platanus racemosa	California Sycamore	18"	50'	20'	X		
27	Platanus racemosa	California Sycamore	19"	50'	20'	X		
28	Liquidambar styraciflua	American Sweet Gum	18"	30'	15'			
29	Liquidambar styraciflua	American Sweet Gum	9"	15'	6'			
30	Cedrus deodara	Deodar Cedar	27"	75'	30'		X	

31	Cedrus deodara	Deodar Cedar	30"	75'	30'		X	
32	Cedrus deodara	Deodar Cedar	24"	70'	30'		X	under protected dbh size
33	Washingtonia robusta	Mexican Fan Palm	18"	35'	10'			
34	Cedrus deodara	Deodar Cedar	24"	70'	30'		X	under protected dbh size
35	Magnolia grandiflora	Southern Magnolia	9"/12"	25'	15'		X	under protected dbh size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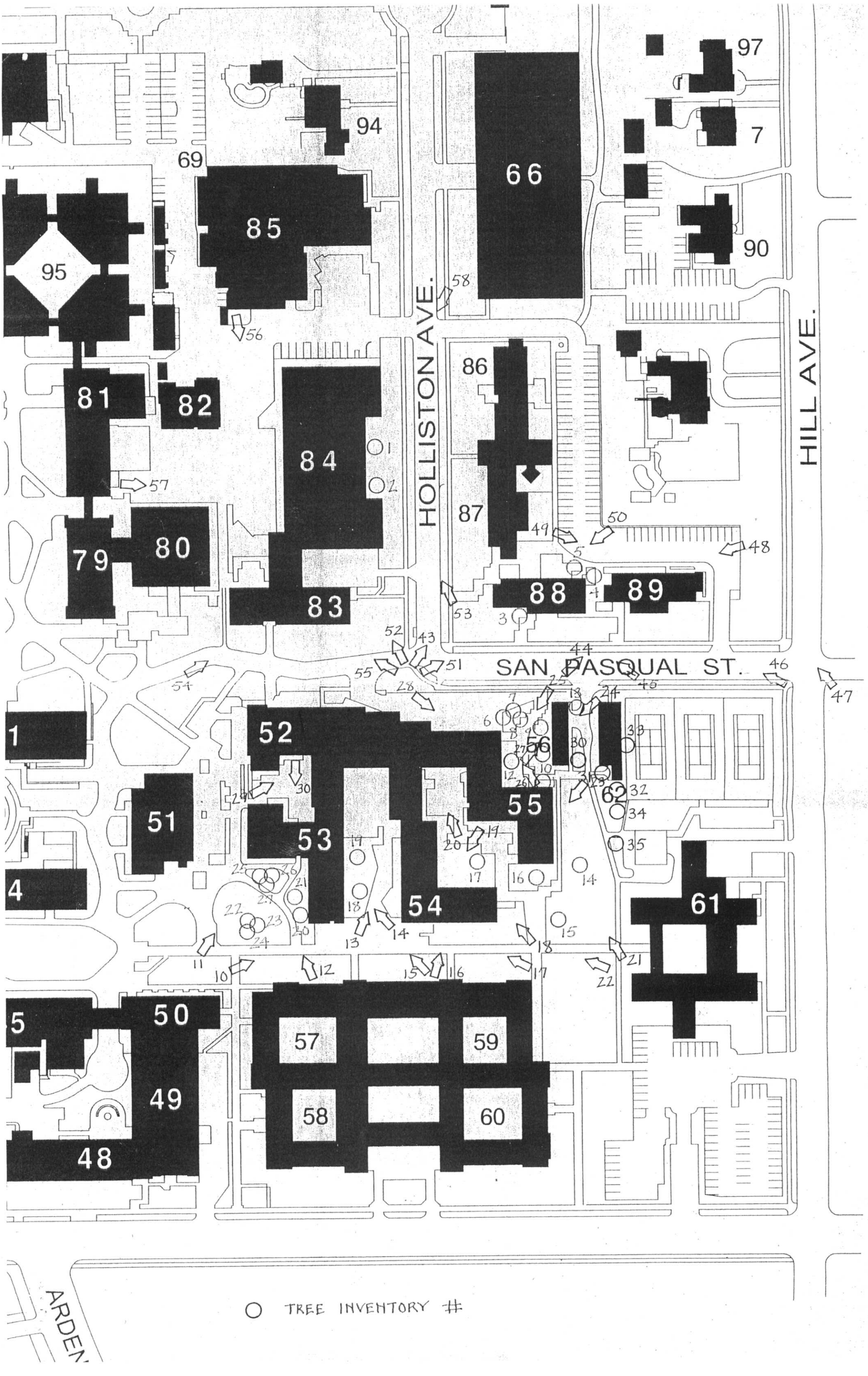
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TREE INVENTORY #

Protected Trees under MPC 8.52

GENUS	SPECIES	COMMON NAME	Size Requirement
Acacia	baileyana	Purple Bailey Acacia	12"
Acacia	cultriformis	Knife Acacia	12"
Acer	macrophyllum	Bigleaf Maple	12"
Acer	buergeranum	Trident Maple	12"
Acer	negundo	Boxleaf Maple	12"
Acer	palmatum	Japanese Maple	12"
Aesculus	carnea	Red Horse Chestnut	12"
Aesculus	hippocastanum	Horse Chestnut Tree	12"
Agathis	robusta	Queensland Kauri	25"
Agonis	flexuosa	Peppermint Tree	12"
Albizia	julibrissin	Mimosa Tree	25"
Angophora	costata	Gum Myrtle	25"
Araucaria	heterophylla	Star Pine	20"
Araucaria	araucana	Monkey Puzzle Tree	25"
Araucaria	bidwillii	Bunya-Bunya Tree	25"
Araucaria	cunninghamii	Hoop Pine	25"
Arbutus	unedo	Strawberry Tree	12"
Archontophoenix	cunninghamiana	King Palm	20 ' tall (brown trunk)
Bauhinia	blakeana	Hong Kong Orchid Tree	12"
Bauhinia	candida	White Orchid Tree	12"
Bauhinia	variegata	Variegated Orchid Tree	12"
Brachychiton	acerifolius	Australian Flame Tree	25"
Brachychiton	discolor	Hat Tree	25"
Brahea	edulis	Guadalupe Palm	10 ' tall (brown trunk)
Brahea	armata	Mexican Blue Palm	10' tall (brown trunk)
Butia	capitata	Pindo Palm	10' tall (brown trunk)
Callistemon	viminalis	Weeping Bottlebrush	12"
Calocedrus	decurrens	Incense Cedar	12"
Calodendrum	capense	Cape Chestnut	12"
Camellia	sp.	Camellia	8"
Cassia	excelsa	Crown of Gold	12"
Casaurina	equisetifolia	Horsetail Tree	25"
Casaurina	cunninghamianan	River She-Oak	25"
Casaurina	stricta	Beefwood	25"
Catalpa	speciosa	Western Catalpa	25"
Cedrus	deodara	Deodar Cedar	25"
Cedrus	atlantica	Atlas Cedar	25"
Cercis	canadensis	Eastern Redbud	8"
Cercis	occidentalis	Western Redbud	8"
Chamaerops	humilis	European Fan Palm	20' tall
Chitalpa	tashkentensis	Chitalpa	12"
Chorisia	insignis	White Floss Silk	25"
Chorisia	speciosa	Floss Silk	25"
Cinnamomum	camphora	Camphor	25"
Cocculus	laurifolius	Laurel Leafed Snail Seed	12"
Dombeya	cacumium	Dombeya	20"
Dracaena	draco	Dragon Tree	12"
Erythrina	caffra	Coral Tree	25"
Erythrina	coralloides	Naked Coral Tree	25"
Erythrina	crista-galli	Cockspur Coral Tree	12"
Eucalyptus	claudocalyx	Sugar Gum	20"

Eucalyptus	doltsopa	Mindinao Gum	20"
Eucalyptus	sideroxylon	Ironbark	20"
Eucalyptus	citriodora	Lemon Scented Gum	30"
Eucalyptus	ficifolia	Red Flowering Gum	25"
Eucalyptus	nicholii	Willow Leafed Peppermint	25"
Eucalyptus	leucoxylon	White Ironbark	25"
Eucalyptus	parvifloria	Small Leaved Gum	25"
Ficus	macrophylla	Morton Bay Fig	30"
Ficus	microcarpa 'Nitida'	Indian Laurel Fig	30"
Fraxinus	oxycarpa	Raywood Ash	30"
Fremontodendron	californicum	Flannel Bush	12"
Geijera	parviflora	Australian Willow	12"
Ginkgo	biloba	Maidenhair Tree	25"
Grevillea	robusta	Silk Oak	20"
Heteromeles	arbutifolia	Toyon	10"
Jacaranda	mimosifolia	Jacaranda	12"
Juglans	regia	English Walnut	25"
Juglans	nigra	Black Walnut	25"
Koelreuteria	bipinnata	Chinese Flame Tree	15"
Lagerstroemia	indica	Crepe Myrtle	12"
Leptospermum	laevigatum	Australian Tea Tree	12"
Liriodendron	tulipfera	Tulip Tree	15"
Lithocarpus	densiflora	Tanbark Oak	25"
Livistona	chinensis	Chinese Fan Palm	15' tall
Livistona	australis	Australian Cabbage Palm	15' tall
Magnolia	grandiflora	Southern Magnolia	25"
Melaleuca	linariifolia	Flax Leafed Paperbark	25"
Melaleuca	quinquenervia	Cajeput Tree	25"
Michelia	doltsopa	No Common Name	12"
Nuxia	floribunda	Kite Tree	12"
Olea	europea	Olive	12"
Phoenix	reclinata	Senegal Date Palm	10 ' tall (brown trunk)
Pinus	halepensis	Aleppo Pine	20"
Pinus	canariensis	Canary Island Pine	25"
Pinus	pinea	Italian Stone Pine	25"
Pinus	torreyana	Torrey Island Pine	25"
Pittosporum	undulatum	Victorian Box	12"
Platanus	acerifolia	London Plane Tree	15"
Podocarpus	gracilior	Fern Pine	20"
Pseudotsuga	menziesii	Douglas Fir	25"
Quercus	kelloggii	California Black Oak	12"
Quercus	douglasii	Blue Oak	12"
Quercus	macrocarpa	Burr Oak	12"
Quercus	robur	English Oak	12"
Quercus	rubra	Red oak	12"
Quercus	suber	Cork Oak	12"
Quercus	virginiana	Southern Live Oak	12"
Schinus	molle	California Pepper	20"
Sequoia	sempervirens	Redwood	25"
Stenocarpus	sinuatus	Firewheel Tree	12"
Syzygium	paniculata	Eugenia	12"
Tabebuia	avellanedae	Lavendar Tabebuia	10"
Tabebuia	ipe	Pink Trumpet	10"
Trachycarpus	fortunei	Chinese Windmill Palm	15' tall
Tristania	conferta	Brisbane Box	20"
Ulmus	parvifolia	Chinese Elm	25"
Washingtonia	filifera	California Fan Palm	35' tall (brown trunk)
	13 Native Trees		
Aesculus	californica	California Buckeye	8"
Platanus	racemosa	California Sycamore	8"
Salix	lasiolepis	Arroyo Willow	8"
Quercus	agrifolia	Coast Live Oak	8"
Quercus	lobata	Claifornia White (Valley) Oak	8"
Populus	fremontii	Western Cottonwood	8"
Alnus	rhobifolia	White Alder	8"
Umbellularia	californica	California Laurel	8"
Quercus	engelmannii	Engelmann Oak	8"
Populus	trichocarpa	Black Cottonwood	8"
Quercus	berberidifolia	Scrub Oak	8"
Quercus	Chrysolepis	Canyon Live Oak	8"
Juglans	californica	California Black Walnut	8"

Appendix B

Air Quality Data

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Program Files\URBEMIS 2002 Version 8.7\Projects2k2\Pasadena Construction all phases.urb
Project Name: Pasadena Caltech Construction
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

CONSTRUCTION EMISSION ESTIMATES

***** 2006 *****	**ROG**	**NOx**	**CO**	**SO2**	**PM10 TOTAL**	**PM10 EXHAUST**	**PM10 DUST**
TOTALS (lbs/day,unmitigated)	5.87	60.18	39.66	0.52	16.43	2.06	14.37
TOTALS (lbs/day, mitigated)	5.87	48.16	39.64	0.52	16.43	2.06	14.37

***** 2007 *****	**ROG**	**NOx**	**CO**	**SO2**	**PM10 TOTAL**	**PM10 EXHAUST**	**PM10 DUST**
TOTALS (lbs/day,unmitigated)	298.92	34.76	54.39	0.01	11.11	1.08	10.03
TOTALS (lbs/day, mitigated)	64.35	27.81	54.23	0.01	6.22	0.22	6.00

***** 2008 *****	**ROG**	**NOx**	**CO**	**SO2**	**PM10 TOTAL**	**PM10 EXHAUST**	**PM10 DUST**
TOTALS (lbs/day,unmitigated)	294.11	0.53	11.20	0.00	0.19	0.01	0.18
TOTALS (lbs/day, mitigated)	59.54	0.52	11.06	0.00	0.19	0.01	0.18

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: June, 2006
Construction Duration: 19.5
Total Land Use Area to be Developed: 3.25 acres
Maximum Acreage Disturbed Per Day: 1 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 523000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

	ROG	**NOx**	**CO**	**SO2**	**PM10 TOTAL**	**PM10 EXHAUST**	**PM10 DUST**
***** 2006*****							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	14.24	-	14.24
Off-Road Diesel	4.20	30.99	31.92	-	1.37	1.37	0.00
On-Road Diesel	1.60	29.10	5.98	0.52	0.82	0.69	0.13
Worker Trips	0.07	0.09	1.76	0.00	0.00	0.00	0.00
Maximum lbs/day	**5.87**	**60.18**	**39.66**	**0.52**	**16.43**	**2.06**	**14.37**
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	10.00	-	10.00
Off-Road Diesel	4.25	27.14	35.23	-	1.05	1.05	0.00
On-Road Diesel	0.41	9.12	1.52	0.13	0.20	0.17	0.03
Worker Trips	0.03	0.01	0.31	0.00	0.00	0.00	0.00
Maximum lbs/day	**4.69**	**36.27**	**37.06**	**0.13**	**11.25**	**1.22**	**10.03**
Max lbs/day all phases	**5.87**	**60.18**	**39.66**	**0.52**	**16.43**	**2.06**	**14.37**

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day) continued

	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
***** 2007*****							
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	10.00	-	10.00
Off-Road Diesel	4.25	26.42	35.41	-	0.92	0.92	0.00
On-Road Diesel	0.38	8.33	1.40	0.01	0.19	0.16	0.03
Worker Trips	0.02	0.01	0.29	0.00	0.00	0.00	0.00
Maximum lbs/day	**4.65**	**34.76**	**37.10**	**0.01**	**11.11**	**1.08**	**10.03**
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	3.74	24.40	30.35	-	0.90	0.90	0.00
Bldg Const Worker Trips	0.99	0.57	12.02	0.00	0.19	0.01	0.18
Arch Coatings Off-Gas	293.20	-	-	-	-	-	-
Arch Coatings Worker Trips	0.99	0.57	12.02	0.00	0.19	0.01	0.18
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	**298.92**	**25.54**	**54.39**	**0.00**	**1.28**	**0.92**	**0.36**
Max lbs/day all phases	**298.92**	**34.76**	**54.39**	**0.01**	**11.11**	**1.08**	**10.03**
***** 2008*****							
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	293.20	-	-	-	-	-	-
Arch Coatings Worker Trips	0.91	0.53	11.20	0.00	0.19	0.01	0.18
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	**294.11**	**0.53**	**11.20**	**0.00**	**0.19**	**0.01**	**0.18**
Max lbs/day all phases	**294.11**	**0.53**	**11.20**	**0.00**	**0.19**	**0.01**	**0.18**

Phase 1 - Demolition Assumptions

Start Month/Year for Phase 1: Jun '06
Phase 1 Duration: 3 months
Building Volume Total (cubic feet): 2238359.3442711
Building Volume Daily (cubic feet): 33914.3753747318
On-Road Truck Travel (VMT): 1256
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Cranes	190	0.430	8.0
1	Crushing/Processing Equip	154	0.780	8.0
1	Tractor/Loaders/Backhoes	79	0.465	8.0

Phase 2 - Site Grading Assumptions

Start Month/Year for Phase 2: Sep '06
Phase 2 Duration: 6 months
On-Road Truck Travel (VMT): 318.06
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Excavators	180	0.580	8.0
1	Graders	174	0.575	8.0
1	Tractor/Loaders/Backhoes	79	0.465	8.0

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Mar '07
Phase 3 Duration: 11.5 months
Start Month/Year for SubPhase Building: Mar '07
SubPhase Building Duration: 8.5 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Cranes	190	0.430	8.0
2	Tractor/Loaders/Backhoes	79	0.465	8.0
1	Trenchers	82	0.695	8.0

Start Month/Year for SubPhase Architectural Coatings: Nov '07
SubPhase Architectural Coatings Duration: 3 months
SubPhase Asphalt Turned OFF

CONSTRUCTION EMISSION ESTIMATES MITIGATED (lbs/day)

	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
***** 2006*****							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	14.24	-	14.24
Off-Road Diesel	4.20	24.79	31.92	-	1.37	1.37	0.00
On-Road Diesel	1.60	23.28	5.98	0.52	0.82	0.69	0.13
Worker Trips	0.07	0.09	1.74	0.00	0.00	0.00	0.00
Maximum lbs/day	**5.87**	**48.16**	**39.64**	**0.52**	**16.43**	**2.06**	**14.37**
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	5.97	-	5.97
Off-Road Diesel	4.25	21.71	35.23	-	0.21	0.21	0.00
On-Road Diesel	0.41	7.30	1.52	0.13	0.06	0.03	0.03
Worker Trips	0.03	0.01	0.31	0.00	0.00	0.00	0.00
Maximum lbs/day	**4.69**	**29.02**	**37.06**	**0.13**	**6.25**	**0.24**	**6.00**
Max lbs/day all phases	**5.87**	**48.16**	**39.64**	**0.52**	**16.43**	**2.06**	**14.37**
***** 2007*****							
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	5.97	-	5.97
Off-Road Diesel	4.25	21.14	35.41	-	0.18	0.18	0.00
On-Road Diesel	0.38	6.66	1.40	0.01	0.06	0.03	0.03
Worker Trips	0.02	0.01	0.29	0.00	0.00	0.00	0.00
Maximum lbs/day	**4.65**	**27.81**	**37.10**	**0.01**	**6.22**	**0.22**	**6.00**
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	3.74	19.52	30.35	-	0.18	0.18	0.00
Bldg Const Worker Trips	0.99	0.57	12.02	0.00	0.19	0.01	0.18
Arch Coatings Off-Gas	58.64	-	-	-	-	-	-
Arch Coatings Worker Trips	0.98	0.56	11.86	0.00	0.19	0.01	0.18
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	**64.35**	**20.65**	**54.23**	**0.00**	**0.56**	**0.20**	**0.36**
Max lbs/day all phases	**64.35**	**27.81**	**54.23**	**0.01**	**6.22**	**0.22**	**6.00**

CONSTRUCTION EMISSION ESTIMATES MITIGATED (lbs/day) continued

	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
***** 2008*****							
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	58.64	-	-	-	-	-	-
Arch Coatings Worker Trips	0.90	0.52	11.05	0.00	0.19	0.01	0.18
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	**59.54**	**0.52**	**11.06**	**0.00**	**0.19**	**0.01**	**0.18**
Max lbs/day all phases	**59.54**	**0.52**	**11.06**	**0.00**	**0.19**	**0.01**	**0.18**

Construction-Related Mitigation Measures

Phase 1: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 1: On-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 1: Worker Trips: Food Available onsite at campus facilities
Percent Reduction(ROG 1.0% NOx 1.3% CO 1.3% SO2 1.3% PM10 1.3%)
Phase 2: Soil Disturbance: Water exposed surfaces - 2x daily
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 34.0%)
Phase 2: Off-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 2: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 2: On-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 2: On-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 2: Stockpiles: Cover all stock piles with tarps
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 9.5%)
Phase 2: Worker Trips: campus dining facilities available on site
Percent Reduction(ROG 1.0% NOx 1.3% CO 1.3% SO2 1.3% PM10 1.3%)
Phase 3: Off-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 3: On-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 3: On-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 3: Worker Trips: dining available at campus facilities onsite
Percent Reduction(ROG 1.0% NOx 1.3% CO 1.3% SO2 1.3% PM10 1.3%)
Phase 3: Offgassing: Rule 1113
Percent Reduction(ROG 80.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 0.0%)

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Construction

The user has overridden the Default Phase Lengths
Demolition Truck Hauling Miles/Round Trip changed from 30 to 20
Site Grading Miles/Round Trip changed from 20 to 18.6
Phase 1 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 1 mitigation measure On-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 1 mitigation measure Worker Trips: Food Available onsite at campus facilities
has been changed from off to on.
Phase 2 mitigation measure Soil Disturbance: Water exposed surfaces - 2x daily
has been changed from off to on.
Phase 2 mitigation measure Off-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 2 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 2 mitigation measure On-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 2 mitigation measure On-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 2 mitigation measure Stockpiles: Cover all stock piles with tarps
has been changed from off to on.
Phase 2 mitigation measure Worker Trips: campus dining facilities available on site
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 3 mitigation measure On-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 3 mitigation measure On-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 3 mitigation measure Worker Trips: dining available at campus facilities onsite
has been changed from off to on.
Phase 3 mitigation measure Offgassing: Rule 1113
has been changed from off to on.

PROJECT AREA SOURCE AND OPERATIONAL EMISSIONS

URBEMIS 2002 For Windows 8.7.0
File Name: C:\Program Files\URBEMIS 2002 Version 8.7\Projects2k2\Pasadena\Pasadena Area and Operational.urb
Project Name: Pasadena Area and Operational Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	0.12	0.00	0.78	0.00	0.00
TOTALS (lbs/day, mitigated)	0.12	0.00	0.78	0.00	0.00

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	10.55	6.30	66.47	0.08	12.72
TOTALS (lbs/day, mitigated)	10.24	5.89	62.17	0.08	11.89

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	10.67	6.30	67.25	0.08	12.72
TOTALS (lbs/day, mitigated)	10.36	5.90	62.95	0.08	11.89

DETAIL REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.00	0.00	0.00	0	0.00
Hearth - No summer emissions					
Landscaping	0.12	0.00	0.78	0.00	0.00
Consumer Prdcts	0.00	-	-	-	-
Architectural Coatings	0.00	-	-	-	-
TOTALS(lbs/day,unmitigated)	**0.12**	**0.00**	**0.78**	**0.00**	**0.00**

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Mitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.00	0.00	0.00	0	0.00
Hearth - No summer emissions					
Landscaping	0.12	0.00	0.78	0.00	0.00
Consumer Prdcts	0.00	-	-	-	-
Architectural Coatings	0.00	-	-	-	-
TOTALS (lbs/day, mitigated)	**0.12**	**0.00**	**0.78**	**0.00**	**0.00**

Area Source Mitigation Measures

Commercial Increase Efficiency Beyond Title 24
Percent Reduction: 20

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10

Replacement University Facilities	10.55	6.30	66.47	0.08	12.72
TOTAL EMISSIONS (lbs/day)	**10.55**	**6.30**	**66.47**	**0.08**	**12.72**

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

MITIGATED OPERATIONAL EMISSIONS

		ROG	NOx	CO	SO2	PM10
Replacement University Facilities		10.24	5.89	62.17	0.08	11.89
TOTAL EMISSIONS (lbs/day)		**10.24**	**5.89**	**62.17**	**0.08**	**11.89**
PERCENTAGE REDUCTION	%	3	6	6	6	6

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES
Analysis Year: 2015 Temperature (F): 90 Season: Summer
EMFAC Version: EMFAC2002 (9/2002)
Summary of Land Uses:

Unit Type	Acreage	Trip Rate	No. Units	Total Trips
Replacement University Facilities	n/a	2.80 trips/1000 sq. ft.	523.00	1,464.40

Sum of Total Trips 1,464.40
Total Vehicle Miles Traveled 8,405.66

Vehicle Assumptions:
Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.40	0.40	99.40	0.20
Light Truck < 3,750 lbs	15.30	0.70	98.00	1.30
Light Truck 3,751- 5,750	16.40	0.60	98.80	0.60
Med Truck 5,751- 8,500	7.30	0.00	98.60	1.40
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.30	0.00	66.70	33.30
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.80	0.00	0.00	100.00
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.60	50.00	50.00	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.50	0.00	93.30	6.70

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips – Residential	20.0	37.0	43.0			

% of Trips - Commercial (by land use)

Replacement University Facilities	5.0	2.5	92.5

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

Changes made to the default values for Operations

The operational emission year changed from 2005 to 2015.

MITIGATION OPTIONS SELECTED

Non-Residential Mitigation Measures
==========
Non-Residential Local-Serving Retail Mitigation

Percent Reduction in Trips is 2%
Inputs Selected:
The Presence of Local-Serving Retail checkbox was selected.

Non-Residential Transit Service Mitigation

Percent Reduction in Trips is 0.66%
Inputs Selected:
The Number of Daily Weekday Buses Stopping Within 1/4 Mile of Site is 56
The Number of Daily Rail or Bus Rapid Transit Stops Within 1/2 Mile of Site is 0
The Number of Dedicated Daily Shuttle Trips is 0

Non-Residential Pedestrian/Bicycle Friendliness Mitigation

Percent Reduction in Trips is 3.81%
Inputs Selected:
The Number of Intersections per Square Mile is 90
The Percent of Streets with Sidewalks on One Side is %
The Percent of Streets with Sidewalks on Both Sides is 100%
The Percent of Arterials/Collectors with Bike Lanes or where Suitable,
Direct Parallel Routes Exist is 20%

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area
The area souce mitigation measure option switch changed from off to on.
Mitigation measure Commercial Increase Efficiency Beyond Title 24
has been changed from off to on.

Changes made to the default values for Operations
The mitigation option switch changed from off to on.
The operational emission year changed from 2005 to 2015.
The Res and Non-Res Local-Serving Retail Mitigation changed from off to on.
The Res and Non-Res Transit Service Mitigation changed from off to on.
The Res and Non-Res Ped/Bike Mitigation changed from off to on.

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Program Files\URBEMIS 2002 Version 8.7\Projects2k2\Pasadena Construction all phases.urb
Project Name: Pasadena Caltech Construction
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

CONSTRUCTION EMISSION ESTIMATES

***** 2006 *****	**ROG**	**NOx**	**CO**	**SO2**	**PM10 TOTAL**	**PM10 EXHAUST**	**PM10 DUST**
TOTALS (lbs/day,unmitigated)	5.87	60.18	39.66	0.52	16.43	2.06	14.37
TOTALS (lbs/day, mitigated)	5.87	48.16	39.64	0.52	16.43	2.06	14.37

***** 2007 *****	**ROG**	**NOx**	**CO**	**SO2**	**PM10 TOTAL**	**PM10 EXHAUST**	**PM10 DUST**
TOTALS (lbs/day,unmitigated)	298.92	34.76	54.39	0.01	11.11	1.08	10.03
TOTALS (lbs/day, mitigated)	64.35	27.81	54.23	0.01	6.22	0.22	6.00

***** 2008 *****	**ROG**	**NOx**	**CO**	**SO2**	**PM10 TOTAL**	**PM10 EXHAUST**	**PM10 DUST**
TOTALS (lbs/day,unmitigated)	294.11	0.53	11.20	0.00	0.19	0.01	0.18
TOTALS (lbs/day, mitigated)	59.54	0.52	11.06	0.00	0.19	0.01	0.18

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: June, 2006
Construction Duration: 19.5
Total Land Use Area to be Developed: 3.25 acres
Maximum Acreage Disturbed Per Day: 1 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 523000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

	ROG	**NOx**	**CO**	**SO2**	**PM10 TOTAL**	**PM10 EXHAUST**	**PM10 DUST**
***** 2006*****							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	14.24	-	14.24
Off-Road Diesel	4.20	30.99	31.92	-	1.37	1.37	0.00
On-Road Diesel	1.60	29.10	5.98	0.52	0.82	0.69	0.13
Worker Trips	0.07	0.09	1.76	0.00	0.00	0.00	0.00
Maximum lbs/day	**5.87**	**60.18**	**39.66**	**0.52**	**16.43**	**2.06**	**14.37**
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	10.00	-	10.00
Off-Road Diesel	4.25	27.14	35.23	-	1.05	1.05	0.00
On-Road Diesel	0.41	9.12	1.52	0.13	0.20	0.17	0.03
Worker Trips	0.03	0.01	0.31	0.00	0.00	0.00	0.00
Maximum lbs/day	**4.69**	**36.27**	**37.06**	**0.13**	**11.25**	**1.22**	**10.03**
Max lbs/day all phases	**5.87**	**60.18**	**39.66**	**0.52**	**16.43**	**2.06**	**14.37**

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day) continued

	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
***** 2007*****							
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	10.00	-	10.00
Off-Road Diesel	4.25	26.42	35.41	-	0.92	0.92	0.00
On-Road Diesel	0.38	8.33	1.40	0.01	0.19	0.16	0.03
Worker Trips	0.02	0.01	0.29	0.00	0.00	0.00	0.00
Maximum lbs/day	**4.65**	**34.76**	**37.10**	**0.01**	**11.11**	**1.08**	**10.03**
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	3.74	24.40	30.35	-	0.90	0.90	0.00
Bldg Const Worker Trips	0.99	0.57	12.02	0.00	0.19	0.01	0.18
Arch Coatings Off-Gas	293.20	-	-	-	-	-	-
Arch Coatings Worker Trips	0.99	0.57	12.02	0.00	0.19	0.01	0.18
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	**298.92**	**25.54**	**54.39**	**0.00**	**1.28**	**0.92**	**0.36**
Max lbs/day all phases	**298.92**	**34.76**	**54.39**	**0.01**	**11.11**	**1.08**	**10.03**
***** 2008*****							
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	293.20	-	-	-	-	-	-
Arch Coatings Worker Trips	0.91	0.53	11.20	0.00	0.19	0.01	0.18
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	**294.11**	**0.53**	**11.20**	**0.00**	**0.19**	**0.01**	**0.18**
Max lbs/day all phases	**294.11**	**0.53**	**11.20**	**0.00**	**0.19**	**0.01**	**0.18**

Phase 1 - Demolition Assumptions

Start Month/Year for Phase 1: Jun '06
Phase 1 Duration: 3 months
Building Volume Total (cubic feet): 2238359.3442711
Building Volume Daily (cubic feet): 33914.3753747318
On-Road Truck Travel (VMT): 1256
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Cranes	190	0.430	8.0
1	Crushing/Processing Equip	154	0.780	8.0
1	Tractor/Loaders/Backhoes	79	0.465	8.0

Phase 2 - Site Grading Assumptions

Start Month/Year for Phase 2: Sep '06
Phase 2 Duration: 6 months
On-Road Truck Travel (VMT): 318.06
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Excavators	180	0.580	8.0
1	Graders	174	0.575	8.0
1	Tractor/Loaders/Backhoes	79	0.465	8.0

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Mar '07
Phase 3 Duration: 11.5 months
Start Month/Year for SubPhase Building: Mar '07
SubPhase Building Duration: 8.5 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Cranes	190	0.430	8.0
2	Tractor/Loaders/Backhoes	79	0.465	8.0
1	Trenchers	82	0.695	8.0

Start Month/Year for SubPhase Architectural Coatings: Nov '07
SubPhase Architectural Coatings Duration: 3 months
SubPhase Asphalt Turned OFF

CONSTRUCTION EMISSION ESTIMATES MITIGATED (lbs/day)

	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
***** 2006*****							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	14.24	-	14.24
Off-Road Diesel	4.20	24.79	31.92	-	1.37	1.37	0.00
On-Road Diesel	1.60	23.28	5.98	0.52	0.82	0.69	0.13
Worker Trips	0.07	0.09	1.74	0.00	0.00	0.00	0.00
Maximum lbs/day	**5.87**	**48.16**	**39.64**	**0.52**	**16.43**	**2.06**	**14.37**
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	5.97	-	5.97
Off-Road Diesel	4.25	21.71	35.23	-	0.21	0.21	0.00
On-Road Diesel	0.41	7.30	1.52	0.13	0.06	0.03	0.03
Worker Trips	0.03	0.01	0.31	0.00	0.00	0.00	0.00
Maximum lbs/day	**4.69**	**29.02**	**37.06**	**0.13**	**6.25**	**0.24**	**6.00**
Max lbs/day all phases	**5.87**	**48.16**	**39.64**	**0.52**	**16.43**	**2.06**	**14.37**
***** 2007*****							
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	5.97	-	5.97
Off-Road Diesel	4.25	21.14	35.41	-	0.18	0.18	0.00
On-Road Diesel	0.38	6.66	1.40	0.01	0.06	0.03	0.03
Worker Trips	0.02	0.01	0.29	0.00	0.00	0.00	0.00
Maximum lbs/day	**4.65**	**27.81**	**37.10**	**0.01**	**6.22**	**0.22**	**6.00**
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	3.74	19.52	30.35	-	0.18	0.18	0.00
Bldg Const Worker Trips	0.99	0.57	12.02	0.00	0.19	0.01	0.18
Arch Coatings Off-Gas	58.64	-	-	-	-	-	-
Arch Coatings Worker Trips	0.98	0.56	11.86	0.00	0.19	0.01	0.18
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	**64.35**	**20.65**	**54.23**	**0.00**	**0.56**	**0.20**	**0.36**
Max lbs/day all phases	**64.35**	**27.81**	**54.23**	**0.01**	**6.22**	**0.22**	**6.00**

CONSTRUCTION EMISSION ESTIMATES MITIGATED (lbs/day) continued

	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
***** 2008*****							
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	58.64	-	-	-	-	-	-
Arch Coatings Worker Trips	0.90	0.52	11.05	0.00	0.19	0.01	0.18
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	**59.54**	**0.52**	**11.06**	**0.00**	**0.19**	**0.01**	**0.18**
Max lbs/day all phases	**59.54**	**0.52**	**11.06**	**0.00**	**0.19**	**0.01**	**0.18**

Construction-Related Mitigation Measures

Phase 1: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 1: On-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 1: Worker Trips: Food Available onsite at campus facilities
Percent Reduction(ROG 1.0% NOx 1.3% CO 1.3% SO2 1.3% PM10 1.3%)
Phase 2: Soil Disturbance: Water exposed surfaces - 2x daily
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 34.0%)
Phase 2: Off-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 2: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 2: On-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 2: On-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 2: Stockpiles: Cover all stock piles with tarps
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 9.5%)
Phase 2: Worker Trips: campus dining facilities available on site
Percent Reduction(ROG 1.0% NOx 1.3% CO 1.3% SO2 1.3% PM10 1.3%)
Phase 3: Off-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 3: On-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 3: On-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 3: Worker Trips: dining available at campus facilities onsite
Percent Reduction(ROG 1.0% NOx 1.3% CO 1.3% SO2 1.3% PM10 1.3%)
Phase 3: Offgassing: Rule 1113
Percent Reduction(ROG 80.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 0.0%)

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Construction

The user has overridden the Default Phase Lengths
Demolition Truck Hauling Miles/Round Trip changed from 30 to 20
Site Grading Miles/Round Trip changed from 20 to 18.6
Phase 1 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 1 mitigation measure On-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 1 mitigation measure Worker Trips: Food Available onsite at campus facilities
has been changed from off to on.
Phase 2 mitigation measure Soil Disturbance: Water exposed surfaces - 2x daily
has been changed from off to on.
Phase 2 mitigation measure Off-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 2 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 2 mitigation measure On-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 2 mitigation measure On-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 2 mitigation measure Stockpiles: Cover all stock piles with tarps
has been changed from off to on.
Phase 2 mitigation measure Worker Trips: campus dining facilities available on site
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 3 mitigation measure On-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 3 mitigation measure On-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 3 mitigation measure Worker Trips: dining available at campus facilities onsite
has been changed from off to on.
Phase 3 mitigation measure Offgassing: Rule 1113
has been changed from off to on.

PROJECT AREA SOURCE AND OPERATIONAL EMISSIONS

URBEMIS 2002 For Windows 8.7.0
File Name: C:\Program Files\URBEMIS 2002 Version 8.7\Projects2k2\Pasadena\Pasadena Area and Operational.urb
Project Name: Pasadena Area and Operational Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	0.12	0.00	0.78	0.00	0.00
TOTALS (lbs/day, mitigated)	0.12	0.00	0.78	0.00	0.00

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	10.55	6.30	66.47	0.08	12.72
TOTALS (lbs/day, mitigated)	10.24	5.89	62.17	0.08	11.89

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	10.67	6.30	67.25	0.08	12.72
TOTALS (lbs/day, mitigated)	10.36	5.90	62.95	0.08	11.89

DETAIL REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.00	0.00	0.00	0	0.00
Hearth - No summer emissions					
Landscaping	0.12	0.00	0.78	0.00	0.00
Consumer Prdcts	0.00	-	-	-	-
Architectural Coatings	0.00	-	-	-	-
TOTALS(lbs/day,unmitigated)	**0.12**	**0.00**	**0.78**	**0.00**	**0.00**

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Mitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.00	0.00	0.00	0	0.00
Hearth - No summer emissions					
Landscaping	0.12	0.00	0.78	0.00	0.00
Consumer Prdcts	0.00	-	-	-	-
Architectural Coatings	0.00	-	-	-	-
TOTALS (lbs/day, mitigated)	**0.12**	**0.00**	**0.78**	**0.00**	**0.00**

Area Source Mitigation Measures

Commercial Increase Efficiency Beyond Title 24
Percent Reduction: 20

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10

Replacement University Facilities	10.55	6.30	66.47	0.08	12.72
TOTAL EMISSIONS (lbs/day)	**10.55**	**6.30**	**66.47**	**0.08**	**12.72**

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

MITIGATED OPERATIONAL EMISSIONS

		ROG	NOx	CO	SO2	PM10
Replacement University Facilities		10.24	5.89	62.17	0.08	11.89
TOTAL EMISSIONS (lbs/day)		**10.24**	**5.89**	**62.17**	**0.08**	**11.89**
PERCENTAGE REDUCTION	%	3	6	6	6	6

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES
Analysis Year: 2015 Temperature (F): 90 Season: Summer
EMFAC Version: EMFAC2002 (9/2002)
Summary of Land Uses:

Unit Type	Acreage	Trip Rate	No. Units	Total Trips
Replacement University Facilities	n/a	2.80 trips/1000 sq. ft.	523.00	1,464.40

Sum of Total Trips 1,464.40
Total Vehicle Miles Traveled 8,405.66

Vehicle Assumptions:
Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.40	0.40	99.40	0.20
Light Truck < 3,750 lbs	15.30	0.70	98.00	1.30
Light Truck 3,751- 5,750	16.40	0.60	98.80	0.60
Med Truck 5,751- 8,500	7.30	0.00	98.60	1.40
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.30	0.00	66.70	33.30
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.80	0.00	0.00	100.00
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.60	50.00	50.00	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.50	0.00	93.30	6.70

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips – Residential	20.0	37.0	43.0			

% of Trips - Commercial (by land use)

Replacement University Facilities	5.0	2.5	92.5

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

Changes made to the default values for Operations

The operational emission year changed from 2005 to 2015.

MITIGATION OPTIONS SELECTED

Non-Residential Mitigation Measures
==========
Non-Residential Local-Serving Retail Mitigation

Percent Reduction in Trips is 2%
Inputs Selected:
The Presence of Local-Serving Retail checkbox was selected.

Non-Residential Transit Service Mitigation

Percent Reduction in Trips is 0.66%
Inputs Selected:
The Number of Daily Weekday Buses Stopping Within 1/4 Mile of Site is 56
The Number of Daily Rail or Bus Rapid Transit Stops Within 1/2 Mile of Site is 0
The Number of Dedicated Daily Shuttle Trips is 0

Non-Residential Pedestrian/Bicycle Friendliness Mitigation

Percent Reduction in Trips is 3.81%
Inputs Selected:
The Number of Intersections per Square Mile is 90
The Percent of Streets with Sidewalks on One Side is %
The Percent of Streets with Sidewalks on Both Sides is 100%
The Percent of Arterials/Collectors with Bike Lanes or where Suitable,
Direct Parallel Routes Exist is 20%

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area
The area souce mitigation measure option switch changed from off to on.
Mitigation measure Commercial Increase Efficiency Beyond Title 24
has been changed from off to on.

Changes made to the default values for Operations
The mitigation option switch changed from off to on.
The operational emission year changed from 2005 to 2015.
The Res and Non-Res Local-Serving Retail Mitigation changed from off to on.
The Res and Non-Res Transit Service Mitigation changed from off to on.
The Res and Non-Res Ped/Bike Mitigation changed from off to on.

Appendix C

Historic Resources Data

HISTORIC RESOURCES REPORT
CALTECH MASTER PLAN REVISION
PASADENA, CA

28 December 2005

Prepared for:

Rincon Consultants
790 East Santa Clara Street
Ventura CA 93001

Prepared by:

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1. Introduction

This report was prepared for the purpose of assisting the City of Pasadena in their compliance with the California Environmental Quality Act (CEQA) as it relates to historic resources, in connection with an amendment to a previously adopted master plan for the campus of the California Institute of Technology. The amendment to the Master Plan consists of the demolition and construction of several buildings on the campus. The buildings proposed to be demolished are: Mead Lab; the Physical Plant Offices and Shops; North Undergraduate houses Page, Lloyd, and Ruddock; and Graduate houses Braun and Marks. [Figure 1]

Specifically, the following amendments to the Master Plan are proposed:

1. Chemistry & Chemical Engineering Laboratory (CCE Lab). Two scenarios are presented for the future construction of the new CCE Laboratory. Under the first scenario, Caltech proposes the construction of a new laboratory in the open space between the Beckman Behavioral Biology (BBB) Lab and Noyes Laboratory. A portion of this open space would be utilized for the new 3-story Chemistry & Chemical Engineering Laboratory. The proposed building would be set back from San Pasqual Mall to match the south side of the pool to the south of the BBB Laboratory.

   Under the second scenario, Caltech proposes the construction of the new lab on the site of the Mead Laboratory and the building envelope identified in the Master Development Plan west of the Mead Laboratory. The Master Development Plan allows a 3-story addition to Mead Laboratory in the building envelope to the west of the existing Laboratory. However, Caltech proposes to demolish the Mead Laboratory and construct a new 3-story CCE Laboratory on the site of the demolished Mead Laboratory and the adjacent building envelope. The setback of the proposed building would be approximately 85 feet from Wilson Avenue and would match the existing Braun Laboratory. In both scenarios, the CCE Laboratory would be constructed with two levels underground and three floors above grade. The footprint would be approximately 16,000 square feet for a building of 80,000 gross square feet total.

   In the first scenario, the proposed building would contain laboratory space and offices. In the second scenario, the proposed building would contain the functions currently in the Mead Laboratory and supplement those with additional laboratory space and offices. The building would be connected to the Noyes Laboratory at several floors.

   In the first scenario, the 16,000 gross square feet of open space that would be lost would be replaced by changing the building envelope west of the Mead Laboratory to open space, and by changing potential areas on the campus that would be generally comparable for open space. Mead Laboratory would remain. The existing public art on the proposed site would either be relocated or reconstructed.

2. Rehabilitation of the existing North Undergraduate Houses (Lloyd, Page, and Ruddock) or construction of new dormitories.

3. Development of new dormitory in place of the existing Braun and Marks graduate houses.

4. Development of a new Campus Center in place of the existing Physical Plant offices and shops.

5. Development of the Astrophysics Building south of California Boulevard as proposed under the Master Development Plan.

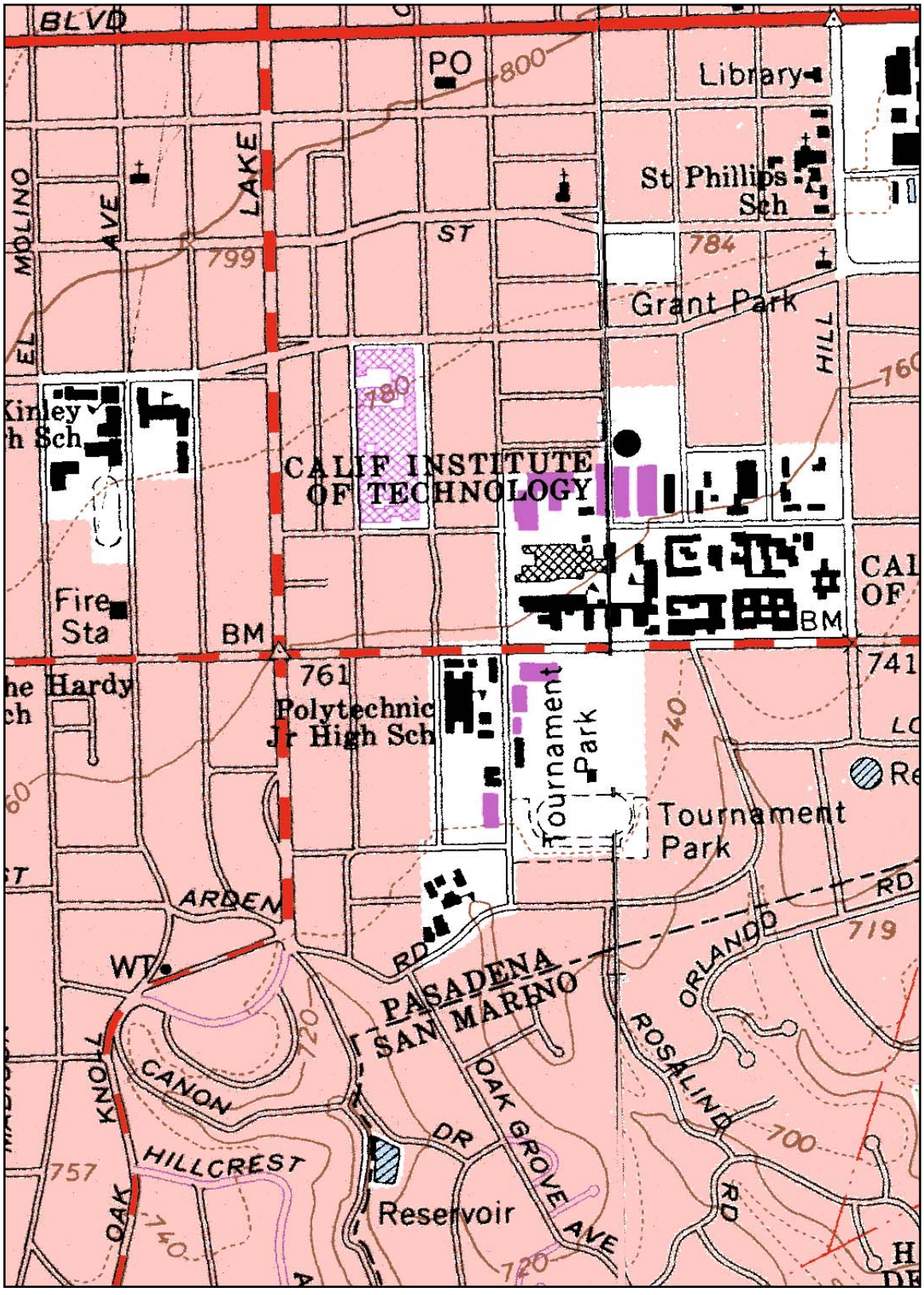

Figure 1. Project Location [USGS 7.5' Quadrangle, Pasadena 1966 rev 1988; Mt. Wilson 1966 rev 1988]

This report assesses the historical and architectural significance of potentially significant historic properties in accordance with the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR) Criteria for Evaluation, and City of Pasadena criteria. A determination will be made as to whether adverse environmental impacts on historic resources, as defined by CEQA and the CEQA Guidelines, may occur as a consequence of the proposed project, and recommend the adoption of mitigation measures, as appropriate.

This report was prepared by San Buenaventura Research Associates of Santa Paula, California, Judy Triem, Historian; and Mitch Stone, Preservation Planner, for Rincon Consultants, Inc., and is based on a field investigation and research conducted in June, 2005. The conclusions contained herein represent the professional opinions of San Buenaventura Research Associates, and are based on the factual data available at the time of its preparation, the application of the appropriate local, state and federal regulations, and best professional practices.

2. Administrative Setting

The California Environmental Quality Act (CEQA) requires evaluation of project impacts on historic resources, including properties "listed in, or determined eligible for listing in, the California Register of Historical Resources [or] included in a local register of historical resources." A resource is eligible for listing on the California Register of Historical Resources if it meets any of the criteria for listing, which are:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

2. Is associated with the lives of persons important in our past;

3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

4. Has yielded, or may be likely to yield, information important in prehistory or history.

By definition, the California Register of Historical Resources also includes all "properties formally determined eligible for, or listed in, the National Register of Historic Places," and certain specified State Historical Landmarks. The majority of "formal determinations" of NRHP eligibility occur when properties are evaluated by the State Office of Historic Preservation in connection with federal environmental review procedures (Section 106 of the National Historic Preservation Act of 1966). Formal determinations of eligibility also occur when properties are nominated to the NRHP, but are not listed due to owner objection.

The criteria for determining eligibility for listing on the National Register of Historic Places (NRHP) have been developed by the National Park Service. Properties may qualify for NRHP listing if they:

A. are associated with events that have made a significant contribution to the broad patterns of our history; or

B. are associated with the lives of persons significant in our past; or

C. embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. have yielded, or may be likely to yield, information important in prehistory or history.

According to the National Register of Historic Places guidelines, the "essential physical features" of a property must be present for it to convey its significance. Further, in order to qualify for the NRHP, a resource must retain its integrity, or "the ability of a property to convey its significance."

The seven aspects of integrity are: Location (the place where the historic property was constructed or the place where the historic event occurred); Design (the combination of elements that create the form, plan, space, structure, and style of a property); Setting (the physical environment of a historic property); Materials (the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property); Workmanship (the physical evidence of the crafts of a particular culture or people during any given period of history or prehistory); Feeling (a property's expression of the aesthetic or historic sense of a particular period of time), and; Association (the direct link between an important historic event or person and a historic property).

The relevant aspects of integrity depend upon the National Register criteria applied to a property. For example, a property nominated under Criterion A (events), would be likely to convey its significance primarily through integrity of location, setting and association. A property nominated solely under Criterion C (design) would usually rely primarily upon integrity of design, materials and workmanship. The California Register procedures include similar language with regard to integrity.

The minimum age criterion for the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR) is 50 years. Properties less than 50 years old may be eligible for listing on the NRHP if they can be regarded as "exceptional," as defined by the NRHP procedures, or in terms of the CRHR, "if it can be demonstrated that sufficient time has passed to understand its historical importance" (Chapter 11, Title 14, §4842(d)(2))

Historic resources as defined by CEQA also includes properties listed in "local registers" of historic properties. A "local register of historic resources" is broadly defined in §5020.1 (k) of the Public Resources Code, as "a list of properties officially designated or recognized as historically significant by a local government pursuant to a local ordinance or resolution." Local registers of historic properties come essentially in two forms: (1) surveys of historic resources conducted by a local agency in accordance with Office of Historic Preservation procedures and standards, adopted by the local agency and maintained as current, and (2) landmarks designated under local ordinances or resolutions. These properties are "presumed to be historically or culturally significant... unless the preponderance of the evidence demonstrates that the resource is not historically or culturally significant." (Public Resources Code §§ 5024.1, 21804.1, 15064.5)

City of Pasadena Criteria for Designation of Historic Resources.

Historic monuments. A historic monument shall include all historic resources previously designated as historic treasures before adoption of this Chapter, historic resources that are listed in the National Register at the State-wide or Federal level of significance (including National Historic Landmarks) and any historic resource that is significant at a regional, State, or Federal level, and is an exemplary representation of a particular type of historic resource and meets one or more of the following criteria:

1. It is associated with events that have made a significant contribution to the broad patterns of the history of the region, State, or nation.

2. It is associated with the lives of persons who are significant in the history of the region, State, or nation.

3. It is exceptional in the embodiment of the distinctive characteristics of a historic resource property type, period, architectural style, or method of construction, or that is an exceptional representation of the work of an architect, designer, engineer, or builder whose work is significant to the region, State, or nation, or that possesses high artistic values that are of regional, State-wide or national significance.

4. It has yielded, or may be likely to yield, information important in prehistory or history of the region, State, or nation.

A historic monument designation may include significant public or semi-public interior spaces and features.

When considering an application for designation of a historic monument the Historic Preservation Commission shall apply the criteria according to the National Register of Historic Places Bulletins (National Park Service) for evaluating historic properties.

Landmarks. A landmark shall include all properties previously designated a landmark before adoption of this Chapter and any historic resource that is of a local level of significance and meets one or more of the criteria listed in Subparagraph 2., below.

A landmark may be the best representation in the City of a type of historic resource or it may be one of several historic resources in the City that have common architectural attributes that represent a particular type of historic resource. A landmark shall meet one or more of the following criteria:

A. It is associated with events that have made a significant contribution to the broad patterns of the history of the City, region, or State.

B. It is associated with the lives of persons who are significant in the history of the City, region, or State.

C. It embodies the distinctive characteristics of a type, architectural style, period, or method of construction, or represents the work of an architect, designer, engineer, or builder whose work is of significance to the City or, to the region or possesses artistic values of significance to the City or to the region.

D. It has yielded, or may be likely to yield, information important locally in prehistory or history.

When considering an application for designation of a landmark, the Historic Preservation Commission shall apply the criteria according to the National Register of Historic Places Bulletins (National Park Service) for evaluating historic properties.

Landmark districts. A landmark district shall include all landmark districts previously designated before adoption of this Chapter and any grouping of contiguous properties that also meet the following criteria:

Within its boundaries, a minimum of 60 percent of the properties qualify as contributing; and

The grouping represents a significant and distinguishable entity of Citywide importance and one or more of a defined historic, cultural, development and/or architectural context(s) (e.g., 1991 Citywide historic context, as amended, historic context prepared in an intensive-level survey or historic context prepared specifically for the nominated landmark district).

When considering applications to designate a landmark district, the Historic Preservation Commission shall apply the above criteria according to applicable National Register of Historic Places. (Pasadena Municipal Code §17.62.040)

3. Impact Thresholds and Mitigation

According to PRC §21084.1, "a project that may cause a substantial change in the significance of an historical resource is a project that may have a significant effect on the environment." The Public Resources Code broadly defines a threshold for determining if the impacts of a project on an historic property will be significant and adverse. By definition, a substantial adverse change means, "demolition, destruction, relocation, or alterations," such that the significance of an historical resource would be impaired (PRC §5020.1(6)). For purposes of NRHP eligibility, reductions in a resource's integrity (the ability of the property to convey its significance) should be regarded as potentially adverse impacts.

Further, according to the CEQA Guidelines, "an historical resource is materially impaired when a project... [d]emolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register of Historical Resources [or] that account for its inclusion in a local register of historical resources pursuant to section 5020.1(k) of the Public Resources Code or its identification in an historical resources survey meeting the requirements of section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant."

The lead agency is responsible for the identification of "potentially feasible measures to mitigate significant adverse changes in the significance of an historical resource." The specified methodology for determining if impacts are mitigated to less than significant levels are the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings and the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (1995), publications of the National Park Service. (PRC §15064.5(b)(3-4))

4. Historical Setting

General Historical Context

The educational institution that would become the California Institute of Technology was founded in 1891 by wealthy Chicago industrialist and politician, Amos Throop, as a local vocational and manual arts school. In 1880 Throop moved his home from Chicago to Los Angeles. Six year later, he bought property in Pasadena. Although by that time he was already quite elderly, Throop immediately became a significant force in the political, social and economic life of the young city. He founded the Pasadena Universalist parish, and was elected to the city council in 1888, and a year later, as the city's mayor.

Throop responded to the community's yearning for an institution of higher education by establishing Throop University, initially renting space for the college in a downtown commercial building. Indirectly, and unoffi-

cially, the school would be an outgrowth of Throop's association with Univeralism. Two year later, the school's name was changed to Throop Polytechnic Institute. Amos Throop died in 1894, but the school he founded would thrive, growing in enrollment to over 500 students by 1906. (Goodstein, 1991: 26-8)

By this time, and despite its initial phase of growth and success, the school's mission had become less than clear, and the institution was facing substantial economic problems. New ideas and directions for the future were needed. The ideal individual to breath new life into the school was found in George Ellery Hale, the director and founder of the Mount Wilson Observatory, then in his 30s and already a renowned astrophysicist. (Wyllie, 2000: 21-23)

Hale joined the board of Throop Polytechnic in 1907, and immediately began the process of transforming the school into an institution focused on the natural sciences and engineering. He persuaded two important figures in chemistry and physics to join the faculty of the college, Arthur A. Noyes and Robert A. Millikan, and in 1908, brought on James Scherer as president. All would be propitious choices: Noyes and Millikan lent credibility to the college as an institution devoted to the study of science, and Scherer would prove to be an adept fund-raiser.

In 1910 Throop abandoned its downtown campus for 22 acres of donated land in Pasadena bounded by California and San Pasqual streets on the south and north, and Wilson and Holliston avenues on the west and east. The established Pasadena architectural firm of Myron Hunt and Elmer Grey had been hired two years earlier to design a master plan for the new campus. Hunt and Grey developed an axial plan, featuring a large grassy quadrangle opening towards Wilson Street on the west, and anchored on the east by Pasadena Hall (later known as Throop Hall), and flanked on the north and south by academic buildings. The overall architectural style of the campus was to be Mission Revival.

Of the buildings anticipated by the Hunt and Grey plan, Pasadena Hall was intended to be the first of 14 constructed. In the end, this building, dedicated in 1910, was the only element of the plan to be completed. Evidently disappointed in the Hunt and Grey plan, and with the somewhat awkward design of Pasadena Hall, George Ellery Hale began searching for an architect with a stronger hand to carry out his vision of a campus which would be thoroughly integrated into both the student's experience and the California landscape. Based primarily on his work on the 1915 Panama Pacific Exposition, Hale settled on architect Bertram Goodhue. (Wyllie, 2000: 25-31)

The Goodhue master plan of 1917 followed essentially the axial plan created in the Hunt and Grey plan, but embellished it with the blending of California romanticism and Beaux Arts sensibilities which had become his trademark. Goodhue introduced north-south cross-axial elements, forming a number of landscaped side and interior quadrangles, arched arcades, and a grand campus entrance facing Wilson Avenue flanked by domed pavilions. Unlike the Hunt and Grey plan, many of the Goodhue master plan elements were implemented over the 20 years following its adoption, with the notable exception of the unbuilt Memorial Building, which was designed as a key element within the Goodhue central quadrangle.

The decades of the 1920s and 1930s marked the period of maturity for the school, which had changed its name to Throop College of Technology in 1913 and then in 1920 to the California Institute of Technology. Under the direction of Hale, Millikan and Noyes, Caltech became a recognized force in the world of physics, chemistry and the natural sciences, attracting many of the world's top academic scientists as visiting scholars, including Werner Heisenberg, Hendrik Lorentz, Niels Bohr and Albert Einstein. An endowment secured the university financially.

In addition to Goodhue, a number of other architects participated in the build-out of the campus during this period, including Mayers, Murray and Phillip (the successor firm to Bertram Goodhue after his death in 1924), Clarence Stein, Gustave Iser, and notable California regionalist, Gordon B. Kaufmann. The campus remained relatively compact, and the general outlines of the Goodhue plan were respected. (Wyllie, 2000: 269-70)

The first formal landscape planning efforts on the campus were begun in the late 1920s, overseen by New York landscape architect Beatrix Farrand, who had moved to San Marino with her husband when he took over the directorship of the Huntington Library. Despite her reputation in the Northeast, Farrand worked for Caltech strictly on an unpaid, part-time basis. Landscape planning continued piecemeal until an overall plan was created in 1935. Even subsequent to the plan, the aesthetic preferences of the campus architects generally prevailed over Farrand's suggestions. Farrand returned to New York after the death of her husband in 1940, leaving a garden at Dabney Hall as her primary contribution to the landscape design of the campus. (Wyllie, 2000: 160-162; Birnbaum, 2000: 117-19)

Along with Gordon Kaufmann's design for the Athenaeum in 1930-31 came the noted California landscape architects Florence Yoch and Lucile Council. Yoch and Council designed landscape treatments of the public spaces around the building, including the forecourt on the south side of the building, a row of olive trees along the building's eastern street frontage, the interior courtyard, and an allée of sycamore trees along the building's northern elevation. (Wyllie, 2000: 162-163; Yoch, 1989: 151-155)

The post-war years marked the turning of a page at Caltech, both in terms of the leadership and the physical form of the campus. By 1945, Hale and Noyes had died, and Millikan was retired due to ill health. Physicist Lee Alvin DuBridge took over as president in 1946, and in 1949, Robert Bacher headed the division of physics, mathematics, and astronomy.

During the DuBridge years, from 1946 to 1969, Caltech grew at a rapid pace. The number of faculty doubled and the campus tripled in area. In 1952, the firm of William Pereria and Charles Luckman was hired to plan for the expansion of the campus, mainly onto property Caltech had acquired on the north side of San Pasqual Street. This plan instigated a major fund-raising campaign in 1958 and resulted in the construction of a number of residential buildings and the expansion of several academic facilities. Two new graduate student residence halls, the two-story Braun and Marx houses, were completed in 1961 on the basis of this plan, as well as the two story North Undergraduate Houses complex, built in 1960. The architects were Smith, Powell and Morgridge, and James H. Van Dyke and Associates of Los Angeles. Also constructed on the basis of the Pereria-Luckman plan was a new, sprawling one story Physical Plant complex, designed by in-house staff, located at the northwestern corner of San Pasqual and Holliston streets, which in 1959, replaced temporary campus maintenance buildings. (Wyllie, 2000: 177)

The Pereria-Luckman Plan represented a distinct shift in approach to the architecture of the campus, from the period revival tone set by the Goodhue plan to one which was decidedly more modernist. For the most part, the new buildings constructed reflected the less academic mode of the International Style, which has recently become known as Mid-Century Modern. These buildings emphasized volumetric forms, were only minimally ornamented if at all, and related less directly to existing context than did the earlier Spanish Colonial Revival buildings.

In terms of overall campus planning, a primary north-south axis was introduced to the campus during the 1960s, roughly bisecting the Goodhue axis. It was anchored at its northern end by the construction of the Beckman Auditorium, designed by Robert Durell Stone in 1964. Defining this axis on the east and west are

Baxter and Beckman halls, built in 1971 and 1974, respectively. This axis would never be an entirely successful organizing device, however, as siting constraints required the auditorium to be located off the centerline of this axis. (Wyllie, 2000: 187-88)

The Millikan Library was introduced in 1967, within the quadrangle, and essentially in the location Bertram Goodhue had reserved in his plan for the domed Memorial Building. Designed by the Los Angeles firm of Flewelling and Moody, the nine story library building was not only the tallest building on the Caltech campus to date, but its most decidedly Modern architectural statement. Its insertion into the Goodhue quadrangle marked a significant and controversial departure from the direction established by the Goodhue plan, a trend which would characterize the next several decades of campus planning and construction. (Wyllie, 2000: 193-99)

Smith, Powell and Morgridge

The firm of Smith, Powell and Morgridge began as the relatively early Los Angeles architecture firm of Norman F. Marsh and Company. In 1928 the partnership came to be known as Marsh, Smith and Powell, with the addition of partners Herbert J. Powell and David D. Smith. In 1955, with the death of Norman F. Marsh, the firm added partner Howard H. Morgridge, becoming Smith, Powell and Morgridge. In its various configurations, this firm was known mainly for its institutional work, particularly churches, primary and secondary schools, and college campuses.

Herbert J. Powell was born in Chicago in 1898 and educated at the University of Redlands, receiving his Masters in Architecture from Harvard University in 1924. He worked in the offices of two New York City architects, including McKim, Mead and White, during the years 1925-26, then the firm of Marston, Van Pelt and Maybury in Pasadena in 1926, before joining in a partnership with Norman F. Marsh in 1928, the same year he was licensed to practice architecture in California. Powell, who lived in San Marino, was elected as a Fellow of the AIA. He died in 1996. (Who's Who on the Pacific Coast, 1949: 747; California Death Index).

David D. Smith was born in Kentucky in 1886. Little is known of his biography. After graduating from Santa Monica High School in 1905, he appears to have been in an early partnership with J.F. Mitchell in the Venice district of Los Angeles prior to joining the firm of Marsh, Smith in Powell in 1928. Smith died in Los Angeles in 1964. (Los Angeles Public Library California Index; Los Angeles Times, 6-12-55; California Death Index)

Howard Morgridge was born in Pasadena in 1919 and graduated with a Bachelors in Architecture at the University of Southern California in 1942. He worked as a designer for the W.A. Bechtel Company before joining Marsh, Smith and Powell during the late 1940s. Morgridge died in 2001. (Who's Who on the Pacific Coast, 1949: 662)

John Kewell, Architect

John J. Kewell, AIA, was born in Canada in 1914. He attended the Central Technical School in Toronto in 1928-29 and the Montreal Technical School in 1929-31, graduating with a degree in Building Construction. He obtained his B.Arch from McGill University in Montreal in 1936, and his license to practice architecture in Canada the following year. After serving in the Canadian Army during World War II, Kewell emigrated to the U.S., apparently beginning but not completing graduate work at the Illinois Institute of Technology in Chicago. By 1946 he had settled in Los Angeles, where he was employed as a designer in the office of architect Stiles O. Clements. Kewell set up his own practice in 1947 in Los Angeles, after obtaining his California archi-

tect's license. His home was in Pasadena. In 1951 he relocated his office to Pasadena, though towards the end of his career, he apparently moved it back to Los Angeles.

Kewell was moderately well-published. Credits include *Architectural Forum*, *AIA Journal*, *House and Hom*e (including a front cover in 1955), *Architectural Record* and the Los Angeles Times *Home Magazine*. One of his designs was featured in the 1947 book *Vision in Motion*, written by the influential exponent of European modern architecture, László Moholy-Nagy, and *Builders Homes for Better Living* by A. Quincy Jones and Frederick E. Emmons (1957).

The architect lectured at the Graduate School of Architecture at U.S.C. in 1953-54. He served on the California Council for the A.I.A. and as president of his local A.I.A. chapter in Pasadena and on the Environmental Quality Committee of the Southern California Association of Governments. His diverse practice included designs for residential, industrial and institutional buildings. Among his known designs are factory/office buildings for the Super-Cold Corporation (Los Angeles, 1951), Chase Brass and Copper Company (Los Angeles, 1953), the Byron Jackson Division of Borg-Warner (Santa Ana, 1956), BJ Electronics (Hawthorne, 1957), Scudder Foods (Orange County, 1960); the Mayall Street School (Granada Hills, 1958), and the Merchant Builders House (1954, location unknown) and the Undergraduate Chemistry Lab at Caltech (1972). John Kewell died in Pasadena in 1975. (Los Angeles Times; Files of the Pasadena and Foothill Chapter of the AIA)

James H. Van Dyke, Architect

James Van Dyke graduated from the U.S.C. School of Architecture in 1939. His Los Angeles office apparently specialized in institutional work during the 1940s, '50s and '60s. Among his known designs are a Methodist Church in Alondra Park (1955) Garden Grove High School (1956), Marks Residence Hall at U.S.C. (1957, addition), Los Angles Post Office Sanford Station (1959), and the Fabrication Services Building at J.P.L. (1962). (Los Angeles Times)

5. Potential Historic Resources

Physical Plant. This rambling one-story complex of office and shop buildings was constructed in 1959 as the campus maintenance shops and related offices. The building features low-pitched hip roof with deep, closed eaves. Wall cladding is stucco, and the windows are primarily steel fixed and sash units. The raised main entrance to the offices is located on the southern elevation. A bank of open loading docks is oriented to the west. This building was evidently designed in 1958 by in-house staff and appears to be unaltered and in very good condition. [Photo 1; Figure 2, Map Reference A]

Braun Graduate House. This two story building is one of four in the graduate housing complex designed in 1960 and completed in 1961 in accordance with the 1952 Pereria Luckman plan, and designed by Smith, Powell and Morgridge in the International Style. The building is essentially rectangular in plan and features stucco cladding over concrete and a flat roof. Steel casement window pairs are organized within shallow concrete pilasters. An entry stoop on the western end of the southern elevation is covered by a projecting concrete canopy. This building is connected to the adjacent Student Services building via a second story skyway. The building appears to unaltered and in very good condition. [Photo 2; Figure 2, Map Reference B]

Marks Graduate House. This building is one of four in the graduate housing complex designed in 1960 and completed in 1961. It was designed by James H. Van Dyke & Associates, with Smith, Powell and Morgridge, as the coordinating architects. It is likely that Smith, Powell and Morgridge handled the site planning for the building with Van Dyke preparing the architectural plans in the International Style. This two-story plastered

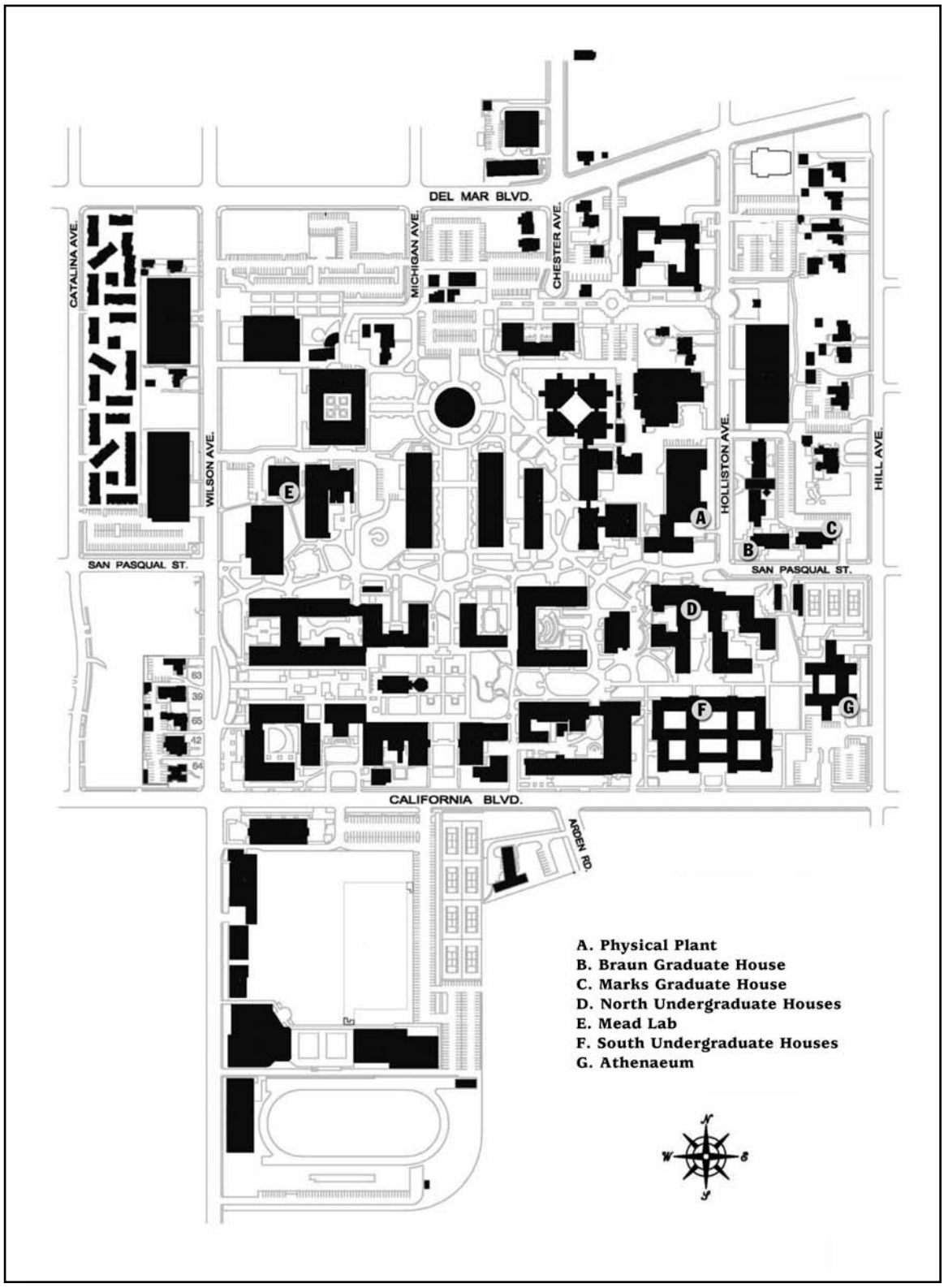

Figure 2. Building Locations [Source: Caltech, San Buenaventura Research Associates]

concrete building is essentially rectangular in plan and features a flat roof and steel casement windows flanked by narrow concrete pilasters. The corners and cornice line are defined by somewhat more massive pilasters. The building appears to unaltered and in very good condition. [Photo 3; Figure 2, Map Reference C]

North Undergraduate Houses. This substantial complex of residence halls was designed in 1959 by Smith, Powell and Morgridge, and constructed in 1960. Unlike many of the buildings constructed on the campus during this period, North Undergraduate Houses were apparently more intentionally designed to relate to earlier buildings nearby, in particular, the 1931 South Undergraduate Houses to the south (Flemming, Ricketts, Dabney and Blacker halls) designed by Gordon Kaufmann, in terms of scale, materials and complex plan forming a series of internal courtyards. Along the adjoining walkway, the Smith, Powell and Morgridge design made a direct reference to Kaufmann's arcade, but rendered in stripped-down form. The building is one and two stories in height, and is highly complex in plan (essentially, a series of joined rectangles forming courtyards). The main southern elevation is characterized by the two-story masses of Page and Lloyd halls, joined by a one-story projecting marquee composed of exposed aggregate concrete panels supported by poured-in-place concrete "Sonotube" columns and concrete screen blocks. The roof shapes are low hips covered with Spanish tile with deep closed eaves. Windows are steel casements. [Photo 4; Figure 2, Map Reference D]

Mead Lab (Undergraduate Chemistry Lab). This one story building was constructed in 1972, designed by John J. Kewell in the late International style. A matching, enclosed open storage area was added in 1992. The building is essentially square in plan and constructed in vertically-scored concrete blocks separated by horizontal reveals. It features a prominent, projecting cornice and pairs of massive pilasters. The building is windowless except for the main anodized aluminum entry doors on the western elevation. The building appears to be unaltered on the exterior, except for the addition of the storage area and is in good condition. [Photo 5; Figure 2, Map Reference E]

6. Eligibility of Historic Resources

National and California Registers: Significance and Eligibility

None of the buildings proposed to be directly impacted by the proposed project are currently 50 years of age or older, the minimum age for eligibility for the NRHP or CRHR under the standard criteria. Properties less than 50 years of age may be eligible if they can be found to be "exceptional." While no hard and fast definition for "exceptional" is provided in the NRHP literature, the special language developed to support nominating these properties was clearly intended to accommodate properties which demonstrate a level of importance such that their historical significance can be understood without the passage of time.

In general, according to NRHP literature, eligible "exceptional" properties may include, "resources so fragile that survivors of any age are unusual. [Exceptionalness] may be a function of the relative age of a community and its perceptions of old and new. It may be represented by a building or structure whose developmental or design value is quickly recognized as historically significant by the architectural or engineering profession [or] it may be reflected in a range of resources for which the community has an unusually strong associative attachment." None of the properties studied appear to rise to the exceptional level, either on historical or architectural grounds.

A number of buildings constructed on the Caltech campus during the 1920s and 1930s may be eligible for listing on the NRHP and CRHR either individually or as contributers to an eligible grouping. Notable among these are Gordon Kaufmann's Athenaeum and Undergraduate Houses. In addition, landscape elements and urban design features on the campus representing historically important master planning efforts (particularly,

the Goodhue plan of 1917 and the Yoch and Council landscape design for the Athenaeum) may also be eligible. However, a comprehensive evaluation of the historical significance of the entire Caltech campus is beyond the scope of this study, which is limited to buildings and sections of the campus proposed to be impacted directly by the Master Plan amendment presently under consideration. These buildings were constructed in accordance with the 1952 Pereria-Luckman master plan, mainly as it was implemented by Smith, Powell and Morgridge during the late 1950s and early 1960s. Given that these improvements occurred less than 50 years ago, an evaluation of the historical significance of this plan, and the buildings constructed as a result of it, appears to be premature.

Local Significance and Eligibility

The City of Pasadena landmarks ordinance establishes evaluation criteria which are essentially identical to the NRHP and CRHR criteria. The ordinance does not contain an explicit minimum age criterion, but does state that "the Historic Preservation Commission shall apply the criteria according to the National Register of Historic Places Bulletins (National Park Service) for evaluating historic properties." The language establishing the 50 minimum age for listing on the NRHP, and the exceptions to that minimum, is contained within the National Register bulletins. Therefore, it is assumed that similar standards for judging the eligibility of properties less than 50 years of age generally applies to local landmark designation.

Conclusion

None of the buildings which may be directly impacted by the proposed amendment to the campus master plan appear to be eligible for listing on the NRHP, CRHR or as Pasadena City Landmarks. Therefore, none of these buildings should be regarded as historic resources for the purposes of CEQA. However, other buildings and design elements on the campus which are located in proximity to some of the proposed activities may be eligible for designation. Of particular note are the Athenaeum, South Undergraduate Houses and the landscape design for the Athenaeum. [Figure 2, Map Reference F and G]

7. Project Impacts

The proposed potential removal and reconstruction of the North Undergraduate Houses may have an adverse impact on the setting of potentially eligible elements of the campus: the Athenaeum, South Undergraduate Houses and the landscape design for the Athenaeum.

8. Mitigation Measures and Residual Impacts

A principle of environmental impact mitigation is that some measure or combination of measures may, if incorporated into a project, serve to avoid or reduce significant and adverse impacts to a historic resource. In reference to mitigating impacts on historic resources, the CEQA Guidelines state:

> Where maintenance, repair, stabilization, rehabilitation, restoration, preservation, conservation or reconstruction of the historical resource will be conducted in a manner consistent with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings* (1995), Weeks and Grimmer, the project's impact on the historical resource shall generally be considered mitigated below a level of significance and thus is not significant. (PRC §15126.4 (b)(1))

These standards, developed by the National Park Service, represent design guidelines for carrying out historic preservation, restoration and rehabilitation projects. The Secretary's Standards and the supporting literature

describe historic preservation principles and techniques, and offers recommended means for carrying them out. Adhering to the Standards is the only method described within CEQA for reducing project impacts on historic resources to less than significant and adverse levels.

The demolition of an historic property cannot be seen as conforming with the *Secretary of the Interior's Standards*. Therefore, the absolute loss of an historic property should generally be regarded as an adverse environmental impact which cannot be mitigated to a less than significant and adverse level. Further, the usefulness of documentation of an historic resource, through photographs and measured drawings, as mitigation for its demolition, is limited by the CEQA Guidelines, which state:

> In some circumstances, documentation of an historical resource, by way of historic narrative, photographs or architectural drawings, as mitigation for the effects of demolition of the resource will not mitigate the effects to a point where clearly no significant effect on the environment would occur. (PRC §15126.4 (b)(2))

Implied by this language is the existence of circumstances whereby documentation may mitigate the impact of demolition to a less than significant level. However, the conditions under which this might be said to have occurred are not described in the Guidelines. It is also noteworthy that the existing CEQA case law does not appear to support the concept that the loss of an historic resource can be mitigated to less than adverse impact levels by means of documentation or commemoration. (League for Protection of Oakland's Architectural and Historic Resources v. City of Oakland [1997] 52 Cal.App.4th 896)

Taken in their totality, the CEQA Guidelines require a project which will have potentially adverse impacts on historic resources to conform to the *Secretary of the Interior's Standard*s, in order for the impacts to be mitigated to below significant and adverse levels. However, CEQA also mandates the adoption of feasible mitigation measures which will reduce adverse impacts, even if the residual impacts after mitigation remain significant. Means other than the application of the Standards would necessarily be required to achieve this level of mitigation. In determining what type of additional mitigation measures would reduce impacts to the greatest extent feasible, best professional practice dictates considering the level of eligibility of the property, as well as by what means it derives its significance.

Mitigation programs for impacts on historic resources tend to fall into three broad categories: documentation, design and interpretation. Documentation techniques involve the recordation of the site according to accepted professional standards, such that the data will be available to future researchers, or for future restoration efforts. Design measures could potentially include direct or indirect architectural references to a lost historic property, e.g., the incorporation of historic artifacts, into the new development, or the relocation of the historic property to another suitable site. Interpretative measures could include commemorating a significant historic event or the property's connection to historically significant themes.

Mitigation

The design of any construction on the location of the North Undergraduate Hall, either alterations to the existing building or demolition and construction of new buildings, shall be subject to the review of the Pasadena Historic Preservation Commission in order to assure its conformance to the *Secretary of the Interior's Standards* with respect to its relationship to the the Athenaeum, Undergraduate Houses and the landscape design for the Athenaeum.

Impacts After Mitigation

Less than adverse.

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Photo 1. Physical Plant building, southern and western elevations. [16 June 2005]

Photo 2. Braun Graduate Hall, southern and eastern elevations. [16 June 2005]

Photo 3. Marks Graduate Hall, southern and western elevations. [16 June 2005]

Photo 4. North Undergraduate Houses, southern and western elevations. [16 June 2005]

Photo 5. Mead Labs building, western and southern elevations. [16 June 2005]

Appendix D

Traffic Study

TRAFFIC AND PARKING STUDY
FOR THE
CALTECH MASTER DEVELOPMENT PLAN AMENDMENTS
PASADENA, CALIFORNIA

APRIL 2006

PREPARED FOR

RINCON CONSULTANTS, INC.

PREPARED BY

KAKU ASSOCIATES
A Corporation

TRAFFIC AND PARKING STUDY
FOR THE
CALTECH MASTER DEVELOPMENT PLAN AMENDMENTS
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April 2006

Prepared for:

RINCON CONSULTANTS, INC.

Prepared by:

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I. INTRODUCTION

This report documents the results of a study by Kaku Associates, Inc. evaluating the potential traffic and parking impacts associated with several proposed developments on the campus of the California Institute of Technology (Caltech) in Pasadena, California (project).

PROJECT DESCRIPTION

The Caltech campus is located at 1200 East California Boulevard in southern Pasadena. Caltech is generally bounded by Del Mar Boulevard on the north, Hill Avenue on the west, California Boulevard on the south, and Catalina Avenue on the east. Figure 1A illustrates the locations of the five projects that Caltech is proposing within the next ten years. The development of these projects as proposed would require amending the Caltech Master Development Plan (CMDP), which was originally formulated in 1989. Each of the proposed projects is described below and illustrated in Figures 1B though 1F:

- The North Undergraduate Houses (Lloyd, Page, and Ruddock Halls) would either be rehabilitated with minor modifications or removed and replaced with new construction. The existing square footage of these buildings is approximately 68,000 square feet (sf). Their rehabilitation would result in approximately 123,000 sf while their replacement would result in approximately 110,000 sf. The number of beds provided (273) would remain the same under both scenarios as what currently exists.

- A new dormitory would be built to replace the existing Braun and Marks Houses, which are used for graduate student housing. The Braun and Marks Houses total approximately 10,000 sf and accommodate 60 students. The proposed dormitory would be approximately 19,000 sf and would provide a total of 57 beds. Eighteen parking spaces would be provided on the site.

- A new Campus Center of approximately 100,000 sf would be developed at the location of the existing Physical Plant offices and shops, which total approximately 37,000 sf. These buildings would be relocated elsewhere on the campus. The Center would house multi-purpose student areas, a music hall, music rehearsal and practice facilities, a visitor information center, offices and a small library.

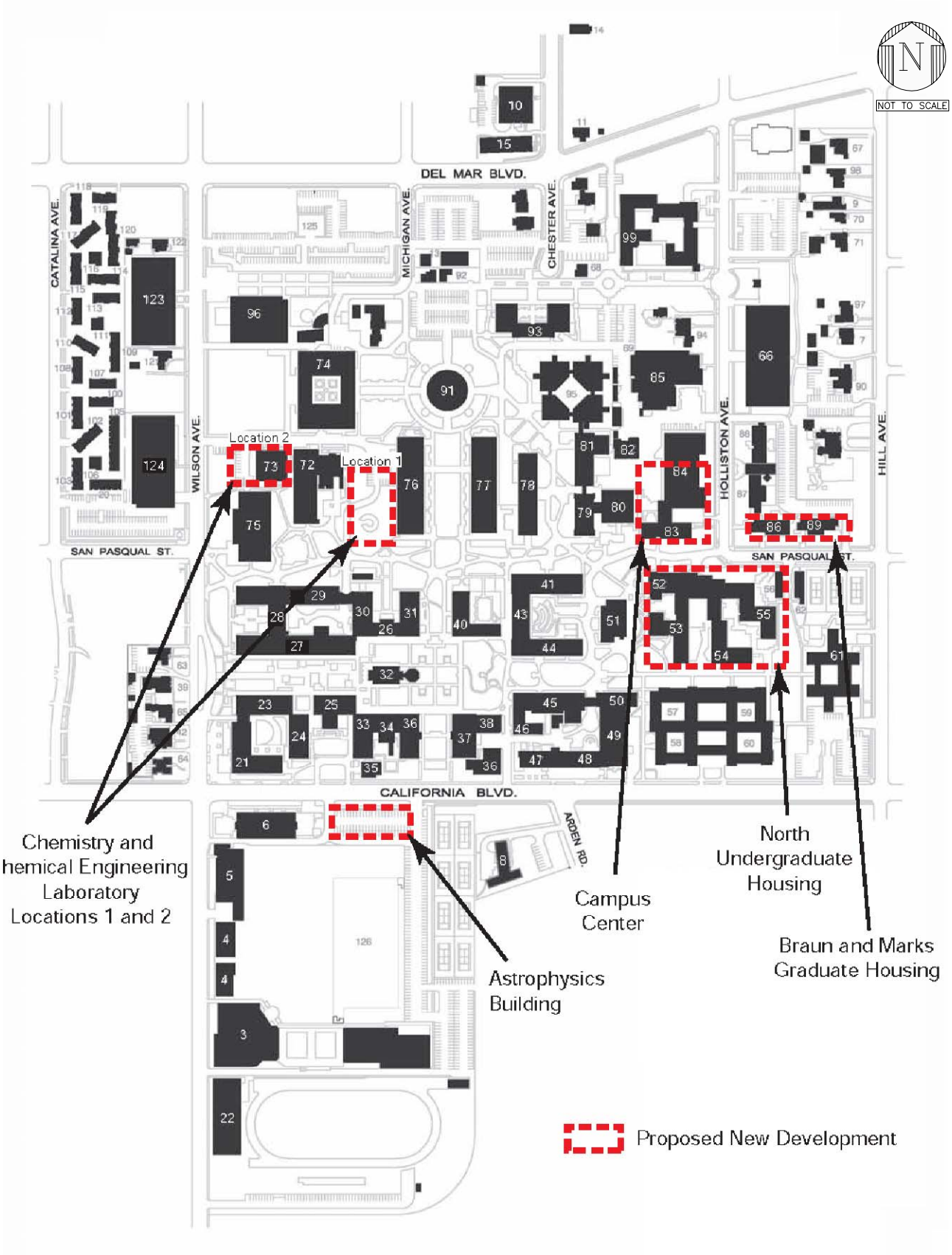

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FIGURE 1A
AMENDMENT LOCATIONS

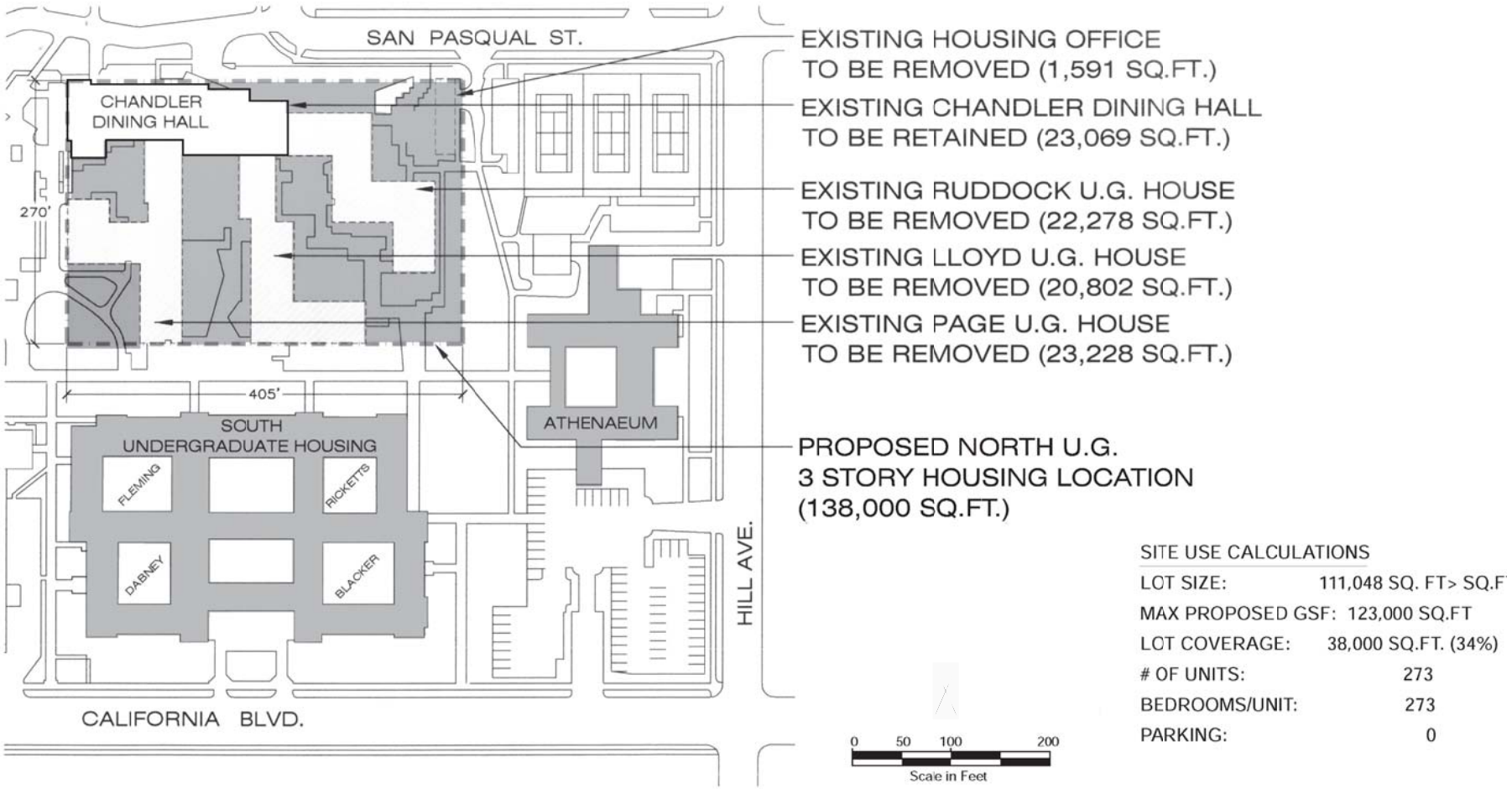

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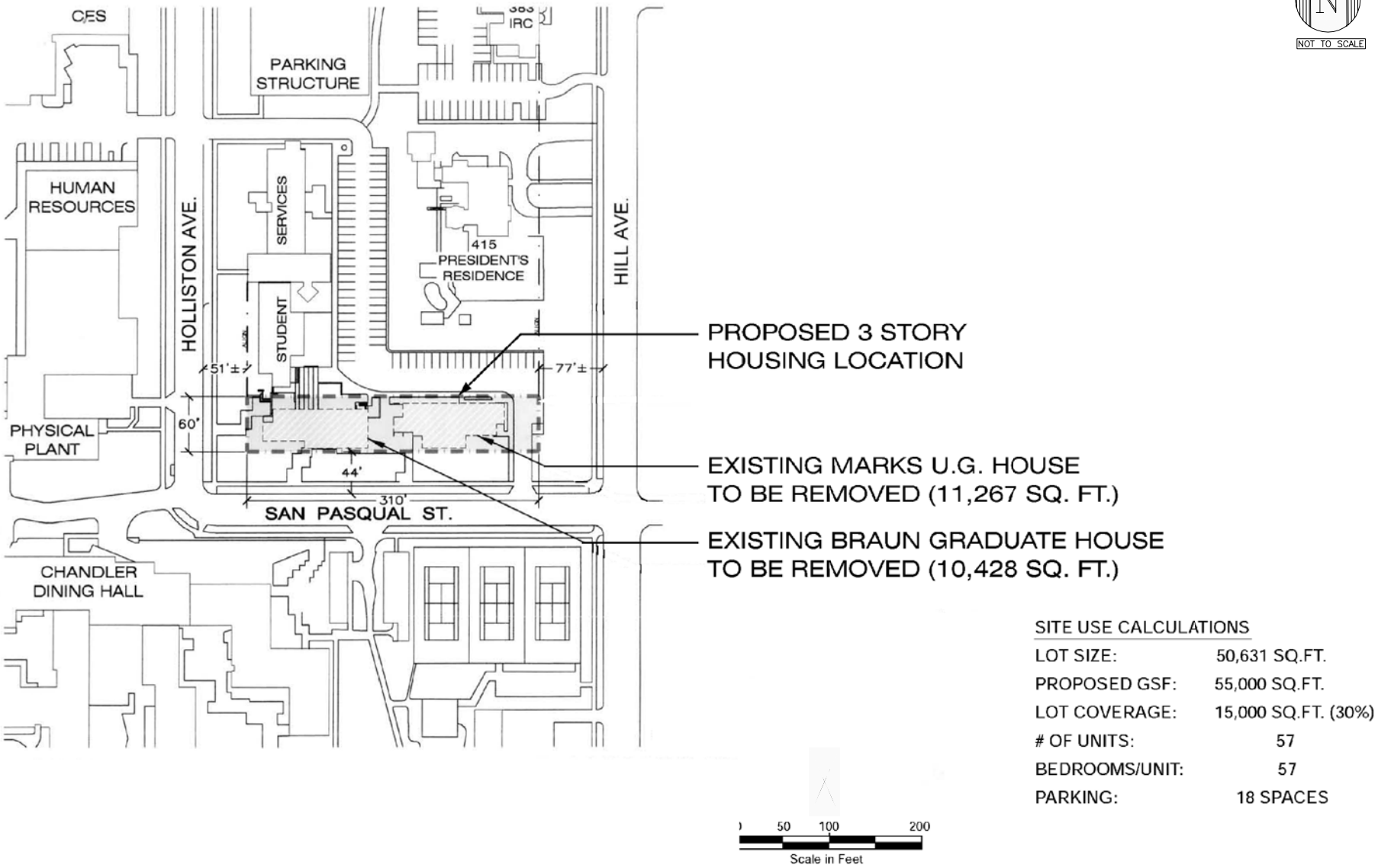
FIGURE 1B
NORTH UNDERGRADUATE HOUSING



SITE USE CALCULATIONS

LOT SIZE:	50,631 SQ.FT.
PROPOSED GSF:	55,000 SQ.FT.
LOT COVERAGE:	15,000 SQ.FT. (30%)
# OF UNITS:	57
BEDROOMS/UNIT:	57
PARKING:	18 SPACES

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FIGURE 1C
BRAUN AND MARKS GRADUATE HOUSING REPLACEMENT

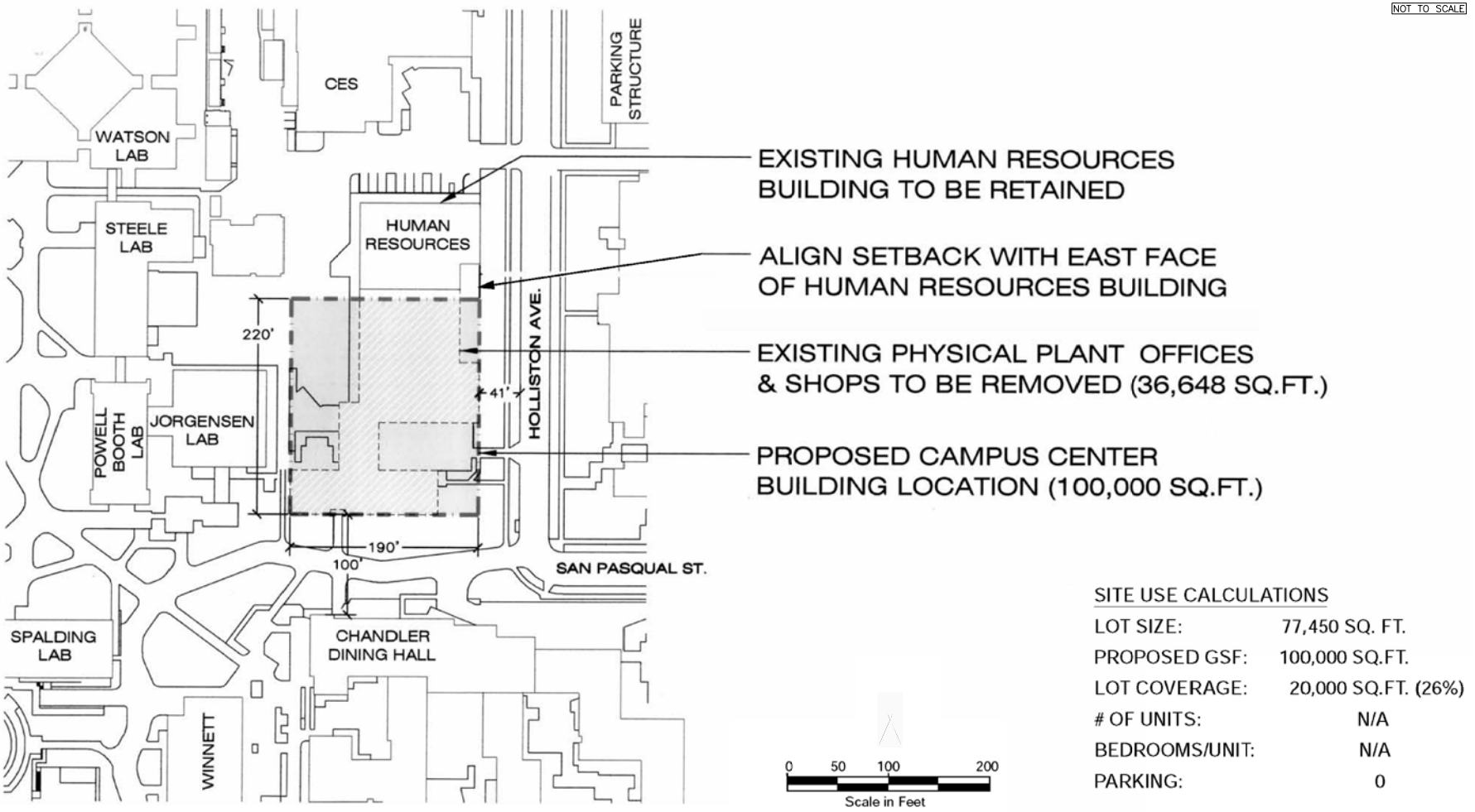

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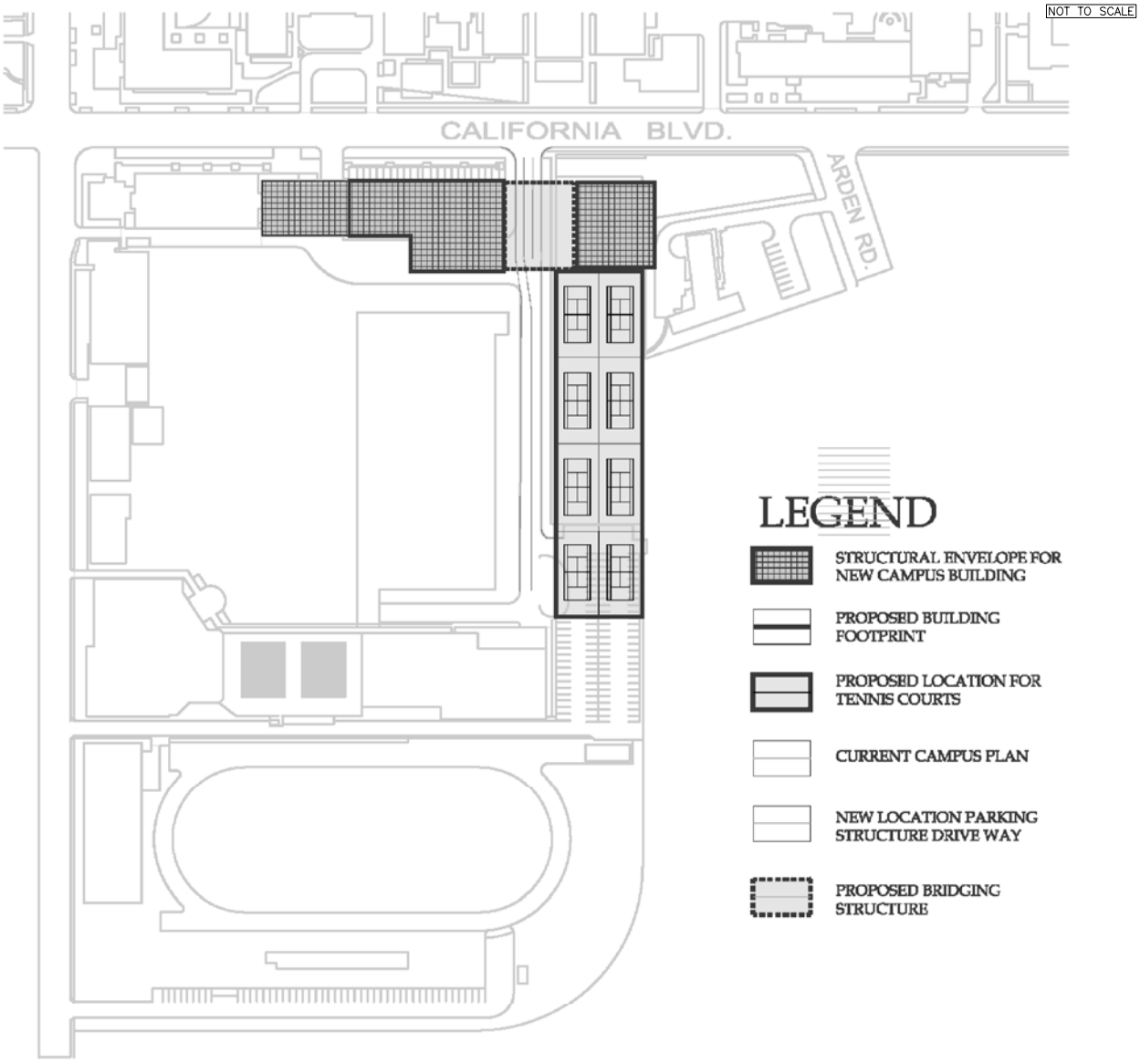
FIGURE 1D
CAMPUS CENTER



SITE USE CALCULATIONS

LOT SIZE:	N/A
PROPOSED GSF:	150,000 SQ.FT
LOT COVERAGE:	25,000 SQ.FT.
# OF UNITS:	N/A
BEDROOMS/UNIT:	N/A
PARKING:	N/A

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FIGURE 1E
ASTROPHYSICS BUILDING

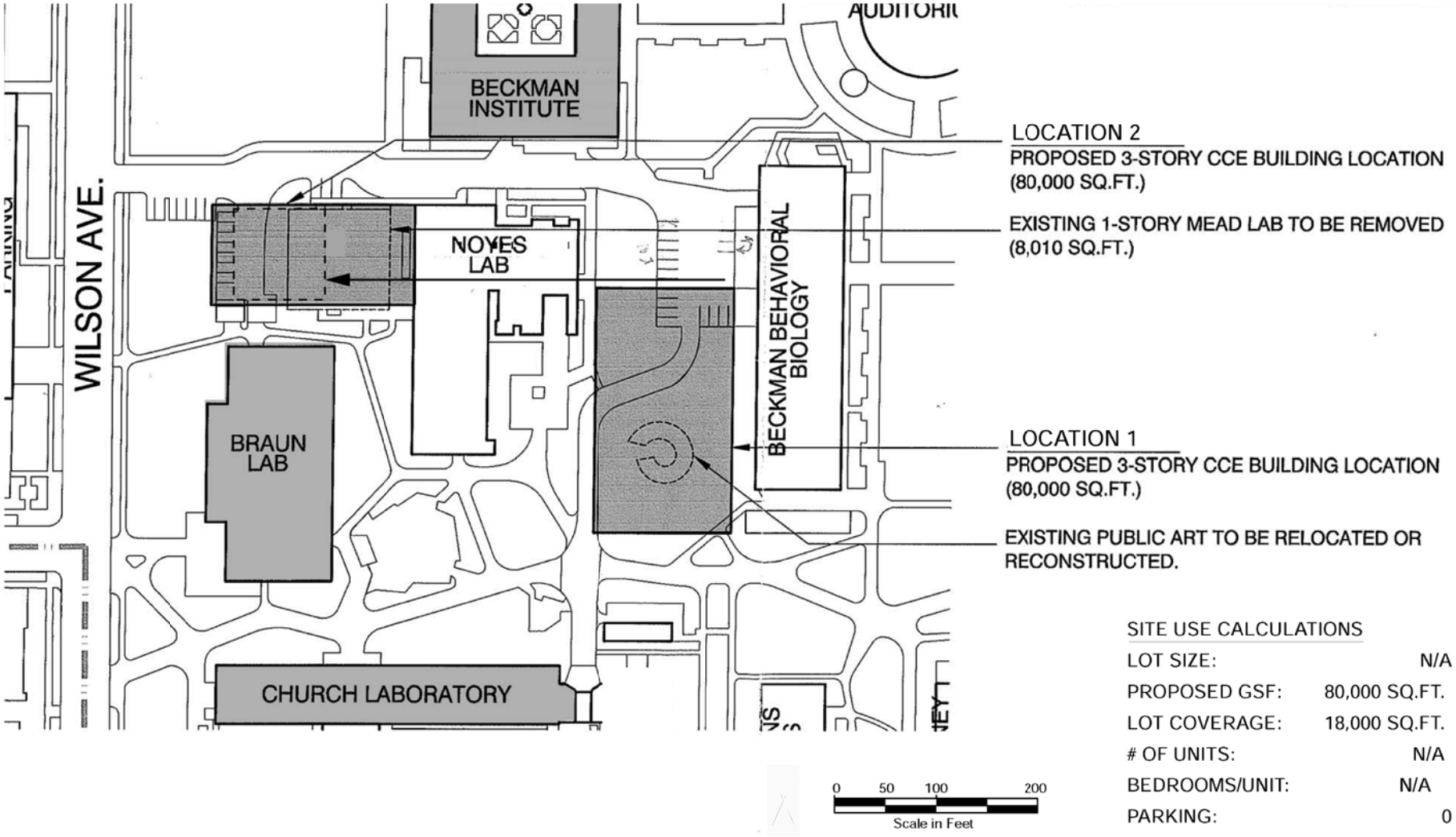


FIGURE 1F
CHEMISTRY AND CHEMICAL ENGINEERING LABORATORY

- A new 150,000 sf Astrophysics Building would be built at the current location of the BSB parking lot (approximately 69 parking spaces) south of California Boulevard. While this building is included in the CMDP, the site where it is now proposed lies 40 feet west of its previously approved location.

- Two scenarios are presented for the future construction of the Chemistry and Chemical Engineering (CCE) Laboratory. It would either be located east of or west of Noyes Laboratory (Location 1 or Location 2). If it were constructed at Location 2, the proposed 80,000 sf building would replace the existing 8,000 sf Mead Laboratory, which is currently used for chemistry laboratory instructional work. Under either scenario, approximately 10 parking spaces would be displaced.

- An amendment to the CMDP for revisions to the design guidelines and thresholds would include revisions to the Open Space Strategy and Design Guidelines for the North Campus Facilities on the East-West Axis and to the Design Review Thresholds. This section of the amendment is not anticipated to change the transportation and parking characteristics of the CMDP.

The proposed project will provide improved facilities to accommodate the projected increases in students, faculty and staff. The on-campus parking supply provided at Caltech will be reduced by approximately 61 spaces. This study addresses both of these issues.

STUDY SCOPE

This study analyzes potential project-generated traffic impacts on the streets surrounding and serving Caltech in accordance with methodology specified by City of Pasadena Department of Transportation staff. The projected completion date of the proposed projects is 2015. The impact analysis examines future conditions both with and without the proposed project. The following traffic scenarios are analyzed in the study:

- Existing (Year 2005) Conditions - The analysis of existing traffic conditions provides a basis for the remainder of the study. The existing conditions analysis includes an assessment of streets, traffic volumes, operating conditions, and transit services.

- Year 2015 Cumulative Base (No Project) Conditions - The objective of this scenario is to project future traffic growth and operating conditions that could be expected to result from regional growth and related projects in the vicinity of the project site, without consideration of the proposed projects.

- Year 2015 Cumulative plus Project Conditions - The objective of this scenario is to identify potential impacts of the proposed project on projected future traffic operating conditions with proposed project traffic added to the cumulative base traffic forecasts.

The potential project impacts on nine intersections were evaluated for weekday a.m. and p.m. peak hour traffic conditions in the vicinity of the proposed project. The analysis locations are illustrated in Figure 2 and are as follows:

1. Lake Avenue and Del Mar Boulevard
2. Wilson Avenue and Del Mar Boulevard
3. Chester Avenue and Del Mar Boulevard
4. Hill Avenue and Del Mar Boulevard
5. Wilson Avenue and San Pasqual Street
6. Hill Avenue and San Pasqual Street
7. Lake Avenue and California Boulevard
8. Wilson Avenue and California Boulevard
9. Hill Avenue and California Boulevard

Potential project traffic impacts were also assessed on the following five street segments, which are shown in Figure 2:

1. Wilson Avenue north of Del Mar Boulevard
2. Hill Avenue north of Del Mar Boulevard
3. Del Mar Boulevard east of Hill Avenue
4. San Pasqual Street east of Hill Avenue
5. California Boulevard east of Hill Avenue

The study also evaluated the ability of the proposed parking supply to accommodate projected parking demands for the proposed projects.

Finally, the study analyzed the potential for project impacts on the regional transportation system, as required by the *2004 Congestion Management Program for Los Angeles County* (CMP), on the surrounding freeway system and at the intersection of California Boulevard and Arroyo Parkway.

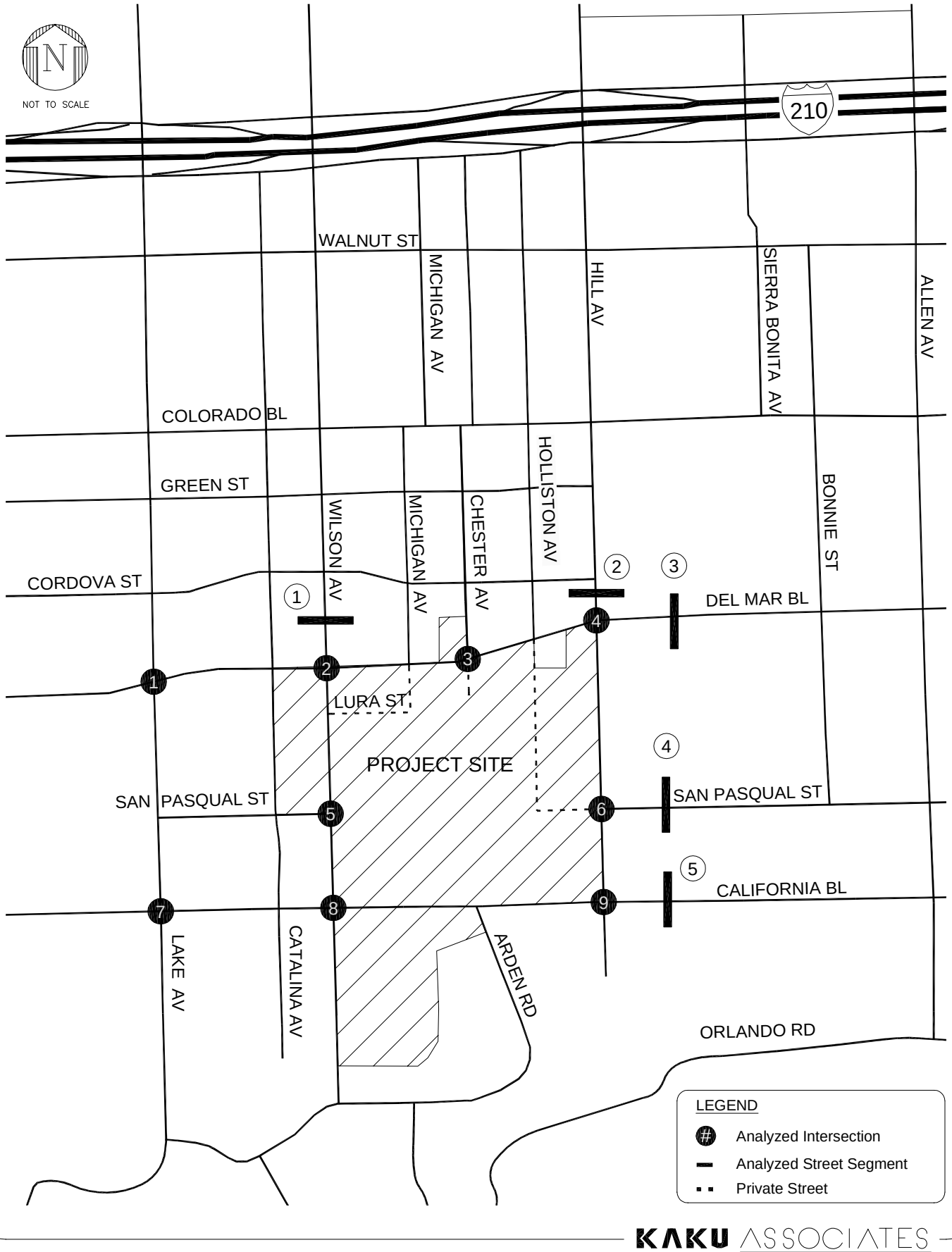


FIGURE 2
STUDY AREA, ANALYZED INTERSECTIONS AND STREET SEGMENTS

ORGANIZATION OF REPORT

This report is divided into eight chapters. Chapter I consists of the introduction. Chapter II describes the existing circulation system, traffic volumes, and traffic conditions in the study area. The methodologies used to forecast future cumulative and project traffic volumes and the resultant forecasts are described in Chapter III. Chapter IV presents an assessment of potential traffic impacts and identifies the need for traffic mitigation measures. An analysis of potential impacts on street segments is presented in Chapter V. Chapter VI contains an analysis of potential parking impacts. Chapter VII presents the results of the regional transportation system impact analysis. Finally, the conclusions and recommendations of the study are summarized in Chapter VIII.

II. EXISTING CONDITIONS

A comprehensive data collection effort was undertaken to identify existing transportation and parking conditions in the vicinity of the proposed project. The assessment of existing conditions relevant to this study includes the street system, traffic volumes and operating conditions, and public transit service.

EXISTING STREET SYSTEM

The site of the proposed project, the Caltech campus, is generally bounded by Del Mar Boulevard on the north, Hill Avenue on the east, California Boulevard and Cornell Road on the south, and Wilson Avenue and Catalina Avenue on the west. The street system in the study area is illustrated in Figure 2. Primary regional access to the area is provided by the Foothill Freeway (I-210), which runs east-west approximately one mile north of the project site and the Pasadena Freeway (SR 110), which runs north-south approximately one mile west of the project site and originates at the intersection of Arroyo Parkway and Glenarm Street. Both Lake Avenue and Hill Avenue provide direct access to the Foothill Freeway. Additional streets serving the project site and the surrounding study area include Wilson Avenue (running in a north-south direction), and Del Mar Boulevard, California Boulevard, and San Pasqual Street (running in an east-west direction).

Table 1 includes a description of the key roadways in the vicinity of the site. Diagrams of the existing intersection lane configurations at the nine study intersections are provided in Appendix A.

TABLE 1
EXISTING SURFACE STREET CHARACTERISTICS

SEGMENT	FROM	TO	LANE		MEDIAN	PARKING RESTRICTIONS		SPEED
			NB/EB	SB/WB	TYPE	NB/EB	SB/WB	LIMIT
Lake Av	Cordova St	California Bl	2	2	RM	1hr 9A-6P	1hr 9A-6P	25
	California Bl	Cornell Rd	2	2	RM	2hr 9A-6P	2hr 9A-6P	25
Catalina Av	Cordova St	California Bl	1	1	UD	2hr 9A-6P	2hr 9A-6P	25
	California Bl	Cornell Rd	1	1	UD	15min 6A-6P/Permit Parking Only	Permit Parking Only	15
Wilson Av	Cordova St	Del Mar Bl	1	1	SDY	2hr 9A-6P	2hr 9A-6P	25
	Del Mar Bl	San Pasqual St	1	1	SDY	PA	2hr 9A-6P	25
	San Pasqual St	California Bl	1	1	RM	PA/NSAT	2hr 9A-6P/NSAT	25
	California Bl	Cornell Rd	1	1	2LT	PA	NPAT/Permit Parking Only	25
Michigan Av	Blanche St	Del Mar Bl	1	1	UD	2hr 9A-6P	2hr 9A-6P	25
	Del Mar Bl	Lura St	1	1	UD	Caltech Parking Only	Caltech Parking Only	25
Chester Av	Cordova St	Del Mar Bl	1	1	UD	4hr 9A-6P	2hr 9A-6P	25
	Del Mar Bl	End	1	1	UD	Caltech Parking Only	Caltech Parking Only	25
Holliston Av	Cordova St	Del Mar Bl	1	1	UD	NPAT	2hr 9A-6P	25
	Del Mar Bl	San Pasqual St	1	1	UD	Caltech Parking Only	Caltech Parking Only	25
Hill Av	Cordova St	Del Mar Bl	2	2	2LT	NSAT	NSAT	25
	Del Mar Bl	San Pasqual St	1	1	SDY	2hr 8A-4P	2hr 8A-4P	30
	San Pasqual St	California Bl	1	1	SDY	2hr 8A-4P	Loading/PA	30
	California Bl	Lombardy Rd	1	1	UD	2hr 7A-6P	2hr 7A-6P	25
Arden Rd	California Bl	Cameron Dr	1	1	SDY	2hr 9A-6P	2hr 9A-6P	25
Del Mar Bl	Hudson Av	Lake Av	2	2	2LT	NSAT	NSAT	35
	Lake Av	Mentor Av	2	2	SDY	NSAT	NSAT	25
	Mentor Av	Catalina Av	2	2	SDY	2hr 9A-6P	2hr 9A-6P	25
	Catalina Av	Wilson Av	2	2	DY	NP 7-9A, 4-6P; 2hr 9A-4P	NP 7-9A, 4-6P; 2hr 9A-4P	30
	Wilson Av	Michigan Av	2	2	DY	NP 7-9A, 4-6P; 2hr 9A-4P	NP 7-9A, 4-6P; 2hr 9A-4P	35
	Michigan Av	Hill Av	2	2	DY	NP 7-9A, 4-6P	NP 7-9A, 4-6P	35
	Hill Av	Sierra Bonita Av	2	2	2LT	Permit Parking Only	NSAT	30
Lura St	Wilson Av	Michigan Av	1	1	UD	PA	NSAT	25
San Pasqual St	Lake Av	Mentor Av	1	1	DY	2hr 9A-6P	2hr 9A-6P	30
	Mentor Av	Wilson Av	1	1	SDY	2hr 9A-6P	2hr 9A-6P	30
	Holliston Av	Hill Av	1	1	UD	Caltech Parking Only	Caltech Parking Only	25
	Hill Av	Ninita Pkwy	1	1	UD	Permit Parking Only	Permit Parking Only	30
California Bl	Hudson Av	Lake Av	2	2	2LT	NSAT	NSAT	30
	Lake Av	Catalina Av	1	1	2LT	2hr 9A-6P	2hr 9A-6P	30
	Catalina Av	Hill Av	1	1	2LT	PA	PA	30
	Hill Av	Sierra Bonita Av	1	1	2LT	2hr 9A-6P	2hr 9A-6P	30

Notes:

MEDIAN TYPE: DY = Double Yellow Centerline
SDY = Single Dashed Yellow Centerline
2LT = Dual Left Turn Centerline
RM = Raised Median
UD = Undivided Lane

PARKING: PA = Parking Allowed
NSAT = No Stopping Anytime
NP = No Parking Allowed

LANES: # = Number of lanes

EXISTING TRAFFIC VOLUMES AND OPERATING CONDITIONS

The following sections present the existing peak hour traffic volumes at the study intersections, the methodology used to analyze intersection operating conditions, and the resulting level of service at each location under existing conditions.

Existing Peak Hour Traffic Volumes

Weekday a.m. and p.m. peak period intersection turning movement counts were collected at the study intersections on Wednesday, May 18, 2005. The existing weekday peak hour turning movements at the analyzed intersections, illustrated in Figure 3, and the traffic count data are provided in Appendix B.

Level of Service Methodology

Level of service (LOS) is a qualitative measure used to describe the condition of traffic flow at an intersection. The levels of service range from excellent conditions at LOS A to overloaded conditions at LOS F. An intersection's volume-to-capacity (V/C) ratio is used to assess the LOS at signalized intersections. Level of service definitions for signalized intersections are listed in Table 2.

Eight of the nine study intersections are controlled by traffic signals. The Intersection Capacity Utilization (ICU) method of intersection analysis, per the City of Pasadena's requirements for analyzing intersection conditions, was used to determine the intersection V/C ratio and corresponding LOS for each study intersection.

Based on recent field studies of saturation flow through Pasadena intersections, the City has established updated lane capacity criteria for use in intersection capacity calculations. These studies showed that intersections in the City are currently operating with saturation flows (i.e., capacity) in excess of 1,700 vehicles per hour per lane (vphpl). Saturation flows were measured at eight locations in the City and the average across all the intersections was calculated to be slightly above 1,750 vphpl. Examples of other cities that use saturation flows of

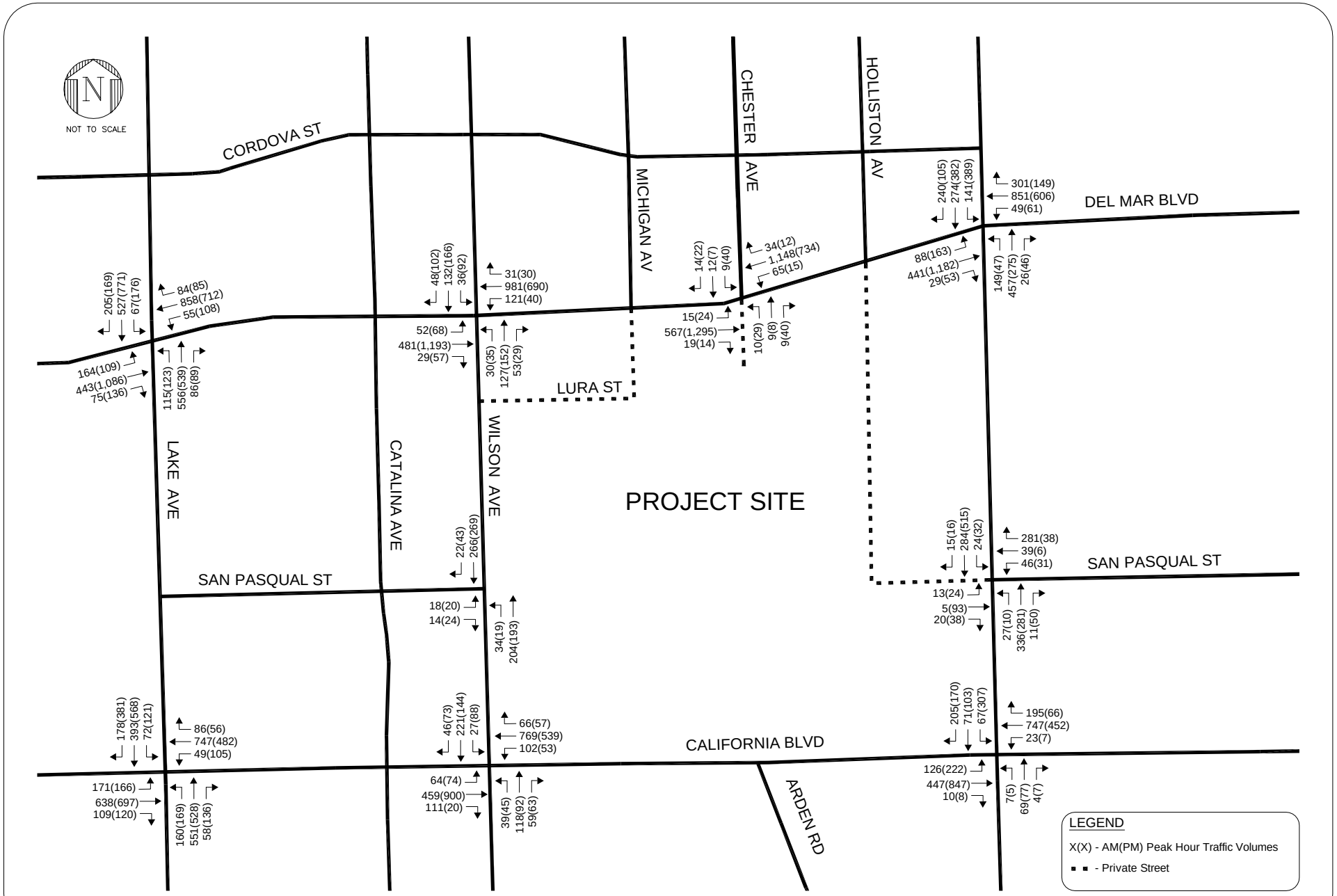


FIGURE 3
EXISTING PEAK HOUR TRAFFIC VOLUMES

TABLE 2
LEVEL OF SERVICE DEFINITIONS FOR SIGNALIZED INTERSECTIONS
(CRITICAL MOVEMENT ANALYSIS METHOD)

Level of Service	Volume/Capacity Ratio	Definition
A	0.000 - 0.600	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.
B	>0.600 - 0.700	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat what restricted within groups of vehicles.
C	>0.700 - 0.800	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	>0.800 - 0.900	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	>0.900 - 1.000	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	> 1.000	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths

Source: *Transportation Research Circular No. 212, Interim Materials on Highway Capacity* Transportation Research Board, 1980.

1,700 vphpl or more include Santa Ana, Simi Valley, Santa Clarita and Tustin. In previous traffic impact studies, the ICU methodology used, per the City's traffic study guidelines, was a default capacity of 1,600 vphpl. In order to reflect the actual operation of intersections in Pasadena more accurately, the ICU methodology was modified to acknowledge the observed field data for saturation flows by using a capacity of 1,700 vphpl for traffic signals along interconnected corridors controlled by the City's Traffic Management Center (TMC). The City has established a capacity of 1,600 vphpl for those isolated intersections that are not connected to the City's TMC, but instead operate independently. City transportation staff directed and approved this change in the methodology.

The City is in the process of implementing upgraded interconnection and computer control strategies along several Intelligent Transportation Systems (ITS) corridors. In the future streets in these corridors will have higher lane capacities, but because the ITS strategies are not yet in place, a capacity of 1,700 vphpl was assumed in the calculations for the existing conditions.

One of the study intersections, Wilson Avenue and San Pasqual Street, is an all-way stop-controlled intersection. LOS at this intersection was evaluated using stop-controlled methodologies from *Highway Capacity Manual* (HCM) (Transportation Research Board, 2000). LOS categories range from excellent, nearly free-flow traffic at LOS A to overloaded, stop-and-go conditions at LOS F. LOS definitions for the unsignalized intersection are provided in Table 3. The LOS definitions and ranges of delay shown in Table 2 represent average conditions for all vehicles at an intersection across an entire hour. Delays longer than the average condition may be experienced by motorists on certain movements and/or during peak times within the peak hour.

Existing Peak Hour Intersection Levels of Service

The existing weekday a.m. and p.m. peak hour turning movements depicted in Figure 3 were used in conjunction with the LOS methodologies described above to determine existing operating conditions at each study intersection. Detailed LOS calculation worksheets are included in Appendix C.

TABLE 3
LEVEL OF SERVICE DEFINITIONS FOR
ALL-WAY STOP-CONTROLLED INTERSECTIONS

Level of Service	Average Vehicle Delay (seconds)
A	0 to 10
B	>10 to 15
C	>15 to 25
D	>25 to 35
E	>35 to 50
F	> 50

Source: *Highway Capacity Manual,* Transportation Research Board, 2000.

Table 4 summarizes the existing weekday a.m. and p.m. peak hour V/C ratio or delay and corresponding LOS for the nine study intersections. As indicated in the summary table, two of the study intersections are currently operating at LOS E during one or both of the analyzed peak hours (Lake Avenue & California Boulevard and Hill Avenue & California Boulevard). The remaining seven study intersections operate at acceptable levels of service (LOS D or better) during both the peak hours.

EXISTING PUBLIC TRANSIT SERVICE

Pasadena is served by two regional transit service providers: Foothill Transit and the Los Angeles County Metropolitan Transportation Authority (MTA). The City of Pasadena also operates two Area Rapid Transit Service (ARTS) shuttle bus lines in the vicinity of Caltech. The bus routes are described below:

- Foothill 187/189 – Line 187/189 provides service between Montclair and Pasadena along Colorado Boulevard. This line travels along Colorado Boulevard in the vicinity of the project site. This line has average headways of 20 minutes during peak periods on weekdays.
- MTA 177 – Line 177 provides service between the Jet Propulsion Laboratory site at Flintridge and the Sierra Madre Villa Gold Line Station. This line travels along California Boulevard and Hill Avenue in the study area. This line has average headways of 30 minutes during peak periods on weekdays.
- MTA 180/181 – Line 180/181 provides service between Hollywood and Altadena. This line travels along Colorado Boulevard in the vicinity of the project site. This line has average headways of 12 minutes during peak periods on weekdays.
- MTA 256 – Line 256 provides service between Commerce and Altadena. This line travels along Arroyo Parkway and Colorado Boulevard in the vicinity of the project site. This line has average headways of 30 minutes during morning peak periods and headways of 30 minutes during afternoon peak periods on weekdays.
- MTA 267 – Line 267 provides service between El Monte and Altadena. This line travels along Del Mar Boulevard adjacent to the project site. This line has average headways of 30 minutes during peak periods on weekdays.
- MTA 485 – Line 485 provides service between downtown Los Angeles and Altadena with stops at Lake Avenue and California Boulevard just west of the campus. This line travels along Lake Avenue in the study area. This line has average headways of 20 minutes during morning peak periods and headways of 15 minutes during afternoon peak periods on weekdays.

TABLE 4
YEAR 2005 EXISTING CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersections	Peak Hour	Existing Conditions	
		V/C or Delay	LOS
1. Lake Ave and Del Mar Blvd	A.M. P.M.	0.626 0.732	B C
2. Wilson Ave and Del Mar Blvd	A.M. P.M.	0.574 0.725	A C
3. Chester Ave and Del Mar Blvd	A.M. P.M.	0.434 0.513	A A
4. Hill Ave and Del Mar Blvd	A.M. P.M.	0.591 0.772	A C
5. Wilson Ave and San Pasqual St [a]	A.M. P.M.	9.0 9.1	A A
6. Hill Ave and San Pasqual St	A.M. P.M.	0.536 0.524	A A
7. Lake Avenue and California Blvd	A.M. P.M.	0.956 0.955	E E
8. Wilson Avenue and California Blvd	A.M. P.M.	0.736 0.815	C D
9. Hill Avenue and California Blvd	A.M. P.M.	0.769 0.901	C E

Notes:

[a] Intersection is controlled by stop signs on each approach. Analysis was done using Highway Capacity Manual (2000) all-way stop-controlled methodology. For the purpose of evaluating the operating conditions of the intersection, average vehicular delay in seconds is reported rather than V/C ratio.

- MTA Metro Gold Line – The Gold Line provides service between downtown Los Angeles and the Sierra Madre Villa Gold Line Station in Pasadena, with the station nearest to the campus located at the Lake Avenue Station, between Maple Street and Corson Street. The Gold Line has an average headway of 10 minutes at this station.

- ARTS 10 – Line 10 provides service between Pasadena City College and Allen Gold Line Station. This line travels along Del Mar Boulevard in the study area. This line has average headways of 15 minutes during peak periods on weekdays.
- ARTS 20 – Line 20 provides service between northern and southern Pasadena via a two-way loop on Fair Oaks Avenue and Lake Avenue. This line travels along California Boulevard in the study area. This line has average headways of 30 minutes during peak periods on weekdays.

III. FUTURE TRAFFIC PROJECTIONS

In order to evaluate potential impacts of the proposed Caltech projects on the street system, it was necessary to develop estimates of future traffic conditions in the study area both with and without the project. Future (year 2015) traffic volumes were first estimated for the study area without the project. These future forecasts reflect shifts in Caltech traffic due to the recent opening of the California Parking Structure, traffic increases due to general regional growth, and traffic expected to be generated by other specific development projects in the vicinity. They represent cumulative base (no project) conditions. The additional amount of traffic expected to result from the proposed project was then estimated and separately assigned to the surrounding street system. The sum of the cumulative base and project-generated traffic represents the cumulative plus project conditions. The development of these future traffic scenarios is described in this chapter.

FUTURE BASELINE STREET IMPROVEMENTS

Several key roadway improvements in or near the study area are expected to be completed by 2015. These improvements, whether the result of capital improvement programs or as mitigation for ongoing or entitled related projects, would result in capacity changes at various locations throughout the study area. These changes would affect the operations of several study intersections:

- Based on the City of Pasadena's policy for the year 2015 and the General Plan Mobility Element, the city will make ITS improvements as part of the city's 2015 Master Plan of Highways. These improvements will result in increased lane capacities at intersections connected to the TMC and those along Principal Multimodal Corridors. With the implementation of the Mobility Element improvements, lane capacities of 1,785 vphpl for those intersections connected to the TMC intersections (intersections along California Boulevard and Hill Avenue in the study area) and 1820 vphpl for intersections along Principal Multimodal Corridors (intersections along Del Mar Boulevard in the study area) are projected.

- With the approved future development at Pasadena Polytechnic School, the southbound approach to the intersection of Wilson Avenue and California Boulevard will be restriped to

provide a separate left-turn lane resulting in a left-turn lane and a shared though/right-turn lane as an approved mitigation for that project.

- The approved California Boulevard Parking Structure on the Caltech campus identified as mitigation the restriping of the southbound approach at the intersection of Hill Avenue and California Boulevard. This improvement will provide a separate left-turn lane resulting in a left-turn lane and a shared though/right-turn lane, and will modify the traffic signal to provide an eastbound left-turn phase.

CUMULATIVE BASE TRAFFIC PROJECTIONS

The cumulative base traffic projections include three elements. The first element is the estimated shift in Caltech-related traffic due to the opening of the California Parking Structure. The second element is the growth in the existing background traffic volumes, reflecting the effects of overall regional growth and development both inside and outside the study area. The third element is the traffic generated by specific related projects located in or near the study area.

The peak hour traffic counts used in this study were performed on May 18, 2005. The recently completed California Parking structure was opened on May 16, 2005. Some Caltech staff who had been parking at the St. Luke's Campus and taking a Caltech shuttle shifted to the parking structure on opening day (the shuttle was terminated on May 16). Many of the other Caltech students, staff, and faculty, however, did not utilize the structure during the first few days of its operation. Based on traffic count data collected at driveways to Caltech parking lots and structures and available utilization data for the California Parking Structure, a portion of the existing Caltech traffic was assumed to shift to the California Parking Structure in the cumulative base scenario.

The cumulative base traffic projections were estimated for this study based on discussions with Pasadena Public Works staff. Based on their knowledge of the study area, it was determined that an annual growth rate of 1.5% would adequately account for ambient growth. Accordingly, the 2005 existing traffic count data was increased by a total of 15% through 2015.

A total of 68 related projects were identified in the study area and are listed in Table 5. The location of each project is illustrated in Figure 4. Information regarding potential future projects that are either under construction, being planned, or proposed for development was obtained from

TABLE 5
RELATED PROJECTS TRIP GENERATION ESTIMATES

ID NO	ADDRESS	PROJECT SCOPE	STATUS AS OF SEPT. 2004	Daily	A.M.			P.M.		
					In	Out	Total	In	Out	Total
1.	451-455 S ARROYO PKWY	45,700 SF SUPER MARKET; 17,100 DRUG STORE; 8,200 SF NURSERY GARDEN CENTER	TRAFFIC STUDY COMPLETED - EIR PENDING	3,211	23	20	43	146	139	285
2.	40 E CALIFORNIA BL	7200 SF ADDITION TO DIAPER CLEANING SERVICE	PPR	50	6	1	7	1	6	7
3.	100 W CALIFORNIA BL	152,275 SF WEST WING OF HUNTINGTON MEMORIAL HOSPITAL	UNDER CONSTRUCTION	2,675	122	60	182	59	120	179
4.	70-100 W CALIFORNIA BL	195,000 SF MEDICAL OFFICE DEMO: 21,000 SF WAREHOUSE, 10,639 SF PHARMACY, AND 1,968 OFFICE	TRAFFIC STUDY COMPLETED	5,059	259	66	325	89	281	370
5.	1200 E CALIFORNIA BL	496 SPACE PARKING STRUCTURE	APPROVED & UNDER CONSTRUCTION	1,100	132	6	138	9	101	110
6.	460 N CATALINA AV	15-UNIT CONDOMINIUM	APPROVED	88	1	5	6	5	3	8
7.	301 E COLORADO BL	8,000 SF RETAIL; 56-UNIT LUXURY CONDOS (MONTANA)	APPROVED	644	7	25	32	28	24	52
8.	556 E COLORADO BL	10,910 SF RETAIL, 1,550 RESTAURANT, AND 99,370 SF MEDICAL OFFICE	PENDING	4,437	209	63	272	113	254	367
9.	621 E COLORADO BL	304-UNIT RESIDENTIAL; 14,602 SF RETAIL; 420 PUBLIC PARKING; 456 RESIDENTIAL PARKING	APPROVED & UNDER CONSTRUCTION	1,970	22	102	124	129	58	187
10.	618 -630 E COLORADO BL	160-UNIT CONDOMINIUM AND 11,000 SF RETAIL (Playhouse Condos)	APPROVED	631	10	56	66	5	25	30
11.	7137 E COLORADO BL	3,988 SF RESTAURANT & BAR	CUP PENDING	359	2	1	3	20	10	30
12.	1010 E COLORADO BL	DEMO 2,434 SF RENTAL CAR OFFICE AND 14,000 SF BANK AND CONSTRUCT NEW 18,236 SF (CITIZEN'S BANK)	APPROVED	N/A	0	0	0	6	6	12
13.	1570 E COLORADO BL	5000 ADDITIONAL STUDENTS TO PASADENA CITY COLLEGE MASTER PLAN	APPROVED & UNDER CONSTRUCTION	7,700	468	182	650	416	234	650
14.	54 S CRAIG AV	13-UNIT CONDOMINIUM	APPROVED	76	1	5	6	5	2	7
15.	96-110 N CRAIG AV	DEMO 6 SFR; CONSTRUCT 18-UNIT CONDOMINIUM	APPROVED	48	0	3	3	2	1	3
16.	250 S DE LACEY AV	34 CONDOS AND 5,000 SF OF RETAIL	APPROVED	213	5	12	17	12	8	20
17.	240 E DEL MAR BL	22-UNIT CONDOMINIUM	APPROVED	129	2	8	10	8	4	12
18.	62 - 100 N EL MOLINO AV	(PART OF MILL CREEK PROJECT AT 686-717 E UNION, 44-48 N EL MOLINO) DEMO 3,207 SF OFFICE AND CONSTRUCT 104 APTS AND GROUND FLOOR RETAIL/OFFICE	APPROVED	1,245	-19	62	43	76	18	94
19.	130 N FAIR OAKS AV	CONVERT EXISTING 11,710 SF OFFICE AND 2,000 SF STORAGE INTO 34 CONDOS; 1700 SF RETAIL; 1700 SF RESTAURANT	N/A	204	-9	15	6	16	-5	11
20.	909 S FAIR OAKS AV	78,200 SF RETAIL AND 40,000 SF OFFICE	PPR	1,774	11	12	23	88	64	152
21.	951 S FAIR OAKS AV	47-UNIT ASSISTED LIVING WITH 51 BEDROOMS	PPR	140	6	2	8	7	12	19
22.	2233 E FOOTHILL BL	STORBOX STORAGE EXPANSION (3 PHASES)	APPROVED	199	9	5	14	11	12	23
23.	1297-1317 E GREEN ST	78 AFFORDABLE HOUSING UNITS AND 1,500 SF OF RESTAURANT	CATEGORICALLY EXEMPT	1,156	28	47	75	49	31	80
24.	100-120 W GREEN ST	61-UNIT CONDOMINIUM AND 8,878 RETAIL	APPROVED	520	7	17	24	25	20	45
25.	936 E GREEN ST	REMOVE 11,000 SF AND CONSTRUCT 46-UNIT CONDOMINIUMS AND 7700 SF RETAIL	APPROVED	479	-7	18	11	27	9	36
26.	83-155 S HILL AV	ST PHILLIPS MDP (ADD 116 STUDENTS)	APPROVED	406	71	64	135	8	12	20
27.	315 N HILL AV	34 CONDOS AND 2,940 SF RETAIL	UNDER CONSTRUCTION	265	10	14	24	15	13	28
28.	251 S HUDSON AV	17-UNIT CONDOMINIUM	APPROVED	100	6	1	7	6	3	9
29.	233 N HUDSON AV	22 APTS AND 3,000 SF RETAIL	APPROVED	268	5	15	20	18	15	33

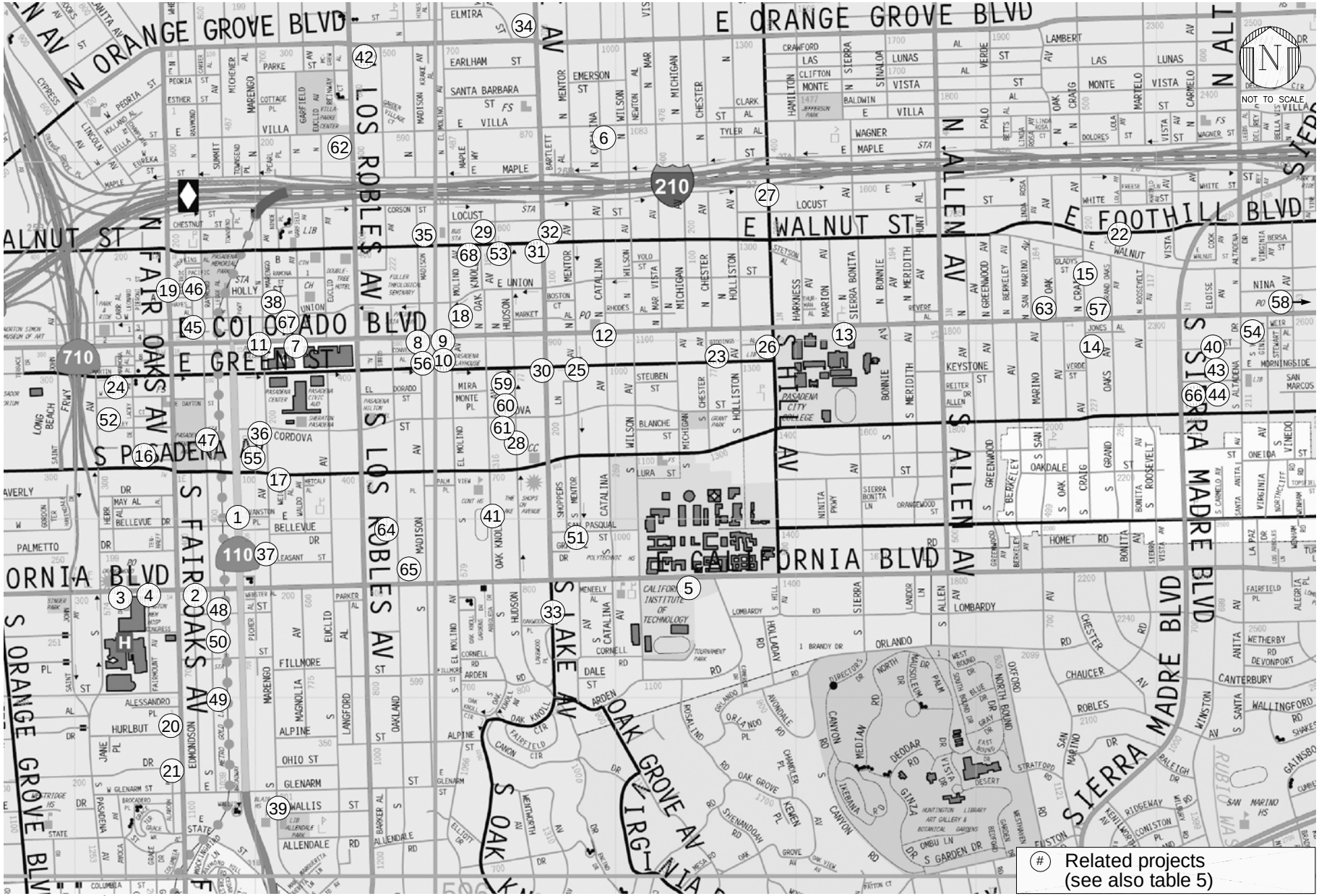
TABLE 5
RELATED PROJECTS TRIP GENERATION ESTIMATES (cont.)

ID NO	ADDRESS	PROJECT SCOPE	STATUS AS OF SEPT. 2004	Daily	A.M.			P.M.		
					In	Out	Total	In	Out	Total
30.	85 S LAKE AV	103 APTS	APPROVED & UNDER CONSTRUCTION	1,181	50	79	129	56	46	102
31.	203 N LAKE AV	204,910 SF OFFICE, 4,236 BANK, 3,671 RESTAURANT	APPROVED & UNDER CONSTRUCTION	24,999	260	39	299	79	259	338
32.	220 N LAKE AV	106 CONDOS; 9,200 SF RETAIL	APPROVED	710	12	42	54	31	24	55
33.	656-662 S LAKE AV	CONSTRUCT 12 CONDOS	APPROVED	70	1	4	5	4	2	6
34.	701 N LAKE AV	5,120 SF RETAIL	APPROVED	220	3	2	5	9	10	19
35.	240-255 N MADISON AV	180-UNIT STUDENT HOUSING (138 NET NEW)	APPROVED	915	12	59	71	58	28	86
36.	215 S MARENGO AV	31 NET NEW APTS	APPROVED	204	2	12	14	12	6	18
37.	511 S MARENGO AV	6 CONDOS	APPROVED	35	1	2	3	2	1	3
38.	78 N MARENGO AV	32-UNIT LIVE/WORK	PENDING	344	4	15	19	23	12	35
39.	1088 S MARENGO AV	11 CONDOS	APPROVED & UNDER CONSTRUCTION	64	1	4	5	4	2	6
40.	2425 MOHAWK ST	7 CONDOS	APPROVED & UNDER CONSTRUCTION	41	1	3	4	2	1	3
41.	444 OAK KNOLL AV	6 CONDOS	APPROVED	35	0	2	2	2	1	3
42.	466 E ORANGE GROVE BL	31-LIVE/WORK & 13,146 SF GROUND FL. RETAIL	APPROVED	438	11	14	25	21	21	42
43.	2445 OSWEGO ST	DEMO 3 SFR & CONSTRUCT 9 CONDOS	APPROVED	35	0	2	2	2	1	3
44.	2448 OSWEGO ST	CONSTRUCT 8 CONDOS	APPROVED	47	2	3	5	3	1	4
45.	35 N RAYMOND AV	13,845 SF RESTAURANT AND 33 CONDOS	APPROVED & UNDER CONSTRUCTION	520	7	17	24	25	20	45
46.	129 N. RAYMOND AV	49 LIVE/WORK; 11,383 SF RETAIL	APPROVED & UNDER CONSTRUCTION	934	13	27	40	49	38	87
47.	240 S RAYMOND AV	DEL MAR STATION	APPROVED & UNDER CONSTRUCTION	2,867	59	145	204	159	91	250
48.	620 S RAYMOND AV	DEMO WAREHOUSE AND CONSTRUCT 59,476 SF MEDICAL OFFICE BUILDING	APPROVED	1,938	112	27	139	50	149	199
49.	766 S RAYMOND AV	30,000 SF MEDICAL OFFICE AND 250 GOLD LINE LIGHT RAIL PARK AND RIDE SPACES FILLMORE STATION/MEDICAL CENTER	APPROVED & UNDER CONSTRUCTION	1,084	59	16	75	30	81	111
50.	686-700 S RAYMOND AV	DEMO 12,535 SF OF VACANT STRUCTURES AND CONSTRUCT 45,000 SF R&D AND 4,000 SF RETAIL	TRAFFIC STUDY BEING PREPARED	555	53	12	65	14	53	67
51.	950 SAN PASQUAL ST	79 CONDOMINIUMS	APPROVED	463	6	29	35	28	15	43
52.	169 VALLEY STREET	832 DWELLING UNITS AND 30,000 SF RETAIL AMBASSADOR CAMPUS (EAST)	N/A	5,520	71	310	381	317	172	489
53.	770 E WALNUT ST	DEMOLISH ONE COMMERCIAL BUILDING, TWO SFR, AND THREE APARTMENT BUILDINGS AND CONSTRUCT 103,000 SF MIXED USE, INCLUDING 71 UNITS, 1500 SF RESTAURANT, 2284 SF GENERAL COMMERCIAL, AND 144 PARKING SPACES	TRAFFIC STUDY BEING PREPARED	65	-9	11	2	9	-9	0
54.	54-62 S ALTADENA DR	DEMO EXISTING 2 SFR AND CONSTRUCT 12-UNIT TOWNHOUSE	TRAFFIC STUDY COMPLETED	51	0	3	3	3	1	4
55.	240-260 S ARROYO PKWY	DEMO EXISTING RESTAURANT AND OFFICE USES AND CONSTRUCT 68 CONDOS; 10,000 SF RESTAURANT; 7,000 SF RETAIL	APPROVED	1,339	41	61	102	73	42	115
56.	592 E COLORADO BL	DEMO 1,440 SF RETAIL (SHOE REPAIR) AND 400 SF OF TAKE OUT RESTAURANT; CONSTRUCT 3,500 SF RETAIL AND 16 CONDOS	PENDING	1,633	68	75	143	17	14	31
57.	2191 E COLORADO BL	44 LIVE/WORK UNITS AND 3,900 SF RETAIL	TRAFFIC STUDY COMPLETED	391	5	18	23	20	14	34
58.	3020 E COLORADO BL	24,400 R&D and 24,400 RETAIL	APPROVED	438	29	7	36	14	33	47

TABLE 5
RELATED PROJECTS TRIP GENERATION ESTIMATES (cont.)

ID NO	ADDRESS	PROJECT SCOPE	STATUS AS OF SEPT. 2004	Daily	A.M.			P.M.		
					In	Out	Total	In	Out	Total
59.	141 S HUDSON AV	9-UNIT CONDO, 3,090 SF OFFICE, AND 475 SF RETAIL	APPROVED	103	7	6	13	6	7	13
60.	151 S HUDSON AV	9 CONDOMINIUM UNITS AND 3500 SF DENTAL OFFICE	TRAFFIC STUDY PENDING	169	8	4	12	6	11	17
61.	171 S HUDSON	DEMO 6,800 SF OFFICE AND CONSTRUCT 20 CONDOMINIUMS AND 9000 SF OFFICE	TRAFFIC STUDY PENDING	152	6	8	14	8	7	15
62.	437-445 N LOS ROBLES AV	DEMO 9 APTS AND CONSTRUCT 16 CONDOS	TRAFFIC STUDY PENDING	34	0	2	2	1	1	2
63.	41-49 N OAK AV	DEMO EXISTING 2 SFR AND CONSTRUCT 12-UNIT TOWNHOUSE	TRAFFIC STUDY PENDING	51	1	3	4	4	3	1
64.	445 S OAKLAND AV	9-UNIT CONDO	TRAFFIC STUDY PENDING	54	1	3	4	3	2	5
65.	520 S OAKLAND AV	6-UNIT CONDO	TRAFFIC STUDY PENDING	36	1	2	3	2	1	3
66.	2420 OSWEGO ST	8-UNIT CONDOS	TRAFFIC STUDY PENDING	42	1	2	3	3	1	4
67.	250 E UNION ST	52 APARTMENTS	TRAFFIC STUDY PENDING	362	9	21	30	21	13	34
68.	712 E WALNUT ST	WALNUT PLACE 28-UNIT APT, 3,396 SF RETAIL	UNDER CONSTRUCTION	269	3	12	15	15	10	25
TOTAL				**83,555**	**2,298**	**1,990**	**4,288**	**2,584**	**2,666**	**5,243**

Note: See Figure 4 for a map of these projects.
Source: Pasadena Department of Transportation, January 2006.



Source: Thomas Bros. Maps

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FIGURE 4
LOCATION OF RELATED PROJECTS

several sources, including recently conducted traffic studies and City of Pasadena files. As summarized in Table 5, the related projects are expected to generate approximately 4,300 trips during the morning peak hour and 5,250 trips during the evening peak hour. Trips from the related projects were assigned to the roadway system based on distribution patterns from their respective studies and the type and location of the project. It should be noted that these projections are conservative in that they do not in every case account for either the existing uses to be removed or the likely use of non-motorized travel modes (transit, walking, etc.).

The resulting cumulative base traffic volumes, representing future conditions without the project for year 2015, are presented Figure 5. These future projections take into account the estimated shift in existing Caltech traffic, overall growth in the surrounding area, and traffic from known related projects in the study area.

PROJECT TRAFFIC PROJECTIONS

Development of future traffic projections for the proposed project involved a three-step process. This process included the estimation of project trip generation, trip distribution, and trip assignment.

Project Trip Generation

Information provided by Caltech staff in June 2005 projected that the current campus population of 5,721 could grow to 6,400 in 2014-2015, an increase of 679 persons or approximately 12%. Of these, it is assumed that 90% of the undergraduate students and 30% of the graduate students would live on-campus. Thus the existing non-resident population would grow from 4,532 to 5,184 persons (652 persons or about 14%). New empirical trip generation rates were developed for the campus by collecting automatic daily traffic volume counts at seven locations on the perimeter of campus on three mid-week days (May 17–19, 2005). Together these locations captured approximately 75% of the trips into and out of campus, based on the location of existing campus parking facilities. This data is provided in Appendix B. Inaccurate data was identified at one location (southbound Chester Avenue south of Del Mar Boulevard) and was adjusted on the basis of an immediately adjacent peak period manual count conducted at the

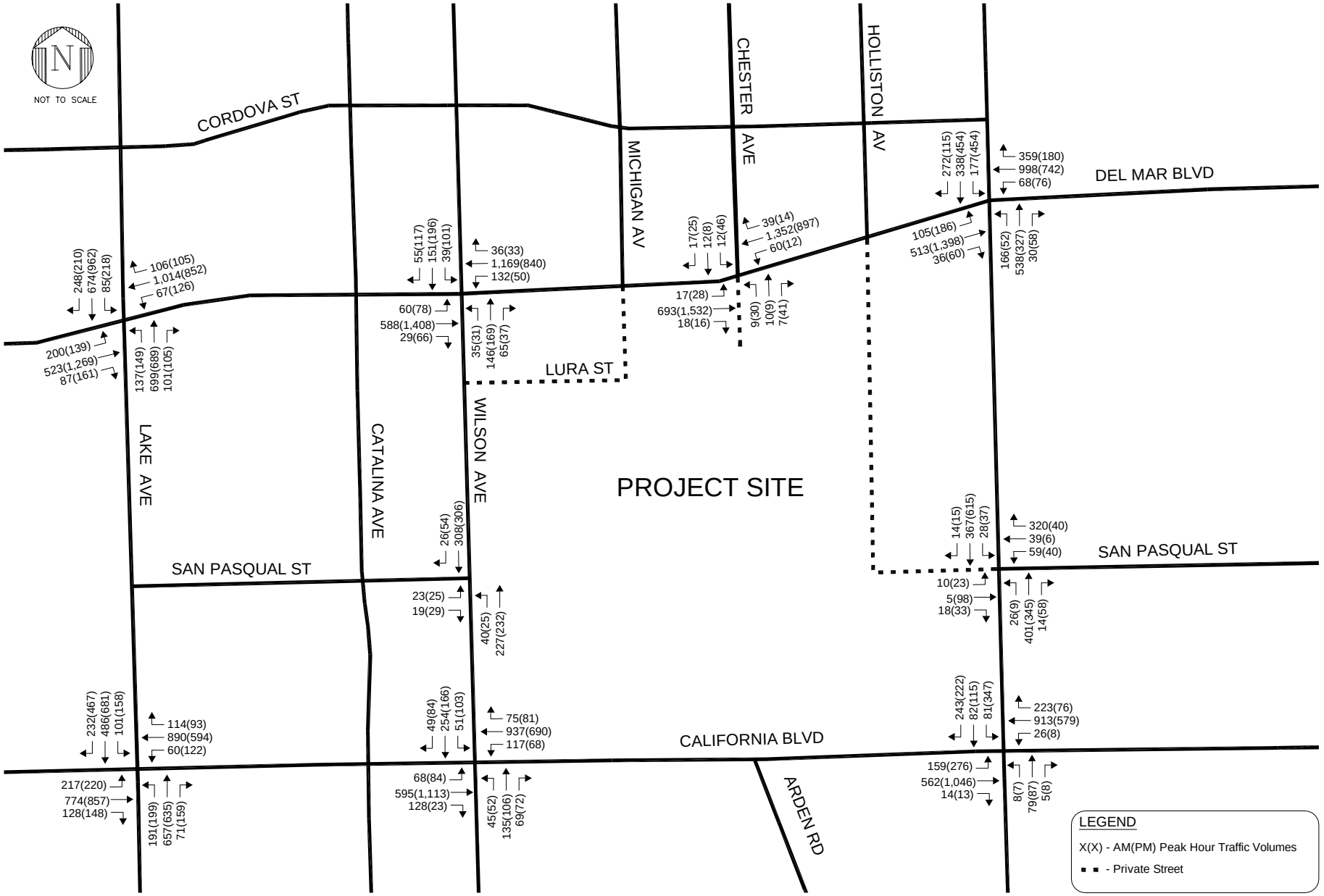

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FIGURE 5
CUMULATIVE BASE PEAK HOUR TRAFFIC VOLUMES

same time. The total adjusted trips were factored upward to include additional trips to the parking areas that were not captured in the cordon count. On this basis, trip rates per non-resident person were identified as 2.24 daily trips, 0.21 a.m. peak hour trips (73% inbound/27% outbound) and 0.21 p.m. peak hour trips (27% inbound/73% outbound).

These rates, as shown in Table 6, were applied to the forecast incremental growth in the campus population in 2014-2015, resulting in an estimated ten-year increase of approximately 1,461 daily trips, including 137 a.m. peak hour trips (100 inbound/37 outbound) and 137 p.m. peak hour trips (37 inbound/100 outbound).

Project Trip Distribution

The geographic distribution patterns for the proposed Caltech projects were based on the current traffic patterns at the Caltech campus. Based on this and following discussions with Pasadena Public Works staff, it was estimated that approximately 35% would come from the north, 10% would come from the south, 20% would come from the west, and 35% would come from the east. Figure 6 illustrates the detailed projected trip distribution pattern at each study intersection.

Project Trip Assignment

Using the estimated trip generation and the distribution pattern developed above, the traffic generated by the proposed projects was assigned to the street network. Figure 7 illustrates the proposed project-generated peak hour traffic volumes for both peak hours at each of the nine study intersections.

CUMULATIVE PLUS PROJECT TRAFFIC PROJECTIONS

The project-generated traffic volumes were added to the cumulative base traffic projections to develop the cumulative plus project traffic forecasts for 2015. Figure 8 illustrates the projected

TABLE 6

PROJECT TRIP GENERATION ESTIMATES

Scenario	Total Campus Population	Non-Resident Campus Population	Daily	A.M. Peak Hour			P.M. Peak Hour		
				In	Out	Total	In	Out	Total
Existing Trips	5,721	4,532	10,133	696	253	949	261	692	953
Trips per Person			*2.24*	*73%*	*27%*	*0.21*	*27%*	*73%*	*0.21*
NET GROWTH	679	652	1,461	100	37	137	37	100	137
Estimated Trips (2015)	6,400	5,184	11,594	796	290	1,086	298	792	1,090

Source: Trip generation rates based on empirical data collected at Caltech on May 17 through May 19, 2005.

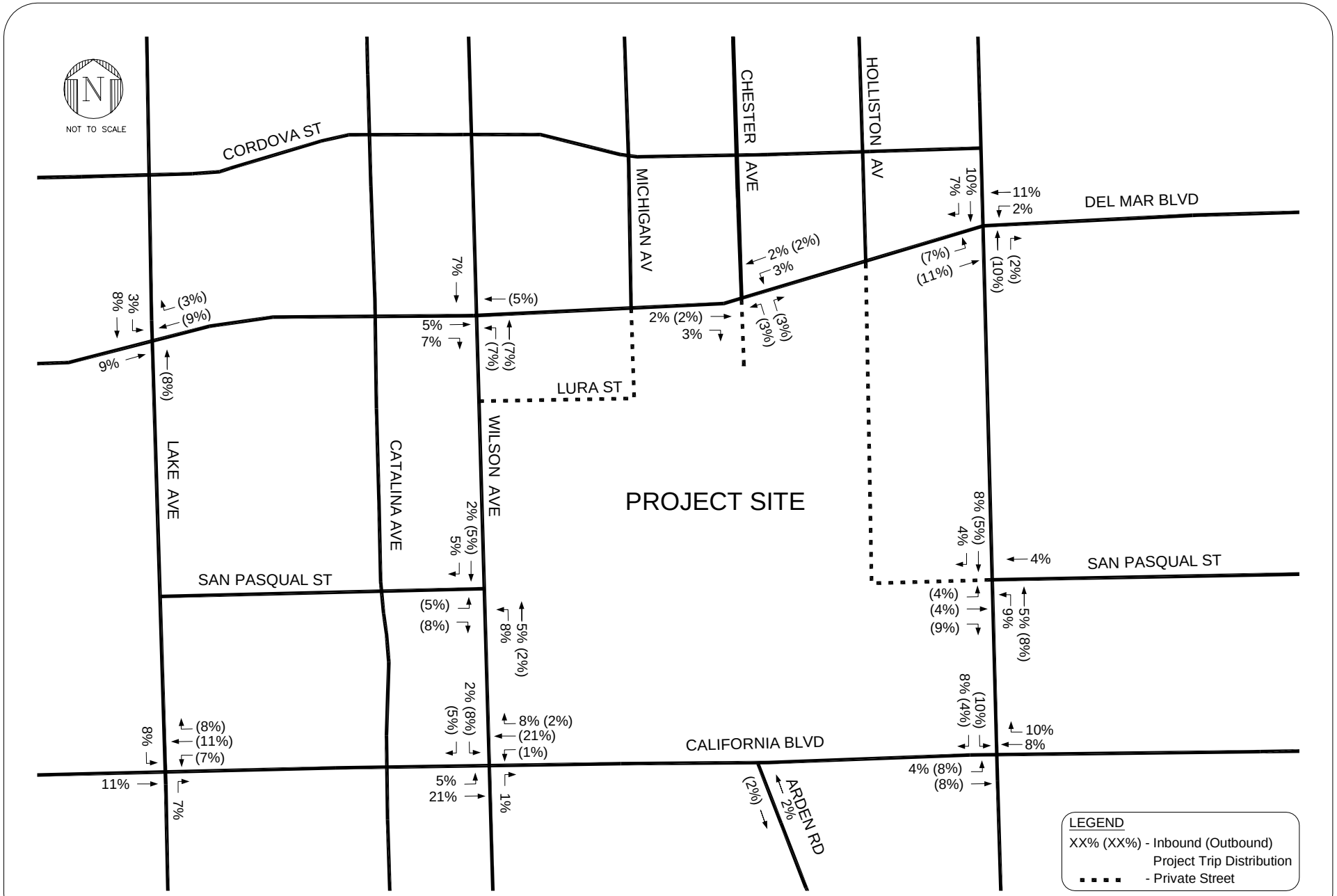

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FIGURE 6
ESTIMATED PROJECT TRIP DISTRIBUTION

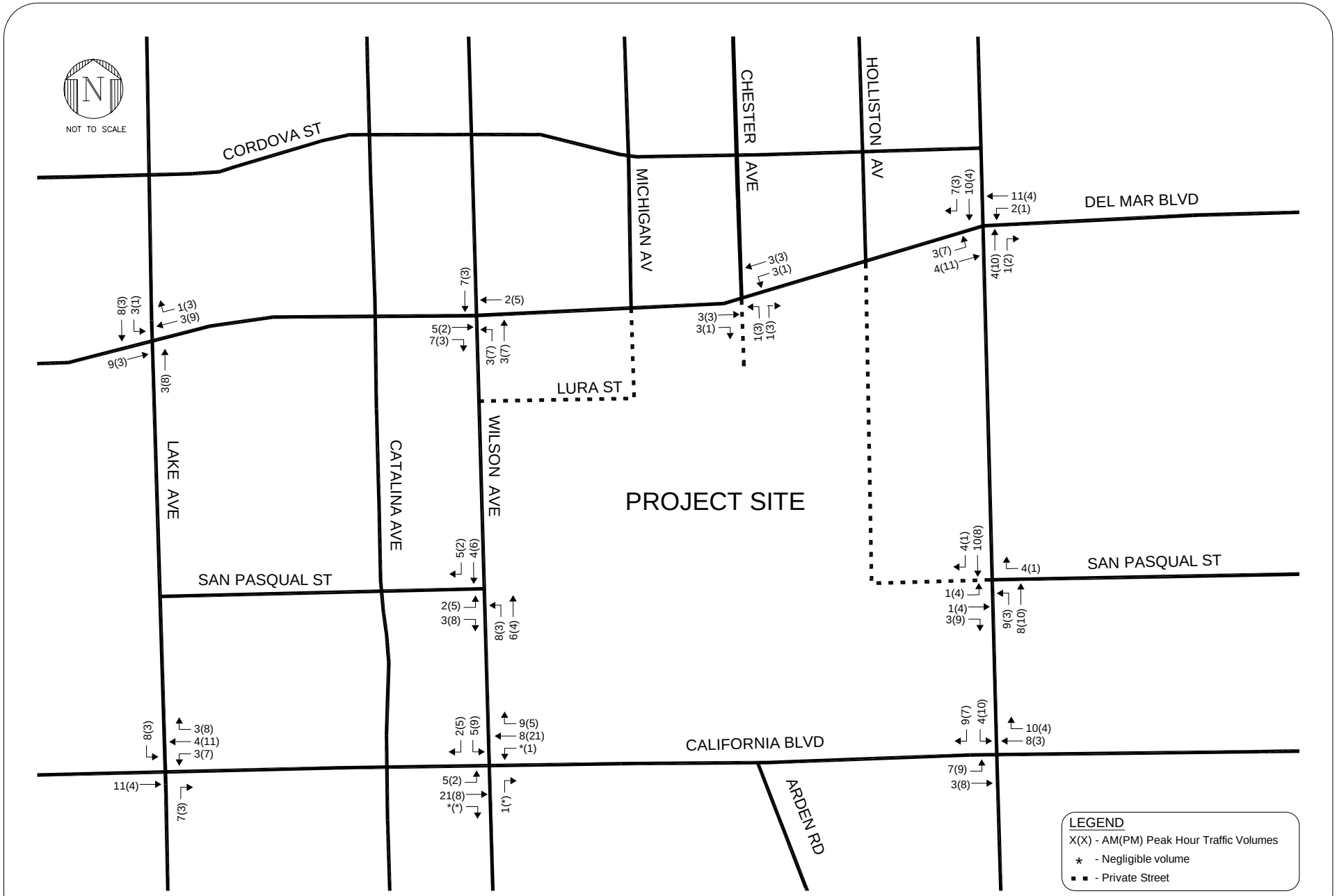

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FIGURE 7
PROJECT ONLY PEAK HOUR TRAFFIC VOLUMES

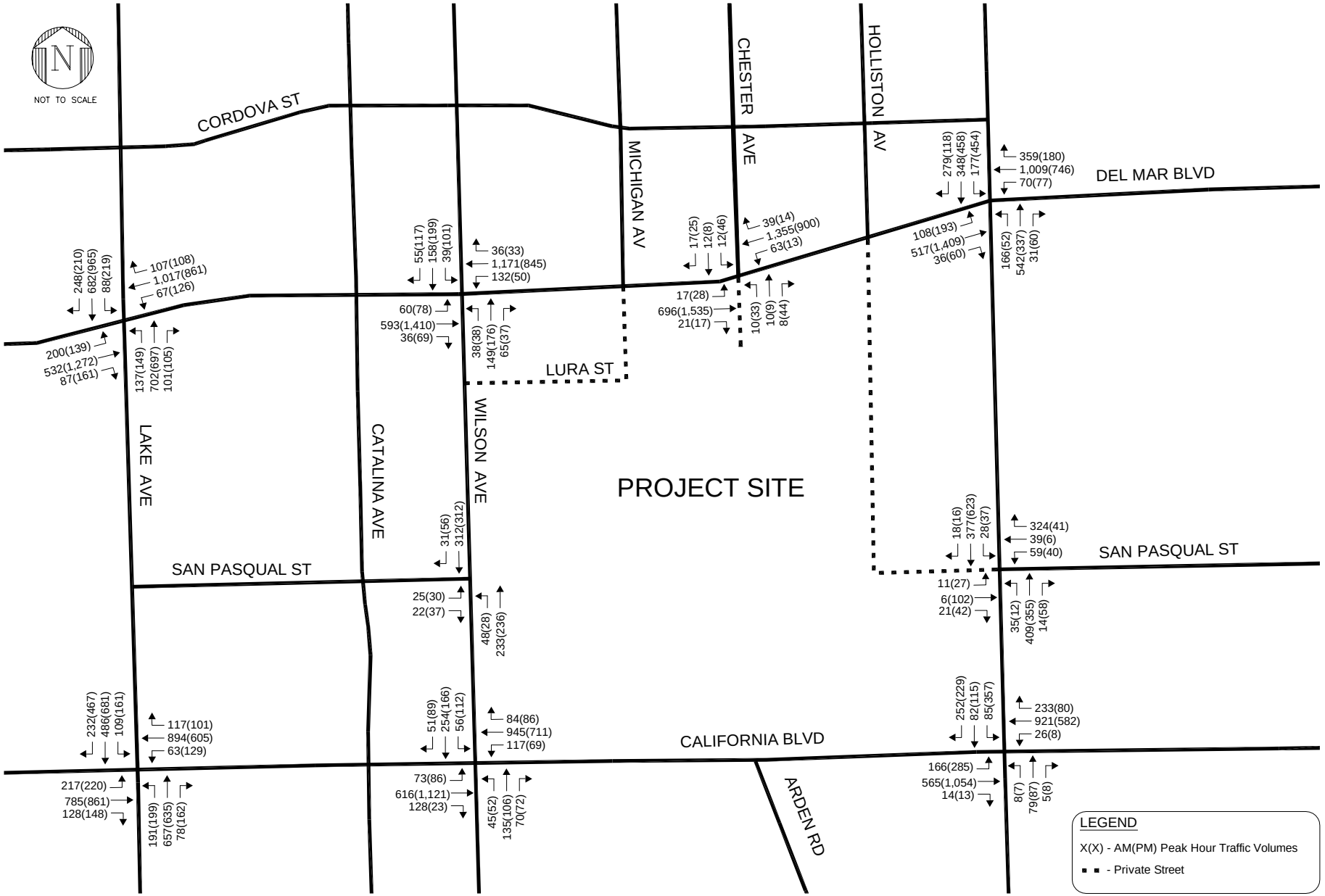

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FIGURE 8
CUMULATIVE PLUS PROJECT PEAK HOUR TRAFFIC VOLUMES

cumulative plus project a.m. and p.m. peak hour traffic volumes at each of the nine study intersections.

IV. INTERSECTION TRAFFIC IMPACT ANALYSIS

This chapter presents an analysis of the potential impacts of the traffic generated by the proposed project on the local street system. The analysis compares the forecasted levels of service at each study location under cumulative conditions for 2015 both with and without the proposed project to determine potential impacts using significance criteria established by the City of Pasadena.

CRITERIA FOR DETERMINATION OF SIGNIFICANT TRAFFIC IMPACT

The Department of Transportation of the City of Pasadena has established threshold criteria that determine if a project has a significant traffic impact at a specific intersection. According to the criteria used by the City of Pasadena, a project impact would be considered significant if the following conditions are met:

Intersection Level of Service under Current Conditions	Project-related Increase in V/C
A	0.06
B	0.05
C	0.04
D	0.03
E	0.02
F	0.01

For the intersection controlled by stop signs, the HCM stop-controlled methodology is used to evaluate the operating condition of the intersection, and average vehicular delay in seconds is reported rather than V/C ratio. For the purpose of application of City of Pasadena significance criteria, the V/C ratio is reported using the ICU methodology.

CUMULATIVE BASE TRAFFIC CONDITIONS

This section presents an analysis of potential future traffic conditions under year 2015 cumulative base conditions. The cumulative base traffic volumes projected in Chapter III were analyzed using the LOS methodologies described in Chapter II to forecast cumulative base peak hour LOS at the study locations.

In accordance with City of Pasadena policy for the year 2015 and based on the General Plan Mobility Element ITS improvements and discussions with City staff, lane capacities of 1,785 vphpl for those intersections connected to the TMC intersections (intersections along California Boulevard and Hill Avenue in the study area) and 1820 vphpl for intersections along Principal Multimodal Corridors (intersections along Del Mar Boulevard in the study area) were assumed in the capacity calculations for the future scenarios to account for the implementation of the Mobility Element improvement program. This is in accordance with City of Pasadena policy for the year 2015 based on the General Plan Mobility Element ITS improvements and discussions with City officials. The Mobility Element includes the development of a traffic impact fee to fund the implementation of the Mobility Element improvement program.

The first columns in Table 7 summarize the results of this analysis. The intersection of Lake Avenue and California Boulevard is projected to operate at LOS F during both peak hours under year 2015 cumulative base conditions.

CUMULATIVE PLUS PROJECT TRAFFIC CONDITIONS

The cumulative plus project peak hour traffic volumes illustrated in Figure 8 were analyzed to determine the forecasted 2015 operating conditions with the inclusion of proposed project traffic. The results of the cumulative plus project analysis are presented in Table 7.

Three of the study intersections are projected to operate at LOS E or F during one or both peak hours under year 2015 cumulative plus project conditions: Lake Avenue and California Boulevard, Wilson Avenue and California Boulevard, and Hill Avenue and California Boulevard.

TABLE 7
YEAR 2015 FUTURE CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Cumulative Base Year 2015		Cumulative plus Project Year 2015			
		V/C or Delay	LOS	V/C or Delay	LOS	Increase in V/C	Significant Impact
1. Lake Ave and Del Mar Blvd	A.M.	0.706	C	0.709	C	0.003	NO
	P.M.	0.814	D	0.816	D	0.002	NO
2. Wilson Ave and Del Mar Blvd	A.M.	0.570	A	0.574	A	0.004	NO
	P.M.	0.726	C	0.733	C	0.007	NO
3. Chester Ave and Del Mar Blvd	A.M.	0.469	A	0.470	A	0.001	NO
	P.M.	0.551	A	0.555	A	0.004	NO
4. Hill Ave and Del Mar Blvd	A.M.	0.641	B	0.649	B	0.008	NO
	P.M.	0.848	D	0.854	D	0.006	NO
5. Wilson Ave and San Pasqual St [a]	A.M.	9.6	A	9.8	A	-	-
	P.M.	9.7	A	9.9	A	-	-
	A.M.	0.396	-	0.410	-	0.014	NO
	P.M.	0.426	-	0.441	-	0.015	NO
6. Hill Ave and San Pasqual St	A.M.	0.553	A	0.566	A	0.013	NO
	P.M.	0.537	A	0.554	A	0.017	NO
7. Lake Avenue and California Blvd	A.M.	1.096	F	1.102	F	0.006	NO
	P.M.	1.091	F	1.097	F	0.006	NO
8. Wilson Avenue and California Blvd	A.M.	0.808	D	0.816	D	0.008	NO
	P.M.	0.899	D	0.908	E	0.009	NO
9. Hill Avenue and California Blvd	A.M.	0.836	D	0.851	D	0.015	NO
	P.M.	0.898	D	0.909	E	0.011	NO

Notes:

[a] Intersection is controlled by stop sign(s). The top rows show analysis using Highway Capacity Manual (2000) stop-controlled methodology. For the purpose of evaluating the operating condition of the intersection, average vehicular delay in seconds is reported rather than V/C ratio. The bottom rows show analysis using the ICU methodology. For the purpose of City of Pasadena significance criteria application, V/C ratio is reported.

According to the City of Pasadena's impact criteria, the proposed project traffic would not result in V/C increases large enough to result in significant traffic impacts at any of the analyzed intersections during peak hour conditions.

MITIGATION MEASURES

The traffic impact analysis determined that the proposed development would not generate significant traffic impacts at any of the analyzed intersections under cumulative plus project conditions. Therefore, project-related intersection traffic mitigation measures are not required.

V. STREET SEGMENT IMPACT ANALYSIS

Five street segments were selected for analysis of impacts of the proposed project. The five street segments are:

1. Wilson Avenue north of Del Mar Boulevard
2. Hill Avenue north of Del Mar Boulevard
3. Del Mar Boulevard east of Hill Avenue
4. San Pasqual Street east of Hill Avenue
5. California Boulevard east of Hill Avenue

DAILY TRAFFIC PROJECTIONS

New 24-hour machine counts (average daily traffic [ADT] volumes) were collected on Wednesday, May 18, 2005 at the five locations and are shown in Table 8. The project ADT volumes are estimated based on the project trip generation shown in Table 6 and distribution patterns illustrated in Figure 6, as discussed in Chapter III. As indicated in the table, the net increase in daily traffic volume generated by the project is estimated at approximately 1,461 trips on weekdays.

STUDY AREA STREET SEGMENT ANALYSIS

The study area street segments were analyzed under existing, cumulative base, and cumulative plus project conditions, much like the intersection analysis. Based on the City of Pasadena requirements, the percentage increase in ADT volumes on study area street roadway segments during the project year that is due to project traffic determines the significance of project impacts. The project is required to provide mitigations for these impacts based on the City's defined threshold levels.

TABLE 8

STREET SEGMENT IMPACT ANALYSIS

Street Segments	Weekday Two-Way Daily Volume					Impact Analysis		
	Existing	Annual Ambient Growth	Cumulative Base	Project Only	Cumulative Base plus Project	Increase (%)	Physical Mitigation Threshold	Impact?
Wilson Avenue north of Del Mar Boulevard	5,226	1.5%	5,887	102	5,989	1.7%	5.0%	No
Hill Avenue north of Del Mar Boulevard	24,154	1.5%	27,209	248	27,457	0.9%	5.0%	No
Del Mar Boulevard east of Hill Avenue	26,019	1.5%	29,310	190	29,500	0.6%	5.0%	No
San Pasqual east of Hill Avenue	2,745	1.5%	3,092	58	3,150	1.8%	5.0%	No
California Boulevard east of Hill Avenue	17,009	1.5%	19,161	263	19,424	1.4%	5.0%	No

STREET SEGMENT IMPACT SIGNIFICANCE CRITERIA

The City of Pasadena has established criteria for determining significant impacts on street segments. A street segment is deemed significantly impacted based on an increase in the projected ADT volumes as follows:

ADT Growth on Street Segment	Required Traffic Mitigation
0.0% - 2.4% ADT Growth	▪ Staff review
2.5% - 4.9% ADT Growth	▪ Soft mitigation required ▪ TDM, Rideshare, etc.
5.0% - 7.4% ADT Growth	▪ Soft mitigation required ▪ Physical mitigation required ▪ Project alternatives considered
7.5% + ADT Growth	▪ Soft mitigation required ▪ Extensive physical mitigation required ▪ Project alternatives considered

ASSESSMENT OF SIGNIFICANT TRAFFIC IMPACT

Using the threshold criteria established by the City of Pasadena, Table 8 shows the daily traffic analysis, which determines the street segment impacts by the proposed project on weekdays. As shown in the table, the proposed project is anticipated to increase daily traffic volumes by less than 2.4% on the analyzed street segments. While this level of increase requires staff review, no physical mitigations are required.

VI. PARKING ANALYSIS

Caltech has recently undertaken a comprehensive analysis of parking conditions at the campus. This analysis was performed in an effort to review existing parking conditions on the campus, to identify alternatives for increasing the effective utilization of the campus parking supply, to forecast future parking demands and conditions based on projected campus activity growth during and after planned construction periods, and to develop both short-term and long-term parking plans for the campus. The following chapter utilizes data from this analysis to determine the parking demand and supply in 2015, by which time the projects assessed in this study would be completed.

EXISTING PARKING CONDITIONS

Prior to the recent completion of the California Parking Structure in May 2005, the on-campus parking supply of 2,708 spaces was considered effectively full, operating at 98% occupancy system-wide at the peak time (after 10 a.m. on typical weekdays) with a peak occupancy of 2,914 spaces. As shown in Table 9, this resulted in an estimated shortfall of slightly more than 200 spaces, which was accommodated through the use of parking spaces on nearby public streets (including both streets directly adjoining the campus and streets in the vicinity).

The previous parking analysis determined that the campus generates a total parking demand for 0.553 spaces per person, based on a campus population of 5,272, including staff, faculty, and students. In addition, a 6.5% circulation contingency for unreserved spaces was suggested to ensure that drives are able to find a space with a reasonable level of convenience. Because information provided for the current study identifies a 2004 campus population of 5,793, the total parking demand factor has been adjusted to 0.503 spaces per person.

The addition of the California Parking Structure has increased the on-campus parking supply by 686 parking spaces to a current (May 2005) total on-campus parking supply of 3,394 spaces. This structure was built to accommodate future growth on the campus. With the existing need

TABLE 9
SUMMARY OF PARKING ANALYSIS

Year	Campus Population	Parking Demand	On-Campus Supply	Surplus (Shortfall)
2004	5,793	2,914	2,708	(206)
2005	5,721	2,878	3,394	516
2015	6,400	3,219	3,333	114

Note: The parking demand shown does not include a 6.5% circulation contingency.

for 2,878 spaces, it is estimated that there is an existing surplus capacity of approximately 516 parking spaces.

Beginning in the Fall 2005 semester, Caltech instituted a fee-based parking system for all users on weekdays between 7:00 a.m. and 5:00 p.m. On-campus parking continues to be free outside those hours on evenings and weekends. This change has resulted in some spillover parking on some neighborhood streets near Caltech. The City is currently working with neighbors on strategies to address this, including such things as preferential permit parking.

FUTURE PARKING CONDITIONS

The future parking conditions at Caltech were determined for year 2015, with the proposed campus development projects described in Chapter I and the projected increase in the campus population described in Chapter III. With an anticipated campus population of 6,400 by year 2015, the projected parking demand would be 3,219 spaces.

The development of the proposed Astrophysics Building would eliminate the existing 69-space BSB parking lot. Either development scenario for the proposed CCE Laboratory building would eliminate approximately 10 parking spaces. Eighteen parking spaces will be constructed with the replacement of the Braun and Marks Houses. Thus, the projects now proposed would reduce the existing on-campus parking supply by approximately 61 parking spaces.

The projected future supply of on-campus parking includes the existing 3,394 spaces minus the estimated loss of approximately 61 spaces. As shown in Table 9, this supply would exceed the future 2015 demand of 3,219 spaces by approximately 114 spaces. This surplus, together with spaces on the public streets immediately adjacent to the campus would provide an allowance for circulation. These calculations are within 2% of the estimated total future parking need for the future campus population, based on the parking ratios presented in the CMDP (3,285 total spaces). Thus, with the forecast growth in campus population and the completion of the proposed projects on campus, the future on-campus parking supply would accommodate the needs of the campus.

It is noted that this analysis is conservative in that it does not make any adjustments for the fact that the former St. Luke's Medical Center, located approximately two miles northeast of campus, was purchased by Caltech and is being developed as a research facility. The transfer of some Caltech employees to this facility would be expected to reduce the demand for parking on the campus itself. It is also noted that the CMDP identifies the potential for the development of three additional parking structures to accommodate future growth on campus beyond what is now proposed, should it become necessary: one north of the existing Holliston Structure, one north of the Athenaeum below the tennis courts and one in the north campus area.

VII. REGIONAL TRANSPORTATION SYSTEM ANALYSIS

This section presents the CMP transportation impact analysis for the proposed project. This analysis was conducted in accordance with the procedures outlined in *2004 Congestion Management Program for Los Angeles County* (Los Angeles County Metropolitan Transportation Authority, July 2004). The CMP requires that, when an environmental impact report is prepared for a project, traffic and transit impact analyses be conducted for select regional facilities based on the quantity of the project traffic expected to use those facilities.

SELECTION OF REGIONAL ANALYSIS LOCATIONS

The CMP guidelines require that the first issue to be addressed is the determination of the geographic scope of the study area. The criteria for determining the study area for the CMP arterial monitoring intersections and for the freeway monitoring locations are:

- All CMP arterial monitoring intersections, including monitored freeway on- or off-ramp intersections, where the proposed project will add 50 or more trips during either the a.m. or p.m. weekday peak hours (of adjacent street traffic)
- All mainline freeway monitoring locations where the project will add 150 or more trips, in either direction, during either the weekday a.m. or p.m. peak hours

The nearest CMP monitoring intersection is located at Arroyo Parkway and California Boulevard, and the nearest CMP freeway monitoring locations are located at: I-210 west of Routes 134/710, I-210 at Rosemead Boulevard, and I-110 at Orange Grove Avenue.

CMP SIGNIFICANT TRAFFIC IMPACT CRITERIA

The CMP traffic impact analysis guidelines establish that a significant project impact occurs when the following threshold is exceeded:

- The proposed project increase traffic demand on a CMP facility by 2% of capacity (V/C ≥0.02), causing LOS F (V/C > 1.00)
- If the facility is already at LOS F, a significant impact occurs when the proposed project increases traffic demand on a CMP facility by 2% of capacity (V/C ≥ 0.02)

CMP ARTERIAL MONITORING INTERSECTION IMPACT ANALYSIS

The CMP arterial monitoring intersection identified for analysis was analyzed using the ICU analysis method in accordance with CMP Traffic Impact Analysis (TIA) requirements and the projected year 2015 with ambient growth background traffic volumes developed in Chapter III. LOS definitions for the ICU method are presented in Table 2 and the results of the analysis are presented in Table 10.

As shown in Table 10, the proposed project would not create a significant regional impact at the analyzed CMP arterial monitoring intersection, Arroyo Parkway and California Boulevard, as the incremental impact resulting from the addition of project traffic is less than the 2% threshold.

FREEWAY IMPACT ANALYSIS

Freeway Level of Service Methodology

Freeway segment levels of service were determined based on V/C ratios and the definitions shown in Table 11. In accordance with values established in the HCM 2000, a LOS E service capacity of approximately 2,200 vphpl was used for freeway mixed-flow lanes. For the purposes of this analysis, auxiliary lanes and high occupancy vehicle (HOV) lanes were analyzed at one-half the capacity of a mainline mixed-flow lane.

TABLE 10

YEAR 2015 CMP ARTERIAL MONITORING INTERSECTION IMPACT ANALYSIS

CMP LOCATION	PEAK HOUR	FUTURE NO PROJECT (YEAR 2015)		FUTURE WITH PROJECT (YEAR 2015)		PROJECT INCREASE IN V/C	SIGNIFICANT PROJECT IMPACT
		V/C	LOS	V/C	LOS		
Arroyo Parkway &	A.M.	0.804	D	0.807	D	0.003	NO
California Boulevard	P.M.	0.983	E	0.985	E	0.002	NO

TABLE 11
LEVEL OF SERVICE DEFINITIONS FOR
FREEWAY MAINLINE SEGMENTS

Level of Service	Volume/Capacity Ratio
A	0.00 - 0.35
B	>0.35 - 0.54
C	>0.54 - 0.77
D	>0.77 - 0.93
E	>0.93 - 1.00
F(0)	>1.00 - 1.25
F(1)	>1.25 - 1.35
F(2)	>1.35 - 1.45
F(3)	>1.45

Source: *2004 Congestion Management Program for Los Angeles County* , MTA, July 2004.

Future No Project (2015) Conditions

Projected year 2015 future no project peak hour traffic volumes were based on Caltrans 2004 traffic counts and 2003 data in the 2004 CMP. The 2003 and 2004 traffic volumes were increased by 1% per year to reflect 2005 and 2015 conditions.

This growth rate assumes that the 2015 background traffic is inclusive of the traffic generated by the related projects. Projected V/C ratios and LOS with these volumes are shown in Table 12. The analyzed segments along the I-210 are projected to operate at LOS F in at least one direction during the analyzed peak hours.

Future with Project (2015) Analysis

Projected year 2015 future with project peak hour traffic volumes were developed by adding project traffic to the future no project peak hour traffic volumes. Projected V/C ratios and LOS with these volumes are shown in Table 12. Both of the analyzed segments along the I-210 freeway and the SR 134 segment are projected to operate at LOS F during the afternoon peak period in the southbound or eastbound direction. As indicated in Table 12, the project is not expected to significantly impact any of the freeway segments because the incremental impact of project traffic on the freeway segments is much less than the 2% CMP criteria.

REGIONAL TRANSIT IMPACT ANALYSIS

Section B.8.4 of the CMP provides a methodology for estimating the number of transit trips expected to result from a proposed project based on the number of vehicle trips. This methodology assumes an average vehicle ridership (AVR) factor of 1.4 in order to estimate the number of person trips to and from the project.

Based on the CMP guidelines, which suggest that approximately 3.5% of these person trips may use public transit to travel to and from the site, the project could add approximately seven new transit trips in the weekday a.m. peak hour and seven new transit trips in the weekday p.m. peak hour. Since the project location is well served by numerous established transit routes,

TABLE 12
YEAR 2015 CMP FREEWAY IMPACT ANALYSIS
CALTECH MASTER PLAN EIR

CMP LOCATION	PEAK HOUR	DIR.	CAPACITY	YEAR 2003/2004		EXISTING (2005)			CUMULATIVE BASE (2015)			CUMULATIVE PLUS PROJECT (2015)				INCREASE	SIGNIFICANT
				VOLUMES	D/C	VOLUMES	D/C	LOS	VOLUMES	D/C	LOS	ADDED TRIPS	VOLUMES	D/C	LOS	IN D/C	IMPACT
I-210	A.M.	EB	8,800	15,037	1.709	15,187	1.726	F(3)	16,706	1.898	F(3)	12	16,718	1.900	F(3)	0.002	NO
West of Routes 134/710*		WB	11,000	9,830	0.894	9,928	0.903	D	10,921	0.993	E	5	10,926	0.993	E	0.000	NO
	P.M.	EB	8,800	10,802	1.228	10,910	1.240	F(0)	12,001	1.364	F(2)	5	12,006	1.364	F(2)	0.000	NO
		WB	11,000	15,570	1.415	15,726	1.430	F(2)	17,299	1.573	F(3)	12	17,311	1.574	F(3)	0.001	NO
I-210	A.M.	EB	8,800	8,568	0.974	8,739	0.993	E	9,613	1.092	F(0)	5	9,618	1.093	F(0)	0.001	NO
Rosemead Boulevard**		WB	11,000	10,000	0.909	10,200	0.927	D	11,220	1.020	F(0)	12	11,232	1.021	F(0)	0.001	NO
	P.M.	EB	8,800	10,880	1.236	11,098	1.261	F(1)	12,207	1.387	F(2)	12	12,219	1.389	F(2)	0.002	NO
		WB	11,000	8,602	0.782	8,774	0.798	D	9,651	0.877	D	5	9,656	0.878	D	0.001	NO
I-110	A.M.	NB	6,600	1,641	0.249	1,657	0.251	A	1,823	0.276	A	4	1,827	0.277	A	0.001	NO
South Pasadena*		SB	6,600	3,590	0.544	3,626	0.549	C	3,989	0.604	C	1	3,990	0.605	C	0.001	NO
Orange Grove Avenue	P.M.	NB	6,600	3,926	0.595	3,965	0.601	C	4,362	0.661	C	1	4,363	0.661	C	0.000	NO
		SB	6,600	2,897	0.439	2,924	0.443	B	3,216	0.487	B	4	3,220	0.488	B	0.001	NO

Note:
*Peak volumes based on counts from *2004 Traffic Volumes on California State Highways* (http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/) and grown by 1%/year to estimate 2005 and 2015 conditions.
**Peak volumes based on data from *Congestion Management Program for Los Angeles County* , MTA, July 2004. Reported 2003 volumes were increased by 1%/year to estimate 2005 and 2015 conditions.

project-related impacts on the regional transit system are not expected to be significant at this level of increase.

VIII. SUMMARY AND CONCLUSIONS

This study was undertaken to analyze potential traffic and parking impacts of the several proposed projects at Caltech, generally located between Del Mar and California Boulevards east of Hill Avenue in southern Pasadena. The following summarizes the key findings of the study:

- Peak hour capacity analyses were conducted for nine intersections on the street system in the vicinity of the project site. Two intersections currently operate at LOS E during at least one of the peak traffic hours: Lake Avenue and California Boulevard, and Hill Avenue at California Boulevard.

- Under year 2015 cumulative base (i.e., no project) conditions, which include planned improvements to the local street system, only one intersection, Lake Avenue and California Boulevard, is anticipated to operate at LOS E or F. The cumulative base forecasts include: shifts in traffic associated with the opening of the California Parking Structure on the Caltech campus, growth in the existing traffic volumes to reflect the effects of overall regional growth and development outside the study area, and the traffic generated by specific related projects located within, or in the vicinity of, the study area.

- The proposed project is estimated to generate a net incremental increase of approximately 1,461 daily trips, with 137 trips during the a.m. peak hour, and 137 trips during the p.m. peak hour.

- Based on City of Pasadena impact criteria for intersections, the proposed project would not generate a significant impact at any of the nine study intersections during peak traffic hours.

- Potential traffic impacts were evaluated for five street segments. Based on application of the City of Pasadena significance criteria for street segment traffic impacts, the project would not generate a significant traffic impact on these roadway segments.

- The existing (May 2005) on-campus parking supply at Caltech is 3,394 spaces, including the newly completed California Parking Structure. Construction of the development projects on campus proposed at this time would slightly reduce this supply in the future (to 3,333 spaces). Future parking demand in 2015 was estimated to be 3,219 spaces, based on parking analysis performed at Caltech and ratios found in the Caltech Master Development Plan. With a projected surplus of over 100 spaces, the future parking supply would be adequate to meet the projected demand.

- Analyses of potential impacts on the regional transportation system conducted in accordance with CMP requirements determined that the project would not have a significant impact on CMP monitoring intersections or the mainline freeway system.

REFERENCES

2004 Traffic Volumes on California State Highways, Caltrans (http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/), 2004.

2004 Congestion Management Program for Los Angeles County, Los Angeles County Metropolitan Transportation Authority, July 2004.

Caltech Master Development Plan, July 1989.

City of Pasadena General Plan, 2004 Mobility Element, City of Pasadena, November 2004.

Highway Capacity Manual, Transportation Research Board, 2000.

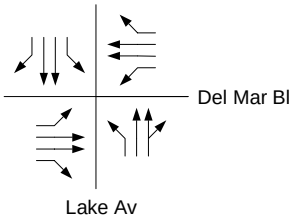
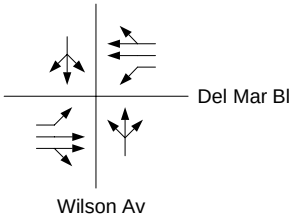
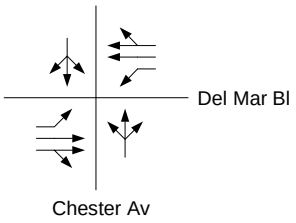
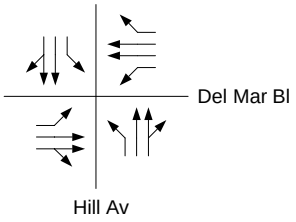
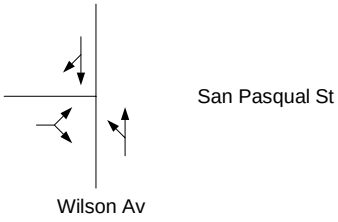
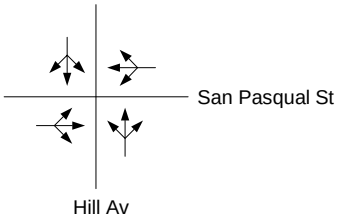
Trip Generation, 7th Edition, Institute of Transportation Engineers, 2003.

APPENDIX A

INTERSECTION CONFIGURATIONS

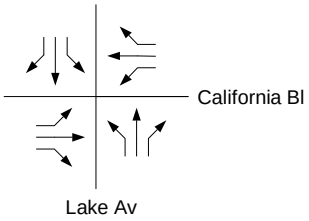
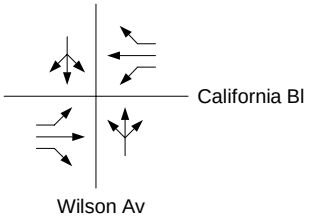
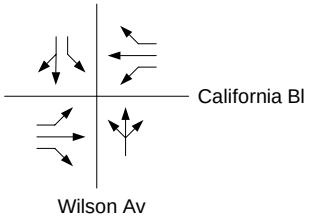
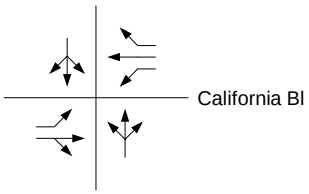
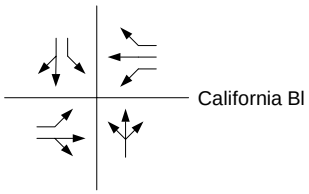
INTERSECTION LANE CONFIGURATIONS

NOT TO SCALE

	EXISTING CONDITIONS	FUTURE CONDITIONS
1. Lake Av & Del Mar Bl		Same As Existing
2. Wilson Av & Del Mar Bl		Same As Existing
3. Chester Av & Del Mar Bl		Same As Existing
4. Hill Av & Del Mar Bl		Same As Existing
5. Wilson Av & San Pasqual St		Same As Existing
6. Hill Av & San Pasqual St		Same As Existing

INTERSECTION LANE CONFIGURATIONS

NOT TO SCALE

	EXISTING CONDITIONS	FUTURE CONDITIONS
7. Lake Av & California Bl		Same As Existing
8. Wilson Av & California Bl		
9. Hill Av & California Bl		

APPENDIX B

INTERSECTION AND ADT TRAFFIC COUNTS

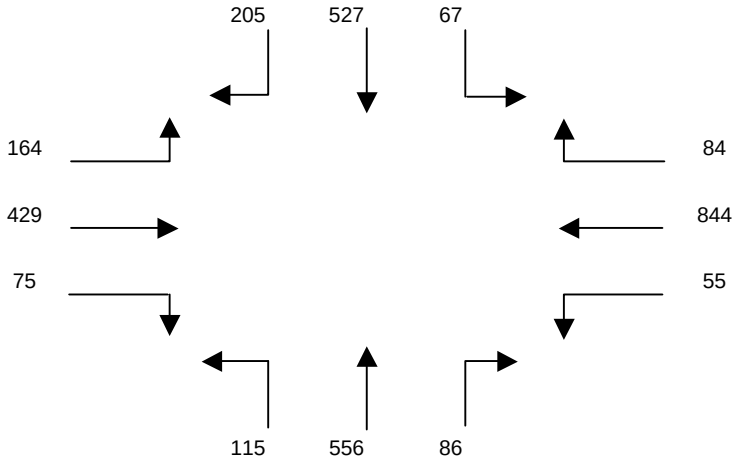
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 07:00 AM TO 09:00 AM
INTERSECTION: N/S LAKE AVENUE
E/W DEL MAR BOULEVARD
FILE NUMBER: 1-AM

15 MINUTE	1	2	3	4	5	6	7	8	9	10	11	12
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT
700-715	23	109	8	8	136	26	12	68	12	9	58	21
715-730	29	103	11	14	162	12	10	128	19	10	51	24
730-745	31	121	10	22	206	12	12	117	20	14	80	28
745-800	56	140	14	26	218	22	19	135	29	12	83	39
800-815	61	149	14	21	204	12	25	154	35	26	116	47
815-830	54	120	26	27	215	9	22	138	25	18	111	49
830-845	34	118	13	10	207	12	20	129	26	19	119	29
845-900	37	112	19	28	176	8	15	125	36	16	96	19

1 HOUR	1	2	3	4	5	6	7	8	9	10	11	12	
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTALS
700-800	139	473	43	70	722	72	53	448	80	45	272	112	2529
715-815	177	513	49	83	790	58	66	534	103	62	330	138	2903
730-830	202	530	64	96	843	55	78	544	109	70	390	163	3144
745-845	205	527	67	84	844	55	86	556	115	75	429	164	3207
800-900	186	499	72	86	802	41	82	546	122	79	442	144	3101

A.M. PEAK HOUR
745-845



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

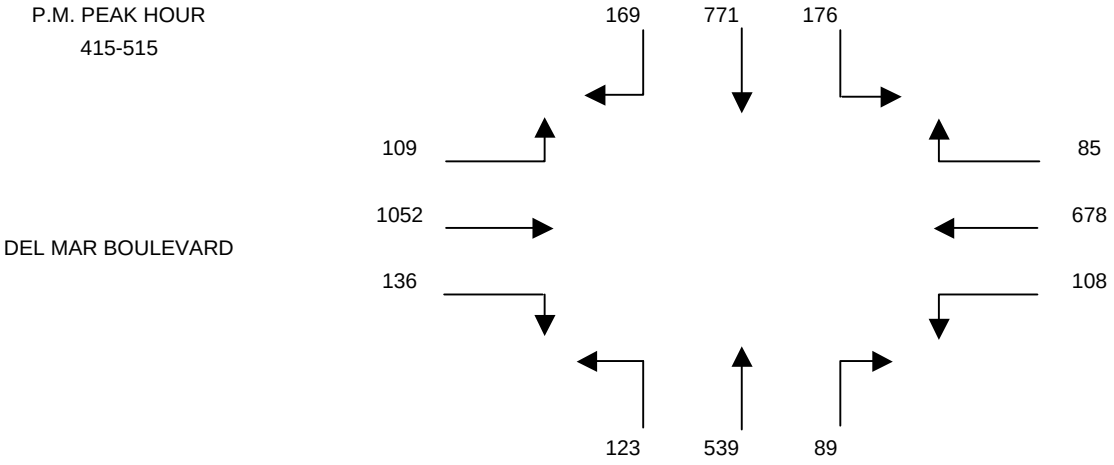
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 04:00 PM TO 06:00 PM
INTERSECTION: N/S LAKE AVENUE
E/W DEL MAR BOULEVARD
FILE NUMBER: 1-PM

15 MINUTE	1	2	3	4	5	6	7	8	9	10	11	12
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT
400-415	45	176	27	19	143	26	18	148	24	40	227	29
415-430	31	195	44	22	161	34	32	145	23	33	261	29
430-445	39	178	35	17	171	20	14	105	36	24	251	23
445-500	50	190	49	28	184	35	27	131	27	44	264	37
500-515	49	208	48	18	162	19	16	158	37	35	276	20
515-530	34	211	42	22	171	20	11	114	27	34	245	17
530-545	20	202	30	15	153	29	21	85	18	34	241	18
545-600	31	208	35	19	141	28	17	92	24	28	236	14

1 HOUR	1	2	3	4	5	6	7	8	9	10	11	12	
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTALS
400-500	165	739	155	86	659	115	91	529	110	141	1003	118	3911
415-515	169	771	176	85	678	108	89	539	123	136	1052	109	4035
430-530	172	787	174	85	688	94	68	508	127	137	1036	97	3973
445-545	153	811	169	83	670	103	75	488	109	147	1026	92	3926
500-600	134	829	155	74	627	96	65	449	106	131	998	69	3733

P.M. PEAK HOUR
415-515



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

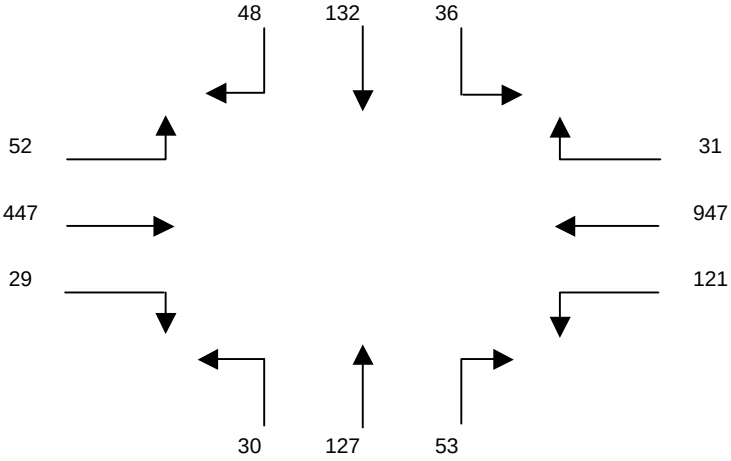
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 07:00 AM TO 09:00 AM
INTERSECTION: N/S WILSON AVENUE
E/W DEL MAR BOULEVARD
FILE NUMBER: 2-AM

15 MINUTE TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT
700-715	7	24	3	4	124	6	5	8	1	2	69	9
715-730	5	21	4	3	158	13	11	10	3	2	63	9
730-745	9	39	5	4	216	32	15	27	8	2	97	11
745-800	12	43	10	6	241	35	16	33	5	5	114	16
800-815	14	32	9	10	246	32	13	34	13	8	123	14
815-830	10	24	11	6	227	26	14	32	7	11	111	10
830-845	12	33	6	9	233	28	10	28	5	5	99	12
845-900	13	23	11	14	227	21	7	19	3	4	77	17

1 HOUR TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
700-800	33	127	22	17	739	86	47	78	17	11	343	45	1565
715-815	40	135	28	23	861	112	55	104	29	17	397	50	1851
730-830	45	138	35	26	930	125	58	126	33	26	445	51	2038
745-845	48	132	36	31	947	121	53	127	30	29	447	52	2053
800-900	49	112	37	39	933	107	44	113	28	28	410	53	1953

A.M. PEAK HOUR
745-845



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

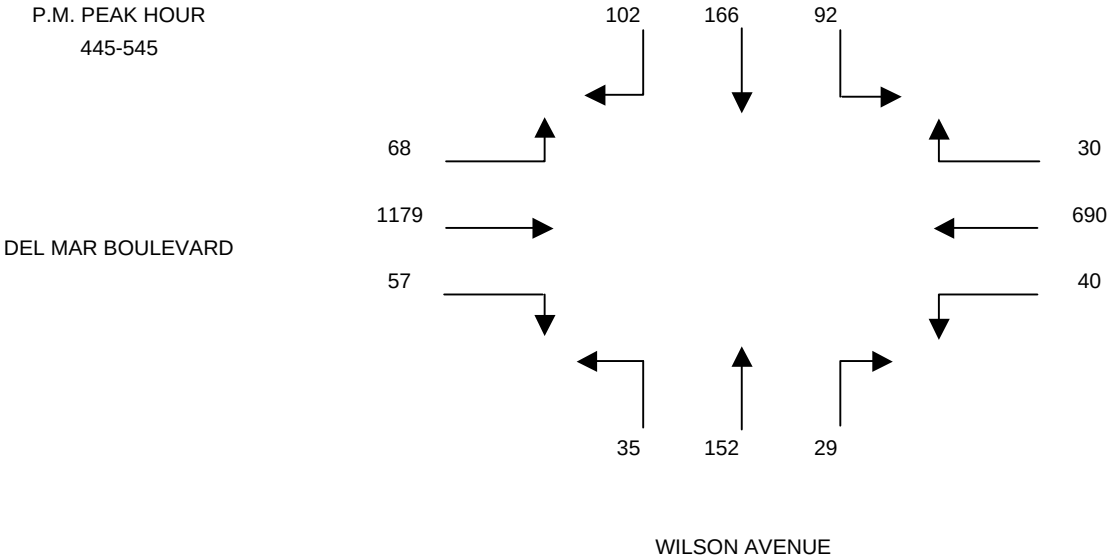
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 04:00 PM TO 06:00 PM
INTERSECTION: N/S WILSON AVENUE
E/W DEL MAR BOULEVARD
FILE NUMBER: 2-PM

15 MINUTE TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT
400-415	17	36	15	9	143	14	4	38	7	6	234	16
415-430	14	29	10	5	161	9	8	22	8	11	261	17
430-445	19	40	12	5	171	15	5	28	13	10	293	15
445-500	19	48	20	5	184	10	8	44	8	14	302	17
500-515	34	46	26	9	162	10	7	34	11	14	300	12
515-530	27	30	26	8	191	11	5	40	10	12	282	20
530-545	22	42	20	8	153	9	9	34	6	17	295	19
545-600	15	39	13	8	141	12	12	29	9	14	275	21

1 HOUR TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
400-500	69	153	57	24	659	48	25	132	36	41	1090	65	2399
415-515	86	163	68	24	678	44	28	128	40	49	1156	61	2525
430-530	99	164	84	27	708	46	25	146	42	50	1177	64	2632
445-545	102	166	92	30	690	40	29	152	35	57	1179	68	2640
500-600	98	157	85	33	647	42	33	137	36	57	1152	72	2549

P.M. PEAK HOUR
445-545



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

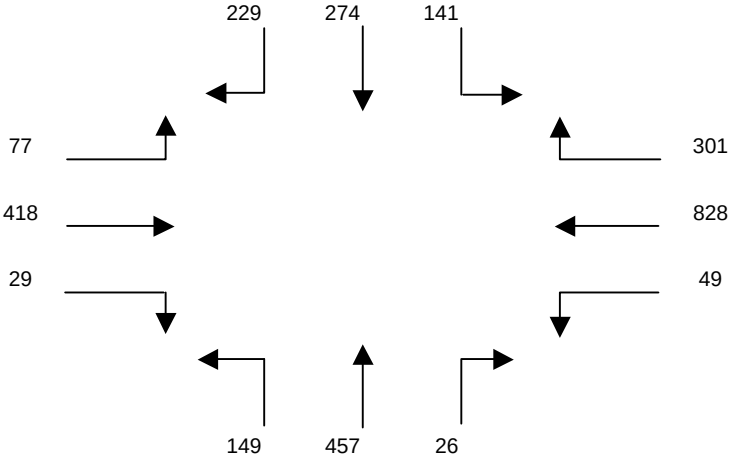
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 07:00 AM TO 09:00 AM
INTERSECTION: N/S HILL AVENUE
E/W DEL MAR BOULEVARD
FILE NUMBER: 3-AM

15 MINUTE	1	2	3	4	5	6	7	8	9	10	11	12
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT
700-715	23	33	13	42	88	6	13	49	15	2	40	10
715-730	33	69	25	31	125	6	7	56	15	2	56	10
730-745	56	65	25	55	190	9	6	95	25	5	85	15
745-800	76	84	44	84	203	10	4	106	49	6	91	22
800-815	58	77	40	68	213	7	3	121	38	11	102	23
815-830	42	52	35	85	205	13	7	115	30	5	117	17
830-845	53	61	22	64	207	19	12	115	32	7	108	15
845-900	45	55	42	63	191	17	8	105	41	6	88	16

1 HOUR	1	2	3	4	5	6	7	8	9	10	11	12	
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTALS
700-800	188	251	107	212	606	31	30	306	104	15	272	57	2179
715-815	223	295	134	238	731	32	20	378	127	24	334	70	2606
730-830	232	278	144	292	811	39	20	437	142	27	395	77	2894
745-845	229	274	141	301	828	49	26	457	149	29	418	77	2978
800-900	198	245	139	280	816	56	30	456	141	29	415	71	2876

A.M. PEAK HOUR
745-845



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

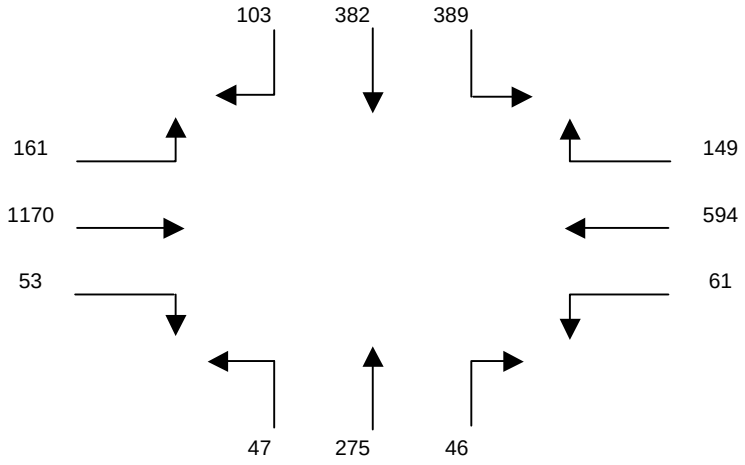
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 04:00 PM TO 06:00 PM
INTERSECTION: N/S HILL AVENUE
E/W DEL MAR BOULEVARD
FILE NUMBER: 3-PM

15 MINUTE	1	2	3	4	5	6	7	8	9	10	11	12
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT
400-415	18	96	99	30	109	18	10	72	11	17	249	55
415-430	29	102	119	70	139	17	7	62	8	13	238	40
430-445	29	90	111	50	142	17	8	76	7	15	273	35
445-500	28	89	83	23	159	13	15	58	8	16	270	34
500-515	26	88	90	37	155	15	15	62	10	12	291	45
515-530	22	101	111	50	147	19	7	89	14	15	315	41
530-545	27	104	105	39	133	14	9	66	15	10	294	41
545-600	21	97	78	35	128	16	13	72	9	7	280	40

1 HOUR	1	2	3	4	5	6	7	8	9	10	11	12	
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTALS
400-500	104	377	412	173	549	65	40	268	34	61	1030	164	3277
415-515	112	369	403	180	595	62	45	258	33	56	1072	154	3339
430-530	105	368	395	160	603	64	45	285	39	58	1149	155	3426
445-545	103	382	389	149	594	61	46	275	47	53	1170	161	3430
500-600	96	390	384	161	563	64	44	289	48	44	1180	167	3430

P.M. PEAK HOUR
445-545



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

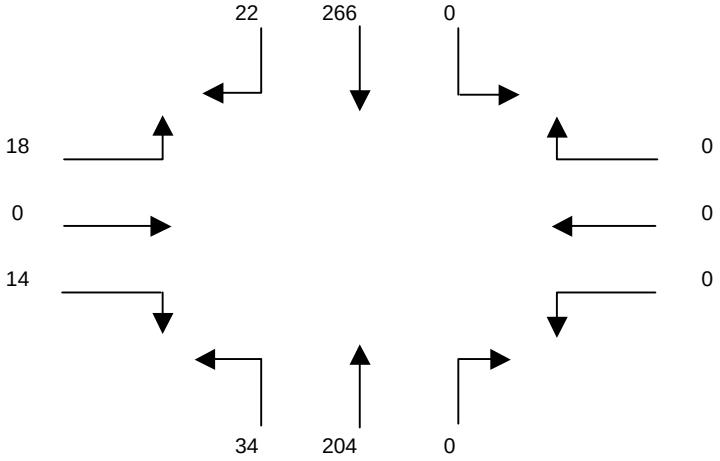
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 07:00 AM TO 09:00 AM
INTERSECTION: N/S WILSON AVENUE
E/W SAN PASQUAL STREET
FILE NUMBER: 4-AM

15 MINUTE TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT
700-715	2	18	0	0	0	0	0	15	0	1	0	5
715-730	3	24	0	0	0	0	0	18	2	0	0	4
730-745	5	55	0	0	0	0	0	39	6	2	0	3
745-800	7	92	0	0	0	0	0	52	14	4	0	4
800-815	4	82	0	0	0	0	0	67	8	5	0	7
815-830	6	37	0	0	0	0	0	46	6	3	0	4
830-845	6	37	0	0	0	0	0	42	7	3	0	4
845-900	12	40	0	0	0	0	0	42	10	3	0	4

1 HOUR TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
700-800	17	189	0	0	0	0	0	124	22	7	0	16	375
715-815	19	253	0	0	0	0	0	176	30	11	0	18	507
730-830	22	266	0	0	0	0	0	204	34	14	0	18	558
745-845	23	248	0	0	0	0	0	207	35	15	0	19	547
800-900	28	196	0	0	0	0	0	197	31	14	0	19	485

A.M. PEAK HOUR
730-830



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

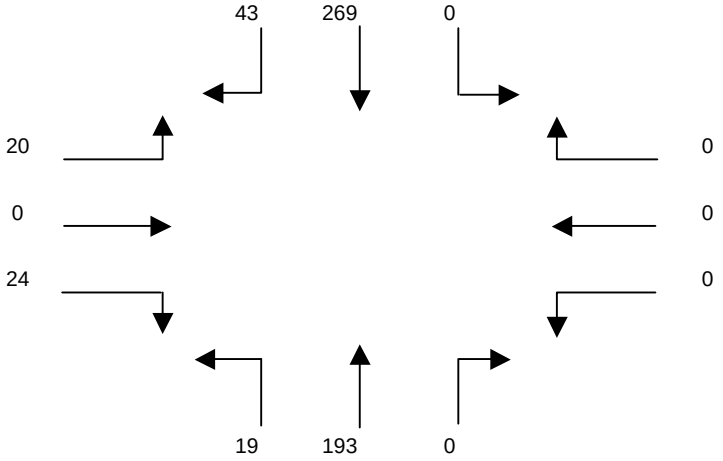
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 04:00 PM TO 06:00 PM
INTERSECTION: N/S WILSON AVENUE
E/W SAN PASQUAL STREET
FILE NUMBER: 4-PM

15 MINUTE TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT
400-415	5	52	0	0	0	0	0	45	5	2	0	2
415-430	10	45	0	0	0	0	0	47	8	7	0	2
430-445	6	52	0	0	0	0	0	45	5	4	0	2
445-500	11	65	0	0	0	0	0	49	5	9	0	5
500-515	12	64	0	0	0	0	0	65	7	6	0	6
515-530	10	70	0	0	0	0	0	42	5	6	0	4
530-545	10	70	0	0	0	0	0	37	2	3	0	5
545-600	8	71	0	0	0	0	0	40	5	4	0	3

1 HOUR TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
400-500	32	214	0	0	0	0	0	186	23	22	0	11	488
415-515	39	226	0	0	0	0	0	206	25	26	0	15	537
430-530	39	251	0	0	0	0	0	201	22	25	0	17	555
445-545	43	269	0	0	0	0	0	193	19	24	0	20	568
500-600	40	275	0	0	0	0	0	184	19	19	0	18	555

P.M. PEAK HOUR
445-545



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

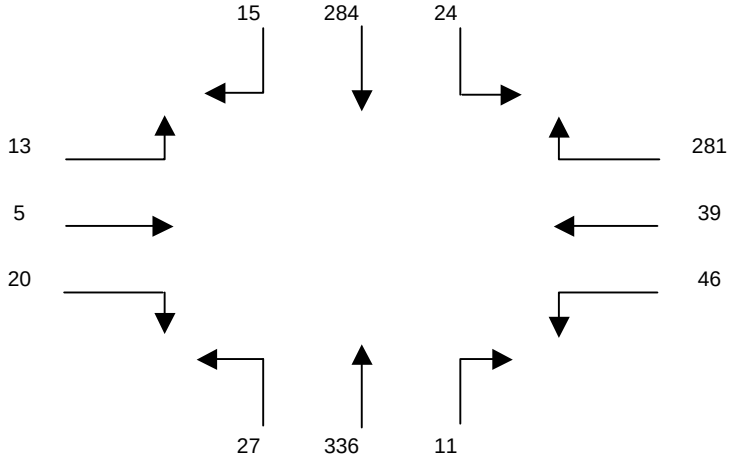
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 07:00 AM TO 09:00 AM
INTERSECTION: N/S HILL AVENUE
E/W SAN PASQUAL STREET
FILE NUMBER: 5-AM

15 MINUTE TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT
700-715	2	26	2	17	9	6	0	42	10	4	0	3
715-730	1	57	5	32	6	14	2	72	7	2	0	2
730-745	4	62	3	49	12	15	2	60	6	1	0	2
745-800	7	66	5	70	13	14	0	78	9	2	2	4
800-815	5	76	10	72	11	10	3	79	9	4	2	2
815-830	2	86	5	68	10	12	3	84	4	5	0	3
830-845	1	56	4	71	5	10	5	95	5	9	1	4
845-900	4	70	3	69	3	6	5	94	5	4	0	2

1 HOUR TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
700-800	14	211	15	168	40	49	4	252	32	9	2	11	807
715-815	17	261	23	223	42	53	7	289	31	9	4	10	969
730-830	18	290	23	259	46	51	8	301	28	12	4	11	1051
745-845	15	284	24	281	39	46	11	336	27	20	5	13	1101
800-900	12	288	22	280	29	38	16	352	23	22	3	11	1096

A.M. PEAK HOUR
745-845



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

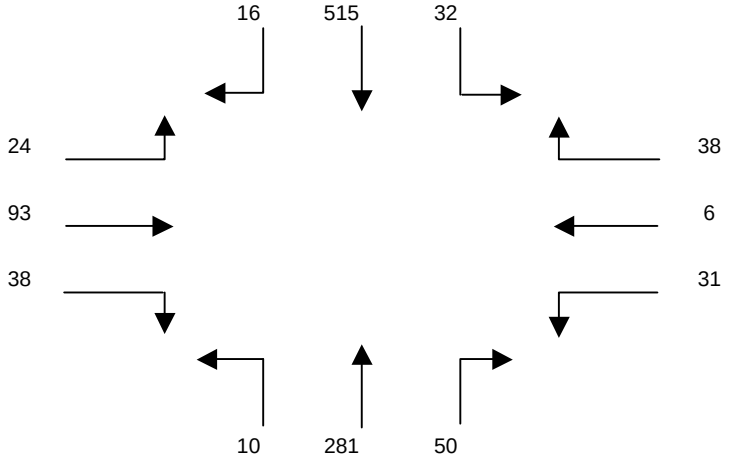
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 04:00 PM TO 06:00 PM
INTERSECTION: N/S HILL AVENUE
E/W SAN PASQUAL STREET
FILE NUMBER: 5-PM

15 MINUTE TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT
400-415	1	95	2	7	1	7	8	50	6	13	14	8
415-430	3	95	6	11	0	3	11	65	6	9	10	5
430-445	2	117	3	14	3	5	7	74	2	7	16	5
445-500	3	134	5	10	2	9	10	62	2	12	19	7
500-515	6	121	4	11	1	8	19	78	4	11	28	5
515-530	5	141	7	7	2	7	13	79	3	7	28	7
530-545	2	119	16	10	1	7	8	62	1	8	18	5
545-600	2	106	11	8	2	7	7	66	2	6	14	5

1 HOUR TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
400-500	9	441	16	42	6	24	36	251	16	41	59	25	966
415-515	14	467	18	46	6	25	47	279	14	39	73	22	1050
430-530	16	513	19	42	8	29	49	293	11	37	91	24	1132
445-545	16	515	32	38	6	31	50	281	10	38	93	24	1134
500-600	15	487	38	36	6	29	47	285	10	32	88	22	1095

P.M. PEAK HOUR
445-545



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

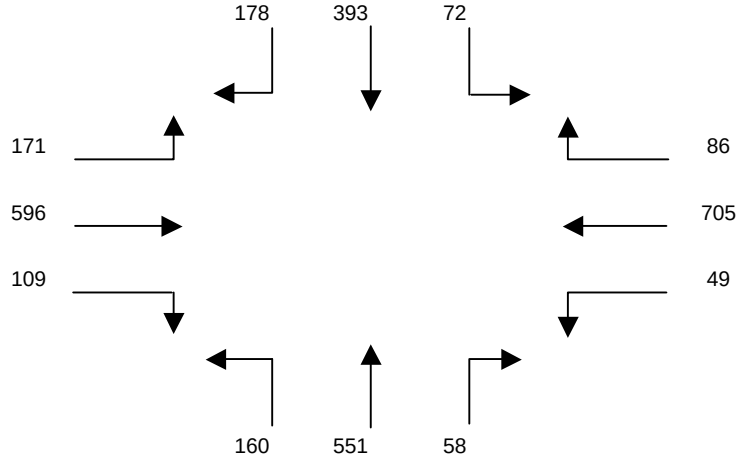
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 07:00 AM TO 09:00 AM
INTERSECTION: N/S LAKE AVENUE
E/W CALIFORNIA BOULEVARD
FILE NUMBER: 6-AM

15 MINUTE	1	2	3	4	5	6	7	8	9	10	11	12
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT
700-715	36	70	13	11	94	19	17	74	18	23	85	17
715-730	48	103	21	8	138	14	19	96	33	20	89	35
730-745	34	97	25	15	172	10	16	79	20	15	73	26
745-800	42	104	21	20	172	16	18	133	34	27	143	36
800-815	54	91	13	23	174	11	12	142	45	25	132	49
815-830	41	95	17	25	184	14	18	146	50	34	148	54
830-845	41	103	21	18	175	8	10	130	31	23	173	32
845-900	31	104	13	21	190	15	9	121	39	25	159	38

1 HOUR	1	2	3	4	5	6	7	8	9	10	11	12	
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTALS
700-800	160	374	80	54	576	59	70	382	105	85	390	114	2449
715-815	178	395	80	66	656	51	65	450	132	87	437	146	2743
730-830	171	387	76	83	702	51	64	500	149	101	496	165	2945
745-845	178	393	72	86	705	49	58	551	160	109	596	171	3128
800-900	167	393	64	87	723	48	49	539	165	107	612	173	3127

A.M. PEAK HOUR
745-845



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

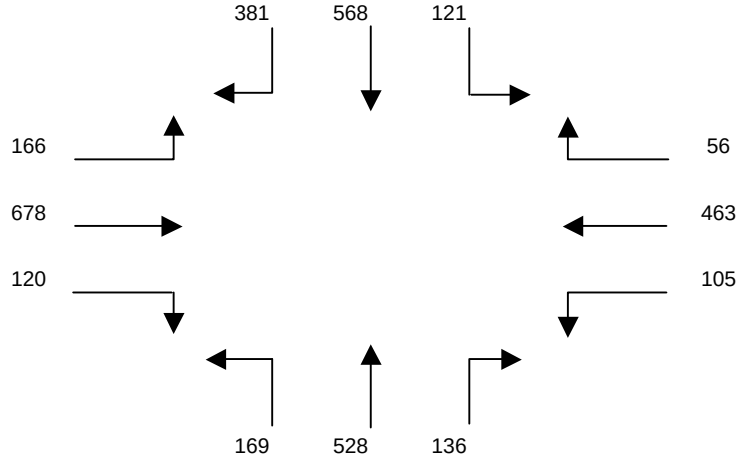
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 04:00 PM TO 06:00 PM
INTERSECTION: N/S LAKE AVENUE
E/W CALIFORNIA BOULEVARD
FILE NUMBER: 6-PM

15 MINUTE	1	2	3	4	5	6	7	8	9	10	11	12
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT
400-415	91	135	29	19	113	15	30	116	47	30	164	39
415-430	79	129	27	14	116	18	20	127	20	25	146	44
430-445	80	112	27	19	129	32	35	130	34	29	168	42
445-500	75	137	34	17	127	23	41	121	50	20	161	46
500-515	90	148	28	12	115	21	37	130	35	37	175	44
515-530	117	139	34	10	112	25	22	140	41	41	176	37
530-545	99	144	25	17	109	36	36	137	43	22	166	39
545-600	94	154	20	12	101	27	31	151	41	20	149	37

1 HOUR	1	2	3	4	5	6	7	8	9	10	11	12	
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTALS
400-500	325	513	117	69	485	88	126	494	151	104	639	171	3282
415-515	324	526	116	62	487	94	133	508	139	111	650	176	3326
430-530	362	536	123	58	483	101	135	521	160	127	680	169	3455
445-545	381	568	121	56	463	105	136	528	169	120	678	166	3491
500-600	400	585	107	51	437	109	126	558	160	120	666	157	3476

P.M. PEAK HOUR
445-545



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

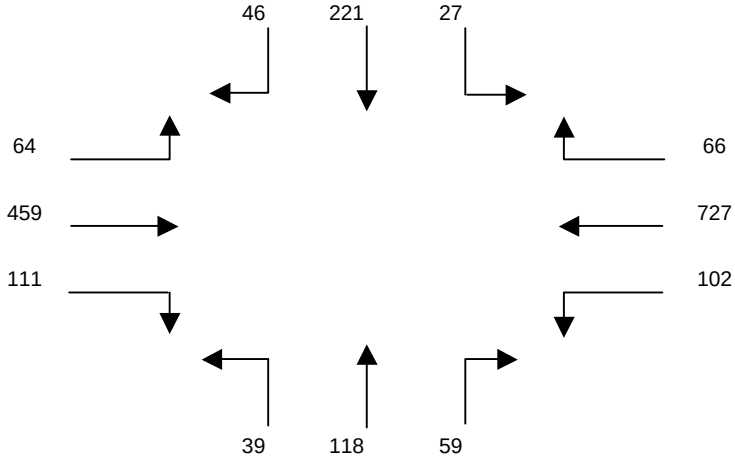
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 07:00 AM TO 09:00 AM
INTERSECTION: N/S WILSON AVENUE
E/W CALIFORNIA BOULEVARD
FILE NUMBER: 7-AM

15 MINUTE TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT
700-715	3	11	4	7	105	5	3	9	4	8	75	7
715-730	5	20	3	15	143	11	10	13	3	10	98	7
730-745	10	42	6	15	170	23	11	27	5	21	97	10
745-800	14	78	7	14	195	39	14	28	14	33	127	16
800-815	13	66	6	19	188	29	19	36	12	39	117	22
815-830	9	35	8	18	174	11	15	27	8	18	118	16
830-845	13	17	8	21	149	10	10	21	9	9	118	15
845-900	8	21	9	18	150	10	15	25	6	5	102	15

1 HOUR TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
700-800	32	151	20	51	613	78	38	77	26	72	397	40	1595
715-815	42	206	22	63	696	102	54	104	34	103	439	55	1920
730-830	46	221	27	66	727	102	59	118	39	111	459	64	2039
745-845	49	196	29	72	706	89	58	112	43	99	480	69	2002
800-900	43	139	31	76	661	60	59	109	35	71	455	68	1807

A.M. PEAK HOUR
730-830



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

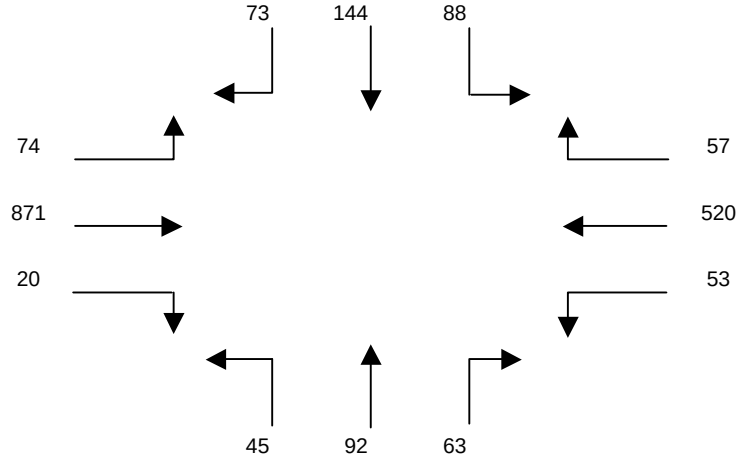
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 04:00 PM TO 06:00 PM
INTERSECTION: N/S WILSON AVENUE
E/W CALIFORNIA BOULEVARD
FILE NUMBER: 7-PM

15 MINUTE TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT
400-415	11	22	11	8	97	8	11	20	7	7	199	13
415-430	15	30	10	10	102	13	10	17	6	3	172	13
430-445	22	38	24	13	138	15	18	29	10	6	223	24
445-500	11	29	18	16	122	10	15	19	10	4	220	15
500-515	29	46	29	18	132	18	17	22	15	5	227	17
515-530	11	31	17	10	128	10	13	22	10	5	201	18
530-545	19	24	16	7	106	11	14	16	6	7	205	11
545-600	16	21	10	4	105	5	15	21	8	9	179	10

1 HOUR TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
400-500	59	119	63	47	459	46	54	85	33	20	814	65	1864
415-515	77	143	81	57	494	56	60	87	41	18	842	69	2025
430-530	73	144	88	57	520	53	63	92	45	20	871	74	2100
445-545	70	130	80	51	488	49	59	79	41	21	853	61	1982
500-600	75	122	72	39	471	44	59	81	39	26	812	56	1896

P.M. PEAK HOUR
430-530



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

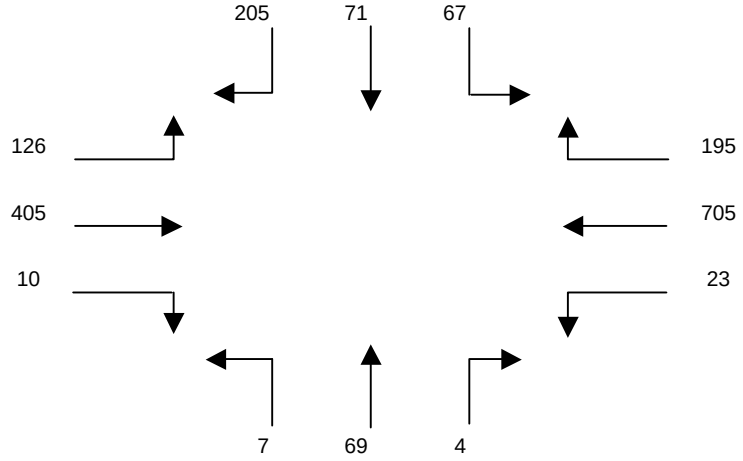
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 07:00 AM TO 09:00 AM
INTERSECTION: N/S HILL AVENUE
E/W CALIFORNIA BOULEVARD
FILE NUMBER: 8-AM

15 MINUTE	1	2	3	4	5	6	7	8	9	10	11	12
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT
700-715	20	6	5	17	103	0	0	10	1	0	58	20
715-730	30	12	10	29	159	0	2	19	1	0	79	28
730-745	44	21	8	43	168	5	0	15	1	0	101	18
745-800	57	20	14	53	196	4	1	22	3	4	103	21
800-815	58	19	19	61	167	12	3	14	0	4	107	33
815-830	38	15	11	41	163	5	0	14	2	1	93	30
830-845	52	17	23	40	179	2	0	19	2	1	102	42
845-900	38	10	14	33	130	2	1	12	0	3	63	25

1 HOUR	1	2	3	4	5	6	7	8	9	10	11	12	
TOTALS	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTALS
700-800	151	59	37	142	626	9	3	66	6	4	341	87	1531
715-815	189	72	51	186	690	21	6	70	5	8	390	100	1788
730-830	197	75	52	198	694	26	4	65	6	9	404	102	1832
745-845	205	71	67	195	705	23	4	69	7	10	405	126	1887
800-900	186	61	67	175	639	21	4	59	4	9	365	130	1720

A.M. PEAK HOUR
745-845



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

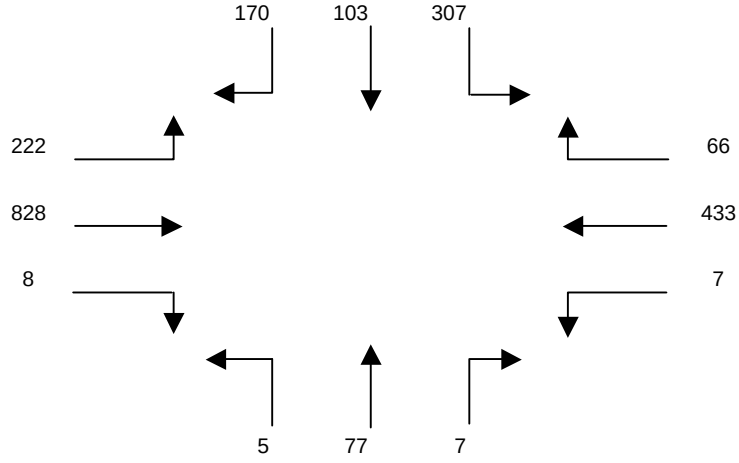
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 04:00 PM TO 06:00 PM
INTERSECTION: N/S HILL AVENUE
E/W CALIFORNIA BOULEVARD
FILE NUMBER: 8-PM

15 MINUTE TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT
400-415	41	23	69	16	78	3	1	19	2	1	179	50
415-430	52	25	78	22	99	1	2	20	1	1	199	45
430-445	33	20	81	15	103	2	2	16	1	3	206	52
445-500	46	33	69	13	125	3	1	16	2	2	211	65
500-515	39	25	79	16	106	1	2	25	1	2	212	60
515-530	42	23	90	17	98	2	0	10	0	2	191	62
530-545	22	17	67	10	70	4	1	12	1	1	205	43
545-600	32	23	79	10	83	1	0	12	1	2	179	47

1 HOUR TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
400-500	172	101	297	66	405	9	6	71	6	7	795	212	2147
415-515	170	103	307	66	433	7	7	77	5	8	828	222	2233
430-530	160	101	319	61	432	8	5	67	4	9	820	239	2225
445-545	149	98	305	56	399	10	4	63	4	7	819	230	2144
500-600	135	88	315	53	357	8	3	59	3	7	787	212	2027

P.M. PEAK HOUR
415-515



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

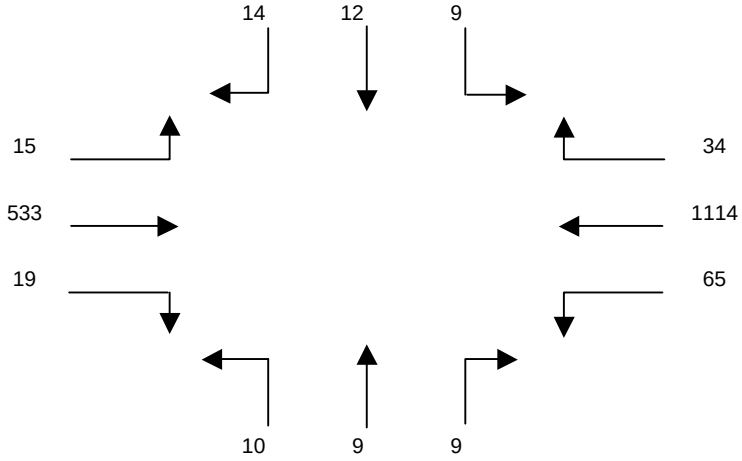
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 07:00 AM TO 09:00 AM
INTERSECTION: N/S CHESTER STREET
E/W CALIFORNIA BOULEVARD
FILE NUMBER: 9-AM

15 MINUTE TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT
700-715	4	1	0	1	125	2	1	0	0	1	80	3
715-730	2	1	2	4	159	7	0	0	0	3	64	1
730-745	2	5	0	3	231	8	1	1	0	2	98	2
745-800	3	3	4	6	314	14	2	1	2	5	101	2
800-815	5	4	3	15	281	18	3	3	1	5	155	4
815-830	2	4	0	7	251	19	2	2	3	6	156	4
830-845	4	1	2	6	268	14	2	3	4	3	121	5
845-900	4	2	1	6	284	13	4	1	6	4	115	2

1 HOUR TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
700-800	11	10	6	14	829	31	4	2	2	11	343	8	1271
715-815	12	13	9	28	985	47	6	5	3	15	418	9	1550
730-830	12	16	7	31	1077	59	8	7	6	18	510	12	1763
745-845	14	12	9	34	1114	65	9	9	10	19	533	15	1843
800-900	15	11	6	34	1084	64	11	9	14	18	547	15	1828

A.M. PEAK HOUR
745-845



CALIFORNIA BOULEVARD

CHESTER STREET

THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

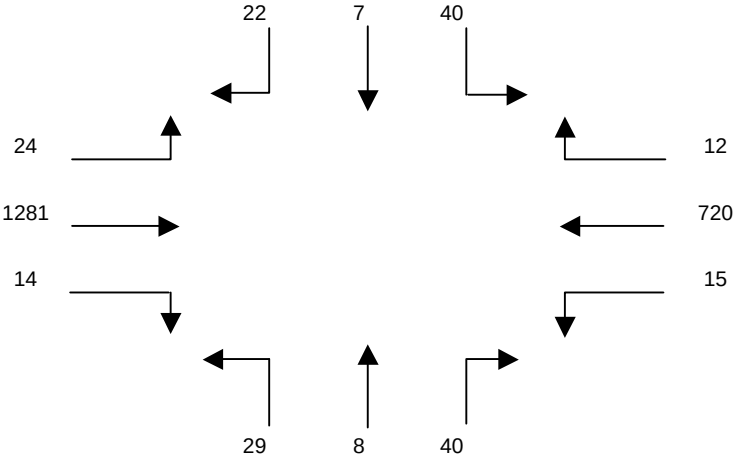
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
DATE: WEDNESDAY, MAY 18, 2005
PERIOD: 04:00 PM TO 06:00 PM
INTERSECTION: N/S CHESTER STREET
E/W DEL MAR BOULEVARD
FILE NUMBER: 9-PM

15 MINUTE TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT
400-415	4	1	6	4	165	3	6	1	5	2	260	3
415-430	5	0	11	3	171	2	6	2	2	1	272	3
430-445	9	2	6	2	188	5	10	1	2	2	310	3
445-500	5	1	7	4	172	2	7	1	5	2	310	7
500-515	5	0	13	4	174	3	13	2	11	3	334	6
515-530	4	4	14	2	190	5	10	3	8	5	320	5
530-545	8	2	6	2	184	5	10	2	5	4	317	6
545-600	4	2	8	2	166	3	14	1	10	4	298	3

1 HOUR TOTALS	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
400-500	23	4	30	13	696	12	29	5	14	7	1152	16	2001
415-515	24	3	37	13	705	12	36	6	20	8	1226	19	2109
430-530	23	7	40	12	724	15	40	7	26	12	1274	21	2201
445-545	22	7	40	12	720	15	40	8	29	14	1281	24	2212
500-600	21	8	41	10	714	16	47	8	34	16	1269	20	2204

P.M. PEAK HOUR
445-545



THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

THE TRAFFIC SOLUTION - ADT WORKSHEET

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
LOCATION: CALIFORNIA BOULEVARD E/O HILL AVENUE
DATE: WEDNESDAY, MAY 18, 2005
FILE NO: A-1

DIRECTION:	WESTBOUND				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
00:00	1	6	1	6	14
01:00	4	1	6	1	12
02:00	2	1	1	1	5
03:00	0	0	1	3	4
04:00	1	5	15	12	33
05:00	20	22	41	61	144
06:00	60	74	115	143	392
07:00	170	220	226	263	879
08:00	236	224	228	248	936
09:00	182	157	161	128	628
10:00	120	120	120	96	456
11:00	106	88	86	113	393
12:00	80	90	82	89	341
13:00	82	82	77	97	338
14:00	100	105	122	129	456
15:00	108	119	110	113	450
16:00	80	107	110	120	417
17:00	116	104	96	113	429
18:00	99	120	94	113	426
19:00	83	90	70	58	301
20:00	55	48	43	33	179
21:00	34	29	18	20	101
22:00	28	30	22	18	98
23:00	16	15	20	11	62
				TOTAL	7494

AM PEAK HOUR	07:45-08:45
VOLUME	951
PM PEAK HOUR	14:30-15:30
VOLUME	478

DIRECTION:	EASTBOUND				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
00:00	23	15	10	9	57
01:00	12	7	4	6	29
02:00	2	4	2	6	14
03:00	1	1	0	2	4
04:00	0	1	4	2	7
05:00	4	3	9	13	29
06:00	14	25	35	35	109
07:00	61	71	104	125	361
08:00	121	103	129	93	446
09:00	97	91	124	89	401
10:00	100	97	112	96	405
11:00	104	112	108	132	456
12:00	120	118	117	116	471
13:00	106	132	139	157	534
14:00	138	146	181	170	635
15:00	227	215	220	214	876
16:00	253	253	255	279	1040
17:00	297	291	276	281	1145
18:00	199	235	182	169	785
19:00	159	144	123	124	550
20:00	120	115	106	113	454
21:00	99	100	87	76	362
22:00	64	60	55	52	231
23:00	43	30	22	19	114
				TOTAL	9515

AM PEAK HOUR	11:45-12:45
VOLUME	487
PM PEAK HOUR	17:00-18:00
VOLUME	1145

TOTAL BI-DIRECTIONAL VOLUME	17009

THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

THE TRAFFIC SOLUTION - ADT WORKSHEET

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
LOCATION: DEL MAR BOULEVARD E/O HILL AVENUE
DATE: WEDNESDAY, MAY 18, 2005
FILE NO: A-2

DIRECTION:	WESTBOUND				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
00:00	15	17	5	5	42
01:00	5	10	4	9	28
02:00	1	1	5	7	14
03:00	1	0	1	4	6
04:00	7	1	14	15	37
05:00	11	23	22	49	105
06:00	64	74	139	177	454
07:00	182	230	294	380	1086
08:00	347	366	330	341	1384
09:00	267	240	223	231	961
10:00	206	206	152	175	739
11:00	188	208	205	219	820
12:00	228	194	192	197	811
13:00	202	224	188	179	793
14:00	196	174	226	237	833
15:00	225	211	184	207	827
16:00	196	222	226	208	852
17:00	197	212	197	179	785
18:00	182	216	201	213	812
19:00	177	176	143	149	645
20:00	131	128	145	130	534
21:00	119	125	112	98	454
22:00	83	69	69	50	271
23:00	37	17	18	15	87
				TOTAL	13380

AM PEAK HOUR	07:45-08:45
VOLUME	1423
PM PEAK HOUR	14:30-15:30
VOLUME	899

DIRECTION:	EASTBOUND				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
00:00	15	12	14	16	57
01:00	13	11	6	4	34
02:00	7	3	5	2	17
03:00	4	2	0	4	10
04:00	2	2	4	5	13
05:00	4	10	4	7	25
06:00	20	24	58	99	201
07:00	72	80	91	116	359
08:00	150	166	132	118	566
09:00	99	94	151	89	433
10:00	123	111	114	153	501
11:00	132	130	171	170	603
12:00	154	147	197	159	657
13:00	188	206	184	182	760
14:00	179	189	216	213	797
15:00	289	309	287	337	1222
16:00	313	366	397	374	1450
17:00	467	433	410	357	1667
18:00	371	345	295	293	1304
19:00	221	182	158	168	729
20:00	146	143	121	115	525
21:00	110	99	109	73	391
22:00	65	58	56	40	219
23:00	33	27	19	20	99
				TOTAL	12639

AM PEAK HOUR	11:45-12:45
VOLUME	668
PM PEAK HOUR	16:45-17:45
VOLUME	1684

TOTAL BI-DIRECTIONAL VOLUME	26019

THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

THE TRAFFIC SOLUTION - ADT WORKSHEET

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
LOCATION: HILL AVENUE N/O DEL MAR BOULEVARD
DATE: WEDNESDAY, MAY 18, 2005
FILE NO: A-3

DIRECTION:	NORTHBOUND				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
00:00	21	16	7	6	50
01:00	5	6	4	1	16
02:00	2	6	7	7	22
03:00	0	0	0	1	1
04:00	5	0	5	9	19
05:00	5	9	10	20	44
06:00	24	44	80	113	261
07:00	106	121	176	218	621
08:00	233	222	192	184	831
09:00	140	141	29	129	439
10:00	143	133	102	113	491
11:00	123	121	132	145	521
12:00	169	137	130	131	567
13:00	148	151	162	135	596
14:00	149	124	180	153	606
15:00	172	164	153	152	641
16:00	158	167	172	144	641
17:00	187	165	150	156	658
18:00	154	167	148	159	628
19:00	137	117	103	90	447
20:00	86	81	87	65	319
21:00	89	79	72	63	303
22:00	49	53	38	24	164
23:00	29	20	11	16	76
				TOTAL	8962

AM PEAK HOUR	07:45-08:45
VOLUME	865
PM PEAK HOUR	16:15-17:15
VOLUME	670

DIRECTION:	SOUTHBOUND				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
00:00	22	7	8	5	42
01:00	8	11	2	3	24
02:00	4	2	3	2	11
03:00	2	1	1	0	4
04:00	9	13	20	14	56
05:00	9	31	31	34	105
06:00	44	76	89	98	307
07:00	88	138	137	216	579
08:00	177	142	146	150	615
09:00	125	138	160	138	561
10:00	148	158	149	142	597
11:00	140	170	170	210	690
12:00	162	186	192	185	725
13:00	168	200	174	181	723
14:00	176	170	210	245	801
15:00	261	223	227	227	938
16:00	261	275	316	337	1189
17:00	361	353	363	305	1382
18:00	303	313	224	225	1065
19:00	185	183	169	190	727
20:00	138	133	116	83	470
21:00	151	114	100	80	445
22:00	85	74	80	59	298
23:00	53	33	28	24	138
				TOTAL	12492

AM PEAK HOUR	11:45-12:45
VOLUME	750
PM PEAK HOUR	16:45-17:45
VOLUME	1414

TOTAL BI-DIRECTIONAL VOLUME	21454

THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

THE TRAFFIC SOLUTION - ADT WORKSHEET

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
LOCATION: WILSON AVENUE N/O DEL MAR BOULEVARD
DATE: WEDNESDAY, MAY 18, 2005
FILE NO: A-4

DIRECTION:	NORTHBOUND				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
00:00	0	1	1	2	4
01:00	0	0	2	3	5
02:00	2	2	1	2	7
03:00	0	2	1	1	4
04:00	0	0	0	1	1
05:00	1	3	2	2	8
06:00	7	5	6	11	29
07:00	12	25	35	50	122
08:00	54	47	37	36	174
09:00	40	38	34	38	150
10:00	31	36	33	30	130
11:00	33	37	47	49	166
12:00	62	54	55	44	215
13:00	48	50	44	58	200
14:00	40	46	52	56	194
15:00	64	63	58	61	246
16:00	66	45	62	61	234
17:00	71	68	64	62	265
18:00	60	53	49	56	218
19:00	46	38	41	32	157
20:00	34	29	20	25	108
21:00	28	23	26	15	92
22:00	12	9	5	2	28
23:00	0	2	1	0	3
				TOTAL	2760

AM PEAK HOUR	07:45-08:45
VOLUME	188
PM PEAK HOUR	17:00-18:00
VOLUME	265

DIRECTION:	SOUTHBOUND				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
00:00	1	0	0	1	2
01:00	0	1	2	0	3
02:00	0	2	1	0	3
03:00	2	0	1	3	6
04:00	1	1	2	3	7
05:00	1	4	5	10	20
06:00	8	12	21	27	68
07:00	25	31	64	78	198
08:00	69	51	59	53	232
09:00	46	49	46	37	178
10:00	29	39	41	43	152
11:00	33	29	45	34	141
12:00	39	44	37	58	178
13:00	39	39	29	47	154
14:00	40	43	32	41	156
15:00	35	35	36	40	146
16:00	33	39	39	49	160
17:00	47	42	45	43	177
18:00	37	39	38	30	144
19:00	32	44	39	30	145
20:00	21	25	28	23	97
21:00	18	18	20	13	69
22:00	9	10	4	3	26
23:00	2	1	0	1	4
				TOTAL	2466

AM PEAK HOUR	07:30-08:30
VOLUME	262
PM PEAK HOUR	16:45-17:45
VOLUME	183

TOTAL BI-DIRECTIONAL VOLUME	5226

THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

THE TRAFFIC SOLUTION - ADT WORKSHEET

CLIENT: KAKU ASSOCIATES
PROJECT: CALTECH - PASADENA
LOCATION: SAN PASQUAL STREET E/O HILL AVENUE
DATE: WEDNESDAY, MAY 18, 2005
FILE NO: A-5

DIRECTION:	WESTBOUND				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
00:00	0	1	0	0	1
01:00	1	0	0	0	1
02:00	0	0	0	1	1
03:00	0	0	0	0	0
04:00	0	1	3	0	4
05:00	0	3	4	7	14
06:00	4	10	17	17	48
07:00	34	49	88	102	273
08:00	102	90	88	61	341
09:00	48	30	25	25	128
10:00	20	21	19	17	77
11:00	14	18	16	26	74
12:00	22	21	14	11	68
13:00	15	28	13	18	74
14:00	13	13	17	30	73
15:00	27	13	30	20	90
16:00	19	13	21	22	75
17:00	28	24	17	21	90
18:00	26	19	20	19	84
19:00	16	14	11	7	48
20:00	6	3	7	6	22
21:00	7	3	3	5	18
22:00	3	2	1	1	7
23:00	0	0	1	0	1
				TOTAL	1612

AM PEAK HOUR	07:30-08:30
VOLUME	382
PM PEAK HOUR	14:45-15:45
VOLUME	100

DIRECTION:	EASTBOUND				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
00:00	1	1	2	1	5
01:00	1	0	0	0	1
02:00	0	0	0	1	1
03:00	0	0	1	0	1
04:00	0	0	1	0	1
05:00	0	0	3	1	4
06:00	0	1	2	5	8
07:00	1	13	8	15	37
08:00	21	8	13	8	50
09:00	4	5	10	16	35
10:00	9	9	14	18	50
11:00	13	7	8	11	39
12:00	15	14	16	11	56
13:00	14	21	11	16	62
14:00	14	20	17	13	64
15:00	23	22	21	38	104
16:00	30	27	28	39	124
17:00	67	45	44	43	199
18:00	42	44	25	31	142
19:00	21	12	16	14	63
20:00	8	13	7	6	34
21:00	10	11	10	9	40
22:00	5	3	1	0	9
23:00	2	1	0	1	4
				TOTAL	1133

AM PEAK HOUR	07:15-08:15
VOLUME	57
PM PEAK HOUR	17:00-18:00
VOLUME	199

TOTAL BI-DIRECTIONAL VOLUME	2745

THE TRAFFIC SOLUTION
329 DIAMOND STREET
ARCADIA, CALIFORNIA 91006
626.446.7978

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: CAL TECH DRIVEWAY NUMBER 1
NORTH OF SAN PASQUAL STREET
DATE: TUESDAY MAY 17TH, 2005

DIRECTION:	ENTER				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	1	0	1	1	3
1:00	0	1	1	1	3
2:00	0	0	0	0	0
3:00	1	0	2	0	3
4:00	1	0	0	2	3
5:00	0	0	1	4	5
6:00	1	6	2	10	19
7:00	4	10	16	26	56
8:00	26	27	30	30	113
9:00	26	26	8	8	68
10:00	8	10	6	7	31
11:00	6	3	4	4	17
12:00	2	3	6	4	15
13:00	2	8	4	6	20
14:00	6	1	2	3	12
15:00	4	2	6	1	13
16:00	4	4	0	4	12
17:00	0	4	1	4	9
18:00	2	0	3	2	7
19:00	4	1	3	0	8
20:00	3	2	3	4	12
21:00	3	2	2	2	9
22:00	3	2	4	0	9
23:00	1	2	2	0	5
				TOTAL	452

AM PEAK HOUR	0800-0900
VOLUME	113
PM PEAK HOUR	1315-1415
VOLUME	24

DIRECTION:	EXIT				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	0	0	0	0	0
1:00	2	0	1	0	3
2:00	0	1	0	1	2
3:00	1	0	0	0	1
4:00	0	0	0	0	0
5:00	0	0	1	1	2
6:00	0	1	0	1	2
7:00	0	0	0	2	2
8:00	2	2	2	2	8
9:00	2	1	3	4	10
10:00	3	1	2	2	8
11:00	3	5	4	11	23
12:00	5	10	6	5	26
13:00	6	4	6	3	19
14:00	4	7	10	6	27
15:00	6	8	7	8	29
16:00	13	13	10	12	48
17:00	34	30	16	22	102
18:00	35	12	12	15	74
19:00	6	11	8	4	29
20:00	0	1	6	5	12
21:00	6	4	3	0	13
22:00	4	0	2	1	7
23:00	2	3	2	0	7
				TOTAL	454

AM PEAK HOUR	1100-1200
VOLUME	23
PM PEAK HOUR	1715-1815
VOLUME	103

TOTAL BI-DIRECTIONAL VOLUME	906

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: CAL TECH DRIVEWAY NUMBER 1
NORTH OF SAN PASQUAL STREET
DATE: WEDNESDAY MAY 18TH, 2005

DIRECTION:	ENTER				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	0	1	0	0	1
1:00	2	2	1	0	5
2:00	0	0	2	0	2
3:00	0	0	0	2	2
4:00	1	0	1	0	2
5:00	0	2	1	4	7
6:00	0	2	4	4	10
7:00	4	6	18	18	46
8:00	34	22	32	24	112
9:00	25	14	14	8	61
10:00	8	10	3	7	28
11:00	5	8	3	2	18
12:00	5	3	6	4	18
13:00	9	6	4	1	20
14:00	4	4	3	4	15
15:00	2	0	0	1	3
16:00	3	0	0	2	5
17:00	2	0	0	2	4
18:00	0	3	4	4	11
19:00	2	3	1	6	12
20:00	4	1	2	3	10
21:00	5	4	0	1	10
22:00	2	1	1	3	7
23:00	4	0	1	2	7
				TOTAL	416

AM PEAK HOUR	0800-0900
VOLUME	112
PM PEAK HOUR	1230-1330
VOLUME	25

DIRECTION:	EXIT				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	0	1	1	0	2
1:00	0	0	0	1	1
2:00	1	0	0	0	1
3:00	1	0	0	0	1
4:00	0	0	0	0	0
5:00	0	2	0	0	2
6:00	0	0	0	1	1
7:00	0	0	2	1	3
8:00	1	1	0	1	3
9:00	2	1	2	1	6
10:00	2	1	3	1	7
11:00	4	2	2	6	14
12:00	9	7	8	7	31
13:00	5	5	4	12	26
14:00	4	6	8	0	18
15:00	8	4	5	9	26
16:00	12	12	11	15	50
17:00	36	22	27	20	105
18:00	14	13	7	11	45
19:00	4	17	8	5	34
20:00	8	5	3	2	18
21:00	1	6	2	6	15
22:00	6	4	4	2	16
23:00	3	1	0	4	8
				TOTAL	433

AM PEAK HOUR	1100-1200
VOLUME	14
PM PEAK HOUR	1700-1800
VOLUME	105

TOTAL BI-DIRECTIONAL VOLUME	849

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: CAL TECH DRIVEWAY NUMBER 1
NORTH OF SAN PASQUAL STREET
DATE: THURSDAY MAY 19TH, 2005

DIRECTION:	ENTER				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	3	0	2	0	5
1:00	0	0	1	0	1
2:00	0	0	0	0	0
3:00	1	0	3	0	4
4:00	1	0	0	2	3
5:00	0	0	1	6	7
6:00	0	1	4	6	11
7:00	3	12	12	18	45
8:00	24	24	26	16	90
9:00	20	22	17	6	65
10:00	8	8	5	7	28
11:00	5	2	8	6	21
12:00	6	8	6	4	24
13:00	6	6	8	3	23
14:00	8	2	2	2	14
15:00	3	6	2	4	15
16:00	8	3	0	0	11
17:00	2	2	2	1	7
18:00	0	0	1	0	1
19:00	2	1	1	7	11
20:00	6	3	2	2	13
21:00	2	1	3	6	12
22:00	0	2	4	2	8
23:00	1	2	4	1	8
				TOTAL	427

AM PEAK HOUR	0745-0845
VOLUME	92
PM PEAK HOUR	1315-1415
VOLUME	25

DIRECTION:	EXIT				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	0	1	1	0	2
1:00	2	0	0	0	2
2:00	1	0	0	0	1
3:00	0	0	0	0	0
4:00	0	0	0	0	0
5:00	0	0	0	0	0
6:00	0	2	0	2	4
7:00	0	0	1	2	3
8:00	1	1	2	1	5
9:00	0	2	0	1	3
10:00	4	0	2	3	9
11:00	1	2	5	2	10
12:00	6	7	9	5	27
13:00	9	2	8	3	22
14:00	10	10	5	14	39
15:00	8	1	8	8	25
16:00	15	10	10	22	57
17:00	38	26	31	20	115
18:00	18	20	11	11	60
19:00	5	10	12	6	33
20:00	10	4	3	6	23
21:00	4	5	1	4	14
22:00	6	4	1	2	13
23:00	4	4	1	3	12
				TOTAL	479

AM PEAK HOUR	1045-1145
VOLUME	11
PM PEAK HOUR	1645-1745
VOLUME	117

TOTAL BI-DIRECTIONAL VOLUME	906

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: CAL TECH DRIVEWAY NUMBER 2
SOUTH OF DEL MAR BOULEVARD
DATE: TUESDAY MAY 17TH, 2005

DIRECTION:	ENTER				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	3	0	4	2	9
1:00	0	2	1	3	6
2:00	1	2	0	0	3
3:00	0	1	0	0	1
4:00	0	1	0	0	1
5:00	2	0	0	0	2
6:00	0	0	2	0	2
7:00	5	1	3	5	14
8:00	8	12	10	18	48
9:00	20	24	30	30	104
10:00	23	24	15	6	68
11:00	7	6	4	2	19
12:00	8	0	5	3	16
13:00	3	0	5	2	10
14:00	6	0	5	2	13
15:00	0	0	2	3	5
16:00	4	1	0	0	5
17:00	1	3	2	2	8
18:00	1	1	2	2	6
19:00	1	0	2	4	7
20:00	2	2	4	3	11
21:00	3	2	6	6	17
22:00	6	4	7	3	20
23:00	2	4	3	1	10
				TOTAL	405

AM PEAK HOUR	0915-1015
VOLUME	107
PM PEAK HOUR	2145-2245
VOLUME	23

DIRECTION:	EXIT				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	2	1	0	2	5
1:00	1	1	1	0	3
2:00	0	0	0	0	0
3:00	0	0	0	1	1
4:00	0	0	0	0	0
5:00	0	0	0	0	0
6:00	0	0	1	0	1
7:00	1	2	0	2	5
8:00	3	1	0	2	6
9:00	2	2	4	4	12
10:00	4	2	2	4	12
11:00	3	2	3	5	13
12:00	8	2	1	3	14
13:00	1	4	3	6	14
14:00	6	4	9	8	27
15:00	7	3	8	4	22
16:00	2	8	7	15	32
17:00	12	12	14	18	56
18:00	14	31	16	20	81
19:00	17	18	5	9	49
20:00	8	7	4	8	27
21:00	8	3	1	8	20
22:00	3	2	0	4	9
23:00	2	2	0	1	5
				TOTAL	414

AM PEAK HOUR	0915-1015
VOLUME	14
PM PEAK HOUR	1815-1915
VOLUME	84

TOTAL BI-DIRECTIONAL VOLUME	819

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: CAL TECH DRIVEWAY NUMBER 2
SOUTH OF DEL MAR BOULEVARD
DATE: WEDNESDAY MAY 18TH, 2005

DIRECTION:	ENTER				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	2	2	1	2	7
1:00	1	1	2	1	5
2:00	0	0	2	1	3
3:00	0	1	0	0	1
4:00	0	0	0	4	4
5:00	0	1	0	0	1
6:00	0	0	4	2	6
7:00	9	2	4	4	19
8:00	6	3	16	16	41
9:00	18	22	29	36	105
10:00	16	16	4	3	39
11:00	6	7	4	3	20
12:00	4	1	3	5	13
13:00	4	6	6	4	20
14:00	2	0	4	8	14
15:00	2	1	3	1	7
16:00	1	0	2	2	5
17:00	3	1	4	1	9
18:00	4	4	2	0	10
19:00	3	3	2	3	11
20:00	6	6	2	6	20
21:00	4	6	3	4	17
22:00	3	0	2	1	6
23:00	1	3	6	2	12
				TOTAL	395

AM PEAK HOUR	0900-1000
VOLUME	105
PM PEAK HOUR	1245-1345
VOLUME	21

DIRECTION:	EXIT				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	0	1	1	1	3
1:00	0	0	0	0	0
2:00	0	0	0	2	2
3:00	0	1	0	0	1
4:00	0	0	1	0	1
5:00	0	0	1	0	1
6:00	0	0	1	1	2
7:00	0	1	2	2	5
8:00	2	6	2	5	15
9:00	2	2	2	2	8
10:00	2	2	0	4	8
11:00	2	4	6	4	16
12:00	4	6	2	4	16
13:00	4	4	2	8	18
14:00	1	2	8	7	18
15:00	4	8	3	8	23
16:00	5	8	8	8	29
17:00	26	12	13	14	65
18:00	16	14	26	8	64
19:00	12	14	3	8	37
20:00	5	4	3	5	17
21:00	4	8	5	4	21
22:00	4	6	3	4	17
23:00	0	2	0	0	2
				TOTAL	389

AM PEAK HOUR	1045-1145
VOLUME	16
PM PEAK HOUR	1745-1845
VOLUME	70

TOTAL BI-DIRECTIONAL VOLUME	784

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: CAL TECH DRIVEWAY NUMBER 2
SOUTH OF DEL MAR BOULEVARD
DATE: THURSDAY MAY 19TH, 2005

DIRECTION:	ENTER				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	2	6	4	4	16
1:00	2	2	1	0	5
2:00	0	1	2	0	3
3:00	4	2	2	0	8
4:00	0	0	0	0	0
5:00	1	0	0	1	2
6:00	0	0	2	2	4
7:00	6	1	2	4	13
8:00	8	10	12	16	46
9:00	20	30	20	22	92
10:00	16	14	6	6	42
11:00	4	8	4	3	19
12:00	7	4	3	2	16
13:00	8	4	2	2	16
14:00	4	3	2	4	13
15:00	2	3	2	0	7
16:00	1	1	2	2	6
17:00	1	1	1	1	4
18:00	2	3	6	0	11
19:00	1	2	2	1	6
20:00	6	4	4	4	18
21:00	4	1	6	3	14
22:00	1	2	5	2	10
23:00	3	4	2	3	12
				TOTAL	383

AM PEAK HOUR	0000-0100
VOLUME	92
PM PEAK HOUR	1215-1315
VOLUME	18

DIRECTION:	EXIT				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	1	1	1	1	4
1:00	0	2	0	0	2
2:00	1	2	1	0	4
3:00	0	0	2	0	2
4:00	0	0	0	0	0
5:00	0	0	1	1	2
6:00	1	0	0	0	1
7:00	1	0	0	0	1
8:00	2	3	0	2	7
9:00	2	4	6	1	13
10:00	6	1	1	1	9
11:00	4	8	8	7	27
12:00	2	2	1	4	9
13:00	4	2	5	2	13
14:00	3	4	6	3	16
15:00	2	8	4	4	18
16:00	4	5	8	18	35
17:00	13	16	20	13	62
18:00	19	14	20	17	70
19:00	10	17	8	4	39
20:00	5	10	7	5	27
21:00	2	2	4	0	8
22:00	6	4	4	7	21
23:00	1	0	1	1	3
				TOTAL	393

AM PEAK HOUR	1100-1200
VOLUME	27
PM PEAK HOUR	1800-1900
VOLUME	70

TOTAL BI-DIRECTIONAL VOLUME	776

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: RECYCLING CENTER DRIVEWAY
WEST OF WILSON AVENUE
DATE: TUESDAY MAY 17TH, 2005

DIRECTION:	TOTAL				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	2	4	2	4	12
1:00	1	0	3	0	4
2:00	1	1	2	2	6
3:00	1	0	0	0	1
4:00	0	2	0	2	4
5:00	1	4	1	0	6
6:00	0	6	6	6	18
7:00	4	6	9	17	36
8:00	24	20	27	20	91
9:00	18	26	13	17	74
10:00	24	27	8	4	63
11:00	16	10	12	12	50
12:00	26	9	15	14	64
13:00	12	8	12	9	41
14:00	8	8	17	20	53
15:00	15	16	13	8	52
16:00	17	13	18	12	60
17:00	26	20	22	10	78
18:00	16	7	9	8	40
19:00	13	10	3	3	29
20:00	8	3	7	5	23
21:00	6	8	2	6	22
22:00	2	4	6	6	18
23:00	2	0	4	1	7
				TOTAL	852

AM PEAK HOUR	0800-0900
VOLUME	91
PM PEAK HOUR	1645-1745
VOLUME	80

DIRECTION:	O				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	0	0	0	0	0
1:00	0	0	0	0	0
2:00	0	0	0	0	0
3:00	0	0	0	0	0
4:00	0	0	0	0	0
5:00	0	0	0	0	0
6:00	0	0	0	0	0
7:00	0	0	0	0	0
8:00	0	0	0	0	0
9:00	0	0	0	0	0
10:00	0	0	0	0	0
11:00	0	0	0	0	0
12:00	0	0	0	0	0
13:00	0	0	0	0	0
14:00	0	0	0	0	0
15:00	0	0	0	0	0
16:00	0	0	0	0	0
17:00	0	0	0	0	0
18:00	0	0	0	0	0
19:00	0	0	0	0	0
20:00	0	0	0	0	0
21:00	0	0	0	0	0
22:00	0	0	0	0	0
23:00	0	0	0	0	0
				TOTAL	0

AM PEAK HOUR	0000-0100
VOLUME	0
PM PEAK HOUR	1200-1300
VOLUME	0

TOTAL BI-DIRECTIONAL VOLUME	852

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: RECYCLING CENTER DRIVEWAY
WEST OF WILSON AVENUE
DATE: WEDNESDAY MAY 18TH, 2005

DIRECTION:	TOTAL				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	2	0	1	2	5
1:00	1	2	0	1	4
2:00	0	0	1	0	1
3:00	0	0	1	0	1
4:00	0	0	1	0	1
5:00	2	2	0	0	4
6:00	3	14	6	4	27
7:00	6	9	13	16	44
8:00	22	36	26	18	102
9:00	25	18	9	9	61
10:00	6	10	12	8	36
11:00	14	13	14	14	55
12:00	12	16	16	17	61
13:00	10	18	14	15	57
14:00	9	7	16	6	38
15:00	20	5	6	12	43
16:00	18	16	20	21	75
17:00	35	18	20	19	92
18:00	18	16	15	7	56
19:00	16	18	19	28	81
20:00	10	18	12	14	54
21:00	6	9	7	32	54
22:00	8	4	2	5	19
23:00	0	0	2	3	5
				TOTAL	976

AM PEAK HOUR	0815-0915
VOLUME	105
PM PEAK HOUR	1630-1730
VOLUME	94

DIRECTION:	O				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	0	0	0	0	0
1:00	0	0	0	0	0
2:00	0	0	0	0	0
3:00	0	0	0	0	0
4:00	0	0	0	0	0
5:00	0	0	0	0	0
6:00	0	0	0	0	0
7:00	0	0	0	0	0
8:00	0	0	0	0	0
9:00	0	0	0	0	0
10:00	0	0	0	0	0
11:00	0	0	0	0	0
12:00	0	0	0	0	0
13:00	0	0	0	0	0
14:00	0	0	0	0	0
15:00	0	0	0	0	0
16:00	0	0	0	0	0
17:00	0	0	0	0	0
18:00	0	0	0	0	0
19:00	0	0	0	0	0
20:00	0	0	0	0	0
21:00	0	0	0	0	0
22:00	0	0	0	0	0
23:00	0	0	0	0	0
				TOTAL	0

AM PEAK HOUR	0000-0100
VOLUME	0
PM PEAK HOUR	1200-1300
VOLUME	0

TOTAL BI-DIRECTIONAL VOLUME	976

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: RECYCLING CENTER DRIVEWAY
WEST OF WILSON AVENUE
DATE: THURSDAY MAY 19TH, 2005

DIRECTION:	TOTAL				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	0	4	3	1	8
1:00	0	1	2	0	3
2:00	0	0	0	6	6
3:00	0	2	3	0	5
4:00	1	1	0	4	6
5:00	2	2	0	3	7
6:00	2	2	6	6	16
7:00	8	9	14	18	49
8:00	22	24	24	22	92
9:00	28	16	12	26	82
10:00	10	9	4	6	29
11:00	8	4	20	12	44
12:00	13	6	10	12	41
13:00	6	6	11	10	33
14:00	15	16	7	9	47
15:00	10	8	8	10	36
16:00	10	14	19	6	49
17:00	19	19	18	18	74
18:00	13	10	6	6	35
19:00	10	12	2	8	32
20:00	12	4	6	10	32
21:00	1	8	8	2	19
22:00	6	2	4	2	14
23:00	2	6	2	3	13
				TOTAL	772

AM PEAK HOUR	0815-0915
VOLUME	98
PM PEAK HOUR	1700-1800
VOLUME	74

DIRECTION:	O				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	0	0	0	0	0
1:00	0	0	0	0	0
2:00	0	0	0	0	0
3:00	0	0	0	0	0
4:00	0	0	0	0	0
5:00	0	0	0	0	0
6:00	0	0	0	0	0
7:00	0	0	0	0	0
8:00	0	0	0	0	0
9:00	0	0	0	0	0
10:00	0	0	0	0	0
11:00	0	0	0	0	0
12:00	0	0	0	0	0
13:00	0	0	0	0	0
14:00	0	0	0	0	0
15:00	0	0	0	0	0
16:00	0	0	0	0	0
17:00	0	0	0	0	0
18:00	0	0	0	0	0
19:00	0	0	0	0	0
20:00	0	0	0	0	0
21:00	0	0	0	0	0
22:00	0	0	0	0	0
23:00	0	0	0	0	0
				TOTAL	0

AM PEAK HOUR	0730-0830
VOLUME	0
PM PEAK HOUR	1200-1300
VOLUME	0

TOTAL BI-DIRECTIONAL VOLUME	772

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: MICHIGAN AVENUE SOUTH OF DEL MAR BOULEVARD
DATE: TUESDAY MAY 17TH, 2005

DIRECTION:		NB			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	1	2	1	0	4
1:00	1	2	1	3	7
2:00	1	3	1	0	5
3:00	1	0	2	0	3
4:00	2	1	0	2	5
5:00	0	1	0	1	2
6:00	0	1	0	3	4
7:00	2	1	0	2	5
8:00	2	2	10	6	20
9:00	5	3	4	4	16
10:00	8	3	1	4	16
11:00	6	0	6	9	21
12:00	7	1	4	4	16
13:00	4	5	6	6	21
14:00	2	2	4	4	12
15:00	4	13	5	7	29
16:00	5	11	7	7	30
17:00	13	11	6	9	39
18:00	8	4	6	4	22
19:00	4	4	4	7	19
20:00	3	3	4	2	12
21:00	0	0	2	3	5
22:00	1	4	3	1	9
23:00	1	3	3	1	8
				TOTAL	330

AM PEAK HOUR	0830-0930
VOLUME	24
PM PEAK HOUR	1700-1800
VOLUME	39

DIRECTION:		SB			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	1	3	0	0	4
1:00	1	0	2	1	4
2:00	0	0	0	0	0
3:00	0	0	3	0	3
4:00	1	0	3	2	6
5:00	0	1	0	2	3
6:00	2	7	5	5	19
7:00	7	8	9	21	45
8:00	16	17	36	17	86
9:00	19	10	11	10	50
10:00	9	8	4	4	25
11:00	11	6	8	5	30
12:00	5	6	12	8	31
13:00	6	8	3	5	22
14:00	4	6	6	3	19
15:00	4	7	5	5	21
16:00	8	4	2	5	19
17:00	3	2	1	4	10
18:00	5	1	3	3	12
19:00	2	3	5	4	14
20:00	4	2	4	3	13
21:00	2	4	0	5	11
22:00	1	2	4	3	10
23:00	1	1	2	1	5
				TOTAL	462

AM PEAK HOUR	0745-0845
VOLUME	90
PM PEAK HOUR	1230-1330
VOLUME	34

TOTAL BI-DIRECTIONAL VOLUME	792

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: MICHIGAN AVENUE SOUTH OF DEL MAR BOULEVARD
DATE: WEDNESDAY MAY 18TH, 2005

DIRECTION:		NB			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	0	0	1	1	2
1:00	3	2	1	0	6
2:00	1	2	0	0	3
3:00	2	0	0	1	3
4:00	2	0	0	1	3
5:00	0	0	1	0	1
6:00	1	0	0	1	2
7:00	1	0	0	2	3
8:00	1	2	1	9	13
9:00	3	3	4	2	12
10:00	5	5	2	1	13
11:00	5	1	5	8	19
12:00	7	3	4	7	21
13:00	5	9	9	2	25
14:00	6	3	6	2	17
15:00	6	7	7	9	29
16:00	5	2	6	11	24
17:00	11	16	7	8	42
18:00	10	7	7	6	30
19:00	5	7	10	20	42
20:00	0	6	4	4	14
21:00	11	19	17	34	81
22:00	18	6	5	1	30
23:00	6	5	2	1	14
				TOTAL	449

AM PEAK HOUR	0030-0130
VOLUME	19
PM PEAK HOUR	2115-2215
VOLUME	88

DIRECTION:		SB			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	1	0	0	0	1
1:00	0	0	0	0	0
2:00	1	0	1	1	3
3:00	0	0	0	0	0
4:00	1	0	1	1	3
5:00	0	1	2	2	5
6:00	2	1	0	2	5
7:00	7	7	5	17	36
8:00	14	22	16	16	68
9:00	14	15	13	5	47
10:00	7	5	6	3	21
11:00	2	2	6	4	14
12:00	5	6	9	6	26
13:00	13	3	4	4	24
14:00	3	6	6	8	23
15:00	3	5	3	4	15
16:00	5	1	6	2	14
17:00	3	3	5	10	21
18:00	12	4	6	10	32
19:00	13	22	42	44	121
20:00	9	8	5	7	29
21:00	2	2	2	5	11
22:00	4	4	1	3	12
23:00	1	1	1	1	4
				TOTAL	535

AM PEAK HOUR	0745-0845
VOLUME	69
PM PEAK HOUR	1900-2000
VOLUME	121

TOTAL BI-DIRECTIONAL VOLUME	984

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: MICHIGAN AVENUE SOUTH OF DEL MAR BOULEVARD
DATE: THURSDAY MAY 19TH, 2005

DIRECTION:		NB			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	0	1	2	2	5
1:00	0	2	1	0	3
2:00	0	0	1	1	2
3:00	1	2	1	0	4
4:00	1	0	0	1	2
5:00	1	0	0	0	1
6:00	0	1	3	1	5
7:00	0	1	0	0	1
8:00	0	4	6	7	17
9:00	1	4	4	3	12
10:00	4	6	4	2	16
11:00	2	5	4	11	22
12:00	6	5	3	2	16
13:00	5	3	5	8	21
14:00	6	2	2	6	16
15:00	4	5	5	9	23
16:00	1	11	7	3	22
17:00	13	9	10	8	40
18:00	1	5	3	2	11
19:00	3	7	6	2	18
20:00	2	5	3	5	15
21:00	9	6	5	3	23
22:00	3	7	5	1	16
23:00	7	3	3	0	13
				TOTAL	324

AM PEAK HOUR	0030-0130
VOLUME	22
PM PEAK HOUR	1700-1800
VOLUME	40

DIRECTION:		SB			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	2	0	0	2	4
1:00	0	0	0	0	0
2:00	0	1	0	1	2
3:00	1	1	0	0	2
4:00	0	2	2	1	5
5:00	0	0	1	2	3
6:00	2	1	4	2	9
7:00	8	8	6	15	37
8:00	13	27	25	22	87
9:00	11	14	8	6	39
10:00	3	4	6	4	17
11:00	3	6	8	8	25
12:00	9	10	4	3	26
13:00	15	5	6	7	33
14:00	7	2	4	2	15
15:00	6	4	7	7	24
16:00	2	1	0	7	10
17:00	4	9	4	9	26
18:00	1	1	6	4	12
19:00	9	10	8	3	30
20:00	3	1	2	3	9
21:00	4	5	2	1	12
22:00	7	5	3	1	16
23:00	2	1	0	0	3
				TOTAL	446

AM PEAK HOUR	0800-0900
VOLUME	87
PM PEAK HOUR	1300-1400
VOLUME	33

TOTAL BI-DIRECTIONAL VOLUME	770

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: CHESTER AVENUE SOUTH OF DEL MAR BOULEVARD
DATE: TUESDAY MAY 17TH, 2005

DIRECTION:	NB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	2	0	0	0	2
1:00	0	0	0	0	0
2:00	0	0	0	0	0
3:00	0	0	0	0	0
4:00	0	0	0	1	1
5:00	0	1	1	1	3
6:00	1	1	1	4	7
7:00	2	4	2	3	11
8:00	6	8	11	7	32
9:00	17	9	8	3	37
10:00	6	10	0	4	20
11:00	6	8	9	7	30
12:00	5	3	3	4	15
13:00	8	6	6	2	22
14:00	4	4	4	4	16
15:00	7	6	2	8	23
16:00	9	2	5	13	29
17:00	20	22	24	12	78
18:00	10	2	6	4	22
19:00	2	0	3	6	11
20:00	4	2	3	2	11
21:00	1	6	1	2	10
22:00	1	0	0	1	2
23:00	0	1	1	0	2
				TOTAL	384

AM PEAK HOUR	0830-0930
VOLUME	44
PM PEAK HOUR	1645-1745
VOLUME	79

DIRECTION:	SB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	3	0	0	0	3
1:00	0	0	0	0	0
2:00	0	0	0	0	0
3:00	2	2	0	0	4
4:00	0	0	2	2	4
5:00	0	3	4	5	12
6:00	5	0	7	8	20
7:00	8	13	14	29	64
8:00	28	38	44	38	148
9:00	34	22	20	6	82
10:00	16	18	6	10	50
11:00	16	21	14	22	73
12:00	14	16	11	16	57
13:00	12	12	15	8	47
14:00	15	9	8	16	48
15:00	14	10	6	19	49
16:00	20	8	10	27	65
17:00	37	34	32	20	123
18:00	10	5	3	5	23
19:00	0	1	4	3	8
20:00	5	5	3	4	17
21:00	1	6	2	3	12
22:00	2	0	2	1	5
23:00	2	1	2	0	5
				TOTAL	919

AM PEAK HOUR	0815-0915
VOLUME	154
PM PEAK HOUR	1645-1745
VOLUME	130

TOTAL BI-DIRECTIONAL VOLUME	1303

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: CHESTER AVENUE SOUTH OF DEL MAR BOULEVARD
DATE: WEDNESDAY MAY 18TH, 2005

DIRECTION:	NB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	0	2	0	0	2
1:00	0	2	0	0	2
2:00	0	1	0	1	2
3:00	0	0	0	0	0
4:00	0	0	0	0	0
5:00	2	0	0	0	2
6:00	1	0	0	1	2
7:00	1	0	4	5	10
8:00	6	8	8	8	30
9:00	10	7	7	4	28
10:00	4	3	5	6	18
11:00	3	4	2	6	15
12:00	8	4	4	5	21
13:00	8	8	13	5	34
14:00	7	6	3	5	21
15:00	6	4	14	7	31
16:00	8	5	13	12	38
17:00	20	14	12	18	64
18:00	14	2	6	11	33
19:00	4	4	10	6	24
20:00	6	6	1	3	16
21:00	4	6	16	10	36
22:00	2	2	2	0	6
23:00	1	1	0	1	3
				TOTAL	438

AM PEAK HOUR	0815-0915
VOLUME	34
PM PEAK HOUR	1700-1800
VOLUME	64

DIRECTION:	SB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	2	4	0	0	6
1:00	0	2	0	1	3
2:00	0	1	0	2	3
3:00	0	0	0	2	2
4:00	0	1	2	1	4
5:00	1	0	2	4	7
6:00	2	4	8	8	22
7:00	4	12	24	28	68
8:00	36	38	24	31	129
9:00	22	16	13	14	65
10:00	12	14	10	16	52
11:00	12	18	9	14	53
12:00	16	16	6	16	54
13:00	12	14	14	8	48
14:00	10	10	8	9	37
15:00	12	11	22	20	65
16:00	21	10	18	15	64
17:00	40	34	42	24	140
18:00	14	5	7	14	40
19:00	8	11	21	22	62
20:00	10	4	2	4	20
21:00	5	6	19	19	49
22:00	6	3	2	2	13
23:00	1	1	4	1	7
				TOTAL	1013

AM PEAK HOUR	0800-0900
VOLUME	129
PM PEAK HOUR	1700-1800
VOLUME	140

TOTAL BI-DIRECTIONAL VOLUME	1451

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: CHESTER AVENUE SOUTH OF DEL MAR BOULEVARD
DATE: THURSDAY MAY 19TH, 2005

DIRECTION:	NB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	1	0	0	1	2
1:00	0	0	0	0	0
2:00	1	0	0	0	1
3:00	2	0	0	0	2
4:00	0	1	0	1	2
5:00	1	0	0	2	3
6:00	0	0	0	1	1
7:00	1	1	1	8	11
8:00	5	10	10	10	35
9:00	7	15	11	15	48
10:00	3	2	8	1	14
11:00	0	6	10	2	18
12:00	9	7	5	9	30
13:00	4	7	8	2	21
14:00	2	4	7	3	16
15:00	6	3	13	10	32
16:00	10	6	12	9	37
17:00	16	14	22	13	65
18:00	8	2	6	6	22
19:00	4	4	5	2	15
20:00	1	3	2	7	13
21:00	1	4	1	0	6
22:00	1	4	0	0	5
23:00	0	0	0	0	0
				TOTAL	399

AM PEAK HOUR	0900-1000
VOLUME	48
PM PEAK HOUR	1700-1800
VOLUME	65

DIRECTION:	SB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	1	0	0	3	4
1:00	0	0	0	3	3
2:00	1	0	0	1	2
3:00	2	2	1	2	7
4:00	0	1	4	3	8
5:00	0	0	2	4	6
6:00	2	2	4	7	15
7:00	7	12	20	32	71
8:00	20	50	29	26	125
9:00	18	26	12	16	72
10:00	14	8	12	5	39
11:00	10	12	18	10	50
12:00	23	13	9	22	67
13:00	11	12	12	12	47
14:00	9	12	8	6	35
15:00	19	9	20	14	62
16:00	18	14	19	20	71
17:00	62	31	30	25	148
18:00	8	3	6	9	26
19:00	4	8	3	8	23
20:00	4	4	8	8	24
21:00	1	2	2	4	9
22:00	4	4	1	2	11
23:00	4	2	0	2	8
				TOTAL	933

AM PEAK HOUR	0745-0845
VOLUME	131
PM PEAK HOUR	1700-1800
VOLUME	148

TOTAL BI-DIRECTIONAL VOLUME	1332

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: HOLLISTON AVENUE SOUTH OF DEL MAR BOULEVARD
DATE: TUESDAY MAY 17TH, 2005

DIRECTION:	NB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	2	4	3	3	12
1:00	0	2	0	1	3
2:00	1	3	3	2	9
3:00	1	0	1	1	3
4:00	2	1	1	5	9
5:00	1	3	1	6	11
6:00	3	4	2	5	14
7:00	4	7	4	18	33
8:00	6	14	13	10	43
9:00	6	9	5	9	29
10:00	6	13	13	13	45
11:00	9	11	17	11	48
12:00	13	13	11	8	45
13:00	11	14	35	9	69
14:00	13	12	12	14	51
15:00	20	7	19	24	70
16:00	20	14	13	20	67
17:00	14	20	10	18	62
18:00	14	13	11	7	45
19:00	14	8	10	4	36
20:00	4	3	7	2	16
21:00	3	6	5	3	17
22:00	6	6	4	1	17
23:00	4	3	3	7	17
				TOTAL	771

AM PEAK HOUR	0745-0845
VOLUME	51
PM PEAK HOUR	1530-1630
VOLUME	77

DIRECTION:	SB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	4	3	0	2	9
1:00	1	2	1	1	5
2:00	0	1	2	1	4
3:00	0	1	1	2	4
4:00	2	3	23	15	43
5:00	2	3	5	14	24
6:00	12	21	13	24	70
7:00	17	28	17	39	101
8:00	28	14	23	14	79
9:00	18	12	24	11	65
10:00	18	12	14	13	57
11:00	6	18	11	15	50
12:00	14	11	8	14	47
13:00	19	14	20	11	64
14:00	13	16	9	15	53
15:00	11	14	18	15	58
16:00	13	17	20	19	69
17:00	29	34	22	21	106
18:00	22	6	9	8	45
19:00	11	6	10	9	36
20:00	7	7	3	5	22
21:00	4	2	7	7	20
22:00	6	4	6	6	22
23:00	3	7	2	4	16
				TOTAL	1069

AM PEAK HOUR	0715-0815
VOLUME	112
PM PEAK HOUR	1700-1800
VOLUME	106

TOTAL BI-DIRECTIONAL VOLUME	1840

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: HOLLISTON AVENUE SOUTH OF DEL MAR BOULEVARD
DATE: WEDNESDAY MAY 18TH, 2005

DIRECTION:	NB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	5	2	3	1	11
1:00	4	3	0	0	7
2:00	4	3	1	0	8
3:00	0	0	0	1	1
4:00	0	1	3	3	7
5:00	0	2	2	0	4
6:00	2	4	3	4	13
7:00	3	7	5	16	31
8:00	5	14	5	9	33
9:00	10	8	12	6	36
10:00	6	8	12	8	34
11:00	8	10	15	15	48
12:00	6	10	8	11	35
13:00	0	0	0	4	4
14:00	5	3	7	3	18
15:00	14	17	24	25	80
16:00	21	12	13	10	56
17:00	17	20	9	14	60
18:00	11	7	10	14	42
19:00	9	9	7	9	34
20:00	7	6	2	4	19
21:00	6	6	10	5	27
22:00	7	6	12	5	30
23:00	7	3	4	5	19
				TOTAL	657

AM PEAK HOUR	1100-1200
VOLUME	48
PM PEAK HOUR	1515-1615
VOLUME	87

DIRECTION:	SB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	6	4	2	0	12
1:00	3	1	0	0	4
2:00	2	1	1	1	5
3:00	0	0	1	0	1
4:00	1	5	19	12	37
5:00	4	4	3	11	22
6:00	12	13	14	14	53
7:00	14	20	22	37	93
8:00	28	16	14	9	67
9:00	9	10	13	13	45
10:00	12	5	10	9	36
11:00	18	13	6	11	48
12:00	10	7	10	10	37
13:00	0	0	0	10	10
14:00	10	3	0	0	13
15:00	4	14	14	20	52
16:00	18	11	19	22	70
17:00	34	17	22	22	95
18:00	10	7	4	11	32
19:00	9	5	11	15	40
20:00	4	6	4	7	21
21:00	5	6	6	3	20
22:00	4	6	9	11	30
23:00	3	3	1	3	10
				TOTAL	853

AM PEAK HOUR	0715-0815
VOLUME	107
PM PEAK HOUR	1645-1745
VOLUME	95

TOTAL BI-DIRECTIONAL VOLUME	1510

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: HOLLISTON AVENUE SOUTH OF DEL MAR BOULEVARD
DATE: THURSDAY MAY 19TH, 2005

DIRECTION:		NB			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	2	3	0	3	8
1:00	1	1	1	4	7
2:00	1	3	0	5	9
3:00	3	0	1	1	5
4:00	0	0	2	1	3
5:00	0	0	1	0	1
6:00	5	4	4	2	15
7:00	5	7	4	20	36
8:00	11	6	6	8	31
9:00	10	5	9	7	31
10:00	11	2	7	9	29
11:00	12	13	7	13	45
12:00	13	8	13	14	48
13:00	14	10	24	13	61
14:00	13	13	10	9	45
15:00	21	9	15	23	68
16:00	27	12	13	8	60
17:00	26	11	14	10	61
18:00	10	11	12	8	41
19:00	5	6	4	9	24
20:00	10	11	4	5	30
21:00	5	10	10	5	30
22:00	8	6	4	5	23
23:00	5	2	4	7	18
				TOTAL	729

AM PEAK HOUR	1100-1200
VOLUME	45
PM PEAK HOUR	1530-1630
VOLUME	77

DIRECTION:		SB			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	3	2	1	0	6
1:00	2	2	0	0	4
2:00	2	0	1	4	7
3:00	1	3	3	1	8
4:00	2	5	17	9	33
5:00	3	2	3	10	18
6:00	14	23	13	13	63
7:00	20	26	18	32	96
8:00	20	20	14	14	68
9:00	17	14	10	8	49
10:00	11	13	10	10	44
11:00	10	7	13	13	43
12:00	9	14	8	17	48
13:00	20	10	13	12	55
14:00	9	10	9	12	40
15:00	11	17	14	20	62
16:00	16	14	12	29	71
17:00	28	30	31	16	105
18:00	23	7	12	10	52
19:00	12	8	6	8	34
20:00	6	4	6	5	21
21:00	6	9	5	3	23
22:00	6	4	7	3	20
23:00	3	2	3	2	10
				TOTAL	980

AM PEAK HOUR	0700-0800
VOLUME	96
PM PEAK HOUR	1645-1745
VOLUME	118

TOTAL BI-DIRECTIONAL VOLUME	1709

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: SAN PASQUAL STREET WEST OF HILL AVENUE
DATE: TUESDAY MAY 17TH, 2005

DIRECTION:		EB			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	3	2	2	1	8
1:00	3	2	0	2	7
2:00	2	1	2	6	11
3:00	2	4	4	2	12
4:00	3	8	5	17	33
5:00	1	4	2	1	8
6:00	2	6	10	11	29
7:00	6	8	14	26	54
8:00	21	14	16	16	67
9:00	9	5	18	14	46
10:00	8	16	13	12	49
11:00	14	14	14	20	62
12:00	20	21	13	7	61
13:00	18	14	36	14	82
14:00	16	13	22	12	63
15:00	22	16	24	27	89
16:00	38	24	34	34	130
17:00	52	44	40	24	160
18:00	32	10	17	12	71
19:00	3	10	7	18	38
20:00	8	7	4	9	28
21:00	6	12	4	7	29
22:00	8	4	4	2	18
23:00	4	5	3	1	13
				TOTAL	1168

AM PEAK HOUR	0745-0845
VOLUME	77
PM PEAK HOUR	1645-1745
VOLUME	170

DIRECTION:		WB			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	4	4	0	2	10
1:00	0	2	2	2	6
2:00	0	2	1	4	7
3:00	3	2	0	1	6
4:00	2	0	6	5	13
5:00	1	1	6	5	13
6:00	3	10	7	12	32
7:00	14	14	22	38	88
8:00	28	21	14	16	79
9:00	14	10	20	8	52
10:00	8	6	10	14	38
11:00	6	12	8	14	40
12:00	10	8	11	11	40
13:00	6	8	14	5	33
14:00	7	6	16	4	33
15:00	12	8	12	10	42
16:00	9	14	4	7	34
17:00	8	12	4	6	30
18:00	10	6	4	4	24
19:00	7	4	4	6	21
20:00	3	9	4	0	16
21:00	2	10	3	5	20
22:00	1	0	1	1	3
23:00	2	1	4	2	9
				TOTAL	689

AM PEAK HOUR	0730-0830
VOLUME	109
PM PEAK HOUR	1530-1630
VOLUME	45

TOTAL BI-DIRECTIONAL VOLUME	1857

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: SAN PASQUAL STREET WESTOF HILL AVENUE
DATE: WEDNESDAY MAY 18TH, 2005

DIRECTION:	EB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	4	2	3	1	10
1:00	0	0	0	2	2
2:00	0	0	0	1	1
3:00	3	1	1	0	5
4:00	1	8	4	7	20
5:00	1	4	2	3	10
6:00	2	8	10	8	28
7:00	6	4	8	16	34
8:00	14	7	26	8	55
9:00	16	10	10	13	49
10:00	6	16	11	10	43
11:00	16	17	12	14	59
12:00	18	14	10	17	59
13:00	17	9	34	19	79
14:00	10	7	20	22	59
15:00	26	22	18	24	90
16:00	44	20	22	38	124
17:00	50	43	34	37	164
18:00	27	12	10	14	63
19:00	14	12	19	14	59
20:00	7	6	9	7	29
21:00	6	7	4	0	17
22:00	4	2	8	4	18
23:00	2	3	2	8	15
				TOTAL	1092

AM PEAK HOUR	0745-0845
VOLUME	63
PM PEAK HOUR	1645-1745
VOLUME	165

DIRECTION:	WB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	0	1	2	1	4
1:00	1	0	0	0	1
2:00	1	0	0	2	3
3:00	1	1	0	0	2
4:00	0	0	4	6	10
5:00	0	0	2	8	10
6:00	5	4	4	8	21
7:00	20	20	20	20	80
8:00	22	20	11	8	61
9:00	13	9	8	6	36
10:00	7	6	14	8	35
11:00	7	14	5	12	38
12:00	6	3	6	16	31
13:00	10	12	8	7	37
14:00	6	6	20	12	44
15:00	10	10	12	10	42
16:00	11	10	16	6	43
17:00	18	10	1	5	34
18:00	0	10	4	16	30
19:00	13	8	11	8	40
20:00	5	2	4	5	16
21:00	2	4	4	2	12
22:00	5	0	3	1	9
23:00	0	0	2	2	4
				TOTAL	643

AM PEAK HOUR	0715-0815
VOLUME	82
PM PEAK HOUR	1430-1530
VOLUME	52

TOTAL BI-DIRECTIONAL VOLUME	1735

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KAKU ASSOCIATES
PROJECT: CALIFORNIA INSTITUTE OF TECHNOLOGY TRAFFIC COUNTS
LOCATION: SAN PASQUAL STREET WESTOF HILL AVENUE
DATE: THURSDAY MAY 19TH, 2005

DIRECTION:	EB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	3	2	2	1	8
1:00	3	1	0	2	6
2:00	0	2	1	0	3
3:00	3	1	1	2	7
4:00	10	0	5	8	23
5:00	1	1	1	4	7
6:00	1	7	10	8	26
7:00	16	8	8	18	50
8:00	14	8	9	9	40
9:00	5	8	8	14	35
10:00	9	11	5	8	33
11:00	5	15	4	10	34
12:00	12	9	13	13	47
13:00	20	12	28	10	70
14:00	18	6	10	8	42
15:00	25	24	24	30	103
16:00	43	22	28	27	120
17:00	55	52	56	28	191
18:00	39	26	25	12	102
19:00	14	9	12	10	45
20:00	12	8	7	10	37
21:00	4	5	8	8	25
22:00	10	5	1	8	24
23:00	5	2	2	4	13
				TOTAL	1091

AM PEAK HOUR	0700-0800
VOLUME	50
PM PEAK HOUR	1700-1800
VOLUME	191

DIRECTION:	WB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	2	0	1	1	4
1:00	0	0	1	1	2
2:00	0	1	2	1	4
3:00	2	2	0	0	4
4:00	1	0	0	2	3
5:00	6	0	4	0	10
6:00	6	11	8	4	29
7:00	17	12	17	25	71
8:00	20	10	8	4	42
9:00	6	8	10	8	32
10:00	12	5	8	8	33
11:00	14	5	4	10	33
12:00	12	8	10	12	42
13:00	8	7	12	8	35
14:00	7	4	13	8	32
15:00	3	14	10	8	35
16:00	18	7	10	5	40
17:00	8	11	6	8	33
18:00	10	12	2	8	32
19:00	13	1	10	5	29
20:00	2	4	2	4	12
21:00	4	1	3	2	10
22:00	6	3	2	5	16
23:00	4	2	4	7	17
				TOTAL	600

AM PEAK HOUR	0715-0815
VOLUME	74
PM PEAK HOUR	1515-1615
VOLUME	50

TOTAL BI-DIRECTIONAL VOLUME	1691

APPENDIX C

INTERSECTION LEVEL OF SERVICE WORKSHEETS

EXISTING CONDITIONS

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **1. Lake Avenue & Del Mar Boulevard**
Description: **EXISTING CONDITIONS**

Date/Time: **AM PEAK HOUR (7:45-8:45)**

Thru Lane:	1700 vph	N-S Split Phase :	N
Left Lane:	1700 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	205	1,700	0.024	N-S(1):	0.228 *
	TH	2.00	527	3,400	0.155	N-S(2):	0.223
	LT	1.00	67	1,700	0.039 *	E-W(1):	0.162
Westbound	RT	1.00	84	1,700	0.010	E-W(2):	0.348 *
	TH	2.00	858	3,400	0.252 *		
	LT	1.00	55	1,700	0.032	V/C:	0.576
Northbound	RT	0.00	86	0	0.000	Lost Time:	0.050
	TH	2.00	556	3,400	0.189 *		
	LT	1.00	115	1,700	0.068		
Eastbound	RT	1.00	75	1,700	0.000	ICU:	0.626
	TH	2.00	443	3,400	0.130		
	LT	1.00	164	1,700	0.096 *	LOS:	B

Date/Time: **PM PEAK HOUR (4:15-5:15)**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	169	1,700	0.035	N-S(1):	0.289
	TH	2.00	771	3,400	0.227 *	N-S(2):	0.299 *
	LT	1.00	176	1,700	0.104	E-W(1):	0.383 *
Westbound	RT	1.00	85	1,700	0.000	E-W(2):	0.273
	TH	2.00	712	3,400	0.209		
	LT	1.00	108	1,700	0.064 *	V/C:	0.682
Northbound	RT	0.00	89	0	0.000	Lost Time:	0.050
	TH	2.00	539	3,400	0.185		
	LT	1.00	123	1,700	0.072 *		
Eastbound	RT	1.00	136	1,700	0.008	ICU:	0.732
	TH	2.00	1,086	3,400	0.319 *		
	LT	1.00	109	1,700	0.064	LOS:	C

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **2. Wilson Avenue & Del Mar Boulevard**
Description: **EXISTING CONDITIONS**

Date/Time: **AM PEAK HOUR (7:45-8:45)**

Thru Lane:	1700 vph	N-S Split Phase :	N
Left Lane:	1700 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	48	0	0.000	N-S(1):	0.145 *
	TH	1.00	132	1,700	0.127 *	N-S(2):	0.145 *
	LT	0.00	36	1,700	0.021 *	E-W(1):	0.221
Westbound	RT	0.00	31	0	0.000	E-W(2):	0.329 *
	TH	2.00	981	3,400	0.298 *		
	LT	1.00	121	1,700	0.071	V/C:	0.474
Northbound	RT	0.00	53	0	0.000	Lost Time:	0.100
	TH	1.00	127	1,700	0.124 *		
	LT	0.00	30	1,700	0.018 *		
Eastbound	RT	0.00	29	0	0.000	ICU:	0.574
	TH	2.00	481	3,400	0.150		
	LT	1.00	52	1,700	0.031 *	LOS:	A

Date/Time: **PM PEAK HOUR (4:45-5:45)**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	102	0	0.000	N-S(1):	0.181
	TH	1.00	166	1,700	0.212 *	N-S(2):	0.233 *
	LT	0.00	92	1,700	0.054	E-W(1):	0.392 *
Westbound	RT	0.00	30	0	0.000	E-W(2):	0.252
	TH	2.00	690	3,400	0.212		
	LT	1.00	40	1,700	0.024 *	V/C:	0.625
Northbound	RT	0.00	29	0	0.000	Lost Time:	0.100
	TH	1.00	152	1,700	0.127		
	LT	0.00	35	1,700	0.021 *		
Eastbound	RT	0.00	57	0	0.000	ICU:	0.725
	TH	2.00	1,193	3,400	0.368 *		
	LT	1.00	68	1,700	0.040	LOS:	C

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **3. Chester Avenue & Del Mar Boulevard**
Description: **EXISTING CONDITIONS**

Date/Time: **AM PEAK HOUR (7:45-8:45)**

Thru Lane:	1700 vph	N-S Split Phase :	N
Left Lane:	1700 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	14	0	0.000	N-S(1):	0.021
	TH	1.00	12	1,700	0.021 *	N-S(2):	0.027 *
	LT	0.00	9	1,700	0.005	E-W(1):	0.210
Westbound	RT	0.00	34	0	0.000	E-W(2):	0.357 *
	TH	2.00	1,148	3,400	0.348 *		
	LT	1.00	65	1,700	0.038	V/C:	0.384
Northbound	RT	0.00	9	0	0.000	Lost Time:	0.050
	TH	1.00	9	1,700	0.016		
	LT	0.00	10	1,700	0.006 *		
Eastbound	RT	0.00	19	0	0.000	ICU:	0.434
	TH	2.00	567	3,400	0.172		
	LT	1.00	15	1,700	0.009 *	LOS:	A

Date/Time: **PM PEAK HOUR (4:45-5:45)**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	22	0	0.000	N-S(1):	0.069 *
	TH	1.00	7	1,700	0.041	N-S(2):	0.058
	LT	0.00	40	1,700	0.024 *	E-W(1):	0.394 *
Westbound	RT	0.00	12	0	0.000	E-W(2):	0.233
	TH	2.00	734	3,400	0.219		
	LT	1.00	15	1,700	0.009 *	V/C:	0.463
Northbound	RT	0.00	40	0	0.000	Lost Time:	0.050
	TH	1.00	8	1,700	0.045 *		
	LT	0.00	29	1,700	0.017		
Eastbound	RT	0.00	14	0	0.000	ICU:	0.513
	TH	2.00	1,295	3,400	0.385 *		
	LT	1.00	24	1,700	0.014	LOS:	A

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **4. Hill Avenue & Del Mar Boulevard**
Description: **EXISTING CONDITIONS**

Date/Time: **AM PEAK HOUR (7:30-8:30)**

Thru Lane:	1700 vph	N-S Split Phase :	N
Left Lane:	1700 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	240	0	0.000	N-S(1):	0.225
	TH	2.00	274	3,400	0.151 *	N-S(2):	0.239 *
	LT	1.00	141	1,700	0.083	E-W(1):	0.167
Westbound	RT	1.00	301	1,700	0.094	E-W(2):	0.302 *
	TH	2.00	851	3,400	0.250 *		
	LT	1.00	49	1,700	0.029	V/C:	0.541
Northbound	RT	0.00	26	0	0.000	Lost Time:	0.050
	TH	2.00	457	3,400	0.142		
	LT	1.00	149	1,700	0.088 *		
Eastbound	RT	0.00	29	0	0.000	ICU:	0.591
	TH	2.00	441	3,400	0.138		
	LT	1.00	88	1,700	0.052 *	LOS:	A

Date/Time: **PM PEAK HOUR (4:45-5:45)**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	105	0	0.000	N-S(1):	0.323 *
	TH	2.00	382	3,400	0.143	N-S(2):	0.171
	LT	1.00	389	1,700	0.229 *	E-W(1):	0.399 *
Westbound	RT	1.00	149	1,700	0.000	E-W(2):	0.274
	TH	2.00	606	3,400	0.178		
	LT	1.00	61	1,700	0.036 *	V/C:	0.722
Northbound	RT	0.00	46	0	0.000	Lost Time:	0.050
	TH	2.00	275	3,400	0.094 *		
	LT	1.00	47	1,700	0.028		
Eastbound	RT	0.00	53	0	0.000	ICU:	0.772
	TH	2.00	1,182	3,400	0.363 *		
	LT	1.00	163	1,700	0.096	LOS:	C

* - Denotes critical movement

1858 Caltech Master Plan EIR

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #5 Wilson & San Pasqual

Cycle (sec): 100 Critical Vol./Cap. (X): 0.337
Loss Time (sec): 0 (Y+R = 4 sec) Average Delay (sec/veh): 9.0
Optimal Cycle: 0 Level Of Service: A

Street Name:	Wilson Avenue						San Pasqual Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1	0	0 0	0	0 0	1 0	0	0	1! 0	0	0	0 0 0
Volume Module:												
Base Vol:	34	204	0	0	266	22	18	0	14	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	34	204	0	0	266	22	18	0	14	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	34	204	0	0	266	22	18	0	14	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	34	204	0	0	266	22	18	0	14	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	34	204	0	0	266	22	18	0	14	0	0	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.14	0.86	0.00	0.00	0.92	0.08	0.56	0.00	0.44	0.00	0.00	0.00
Final Sat.:	119	712	0	0	790	65	386	0	301	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.29	0.29	xxxx	xxxx	0.34	0.34	0.05	xxxx	0.05	xxxx	xxxx	xxxx
Crit Moves:	****				****				****			
Delay/Veh:	9.0	9.0	0.0	0.0	9.2	9.2	8.0	0.0	8.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	9.0	9.0	0.0	0.0	9.2	9.2	8.0	0.0	8.0	0.0	0.0	0.0
LOS by Move:	A	A	*	*	A	A	A	*	A	*	*	*
ApproachDel:	9.0			9.2			8.0			xxxxxx		
Delay Adj:	1.00			1.00			1.00			xxxxx		
ApprAdjDel:	9.0			9.2			8.0			xxxxxx		
LOS by Appr:	A			A			A			*		

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #5 Wilson & San Pasqual

Cycle (sec):	100	Critical Vol./Cap. (X):	0.362
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh):	9.1
Optimal Cycle:	0	Level Of Service:	A

Street Name:	Wilson Avenue						San Pasqual Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1	0	0 0	0	0 0	1 0	0	0	1! 0	0	0	0 0 0
Volume Module:												
Base Vol:	19	193	0	0	269	43	20	0	24	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	19	193	0	0	269	43	20	0	24	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	19	193	0	0	269	43	20	0	24	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	19	193	0	0	269	43	20	0	24	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	19	193	0	0	269	43	20	0	24	0	0	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.09	0.91	0.00	0.00	0.86	0.14	0.45	0.00	0.55	0.00	0.00	0.00
Final Sat.:	73	746	0	0	742	119	318	0	382	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.26	0.26	xxxx	xxxx	0.36	0.36	0.06	xxxx	0.06	xxxx	xxxx	xxxx
Crit Moves:	****				****				****			
Delay/Veh:	8.8	8.8	0.0	0.0	9.4	9.4	8.0	0.0	8.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	8.8	8.8	0.0	0.0	9.4	9.4	8.0	0.0	8.0	0.0	0.0	0.0
LOS by Move:	A	A	*	*	A	A	A	*	A	*	*	*
ApproachDel:	8.8			9.4			8.0			xxxxxx		
Delay Adj:	1.00			1.00			1.00			xxxxx		
ApprAdjDel:	8.8			9.4			8.0			xxxxxx		
LOS by Appr:	A			A			A			*		

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **6. Hill Avenue & San Pasqual Street**
Description: **EXISTING CONDITIONS**

Date/Time: **AM PEAK HOUR (7:45-8:45)**

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	15	0	0.000	N-S(1):	0.249 *
	TH	1.00	284	1,600	0.202	N-S(2):	0.219
	LT	0.00	24	1,600	0.015 *	E-W(1):	0.053
Westbound	RT	0.00	281	0	0.000	E-W(2):	0.237 *
	TH	1.00	39	1,600	0.229 *		
	LT	0.00	46	1,600	0.029	V/C:	0.486
Northbound	RT	0.00	11	0	0.000	Lost Time:	0.050
	TH	1.00	336	1,600	0.234 *		
	LT	0.00	27	1,600	0.017		
Eastbound	RT	0.00	20	0	0.000	ICU:	0.536
	TH	1.00	5	1,600	0.024		
	LT	0.00	13	1,600	0.008 *	LOS:	A

Date/Time: **PM PEAK HOUR (4:45-5:45)**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	16	0	0.000	N-S(1):	0.233
	TH	1.00	515	1,600	0.352 *	N-S(2):	0.358 *
	LT	0.00	32	1,600	0.020	E-W(1):	0.116 *
Westbound	RT	0.00	38	0	0.000	E-W(2):	0.062
	TH	1.00	6	1,600	0.047		
	LT	0.00	31	1,600	0.019 *	V/C:	0.474
Northbound	RT	0.00	50	0	0.000	Lost Time:	0.050
	TH	1.00	281	1,600	0.213		
	LT	0.00	10	1,600	0.006 *		
Eastbound	RT	0.00	38	0	0.000	ICU:	0.524
	TH	1.00	93	1,600	0.097 *		
	LT	0.00	24	1,600	0.015	LOS:	A

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **7. Lake Avenue & California Boulevard**
Description: **EXISTING CONDITIONS**

Date/Time: **AM PEAK HOUR (7:45-8:45)**

Thru Lane:	1700 vph	N-S Split Phase :	N
Left Lane:	1700 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	178	1,700	0.004	N-S(1):	0.366 *
	TH	1.00	393	1,700	0.231	N-S(2):	0.325
	LT	1.00	72	1,700	0.042 *	E-W(1):	0.404
Westbound	RT	1.00	86	1,700	0.008	E-W(2):	0.540 *
	TH	1.00	747	1,700	0.439 *		
	LT	1.00	49	1,700	0.029	V/C:	0.906
Northbound	RT	1.00	58	1,700	0.005	Lost Time:	0.050
	TH	1.00	551	1,700	0.324 *		
	LT	1.00	160	1,700	0.094		
Eastbound	RT	1.00	109	1,700	0.000	ICU:	0.956
	TH	1.00	638	1,700	0.375		
	LT	1.00	171	1,700	0.101 *	LOS:	E

Date/Time: **PM PEAK HOUR (4:45-5:45)**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	381	1,700	0.126	N-S(1):	0.382
	TH	1.00	568	1,700	0.334 *	N-S(2):	0.433 *
	LT	1.00	121	1,700	0.071	E-W(1):	0.472 *
Westbound	RT	1.00	56	1,700	0.000	E-W(2):	0.382
	TH	1.00	482	1,700	0.284		
	LT	1.00	105	1,700	0.062 *	V/C:	0.905
Northbound	RT	1.00	136	1,700	0.018	Lost Time:	0.050
	TH	1.00	528	1,700	0.311		
	LT	1.00	169	1,700	0.099 *		
Eastbound	RT	1.00	120	1,700	0.000	ICU:	0.955
	TH	1.00	697	1,700	0.410 *		
	LT	1.00	166	1,700	0.098	LOS:	E

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **8. Wilson Avenue & California Boulevard**
Description: **EXISTING CONDITIONS**

Date/Time: **AM PEAK HOUR (7:30-8:30)**

Thru Lane:	1700 vph	N-S Split Phase :	N
Left Lane:	1700 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	46	0	0.000	N-S(1):	0.143
	TH	1.00	221	1,700	0.173 *	N-S(2):	0.196 *
	LT	0.00	27	1,700	0.016	E-W(1):	0.330
Westbound	RT	1.00	66	1,700	0.023	E-W(2):	0.490 *
	TH	1.00	769	1,700	0.452 *		
	LT	1.00	102	1,700	0.060	V/C:	0.686
Northbound	RT	0.00	59	0	0.000	Lost Time:	0.050
	TH	1.00	118	1,700	0.127		
	LT	0.00	39	1,700	0.023 *		
Eastbound	RT	1.00	111	1,700	0.042	ICU:	0.736
	TH	1.00	459	1,700	0.270		
	LT	1.00	64	1,700	0.038 *	LOS:	C

Date/Time: **PM PEAK HOUR (4:30-5:30)**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	73	0	0.000	N-S(1):	0.170
	TH	1.00	144	1,700	0.179 *	N-S(2):	0.205 *
	LT	0.00	88	1,700	0.052	E-W(1):	0.560 *
Westbound	RT	1.00	57	1,700	0.000	E-W(2):	0.361
	TH	1.00	539	1,700	0.317		
	LT	1.00	53	1,700	0.031 *	V/C:	0.765
Northbound	RT	0.00	63	0	0.000	Lost Time:	0.050
	TH	1.00	92	1,700	0.118		
	LT	0.00	45	1,700	0.026 *		
Eastbound	RT	1.00	20	1,700	0.000	ICU:	0.815
	TH	1.00	900	1,700	0.529 *		
	LT	1.00	74	1,700	0.044	LOS:	D

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **9. Hill Aveune & California Boulevard**
Description: **EXISTING CONDITIONS**

Date/Time: **AM PEAK HOUR (7:45-8:45)**

Thru Lane:	1700 vph	N-S Split Phase :	N
Left Lane:	1700 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	205	0	0.000	N-S(1):	0.086
	TH	1.00	71	1,700	0.202 *	N-S(2):	0.206 *
	LT	0.00	67	1,700	0.039	E-W(1):	0.283
Westbound	RT	1.00	195	1,700	0.075	E-W(2):	0.513 *
	TH	1.00	747	1,700	0.439 *		
	LT	1.00	23	1,700	0.014	V/C:	0.719
Northbound	RT	0.00	4	0	0.000	Lost Time:	0.050
	TH	1.00	69	1,700	0.047		
	LT	0.00	7	1,700	0.004 *		
Eastbound	RT	0.00	10	0	0.000	ICU:	0.769
	TH	1.00	447	1,700	0.269		
	LT	1.00	126	1,700	0.074 *	LOS:	C

Date/Time: **PM PEAK HOUR (4:15-5:15)**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	170	0	0.000	N-S(1):	0.233
	TH	1.00	103	1,700	0.341 *	N-S(2):	0.344 *
	LT	0.00	307	1,700	0.181	E-W(1):	0.507 *
Westbound	RT	1.00	66	1,700	0.000	E-W(2):	0.397
	TH	1.00	452	1,700	0.266		
	LT	1.00	7	1,700	0.004 *	V/C:	0.851
Northbound	RT	0.00	7	0	0.000	Lost Time:	0.050
	TH	1.00	77	1,700	0.052		
	LT	0.00	5	1,700	0.003 *		
Eastbound	RT	0.00	8	0	0.000	ICU:	0.901
	TH	1.00	847	1,700	0.503 *		
	LT	1.00	222	1,700	0.131	LOS:	E

* - Denotes critical movement

CUMULATIVE BASE CONDITIONS

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **1. Lake Avenue & Del Mar Boulevard**
Description: **CUMULATIVE BASE CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1820 vph	N-S Split Phase :	N
Left Lane:	1820 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	248	1,820	0.026	N-S(1):	0.267 *
	TH	2.00	674	3,640	0.185	N-S(2):	0.260
	LT	1.00	85	1,820	0.047 *	E-W(1):	0.181
Westbound	RT	1.00	106	1,820	0.012	E-W(2):	0.389 *
	TH	2.00	1,014	3,640	0.279 *		
	LT	1.00	67	1,820	0.037	V/C:	0.656
Northbound	RT	0.00	101	0	0.000	Lost Time:	0.050
	TH	2.00	699	3,640	0.220 *		
	LT	1.00	137	1,820	0.075		
Eastbound	RT	1.00	87	1,820	0.000	ICU:	0.706
	TH	2.00	523	3,640	0.144		
	LT	1.00	200	1,820	0.110 *	LOS:	C

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	210	1,820	0.039	N-S(1):	0.338
	TH	2.00	962	3,640	0.264 *	N-S(2):	0.346 *
	LT	1.00	218	1,820	0.120	E-W(1):	0.418 *
Westbound	RT	1.00	105	1,820	0.000	E-W(2):	0.310
	TH	2.00	852	3,640	0.234		
	LT	1.00	126	1,820	0.069 *	V/C:	0.764
Northbound	RT	0.00	105	0	0.000	Lost Time:	0.050
	TH	2.00	689	3,640	0.218		
	LT	1.00	149	1,820	0.082 *		
Eastbound	RT	1.00	161	1,820	0.007	ICU:	0.814
	TH	2.00	1,269	3,640	0.349 *		
	LT	1.00	139	1,820	0.076	LOS:	D

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **2. Wilson Avenue & Del Mar Boulevard**
Description: **CUMULATIVE BASE CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1820 vph	N-S Split Phase :	N
Left Lane:	1820 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	55	0	0.000	N-S(1):	0.156 *
	TH	1.00	151	1,820	0.135	N-S(2):	0.154
	LT	0.00	39	1,820	0.021 *	E-W(1):	0.243
Westbound	RT	0.00	36	0	0.000	E-W(2):	0.364 *
	TH	2.00	1,169	3,640	0.331 *		
	LT	1.00	132	1,820	0.073	V/C:	0.520
Northbound	RT	0.00	65	0	0.000	Lost Time:	0.050
	TH	1.00	146	1,820	0.135 *		
	LT	0.00	35	1,820	0.019		
Eastbound	RT	0.00	29	0	0.000	ICU:	0.570
	TH	2.00	588	3,640	0.170		
	LT	1.00	60	1,820	0.033 *	LOS:	A

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	117	0	0.000	N-S(1):	0.185
	TH	1.00	196	1,820	0.227 *	N-S(2):	0.244 *
	LT	0.00	101	1,820	0.055	E-W(1):	0.432 *
Westbound	RT	0.00	33	0	0.000	E-W(2):	0.283
	TH	2.00	840	3,640	0.240		
	LT	1.00	50	1,820	0.027 *	V/C:	0.676
Northbound	RT	0.00	37	0	0.000	Lost Time:	0.050
	TH	1.00	169	1,820	0.130		
	LT	0.00	31	1,820	0.017 *		
Eastbound	RT	0.00	66	0	0.000	ICU:	0.726
	TH	2.00	1,408	3,640	0.405 *		
	LT	1.00	78	1,820	0.043	LOS:	C

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **3. Chester Avenue & Del Mar Boulevard**
Description: **CUMULATIVE BASE CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1820 vph	N-S Split Phase :	N
Left Lane:	1820 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	17	0	0.000	N-S(1):	0.021
	TH	1.00	12	1,820	0.023 *	N-S(2):	0.028 *
	LT	0.00	12	1,820	0.007	E-W(1):	0.228
Westbound	RT	0.00	39	0	0.000	E-W(2):	0.391 *
	TH	2.00	1,352	3,640	0.382 *		
	LT	1.00	60	1,820	0.033	V/C:	0.419
Northbound	RT	0.00	7	0	0.000	Lost Time:	0.050
	TH	1.00	10	1,820	0.014		
	LT	0.00	9	1,820	0.005 *		
Eastbound	RT	0.00	18	0	0.000	ICU:	0.469
	TH	2.00	693	3,640	0.195		
	LT	1.00	17	1,820	0.009 *	LOS:	A

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	25	0	0.000	N-S(1):	0.069 *
	TH	1.00	8	1,820	0.043	N-S(2):	0.059
	LT	0.00	46	1,820	0.025 *	E-W(1):	0.432 *
Westbound	RT	0.00	14	0	0.000	E-W(2):	0.265
	TH	2.00	897	3,640	0.250		
	LT	1.00	12	1,820	0.007 *	V/C:	0.501
Northbound	RT	0.00	41	0	0.000	Lost Time:	0.050
	TH	1.00	9	1,820	0.044 *		
	LT	0.00	30	1,820	0.016		
Eastbound	RT	0.00	16	0	0.000	ICU:	0.551
	TH	2.00	1,532	3,640	0.425 *		
	LT	1.00	28	1,820	0.015	LOS:	A

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **4. Hill Avenue & Del Mar Boulevard**
Description: **CUMULATIVE BASE CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1820 vph	N-S Split Phase :	N
Left Lane:	1820 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	272	0	0.000	N-S(1):	0.253
	TH	2.00	338	3,640	0.168 *	N-S(2):	0.259 *
	LT	1.00	177	1,820	0.097	E-W(1):	0.188
Westbound	RT	1.00	359	1,820	0.100	E-W(2):	0.332 *
	TH	2.00	998	3,640	0.274 *		
	LT	1.00	68	1,820	0.037	V/C:	0.591
Northbound	RT	0.00	30	0	0.000	Lost Time:	0.050
	TH	2.00	538	3,640	0.156		
	LT	1.00	166	1,820	0.091 *		
Eastbound	RT	0.00	36	0	0.000	ICU:	0.641
	TH	2.00	513	3,640	0.151		
	LT	1.00	105	1,820	0.058 *	LOS:	B

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	115	0	0.000	N-S(1):	0.355 *
	TH	2.00	454	3,640	0.156	N-S(2):	0.185
	LT	1.00	454	1,820	0.249 *	E-W(1):	0.443 *
Westbound	RT	1.00	180	1,820	0.000	E-W(2):	0.306
	TH	2.00	742	3,640	0.204		
	LT	1.00	76	1,820	0.042 *	V/C:	0.798
Northbound	RT	0.00	58	0	0.000	Lost Time:	0.050
	TH	2.00	327	3,640	0.106 *		
	LT	1.00	52	1,820	0.029		
Eastbound	RT	0.00	60	0	0.000	ICU:	0.848
	TH	2.00	1,398	3,640	0.401 *		
	LT	1.00	186	1,820	0.102	LOS:	D

* - Denotes critical movement

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #5 Wilson & San Pasqual

Cycle (sec):	100	Critical Vol./Cap. (X):	0.396
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh):	9.6
Optimal Cycle:	0	Level Of Service:	A

Street Name:	Wilson Avenue						San Pasqual Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1	0	0 0	0	0	0 1 0	0	0	1! 0	0	0	0 0 0
Volume Module:												
Base Vol:	40	227	0	0	308	26	23	0	19	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	40	227	0	0	308	26	23	0	19	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	40	227	0	0	308	26	23	0	19	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	40	227	0	0	308	26	23	0	19	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	40	227	0	0	308	26	23	0	19	0	0	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.15	0.85	0.00	0.00	0.92	0.08	0.55	0.00	0.45	0.00	0.00	0.00
Final Sat.:	122	692	0	0	777	66	363	0	300	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.33	0.33	xxxx	xxxx	0.40	0.40	0.06	xxxx	0.06	xxxx	xxxx	xxxx
Crit Moves:	****				****		****					
Delay/Veh:	9.4	9.4	0.0	0.0	9.9	9.9	8.2	0.0	8.2	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	9.4	9.4	0.0	0.0	9.9	9.9	8.2	0.0	8.2	0.0	0.0	0.0
LOS by Move:	A	A	*	*	A	A	A	*	A	*	*	*
ApproachDel:	9.4			9.9			8.2			xxxxxx		
Delay Adj:	1.00			1.00			1.00			xxxxx		
ApprAdjDel:	9.4			9.9			8.2			xxxxxx		
LOS by Appr:	A			A			A			*		

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #5 Wilson & San Pasqual

Cycle (sec):	100	Critical Vol./Cap. (X):	0.426
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh):	9.7
Optimal Cycle:	0	Level Of Service:	A

Street Name:	Wilson Avenue						San Pasqual Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1	0	0 0	0	0 0	0 1	0	0 0	1! 0	0	0 0	0 0 0
Volume Module:												
Base Vol:	25	232	0	0	306	54	25	0	29	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	25	232	0	0	306	54	25	0	29	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	25	232	0	0	306	54	25	0	29	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	25	232	0	0	306	54	25	0	29	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	25	232	0	0	306	54	25	0	29	0	0	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.10	0.90	0.00	0.00	0.85	0.15	0.46	0.00	0.54	0.00	0.00	0.00
Final Sat.:	78	725	0	0	718	127	308	0	358	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.32	0.32	xxxx	xxxx	0.43	0.43	0.08	xxxx	0.08	xxxx	xxxx	xxxx
Crit Moves:	****				****		****					
Delay/Veh:	9.4	9.4	0.0	0.0	10.2	10.2	8.3	0.0	8.3	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	9.4	9.4	0.0	0.0	10.2	10.2	8.3	0.0	8.3	0.0	0.0	0.0
LOS by Move:	A	A	*	*	B	B	A	*	A	*	*	*
ApproachDel:	9.4			10.2			8.3			xxxxxx		
Delay Adj:	1.00			1.00			1.00			xxxxx		
ApprAdjDel:	9.4			10.2			8.3			xxxxxx		
LOS by Appr:	A			B			A			*		

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **6. Hill Avenue & San Pasqual Street**
Description: **CUMULATIVE BASE CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1785 vph	N-S Split Phase :	N
Left Lane:	1785 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	14	0	0.000	N-S(1):	0.263 *
	TH	1.00	367	1,785	0.229	N-S(2):	0.244
	LT	0.00	28	1,785	0.016 *	E-W(1):	0.051
Westbound	RT	0.00	320	0	0.000	E-W(2):	0.240 *
	TH	1.00	39	1,785	0.234 *		
	LT	0.00	59	1,785	0.033	V/C:	0.503
Northbound	RT	0.00	14	0	0.000	Lost Time:	0.050
	TH	1.00	401	1,785	0.247 *		
	LT	0.00	26	1,785	0.015		
Eastbound	RT	0.00	18	0	0.000	ICU:	0.553
	TH	1.00	5	1,785	0.018		
	LT	0.00	10	1,785	0.006 *	LOS:	A

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	15	0	0.000	N-S(1):	0.252
	TH	1.00	615	1,785	0.374 *	N-S(2):	0.379 *
	LT	0.00	37	1,785	0.021	E-W(1):	0.108 *
Westbound	RT	0.00	40	0	0.000	E-W(2):	0.061
	TH	1.00	6	1,785	0.048		
	LT	0.00	40	1,785	0.022 *	V/C:	0.487
Northbound	RT	0.00	58	0	0.000	Lost Time:	0.050
	TH	1.00	345	1,785	0.231		
	LT	0.00	9	1,785	0.005 *		
Eastbound	RT	0.00	33	0	0.000	ICU:	0.537
	TH	1.00	98	1,785	0.086 *		
	LT	0.00	23	1,785	0.013	LOS:	A

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **7. Lake Avenue & California Boulevard**
Description: **CUMULATIVE BASE CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1785 vph	N-S Split Phase :	N
Left Lane:	1785 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	232	1,785	0.008	N-S(1):	0.425 *
	TH	1.00	486	1,785	0.272	N-S(2):	0.379
	LT	1.00	101	1,785	0.057 *	E-W(1):	0.468
Westbound	RT	1.00	114	1,785	0.007	E-W(2):	0.621 *
	TH	1.00	890	1,785	0.499 *		
	LT	1.00	60	1,785	0.034	V/C:	1.046
Northbound	RT	1.00	71	1,785	0.006	Lost Time:	0.050
	TH	1.00	657	1,785	0.368 *		
	LT	1.00	191	1,785	0.107		
Eastbound	RT	1.00	128	1,785	0.000	ICU:	1.096
	TH	1.00	774	1,785	0.434		
	LT	1.00	217	1,785	0.122 *	LOS:	F

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	467	1,785	0.138	N-S(1):	0.445
	TH	1.00	681	1,785	0.382 *	N-S(2):	0.493 *
	LT	1.00	158	1,785	0.089	E-W(1):	0.548 *
Westbound	RT	1.00	93	1,785	0.000	E-W(2):	0.456
	TH	1.00	594	1,785	0.333		
	LT	1.00	122	1,785	0.068 *	V/C:	1.041
Northbound	RT	1.00	159	1,785	0.021	Lost Time:	0.050
	TH	1.00	635	1,785	0.356		
	LT	1.00	199	1,785	0.111 *		
Eastbound	RT	1.00	148	1,785	0.000	ICU:	1.091
	TH	1.00	857	1,785	0.480 *		
	LT	1.00	220	1,785	0.123	LOS:	F

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **8. Wilson Avenue & California Boulevard**
Description: **CUMULATIVE BASE CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1785 vph	N-S Split Phase :	N
Left Lane:	1785 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	49	0	0.000	N-S(1):	0.168
	TH	1.00	254	1,785	0.170 *	N-S(2):	0.195 *
	LT	1.00	51	1,785	0.029	E-W(1):	0.399
Westbound	RT	1.00	75	1,785	0.013	E-W(2):	0.563 *
	TH	1.00	937	1,785	0.525 *		
	LT	1.00	117	1,785	0.066	V/C:	0.758
Northbound	RT	0.00	69	0	0.000	Lost Time:	0.050
	TH	1.00	135	1,785	0.139		
	LT	0.00	45	1,785	0.025 *		
Eastbound	RT	1.00	128	1,785	0.046	ICU:	0.808
	TH	1.00	595	1,785	0.333		
	LT	1.00	68	1,785	0.038 *	LOS:	D

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	84	0	0.000	N-S(1):	0.187 *
	TH	1.00	166	1,785	0.140	N-S(2):	0.169
	LT	1.00	103	1,785	0.058 *	E-W(1):	0.662 *
Westbound	RT	1.00	81	1,785	0.000	E-W(2):	0.434
	TH	1.00	690	1,785	0.387		
	LT	1.00	68	1,785	0.038 *	V/C:	0.849
Northbound	RT	0.00	72	0	0.000	Lost Time:	0.050
	TH	1.00	106	1,785	0.129 *		
	LT	0.00	52	1,785	0.029		
Eastbound	RT	1.00	23	1,785	0.000	ICU:	0.899
	TH	1.00	1,113	1,785	0.624 *		
	LT	1.00	84	1,785	0.047	LOS:	D

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **9. Hill Aveune & California Boulevard**
Description: **CUMULATIVE BASE CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1785 vph	N-S Split Phase :	N
Left Lane:	1785 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	243	0	0.000	N-S(1):	0.097
	TH	1.00	82	1,785	0.182 *	N-S(2):	0.186 *
	LT	1.00	81	1,785	0.045	E-W(1):	0.338
Westbound	RT	1.00	223	1,785	0.080	E-W(2):	0.600 *
	TH	1.00	913	1,785	0.511 *		
	LT	1.00	26	1,785	0.015	V/C:	0.786
Northbound	RT	0.00	5	0	0.000	Lost Time:	0.050
	TH	1.00	79	1,785	0.052		
	LT	0.00	8	1,785	0.004 *		
Eastbound	RT	0.00	14	0	0.000	ICU:	0.836
	TH	1.00	562	1,785	0.323		
	LT	1.00	159	1,785	0.089 *	LOS:	D

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	222	0	0.000	N-S(1):	0.251 *
	TH	1.00	115	1,785	0.189	N-S(2):	0.193
	LT	1.00	347	1,785	0.194 *	E-W(1):	0.597 *
Westbound	RT	1.00	76	1,785	0.000	E-W(2):	0.479
	TH	1.00	579	1,785	0.324		
	LT	1.00	8	1,785	0.004 *	V/C:	0.848
Northbound	RT	0.00	8	0	0.000	Lost Time:	0.050
	TH	1.00	87	1,785	0.057 *		
	LT	0.00	7	1,785	0.004		
Eastbound	RT	0.00	13	0	0.000	ICU:	0.898
	TH	1.00	1,046	1,785	0.593 *		
	LT	1.00	276	1,785	0.155	LOS:	D

* - Denotes critical movement

CUMULATIVE PLUS PROJECT CONDITIONS

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **1. Lake Avenue & Del Mar Boulevard**
Description: **CUMULATIVE BASE PLUS PROJECT CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1820 vph	N-S Split Phase :	N
Left Lane:	1820 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	248	1,820	0.026	N-S(1):	0.269 *
	TH	2.00	682	3,640	0.187	N-S(2):	0.262
	LT	1.00	88	1,820	0.048 *	E-W(1):	0.183
Westbound	RT	1.00	107	1,820	0.010	E-W(2):	0.390 *
	TH	2.00	1,018	3,640	0.280 *		
	LT	1.00	67	1,820	0.037	V/C:	0.659
Northbound	RT	0.00	101	0	0.000	Lost Time:	0.050
	TH	2.00	702	3,640	0.221 *		
	LT	1.00	137	1,820	0.075		
Eastbound	RT	1.00	87	1,820	0.000	ICU:	0.709
	TH	2.00	532	3,640	0.146		
	LT	1.00	200	1,820	0.110 *	LOS:	C

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	210	1,820	0.039	N-S(1):	0.341
	TH	2.00	965	3,640	0.265 *	N-S(2):	0.347 *
	LT	1.00	220	1,820	0.121	E-W(1):	0.419 *
Westbound	RT	1.00	108	1,820	0.000	E-W(2):	0.313
	TH	2.00	861	3,640	0.237		
	LT	1.00	126	1,820	0.069 *	V/C:	0.766
Northbound	RT	0.00	105	0	0.000	Lost Time:	0.050
	TH	2.00	697	3,640	0.220		
	LT	1.00	149	1,820	0.082 *		
Eastbound	RT	1.00	161	1,820	0.007	ICU:	0.816
	TH	2.00	1,273	3,640	0.350 *		
	LT	1.00	139	1,820	0.076	LOS:	D

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **2. Wilson Avenue & Del Mar Boulevard**
Description: **CUMULATIVE BASE PLUS PROJECT CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1820 vph	N-S Split Phase :	N
Left Lane:	1820 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	55	0	0.000	N-S(1):	0.159 *
	TH	1.00	158	1,820	0.138	N-S(2):	0.158
	LT	0.00	39	1,820	0.021 *	E-W(1):	0.246
Westbound	RT	0.00	36	0	0.000	E-W(2):	0.365 *
	TH	2.00	1,171	3,640	0.332 *		
	LT	1.00	132	1,820	0.073	V/C:	0.524
Northbound	RT	0.00	65	0	0.000	Lost Time:	0.050
	TH	1.00	149	1,820	0.138 *		
	LT	0.00	37	1,820	0.020		
Eastbound	RT	0.00	36	0	0.000	ICU:	0.574
	TH	2.00	593	3,640	0.173		
	LT	1.00	60	1,820	0.033 *	LOS:	A

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	117	0	0.000	N-S(1):	0.193
	TH	1.00	198	1,820	0.229 *	N-S(2):	0.250 *
	LT	0.00	101	1,820	0.055	E-W(1):	0.433 *
Westbound	RT	0.00	33	0	0.000	E-W(2):	0.284
	TH	2.00	845	3,640	0.241		
	LT	1.00	50	1,820	0.027 *	V/C:	0.683
Northbound	RT	0.00	37	0	0.000	Lost Time:	0.050
	TH	1.00	176	1,820	0.138		
	LT	0.00	38	1,820	0.021 *		
Eastbound	RT	0.00	68	0	0.000	ICU:	0.733
	TH	2.00	1,410	3,640	0.406 *		
	LT	1.00	78	1,820	0.043	LOS:	C

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **3. Chester Avenue & Del Mar Boulevard**
Description: **CUMULATIVE BASE PLUS PROJECT CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1820 vph	N-S Split Phase :	N
Left Lane:	1820 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	17	0	0.000	N-S(1):	0.022
	TH	1.00	12	1,820	0.023 *	N-S(2):	0.028 *
	LT	0.00	12	1,820	0.007	E-W(1):	0.232
Westbound	RT	0.00	39	0	0.000	E-W(2):	0.392 *
	TH	2.00	1,355	3,640	0.383 *		
	LT	1.00	63	1,820	0.035	V/C:	0.420
Northbound	RT	0.00	8	0	0.000	Lost Time:	0.050
	TH	1.00	10	1,820	0.015		
	LT	0.00	10	1,820	0.005 *		
Eastbound	RT	0.00	21	0	0.000	ICU:	0.470
	TH	2.00	696	3,640	0.197		
	LT	1.00	17	1,820	0.009 *	LOS:	A

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	25	0	0.000	N-S(1):	0.072 *
	TH	1.00	8	1,820	0.043	N-S(2):	0.061
	LT	0.00	46	1,820	0.025 *	E-W(1):	0.433 *
Westbound	RT	0.00	14	0	0.000	E-W(2):	0.266
	TH	2.00	900	3,640	0.251		
	LT	1.00	13	1,820	0.007 *	V/C:	0.505
Northbound	RT	0.00	44	0	0.000	Lost Time:	0.050
	TH	1.00	9	1,820	0.047 *		
	LT	0.00	33	1,820	0.018		
Eastbound	RT	0.00	17	0	0.000	ICU:	0.555
	TH	2.00	1,535	3,640	0.426 *		
	LT	1.00	28	1,820	0.015	LOS:	A

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **4. Hill Avenue & Del Mar Boulevard**
Description: **CUMULATIVE BASE PLUS PROJECT CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1820 vph	N-S Split Phase :	N
Left Lane:	1820 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	279	0	0.000	N-S(1):	0.254
	TH	2.00	348	3,640	0.172 *	N-S(2):	0.263 *
	LT	1.00	177	1,820	0.097	E-W(1):	0.190
Westbound	RT	1.00	359	1,820	0.100	E-W(2):	0.336 *
	TH	2.00	1,009	3,640	0.277 *		
	LT	1.00	70	1,820	0.038	V/C:	0.599
Northbound	RT	0.00	31	0	0.000	Lost Time:	0.050
	TH	2.00	541	3,640	0.157		
	LT	1.00	166	1,820	0.091 *		
Eastbound	RT	0.00	36	0	0.000	ICU:	0.649
	TH	2.00	517	3,640	0.152		
	LT	1.00	108	1,820	0.059 *	LOS:	B

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	118	0	0.000	N-S(1):	0.358 *
	TH	2.00	457	3,640	0.158	N-S(2):	0.187
	LT	1.00	454	1,820	0.249 *	E-W(1):	0.446 *
Westbound	RT	1.00	180	1,820	0.000	E-W(2):	0.311
	TH	2.00	746	3,640	0.205		
	LT	1.00	77	1,820	0.042 *	V/C:	0.804
Northbound	RT	0.00	60	0	0.000	Lost Time:	0.050
	TH	2.00	337	3,640	0.109 *		
	LT	1.00	52	1,820	0.029		
Eastbound	RT	0.00	60	0	0.000	ICU:	0.854
	TH	2.00	1,409	3,640	0.404 *		
	LT	1.00	193	1,820	0.106	LOS:	D

* - Denotes critical movement

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #5 Wilson & San Pasqual

Cycle (sec):	100	Critical Vol./Cap. (X):	0.410
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh):	9.8
Optimal Cycle:	0	Level Of Service:	A

Street Name:	Wilson Avenue						San Pasqual Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1	0	0 0	0	0	0 1	0	0	1! 0	0	0	0 0 0
Volume Module:												
Base Vol:	48	232	0	0	312	31	25	0	22	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	48	232	0	0	312	31	25	0	22	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	48	232	0	0	312	31	25	0	22	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	48	232	0	0	312	31	25	0	22	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	48	232	0	0	312	31	25	0	22	0	0	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.17	0.83	0.00	0.00	0.91	0.09	0.53	0.00	0.47	0.00	0.00	0.00
Final Sat.:	139	670	0	0	761	76	350	0	308	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.35	0.35	xxxx	xxxx	0.41	0.41	0.07	xxxx	0.07	xxxx	xxxx	xxxx
Crit Moves:	****					****	****					
Delay/Veh:	9.6	9.6	0.0	0.0	10.1	10.1	8.3	0.0	8.3	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	9.6	9.6	0.0	0.0	10.1	10.1	8.3	0.0	8.3	0.0	0.0	0.0
LOS by Move:	A	A	*	*	B	B	A	*	A	*	*	*
ApproachDel:	9.6			10.1			8.3			xxxxxx		
Delay Adj:	1.00			1.00			1.00			xxxxx		
ApprAdjDel:	9.6			10.1			8.3			xxxxxx		
LOS by Appr:	A			B			A			*		

CALTECH MASTERPLAN EIR

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #5 Wilson & San Pasqual

Cycle (sec):	100	Critical Vol./Cap. (X):	0.441
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh):	9.9
Optimal Cycle:	0	Level Of Service:	A

Street Name:	Wilson Avenue						San Pasqual Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1	0	0 0	0	0 0	0 1	0	0 0	1! 0	0	0 0	0 0 0
Volume Module:												
Base Vol:	28	236	0	0	312	56	30	0	37	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	28	236	0	0	312	56	30	0	37	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	28	236	0	0	312	56	30	0	37	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	28	236	0	0	312	56	30	0	37	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	28	236	0	0	312	56	30	0	37	0	0	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.11	0.89	0.00	0.00	0.85	0.15	0.45	0.00	0.55	0.00	0.00	0.00
Final Sat.:	84	709	0	0	708	127	297	0	367	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.33	0.33	xxxx	xxxx	0.44	0.44	0.10	xxxx	0.10	xxxx	xxxx	xxxx
Crit Moves:	****				****		****					
Delay/Veh:	9.6	9.6	0.0	0.0	10.5	10.5	8.4	0.0	8.4	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	9.6	9.6	0.0	0.0	10.5	10.5	8.4	0.0	8.4	0.0	0.0	0.0
LOS by Move:	A	A	*	*	B	B	A	*	A	*	*	*
ApproachDel:	9.6			10.5			8.4			xxxxxx		
Delay Adj:	1.00			1.00			1.00			xxxxx		
ApprAdjDel:	9.6			10.5			8.4			xxxxxx		
LOS by Appr:	A			B			A			*		

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **6. Hill Avenue & San Pasqual Street**
Description: **CUMULATIVE BASE PLUS PROJECT CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1785 vph	N-S Split Phase :	N
Left Lane:	1785 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	18	0	0.000	N-S(1):	0.273 *
	TH	1.00	376	1,785	0.236	N-S(2):	0.256
	LT	0.00	28	1,785	0.016 *	E-W(1):	0.055
Westbound	RT	0.00	324	0	0.000	E-W(2):	0.243 *
	TH	1.00	39	1,785	0.236 *		
	LT	0.00	59	1,785	0.033	V/C:	0.516
Northbound	RT	0.00	14	0	0.000	Lost Time:	0.050
	TH	1.00	409	1,785	0.257 *		
	LT	0.00	35	1,785	0.020		
Eastbound	RT	0.00	22	0	0.000	ICU:	0.566
	TH	1.00	6	1,785	0.022		
	LT	0.00	12	1,785	0.007 *	LOS:	A

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	16	0	0.000	N-S(1):	0.259
	TH	1.00	623	1,785	0.379 *	N-S(2):	0.386 *
	LT	0.00	37	1,785	0.021	E-W(1):	0.118 *
Westbound	RT	0.00	42	0	0.000	E-W(2):	0.064
	TH	1.00	6	1,785	0.049		
	LT	0.00	40	1,785	0.022 *	V/C:	0.504
Northbound	RT	0.00	58	0	0.000	Lost Time:	0.050
	TH	1.00	354	1,785	0.238		
	LT	0.00	13	1,785	0.007 *		
Eastbound	RT	0.00	42	0	0.000	ICU:	0.554
	TH	1.00	102	1,785	0.096 *		
	LT	0.00	27	1,785	0.015	LOS:	A

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **7. Lake Avenue & California Boulevard**
Description: **CUMULATIVE BASE PLUS PROJECT CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1785 vph	N-S Split Phase :	N
Left Lane:	1785 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	232	1,785	0.008	N-S(1):	0.429 *
	TH	1.00	486	1,785	0.272	N-S(2):	0.379
	LT	1.00	109	1,785	0.061 *	E-W(1):	0.475
Westbound	RT	1.00	117	1,785	0.004	E-W(2):	0.623 *
	TH	1.00	894	1,785	0.501 *		
	LT	1.00	63	1,785	0.035	V/C:	1.052
Northbound	RT	1.00	78	1,785	0.008	Lost Time:	0.050
	TH	1.00	657	1,785	0.368 *		
	LT	1.00	191	1,785	0.107		
Eastbound	RT	1.00	128	1,785	0.000	ICU:	1.102
	TH	1.00	785	1,785	0.440		
	LT	1.00	217	1,785	0.122 *	LOS:	F

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	467	1,785	0.138	N-S(1):	0.446
	TH	1.00	681	1,785	0.382 *	N-S(2):	0.493 *
	LT	1.00	161	1,785	0.090	E-W(1):	0.554 *
Westbound	RT	1.00	101	1,785	0.000	E-W(2):	0.462
	TH	1.00	605	1,785	0.339		
	LT	1.00	129	1,785	0.072 *	V/C:	1.047
Northbound	RT	1.00	161	1,785	0.018	Lost Time:	0.050
	TH	1.00	635	1,785	0.356		
	LT	1.00	199	1,785	0.111 *		
Eastbound	RT	1.00	148	1,785	0.000	ICU:	1.097
	TH	1.00	861	1,785	0.482 *		
	LT	1.00	220	1,785	0.123	LOS:	F

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **8. Wilson Avenue & California Boulevard**
Description: **CUMULATIVE BASE PLUS PROJECT CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1785 vph	N-S Split Phase :	N
Left Lane:	1785 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	51	0	0.000	N-S(1):	0.171
	TH	1.00	254	1,785	0.171 *	N-S(2):	0.196 *
	LT	1.00	56	1,785	0.031	E-W(1):	0.411
Westbound	RT	1.00	84	1,785	0.016	E-W(2):	0.570 *
	TH	1.00	945	1,785	0.529 *		
	LT	1.00	118	1,785	0.066	V/C:	0.766
Northbound	RT	0.00	70	0	0.000	Lost Time:	0.050
	TH	1.00	135	1,785	0.140		
	LT	0.00	45	1,785	0.025 *		
Eastbound	RT	1.00	128	1,785	0.046	ICU:	0.816
	TH	1.00	616	1,785	0.345		
	LT	1.00	73	1,785	0.041 *	LOS:	D

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	89	0	0.000	N-S(1):	0.191 *
	TH	1.00	166	1,785	0.143	N-S(2):	0.172
	LT	1.00	111	1,785	0.062 *	E-W(1):	0.667 *
Westbound	RT	1.00	86	1,785	0.000	E-W(2):	0.446
	TH	1.00	711	1,785	0.398		
	LT	1.00	69	1,785	0.039 *	V/C:	0.858
Northbound	RT	0.00	73	0	0.000	Lost Time:	0.050
	TH	1.00	106	1,785	0.129 *		
	LT	0.00	52	1,785	0.029		
Eastbound	RT	1.00	23	1,785	0.000	ICU:	0.908
	TH	1.00	1,121	1,785	0.628 *		
	LT	1.00	86	1,785	0.048	LOS:	E

* - Denotes critical movement

Project Title: **CALTECH MASTERPLAN EIR**
Intersection: **9. Hill Aveune & California Boulevard**
Description: **CUMULATIVE BASE PLUS PROJECT CONDITIONS (Year 2015)**

Date/Time: **AM PEAK HOUR**

Thru Lane:	1785 vph	N-S Split Phase :	N
Left Lane:	1785 vph	E-W Split Phase :	N
Double Lt Penalty:	0 %	Lost Time (% of cycle) :	5
ITS:	0 %	V/C Round Off (decs.) :	3

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	253	0	0.000	N-S(1):	0.100
	TH	1.00	82	1,785	0.188 *	N-S(2):	0.192 *
	LT	1.00	85	1,785	0.048	E-W(1):	0.339
Westbound	RT	1.00	233	1,785	0.083	E-W(2):	0.609 *
	TH	1.00	921	1,785	0.516 *		
	LT	1.00	26	1,785	0.015	V/C:	0.801
Northbound	RT	0.00	5	0	0.000	Lost Time:	0.050
	TH	1.00	79	1,785	0.052		
	LT	0.00	8	1,785	0.004 *		
Eastbound	RT	0.00	14	0	0.000	ICU:	0.851
	TH	1.00	565	1,785	0.324		
	LT	1.00	166	1,785	0.093 *	LOS:	D

Date/Time: **PM PEAK HOUR**

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	229	0	0.000	N-S(1):	0.257 *
	TH	1.00	115	1,785	0.193	N-S(2):	0.197
	LT	1.00	357	1,785	0.200 *	E-W(1):	0.602 *
Westbound	RT	1.00	79	1,785	0.000	E-W(2):	0.486
	TH	1.00	582	1,785	0.326		
	LT	1.00	8	1,785	0.004 *	V/C:	0.859
Northbound	RT	0.00	8	0	0.000	Lost Time:	0.050
	TH	1.00	87	1,785	0.057 *		
	LT	0.00	7	1,785	0.004		
Eastbound	RT	0.00	13	0	0.000	ICU:	0.909
	TH	1.00	1,054	1,785	0.598 *		
	LT	1.00	285	1,785	0.160	LOS:	E

* - Denotes critical movement

Appendix E

Initial Study

CITY OF PASADENA
PLANNING DIVISION
HALE BUILDING
175 NORTH GARFIELD AVENUE
PASADENA, CA 91109-7215

0457170

INITIAL STUDY

In accordance with the Environmental Policy Guidelines of the City of Pasadena, this analysis, the associated "Master Application Form," and/or Environmental Assessment Form (EAF) and supporting data constitute the Initial Study for the subject project. This Initial Study provides the assessment for a determination whether the project may have a significant effect on the environment.

SECTION I – PROJECT INFORMATION

1. Project Title: **California Institute of Technology (Caltech) Master Development Plan Amendment**

2. Lead Agency Name and Address: **City of Pasadena**
   Planning and Development Department
   175 North Garfield Avenue
   Pasadena, CA 91109

3. Contact Person and Phone Number: **Lanny Woo**
   (626) 744-6776

4. Project Location: **1200 East California Boulevard**
   On the Caltech campus south of California Boulevard between Arden Road and Wilson Avenue

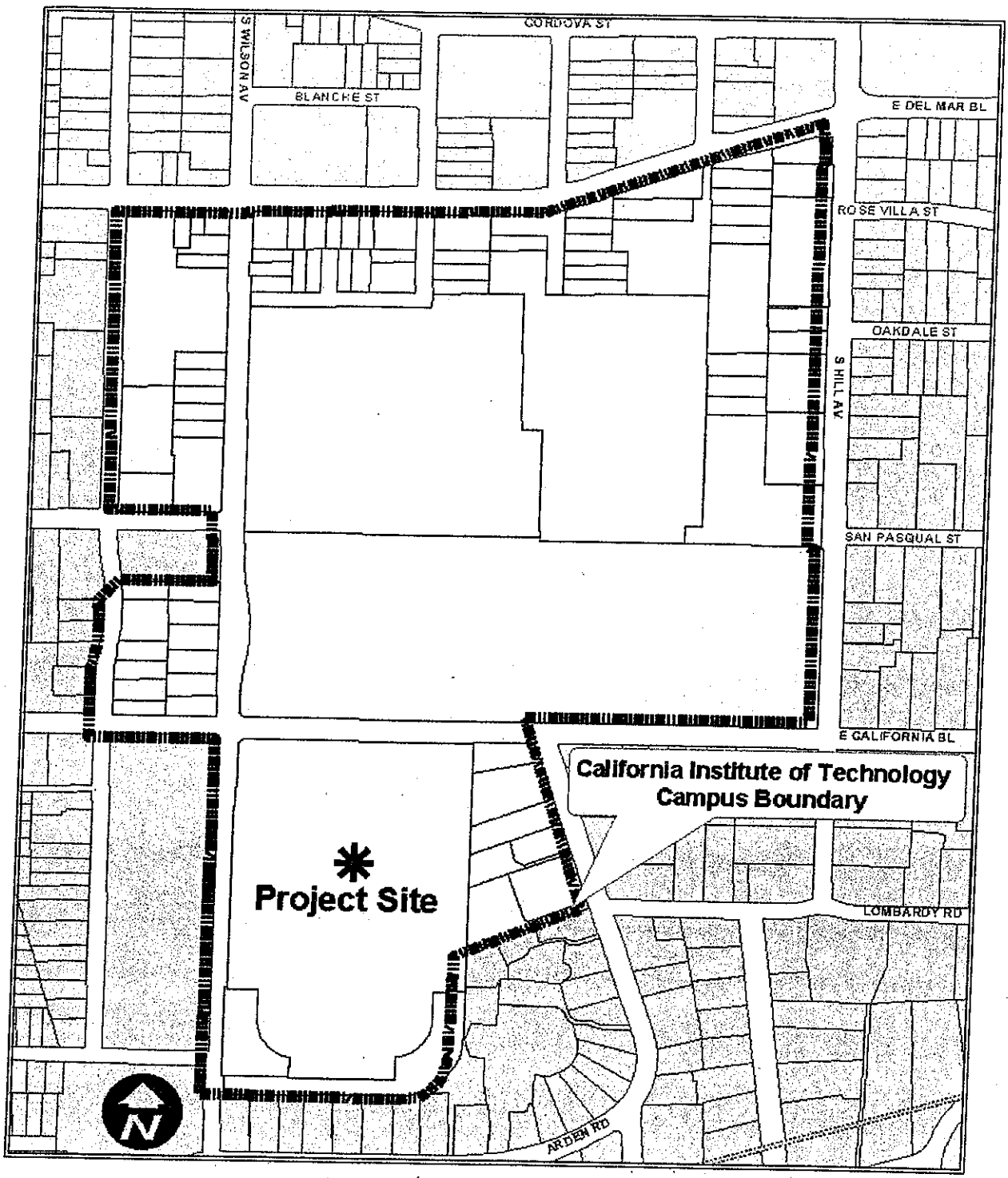
5. Project Sponsor's Name and Address: **California Institute of Technology (Caltech)**
   1200 E. California Boulevard
   Pasadena, CA 91125

6. General Plan Designation: **Institutional**

7. Zoning: **Public and Semi-Public (PS)**

(Pat Gibson
310 354-7663

Figure 1


CORDOVA ST
S WILSON AV
BLANCHE ST
E DEL MAR BL
ROSE VILLA ST
OAKDALE ST
S HILL AV
SAN PASQUAL ST
E CALIFORNIA BL
California Institute of Technology
Campus Boundary
Project Site
LOMBARDY RD
ARDEN RD
N

8. Description of the Project: The City of Pasadena adopted a Master Plan for the California Institute of Technology (Caltech) in 1989, and a subsequent Amended Master Plan in 1995 and 1999. The Master Plan provides for 1.6 million gross square feet of new academic and administrative space in the area north of California Boulevard, and bounded by Holliston Avenue, Wilson Avenue, and Del Mar Boulevard. A smaller area south of California Boulevard and north of the existing playing fields is set aside for limited development of 150,000 square feet of new gross building space, over and which exists at the time of adoption of the Master Plan. This is in addition to new athletic facilities and building additions specified in the Master Plan. The current Caltech Master Plan includes the following sections: Concept, Open-Space Strategy, Landscape Guidelines, Circulation and Parking Strategy, Campus Utilities Strategy, Design Guidelines, and Implementation and Phasing Guidelines. The applicant, Caltech has submitted a Master Development Plan Amendment application to amend the Caltech Master Plan.

The proposed project consists of the following amendments to the Caltech Master Plan:

- Addition of the Following Campus Development Projects, which involve demolition of buildings or setback reduction not provided for in the Master Plan:
    - Chemistry and Chemical Engineering Laboratory
    - North Undergraduate Houses
    - Braun & Marks Graduate Houses
    - Campus Center
- Revisions to the Open-Space Strategy and Design Guidelines for the North Campus Facilities on the East-West Axis
- Revisions to the Design Review thresholds established in the Design Guidelines

These amendments are described below.

Campus Development Projects

Caltech proposes four (4) campus development projects which are described below.

Chemistry and Chemical Engineering Laboratory

1) Caltech proposes to replace the existing Mead Laboratory with a new Chemistry and Chemical Engineering Laboratory (CCE). The proposed building would house Mead Lab's current functions and add supplementary laboratory and office spaces. The existing Mead Lab is a 1-story, 8,000-square foot structure that was built in 1973. The Caltech Master Plan proposes an "envelope" to expand Mead Lab, however, replacement of the lab is not included in the Master Plan.

The proposed Chemistry and Chemical Engineering Laboratory is an 80,000 square foot structure, with three (3) above ground floors and two (2) subterranean levels. The footprint of the proposed structure would encompass the existing Mead lab footprint and the "envelope" for Mead Lab expansion shown in the Master Plan. The height of the proposed structure, as well its setback from Wilson Avenue, would match Braun Laboratory, which is located adjacent to the southerly side of Mead Lab. Portions of the proposed structure would connect to Noyes Laboratory, which is located adjacent to the eastern side of Mead Lab.

North Undergraduate Houses

2) Caltech proposes to replace the existing Lloyd, Page, and Ruddock undergraduate housing buildings and a housing office with a new undergraduate dormitory facility. The existing buildings were constructed in 1960. This project also includes rehabilitating Chandler Dining Hall. The existing 2-story undergraduate housing buildings and housing office total 67,899 square feet. The proposed undergraduate dormitories consist of four (4) connected 3-story houses, courtyards, common areas, offices, and additional kitchen areas to support Chandler Dining Hall. The proposed dormitory facilities total 138,000 square feet of building space, with three (3) above-ground floors and one (1) subterranean level. The proposed dormitory facility will include 273 dorm units, and the footprint of the proposed facility total 38,000 square feet. The Caltech Master Plan listed the Lloyd, Page and Ruddock dormitories as buildings that would remain on the campus; replacement of these facilities was not included in the Master Plan.

Braun and Marks Graduate Houses

3) Caltech proposes to replace the existing Braun and Marks Graduate Houses with a new dormitory. The existing buildings were constructed in 1961. The existing buildings currently house 60 students and total 21,695 square feet of floor space. The proposed dormitory is a 3-story, 55,000 square foot structure with 57 units and will have a 44-foot setback from San Pasqual Street. The Caltech Master Plan listed the Braun and Marks Graduate houses as buildings that would remain on the campus; replacement of these facilities was not included in the Master Plan.

Campus Center

4) Caltech proposes to replace the existing Physical Plant Offices and Shops building with a Campus Center. The existing building is a 1-story, 37,000 square foot building. The proposed Campus Center is a 100,000 square foot structure, with three (3) above ground floors, two (2) subterranean levels, total footprint of 20,000 square feet and a setback of 41 feet from Holliston Avenue. The proposed Campus Center will house multi-purpose student areas, a music hall, music rehearsal and practice facilities, a visitor information center, offices, and a library. The Master Plan established a 60-foot setback for new building along the west side of Holliston Avenue. Caltech proposes a reduced setback (41 feet) for the Campus Center building.

Revisions to the Open Space Strategy and Design Guidelines for the North Campus Facilities on the East-West Axis

Caltech proposes to revise the Master Plan's Open Space Strategy and Design Guidelines for academic facilities for the north Campus facilities on the east-west open space axis. These revisions include altering the plan for the east-west open space axis to modify the arcade dedication and pavilion requirements, and allowing for increase variation in architectural and design techniques.

Revisions to the Design Review Thresholds Established in the Design Guidelines

Caltech proposes to revise the Master Plan's Design Review thresholds to match the City's current design review procedures. The proposed Design Review thresholds are as follows:

- Major exterior alteration or major additions to any existing academic or residential facility visible from the public right-of-way, and new campus facilities with a gross floor area between 25,000 square feet and 70,000 square feet will be subject to design review by the City's Planning Director.

- New campus developments exceeding 70,000 square feet of gross floor area will be subject to design review by the City's Design Commission.

- Major exterior alterations or major additions to the facilities listed in the added Table 13 of the Master Plan will be subject to review by the City's Historic Preservation Commission. In addition, the Secretary of the Interior's Standards for Rehabilitation shall apply to reviews affecting buildings listed in Table 13 of the Master Plan.

  Table 13: "Facilities Where Major External Alterations or Additions will be reviewed by the Historic Preservation Commission", will be added to the Master Plan. This table lists the following structures: South Undergraduate Houses, North Mudd Lab, Robinson Lab, Arms Lab, Gates Annex, Kerckhoff Lab, Crellin Lab, Parsons-Gates, Bridge Labs, Bridge Annex, Dabney Hall, Thomas Lab, Guggenheim Lab, Athenaeum, and Beckman Auditorium.

- Major exterior alterations or major additions to the primary elevations of single-family houses that are visible from Del Mar Boulevard, Wilson Avenue, California Boulevard, Hill Avenue, Catalina Avenue, or Arden Road will be subject to review by the City's Planning Director. Interior alterations or exterior alterations/additions on secondary elevations will not be subject to design review.

Existing Conditions

The Caltech campus encompasses approximately 124 acres. The campus is bounded by Catalina Avenue on the west, Del Mar Boulevard on the north, Hill Avenue on the east, California Boulevard from Hill Avenue to Arden Road on the southeast, and Arden Road, Tournament Park, and Wilson Avenue to the south. The

campus contains a variety of specific uses including academic buildings, administration and support facilities, residences, and athletic facilities. Academic buildings are concentrated in the center of the campus north of California Boulevard and east of Wilson Avenue. Athletic facilities are located south of California Boulevard. Residential uses are found at the campus' edges along Catalina Avenue near Del Mar Boulevard, San Pasqual Street and Holliston Avenue near Hill Avenue, and California Boulevard near Hill Avenue. Homes on the west side of Hill Avenue have been converted to administrative uses.

The campus is bordered on the north and west by two-to three-story apartments and condominiums along the Mentor Avenue-Catalina Avenue and Cordova Street-Del Mar Boulevard corridors. To the south and east of the campus are established single-family neighborhoods that date from the early 1900s. The predominant one-and two-story housing stock in these areas ranges from more modest dwellings on smaller lots near Del Mar Boulevard to much larger homes on estate-sized lots in the southern areas of the City.

An Environmental Impact Report (EIR) for the Caltech Master Plan was approved and certified by the City Council in 1989, and subsequent a Master Development Plan was approved that governs development for the campus. The Master Plan provides for construction of new academic and administrative facilities in two areas of the campus. The majority of construction will be developed between the existing campus and Del Mar Boulevard. A smaller area south of California Boulevard and north of the existing playing fields is set aside for limited development. The total area of new academic and administrative area north of California Boulevard, and bounded by Holliston Avenue, Wilson Avenue, and Del Mar Boulevard, is 1.6 million gross square feet. The maximum site coverage of all buildings, existing and new, within this area is 35%. This figure matches the site coverage of the original campus. The limit established for development of the two building envelopes on the south California Boulevard frontage and north of the playing fields is 150,000 square feet of new gross building space, over and above that which exists at the time of adoption of the Master Plan. This is in addition to new athletic facilities and building additions specified on page 52 of the Caltech Master Plan. As of today, 396,230-square foot of building area has been developed on the north campus of Caltech, with a remainder of 1.2 million gross square feet.

Amendments were made to the Master Plan in 1994 and 1999. The amendments do not affect the foundation of the 1989 Master Plan which includes: total square footage and overall location of development "envelopes"; the total number of beds, 649 beds; strategies for open space; circulation/parking; campus utilities, and design which guide the future development of the Caltech campus.

8. Surrounding Land Uses and Setting: Land uses east of the campus along Hill Avenue are single-family residential units. Single-family residential units are also located along California Boulevard between Hill Avenue and Arden Road, and along Arden Road south of the campus and east of the athletic fields and Tournament Park. West of the athletic fields and south of California Boulevard on Wilson Avenue is an institutional use, Polytechnic School. West of the campus on Catalina Avenue are single-family and multi-family residential uses. North of the campus along Del Mar Boulevard are multi-family uses.

9. Other public agencies whose approval is required (e.g. permits, financing approval, or participation agreement): The Historic Preservation Commission, Transportation Advisory Commission, Design Commission, Planning Commission, and the City Council will review the amendment to the Master Plan. The Historic Preservation Commission, Transportation Advisory Commission, Design Commission, and Planning Commission will make recommendations to the City Council to take final action on the Master Development Plan Amendment. In addition, building permits will be required to be approved by the Planning and Development Department. Approval is also required from the County Sanitation Districts of Los Angeles County.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

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

- X -	Aesthetics		Geology and Soils		Population and Housing
	Agricultural Resources		Hazards and Hazardous Materials		Public Services
- X -	Air Quality		Hydrology and Water Quality		Recreation
- X -	Biological Resources		Land Use and Planning	- X -	Transportation/Traffic
- X -	Cultural Resources		Mineral Resources	- X -	Utilities and Service Systems
	Energy		Noise	- X -	Mandatory Findings of Significance

DETERMINATION: (to be completed by the Lead Agency)

On the basis of this initial evaluation:

I find that the proposed project DOES NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.	
I find that, although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A MITIGATED NEGATIVE DECLARATION will be prepared.	
I find that the proposed project MAY have a significant effect(s) on the environment. Analysis in the Initial Study shows that one or more impact areas will have a "Potentially Significant Impact" An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that were not analyzed in a previously approved EIR or Negative Declaration for the project at hand.	- X -
I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.	

_____ _____

Signature Date

_____ _____

Printed Name For

EVALUATION OF ENVIRONMENTAL IMPACTS:

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

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

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

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Unless Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less than Significant Impact." The Lead Agency must describe the mitigation measures and briefly explain how they reduce the effect to a less than significant level (mitigation measures from Section 20, "Earlier Analysis," may be cross-referenced).

5) Earlier analysis may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. See CEQA Guidelines Section 15063(c)(3)(D). Earlier analyses are discussed in Section 20 at the end of the checklist.

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

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

   c) Mitigation Measures. For effects that are "less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier documents and the extent to which address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated. A source list should be attached and other sources used or individuals contacted should be cited in the discussion.

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

8) The explanation of each issue should identify:

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

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

SECTION II - ENVIRONMENTAL CHECKLIST FORM

1. **BACKGROUND.**
   Date checklist submitted: August 2, 2004
   Department requiring checklist: Planning and Development
   Planner assigned: Lanny Woo

2. **ENVIRONMENTAL IMPACTS.** (explanations of all answers are required):

	Potentially Significant Impact	Significant Unless Mitigation is Incorporated	Less Than Significant Impact	No Impact

3. **AESTHETICS.** Would the project:

   a. *Have a substantial adverse effect on a scenic vista? ( )*

☐	☐	☒	☐

WHY? The proposed project is not located in the vicinity of any scenic vista or scenic highway. None of the potential development under the Master Plan amendment will increase shade or shadow conditions on any surrounding residences. The project will not affect views of the existing residential uses. Currently trees, foliage, and buildings on the Caltech campus block existing views to the mountains. The heights of the proposed development are consistent with the Caltech Master Plan. Impact is considered less than significant; therefore this issue will not be addressed in the EIR.

The project does not impact any scenic vista as defined in the 1994 final EIR for the Land Use and Mobility Elements of the City of Pasadena General Plan.

   b. *Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway? ( )*

☒	☐	☐	☐

WHY? The proposed amendment to the Master Plan and the future development does not substantially impact any scenic resources within a scenic highway corridor. The proposed project would not result in the destruction of any landmark eligible trees, stand of trees, rock outcropping or natural feature recognized as having significant aesthetic value, but however, the proposed amendment to the Master Plan would result in future development that will cause removal of native and specimen trees as specified in the Chapter 8.52 "City Trees and Tree Protection Ordinance" of the Pasadena Municipal Code. On-site trees may be considered an important resource and removal of these trees may have a potentially significant. See also 6.e. This item will be addressed in the EIR.

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

☒	☐	☐	☐

WHY? The proposed project is within the height limitations of the Caltech Master Plan and is required to submit full exterior design elevations and sections and a landscape plan for review and approval by the Zoning Administrator and/or the Design Commission prior to the issuance of any building permits. Approval of the proposed project would not lead to any demonstrable negative aesthetic impact.

The design of this project will be reviewed for approval by the Design Commission. Any negative impacts from the proposed creation of an aesthetically offensive site will be mitigated to a level of insignificance by conditions imposed by the Commission during this review. The project's design will not have significant impacts to the visual quality of the site and surrounding. However, the proposed amendment to the Master Plan would result in future development that will cause removal of native and specimen trees as specified in Chapter 8.52 "City Trees and Tree Protection

Ordinance" of the Pasadena Municipal Code. On-site trees may be considered an important resource. Removal of these trees may be a significant impact to the visual character of the site and surroundings. See also 6.3. This item will be addressed in the EIR.

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

☐ ☐ ☒ ☐

WHY? The project will not have a significant impact on light and glare because it will be required to comply with the standards in the zoning code that regulate glare and outdoor lighting. Height and direction of any outdoor lighting and the screening of mechanical equipment must conform to Zoning Code requirements. The type of hardware shall conform to current policies approved by the City Council, and the locations shall be approved by the Department of Public Works. The project is in an older, developed commercial urban area with streetlights in place. These lights are not sources of glare and are an aide to public safety.

Exterior and interior lights and reflective building materials may be potential sources of light and glare. Use of reflective materials shall conform to Zoning Code requirements and to evaluations of exterior cladding and materials through the City's design review process.

The design of this project, including its finish, colors, and building materials, will be reviewed for approval through the Design Review process. Through this review, any impacts such as glare will be reduced to less than significant; therefore this issue will not be addressed in the EIR.

4. AGRICULTURAL RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:

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

☐ ☐ ☐ ☒

WHY? The City of Pasadena is a developed urban area surrounded by hillsides to the north and northwest. The western portion of the City contains the Arroyo Seco, which runs from north to south though the City. It has commercial recreation, park, natural and open space. There is no prime farmland, unique farmland, or farmland of statewide importance, as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency. No impact is expected; therefore this issue will not be addressed in the EIR.

b. *Conflict with existing zoning for agricultural use, or a Williamson Act contract? ( )*

☐ ☐ ☐ ☒

WHY? The City of Pasadena has no land zoned for agricultural use other than retail plant nurseries being allowed by right in the CG (General Commercial) and conditionally permitted in the CL (Limited Commercial), IG (Industrial), and OS (Open Space) zoning districts. No impact is expected; therefore this issue will not be addressed in the EIR.

c. *Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use? ( )*

	Potentially Significant Impact	Significant Unless Mitigation is Incorporated	Less Than Significant Impact	No Impact
	☐	☐	☐	☒

WHY? There is no known farmland in the City of Pasadena; therefore the proposed project would not result in the conversion of farmland to a non-agricultural use. No impact is expected; therefore this issue will not be addressed in the EIR.

5. **AIR QUALITY.** Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:

a. Conflict with or obstruct implementation of the applicable air quality plan? ( )

☐	☐	☐	☒

WHY? The project must comply with the Federal Clean Air Act, the California Clean Air Act and the regional Air Quality Management Plan (AQMP) adopted by the South Coast Air Quality Management District and Southern California Association of Governments. The AQMP contains measures to meet federal and state requirements. The City of Pasadena is also part of the West San Gabriel Valley Planning Council, which adopted the West San Gabriel Valley Air Quality Plan.

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

☒	☐	☐	☐

WHY? Due to its geographical location and the prevailing off shore daytime winds, Pasadena receives smog from downtown Los Angeles and other areas in the Los Angeles basin. The prevailing winds, from the southwest, carry smog from wide areas of Los Angeles and adjacent cities, to the San Fernando Valley and to Pasadena in the San Gabriel Valley where it is trapped against the foothills. For these reasons the potential for adverse air quality in Pasadena is high.

Pasadena is located in a non-attainment area, an area that frequently exceeds national ambient air quality standards for several "criteria pollutants". The project will result in increased emissions of these pollutants during construction and operation. At some locations, traffic conditions could continue to be congested, resulting in localized carbon monoxide concentrations. Impact may be potentially significant; therefore this issue will be addressed in the EIR.

c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)? ( )

☒	☐	☐	☐

WHY? The City of Pasadena is within the South Coast Air Basin (SCAB). This basin is a non-attainment area Ozone (O_3), Fine Particulate Matter (PM_{25}), Respirable Particulate Matter (PM_{10}), and Carbon Monoxide (CO), and is in a maintenance area for Nitrogen Dioxide (NO_2). Projects that contribute to a significant cumulative increase in O_3, PM_{25}, PM_{10}, CO, or NO_2 will be considered to be significant and require the consideration of mitigation measures. This project may cause a cumulatively considerable increase in O_3, PM_{25}, PM_{10}, CO, and/or NO_2 during construction and/or operation. Impact is potentially significant and will be addressed in the EIR.

d. Expose sensitive receptors to substantial pollutant concentrations? ( )

☒	☐	☐	☐

WHY? Places where the young, the elderly, and the acutely ill and chronically ill gather are considered sensitive receptors, and include residences, parks, hospitals, and convalescent homes. Residential areas are also considered to be sensitive receptors because residents tend to be at home for extended periods, resulting in sustained exposure to air pollutants that are present. Residential land uses are considered moderately sensitive to air pollution.

Construction activities generally result in temporary air pollution that may adversely affect nearby sensitive receptors, such as parks and residences. Residential areas are considered to be sensitive receptors because residents tend to be at home for extended periods, resulting in sustained exposure to air pollutants that are present. Sensitive receptors in the vicinity of the proposed project include the Polytechnic Elementary and High School to the west of the campus boundary, residences to the east, north, and south. Over the long term, the project may result in increased vehicle trips, which may result in localized carbon monoxide. Impact may be potentially significant; therefore this issue will be addressed in the EIR.

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

☐ ☐ ☐ ☒

WHY? This type of use is not shown on the 1993 updated SCAQMD's CEQA Air Quality Handbook Figure 5-5 "Land Uses Associated with Odor Complaints." No impact is expected; therefore this issue will not be addressed in the EIR.

6. **BIOLOGICAL RESOURCES.** Would the project:

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

☐ ☐ ☐ ☒

WHY? The project is in a developed urban area. There are no known unique, rare or endangered plant or animal species or habitats on or near the site. The site has been urbanized for many years. No impact is expected; therefore this issue will not be addressed in the EIR.

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

☐ ☐ ☐ ☒

WHY? There are no designated natural communities however; the Final Environmental Impact Report for the adopted 1994 Land Use and Mobility Elements maps the natural communities within the City's boundaries. The project is not located near any of these communities.

The project is located in a developed urban area. There are no known existing plant communities on or near the site. No impact is expected; therefore this issue will not be addressed in the EIR.

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

☐ ☐ ☐ ☒

Potentially Significant Impact	Significant Unless Mitigation is Incorporated	Less Than Significant Impact	No Impact

WHY? The project is located in a developed urban area. There are no discernable watercourses or wetland onsite. No impact is expected; therefore this issue will not be addressed in the EIR.

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

☐ ☐ ☐ ☒

WHY? The project is located in a developed urban area and does not involve the dispersal of wildlife nor result in a barrier to migration or movement. No impact is expected; therefore this issue will not be addressed in the EIR.

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

☒ ☐ ☐ ☐

WHY? On-site trees may be considered an important resource. The City of Pasadena has an ordinance for the protection of native and specimen trees. A tree inventory was submitted for the project, which indicates that twenty-nine (29) trees are proposed for removal. The proposed project may affect oak and sycamore trees. Seventeen (17) of the trees proposed for removal are protected by Ordinance No. 6896 "City Trees and Tree Protection Ordinance" as detailed in the table below. The project is not in the Hillside Development Overlay District or the Lower Arroyo. See also 3.b. Since the project could affect a number of locally-protected trees, directly through removal, impacts are considered potentially significant. The project's potential impacts to locally-protected trees and compliance with the City's Ordinance No. 6896 will be addressed in the EIR.

#	Genus & Species	Common Name	Diameter	Native	Specimen	Remain	Remove
1	Chorisia insignis	White Floss Silk Tree	28		X		X
2	Pittosporum undulatum	Victorian Box Pittosporum	13		X		X
3	Sequoia sempervirens *	Coast Redwood	9		X		X
4	Eucalyptus citriodora *	Lemon-scented Gum	21		X		X
5	Phoenix canariensis	Canary Island Date Palm	26				X
6	Washingtonia robusta	Mexican Fan Palm	13				X
7	Washingtonia robusta	Mexican Fan Palm	12				X
8	Pinus halepensis *	Aleppo Pine	13				X
9	Cedrus deodara *	Deodar Cedar	24				X
10	Cedrus deodara	Deodar Cedar	28		X		X
11	Quercus engelmannii	Engelmann Oak	29	X			X
12	Quercus agrifolia	Coast Live Oak	9	X			X
13	Cinnamomum camphora *	Camphor Tree	20				X
14	Quercus agrifolia	Coast Live Oak	28	X			X
15	Cedrus deodara	Deodar Cedar	32		X		X
16	Quercus engelmannii	Engelmann Oak	28	X			X
17	Jacaranda mimosifolia	Jacaranda	10		X		X
18	Jacaranda mimosifolia	Jacaranda	16				X
19	Jacaranda mimosifolia *	Jacaranda	10				X
20	Cassia leptophylla	Gold Medallion Tree	9				X
21	Cassia leptophylla	Gold Medallion Tree	9				X
22	Platanus racemosa	California Sycamore	22	X			X
23	Platanus racemosa	California Sycamore	24	X			X
24	Platanus racemosa	California Sycamore	19	X			X
25	Platanus racemosa	California Sycamore	22	X			X

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	Potentially Significant Impact	Significant Unless Mitigation is Incorporated	Less Than Significant Impact	No Impact

26	Platanus racemosa	California Sycamore	18	X			X
27	Platanus racemosa	California Sycamore	19	X			X
28	Liquidambar styraciflua	American Sweet Gum	18				X
29	Liquidambar styraciflua	American Sweet Gum	9				X

(* under protected size of the tree ordinance)

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

☐ ☐ ☐ ☒

WHY? There are currently no adopted Habitat Conservation or Natural Community Conservation Plans within the City of Pasadena. There were also no approved local, regional or state habitat conservation plans. No impact is expected; therefore this issue will not be addressed in the EIR.

7. **CULTURAL RESOURCES.** Would the project:

a. *Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5? ( )*

☒ ☐ ☐ ☐

WHY? The proposed project is an amendment to the Caltech Master Plan, which consists of demolition and construction of several buildings on the campus site. The buildings proposed for demolition and replacement are: 1) Mead Lab built in 1973; 2) Physical Plant Offices and Shops built in 1959; 3) North Undergraduate houses Page, Lloyd, and Ruddock built in 1960; and the 4) Graduate houses Braun and Marks built in 1961.

As part of the evaluation of existing buildings on the Caltech campus, a historic resources survey was prepared in 1986 inventorying all existing single-family houses within the campus boundaries. The 1989 EIR also identified existing potentially historic academic, administrative, and student facilities within the campus; but however, only minor analysis was conducted for these facilities.

None of the structures proposed for demolition are included on the lists of historic facilities in the original Master Plan EIR or the 1986 historic resources survey report. However, substantial changes in historic resource circumstances have occurred since the 1986 historic resource survey was conducted and the Master Plan EIR was certified. These changes are twofold. First, the historic context has changed; and structures that were not considered historic in 1989 may now meet the criteria for designation as a historical resource of national, statewide, or local significance. Second, the policies governing historic resources have changed. The City has adopted a Historic Preservation Ordinance (Pasadena Municipal Code Section 17.52) that establishes criteria for designating locally historic resources, including Historic Monuments, Landmarks, Historic Signs, and Landmark Districts (Pasadena Municipal Code Section 17.52.040). Structures that were previously not considered historic, may now meet the City's criteria for historic resources of local significance.

Since substantial changes in historic resource circumstances have occurred, the demolition of structures proposed by the amendment may result in a new significant environmental effect. Therefore, the amendment's potential to impact historic resources will be discussed in the EIR.

b. *Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5? ( )*

☐ ☐ ☐ ☒

Potentially Significant Impact	Unless Mitigation is Incorporated	Less Than Significant Impact	No Impact

WHY? No records are known indicating any significant archaeological resources, including any prehistoric human remains, exist in the City of Pasadena. The Caltech campus has been disturbed by past human activities, and is not expected to contain archaeological resources. Therefore, the proposed project would have no impact to archaeological resources, and this topic does not need to be discussed in the EIR. Nevertheless, in the unlikely event that such resource is discovered during construction, all construction in the affected area must cease. An archaeologist shall be notified and provisions for recording and excavating the site shall be made in compliance with Section 15064.5 of the California Environmental Quality Act Guidelines.

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

☐ ☐ ☐ ☒

WHY? No records are known indicating any significant paleontological resources exist in the City of Pasadena. The Caltech campus has been disturbed by past human activities, and are not expected to contain paleontological resources. Nevertheless, in the unlikely event that such resource are encountered during grading or construction of the project, all grading or construction efforts which would disturb these sites shall cease. A paleontologist shall be notified and provisions for recording and excavating the site shall be made in compliance with California Environmental Quality Act (CEQA) Guidelines, Section 15064.5. Impact will be less than significant. No impact is expected; therefore this issue will not be addressed in the EIR.

d. *Disturb any human remains, including those interred outside of formal ceremonies? ( )*

☐ ☐ ☐ ☒

WHY? There are no known human remains on the site. In the unlikely event that human remains are encountered during project construction, State Health and Safety Code Section 7050.5 requires the project to halt until the Los Angeles County Coroner has made the necessary findings as to the origin and disposition of the remains pursuant to Public Resources Code Section 5097.98. No impact is expected; therefore this issue will not be addressed in the EIR.

8. **ENERGY.** Would the proposal:

a. *Conflict with adopted energy conservation plans? ( )*

☐ ☐ ☐ ☒

WHY? The project does not conflict with the 1983 adopted Energy Element of the General Plan. Further the project will comply with the energy standards in the California Energy Code, Part 6 of the California Building Standards Code (Title 24). Measures to meet these performance standards may include high-efficiency Heating Ventilation and Air Conditioning (HVAC) and hot water storage tank equipment, lighting conservation features, higher than required rated insulation and double-glazed windows. No impact is expected; therefore this issue will not be addressed in the EIR.

b. *Use non-renewable resources in a wasteful and inefficient manner? ( )*

☐ ☐ ☒ ☐

Why? Construction of the project will result in consumption of oil-based energy products. However, the additional amount of resources used will not cause a significant reduction in available supplies.

The long-term impact from increased energy use by this project is not significant in relationship to the number of customers currently served by the electrical and gas utility companies. Supplies are available from existing mains,

lines and substations in the area. Occupation of the project will result in consumption of natural gas. This consumption will be lessened by adherence to the performance standards of California Energy Code, Part 6 of the California Building Standards Code Title 24. This project will result in the increased consumption of 6,746 net kilowatt-hours of electrical energy per day. This increased consumption will be reduced to an insignificant level by meeting the above referenced energy standards. Measures to meet these performance standards may include high efficiency Heating Ventilation and Air Conditioning (HVAC) and hot water storage tank equipment, lighting conservation features, higher than required rated insulation and double-glazed windows. The energy conservation measures will be prepared by the developer and shown on building plans. These plans will be submitted to the Water and Power Department and Building Official for review and approval prior to the issuance of a building permit. Installation of energy-saving features will be inspected by a City Inspector prior to issuance of a Certificate of Occupancy.

This project will result in an increase of approximately 1,380 gallons per day in water consumption. The current uses consume approximately 40,900 gallons of water per day. The proposed use would have an increase in water consumption of 42,280 gallons of water per day. However, this impact will be mitigated during drought periods by the applicant adhering to the Water Shortage Procedures Ordinance, which restricts water consumption to 90% of expected consumption during each billing period.

9. GEOLOGY AND SOILS. Would the project:

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

i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42. ( )

☐ ☐ ☒ ☐

WHY? According to the 2002 adopted Safety Element of the City of Pasadena's General Plan, the San Andreas Fault is a "master" active fault and controls seismic hazard in Southern California. This fault is located approximately 21 miles north of Pasadena.

The County of Los Angeles and the City of Pasadena are both affected by Alquist-Priolo Earthquake Fault Zones. Pasadena is in four USGS Quadrants, the Los Angeles, and the Mt. Wilson quadrants were mapped for earthquake fault zones under the Alquist-Priolo Act in 1977. The Pasadena and Condor Peak USGS Quadrangles have not yet been mapped per the Alquist-Priolo Act.

Adjacent to and partially in the City of Pasadena are two faults, considered active, the Sierra Madre primarily north of the City and the Raymond Fault primarily south of the City. The 2002 Safety Element of the General Plan considers the Sierra Madre Fault to be in a Fault Hazard Management Zone and the Raymond Fault to be in an Alquist-Priolo Earthquake Fault Zone. Within the southwest area of the City, the Eagle Rock Fault is considered potentially active. The proposed project is two miles south of the Sierra Madre Fault, approximately 1.4 miles south of a potentially active strand of the Sierra Madre Fault, 1.4 miles north of the Raymond Fault, and approximately 2.8 miles north of the Eagle Rock Fault.

The potential exists for people and property to be exposed to the hazards of seismic activity in most of California. This project will not increase the potential occurrence of earthquakes. The risk of earthquake damage is minimized because the new structure shall be built according to the Uniform Building Code and other applicable codes, and is subject to inspection during construction. Structures for human habitation must be designed to meet or exceed California Uniform Building Code standards for Seismic Zone 4. Conformance with these existing standards will ensure a less than significant impact; therefore, this issue will not be addressed in the EIR.

ii. Strong seismic ground shaking? ( )

Potentially Significant Impact	Significant Unless Mitigation is Incorporated	Less Than Significant Impact	No Impact
☐	☐	☒	☐

WHY? As discussed in item 9.a.i., the project site is expected to be subject to seismic ground shaking, similar to most of California. Since the City of Pasadena is located within a larger area traversed by numerous active fault systems, such as the San Andreas and Newport-Inglewood, any major earthquake along these systems will cause seismic ground shaking in Pasadena. At a minimum the earthquake-resistant design and materials of new projects must meet or exceed the current seismic engineering standards of the California Uniform Building Code Seismic Zone 4 requirements. Much of the City is on sandy, stony or gravelly loam formed on the alluvial fan adjacent to the San Gabriel Mountains. This soil is more porous and loosely compacted than bedrock and thus subject to greater impacts from seismic ground shaking than bedrock.

At a minimum, the earthquake resistant design and materials utilized in new projects must meet or exceed the current seismic engineering standards of the California Uniform Building Code Seismic Zone 4 requirements. As required, the applicant shall submit to the Building Division a soils report for review and approval. The applicant must also submit project plans for review and approval, showing compliance with these standards, including a grading plan, prior to beginning of construction. Conformance with these standards will ensure a less than significant impact. See also 9.a.i.

iii. Seismic-related ground failure, including liquefaction as delineated on the most recent Seismic Hazards Zones Map issued by the State Geologist for the area or based on other substantial evidence of known areas of liquefaction? ( )

☐	☐	☒	☐

WHY? According to the State of California Seismic Hazard Zone map, Pasadena, Mt. Wilson Quadrangle, the project site is not in an area subject to either liquefaction or earthquake-induced landslides. The 2002 adopted Safety Element of the General Plan Plate 1-3 does not show the project site to be located in an area subject to liquefaction or earthquake-induced landslides. The 2002 adopted Safety Element of the General Plan, Plate 2-4 Slope Distribution Map, also shows that the project site is in an area where the slopes are less than 10-degrees. Any slope instability will be controlled by existing City regulations; therefore impact will be less than significant, and this issued will not be addressed in the EIR. As required, the applicant shall submit to the Building Division a soils report for review and approval for any new construction of buildings.

Due to these codes and inspections there will be no increased exposure to seismic ground failure including liquefaction.

iv. Landslides as delineated on the most recent Seismic Hazards Zones Map issued by the State Geologist for the area or based on other substantial evidence of known areas of landslides? ( )

☐	☐	☐	☒

WHY? According to the State of California Seismic Hazard Zone Map, Pasadena, Mt. Wilson Quadrangle, the adopted 2002 Safety Element of the General Plan Seismic Hazards Map Plate 1-3, and Slope Instability Map Plate 2-4, the project site is located where slopes have no slope instability. According to these sources there is not any known historic evidence of landslides on the project site or adjacent properties. Existing City Regulations will control any slope instability; therefore there will be no impact. In addition, the Seismic Hazard Map does not show this project to be located in an area where there is geologic evidence of past landslides. This issue will not be addressed in the EIR.

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

☐	☐	☒	☐

WHY? The proposed project will involve approximately 59,506 cubic yard of cut and 16 cubic yard of fill. A total of 53,190 cubic yard is expected to be exported. The existing building regulations and property site inspections ensure that construction activities do not create unstable earth conditions. The grading activities are regulated by Title 14 of the Pasadena Municipal Code, which adopts the California Uniform Building Code (UBC) standards, among other standards. Compliance with the standards adopted under Title 14 will ensure that the project will not result in substantial soil erosion or loss of topsoil.

The displacement of soil through cut and fill will be controlled by Appendix Chapter 33 of the 2001 California Building Code relating to grading and excavation; therefore impact will be less than significant.

The applicant must have an approved site to receive any exported cut earth.

According to the Final Environmental Impact Report certified for the adoption of the 1994 Land Use and Mobility Elements, the natural water erosion potential of Pasadena's soil is low unless these soils are disturbed during the wet season. Both the Ramona and Hanford soils associations, which underlay much of the City, have high permeability, low surface runoff and slight erosion hazard due to the gravelly surface layer and low topographic relief away from the steeper foothills areas of the San Gabriel Mountains.

Water erosion during construction will be minimized by limiting construction to dry weather, covering exposed excavated dirt during periods of rain and protecting excavated areas from flooding with temporary berms.

Soil erosion after construction will be controlled by implementation of an approved landscape and irrigation plan. This plan shall be submitted to the Zoning Administrator and Design Commission for review and approval prior to the issuance of a building permit.

Any project, which involves more than 250 cubic yards of cut or fill, must have an erosion and sediment transport control plan as part of the applicant's grading plan. The grading plan must be approved by the Building Official and the Department of Public Works prior to the issuance of any building permits.

An erosion and sediment control plan should include the following measures if applicable:

Confine construction to the dry season (April 16th to October 14th), whenever possible; If construction needs to be scheduled for the wet season (October 15th to April 15th of the following year), ensure that structural erosion and sediment transport control measures are ready for implementation prior to the onset of the first major storm of the season: Locate staging areas outside major streams (such as the main Arroyo Seco or Eaton Wash streambed) and drainage ways; Keep slope lengths and gradients to a minimum; Discharge construction runoff into small drainages at frequent intervals to avoid buildup of large potentially erosive flows; Prevent runoff from flowing over unprotected slopes; Keep disturbed areas to the minimum necessary for construction; Keep runoff away from disturbed areas during construction; Stabilize disturbed areas as quickly as possible, either by vegetative or mechanical methods; Direct flows over vegetated areas prior to discharge into public storm drainage systems; Trap sediment before it leaves the site with such techniques as check dams, sediment ponds, or siltation fences; Make removal and disposal of all project construction-generated siltation from off-site retention ponds the responsibility of the contractor; Use landscaping and grading methods that lower the potential for down-stream sedimentation. Modified drainage patterns and longer flow paths, encouraging infiltration into the ground, and slower storm-water conveyance velocities are examples of effective methods; and Control landscaping activities carefully with regard to the application of fertilizers, pesticides or other hazardous substances. Provide proper instruction to all landscaping personnel on the construction team. Conformance with these existing standards will ensure the project would not have a significant impact; therefore this issue will not be addressed in the EIR.

c. *Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse? ( )*

☐ ☐ ☐ ☒

WHY? The City of Pasadena rests primarily on an alluvial plain. To the north, the San Gabriel Mountains are relatively new in geological time. These mountains run generally east-west and have the San Andreas Fault on the north and the Sierra Madre Fault to the south. The action of these two faults in conjunction with the north-south compression of the San Andreas tectonic plate is pushing up the San Gabriel Mountains. This uplifting combined with erosion has helped form the alluvial plain. The project site is virtually flat and within a developed portion of the City. According to the adopted 2002 Safety Element of the General Plan Plate 2-4, the project site is located in an area that has no slope instability potential. No impact is expected; therefore this issue will not be addressed in the EIR.

d. *Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property? ( )*

☐ ☐ ☐ ☒

WHY? According to the 2002 adopted Safety Element of the City's General Plan the project site is underlain by alluvial material from the San Gabriel Mountains. This soil consists primarily of sand and gravel and is in the low to moderate range for expansion potential. At a minimum, foundation design will be required to accommodate expansive soil conditions in accordance with the California Uniform Building Code. No impact is expected; therefore this issue will not be addressed in the EIR.

e. *Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater? ( )*

☐ ☐ ☐ ☒

WHY? The City of Pasadena allows septic tanks to be used for only specified areas in the hillsides per regulations found in Ordinances 3881 and 4170 and codified in Pasadena Municipal Code. The proposed project is not in any of these specified areas. The project is located in a developed urban area where sewer service is available. The project can connect to the City sewer system and will not result in a new or substantial alteration to the existing sewer system. No impact is expected; therefore this issue will not be addressed in the EIR.

10. HAZARDS AND HAZARDOUS MATERIALS. Would the project:

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

☐ ☐ ☐ ☒

WHY? The project does not involve the use or storage of hazardous substances other than the small amounts of pesticides, fertilizers and cleaning agents required for normal maintenance of the structures and landscaping. The proposed Chemistry and Chemical Engineering Laboratory may use and store chemicals that are utilize only for student lab work. The project must adhere to applicable zoning and fire regulations regarding the use and storage of any hazardous substances. Further there is no evidence that the site has been used for underground storage of hazardous materials. No impact is expected; therefore this issue will not be addressed in the EIR.

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

☐ ☐ ☐ ☒

WHY? The project does not involve hazardous materials therefore there is no significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions, which could release hazardous material. No impact is expected; therefore this issue will not be addressed in the EIR.

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

☐ ☐ ☐ ☒

WHY? The project does not emit hazardous emissions or handle hazardous or acutely hazardous materials, substance, or waste. The proposed Chemistry and Chemical Engineering Laboratory may use and store chemicals that are utilize only for student lab work. The proposed project is within one-quarter mile from Polytechnic School. No impact is expected; therefore this issue will not be addressed in the EIR.

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

☐ ☐ ☐ ☒

WHY? The project site is not located on the State of California Hazardous Waste and Substances Sites List of sites published by California Environmental Protection Agency (CAL/EPA). No impact is expected; therefore this issue will not be addressed in the EIR.

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

☐ ☐ ☐ ☒

WHY? The project site is not within an airport land use plan or within two miles of a public airport or public use airport. The nearest public use airport is in Burbank, and is operated by a Joint Powers Authority with representatives from the City of Burbank, Glendale, and Pasadena. Helipads are required on many high-rise buildings for evacuating occupants in case of emergency. The police heliport is located at the eastern edge of the Arroyo Seco near the City's border with Altadena. This heliport is not open for public use. No impact is expected; therefore this issue will not be addressed in the EIR.

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

☐ ☐ ☐ ☒

WHY? The project site is not within the vicinity of a private airstrip. There are no private airstrips in Pasadena. No impact is expected; therefore this issue will not be addressed in the EIR.

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

☐ ☐ ☐ ☒

	Potentially Significant Impact	Significant Unless Mitigation is Incorporated	Less Than Significant Impact	No Impact
	☐	☐	☐	☒

WHY? See response to 14.a. The proposed project will not exceed the ambient noise level in the vicinity. This topic will not be discussed in the EIR.

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

☐	☐	☐	☒

WHY? Construction of the project may temporarily increase ambient noise levels. However, the impact from construction noise will be short-term and limited to normal working hours (7:00 a.m. to 9:00 p.m., Monday through Saturday in or within 500 feet of a residential area) in accordance with City Noise Restriction Ordinance (PMC Section 9.36.110). In addition, Section 9.36.120 of the PMC prohibits the use of construction equipment that emits noise at a level in excess of 85 dBA when measured within a radius of 100 feet from such equipment. A construction related traffic plan is required to ensure that truck routes for transportation of materials and equipment are established with consideration for sensitive uses in the neighborhood. A traffic and parking plan for the construction phase will be submitted for approval to the Traffic Engineer in the Department of Public Works and the Department of Transportation and to the Zoning Administrator prior to the issuance of any permits. Compliance with the City's Noise Restriction Ordinance will ensure that the project would not have significant impacts due to a temporary increase in noise levels. This topic will not be discussed in the EIR.

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

☐	☐	☐	☒

WHY? As of July 2003, there were no airports or airport land use plans within the City of Pasadena. Pasadena is part of the Burbank, Glendale, and Pasadena Airport Authority, but the airport is in the City of Burbank. No impact is expected; therefore this issue will not be addressed in the EIR.

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

☐	☐	☐	☒

WHY? The project is not within the vicinity of the Police Heliport or the Fire Camp in the Arroyo Seco. No impact is expected; therefore this issue will not be addressed in the EIR.

15. POPULATION AND HOUSING. Would the project:

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

☐	☐	☐	☒

WHY? The project is in a developed area where all the major infrastructure is in place. According to the Caltech Master Plan, the student population for graduate and faculty/staff was to increase at a yearly rate of 1.4% and 1.0% respectively. Using the yearly growth rate, it is estimated that the graduate population had an increase of 301 students (30% rate of increase) and the faculty/staff population had an estimated increase of 440 staff member (21% rate of

increase) for 1985-2004. According to Caltech, the population of graduate and faculty/staff fluctuates yearly, but would not go beyond the yearly rate as provided in the Master Plan. Contrasting with the very slow growth in campus population is the increase in the size of facilities at the campus. This can be expected at research institutions such as Caltech where, in the rapidly changing technology, more equipment and experimental facilities per person are required. The proposed project would not increase the dormitory population on campus. The slow growth of the graduate student and faculty/staff population would not be a significant impact because it is consistent with the established Master Plan as discussed. This topic will not be addressed in the EIR.

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

☐ ☐ ☒ ☐

WHY? The project does involve the demolition of housing units (student dormitories) for undergraduate and graduate students. The demolition and construction of the new student dormitories for the undergraduate and graduate students may displace students of up to three years. While this may be a short-term impact, replacement housing for the students temporarily displaced by the project is required. Caltech proposes to provide this replacement housing with the modular units that will be installed on-campus to temporarily house students displaced by the campus' ongoing South Undergraduate Housing (SUH) replacement project. The proposed North Undergraduate Housing (NUH) and Braun and Marks Houses replacement projects will not be undertaken until the SUH replacement project is complete, and the temporary residents of the modular units can inhabit the new SUH dorms. No new modular units will be installed to house the residents displaced by the proposed project. Rather, the project will result in the continued use of existing temporary housing on-campus. Therefore, the project would not have significant impacts related to the construction of replacement housing.

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

☐ ☐ ☒ ☐

WHY? The project would temporarily displace approximately 275 undergraduate students and 50 graduate students. However, the displaced students will be housed in modular units that will be installed on-campus to temporarily house students displaced by the campus' ongoing South Undergraduate Housing (SUH) replacement project. No new modular units will be installed to house the residents displaced by the proposed project. Rather, the project will result in the continued use of existing temporary housing on-campus. Therefore, the project would not have significant impacts related to the construction of replacement housing. See also response to 15.b.

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

a. *Fire Protection? ( )*

☐ ☐ ☒ ☐

WHY? The project site is located in a low wildfire hazard area according to the Wildfire Hazard Map (Plate 4-2) of the adopted 2002 Safety Element of the City's General Plan. Fire Station #34 at 1360 E. Del Mar Boulevard (located on the southeast corner of Holliston Avenue and Del Mar Boulevard on the Caltech campus) provides fire protection service to the Caltech campus. Project plans must be reviewed and approved by the Building Division and the Fire Department prior to issuance of any permits. Existing fire protection services are available to serve the project, and the project will not substantially increase demand for such services. Impact will be less than significant.

	Potentially Significant Impact	Unless Mitigation is Incorporated	Less Than Significant Impact	No Impact

b. Libraries? ( )

☐ ☐ ☐ ☒

WHY? The project site is located 0.19 mile from the nearest branch library (Hill Avenue, 55 S. Hill Avenue). The Caltech campus also has library facilities that serve its students. The City as a whole is well served by its Public Information (library) System. No impact is expected.

c. Parks? ( )

☐ ☐ ☒ ☐

WHY? The project site is located north of Tournament Park. The project would not result in need of new parks. The Caltech campus does provide recreational facilities for its students and faculty members. According to Parks and Natural Resources staff, the City as a whole had 1.6 acres of parkland per 1000 residents in May 2002. The state standard in the Quimby Act is 3.0 acres per 1,000 residents. Impact will be less than significant.

d. Police Protection? ( )

☐ ☐ ☒ ☐

WHY? The proposed site is in an area which has reported low crime rates according to Police Department burglary statistics. The project will not increase the need for police protection. However, the effect on police service is not significant, since this change is within the Police Department's scope of responsibility. Impact will be less than significant.

e. *Schools? ( )*

☐ ☐ ☐ ☒

WHY? The proposed project is not subject to the school impact fee. City of Pasadena collects a Pasadena Unified School District (PUSD) Construction tax on all new construction. Institutional uses are exempt from the school impact fee, because they do not result in a population increase of school-aged children. However, the project is subject to building permit fees.

In FY 2004 a school development impact fee of $0.33 per square foot is collected on commercial construction of projects exceeding 500 square feet ($.03 is collected on self-storage uses). This fee helps pay for the cost of new children enrolling in the school district as a result of commercial development. Public facilities, public schools and churches are exempt from this fee.

f. *Other public facilities? ( )*

☐ ☐ ☒ ☐

WHY? The project's development may result in additional maintenance of other public facilities. Since the project is consistent with the General Plan and zoning designation for the site, project demand for public facilities has been accounted for in the City's planning process. City services in processing discretionary reviews for this project will be paid for in fees collected for these services. Revenue from development fees will ensure that adequate levels of service are maintained. The project will not substantially increase demand for any City services or substantially degrade any public facility. Impact will be less than significant.

Potentially Significant Impact	Significant Unless Mitigation is Incorporated	Less Than Significant Impact	No Impact

17. RECREATION.

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

☐ ☐ ☐ ☒

WHY? The project site is north of Tournament Park. Recreational opportunities in the vicinity have already been established. The Caltech campus does provide for recreational facilities for its students and faculty members. Residents in the surrounding neighborhood have been utilizing some of the campus recreational facilities. The proposed amendment to the Caltech Master Plan would not increase the use of existing neighborhood and regional parks in the area. No impact is expected.

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

☐ ☐ ☐ ☒

WHY? The Caltech campus does provide for recreational facilities to its students and faculty members. The proposed project is an amendment to the Caltech Master Plan, which guides future development of the campus. The proposed project would not require the expansion of recreational facilities in the area. No impact is expected.

18. TRANSPORTATION/TRAFFIC. Would the project:

a. *Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)? ( )*

☒ ☐ ☐ ☐

WHY? The Circulation and Parking Strategy of the Caltech Master Plan was based on the street system and traffic patterns that existed in 1989. Since the Plan was adopted, the surrounding street system and traffic patterns have changed. California Boulevard became a two-lane residential street from a four-lane collector roadway. The increase in student population beyond 2000 until the campus build-out 30-40 years as envisioned in the Plan, may result in increase in vehicles trips in the surrounding area.

Adjacent to the Caltech campus is Pasadena City College (PCC). Increase in student population to both campus will result in vehicles trips in the surrounding area and may have a potential significant impact to the existing traffic load and capacity of the street. Potential impacts will be addressed in the EIR.

b. *Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways? ( )*

☒ ☐ ☐ ☐

WHY? The project site is located within a highway or road system as defined in the 2002 Congestion Management Program. The project site is located 0.66 miles from the 210 Freeway. The project may have a significant potential impact to this roadway system. Potential impacts will be addressed in the EIR.

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

	Potentially Significant Impact	Significant Unless Mitigation is Incorporated	Less Than Significant Impact	No Impact
	☐	☐	☐	☒

WHY? The project site is not within an airport land use plan or within two miles of a public airport or public use airport.

The nearest public use airport is in Burbank, which is operated by a Joint Powers Authority with representatives from the Cities of Burbank, Glendale, and Pasadena. Helipads are required on many high-rise buildings for evacuating occupants in case of an emergency. The police heliport is located at the eastern edge of the Arroyo Seco near the City's border with Altadena. This heliport is not open for public use.

The proposed project would not directly impact any airports, helipads, runways, or any air travel support facilities. In addition, the proposed project would not cause a change in the directional patterns of aircraft. As discussed in Section 15 of this report, the project would not induce growth beyond local and regional growth expectations; and thus, would not result in the need for increased air traffic. Therefore, the proposed project would have no impact to air traffic patterns. This topic will not be discussed in the EIR.

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

☐	☐	☐	☒

WHY? The proposed project is served by existing streets and will not introduce any uses not already existing in the surrounding area. No agricultural operations are located in the vicinity. Therefore, no impact in regard to incompatible land uses will result, and this issue will not be addressed in the EIR. Construction traffic and related traffic safety issues will be reviewed by the Transportation Department. The project and its impact on circulation due to the proposed use and its design, has been found not to be hazardous to traffic circulation either within the project or in the vicinity of the project. No impact is expected.

e. *Result in inadequate emergency access? ( )*

☐	☐	☒	☐

WHY? The project will not alter emergency access to nearby uses or to the Caltech campus. The project must comply with all Building, Fire and Safety Codes and plans are subject to review and approval by the Public Works, Transportation Department, Building Division, and Fire Department. Compliance with existing building and zoning codes will ensure that impact will be less than significant.

f. *Result in inadequate parking capacity? ( )*

☒	☐	☐	☐

WHY? A total of 1,978 off-street parking spaces and 413 on-street parking spaces were identified in the EIR originally prepared for the Caltech Master Plan. The Master Plan anticipated the construction of three parking structures within the campus. A parking structure was built on Holliston Avenue in 1994 and provided 437 parking spaces. A four-level, above-grade parking structure on the west side of Wilson Avenue was built in 1987 and provided for 443 parking spaces. A third parking structure south of California Boulevard between Wilson and Hill Avenue, currently under construction, will provide for 692 parking spaces. The Circulation and Parking Strategy of the Caltech Master Plan was based on the street system, traffic, and parking patterns that existed in 1989. Since the Plan was adopted, the surrounding street system, traffic, and parking patterns have changed. The proposed project may have an impact on parking in the surrounding area. Parking and parking location for the proposed project will need to be analyzed to show the distribution of parking for the proposed uses for the campus. This issue will be evaluated in the EIR.

g. *Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g. bus turnouts, bicycle racks)? ( )*

Potentially Significant Impact	Significant Unless Mitigation is Incorporated	Less Than Significant Impact	No Impact
☐	☐	☒	☐

WHY? The proposed project will not result in a substantial impact upon the existing transportation system. The project is served by MTA (Metropolitan Transportation Authority) bus route #177 on California Boulevard and bus route #267 on Del Mar Boulevard.

The Caltech campus does have a Transportation Demand Management Plan with the City. The Plan does provide for alternative transportation for its employees. In addition, the Master Plan specifies that project larger than 70,000 square feet of gross floor area shall submit a transportation system management program for approval by the Director of Public Works prior to the issuance of a building permit for any project larger than 70,000 square feet of gross floor area that will at a minimum: 1) establish a reasonable route and number of truck trips to be permitted going to and from the site during the demolition and construction phases of the project; and 2) Provide a parking plan for construction-related vehicles that will ensure that they are not parked on the residential streets surrounding the site.

19. UTILITIES AND SERVICE SYSTEMS. Would the project:

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

☐	☐	☐	☒

WHY? None of the proposed uses would generate atypical wastewater such as industrial or agricultural effluent. All wastewater generated by the proposed project is expected to be domestic sewage. Wastewater treatment facilities are designed to treat domestic sewage; and thus, typical domestic sewage does not exceed wastewater treatment requirements. Since the project would not generate atypical wastewater, the project would not exceed wastewater treatment requirements, and the project would have no associated impacts. This topic does not need to be discussed in the EIR.

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

☒	☐	☐	☐

WHY? The proposed campus facilities would increase the quantity of wastewater created on-campus; and would similarly increase the campus' demand for water. Further coordination with the Pasadena Public Works Department and the Pasadena Water and Power (PWP) will be required to determine the water and wastewater agencies' capacity to handle the increased demand and to determine if any additional facilities are required. According to the Public Works Department, there are existing capacity deficiencies in the sewers that serve Caltech. These deficiencies will be aggravated by the proposed project. This topic will be evaluated in the project's EIR.

New development built pursuant to the 2004 Land Use Element, as implemented by the Zoning Code Revisions, will increase wastewater generation. Approximately 90% of water consumed within the City becomes wastewater. Using this factor, Pasadena is expected to generate approximately 24.2 million gpd of wastewater in 2015, an increase of 4.28 million gpd (18%) over 2000 conditions. The Whittier Narrows, San Jose Creek, and Los Coyotes Water Reclamation Plants, which treats the City's Wastewater, process a total of 128.3 million gpd. Pasadena is expected to account for no more than 19% of the reclamation plants' daily treated wastewater by the year 2015. At the time when this project is constructed, any deficiencies identified in that particular portion of the sewer system that may be impacted by the project, will become the responsibility of the developer.

c. *Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects? ( )*

Potentially Significant Impact	Significant Unless Mitigation is Incorporated	Less Than Significant Impact	No Impact
☐	☐	☒	☐

WHY? See Section 11 of this document. The project may result in alterations to on-site hydrology. However the project site is virtually flat and within a currently developed, urban, portion of the City of Pasadena that is drained entirely by the City's storm drain system. The proposed project does not involve grading that would alter drainage patterns. The proposed project would involve only minor changes in the site's runoff patterns due to the placement of structures and impermeable surfaces. Furthermore, the project is required to comply with the SUSMP, which requires post-development peak stormwater runoff discharge rates to not exceed pre-development rates where discharges may result in increased potential for downstream erosion. Therefore, the proposed project would not result in the construction of new stormwater facilities, and the project would have no associated significant impacts. This topic will not be discussed in the EIR.

The City's Street Maintenance and Integrated Waste Management Division are responsible for the maintenance of storm drains and sewers, including pumping stations and catch basins. The standard level of protection to be provided against flooding in Los Angeles County requires that during the "urban design storm", the surface capacity of a street may be used up to a water surface level not extending above or beyond the street's right-of-way lines. Pasadena's drainage system consists of open channels, underground conduits, and streets, provides a reasonable degree protection against flooding.

The Los Angeles County Department of Public Works (LACDPW) and the U.S. Army Corps of Engineers constructed several detention/debris basins in the hills above Pasadena. The LACDPW has also made channel alterations, including concrete linings, earthen bottoms with concrete stabilizers, and rock-riveted side slopes. These flood control structures are presently owned and operated by LACDPW, which has jurisdiction over watercourses in the Pasadena area, as well as the regional flood control system in the county. In addition, property owners in the hillside areas have constructed numerous small dikes to impound water. The City of Pasadena has participated in the National Flood Insurance Program (NFIP) since 1984. However, there are no flood-prone areas recognized within the City.

Stormwater runoff is further regulated by Pasadena Municipal Code Section 4.19.060 (Use and Disbursement of Fees), which requires that all new development pay an impact fee, part of which will be used for street improvements, including storm drains. In addition, major developments projects that impact the capacity of downstream lines are required to upgrade adjacent system components to mitigate impacts at the developer's expense. The project will be subject to the City's impact fees to improve storm drains, which will ensure a less than significant impact on stormwater drainage systems. Further, the project must have an on-site drainage plan approved by the Building Official and the Department of Public Works prior to the issuance of any building permits. Any on-site improvements needed to provide drainage or to connect the project with the existing City drainage system are the responsibility of the applicant.

The project is subject to the requirements of the City's Storm Water and Urban runoff Control Regulation Ordinance that implements the requirements of the Regional Water Quality Control Board's Standard Urban Storm Water Mitigation Plan (SUSMP). Prior to the issuance of any demolition, grading, or construction permits for this project, the developer shall submit a detailed plan indicating the method of SUSMP compliance.

The City of Pasadena through Ordinance 6837 adopted the Standard Urban Storm Water Mitigation Plan recommended by the California Regional Water Quality Control Board, Los Angeles Region. This ordinance enables the City to be part of the municipal storm sewer permit issued by the Los Angeles Region to the County of Los Angeles. The City Council is committed If to adopting any changes made to the Standard Urban Storm Water Mitigation by the California regional Water Quality Control Board, Los Angeles Region. Impact will be less than significant.

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

☐	☐	☒	☐

WHY? The water demand for the proposed development is well within the projected supply of the 2000 Urban Water Management Plan and will therefore not create a significant impact on groundwater supply. Additionally, the 2004 Land Use Element contains infrastructure maintenance measures to ensure that the City's water utilities are not impacted by future development. Impact on City water supply and utilities will be less than significant.

The City's projected future water demand is well within the projected supply reported in the 2000 Urban Water Management Plan. Thus, development pursuant to the 2004 Land Use Element, and implemented through the Zoning Code Revisions, will neither deplete water supplies nor exceed expected projections. Impact on water supply will be less than significant.

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

☒ ☐ ☐ ☐

WHY? The proposed campus facilities would increase the quantity of wastewater created on-campus. Further coordination with the Pasadena Public Works Department will be required to determine the wastewater agencies' capacity to handle the increased demand and to determine if any additional facilities are required. According to the Public Works Department, there are existing capacity deficiencies in the sewers that serve Caltech. These deficiencies will be aggravated by the proposed project. This topic will be discussed in the project's EIR. See response to 19.b.

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

☐ ☐ ☒ ☐

WHY? The proposed facilities would generate solid waste. However, solid waste is disposed of at landfills with a region-wide service area. The solid waste collected at the project site would be negligible in comparison to the amount of sold waste generated by the region. Therefore, the proposed amendments would not significantly impact the capacity of the region-wide landfills. This topic will not be discussed in the project's EIR.

The City's Street Maintenance and Integrated Waste Management Division is responsible for solid waste collection and disposal, and the contracting of such services, from all residential properties within the City. For nonresidential uses, the Division oversees 59 private haulers that are part of an extensive non-exclusive franchise system. The Division's duties include collection and disposal of refuse from municipal office, libraries, parks, and various business districts; collection of recyclables items for those households with residential refuse service provided by the City. The Division and the majority of the City's private haulers dispose of waste at the Scholl Canyon Landfill located in the City of Glendale north of the State Route 134 Freeway. This major Class III landfill accepts only non-hazardous municipal solid waste. The site has a remaining capacity of 7.9 million tons and is projected to close in the year 2020. Based on the California Integrated Waste Management Board's profile for Pasadena, 6.6 pounds of waste are generated per resident per day as of 2000. With an estimated population increase of 16,979 people between 2004 and 2015, the City can be expected to create an additional 112,061 pounds of waste per day, or 20,451 tons per year for a total of 190,568 tons. Non-residential development is anticipated to increase by 4.97 million square feet, with an estimated resulting waste of 3,942.97 tons per year. Residential and non-residential waste combined is anticipated to be 194,510.97 tons per year. Pasadena's estimated waste generated by the year 2015 is approximately 2.46% of School Canyon's remaining capacity. The project can be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs.

The City enforces construction and demolition waste reduction adhering to Pasadena Municipal Code Section 8.62 (Waste Management Plan for Certain Construction and Demolition Projects within the City of Pasadena), which requires a minimum of 50% waste diversion rate on "covered projects". Covered projects include new structures, residential additions, and demolition projects of 1,000 square feet or more, and any tenant improvement project of

3,000 square feet or more. A waste management plan and monthly progress reports must be submitted and approved by the City.

Pasadena will continue to provide collection services for its residents and businesses and use the School Canyon Landfill as its primary waste disposal site, which will remain in operation until 2020. The City will continue to comply with AB 939 to lessen the impact on landfill capacity. Pasadena has several recycling programs established, including municipal and residential green waste composting, commercial recycling programs, and economic incentives for residents. The proposed project will not generate solid waste that will result in a need for new or substantially altered solid waste facilities. Continue compliance with existing regulations and City policies will ensure a less than significant impact.

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

☐ ☐ ☒ ☐

WHY? The proposed project would comply with federal, state, and local statutes and regulations related to solid waste. These statutes and regulations include the California Integrated Solid Waste Management Act, the California Beverage Container Recycling and Litter Reduction Act, and the City's solid waste policies. The construction and operation of the proposed facilities would generate typical solid waste, and would not generate uniquely hazardous waste or industrial byproducts. Therefore, the proposal amendments would have no impact related to infractions with solid waste statutes or regulations, and this topic does not need to be addressed in the EIR.

The project will comply with applicable statutes and regulations related to solid waste.

The applicant is required to submit a program to the Department of Public Works Solid Waste for recycling solid waste. This program must be approved by the Public Works Solid Waste Division prior to the issuance of any building permits. The program must contain recycling for office paper, corrugated cardboard, mixed glass and green waste.

In 1992, the City adopted the "Source Reduction and Recycling Element" to comply with the California Integrated Waste Management Act. This act requires a 25% reduction in solid waste before 1995 and a 505 reduction before 2001, based on the solid waste generated in 1990.

In accordance with the Construction and Demolition Ordinance, Chapter 8.62 of the Pasadena Municipal Code, the applicant must submit a Construction Waste Management Plan, if the project meets any of the following thresholds:

1. Residential additions of 1,000 or more gross square feet;
2. Tenant improvement of 3,000 or more square feet;
3. New structures of 1,000 or more gross square feet;
4. Demolition of 1,000 or more gross square feet; and
5. All City public works and construction projects, which are awarded pursuant to competitive bid procedure established by Chapter 4.08 of the Pasadena Municipal Code.

20. EARLIER ANALYSIS.

Earlier analysis may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. See CEQA Guidelines Section 15063(c)(3)(D). Earlier analyses are discussed in Section 20 at the end of the checklist.

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

On April 18, 1994 and May 16, 1994, the City of Pasadena adopted its Revised General Plan's Mobility and Land Use Elements, respectively. A Program Environmental Impact Report (EIR) was adopted. A Program Environmental Impact Report (EIR) was adopted. This program EIR focused its analysis on Land Use; Population, Employment and Housing; Transportation and Circulation; geology; Hydrology and Water Quality; Air Quality; Noise; Biological Resources; Utilities; Public Services; Aesthetic/Visual Impacts; and Cultural Resources. For all these impacts, the EIR identified mitigation measures that would reduce the

potential impact to insignificant levels. The revised Mobility Element, which was approved in concept by the City Council April 7, 2003, does not list the lowest acceptable LOS as of October 2003.

The City of Pasadena adopted the California Institute of Technology (Caltech) Master Plan and certified an accompanying Program EIR 1989. This Program EIR addressed the impacts of anticipated of the proposed course of action identified in the Master Plan including anticipated campus development and the school's expected population growth. The Master Plan and accompanying EIR are intended to guide development until campus build-out occurs.

In addition to the General Plan elements, Caltech Master Plan, and identified CEQA document, the following documents were used in analyzing the Initial Study:

INITIAL STUDY REFERENCE DOCUMENTS

#	Document
1	Alquist-Priolo Earthquake Fault Zoning Act, California Public Resources Code, revised January 1, 1994 official Mt. Wilson, Los Angeles and Pasadena quadrant maps were released March 25, 1999.
2	Alquist-Priolo Earthquake Fault Maps- the official Los Angeles and Mt. Wilson, quadrant maps were released in 1977.
3	CEQA Air Quality Handbook, South Coast Air Quality Management District, revised 1993
4	East Pasadena Specific Plan Overlay District, City of Pasadena Planning and Development Department, codified 2001
5	Energy Element of the General Plan, City of Pasadena, adopted 1983
6	Fair Oaks/Orange Grove Specific Plan Overlay District, City of Pasadena Planning and Development Department codified 2002
7	Final Environmental Impact Report (FEIR) Land Use and Mobility Elements of the General Plan, City of Pasadena, certified 1994
8	2000-2005 Housing Element of the General Plan, City of Pasadena, adopted 2002.
9	Inclusionary Housing Ordinance Pasadena Municipal Code Chapter 17.71 Ordinance #6868
10	Land Use Element of the General Plan, City of Pasadena, adopted 1994
11	Mobility Element of the General Plan, City of Pasadena, adopted 1994
12	Noise Element of the General Plan, City of Pasadena, adopted 2002
13	Noise Protection Ordinance Pasadena Municipal Code Chapter 9.36 Ordinances # 5118, 6132, 6227, 6594 and 6854
14	North Lake Specific Plan Overlay District, City of Pasadena Planning and Development Department, Codified 1997
15	Regional Comprehensive Plan and Guide, "Growth Management Chapter," Southern California Association of Governments, June 1994
16	Safety Element of the General Plan, City of Pasadena, adopted 2002
17	Scenic Highways Element of the General Plan, City of Pasadena, adopted 1975
18	Seismic Hazard Maps, California Department of Conservation, official Mt. Wilson, Los Angeles and Pasadena quadrant maps were released March 25, 1999. The preliminary map for Condor Peak was released in 2002.
19	South Fair Oaks Specific Plan Overlay District Planning and Development, codified 1998
20	State of California "Aggregate Resource in the Los Angeles Metropolitan Area" by David J. Beeby, Russell V. Miller, Robert L. Hill, and Robert E. Grunwald, Miscellaneous map no. .010, copyright 1999, California Department of Conservation, Division of Mines and Geology
21	Storm Water and Urban Runoff Control Regulations n Pasadena Municipal Code Chapter 8.70 Ordinance #6837
22	Transportation, Housing, and Child Care Survey: A Report Describing the Results and Findings of a Survey of Employees in the City of Pasadena, Child Care Planning Associates for the City of Pasadena, April 11, 1990
23	Tree Protection Ordinance Pasadena Municipal Code Chapter 8.52 Ordinance # 6896
24	West Gateway Specific Plan Overlay District, City of Pasadena Planning and Development Department codified 2001

25 Zoning Code, Chapter 17 of the Pasadena Municipal Code

A copy of the Final Program EIR for the Land Use and Mobility Element of the City's General Plan, the Program EIR for the Caltech Master Plan, and the above documents are available for review at the City of Pasadena, Permit Center, Hale Building, Planning and Development Department, 175 North Garfield Avenue, Pasadena, CA 91109.

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

None of the potentially significant impacts identified herein are adequately addressed or mitigated by any previous CEQA document.

c) Mitigation Measures. For effects that are "less than Significant with Mitigation Measures Incorporated," describe the mitigation measures, which were incorporated or refined from the earlier documents and the extent to which address site-specific conditions for the project.

No mitigation measures are identified herein.

21. MANDATORY FINDINGS OF SIGNIFICANCE.

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

☐ ☐ ☒ ☐

WHY? As discussed in Section 6 of this document, the proposed project would not have substantial impacts to special status species, stream habitat, and wildlife dispersal and migration. Furthermore, the proposed project would not affect the local, regional, or national populations or ranges of any plant or animal species and would not threaten any plant communities. Similarly, as discussed in Section 7 of this document, the proposed project would not have substantial impacts to archaeological, or paleontological resources. Further investigation is required to determine if the proposed project would impact historical resources. Thus, historic resources will be address in the EIR; however, the project is not expected to eliminate any important examples of California history or prehistory. Therefore, the proposed project does not have a Mandatory Finding of Significance due to impacts to biological or cultural resources.

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

☒ ☐ ☐ ☐

WHY? The proposed project has the potential to contribute to cumulative air quality, noise, traffic, and utility impacts. Cumulative impacts will need to be discussed in the project's EIR.

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

☐ ☐ ☐ ☒

WHY? Section 10 of this document assesses the project for potential impacts form hazards and hazardous materials. As explained in Section 10, the project site does not contain any hazards or hazardous material concems. Similarly as discussed in Sections 9, 11, and 18 of this document, modern engineering practices would ensure the project would not cause substantial adverse effects on human beings due to seismic shaking, geologic and soil condition hazards, flooding, and transportation hazards.

Appendix F

Revised Caltech Master Plan Design Guidelines

Revisions to the Open-Space Strategy and Design Guidelines Sections of the Master Plan

1. At page 60 revise the fourth paragraph to read as follows:

   While this axis will maintain a sense of continuous open space by virtue of a visual corridor along its entire length, it **should** be designed as a series of interconnected courtyards. These courtyards **should** be developed as a combination of **more** formal hardscape and landscape spaces, in contrast with the more free-form landscaping along the San Pasqual alignment. Landscape and hardscape **in this area** should reinforce the axial design of these spaces **so that this area may be reflective of the rest of the Caltech campus.** As of the first five-year compliance review, the axis began to be delineated with the construction of both the Moore Laboratory and the Avery House.

2. At Page 61 map, strike out lefthand margin arrow and entire note: "BREAK STREET TREES @ CAMPUS ENTRIES AND CONSTRUCT LANDSCAPED ISLAND @ AUTO DROP OFF."

3. At Page 61 map, strike out righthand margin arrow and entire note: "CREATE INFORMAL PARK @ WEST SIDE OF HOLLISTON ACROSS [SIC] FROM DORMS."

4. Change page 89 by revising the text of the third paragraph ("East-West Axis") to read as follows:

   While this axis is intended to be an open space along its entire length, it **should** be designed as a series of interconnected courtyards. **The design of the courtyards should be consistent with the Master Plans' "open space strategy." The width of the outdoor "corridors" formed by the building facades on either side should be approximately 120 feet wide. Optional arcades on building facades may project into the 120-foot width but should not reduce the "corridor" width to less than 80 feet.** Individual buildings along the axis **should** be clustered to form courtyards and interconnected by a system of **connecting outdoor "corridors", including** arcades, **tree allees and pedestrian paths. The "corridors", should** terminate at small at small pavilion structures, **tree groupings or other landscape features** (similar to those seen at the **original east-west axis)** at their intersection with Wilson Avenue and Holliston Avenue, to promote a consistent encoding of the gateways into the campus.

5. Change text beginning at the bottom of page ("Architecture, Academic Buildings") through 100 as follows:

   Caltech's original campus was designed with two distinctive architectural styles: that of the academic buildings in the western portion of the original campus and

that of the **south** dormitories and Athenaeum at the east end. The Goodhue design of the academic buildings was scholarly and classic in nature; they were unified with an arcade system to create sheltered courtyards and present a unified architectural statement rather than expressions of individual buildings. The architecture of Gordon Kaufmann at the Athenaeum, **and the S. Undergraduate Houses, however, reflected a more decorative style; they were unified with each other and the western portion of the campus by way of the landscaping along Olive Walk. However, it should be kept in mid that even in the western portion of the campus, there is a distinctive architectural expression exhibited in Elmer Grey's design of Parsons-Gates, the oldest building on the campus. This building is more reflective of Kaufmann's work than Goodhue's. This variance of style between the two ends of the original campus, and even within the western portion, works to create a more dynamic campus. Both the landscaping and the buildings contribute to make the campus a park for learning and discovery. The surroundings provide a framework conducive to realizing Caltech's mission. The campus is not a monotonous park of a singular architectural style but rather an ever changing setting starting with the styles of Goodhue and Kaufman, and continuing with a collection of buildings that reflect the styles of the various periods that they were built in. The architectural pastiches works because of the layout of the buildings, the carefully thought-out paths that connect them, the open spaces and the canopy of trees that provide shelter from the sun.**

Buildings north of the San Pasqual alignment, including along the east-west axis, should be designed in accordance with the principles that have made the campus so successful thus far. These principles do not imply architectural monotony but rather an active engagement with the present. That is, after all, Caltech's mission – to be building into the future using the wisdom of the past. In the spirit of this mission, buildings should be designed **as imaginative architectural visions, whether contemporary in design or reminiscent of the original buildings. However, they should also be designed** as part of a larger whole to be interconnected with **hardscape or landscape bordered** courtyards, **paths and open spaces.**

Recognizing the significance of Caltech's historic core, any physical changes or additions within the original campus **between California Boulevard and the San Pasqual alignment** should be sympathetic to and compatible with the **massing, size,** scale, **open space, materials** and architectural style of Caltech's original buildings.

The area south of California Boulevard was not added to the campus until after WW II. The existing buildings in this area are not good examples of the periods that they were built in. The remaining building sites along California Boulevard should seek to improve the overall appearance of this area with significant buildings of quality and distinction. This can be

achieved without relating to the buildings in Caltech's historic core on the north side of California because such an approach could dilute the overall character of the historic core and create a false sense of history.

The architecture and urban design of the existing campus suggest that the following general principles guide the design of new buildings **outside the historic core:**

- New buildings should be designed **in accordance** with the same principles for siting, massing, **size, scale** and **open space** that guided the design of buildings at the original campus bounded by San Pasqual Street, California Boulevard, Wilson Avenue, and Hill Avenue;

- **New buildings should be designed to be** compatible with the massing, scale, architectural treatment, and materials of nearby buildings and places;

- New building should not be designed in isolation, but address and seek to unify the architectural character of surrounding buildings.

- At the edge of the campus, the design of buildings should seek compatibility with the surrounding urban context, while contributing to a unified campus-wide image and character.

Add the following items to the previous amendment proposal:

6. At page 86, revise the 2nd sentence in the 1st paragraph under "BUILDING HEIGHTS AND SETBACKS" as follows: "Building heights are presented in **feet** above natural or finish grade."

7. At page 88, revise the 1st sentence in the 1st paragraph under "Building Heights" as follows: "Building heights for new facilities to be constructed at the campus are presented in **feet."**

8. At page 88, revise the 1st sentence in the 2nd paragraph under "Building Heights" as follows: "The **maximum** height of new academic buildings of two-, three-, four-, and six-story structures **is** 35 feet, 50 feet, 65 feet, and 100 feet respectively, measured to the top of the top plate at the uppermost floor with the following exceptions:"

9. At page 88, revise the 1st sentence in the 2nd paragraph under "Building Heights" as follows: "Mansard or pitched roofs may exceed the basic maximum permitted heights by 15 feet. **Occupied space is allowed within this 15 feet."**

10. At page 88, revise the 1st sentence in the 3rd paragraph under "Building Heights" as follows: "The **maximum** height of new residential facilities will be 25 feet and

35 feet measured to the top of the top plate at the uppermost floor of two- and three-story building respectively, with the following exceptions:"

11. At page 88, revise the 1st bulleted sentence in the 3rd paragraph under "Building Heights" as follows: "Mansard or pitched roofs may exceed the basic maximum permitted heights by 10 feet. **Occupied space is allowed within this 10 feet."**

12. At page 88, revise the 1st sentence in the 2nd paragraph under "GUIDELINES FOR ACADEMIC FACILITIES" as follows: "Most new academic building will be **50' high,** with one or two basement levels used for academic and administrative purposes.

13. At page 89, revise the 1st paragraph under "North Campus Facilities" as follows: "Buildings in the north campus area will be a maximum **of 50' high,** with the exception that new buildings flanking the gateway at Del Mar Boulevard and north of Beckman Auditorium may rise to **65' high,** while the central building at the southern end of the Gateway Plaza may rise to **100' high,** depending on final design. A **50' high** addition to the west side of Mead Laboratory is also planned.

14. At page 90, revise the 2nd and 3rd sentences in the 1st paragraph under "California Boulevard Facilities" as follows: "The height of new structures west of the new parking lot entry driveway shall be limited to **50'** to match the height of the Keith Spalding Building. The height of the structure east of the new driveway shall be limited to **35'**."

15. At page 91, revise the 1st sentence in the 1st paragraph under "Catalina Dormitories" as follows: "New dormitories at Catalina III will be **35'** in height, matching the scale of Catalina I and II; new facilities at Catalina IV, between Catalina and Wilson Avenues, north of San Pasqual Street, will be predominately **25'** in height as shown on the Catalina Avenue Dormitories map."

16. At page 92, revise the 1st sentence in the 1st paragraph under "Del Mar/Holliston Residential Facility" as follows: "The new undergraduate, graduate student, and faculty housing facility at the corner of Holliston Avenue and Del Mar Boulevard will be **25'** in height, harmonizing with the scale of the surrounding two- and three-story apartments and condominiums existing along the Del Mar Boulevard corridor."

17. At the map on page 87, change all the 'story' heights on the map to the corresponding 'feet' heights.

Design Review

The City of Pasadena has established design review procedures for new construction and rehabilitation that will apply to new development at Caltech as prescribed herein. Projects shall be reviewed and evaluated at three levels of concern: the campus, the specific area, and the individual building.

~~Alterations to Existing~~ Academic/Support Facilities or Dormitories

Permits for major exterior alterations or major additions to any existing academic or residential facility visible from the public right-of-way, and new facilities with more than 25,000 square feet of gross floor area, will be reviewed ~~by the Design Review Commission, if deemed necessary~~ by the Planning Director. New facilities exceeding 70,000 square feet of gross floor area and the tennis court/parking structure south of California Boulevard will be reviewed by the Design Commission. Recognizing the significance of Caltech's older facilities to both Caltech and the community, permit applications for major exterior alterations or major additions ~~to any of the existing academic/residential buildings, except single family houses, more than 50 years old~~ the facilities listed in Table 13 will be reviewed by the ~~Cultural Heritage~~ Historic Preservation Commission. The Secretary of the Interior's Standards for Rehabilitation shall apply to reviews affecting buildings listed in Table 13. Interior remodeling at existing facilities will not be reviewed under the Design Review process.

~~New Academic/Support Facilities or Dormitories~~

~~New facilities with more than 25,000 square feet of gross floor area will be reviewed by the Planning Director. Facilities exceeding 70,000 square feet of gross floor area, residential facilities with more than 50 units and the tennis court/parking structure and academic buildings south of California Boulevard will be reviewed by the Design Review Commission.~~

Existing Houses

Permits for major exterior alterations or major additions to the primary elevations of single-family houses that are visible from Del Mar Boulevard, Wilson Avenue, California Boulevard, Hill Avenue, Catalina Avenue, or Arden Road will be reviewed by the Planning Director. Interior alterations or exterior alterations/additions ~~not visible from these streets~~ on secondary elevations will not be reviewed under the Design Review process.

TABLE 13: FACILITIES WHERE MAJOR EXTERIOR ALTERATIONS OR ADDITIONS WILL BE REVIEWED BY THE HISTORIC PRESERVATION COMMISSION OR PLANNING DIRECTOR FOR COMPLIANCE WITH THE SECRETARY OF INTERIOR STANDARDS FOR REHABILITATION

South Undergraduate Houses
North Mudd Lab
Robinson Lab
Arms Lab
Gates Annex
Kerckhoff Lab
Crellin Lab
Parson-Gates
Bridge Labs
Bridge Annex
Dabney Hall
Thomas Lab
Guggenheim Lab
Athenaeum
Beckman Auditorium
Kellog Lab
Synchrotron Lab

Footnote: This list includes all academic/support facilities and dormitories ~~over 50 years old~~ that have not been significantly altered, and the only building less than 50 years old (Beckman Auditorium) that may be individually eligible for the National Register of Historic Places.

Appendix G

Responses to Comments

RESPONSES TO COMMENTS ON THE DRAFT EIR

INTRODUCTION

The Draft EIR for the proposed Caltech Master Development Plan Amendment Project was circulated for public review on August 22, 2006. The 45-day public review period concluded on October 6, 2006.

During the public review period, the City received oral comments on the Draft EIR at three separate public hearings as well as three written comment letters. The City also received one comment via telephone. Responses to these comments have been prepared to address the environmental concerns raised by the commenter and to indicate where and how the EIR addresses pertinent environmental issues.

The Draft EIR and the responses to comments collectively comprise the Final EIR for the Caltech Master Development Plan Amendment Project. Any changes made to the text of the Draft EIR correcting information, data or intent, other than minor typographical corrections or minor working changes, are noted in the Final EIR as changes from the Draft EIR.

The comments received at the public hearings are addressed first, followed by the written comment letters and the comment received via telephone. The comment letters have been numbered sequentially, and each issue within a comment letter, if more than one, has a letter assigned to it. References to the responses to comments identify first the letter number, and second, the comment letter (6A, for example). Where comments have been duplicated, the reader is referred to the response where the issue is first addressed.

COMMENTERS on the DRAFT EIR

The commenter along with the page number on which a summary of the comments or the comment letter appear are listed below. Responses to the summary of comments or comment letters immediately follow. If a letter includes more than one comment, the individual comments are lettered (1A, for example) and the responses that follow are lettered similarly.

Comments from the Design Commission Meeting of August 28, 2006
Draft SEIR and Design Guidelines and Design Review Thresholds
Caltech Master Development Plan Amendment

- Reaffirm the previous comments made by the Commission on March 13, 2006 in support of the revisions to the Design Guidelines.
- Concern about new additions to the North Undergraduate Houses encroaching south into the open space area.
- Recommend lowering the Design Review thresholds in the master plan to less than 70,000 square feet for Commission review. Specifically, the Commission recommends a threshold of 25,000 square feet for buildings along public streets and 50,000 square feet for buildings on the interior of the campus. Lowered thresholds are more desirable because the new guidelines are more open to interpretation.
- The plan should identify thematic elements in new buildings that would tie the architectural elements of the campus together in certain elements while still allowing for innovation.

COMMENTER: City of Pasadena Design Commission

DATE: August 28, 2006 (verbal comments made at public hearing)

RESPONSE:

Response A

The commenters' reiterate their support for the revisions to the Design Guidelines, as originally expressed in their March 13, 2006. Comment noted. No response is necessary.

Response B

The commenters' note concerns regarding the encroachment of the new additions to the North Undergraduate Houses encroaching into an open space area. Per the commenters' recommendation in its March 13, 2006 letter, the EIR addressed this concern in Section 4.1, *Aesthetics,* by recommending the following mitigation measure.

> **AES-1(c) Avoidance of Open Space.** Caltech shall avoid constricting or obstructing the open space area west of the Athenaeum. Replacement of the North Undergraduate House rather than rehabilitation would avoid this impact and would be the preferred scenario for preservation of the existing open space and preservation of existing visual resources in the area. However, if avoidance of this open space area is not feasible, the rehabilitation scenario shall incorporate a landscape element along the southern building façade. Landscaping should be developed to soften the visual impacts of new development within the existing north-south open space corridor east of the Athenaeum.

Further, the alternatives analysis in Section 6.0, *Alternatives,* examines two alternatives that would restrict development of the North Undergraduate Houses to their existing footprint and would require that the development not exceed its existing setbacks from adjacent open space and view corridors. Specifically, these alternatives would prevent the expansion of the houses to the east, across an existing structured open space and view corridor. Of the development alternatives, the EIR concludes that these alternatives would have the least overall impact and would reduce and avoid impacts to open space areas and visual corridors.

Response C

The commenters recommend lowering the Design Review thresholds in the master plan from 70,000 square feet for Commission review to 25,000 square feet for buildings along public streets and 50,000 square feet for buildings on the interior of the campus. The commenters state an opinion that the lower thresholds are more desirable because the new guidelines are more open to interpretation. The Design Commission's comments on lowering the design review thresholds of 25,000 square feet for buildings along public streets and 50,000 square feet for buildings on the interior of the campus were taken into consideration and noted as comments in the EIR for the amendments to the Master Plan. Although these comments are noted in the EIR,

they are not environmental comments, but pertain to the Caltech Master Plan Amendments. The Planning staff will present recommendations to the Planning Commission and City Council on lowering the design review thresholds for the Caltech Master Plan.

Response D

The commenters recommend that the plan identify thematic elements in new buildings that would tie the architectural elements of the campus together in certain elements while still allowing for innovation. This recommendation is noted and will be considered by City decisionmakers. However, the EIR's purpose is to analyze the impacts of the plan amendments that are currently proposed, which do not include the commenters' recommendation.

Comments from the Historic Preservation Commission – September 8, 2006

Members present: Bruce Jimenez (Vice-chair), Richard Doren, Ken Miedema, Marcia Sota, Jim Ipekjian

Recommend approval of staff recommendation – including Table 13 with the design review thresholds for historic properties on the Caltech campus – with the following additional specifications:

- The future design, massing, and location of the expanded North Undergraduate Houses shall respect the Athenaeum and its setting. The new construction should avoid as much as possible the mature trees in the open space on the west side of the Athenaeum.
- At its eastern edge, the expanded (or newly constructed) North Undergraduate Houses shall match (or closely approximate but not exceed) the footprint and massing of the east wing of the South Undergraduate Houses to respect the open space and setting of the Athenaeum.
- The Historic Preservation Commission shall review the massing and footprint of the expanded (or newly constructed) North Undergraduate Houses, and the Design Commission shall review the design.

- The approach for new architecture outside the "historic core" of the early campus. (In these areas—e.g., south of E. California Blvd.—the revised guidelines more forthrightly encourage innovative architecture in line with the scientific endeavors at the university and with the city-wide design principles in the General Plan.)

- Technical clarifications and terminology to align with guidelines with the zoning code. (The revisions rely, for example, of feet instead of stories to define the heights of new buildings.)

Public Hearing:
The following persons spoke:
Hall Daily, applicant-in favor
Brad Smith, Caltech project manager-in favor
Bonnie Khang-Keating, Caltech architect-shared the following:
- Master plan—with amendments—retains 80% open space on the campus.
- Guidelines in existing master plan were drafted 21 years ago.
- Caltech is searching internationally for the "world's best architects" and wants its new buildings to reflect current architecture and the evolution of scientific research.
- The campus has places for both "signature" buildings and opportunities for new buildings that are compatible with existing historic buildings.
- The primary intent of the revised guidelines is to increase the amount of freedom in the design of new buildings outside the historic core of the campus; to some extent the revised guidelines are a request to codify actions taken by the City Council when it approved the Broad Center building.

Action:
No action taken due to advisory only, but the following comments were made by the Commission members:

- Exciting for the City that Caltech is choosing celebrity architects.
- Support approach of bringing current architecture to Pasadena.
- Endorse the idea of "keeping the bar high" and avoiding mimicry of 1920s-era architecture.
- Encourage dual approach of retaining historic pieces and introducing contemporary works.
- Fusion of linking the campus through landscaped courtyards and paths along with works by eminent architects and historic buildings has exciting possibilities.
- The statement proposing "creative, dynamic architecture of our time" is too vague for a guideline; it does not offer sufficient direction to a design team.
- Linked pathways and walkways could substitute existing phrasing about connecting arcades.
- Omit mission statement on p. 4.
- Ensure that there is adequate floor-to-ceiling height (e.g., 17 feet) in the dimensions cited on p. 7 (height).

7:38 p.m. Commissioner Wilson recused himself from then meeting due to a conflict of interest.

7:54 p.m. Commissioner Lomako excused himself from the meeting.

4. APPLICATION FOR FINAL DESIGN REVIEW

A. 600 N. Fair Oaks Avenue, Fair Oaks Court – Rehabilitation of existing buildings and new construction; a mixed-use development with 31 residential units and one office/community room over subterranean parking. (Applicant: Heritage Housing Partners; Architect: Moule/Polyzoides). (Staff/Cronin). **Council District #3**

COMMENTER: City of Pasadena Historic Preservation Commission

DATE: September 8, 2006 (verbal comments made at public hearing)

RESPONSE:

Response A

The commenters recommend approval of the proposed revisions to the design review thresholds for historic properties, with inclusion of three specifications. These recommended specifications are discussed individually in Responses B – D.

Response B

The commenters recommend that future design, massing, and location of the expanded North Undergraduate Houses respect the Athenaeum and its setting and that the new construction should avoid as much as possible the mature trees in the open space on the west side of the Athenaeum.

As discussed in Response B to the City of Pasadena Design Commission comments, Mitigation Measure AES-1(c) protects the setting of the Athenaeum by requiring Caltech to "avoid constricting or obstructing the open space area west of the Athenaeum. Replacement of the North Undergraduate Houses rather than rehabilitation would avoid this impact and would be the preferred scenario for preservation of the existing open space and preservation of existing visual resources in the area." Further, mitigation measures AES-1(a) and BIO-1(a) protect mature trees by requiring tree protection plans, tree relocation and replacement. Measures AES-1(a) and BIO-1(a) are listed below.

AES-1(a) **Landscaping Plan.** For each building in connection with the proposed amendments, the applicant shall submit a landscape plan that will have as a goal to restore the theme and visual integrity of existing landscaped areas. The design of landscaping at the new buildings should continue to promote integration of open space between existing and new buildings. Landscaped areas between new facilities within building envelopes should be consistent with the general character of the surrounding area and should promote a unified image for the campus. The landscaping plan required under BIO-1 will follow the provisions herein; therefore no significant impacts on aesthetics will result from the proposed amendments.

BIO-1(a) **City Trees and Tree Protection Ordinance.** Prior to the issuance of a building permit for each individual building in connection with the proposed amendments, the applicant shall submit a landscape plan including proposed tree removals and replacement, for review and approval by the Planning and Development Director or the Design Commission, according to the review thresholds in the CMDP. Such plan shall show the square feet of tree canopy coverage proposed to be removed within the development site. The area of removed

canopy shall be replaced at a ratio of 1:1 through a combination of relocated and new trees planted within areas of the development site that are suitable for new tree planting. While canopy replacement on the development site shall be the first priority, any canopy that cannot be reasonable replaced onsite, shall be replaced within other areas of the campus that are targeted by the CMDP for landscaping. While incorporating a range of species necessary to maintain the landscaping theme existing in the campus, the landscape plan shall also provide for the replacement of removed trees with native and specimen trees protected under the Tree Protection Ordinance. Further replacement trees shall achieve equal or greater canopy than the canopy removed within 5 years of implementation of the landscaping plan.

A Tree Protection Plan shall be prepared in accordance with the Tree Protection Guidelines per Chapter 8.52 of the Pasadena Municipal Code. The plan shall detail the protective measures to be used during demolition and construction of each building site proposed in the amendment. The plan shall be reviewed and approved by the Planning staff prior to issuance of any grading or building permits.

The applicant shall submit a landscape/planting plans for review and approval as provided in the provisions of the amended Master Plan.

Response C

The commenters recommend that at its eastern edge, the expanded (or newly constructed) North Undergraduate Houses should match (or closely approximate but not exceed) the footprint and massing of the east wing of the South Undergraduate Houses to respect the open space and setting of the Athenaeum.

Mitigation Measure H-2 in Section 4.4, *Historic Resources*, requires that expansion or new development consider and respect the open spaces and setting of the Athenaeum through review by the Pasadena Design Commission for the project's conformance with the current setting of the Athenaeum. Measure H-2 is listed below.

H-2 **Design Review.** The design of any construction on the location of the North Undergraduate Houses (either alterations to the existing building or demolition and construction of new buildings) shall be subject to the review of the Pasadena Design Commission in order to assure its conformance to the Secretary of Interior's Standards with respect to its relationship to the Athenaeum, South Undergraduate Houses, and the landscape design for the Athenaeum.

The EIR also examines several alternatives which would limit construction or expansion of the North Undergraduate Houses to its current footprint. These are discussed in Section 6.0, *Alternatives*, and in Response B to the City of Pasadena Design Commission comments.

Response D

The commenters recommend that, prior to approval, the Historic Preservation Commission should review the massing and footprint of the expanded (or newly constructed) North Undergraduate Houses and the Design Commission should review the design.

Comments noted. As indicated in Response C to the City of Pasadena Design Commission comments, Mitigation Measure H-2 requires that "the design of any construction on the location of the North Undergraduate Houses (either alterations to the existing building or demolition and construction of new buildings) shall be subject to the review of the Pasadena Design Commission."

TRANSPORTATION ADVISORY COMMISSION (TAC)
Thursday, September 7th, 2006

Summary of Meeting Discussion
and Commissioner Comments

A. Caltech Master Development Plan SEIR – Planning Department

1) Lanny Woo, presented an overview of the draft SEIR for the Caltech Master Plan and recommended that the Commission review and comment on the draft SEIR and forward comments to the Planning Commission and City Council.

2) Commission Comments and Recommendations:

- The EIR should address the impact of fee based parking in the campus lots on adjacent residential streets.
- The EIR should consider and may render the number of available parking spaces listed in the SEIR as misleading.
- "Priority parking" could reduce the number of spaces available to the student and visitor populations.
- The SEIR should analyze the impact of construction on traffic.
- The traffic analysis applied to this project uses the same assumptions and methodology that was used for the Sares Regis project.
- The SEIR should consider significant impacts at the intersections at Wilson and California, Hill and California (Pg. 4.5-15) and Lake and California and study ways in which to mitigate these impacts.
- The SEIR should indicate whether or not the applicant is participating in the Fair Share Trip Reduction Fee.
- Given the low or poor level of service at many of the intersections around Caltech, staff should provide more innovative recommendations for non-auto travel in this area.
- The SEIR should consider a recommendation to reduce the number of automobile parking spaces as a means of reducing traffic.
- The SEIR should include an analysis of non-auto travel.

In addition to these comments, the following written comments were submitted by individual commissioners:

Commissioner Robert Holmquist

1. Why is California between Lake and Hill allowed to be a Hands off area? Two college campuses, Cal Tech, PCC, Poly Tech School, and St Philip's Grammar School are all right there. Surely they require better traffic signals.
2. Is each school looked at separately? If you look at them together a lot more should be done regards ridesharing, vanpooling, and bike lanes and, car and bike parking. Perhaps a study of the effects of all four schools together should be made.

Commissioner Jennifer Higginbotham

1. The SEIR should consider the impact of construction activity on parking and traffic, especially since this is a multi-year project and part of an ongoing building plan.
2. The SEIR should acknowledge the CalTech Master Plan was approved when California Boulevard had 4 lanes (2 each direction), but has now been narrowed to a 2-lane road and remains designated a de-emphasized street. The definition of de-emphasized street should be stated in the SEIR.
3. The SEIR should include the construction parking and traffic plan.
4. The SEIR should consider the impact of fee-based and preferential on-campus parking on neighborhood parking. The current draft SEIR indicates there is no shortage of available parking. However, CalTech converted one parking lot from free parking to fee-based parking, which has effectively pushed many parked cars into the adjacent neighborhoods and caused an outcry.
5. The SEIR should acknowledge the current neighborhood parking problems and detail the steps the City and CalTech have taken and will take to mitigate these problems.
6. The SEIR should consider the impact/level of non-auto travel as a means of assessing the need for additional parking for bicycles and/or safeguards for pedestrians.
7. I do not believe the SEIR should include any recommendations for reducing available on-campus parking given the existing neighborhood complaints about parking off-campus. If they are made, any recommendations for reducing available parking should be accompanied by recent research indicating rapid behavior changes based on unavailable or inconvenient vehicle parking. Given the availability of free neighborhood parking, I believe overflow CalTech parking would end up in the adjacent neighborhood rather than switch to non-auto modes of travel. If no nearby free neighborhood off-campus parking existed, then restricting parking to encourage non-auto travel might be effective in the long term.
8. The SEIR should include methods for maintaining current LOS ratings for key intersections such as Lake and California (specifically those on de-emphasized streets) rather than passively allowing the LOS to decline to F

levels, which I believe is in direct conflict with the updated Mobility Element.

3) Action Taken:

No action was taken. The Commission agreed to submit a summarized list of comments and recommendations.

COMMENTER: City of Pasadena Transportation Advisory Commission

DATE: September 7, 2006 (verbal comments made at public hearing)

RESPONSE:

Response A and B

The comments states that the EIR should consider the impact of fee-based parking at Caltech and that the implementation of fee-based parking at Caltech may render the discussion of available parking on campus as misleading. In October 2005, following the opening of the new California Parking Structure, Caltech implemented a fee-based parking system on weekdays from 7:00 a.m. to 5:00 p.m. There is no charge for parking on campus during evening and weekend hours.

The EIR acknowledges that, under current conditions, there is some spillover of Caltech-related parking on the surrounding neighborhood streets. The City is actively working with residents and Caltech to address this issue. As part of the modified conditions that were approved by the Board of Zoning Appeals for Conditional Use Permit #4253 (CUP #4253 – Caltech Parking Structure), Caltech was to conduct a neighborhood meeting to clarify the concerns of the neighboring residents. Caltech also had to develop a plan for the full use of the parking structure on California Boulevard. The plan was to contain strategies and actions that were to be taken to insure the full use of the 700 space parking structure. The plan was to include but not limited to the following strategies: a) reduction or elimination of parking fees for parking in the parking structure; b) provision of a (free) shuttle service between the parking structure and the main area of the campus; c) assignment of specific parking spaces in the parking structure to students, faculty, and employees; d) provide additional guards and security to make those that use the parking structure feel that they are safe in the parking structure, and traveling between the parking structure and the main campus.

The change in the management of the available on-campus parking supply (i.e., fee-based parking) however, is not an element of the proposed Caltech Master Development Plan Amendment project and its effects are not related to the proposed project. The EIR's purpose is to analyze the impacts of the plan amendments that are currently proposed, not existing issues or problems not caused by the proposed project.

As noted in the Draft EIR, per CEQA, a parking impact is considered significant if it would cause a deficiency in parking. The Draft EIR analysis shows that Caltech currently has and will continue to have adequate parking to accommodate its demand.

The Draft EIR documents that in 2004 the on-campus parking supply was 2,708 spaces, approximately 206 spaces less than the demand. Following the opening of the California Parking Structure in May 2005, the on-campus parking supply increased to 3,394 spaces, with a surplus of 516 spaces. Under 2015 conditions, a surplus of 114 spaces is projected.

The management of the parking supply is a separate issue from the availability of that parking.

Response C

The comment states that the presence of "priority parking" on campus could reduce the number of spaces available to the student and visitor populations.

Restrictions on the use of spaces in the existing on-campus parking supply are noted in the Draft EIR. The development of a parking demand factor for the campus, used in projecting future parking demand, includes the assumption that some parking spaces will continue to be reserved for specific uses or for specific individuals, but allows a sufficient number of spaces to accommodate the projected increases in student enrollment. As noted in Response B, a parking impact is considered significant if it would cause a deficiency in parking; however, a surplus of parking is projected through 2015. Therefore, adequate parking is available.

Response D

The comment states an opinion that the Draft EIR should analyze the traffic impacts of construction. The project analyzed in the Draft EIR proposes changes to the Caltech Master Development Plan that would accommodate several specific building projects on the campus. Approval of the project would not eliminate the need for each of those specific building projects to proceed through the City's normal process for granting building permits. That process includes a review of the proposed building plans and the imposition of appropriate restrictions related to truck haul routes, hours of construction activities and construction-related parking, construction staging and a construction management plan. These plans are subject to review and approval by the Department of Transportation.

Response E

The commenter expressed concern that the traffic analysis utilized for the project uses the same assumptions and methodology that were used for the Sares Regis project.

The Draft EIR traffic analysis followed the methodology currently required by the City. This methodology was also used in the assessment of potential traffic impacts related to the Sares Regis project, as well as numerous other projects that have been recently considered by the City. It is noted that concerns with some aspects of this methodology have been expressed by members of the Transportation Advisory Commission and Planning Commission. On September 18, 2006, however, when the City Council upheld the appeal of the Planning Commission's decision regarding the Sares Regis project, the traffic analysis methodology was discussed and validated by the Council and will continue to be used in the review of future projects.

Response F

The comment states that the Draft EIR should consider ways to mitigate the potential traffic impacts at Wilson Avenue & California Boulevard, Hill Avenue & California Boulevard and Lake Avenue & California Boulevard. The traffic analysis in the Draft EIR found that the proposed Caltech Master Development Plan Amendment project would not result in traffic impacts above the level of significance at these intersections, nor at other analyzed locations. For this reason, no mitigation measures are required.

Response G

The comment states that the Draft EIR should indicate whether or not the applicant will be required to participate in the Fair Share Trip Reduction Fee being developed by the City. As proposed, the Traffic Impact Fee would apply to commercial (retail and office), industrial, and residential land uses. Institutional land uses were not included in the fee recommendation to City Council.

Response H

The comment states that, given the poor levels of service at intersections around Caltech, staff should recommend measures to encourage non-automotive travel in the area. The Draft EIR analysis found that two of the nine study intersections are currently operating at LOS E and that under projected 2015 cumulative plus project conditions three of the nine study intersections would operate at LOS E or F. As noted in the Draft EIR, "traffic associated with the proposed project would incrementally increase delays at study area intersections. However, the changes in the ICUs and delays would not be significant at any study area intersections based on City criteria." Therefore, no specific mitigation measures to reduce Caltech-related traffic growth are required.

It should be noted that the City is actively promoting non-automotive travel citywide through implementation of the policies and programs described in the Pasadena Mobility Element and that staff have made specific recommendations pursuant to those policies that relate to the Caltech Master Development Plan Amendment project. These include continued participation in the City's Transportation Demand Management program, provision of at least 170 bicycle parking spaces on campus, funding enhancements to certain existing bus stops, funding new pedestrian countdown indicators and participation in the Citywide Transportation Monitoring Program. Currently, Caltech has approximately 200 bicycle parking spaces spread throughout the campus. With the addition of at least 170 bicycle parking spaces, a total of 370 spaces would be located on the campus.

Response I

The comment states that the Draft EIR should consider a recommendation to reduce the number of automobile parking spaces as a means of reducing traffic. It should be noted that, although the Master Development Plan allows for the construction of new parking structures on the campus, none are currently being proposed for development.

As discussed in the Responses A through C, the future parking supply will be adequate to accommodate the projected demand. As discussed in Response H, because the proposed Caltech Master Development Plan Amendment project would result in no significant traffic impacts, no traffic mitigation measures are required. Page 4.5-13 of the Draft EIR states that, "impacts to on-site parking availability are considered significant if the proposed project would cause a deficiency in parking, or if an individual project does not provide adequate parking for the specific use that is proposed." Reducing the amount of parking on-campus could potentially result in undesirable significant parking impacts (e.g., overflow parking into the neighborhoods).

Response I

The comment states that the Draft EIR should include an analysis of non-auto travel. This issue was considered during the preparation of the Initial Study for the proposed project and it was determined that the project would not conflict with adopted policies, plans or programs supporting alternative transportation. The assessment of transportation/traffic impacts under CEQA focuses on an impact analysis of vehicular traffic related to specific projects. Extensive analysis was conducted in accordance with the City's guidelines to adequately assess the potential transportation impacts of the proposed project. In addition, Caltech is subject to the Trip Reduction Ordinance and is required to submit an annual Transportation System Management Program Plan to the City.

Response K

The comment asks why the segment of California Boulevard between Lake Avenue and Hill Avenue is a "Hands off area." The City, through the development and adoption of the Pasadena Mobility Element, has identified certain streets for "de-emphasis." Among them is California Boulevard east of Lake Avenue. Pursuant to the policies and programs described in the Pasadena Mobility Element, the number of peak period through traffic lanes on this segment of California Boulevard has been reduced from four to two. In addition, strategies through signal operations have been in place to reduce cut-through traffic on California Boulevard. Although means to improve signal operations and increase the capacity of this street are technically feasible, the City's adopted policies preclude their implementation. Also, please see Responses F and N.

Response L

The comment asks whether each of the several educational facilities located near Caltech, including Pasadena City College, Pasadena Polytechnic School and St. Phillip's Grammar School, are looked at separately and notes that non-automotive travel (carpooling, vanpooling, cycling) in the area could be more strongly encouraged if travel to all four schools were considered together.

The City must consider each new development proposal, or renewal of an existing Master Plan, on its own as it is presented and at the time it is presented. Because there is no formal link between the schools cited in the comment, conditions at each school are considered separately from an environmental impact perspective. However, all four schools have been included in the cumulative analysis because the traffic to/from the three nearby schools has been included in the background conditions for the proposed project. Also, it should be pointed out that Caltech and Polytechnic coordinate special events and often share parking supplies to reduce impact on the adjacent neighborhoods.

Response M

The comment states that the Draft EIR should analyze the traffic impacts of construction. Please see Response D.

Response N

The comment states an opinion that the Draft EIR should acknowledge that the Caltech Master Development Plan was originally approved when California Boulevard provided four peak period through travel lanes. The comment also requests a definition for "de-emphasized" streets.

It is acknowledged that the Caltech Master Development Plan was originally approved in 1989, before California Boulevard was de-emphasized pursuant to the policies and programs described in the Pasadena Mobility Element. As described on page 34 of the Pasadena Mobility Element, in 1994 the City designated certain streets for de-emphasis and adopted a "policy to limit the growth of future traffic volumes on certain streets ... in order to protect residential neighborhoods. No capital or operational transportation improvements will be made to increase traffic on the de-emphasized streets."

Response O

The comment states that the Draft EIR should include the construction and parking plan. Please see Response D.

Response P

The comment states that the Draft EIR should consider the effects of fee-based parking and reserved parking on campus. Please see Responses A through C.

Response Q

The comment states that the Draft EIR should acknowledge the current neighborhood parking problems and detail the steps the City and Caltech have taken and will take to mitigate these problems.

As noted on page 45 of Appendix D to the Draft EIR, the introduction of fee-based parking at Caltech "has resulted in spillover parking on some neighborhood streets near Caltech. The City is currently investigating residential parking in the area immediately south of Caltech. Please see Responses A-C.

Response R

The comment states that the City should assess the impact of non-automotive travel on the need for additional bicycle parking and/or pedestrian safeguards. Please see Response H.

Response S

The comment does not support a reduction in the on-campus parking supply because it could result in additional undesirable spillover of Caltech-related parking in the surrounding neighborhoods. The commenter states an opinion that a reduction of on-campus parking would likely result in more spillover to the neighborhoods and that a reduction in on-campus parking supply would only result in a change in mode to non-auto travel if there were no free parking alternatives available to students and faculty/staff – which is not the case in this

instance. These comments are noted, but do not pertain to the EIR analysis. No response is necessary.

Response T

The comment states that the Draft EIR should include methods for maintaining current levels of service at key intersections, such as Lake Avenue & California Boulevard, rather than allowing them to worsen. The traffic analysis has been prepared in accordance with the City's guidelines and established thresholds. The analyses concludes that the key intersections proposed under the Master Development Plan, will not exceed the threshold of significance, thus no mitigation measures are required. As noted on page 4.5-7 of the Draft EIR, the City is actively implementing the programs and policies described in the Pasadena Mobility Element, including intelligent transportation systems (ITS) improvements. These improvements will enhance the capacity of streets and intersections on designated multimodal corridors throughout the City, including Del Mar Boulevard, Lake Avenue north of California Boulevard and Hill Avenue north of Del Mar Boulevard. Further, it should be noted that the Draft EIR analysis found that the proposed project would result in no significant traffic impacts at the intersection mentioned in the comment, nor at other analyzed locations.

WATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road, Whittier, CA 90601-1400
Mailing Address: P.O. Box 4998, Whittier, CA 90607-4998
Telephone: (562) 699-7411, FAX: (562) 699-5422
www.lacsd.org

JAMES F. STAHL
Chief Engineer and General Manager

September 20, 2006

File No: 16-00.04-00

Mr. Lanny Woo, Associate Planner
Planning and Development Department
City of Pasadena
175 North Garfield Avenue
Pasadena, CA 91101-1704

Dear Mr. Woo:

California Institute of Technology (Caltech) Master Development Plan Amendment

The County Sanitation Districts of Los Angeles County (Districts) received a Draft Environmental Impact Report for the subject project on August 30, 2006. The proposed development is located within the jurisdictional boundaries of District No. 16. We offer the following updated information and comments regarding sewerage service:

1. *Page 4.6-1, Setting, a., Wastewater:* The Districts' Allen Avenue Trunk Sewer, Sections 1, 2, and 4 conveyed peak flows of 0.3-1.8 million gallons per day (mgd) when last measured in 2006. The Districts' San Marino Outfall Trunk Sewer conveyed a peak flow of 1.3 mgd when last measured in 2006. The Districts' Chapel Avenue Trunk Sewer, Section 2, conveyed a peak flow of 0.5 mgd when last measured in 2006. The Districts' Lamanda Park Trunk Sewer conveyed a peak flow of 10.7 mgd when last measured in 2006. The San Jose Creek Water Reclamation Plant (WRP) currently processes an average flow of 88.4 mgd. The Whittier Narrows WRP currently processes an average flow of 6.9 mgd. The Los Coyotes WRP currently processes an average flow of 30.2 mgd.

2. *Figure 4.6-1, Legend:* All references to sewer line "width" should be changed to sewer line "diameter."

3. All other information concerning Districts' facilities and sewerage service contained in the document is current.

4. The Districts encourage distribution of large environmental documents in electronic format in order to reduce paper waste. Whenever possible, please submit these documents on CD (pdf files) or provide Notices of Availability that include website information for downloading environmental documents.

If you have any questions, please contact the undersigned at (562) 908-4288, extension 2717.

Very truly yours,

James F. Stahl

Ruth I. Frazen
Engineering Technician
Facilities Planning Department

RIF:rf

692289.1

Letter 1

COMMENTER: Ruth I. Frazen, Engineering Technician, County of Sanitation Districts of Los Angeles County

DATE: September 20, 2006

RESPONSE:

Response 1A

The commenter provides updates to the sewerage service rates provided in Section 4.6, *Utilities and Service Systems*. The conveyance measurements on pages 4.6-1, 4.6-4, and 4.6-5 of the Final EIR have been updated to reflect the latest measurements taken in 2006. The measurements represent an overall reduction in peak flows and an increase in available capacity. Therefore, these updates provide that the County facilities have a greater capacity for waste. Thus, with these updates the project would still have a less than significant impact with respect to wastewater facilities.

Response 1B

The commenter notes that all references to sewer line "width" should be changed to "diameter." This comment is noted and the appropriate changes to Figure 4.6-1 have been made.

Response 1C

The commenter states that all other information concerning Districts' facilities and sewerage service contained in the document is current. This comment is noted. No response is necessary.

Response 1D

The commenter encourages distribution of large environmental documents in electronic format in order to reduce paper waste and requests submittal of such documents digitally. This comment is noted.

651 South Saint John Avenue
Pasadena, California 91105 2913
Telephone 626 441 6333
Facsimile 626 441 2917

PASADENA HERITAGE

October 6, 2006

Lanny Woo
Associate Planner
Planning & Development Department
175 North Garfield Avenue
Pasadena, CA 91101

RE: Caltech Master Development Plan Amendment

Dear Mr. Woo:

Pasadena Heritage would like to submit the following comments on the Draft Environment Impact Report for the Caltech Master Development Plan Amendment. We want to commend Caltech for their ongoing protection of the important historic resources located on the campus, and for the care that has gone into this new plan.

Section 4.4 Historic Resources

The revised plan calls for the removal or reconstruction of five potential historic resources on the campus. Several of these structures (the Braun Graduate House, Marks Graduate House, and North Undergraduate Houses) were part of the of the 1952 master plan that was created by the renowned architectural firm of Pereira and Luckman. (Note that throughout the document, Charles Pereira's name is misspelled as Pereria.) The document states that most of the buildings are largely unaltered and in good condition, but that they are not eligible for state, federal, or local listing because they do not meet the fifty-year threshold (or have achieved exceptional merit) for consideration as historic resources. However, several are on the precipice of reaching this milestone, and the late modernist period to which these structures belong is now receiving the deserved attention by scholars -- for example, in 2002 a symposium on Pereira was held at the University of California-Irvine, and USC published a book on his work. Before a final determination is made on any buildings that are slated for demolition, we ask that additional study be undertaken by a Modern architecture specialist to determine their relative significance in comparison to other buildings from this period.

In addition, we feel that the importance of the Pereira-Luckman plan is not adequately addressed in the document, and that it will be important to look at the individual buildings in relation to their contribution to the 1952 master plan of the campus. It is not entirely clear to us is how the current master plan fits in with the 1952 historic plan, which we understand was created with the goal of protecting the earlier structures on the campus (eg the Athenaeum and Gordon Kaufmann's Undergraduate Houses), while providing opportunities for additional development on the campus. What seems to be needed is an evaluation of where the current plan deviates from the 1952 plan so as to understand the overall impact on the historic nature of the campus.

North Undergraduate Houses

PASADENA HERITAGE

The current plans call for either rehabilitation or removal of these structures. Pasadena Heritage advocates for their rehabilitation, as the buildings appear to be relatively intact and in good condition. In addition, because they are located in close proximity to other historic resources and were designed to complement those structures, retaining them would be the best preservation solution.

Braun and Marks houses

These structures would both be lost under the current plan, to be replaced by a new dormitory. These are both intact examples of International Style architecture, and both were constructed in accordance with the Pereira-Luckman Plan. Again, we ask that these buildings be re-evaluated and considered for retention.

Physical Plant

Although this building was also created as part of the Pereira-Luckman plan, it is not as significant architecturally as the other buildings, and we are amenable to its removal to accommodate the plans for a new Campus Center.

Not addressed in the document is the Tolman-Bacher House, which we noted from the 1999 master plan was scheduled for relocation to another site on the campus in 2004. Are there currently plans for moving the house, or will it remain in its current location? We understand that this may be outside the scope of the DEIR currently under review, but we are concerned about its fate.

Finally, we urge the careful consideration of the designs for any new buildings proposed for the campus, particularly those that are immediately adjacent to important historic resources such as the Athenaeum. It is exceedingly difficult to fit new buildings among old that complement the existing structures without resorting to false historicism or mimicry. Caltech continues to be a place for avant-garde architecture, which we applaud, but we urge the design team to carefully consider the context of the surrounding campus. We would also encourage Caltech to consider nominating the portion of the campus laid out first by Myron Hunt and continued by Bertram Goodhue as a National Register Historic District, which would officially recognize these important resources and provide an opportunity for Caltech to qualify for funding opportunities for their maintenance and rehabilitation.

Thank you for the opportunity to comment.

Sincerely,

Susan N. Mossman
Executive Director

Christine Lazzaretto
Preservation Director

Letter 2

COMMENTER: Susan N. Mossman, Pasadena Heritage

DATE: October 6, 2006

RESPONSE:

Response 2A

The commenter notes the correct spelling of architectural firm Pereira and Luckman. This comment is noted. The spelling has been corrected in the Final EIR.

Response 2B

The commenter states that although many buildings on campus are not currently eligible for state, federal, or local (no age limit) listing because they do not meet the 50-year threshold (or have achieved exceptional merit) for consideration as historic resources, several are on the precipice of reaching this milestone. The commenter further states an opinion that the importance of the Pereira-Luckman plan is not adequately addressed in the Draft EIR. The commenter suggests that an additional study be undertaken by a Modern architecture specialist prior to individual project approval to determine their relative significance in comparison to other buildings from this period and evaluate how the proposed plan revisions deviate from the 1952 plan.

This comment is noted; however, while the Pereira-Luckman master plan was adopted over 50 years ago, the majority of the buildings constructed as a result are currently less than 50 years of age. As noted in the EIR, the minimum age criterion for the National Register of Historic Places and the California Register of Historic Resources is 50 years. Properties less than 50 years old may be eligible for listing on the NRHP if they can be regarded as "exceptional," as defined by the NRHP procedures, or in terms of the CRHR, "if it can be demonstrated that sufficient time has passed to understand its historical importance" (Chapter 11, Title 14, §4842(d)(2)). Even if this master plan were to be regarded as potentially eligible, the essential physical features of the plan, represented by the buildings and other improvements, do not qualify under the "exceptional" criterion. As stated in the EIR, none of the structures studied appear to rise to the exceptional level, either on historical or architectural grounds. **Further, these buildings were in either event not designed by Pereira and Luckman, but by the firm of Smith, Powell and Morgridge, or other architects working under their direction and the buildings have no architectural interest or distinction.**

Further, all of the buildings proposed for demolition or rehabilitation were examined for historical significance, pursuant to CEQA standards, as delineated in subsection 4.4.1.(c), *Regulatory Setting*, of Section 4.4, *Historic Resources*. As noted under Impact H-1, "none of the structures proposed for demolition are included on the lists of historic resources in the original Master Plan EIR or the 1986 historic resource survey report. Structures that were previously not considered historic have been re-evaluated by SBRA, who conducted analysis of the structures proposed for demolition under the current policies and ordinances affecting eligibility of historic resources." Therefore, an updated survey was conducted to ensure

compliance with CEQA. Additional studies would not be necessary to comply with CEQA's environmental review requirements.

Response 2C

The commenter notes that the Tolman-Bacher House was not discussed in the EIR and asks if there are currently plans for moving the house. The proposed master plan amendments do not include any plans to move or otherwise affect this house. Because the purpose of the EIR is to address the significant effects of the currently proposed amendments, consideration of the Tolman-Bacher house is not warranted. The certified 1989 EIR for the Caltech Master Development Plan provided analysis of the Tolman-Bacher house. As part of the mitigation measure for the Master Plan, the Tolman-Bacher house was to remain on site for 15 years. After that period, it was to be relocated to a new site within the campus. Currently, the Tolman-Bacher house has remained on its original site. The proposed amendments to the Caltech Master Plan do not involve changes to this building or this site.

Response 2D

The commenter requests that Caltech consider nominating the portion of the campus laid out first by Myron Hunt and continued by Bertram Goodhue as a National Register Historic District, which would officially recognize these resources. This comment is noted; however, the purpose of the EIR is to identify the potentially significant environmental effects of the currently proposed master plan amendments. Mitigation measures contained in the DEIR addresses the potential impacts of the project on the setting of identified historic properties, and the implementation of the Secretary of the Interior's Standards as the appropriate methodology for mitigating these potential impacts.

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
www.ladpw.org

DONALD L. WOLFE, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

October 11, 2006

IN REPLY PLEASE
REFER TO FILE: LD-0

Mr. Lanny Woo
Planning and Development Department
Permit Center
City of Pasadena
175 North Garfield Avenue
Pasadena, CA 91101

Dear Mr. Woo:

RESPONSE TO NOTICE OF COMPLETION
FOR DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT
CALTECH MASTER PLAN AMENDMENT
CITY OF PASADENA

Thank you for the opportunity to review the Draft Supplemental Environmental Impact Report for the above project. We have the following comments for your consideration:

The California Solid Waste Reuse and Recycling Access Act of 1991, as amended, requires each "development project" to provide an adequate storage area for collection and removal of recyclable materials. The environmental document should include/discuss standards to provide adequate recyclable storage areas for collection/storage of recyclable and green waste materials for this project.

If you have any questions or require additional information, please contact Ms. Simin Agahi at (626) 458-4915.

Very truly yours,

DONALD L. WOLFE
Director of Public Works

ROSSANA D'ANTONIO
Assistant Division Engineer
Land Development Division

SA:ca
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Letter 3

COMMENTER: Rossana D'Antonio, County of Los Angeles Department of Public Works

DATE: October 11, 2006

RESPONSE:

The commenter notes that the California Solid Waste Reuse and Recycling Access Act of 1991, as amended, requires each "development project" to provide an adequate storage area for collection and removal of recyclable materials. The commenter states an opinion that the environmental document should discuss standards to provide adequate recyclable storage areas for collection/storage of recyclable and green waste materials.

The California Solid Waste Reuse and Recycling Access Act of 1991 (Public Resources Code Section 42900-42901) requires that cities and counties divert 50 percent of all solid waste through reduction, recycling, and composting activities. This requires the participation of the residential, commercial, industrial, and public sectors. Thus, the Caltech campus is currently subject to the requirements of the California Solid Waste Reuse and Recycling Access Act of 1991. Further, Chapter 8.62, Waste Management Plan for Certain Construction and Demolition Projects within the City of Pasadena, of the City of Pasadena Municipal Code requires diversion of recyclables from construction sites. Thus, the project is subject to state and local laws which require projects to provide adequate storage and collection facilities.

Compliance with the City's Municipal Code and Waste Management Plan for Certain Construction and Demolition Projects within the City of Pasadena would reduce the amount of waste disposed of in landfills to the degree feasible. Compliance with the City's Municipal Code would thus ensure that adequate areas are provided for collecting and loading recyclable materials within the project area. Compliance with the City's Waste Management Plan would ensure that construction waste diverted to local landfills is reduced to the degree feasible. As there is no evidence that the proposed amendments to the master plan would create significant effects relating to solid waste, further analysis of this issue or inclusion of mitigation is not warranted.

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Arnold Schwarzenegger
Governor

Sean Walsh
Director

October 6, 2006

Lanny Woo
City of Pasadena
Permit Center, 175 North Garfield Avenue
Pasadena, CA 91101-1704

Subject: California Institute of Technology (Caltech) Master Development Plan Amendment Supplemental EIR
SCH#: 2005031137

Dear Lanny Woo:

The State Clearinghouse submitted the above named Draft EIR to selected state agencies for review. The review period closed on October 5, 2006, and no state agencies submitted comments by that date. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.

Please call the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process. If you have a question about the above-named project, please refer to the ten-digit State Clearinghouse number when contacting this office.

Sincerely,

Terry Roberts

Terry Roberts
Director, State Clearinghouse

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
TEL (916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

Document Details Report

State Clearinghouse Data Base

SCH#	2005031137
Project Title	California Institute of Technology (Caltech) Master Development Plan Amendment Supplemental EIR
Lead Agency	Pasadena, City of
Type	EIR Draft EIR
Description	The proposed project consists of the following amendments to the Caltech Master Plan: - Addition of the following Campus Development Projects, which involve demolition of buildings or setback reduction not provided for in the Master Plan: > Chemistry and Chemical Engineering Laboratory > North Undergraduate Houses > Braun & Marks Graduate Houses > Campus Center - Revisions to the Open-Space Strategy and Design Guidelines for the North Campus Facilities on the East-West Exis - Revisions to the Design Review thresholds established in the Design Guidelines.

Lead Agency Contact

Name	Lanny Woo		
Agency	City of Pasadena		
Phone	(626) 744-6776	*Fax*	
email			
Address	Permit Center, 175 North Garfield Avenue		
City	Pasadena	*State* CA	*Zip* 91101-1704

Project Location

County	Los Angeles		
City	Pasadena		
Region			
Cross Streets	California Boulevard / Wilson Avenue / Del Mar Boulevard		
Parcel No.	5735-007-035, 031; 5327-004-005; 5327-016-005; 5327-014-006; 5736-004-011		
Township	*Range*	*Section*	*Base*

Proximity to:

Highways	210, 110
Airports	
Railways	MTA Gold Line
Waterways	
Schools	Polytechnic School and Pasadena City College
Land Use	Institutional / Public and Semi-Public (PS) / Institutional

Project Issues Aesthetic/Visual; Air Quality; Archaeologic-Historic; Biological Resources; Sewer Capacity; Traffic/Circulation

Reviewing Agencies Resources Agency; Regional Water Quality Control Board, Region 4; Department of Parks and Recreation; Native American Heritage Commission; Office of Historic Preservation; Department of Health Services; Department of Fish and Game, Region 5; Department of Water Resources; California Highway Patrol; Caltrans, District 7; Department of Toxic Substances Control; Office of Emergency Services

Date Received 08/22/2006 *Start of Review* 08/22/2006 *End of Review* 10/05/2006

Note: Blanks in data fields result from insufficient information provided by lead agency.

Letter 4

COMMENTER: Terry Roberts, State of California Governor's Office of Planning and Research, State Clearinghouse and Planning Unit

DATE: October 6, 2006

RESPONSE:

The commenter notes that the State Clearinghouse submitted the DEIR to selected state agencies. The review period ended on October 5th, 2006 and no state agencies submitted comments by that date. The commenter notes that the applicant has complied with state clearinghouse review requirements, pursuant to CEQA.

This comment is noted.

Comments Received via Phone

Scott Harrison, California Department of Fish and Game:

The commenter notes that the removal of trees associated with the proposed project could indirectly disturb nesting bird species and suggests further measures to minimize disturbance to birds.

In response to this comment, the following impact and mitigation measure was added to Section 4.3, *Biological Resources*, of the EIR.

> **Impact BIO-2** **Removal of up to 84 trees has the potential to affect nesting raptors and migratory birds. This is considered a Class II, *significant but mitigable*, impact.**

The removal of up to 84 trees within the Caltech campus has the potential to affect nesting birds. These trees may provide potential nesting habitat for raptors and other common bird species. Raptors and their nests are protected under California Fish and Game Code Section 3503.5, and all other bird nests are protected under Section 3503. It is unlikely that the loss of nesting habitat potentially associated with proposed development would adversely affect raptor populations in the area as similar nesting and foraging habitat is available in off-site areas and the current level of development on campus has reduced foraging habitat. However, construction activity, including tree removal if required, could potentially disturb active nests, which would be a violation of Fish and Game Code and so is considered a significant, but mitigable impact. The Migratory Bird Treaty Act, as well as the Fish and Game Code, also protects nesting birds, eggs and young.

Mitigation Measures. Mitigation Measure BIO-2 would provide for compliance with applicable City requirements and California Fish and Game Code and the Migratory Bird Treaty Act.

> BIO-2 **Bird Nesting Surveys.** Prior to any earthmoving activities during the breeding and nesting season (typically March 1 to September 1 or as early as February 1 for raptors), the applicant shall have a field survey conducted by a qualified biologist to determine if active nests of breeding birds are present within the area of potential influence of the activity. If nesting birds protected under the Migratory Bird Treaty Act are found within the area of potential influence, an appropriate buffer as determined by the biologist will be recommended and the nest shall not be disturbed until the young have fledged. This survey shall be conducted within three (3) days prior to commencement of grading for each development amendment.

Significance After Mitigation. Measure BIO-2 would reduce impacts to nesting birds to a less than significant level.

Appendix H

Mitigation Monitoring and Reporting Program

Mitigation Measure/Condition of Approval	Action Required	When Monitoring to Occur	Monitoring Frequency	Responsible Agency or Party	Compliance Verification		
					Initial	Date	Comments
AESTHETICS							
AES-1(a) Landscaping Plan. For each building in connection with the proposed amendments, the applicant shall submit a landscape plan that will have as a goal to restore the theme and visual integrity of existing landscaped areas. The design of landscaping at the new buildings should continue to promote integration of open space between existing and new buildings. Landscaped areas between new facilities within building envelopes should be consistent with the general character of the surrounding area and should promote a unified image for the campus. The landscaping plan required under BIO-1 will follow the provisions herein; therefore no significant impacts on aesthetics will result from the proposed amendments.	Review and approve landscape plans for each individual building	Prior to issuance of individual building permits	Once for each individual building	CPPD			
AES-1(b) Public Art Relocation. Avoidance of development within Location 1 for Amendment 1 would be the preferred scenario in order to avoid impacts to a scenic resource. If avoidance of Location 1 is not feasible, prior to development the applicant shall consult with the City of Pasadena Arts and Culture Commission as to the deaccession procedures and policy and in compliance with State of California Works of Art Law and the Federal Visual Artists Rights Act (VARA). The Arts Commission may approve removal and relocation of the art piece, in consultation with the artist. If relocation is deemed infeasible, the applicant shall replace the art piece with a new piece of equal or greater value. As an alternative, Caltech may voluntarily contribute a like amount to an arts fund administered by the City of Pasadena Arts and Culture Commission: payable in lieu to the Cultural Trust Fund shall be approved by the Arts and Culture Commission.	Verification that Amendment 1 avoids the open space area between Noyes and Beckman Labs OR IF AVOIDANCE IS INFEASIBLE Verification that the applicant has replaced the art piece or contributed to an arts fund	Prior to issuance of building permit for Amendment 1	Once	CPACC and CPPD			
AES-1(c) Avoidance of Open Space Encroachment.	Verification that North Undergraduate Housing	Prior to approval of	Once	CPDC and CPPD			

Key: **CPACC - City of Pasadena Arts and Culture Commission**
CPDC - City of Pasadena Design Commission
CPPD - City of Pasadena Planning Division
HPC - Historic Preservation Commission

Mitigation Measure/Condition of Approval	Action Required	When Monitoring to Occur	Monitoring Frequency	Responsible Agency or Party	Compliance Verification		
					Initial	Date	Comments
Caltech shall avoid encroachment into or obstructing the open space area west of the Atheneaum. Replacement of the North Undergraduate House rather than rehabilitation would avoid this impact and would be the preferred scenario for preservation of the existing open space and preservation of existing visual resources in the area. However, if avoidance of this open space encroachment is not feasible, the rehabilitation scenario shall incorporate a landscape element along the southern building façade. Landscaping should be developed to soften the visual impacts of new development within the existing north-south open space corridor east of the Athenaeum.	does not encroach into the open space area west of Athenaeum OR Review and approval of landscape plans for North Undergraduate Housing	building permit for North Undergraduate Housing					
AES-2(a) Facade Articulation. Any addition or new construction associated with the residential houses shall be designed in a manner that clearly articulates the massing of the new building as distinct from the existing residential structures. Façades shall be designed in a manner that incorporates changes in relief such that no façade can measure greater than 150 feet without interruption. Articulated fenestration, parapets, and rooflines are encouraged.	Verification that new student residences meet specified requirements	Prior to issuance of building permits for student residences	Once for each student residence	CPDC and CPPD			
AES-2(b) Replacement Landscaping. Any addition or new construction associated with removal of landscaping and ornamental vegetation shall design and implement replacement landscaping of a suitable nature. Landscaping shall integrate the surrounding landscape design and incorporate the new developments in order to soften the affect of building massing.	Verification that replacement landscape meet specific requirements	Prior to issuance of individual building permits	Once for each individual building	CPDC and CPPD			
AIR QUALITY							
AQ-1(a) ROG Control. The following shall be implemented to minimize daily ROG emissions related to the application of architectural coatings: • Low VOC architectural and asphalt coatings shall be	• Review and approval of final construction specifications • Field verification of compliance with	• Specification review prior to issuance of individual building	• Specification review once for each building • Field	CPPD			

Key: **CPACC - City of Pasadena Arts and Culture Commission**
CPDC - City of Pasadena Design Commission
CPPD - City of Pasadena Planning Division
HPC - Historic Preservation Commission

Mitigation Measure/Condition of Approval	Action Required	When Monitoring to Occur	Monitoring Frequency	Responsible Agency or Party	Compliance Verification		
					Initial	Date	Comments
used on site and shall comply with AQMD Rule 1113-Architectural Coatings. • Daily coating use shall be restricted to 65 gallons per day (assuming a VOC content of 1.1 pounds per gallon).	required specifications	permits • Field verification as necessary during construction	verification as necessary				
AQ-1(b) Ozone Precursor Control. The following shall be implemented during construction to minimize emissions from construction equipment: • Equipment engines should be maintained in good condition and in proper tune as per manufacturer's specifications; • Lengthen construction periods during the smog season so as to minimize the number of vehicles and equipment operating simultaneously; and • Use new technologies to control ozone precursor emissions as they become available. • Diesel oxidation catalysts and particulate filters shall be installed on all on and off road construction vehicles.	• Review and approval of final construction specifications • Field verification of compliance with required specifications	• Specification review prior to issuance of individual building permits • Field verification as necessary during construction	• Specification review once for each building • Field verification as necessary	CPPD			
AQ-1(c) Fugitive Dust Control. The following shall be implemented during construction to minimize fugitive dust emissions: ▪ Water trucks shall be used during construction to keep all areas of vehicle movements damp enough to prevent dust from leaving the site. At a minimum, this will require twice daily applications (once in late morning and once at the end of the workday). Increased watering is required whenever wind speed exceeds 15 mph. Grading shall be suspended if wind gusts exceed 25 mph. ▪ If importation, exportation and stockpiling of fill material is involved, soil with 5% or greater silt content that is stockpiled for more than two days	Field verification of compliance with specifications	Throughout construction of individual buildings	As necessary during construction	CPPD			

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Mitigation Measure/Condition of Approval	Action Required	When Monitoring to Occur	Monitoring Frequency	Responsible Agency or Party	Compliance Verification		
					Initial	Date	Comments
shall be covered, kept moist, or treated with soil binders to prevent dust generation. Trucks transporting material shall be tarped from the point of origin or shall maintain at least two feet of freeboard. ▪ All material excavated or graded shall be sufficiently watered to prevent excessive amounts of dust. Watering should occur at least twice daily with complete coverage, preferably in the late morning and after work is done for the day. ▪ All clearing, grading, earth moving, or excavation activities shall cease during periods of high winds (i.e., greater than 20 mph averaged over one hour) so as to prevent excessive amounts of dust. ▪ All material transported off-site shall be either sufficiently watered or securely covered to prevent excessive amounts of dust. ▪ Face masks shall be used by all employees involved in grading or excavation operations during dry periods to reduce inhalation of dust which may contain the fungus which causes San Joaquin Valley Fever. ▪ All active portions of the construction site shall be sufficiently watered to prevent excessive amounts of dust.							
BIOLOGY							
BIO-1 Construction Practices. Construction of individual campus developments associated with the proposed Master Plan amendments shall adhere to the following: • •No grading or development shall occur within 5 feet from the driplines of mature native or specimen trees that are not to be removed as part of the project, but that occur near the construction area. • •All mature native or specimen trees within 25 feet of	Requires protection of mature trees.	-During construction.	-Once per project application. -At least once, as required.	CPPD			

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Mitigation Measure/Condition of Approval	Action Required	When Monitoring to Occur	Monitoring Frequency	Responsible Agency or Party	Compliance Verification		
					Initial	Date	Comments
proposed ground disturbances, which are not to be removed as part of the project, shall be temporarily fenced with chain-link or other material satisfactory to the City throughout all grading and construction activities. The fencing shall be installed six feet outside the dripline of each specimen oak tree, and shall be staked every six feet. • •No construction equipment shall be parked, stored or operated within six feet of any mature native or specimen tree dripline. • •No fill soil, rocks, or construction materials shall be stored or placed within six feet of the dripline of a mature native or specimen tree (pervious paving and other materials are allowed, as approved by the City). • •Any roots encountered that are one inch in diameter or greater shall be cleanly cut. This shall be done under the direction of a City approved arborist/oak tree consultant. • •No permanent irrigation shall occur within the critical root zone of any mature native or specimen tree. Drainage plans shall be designed so that tree trunk areas are properly drained to avoid ponding. • •Any trenching required within the dripline or sensitive root zone of any mature native or specimen tree shall be done by hand. In addition, trenching in the protected zone needs to preserve roots over 1 inch by tunneling.							
BIO-1(a) City Trees and Tree Protection Ordinance. Prior to the issuance of a building permit for each individual building in connection with the proposed amendments, the applicant shall submit a landscape plan including proposed tree removals and replacement, for review and approval by the Planning and Development Director and the Design Commission, according to the review thresholds in the CMDP. Such plan shall show	• Review and approval of tree preservation and replacement plan to ensure consistency with required specifications • Field verification of compliance	• Plan review prior to issuance of individual building permits • Field verification	Once for each individual building	CPPD Development Director and CPDC			

Key: **CPACC - City of Pasadena Arts and Culture Commission**
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Mitigation Measure/Condition of Approval	Action Required	When Monitoring to Occur	Monitoring Frequency	Responsible Agency or Party	Compliance Verification		
					Initial	Date	Comments
the square feet of tree canopy coverage proposed to be removed within the development site. The area of removed canopy shall be replaced at a ratio of 1:1 through a combination of relocated and new trees planted within areas of the development site that are suitable for new tree planting. While canopy replacement on the development site shall be the first priority, any canopy that cannot be reasonably replaced onsite, shall be replaced within other areas of the campus that are targeted by the CMDP for landscaping. While incorporating a range of species necessary to maintain the landscaping theme existing in the campus, the landscape plan shall also provide for the replacement of removed trees with native and specimen trees protected under the Tree Protection Ordinance. Further, replacement trees shall achieve equal or greater canopy than the canopy removed within 5 years of implementation of the landscaping plan. A Tree Protection Plan shall be prepared in accordance with the Tree Protection Guidelines per Chapter 8.52 of the Pasadena Municipal Code. The plan shall detail the protective measures to be used during demolition and construction of each building site proposed in the amendment. The plan shall be reviewed and approved by the Planning staff prior to issuance of any grading or building permits. The applicant shall submit a landscape/planting plans for review and approval as provided in the provisions of the amended Master Plan.		prior to issuance of individual occupancy permits					
BIO-2 Bird Nesting Surveys. Prior to any earthmoving activities during the breeding and nesting season (typically March 1 to September 1 or as early as February 1 for raptors), the applicant shall have a field survey conducted by a qualified biologist to determine if	Verification that specified bird nesting surveys have been conducted	Three days prior to grading for individual buildings	Once for each individual building	CPPD			

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HPC - Historic Preservation Commission

Mitigation Measure/Condition of Approval	Action Required	When Monitoring to Occur	Monitoring Frequency	Responsible Agency or Party	Compliance Verification		
					Initial	Date	Comments
active nests of breeding birds are present within the area of potential influence of the activity. If nesting birds protected under the Migratory Bird Treaty Act are found within the area of potential influence, an appropriate buffer as determined by the biologist will be recommended and the nest shall not be disturbed until the young have fledged. This survey shall be conducted within three (3) days prior to commencement of grading for each development amendment.							
HISTORIC RESOURCES							
H-2 Design Review. The design of any construction on the location of the North Undergraduate Hall (either alterations to the existing building or demolition and construction of new buildings) shall be subject to the review by Pasadena Design Commission in order to assure its conformance with the Secretary of Interior's Standards with respect to its potential impacts on the Athenaeum, South Undergraduate Houses, and the landscape features.	Verification that Pasadena Design Commission and Historic Preservation Commission review and approval has occurred	Prior to issuance of building permit for North Undergraduate Hall	Once	CPDC, HPC, and CPPD			

Key: **CPACC - City of Pasadena Arts and Culture Commission**
CPDC - City of Pasadena Design Commission
CPPD - City of Pasadena Planning Division
HPC - Historic Preservation Commission