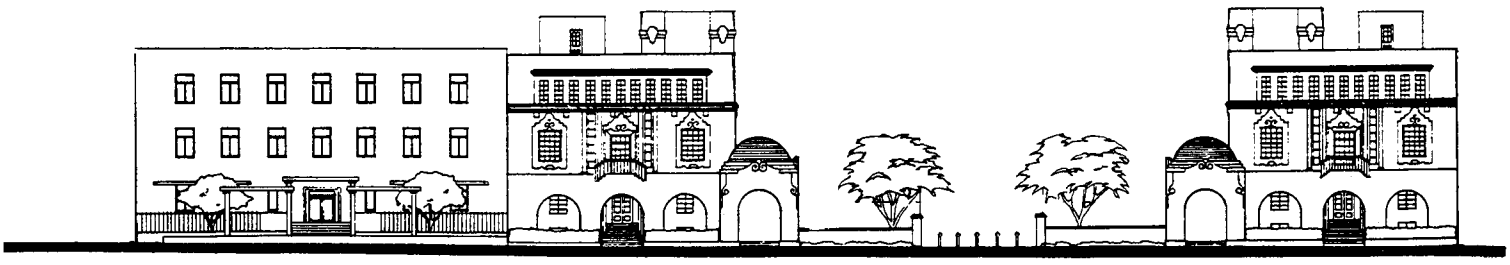
CALIFORNIA INSTITUTE
OF TECHNOLOGY

MASTER PLAN



Adopted by the Pasadena City Council 1989
Last Amended on December 11, 2006

Contents

INTRODUCTION

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In 1994 Caltech proposed the development of a student and faculty residential facility at the corner of Del Mar Boulevard and Holliston Avenue. The facility was proposed to be built in an area designated by the 1989 Caltech Master Plan for future academic structures; therefore, an amendment to the 1989 Master Plan was necessary.

The Amended Caltech Master Plan also reflects changes made during the implementation of the 1989 Master Plan. The modifications 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; strategies for open space; circulation/parking; campus utilities, and design which guide the future development of the Caltech Campus.

The Amended Caltech Master Plan was adopted by the City Council on September 18, 1995, and published during the summer of 1997. The document includes the following modifications to the 1989 Master Plan:

- including a provision for a student and faculty housing facility (Avery House, Building No. 99) in an envelope previously designated for academic uses. The 56,257 square foot facility will house undergraduate and graduate students as well as faculty members;

- eliminating the provision for six racquetball/squash courts as they were included in the Braun Athletic Center built in 1992, and maintaining the space previously designated for the courts in its current use as parking until Caltech pursues a plan amendment to designate the future use of the site;

- reducing the number of beds to be built in two residential envelopes, on Holliston Avenue and San Pasqual Street and Catalina Avenue and San Pasqual Street; and reallocating that number to the Avery House, but resulting in no changes to the total number of beds provided for in the plan;

- adding a provision for a driveway on Holliston Avenue for access to the 50-space underground parking area at the Avery House;

- adding a requirement of the Public Works and Transportation Department that Caltech purchase in place the existing street lights within the campus bounds and either pay for City power on a metered program or reconnect the lights to the Caltech electrical circuit; and,

- correcting errors in the text, tables and graphics of the 1989 Master Plan regarding the disposition of Building No. 43, an abandoned central heating plant built in 1926. In one area of the 1989 Master Plan the building is listed as one to remain on campus and in another it is listed as one to be removed. The building was demolished in 1994 and was replaced with the Sherman Fairchild Library of Engineering and Applied Sciences.

An Initial Study was prepared for the Amended Master Plan. It was determined that the Amended Master Plan will not create any new environmental impacts beyond those addressed in the Final Environmental Impact Report (FEIR) prepared for the 1989 Master Plan. The modifications that are included in the amended document do not alter the intent of the 1989 Master Plan.

An addendum, however, was necessary to correct errors in the text of the FEIR regarding the disposition of Building No. 43. The FEIR also contained conflicting information about this building, as indicated above. The addendum merely corrected the errors in the FEIR for clarification of the document. These changes are also made in the Amended Master Plan. The graphics contained in the Amended Master Plan now show the new Fairchild Engineering Library (Building No. 43) and not the Original Central Heating Plant building.

The Amended Caltech Master Plan also includes the Conditions of Approval of the 1989 Master Plan and updated information received during the first five-year compliance review initiated in 1994.

On August 2, 1999, several amendments were approved by the City Council. These amendments include:

- Conversion of 32,769 gross square feet of student housing of the Keck and Mosher-Jorgensen buildings to administrative office space;

- Exchanging open space from the Physical Plant building area to the Beckman Institute (west side);

- Relocation of the Co-generation IV and Co-generation V (COG IV and COG V) from the South Holliston Plant to the South Wilson Plant; and

- Inserting wording to the Phasing Plan map to reflect consistency with the text on page 57 of the Plan. On page 57, the Plan provides for additions for the single-family houses on Hill Avenue for administrative or academic offices. Wording in the the Phasing Plan map will have to reflect consistency with the Plan.

On December 11, 2006, an amendment to the Master Plan was approved by the City Council. This amendment includes:

- Construction of the Chemistry and Chemical Engineering Laboratory (CCE Lab) between the Beckman Behavior Biology (BBB) and Noyes Laboratories;

- Rehabilitation or construction of the North Undergraduate Houses (Page, Lloyd, and Ruddock);

- Demolition and replacement of the Braun and Marks Graduate Houses;

- Construction of a new Campus Center; and

- Revisions of the Open Space Strategy and Design Guidelines for the north campus facilities on the east-west axis and revisions to the Design Review Thresholds established in the Design Guidelines.

The provisions amended in 2006 supersedes the provisions of the California Institute of Technology Master Plan adopted by the Board of Directors on May 30, 1989, which became effective on July 2, 1989.

This amended Master Plan incorporates all prior amendments to the 1989 Master Plan and reflects progress implementation from five-year reviews in italics.

Original graphics still pertinent are indicated with the date July 1989 in the bottom right corner. Information contained in those graphics depict conditions which were present at that time.

Some of the graphics have been modified to reflect the current information contained in the Amended Master Plan. For those graphics that were modified, the original date is striken out and the new date appears in the bottom right corner, i.e. December 2007. If there are discrepancies between the text and graphics, the text shall control over the graphic.

Both the Amended Master Plan and the addendum to the FEIR will be used by City staff when reviewing future projects within the Caltech Master Plan boundaries. The 1989 Master Plan was prepared 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. This is best achieved when the Master Plan and supporting documents contain the most current and correct information.

PLAN SUMMARY

PLAN OBJECTIVES & APPLICABILITY

This Master Plan presents the guideline for future development of the campus of the California Institute of Technology in Pasadena, California. Caltech is an independent, privately supported university that offers instruction at both undergraduate and graduate levels and is at the same time recognized as a leading research center. The Master Plan addresses four primary objectives:

- To provide for the future growth of Caltech's academic divisions;
- To provide an appropriate interface between the campus and surrounding residential neighborhoods;
- 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
- To provide a unified, balanced, and attractive Plan for future growth.

This Master Plan report documents the complete planning process. Section I, entitled Plan Summary, presents an overview: Plan Objectives and Applicability; The Planning Process; Caltech in Pasadena; and Master Plan Summary. Section II presents a summary of the Constraints and Potentials definition phase of the process. A companion "Report on Existing Conditions" documents the data-gathering phase and is appendixed by reference.

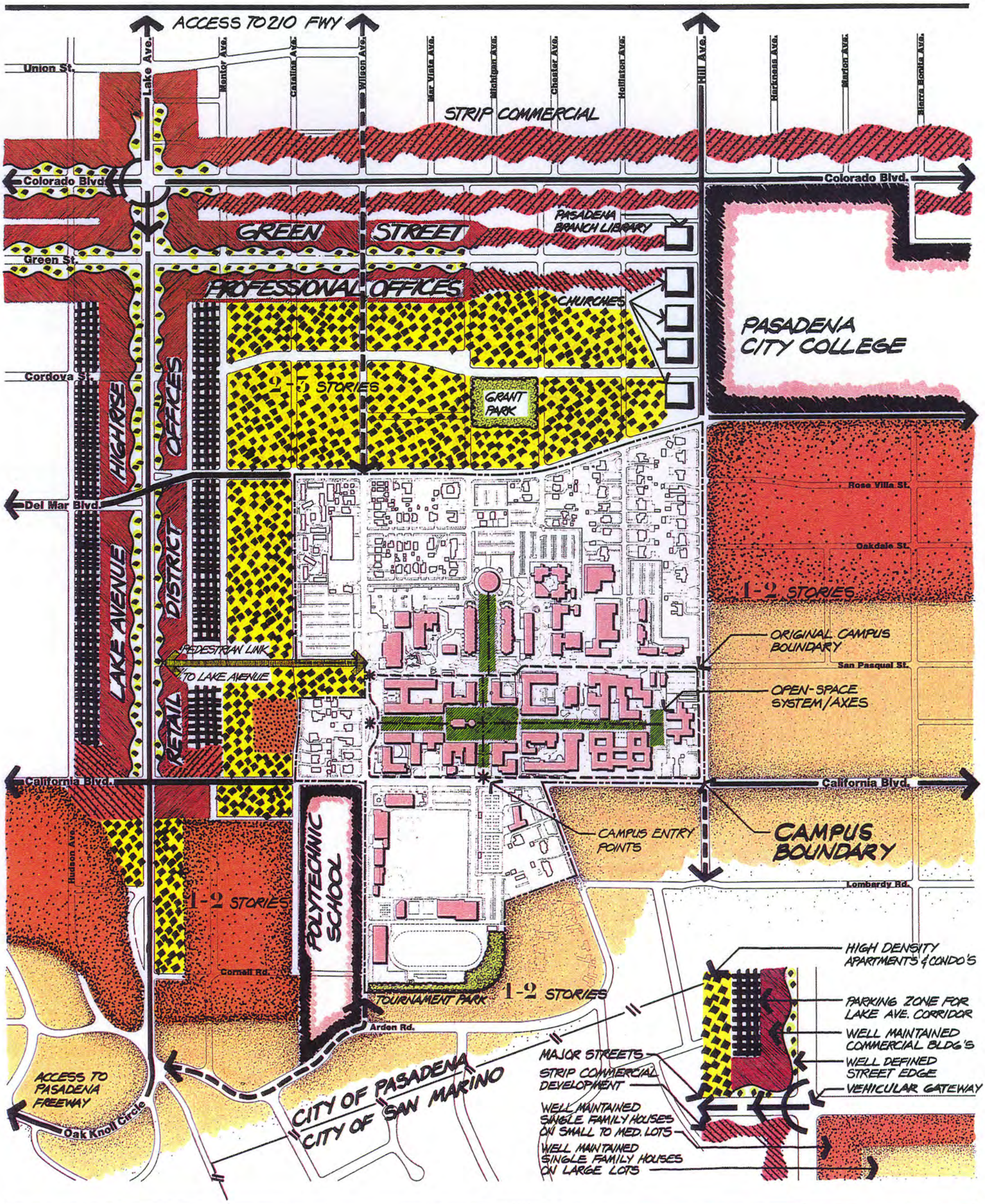
Section III of this report presents the Plan itself, which, together with this subsection on Plan Objectives and Applicability, will be subject to review and formal adoption by the City Board of Directors.

THE CONTEXT TODAY

Caltech's campus is located in south central Pasadena, south and east of the Lake Avenue and Colorado Boulevard commercial corridors. 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 and well-maintained 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 southern areas of the City.

The Context



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

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KURT MEYER PARTNERS

DECEMBER 2007

THE CALTECH CAMPUS

Today, Caltech's campus encompasses approximately 124 acres. Boundaries for the campus and this Master Plan are:

- 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 on the south.

Within these boundaries, Caltech owns all property with the exception of one residential parcel in the northern portion of the campus. The Master Plan assumes that all non-Caltech properties within the campus boundaries can and will be purchased during the Master Plan time frame. Since the adoption of the 1989 Master Plan nine properties have been acquired by Caltech. The properties are listed below and are indicated in yellow on the following graphic.

- 320 South Wilson Avenue, acquired on March 13, 1989
- 275 South Holliston Avenue, acquired on September 14, 1989
- 327 South Holliston Avenue, acquired on May 22, 1989
- 287 South Hill Avenue, acquired on September 21, 1990
- 320 South Michigan Avenue, acquired on March 19, 1992
- 295 South Wilson Avenue, acquired on October 1999
- 1060 East Del Mar Boulevard, acquired on October 1999
- 295 South Wilson Avenue, acquired on October 1999
- 505 South Wilson Avenue, acquired on May 30, 2002

Caltech owns or operates satellite facilities elsewhere in Pasadena and southern California, which include:

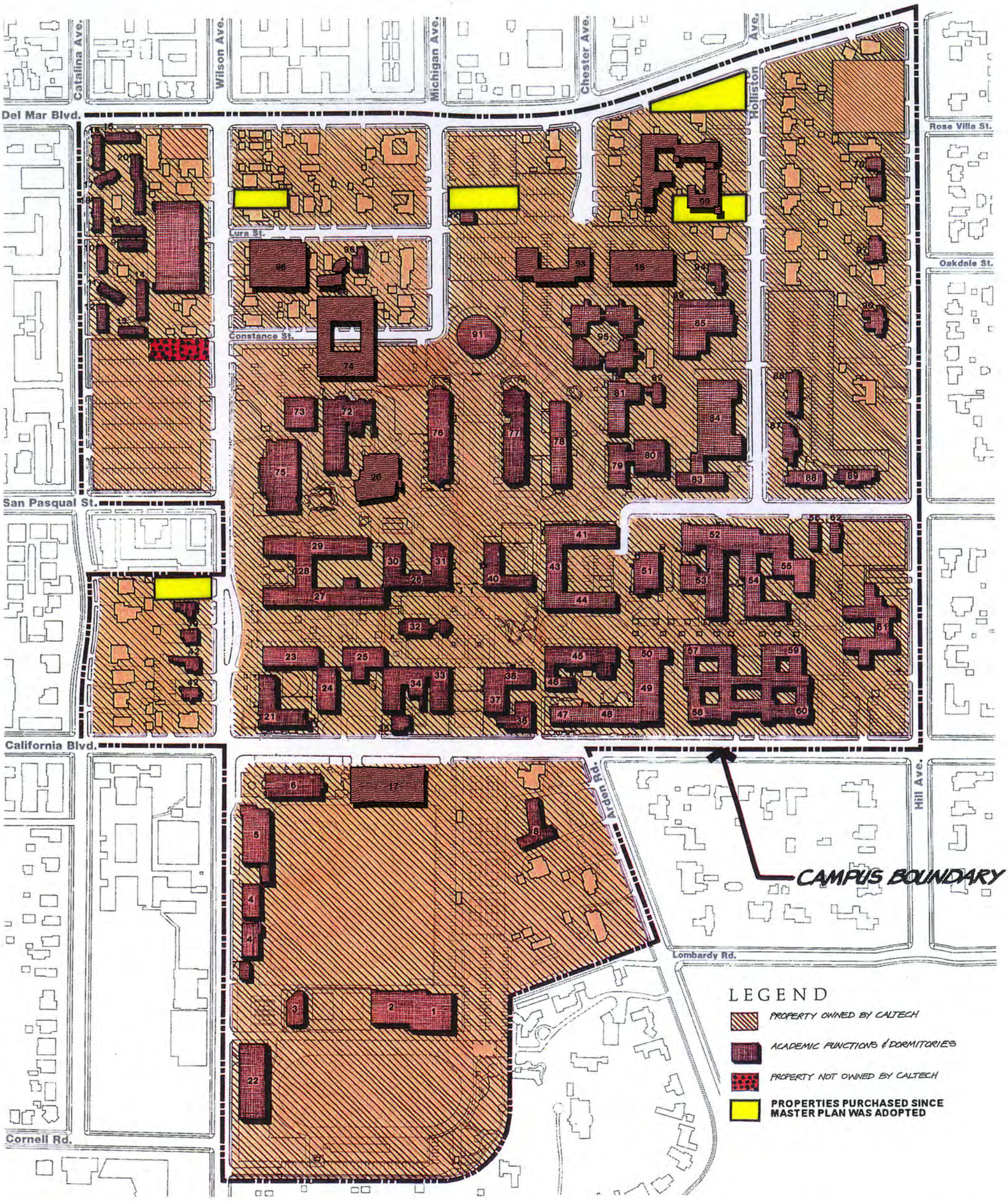
- Jet Propulsion Laboratory - Pasadena;
- Palomar Observatory - San Diego County;
- Owens Valley Radio Observatory - Big Pine;
- Big Bear Solar Observatory - Big Bear Lake;
- William G. Kerckhoff Marine Biology Laboratory Corona del Mar; and
- Kresge Building (Seismological Laboratory) and other satellite facilities outside the campus boundary but within the City of Pasadena.

While integral parts of Caltech's program of instruction and research, these facilities are not included under this Master Plan.

ZONING

Most of Caltech's campus is located within the City's "PS" Base District (Public and Semi-Public Space) as set forth in Pasadena's Municipal Code (P.M.C.), Title 17, Zoning, as adopted by the Board of Directors of the City of Pasadena on May 14, 1985 (the Zoning Ordinance). This Master Plan has been prepared under the requirements set forth in the Zoning Ordinance for the "PS" District and will be reviewed under the procedure set forth in P.M.C. Chapter 17.98, entitled "Master Development Plan Review." Concurrent with the review and approval of this Master Plan, a zone change was processed for all Caltech-owned property within the campus boundaries not currently in the "PS"District.

The Caltech Campus & Land Ownership



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On May 5, 1989 the Board of Directors of the City of Pasadena adopted Ordinance No. 6328 amending the official zoning map of the City of Pasadena to rezone all Caltech-owned properties within the Master Plan boundaries to PS (Public and Semi-Public) to facilitate implementation of the Master Plan.

Property not owned by Caltech, but within the Master Plan boundaries, will retain, and its development will continue to be regulated by, its current zoning. The City shall institute zone change proceedings to establish PS (Public and Semi-Public) zoning districts for those properties within the Master Plan boundaries not currently owned by Caltech but subsequently acquired. Such initiation of zone change proceedings shall occur within 30 days of Concept Plan Review for new construction or upon request by Caltech.

Since the adoption of the 1989 Master Plan nine properties within the Master Plan boundaries have been acquired by Caltech and zone changes to PS have been approved. All but one of the property that remained privately owned, 391 South Wilson Avenue, is not zoned PS.

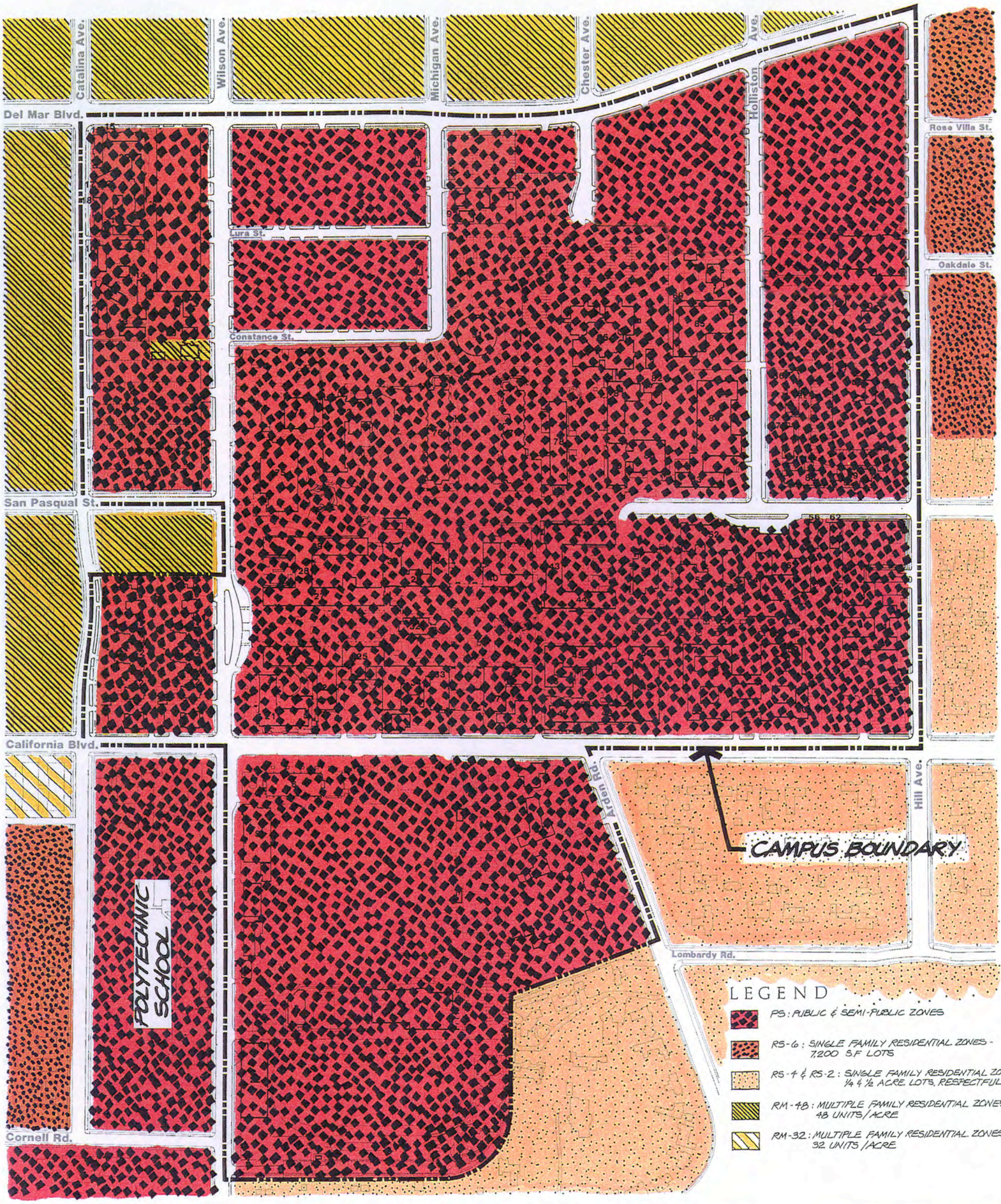
PLAN APPLICABILITY/ IMPLEMENTATION

The Master Plan, when reviewed, approved, and adopted by the Board of Directors, will become the basis for future development on Caltech's campus. This Master Plan shall supersede all other sections of P.M.C. Title 17, Zoning, unless specifically incorporated by reference. Where there is a conflict between provisions of this Master Plan and P.M.C. Title 17, Zoning, the provisions of this Master Plan shall control. Where uncertainty exists regarding the extent or interpretation of any provision of this Master Plan, the Zoning Administrator shall determine the intent of the provision. Unless specifically noted, all references to the Pasadena Municipal Code refer to that edition in force as of the date of adoption of this Master Plan.

The Master Plan presents regulations which 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; and
- The sequencing of new development and interim development guidelines.

Existing Zoning



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

KURT MEYER PARTNERS

DECEMBER 2007

The following chapters of Pasadena Municipal Code, Title 17, Zoning, in effect as of the date of adoption of this Master Plan, are incorporated by reference, with the noted exceptions, into the Master Plan:

1. Chapter 17.64- Site Regulations, except for:
   - Section 17.64.020- Relocated Buildings and Additional Units
   - Section 17.64.190- Measurement of Height
   - Section 17.64.200- Exceptions to Height Limits

2. Chapter 17.68- Off-Street Parking and Loading Regulations, except for:
   - Section 17.68.020- Basic Requirements for Off-Street Parking and Loading
   - Section 17.68.030- Off-Street Parking and Loading Space Required
   - Section 17.68.040- Collective Provision of Parking and Loading
   - Section 17.68.050- Reduced Parking in Senior Citizen Housing

3. Chapter 17.72- Sign Regulations

The words "shall" and "must" have the following meaning: each is mandatory. The words "may" and "should" refer to a discretionary duty or obligation. Unless explicitly stated, there are no specific deadlines for implementation of projects and improvements described by the Master Plan.

The words "gross floor area" have the following meaning: the total enclosed are of all floors of a building measured to the inside face of the exterior walls including halls, stairways, elevator shafts at each floor level, service and mechanical equipment rooms and basement or attic areas having a height of seven feet, but excluding areas used exclusively for vehicle parking or loading.

The Master Plan guidelines are presented in text and graphic formats; if there is a conflict between the two, the text shall control over the graphic.

Review of the Master Plan

While structured to cover at least the next 30 years of Caltech's development, the Master Plan shall be subject to the following interim reviews:

- The Planning Commission shall receive a report on Caltech's progress toward compliance with the conditions of approval of the Master Plan one (1) year and five (5) years after the effective date of the **1989** Plan's approval. The review for compliance shall take place during a legally noticed regular meeting of the Planning Commission. If said review results in a finding of noncompliance with conditions of the Master Plan and/or mitigation measures of the Final EIR, the Planning Commission may withhold issuance of any building and/or certificate of occupancy permits until compliance has been determined. At the time of said 5-year review, the Planning Commission shall determine if subsequent 5-year compliance reviews are appropriate.

At the first five-year review the Planning Commission determined that subsequent reviews of Caltech's compliance are appropriate.

On October 27, 1999, the Planning Commission reviewed the second five-year and found that Caltech was in compliance with the conditions of approval and provisions as outlined in the Master Development Plan.

On December 12, 2007, the Planning Commission reviewed the third five-year and found that Caltech was in compliance with the conditions of approval and provisions as outlined in the Master Development Plan and that the fourth five-year compliance review commence on 2012.

- The Planning Commission shall review the Master Plan 25 years from the effective date of the **1989** Plan's approval. The review shall take place during a legally noticed public hearing of the Planning Commission. If said review results in a determination that environmental conditions have changed so substantially that the conclusions of the Final Environmental Impact Report are questioned, the Commission may, at its discretion, initiate proceedings pursuant to Chapter 17.98 of the Municipal Code for revising the Master Plan. Depending on the magnitude of potential changes in environmental conditions, said revisions may include additional or revised conditions of approval and/or further modifications to the Master Plan.

Any review or amendment process initiated by either the City or Caltech shall follow the procedure outlined for approval of Master Development Plans in P.M.C. Chapter 17.98.

Conditions of Approval

As stipulated when the plan was approved in 1989, the Caltech Master Development Plan shall be subject to the following conditions of approval:

A. Notice of Hearing

Notice of any hearings required in the master plan shall be provided in accordance with P.M.C. Section 17.100.040. Pursuant to the provisions of this section, residents of Arden Road have submitted a request to receive notice of said hearings delivered to the list of addresses on file with the Planning Department and incorporated herein by reference. The request shall apply for the life of the Master Plan. In addition, one or more meetings with such residents shall be scheduled and their comments incorporated in reports to the Planning Commission concerning compliance with those portions of the master plan affecting Arden Road.

As of the first, second, and third five-year compliance review, notification has been provided as required.

B. New Construction

1. The provision of public art has been identified in the Cultural and Recreational Element of the Comprehensive General Plan as a goal to be achieved by the City. The following standard shall be used to implement this objective. 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. Caltech shall consult with the Arts Commission of the City of Pasadena and follow the New Private Development Public Art Program Guidelines when implementing its public art project. As an alternative, Caltech may voluntarily contribute a like amount to an art fund administered by the Arts Commission.

As of the first five-year compliance review, an art component was provided on campus in connection with the development of the 90,124-gross square foot Moore Laboratory.

As of the third five-year compliance review, an art element was provided for the Broad Center for Biological Science. The process to design an art element for the Cahill Center for Astronomy and Astrophysics was underway. An artist (Diane Thater) was selected by the Arts and Cultural Commission and the design was considered by the Commission.

2. Caltech shall submit a construction 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:

    a. 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;
    b. Provide a parking plan for construction-related vehicles that will ensure that they are not parked on the residential streets surrounding the site; and
    c. Provide noise equipment on the construction site to monitor the noise level to ensure compliance with existing noise standards. If the developer exceeds noise standards, the project shall be brought immediately into compliance. The noise level during the construction phase shall not exceed the level authorized in the noise ordinance for construction sites.

    As of the first five-year compliance review, Caltech had submitted a construction transportation system management program for the 90,124-gross square foot Moore Laboratory.

    As of the second five-year compliance review, a construction transportation system management program for the 126,290 square-foot, 440 parking space, 4-level parking structure on the west side of Wilson Avenue was submitted.

    As of the third five-year compliance review, Caltech submitted and received aproval of a construction transportation system management plan during the construction of the Broad Center for Biological Science in 1997, the construction of the parking structure south of California Boulevard in 2004, and for the construction of the Cahill Center of Astronomy and Astrophysics on the south side of California Boulevard.

3. Caltech shall file an agreement with the City, approved as to form by the City's Affirmative Action Administrator and City Attorney's Office, within one (1) year of the effective date of the Master Plan's approval. Said agreement shall contain a requirement that Caltech make good faith efforts to meet affirmative action goals in hiring disadvantaged business enterprises as contractors or subcontractors in the construction phase of any project.

   As of the first and second five-year review, Caltech was in compliance.

   The passage of Proposition 209 in 1996, which amended the State law to address public institutions and discrimination, preempts the Affirmative Action provisions of the Master Plan.

4. Caltech shall provide a report to the City's Child Care Coordinator, within one (1) year of the effective date of the Master Plan's approval, on the existing level of child care services provided for faculty and staff. In addition, Caltech shall work with the City's Child Care Coordinator on preparing and submitting a plan for the provision of child care facilities to serve additional demand for child care services new construction may create, consistent with the intent of the City's Child Care policy as defined in Resolution No. 6073 adopting guidelines for the implementation of Ordinance No. 6286.

   As of the first five-year review, the Children's Center at Caltech was in compliance and had received National Accreditation from the National Academy of Early Childhood Programs.

   As of the second five-year review, the Children's Center was in compliance and had received National Accreditation from the National Academy of Early Childhood Programs and received the City of Pasadena/Pasadena Chamber of Commerce 1999 Employer of the Year Award for Working Parents. This award was granted to Caltech for their family friendly benefits provided to their employees, which includes on-site child care for their employees.

   As of the third five-year review, the Children's Center was in compliance and has received accreditation from the National Association for Education of Young Children (NAEYC). Caltech also participated in the annual Child Care Provider Conference and their staff attends and the Director serves as Secretary for the CCIS/City Child Care Center Director's Alliance.

5. If it is established by the City that new construction results in a net loss of any low-moderate income housing which may exist on the site (units which have not been replaced with student housing built since 1984 or will not be replaced by additional student dormitories), measured at the time of the Planning Commission's 5-year compliance review(s), Caltech shall replace or make provision for replacement on a

one for one basis, consistent with the intent of the City's Housing policy as defined in Resolution No. 6073 adopting guidelines for the implementation of Ordinance No. 6286.

As of the first five-year compliance review, thirty-eight (38) houses had been removed due to new construction. Estimated at three (3) beds per single family unit, there was a total net loss of 114 beds. No net loss occurred, however, because Avery House provides approximately 135 student beds, which are considered low-moderate income, providing a surplus of twenty-one (21) beds.

C. Housing Relocation

In addition to the provisions of the section of the master plan entitiled "Removal of Existing Houses", Caltech shall pay a recipient of any house to be relocated off-campus $15,000 for each house which will remain in the City of Pasadena, $7,500 for each house which will be moved outside of the City limit, and $20,000 for each of the two courts on Wilson Avenue. The compensation shall be increased to account for inflation during each five (5) year interval from the effective date of the 1989 Master Plan. The increase shall be based upon the Los Angeles-Anaheim-Riverside Consumer Price Index (CPI) or three (3) percent compounded annually, whichever is less.

As of the first five-year compliance review, Caltech had offered $7,500 or $15,000 to parties that succeeded in relocating houses within City limits or outside of the City, respectively. As of October 10, 1994, Caltech shall now pay $16,953 for relocations within the City, $8,476 for relocations outside of the City, and $22,604 for each of the two courts located on Wilson Avenue. The compensation amount shall be increased again in July 1999.

As of July 1999, Caltech was required to pay $18,334.51 for relocations within the City, $9,166.72 for relocations outside of the City and $24,446.00 for each of the two courts located on Wilson Avenue. The compensation amount shall be increased in July 2004.

As of March 1, 2007, Caltech was required to pay $23,927.02 for relocations within the City and $11,962.78 for relocations outside the City. The compensation amount shall be increased again in 2012.

Review of Projects

Conditional Use Permits will not be required for any project envisioned by and described in this Master Plan. Applications for development not envisioned under the Master Plan will require a Conditional Use Permit in accordance with P.M.C. Chapter 17.88. If such development represents a major deviation from the approved Master Plan, the review and approval of a revised Plan, pursuant to P.M.C. Chapter 17.98, will be required prior to consideration of the development. Minor changes and/or clarifications may be made by the Zoning Administrator.

As of the third five-year compliance, a Conditonal Use Permit (CUP #4253) was approved to allow for the construction of a 700-space parking structure under the Athletic Field and to the west of the existing eight tennis courts approximately 210 feet from the nearest

residence on Arden Road. The Master Plan initially envisioned a parking structure with two levels above grade and new tennis courts above. The CUP found that the revised proposal reduced the potential impacts to the adjacent residences on Arden Road.

Project approval by the Zoning Administrator shall be required for all proposed facilities within 50 feet of property not owned by Caltech and within the campus boundary. Changes in a project required as a condition of said approval shall be limited to measures required to adequately mitigate the impact of said project on adjoining property within the subject 50 feet. The distance shall be measured from the proposed facility to the property line of the adjoining property not owned by Caltech.

Projects described under this Master Plan will require Concept Plan Review (now Preliminary Plan Review) as set forth in P.M.C. Chapter 17.84 and Design Review pursuant to the procedure described in P.M.C. Chapter 17.92 for only those projects identified in the Design Guidelines section of the Master Plan.

Appeals of decisions under the Conditional Use Permit, Design Review, or Concept Plan Review procedures shall be processed as described in the P.M.C. Section 17.84. Appeals of decisions made by Staff shall follow the same procedure.

Environmental Review

The Caltech Master Plan Final Environmental Impact Report (E.I.R.) was prepared as a program E.I.R., and reviewed all projects described by this Master Plan. Future development at the Caltech campus shall require additional environmental review as described herein.

An "Initial Study" shall be prepared for all proposed facilities exceeding 70,000 square feet of gross floor area. The Initial Study will be used by the City's Environmental Administrator to make one of the three following findings:

(1) The proposal is consistent with the Master Plan and would result in a range of potential impacts consistent with the Master Plan Final Environmental Impact Report;
(2) The proposal contains minor alterations from prior considerations, which warrant preparation of an Addendum to the Final Environmental Impact Report; or
(3) The proposal contains major changes that alter the conclusions of the Final Environmental Impact Report, or surrounding conditions have changed so substantially that the conclusions of the Final Environmental Impact Report are questioned. In both of these cases, depending on the magnitude of potential changes, either a Subsequent or a Supplemental Environmental Impact Report would be needed.

As of the third five-year compliance, an Initial Study was prepeared for the construction of the 98,000-square foot Cahill Center for Astronomy and Astrophysics. Further, as part of the 2006 amendment to the Master Plan, a Supplemental EIR was prepared to assess potential impacts of potential demolition and replacement of several buildings.

Proposed facilities of less than 70,000 square feet of gross floor area shall not require additional environmental review.

THE PLANNING PROCESS

The City of Pasadena, in July 1985, 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. At the suggestion of the Pasadena Planning Commission, Caltech began preparation of such a Master Plan for its 124-acre campus.

The new Caltech Master Plan, when approved, will be the most comprehensive Plan ever developed for the campus. (Earlier campus Master Plans, dating back to Bertram Goodhue's 1917 Plan, had not been subjected to City review and had been used only for internal planning purposes.) The new Plan will provide both the university and the community with established guidelines for Caltech's future development.

Phase one of the Caltech Master Plan project included the preparation of a "Report on Existing Conditions," presented to the City's Planning Commission in July 1986.

Phase two of the process was a review of development opportunities and constraints, and included a presentation to Caltech's Board of Trustees and a series of meetings with faculty and staff, and neighbors drawn from the four sides of the campus. The latter meetings, held in February 1987, provided Caltech with useful feedback and with the views of many adjoining property owners.

Phase three began in April 1987 with the presentation of a Development Strategy Plan (a "first draft" of the proposed Master Plan) to the Caltech faculty and staff, the Planning Commission, and the City's Cultural Heritage Commission. In addition, invitations were sent to all neighbors within 500 feet of the campus, and presentations were made in a series of meetings held in May and June.

Based on the feedback acquired during phase three, a final version of the proposed Master Plan has been developed, approved by Caltech's Board of Trustees, and presented to the Planning Commission. The Planning Commission, in turn, has asked the City's Public Works Department, Design Review Committee, and Cultural Heritage Commission to comment on Caltech's proposed Plan. The Planning Commission will schedule public hearings on the proposed Plan, the zoning changes that would be required to implement the Plan, and a Draft Environmental Impact Report (DEIR) on the Plan. Hearings on

the Draft EIR will be held first, followed by additional hearings covering the Master Plan itself.

The Board of Directors will receive the recommendations of the Planning Commission and will make its own findings, and we anticipate will ultimately approve the Master Plan.

The Board of Directors reviewed and adopted the Caltech Master Plan in May 1989. The Master Plan became effective on July 2, 1989. In May 1994, Caltech applied for a Master Plan Amendment which was approved by the Planning Commission on June 28, 1995, and ultimately adopted by the City Council on September 18, 1995.

Also in 1994, the first five-year review process commenced. The Planning Commission reviewed Caltech's progress toward compliance with the conditions of approval and provisions of the Master Plan during the first five years of implementation of the Plan. On July 26, 1995, Caltech was found to be in compliance.

On October 27, 1999, the Planning Commission reviewed the second five-year and found that Caltech was in compliance with the conditions of approval and provisions of the Master Plan.

On December 12, 2007, the Planning Commission reviewed the third five-year and found that Caltech was in compliance with the conditions of approval and provisions as outlined in the Master Development Plan and that the fourth five-year compliance review commence on 2012.

Pasadena and Caltech share a forefather in Amos G. Throop, a retired Chicago businessman who moved to Pasadena in 1886, the year the city was incorporated. By 1888 he was known to many as "Father" Throop, and in 1889 he became Pasadena's third mayor. Two years later, he also founded Throop University, a vocational school located at the southeast corner of Fair Oaks Avenue and Green Street.

Throop University, which soon became Throop Polytechnic Institute, grew rapidly. By 1894 it had an enrollment of 300 and had moved to new quarters at Raymond Avenue and Chestnut Street, just south of today's Foothill Freeway. In 1907 the school had reason to welcome another gentleman from Chicago, noted astronomer George Ellery Hale, who quickly accomplished two tasks. First, he established the Mount Wilson Observatory. Second, he became a Throop trustee and persuaded his colleagues on the board to drop the grammar and high schools and concentrate on developing a first-class institution of engineering. The reorganized school was to be located on 22 acres at the eastern edge of town, land provided by Arthur Fleming and his daughter Marjorie. The campus — renamed Throop College of Technology in 1913 — has been there ever since.

Mr. Fleming gave $25,000 toward construction of the first building on the new campus, and the citizens of Pasadena raised the remainder of the necessary $170,000. Pasadena Hall was formally dedicated on June 8, 1910. This building was the centerpiece of the first Master Plan for the campus, drawn up in 1908 by Myron Hunt and Elmer Gray. In 1917, a second Master Plan was prepared by noted architect Bertram Goodhue. Both Plans were based on the concept of an organizing east-west axis.

In addition to his work on behalf of Throop, Hale began service for the City of Pasadena toward seeing it established as a research and cultural center — the "Athens of the West." To that end he proposed that the City draw up a Master Plan for the Civic Center area. As a member of the first Planning Commission, he was influential in securing an admirable group of coordinated municipal buildings that include Pasadena's City Hall, library, and civic auditorium.

In 1920, when Throop College became the California Institute of Technology and Pasadena Hall was renamed Throop Hall, still another Chicagoan arrived to be its head — Robert Andrews Millikan. Caltech added science to its original engineering curriculum, its aeronautics department increasingly served the needs of southern California's aircraft industry, work began on a 200-inch telescope on Palomar Mountain, and the Jet Propulsion Laboratory was established. By the time Millikan retired in 1946, Caltech had 20 buildings, one of the best-known of which was the Athenaeum, the

faculty club that has played host to thousands of Pasadenans and distinguished visitors since it was dedicated in 1931.

Millikan was succeeded in 1946 by Lee DuBridge, during whose 23-year tenure the size of the campus grew to 80 acres, occupied by 64 buildings. Since 1964, southern Californians have particularly enjoyed the presence of Beckman Auditorium, where concerts, plays, symposia, and the Earnest C. Watson demonstration lectures are open to the public.

Early in the presidency of Dr. DuBridge's successor, Harold Brown, the San Fernando earthquake forced demolition of Throop Hall, whose famous Calder arches were stored by the City of Pasadena until they could be reinstalled on campus in 1986. Building was continued on the north side of San Pasqual Street, which led to its closing to automobile traffic between Wilson and Holliston Avenues.

Marvin Goldberger, who succeeded Brown in 1978, has recently left Caltech; developments during his nine-year term in office included renovation of several old buildings and building of several new ones. Among them were the earthquake-damaged Gates Laboratory of Chemistry, dating from 1917, renovated to become the Parsons-Gates Hall of Administration; the new Braun Laboratories, facing Wilson Avenue; and the Watson Laboratories. The W. M. Keck Observatory, which will house the world's largest optical telescope, and planning for the Beckman Institute, which will deal with problems at the interface between biology and chemistry, were also begun.

Both Caltech and Pasadena have grown in many ways. Caltech has seen an increase in endowments, buildings, and programs, but a relatively modest increase in the number of people involved. The enrollment in 1946, for example, was 1,391; today it is approximately 2,200.

With the appointment of Thomas E. Everhart as the new president, beginning in the fall of 1987, Caltech enters a new era. Projects now under way on campus will bring major changes in our understanding of the world around us, including increased knowledge in the fields of astronomy, treatment of disease, and computer technology.

In its special issue of June 16, 1986, devoted to the "American Best," *TIME* magazine called Caltech a national treasure. Caltech is dedicated to remaining small and continuing to deserve such an accolade. It is also dedicated to remaining a good citizen of its parent city and good friends with its neighbors.

The 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. Urban design guidelines define the height, location, and character of new development.

A graphic entitled "Concept Summary Plan" appears on page 24. Description of the graphic follows.

ACADEMIC BUILDINGS

Most new facilities for research and education would be placed in the area west, north, and east of Beckman Auditorium, between Wilson and Holliston Avenues and eventually extending north to Del Mar Boulevard. A secondary expansion area for academic buildings would include the south frontage of California Boulevard, east of Wilson. All new facilities, except as noted below, would be a maximum of three stories above grade.

STUDENT HOUSING

Most of the houses in the northern part of the campus currently serve as student residences. As those houses are removed to permit construction of academic buildings, it is expected that undergraduates will be moved to dormitory facilities. Graduate students would find space in new apartments to be built on the west side of campus, between Catalina Avenue and Wilson Avenue, north of San Pasqual Street and in the new Avery House on the corner of Del Mar Boulevard and Holliston Avenue.

OPEN SPACE AND GATEWAYS

The area set aside for academic buildings on the north side of the campus would include an east-west mall north of Beckman Auditorium similar in character to the Olive Walk-Bechtel Mall axis of Bertram Goodhue's 1917 campus Master Plan. Also, the north-south axis that today terminates at Beckman Auditorium would be extended north to Del Mar Boulevard, where a new gateway to the campus would be created. To help identify the area as a major entrance to the campus, it is proposed to increase the height above grade of the buildings in the surrounding area to four stories, with the possibility of a single five- or six-story building. Secondary gateways will be created at the ends of the new east-west mall, on Wilson and Holliston Avenues, and the present pedestrian gateway on California Boulevard will be expanded and realigned with the north-south axis.

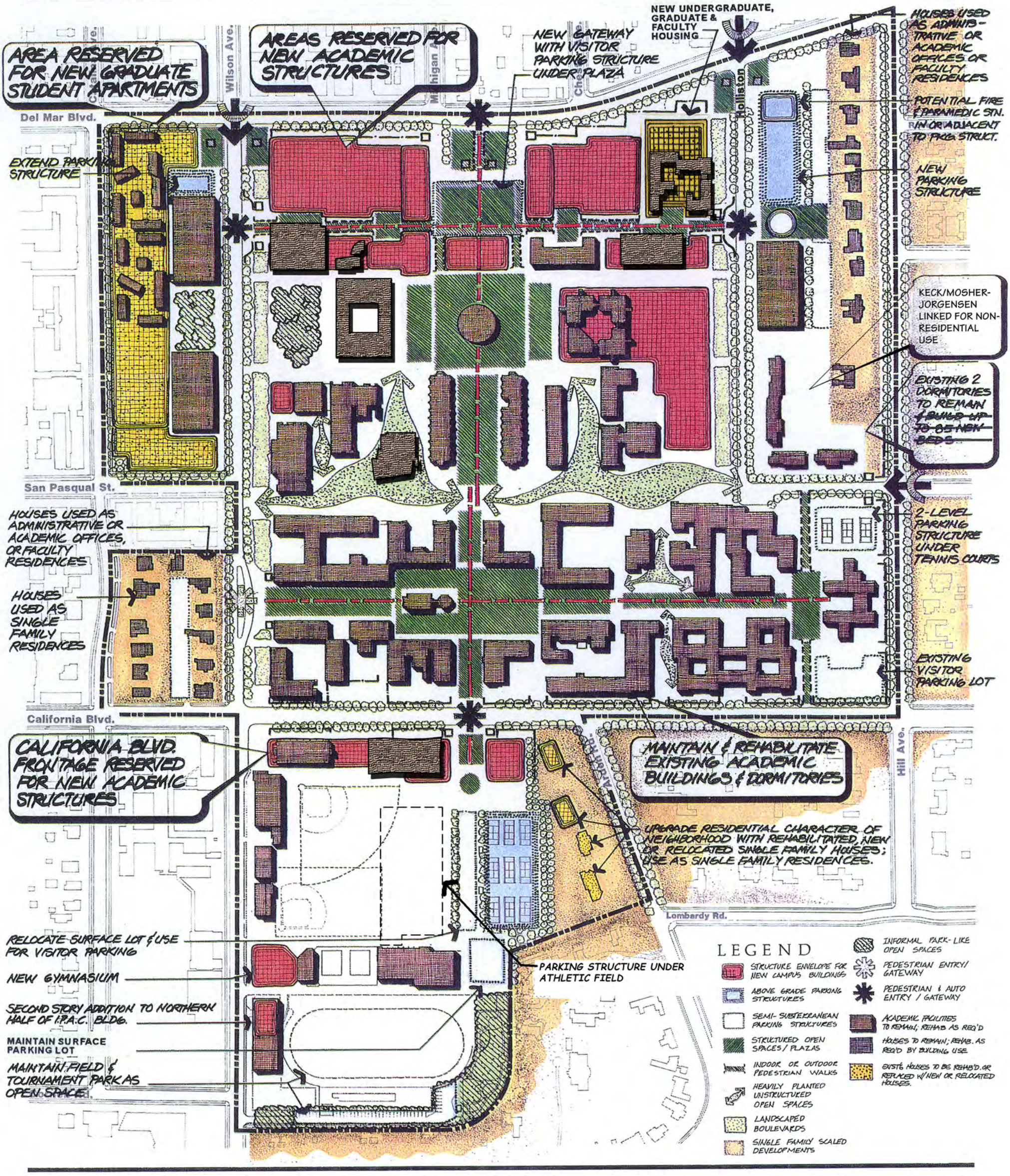
PARKING

The campus population is expected to grow slowly, but academic buildings in many cases would displace existing surface parking lots. It is anticipated that future parking will be provided primarily in multi-level structures. Some 1,000 parking spaces would be located on the west side of Wilson Avenue, south of Del Mar Boulevard, in two structures; the first was completed in the summer of 1987 and provides 443 spaces. Another 1,000 spaces would be provided in two similar structures on the east side of Holliston Avenue, south of Del Mar Boulevard; the first was completed in 1994 and provides 437 spaces. And about 700 spaces would be created beneath the Athletic Field south of California Boulevard. These three major parking areas, each approximately equidistant from the center of the campus, should handle the anticipated campus parking requirements in the years to come, and help relieve parking congestion on neighboring streets. In addition, adequate visitor parking will be provided in a 250-space underground structure at the northern gateway.

A four-level parking structure located on the west side of Wilson Avenue between Del Mar Boulevard and San Pasqual Street was completed on February 14, 2000. This structure provided for 440-parking spaces.

A three level fully subterranean garage beneath an existing Athletic Field located on the south side of California Boulevard between Wilson Avenue and Arden Road was completed in 2005. This structure provided approximately 700 parking spaces. CUP #4253 was approved on October 1, 2003, which allowed for the construction of a parking structure under the Athletic Field and to the west of the existing eight tennis courts approximately 210 feet from the nearest residence on Arden Road. The Master Plan initially envisioned a parking structure with 1/2 level above grade and 2 1/2 below grade and new tennis courts above.

Concept Summary Plan



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

KURT MEYER PARTNERS

DECEMBER 2007

CONSTRAINTS & POTENTIALS

This section is essentially a documentation of the conditions that existed around and within the Caltech campus in 1987 and was the foundation for the 1989 Master Plan. However, for the purposes of the 1995 and the 2006 Amended Master Plan, pertinent information has been updated, i.e. student population and student housing accommodations.

The Master Plan attempts to balance the concerns of the City of Pasadena and Caltech's neighbors with Caltech's own operational needs. During the constraints/potentials phase of the planning process, Caltech and the consultant team met frequently with small groups of residents from each of the four neighborhoods surrounding the campus.

CITIZEN INPUT

The following paragraphs summarize comments received in a series of 16 meetings with neighbors held in February-June 1987.

Predominant Comments

Master Plan: many positive comments were received, especially in support of the concept of developing a second east-west mall in the northern area of the campus, and the creation of three major concentrations of parking within the campus.

On-street parking: attempt to reduce Caltech staff, student, and visitor parking on surrounding streets by providing sufficient on-campus parking and by encouraging the City to enforce existing street parking regulations.

On-campus parking: make as unobtrusive as possible by placing parking underground and/or in as attractive as possible above-ground structures.

Traffic: avoid significantly increasing traffic on Wilson Avenue.

California Boulevard pedestrian traffic: consider reducing foot traffic in the vicinity of the present tennis courts through the use of a bridge or tunnel.

Open-space maintenance: current landscaping was widely praised.

West Side

Future graduate student housing on Catalina Avenue and San Pasqual Street: maximum height on northeast corner of Catalina and San Pasqual should be two stories; setbacks should be appropriate to the neighborhood.

Parking structures: create incentives for residents of graduate student housing on Catalina Avenue to use the parking structure(s) on Wilson Avenue; consider building the next structure anywhere but on Wilson.

North Side

Proposed Del Mar Boulevard gateway: preserve a view of Beckman Auditorium from Del Mar; don't make the gateway too "flashy"

(buildings should reflect excellent design and project an appropriate image of the institution); examine potential for congestion on Del Mar.

Open space: until academic buildings are erected, would prefer open space on Del Mar Boulevard to present housing.

East Side

On-street parking: Athenaeum employee parking generates late-evening noise as well as congestion.

Vacant housing: houses held for visiting faculty members, if left vacant too long, can become "attractive nuisances."

South Side

Maintain building-free zone south of gymnasium in accordance with prior agreements.

Proposed parking beneath relocated tennis courts: structure should not be too high; contiguous residences should be shielded by landscaped berms and other means from light, noise, and auto pollution; adequate drainage should be provided.

Caltech's Arden Road properties: present residential structures and landscaping are incompatible with the neighborhood.

Development south of California Boulevard: future development should be limited and in keeping with the surrounding residential properties.

California Boulevard: reduce traffic if possible.

These group forums and meetings with individual residents in the surrounding community, as well as subsequent meetings with Caltech staff/faculty and the City's staff, led to the identification of five basic areas of City/neighborhood concerns and Caltech operational needs. These concerns and needs form the basis for the constraints and potentials to Caltech's development.

TABLE 1: CITY/NEIGHBORHOOD CONCERNS & CALTECH OPERATIONAL NEEDS

CITY/NEIGHBORHOOD CONCERNS	CALTECH OPERATIONAL NEEDS
1. Protect integrity of residential neighborhoods.	1. Obtain an entitlement for construction of new facilities within campus boundaries to accommodate projected requirements; and Receive expeditious administrative approvals for projects conforming to an Master Plan.
2. Limit intensity of development.	2. Retain development flexibility to respond to changing programmatic needs and funding.
3. Create an attractive community resource.	3. Maintain and extend the pleasant open spaces of the existing campus.
4. Minimize impact of development on traffic.	4. Develop an organized campus framework with efficient vehicular access for faculty, staff, students, and visitors.
5. Provide an adequate supply of parking.	5. Provide adequate and conveniently located parking facilities.

DEVELOPMENT CONSTRAINTS AROUND THE CAMPUS

Based on the City's and neighborhood's concerns and a review of existing conditions around the campus, the following constraints to development of the campus were identified and are illustrated on the accompanying map.

Single-Family Neighborhoods

Hill Avenue

The well-established single-family neighborhoods that abut the eastern and southern boundaries of the campus must be protected. Single- family houses currently inside campus boundaries along Hill Avenue, while used for a mix of residential and academic purposes, are a part of the adjacent neighborhood and contribute to the residential character of the street. Maintenance of a residential character at this edge is important to the preservation of the neighborhood to the east. The heritage of houses along Hill Avenue strongly suggests their preservation.

Arden Road

Despite the presence of houses on both sides of the street, the residential character of Arden Road breaks down toward California Boulevard because houses on the west side are set too far back to define neighborhood scale at the street edge. In addition, both the Young Health Center and associated landscaping detract from the residential character of the street. The poor condition and minimal historic value of the two existing houses at 1221 and 1227 Arden Road further detract from the area's image. Taken together, these factors suggest that improvement or replacement of houses within Caltech's boundary along Arden could enhance the character of the street.

Catalina Avenue

The existing houses on the east side of Catalina Avenue between California Boulevard and San Pasqual Street are used by Caltech as

faculty residences and, together with the houses on the west side of the street, form a pocket neighborhood. Caltech's own need for on-campus faculty housing and the heritage of this neighborhood suggest its preservation.

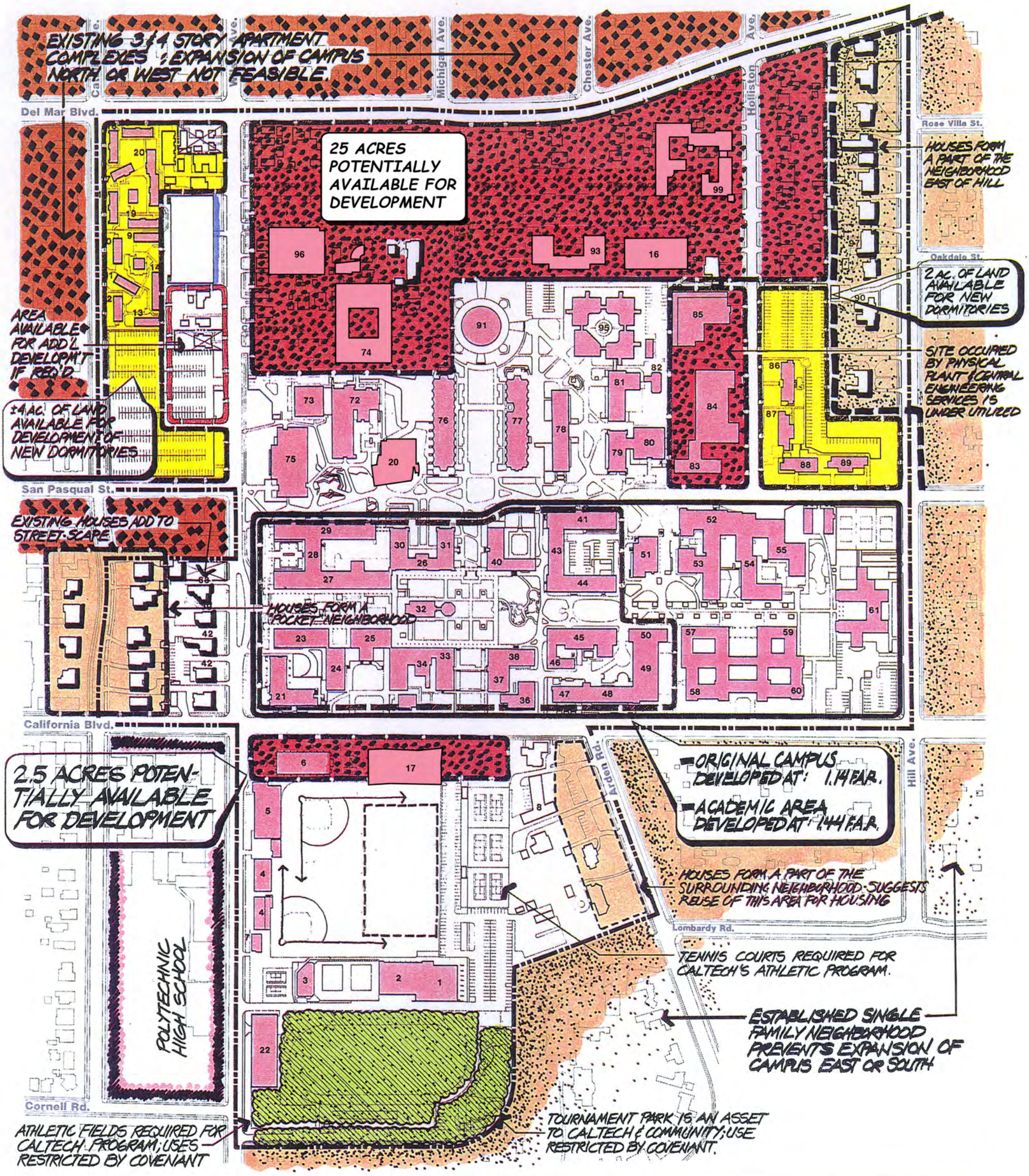
Apartment/Condominium Neighborhoods

Areas to the north and west of the campus are developed with high-density apartments and condominiums. This level of development precludes Caltech's expansion north and west and implies certain development patterns within portions of the campus adjoining these areas. For example, development of additional dormitories on the east side of Catalina Avenue, north of San Pasqual, would be more compatible with existing apartments and condominiums on the west side of the street than academic or parking facilities. Development of academic facilities along Del Mar would be more compatible with the scale of apartments and condominiums to the north than the existing single- family houses.

Tournament Park/ Athletic Facilities

Tournament Park bounds the southern edge of the campus. Existing covenants on the park and the playing field immediately to the north limit the use of these areas to open space or athletic fields. Development of buildings in this area is therefore precluded. A single exception to this is the addition of a second story over the northern half of the I.P.A.C. Building, which has already been approved under a prior C.U.P. Caltech's own need for athletic fields, which require more space than is currently available, reinforces the need to limit development in the rest of the campus property south of California Boulevard.

Development Constraints / Potentials



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

KURT MEYER PARTNERS

DECEMBER 2007

DEVELOPMENT POTENTIAL ON THE CAMPUS

The review of existing conditions within the campus boundaries suggests two main areas for development of new academic facilities. The first is the roughly 25-acre area between the existing campus and Del Mar Boulevard. The area is currently occupied by parking lots or single-family houses that are recommended for removal. The second area is roughly a 2-1/2-acre strip of land immediately south of California Boulevard, north of the existing playing field. It is currently used as a surface parking lot.

The existing pattern of development and surrounding land uses suggests the continued development of apartment buildings for graduate students along Catalina Avenue and San Pasqual Street. The presence of the existing dormitory complex at Holliston Avenue and San Pasqual Street and the existence of additional dormitories south of San Pasqual Street suggest development of additional dormitories in this area.

Property Ownership

The land area within the defined campus is approximately 124 acres. Caltech owns all properties within the campus boundaries with the exception of nine residential parcel, which are located in the northern area of the campus. Except for one parcel located immediately north of the Beckman Auditorium, properties not owned by Caltech are located at the perimeter of the area identified for development of academic facilities. While it is considered likely that all non-Caltech properties within the campus boundaries can be purchased, acquisition of this property is not immediately required for implementation of the Master Plan and therefore not considered a constraint.

As of the third five-year compliance, Caltech owns all property within the Master Plan boundary area with the exception of one residential parcel in the northern portion of the campus, 391 S. Wilson Avenue.

Building Condition

The review of facilities at the campus was a basic determinant for the definition of areas for new development. With some exceptions, most existing academic facilities are in good condition, and are expected to remain in place for the life of this Master Plan. This precludes major redevelopment within the existing campus. By contrast, most existing houses within the campus boundary, with the exception of those on Hill, Arden, Wilson, and Catalina, are neither substantial nor historic in nature, and are generally in average condition considering their age. It is therefore assumed that the sites of these houses can be cleared by removal or demolition.

Functional Requirements

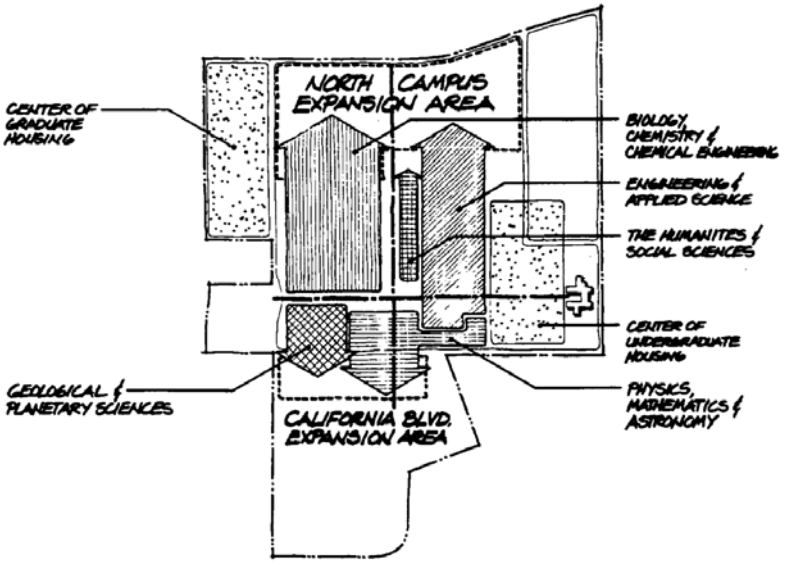
The functional organization of Caltech's academic campus was also a determinant for selecting areas of new development. The northern area would provide space for expansion of the likely high-growth divisions at Caltech:

- Biology;

- Chemistry and Chemical Engineering; and
- Engineering and Applied Science.

The area identified south of California Boulevard would provide expansion space for divisions housed in academic facilities at the north side of California Boulevard:

- Physics, Mathematics and Astronomy; and
- Geological and Planetary Sciences.



The development of the undergraduate and graduate housing should reinforce the current concentration of each in the Holliston Avenue and Catalina Avenue areas, respectively.

An area potentially available for redevelopment within the campus boundaries is the site occupied by the Physical Plant and Central Engineering Services (Buildings 83, 84, and 85). These facilities are of wood construction and were originally built as temporary facilities; the land they occupy is underutilized by comparison to the rest of the campus.

Intensity of Development

An objective of this planning process was to define a development strategy that would maintain and extend the scale and open-space qualities of the existing campus. Therefore, land utilization within the developed campus was analyzed to determine the appropriate scale for new facilities. This area is developed to an F.A.R. (Floor Area Ratio) of approximately 1.44 (that is, for every square foot of net property area, inclusive of building setbacks, there exists about 1-1/2 square feet of building space). The present F.A.R. provides an agreeable scale of development as well as an attractive array of open

space. In planning for expansion of the campus, the F.A.R of the existing campus was used as a benchmark for the scale of new development.

The next step in the planning process was the estimation of the future campus population and attendant facility needs.

POPULATION GROWTH

The graphs on the following page summarize the historic and potential future growth in staff, faculty, and students at the campus. Over the last twenty years, from 1965 to 1985, the growth of the campus population has not been substantial, increasing from a population of 3,258 in 1965 to 3,953 in 1985. Future growth is expected to continue this trend. The historic trend correlates closely with the assumptions of Caltech's staff for future growth of the campus population:

- Faculty/staff population will increase at a rate of approximately 1% per year to 2,430 in the next 15 years;
- The undergraduate student population is not expected to increase significantly; and
- The graduate student population is expected to increase by up to 1.4% per year, or to about 1,200 students.

These assumptions lead to the estimate of future campus population presented in Table 2. Recognizing that projections of future growth will deviate slightly from actual populations, this estimate is useful for the purpose of defining the magnitude of impact of Caltech's population growth on the surrounding community. As Caltech's expected population growth is quite small, the impact of that growth will be minimal. A population growth slightly less or more than that projected should not significantly change the impact.

TABLE 2: POPULATION ESTIMATE

	GROWTH YR 1985	RATE/YR	YR 2000
Undergraduates	845	-0-	845
Graduates	995	1.4%	1,200
Faculty/Staff	2,113	1.0%	2,430
TOTAL POPULATION	3,953	0.9%	4,475

The above estimates were analyzed in the 1989 EIR. As analyzed in the EIR for the 2006 amendments, Table 2A 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 studies before the end of each

academic year (June), student population drops during the course of every year.

Table 2A Caltech Enrollment History

Enrollment	Graduate Students	Undergraduate Students	Total
1995-1996	1,050	923	1,973
1996-1997	1,020	882	1,902
1997-1998	1,021	904	1,925
1998-1999	957	901	1,858
1999-2000	982	907	1,889
2000-2001	1,039	929	1,968
2001-2002	1,116	942	2,058
2002-2003	1,181	939	2,120
2003-2004	1,281	891	2,172
2004-2005	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 2B presents the forecasted campus population for 2007-2015 based on these growth rates.

Table 2B Forecast Student Population

Enrollment	Graduate Students	Undergraduate Students	Total
2004-2005	1,275	896	2,171
2007-2008	1,300	920	2,220
2014-2015	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 2000 – 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 beginning of several large projects (unforeseeable at the time of the original Master Plan's drafting and review/approach). Notable among them were the Laser Interferometer Gravity-wave Observatory (LIGO), the Spitzer (Infrared Telescope) Science Center, and an expansion of the Infrared Processing & Analysis Center (IPAC) precipitated by a separate space mission.

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 is at 3,534 (2006). The professiorial faculty population is expected to contine to grow modestly above its current level (283 as of October 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 2007 year and following, with about 2% growth thereafter based on a 5-year forecast. However, growth through 2014-2015 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 Sceince Foundation. Several such centers, usually lasting 5-10 years, have affected campus population in the last 15 years. Table 2C shows the forecase of the campus population for 2007 through 2015.

Table 2C Forecast Campus Population

Enrollment	Student Population	Faculty & Staff Population	Total
2004-2005	2,171	3,550	5,721
2007-2008	2,220	3,550 - 3,600	5,770 - 5,820
2014-2015	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 2014-2015 is estimated between 350 and 550 persons (approximately 10% to 15%).

ACADEMIC FACILITIES

Contrasting with the relatively slow growth in campus population is the historically more rapid increase in the size of facilities at the campus. This dichotomy is to be expected at research institutions such as Caltech where, in the face of rapidly changing technology, more equipment and experimental facilities per person are required. While exact requirements for new academic facilities cannot be predicted, the Master Plan must allow for continuation of the campus's historic growth rate, based on the following assumptions:

- The growth in academic and administrative facilities will outstrip the growth in faculty/students as facility requirements per person continue to increase; and

- Facilities will increase at a rate of 2-3% per year based on current forecasts and historic trends.

Academic divisions are likely to experience modest growth over the next 15 years. The academic divisions are:

- Biology;
- Chemistry and Chemical Engineering;
- Engineering and Applied Science;
- Geological and Planetary Sciences;
- Humanities and Social Sciences; and
- Physics, Mathematics and Astronomy.

Given the historic rate of construction of new facilities at the campus, as evidenced in the accompanying diagram, the area between the existing campus and Del Mar should be sufficient to meet Caltech's growth needs for the next 30 to 40 years. The "new campus" area north of the line of San Pasqual Street contains approximately 650,000 square feet of academic facilities on about 17 acres of property, and took approximately 30 years to develop. By comparison the area to the north provides about 25 acres for future development.

STUDENT HOUSING

The assumptions underlying the projection of student housing requirements are:

- 100% of the undergraduate student body may be housed in Caltech-owned facilities; and
- 50% - 60% of the graduate student body may be housed in Caltech-owned facilities.

An analysis of current undergraduate and graduate student housing on campus is presented in Tables 3 and 4. These figures include the Catalina II graduate student dormitory.

TABLE 3:
CURRENT UNDERGRADUATE ACCOMMODATIONS

• Students housed in dormitories south of San Pasqual	284
• Students housed in converted graduate dormitory (Braun/Marks)	58
• Students in houses and apartments in north campus	382
• Students housed in Caltech-owned facilities off campus	150
• Students housed in private facilities off campus	65
TOTAL UNDERGRADUATE POPULATION	939

77% of undergraduates are currently housed on campus and 23% are housed in Caltech-owned facilities on or off campus.

TABLE 4:
CURRENT GRADUATE ACCOMMODATIONS

• Students in dormitories east of Holliston	0
• Students in Catalina I & II & III (North, Central, South)	446
• Students in houses in north campus	23
• Students in Caltech-owned facilities off campus	142
• Students in private facilities off campus	638
TOTAL GRADUATE STUDENT POPULATION	1,249

41% of graduates are housed on campus and 49% are housed in Caltech-owned facilities or or off campus.

The analysis of existing student housing accommodations and comparison to assumed housing requirements lead to the following constraints for the Master Plan:

- Construction of new academic facilities in the north campus will necessitate provision of replacement housing for both graduate and undergraduate students living in the area; and

- New housing for graduates may need to be constructed as that segment of Caltech's population increases.

ATHLETIC FACILITIES

Caltech's athletic facilities are currently located south of California Boulevard and include the following:

- Gymnasium and Weight Room Building;
- Two swimming pools;
- Eight lighted tennis courts;
- Two overlapping soccer fields;
- Two overlapping baseball diamonds; and
- Running track and additional field between the gymnasium and Tournament Park.

Caltech's athletic facilities are important to its viability as an urban campus. But deficiencies in facilities exist that make it difficult to accommodate current programs. The following programmatic needs exist:

- An east-west expansion of the northern playing field's width to reduce or eliminate the existing conflict between concurrent soccer and baseball games;

- Expanded or new gymnasium facilities to provide for basketball, volleyball, and badminton;

- Refurbishment of the Weight Room Building to provide a larger weight room and additional locker space;

- Two to four additional tennis courts;

- Racquetball/Squash courts;

- Additional lighting at the running track and southern playing field to increase safety for nighttime use by Caltech personnel and neighborhood residents; and

- Miscellaneous improvements to existing facilities such as installation of an all-weather surface at the running track, recently accomplished.

After defining likely areas for future campus development, an analysis, illustrated on the accompanying map, was made of the existing campus organization and its network of open spaces to establish open-space principles for future organization of the campus. This analysis led to the recommendation that underlies the Master Plan:

- To preserve and extend the system of open spaces that exists today with landscaped spaces of similar quality.

EXISTING OPEN-SPACE NETWORK

The campus is organized around a series of formal malls that form east-west and north-south axes.

The Axes

The east-west axis starts at the Athenaeum and runs west along the Olive Walk to the Bechtel Mall at Wilson Avenue. A north-south axis starts at California Boulevard between the Bridge and Sloan Laboratories, intersects the east-west axis at Millikan Library, and runs north through the Court of Man to the Beckman Auditorium. These two axes, and the associated open spaces along them, form the major organizing elements for the campus and help to make the geography of the campus understandable to the visitor.

San Pasqual Street

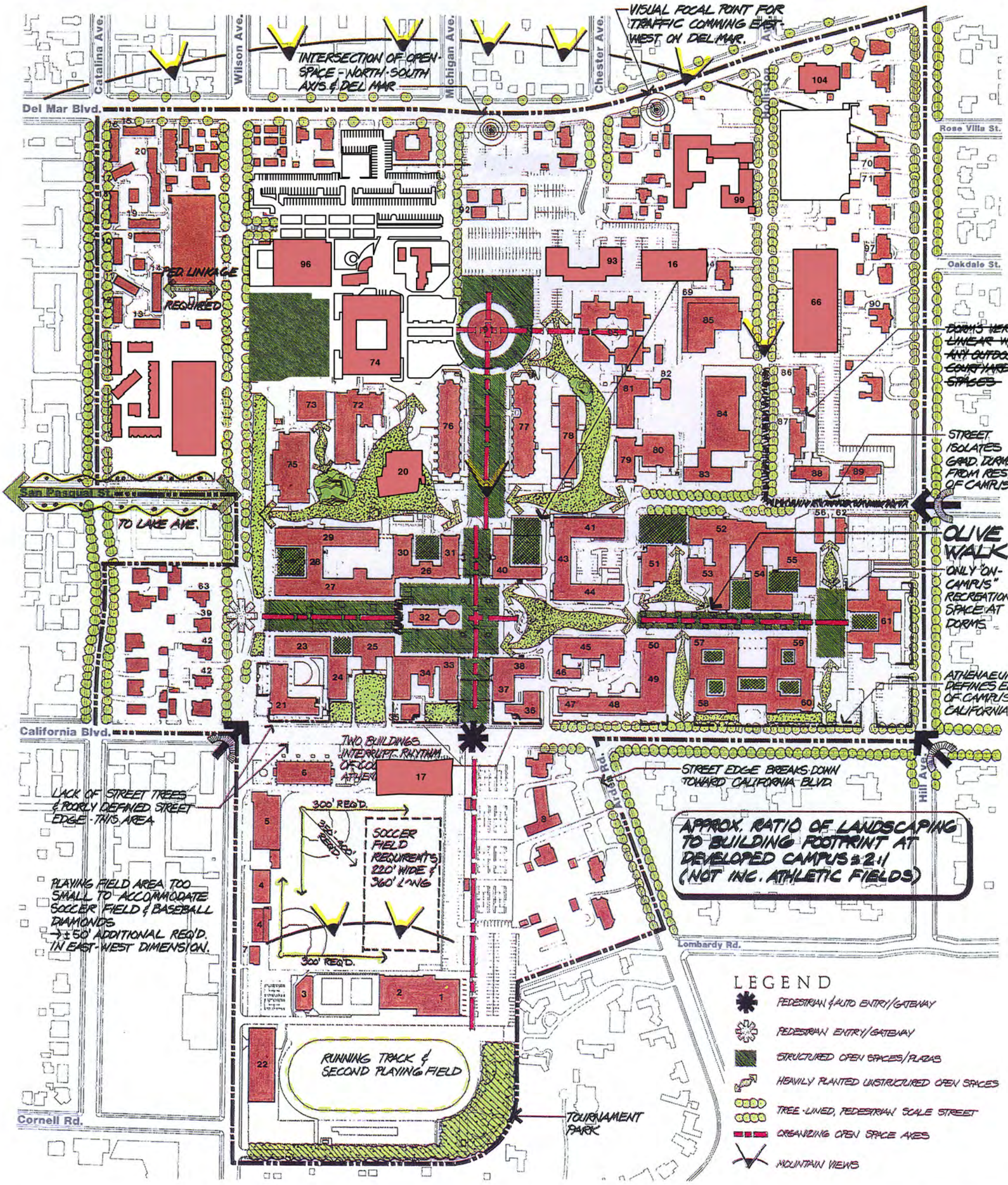
As the campus expanded north, portions of San Pasqual Street were vacated and developed as a heavily landscaped, parklike setting. This area creates a pleasant contrast to the formal malls seen elsewhere on the campus. The free-form walkway system and dense tree canopy provide a human scale. Informal groupings of benches and structured amphitheaters are located at various points throughout this area and provide opportunities for quiet study and conversation.

The Courtyards

In addition to these larger open spaces, small courtyards, like that at Dabney Hall, have been provided at numerous buildings throughout the campus. These spaces provide quiet areas for informal study and conversation and are an important aspect of the campus open-space network.

The sum of these open spaces, the formal malls, the small courts, and the parklike areas, creates a very pleasant campus setting and provides the premise for the open-space strategy proposed by this plan.

Existing Open Space



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

KURT MEYER PARTNERS

DECEMBER 2007

CAMPUS GATEWAYS

While there are numerous informal entry points onto the campus, there are two primary gateways through which visitors as well as students, faculty, and staff arrive. The most recognizable image of Caltech is found at the gateway located along Wilson Avenue at the west end of the Bechtel Mall. Here the road widens out around a landscaped island to announce the entrance to the mall. The entry to the mall is flanked by blue domes, which announce the beginning of the campus arcade system. Unfortunately, there is no parking at this location, so the sense of arrival is fleeting as one drives north or south on Wilson Avenue to find parking. Having parked one's car, the return trip to the campus is normally through one of the informal entrances. This, particularly for the visitor, is a disorienting experience.

Another more practical gateway is located along California Boulevard, where a pedestrian signal marks an entry into the campus, and a driveway entrance to visitor, faculty, and staff parking. While functional, this entrance can most appropriately be described as a side door into the campus.

Neither of these gateways serve well the function they are assigned, and as a result the Caltech campus lacks a truly identifiable entry point. While there are implications for the campus's visibility stemming from this situation, the major impact is on traffic and parking on the surrounding streets. The lack of a defined gateway and associated parking leads visitors, staff, and students to drive the surrounding residential streets in search of Caltech and a parking space, thereby throwing more traffic and parking into the surrounding residential neighborhoods.

The analysis of existing open spaces suggested two potential locations for new entrances to the campus. Both locations lie along Del Mar Boulevard, which is a major east-west traffic carrier within the City of Pasadena. One point falls at the extension of the intersection of the north-south axis with Del Mar Boulevard, the other at the bend in Del Mar Boulevard, which would become a visual focal point for traffic moving east on the street. Development of the open-space strategy analyzed the placement of a new gateway to the campus at both locations.

Existing traffic and parking conditions at Caltech's campus were analyzed by Weston Pringle & Associates to provide a data base for preparation of the Master Plan. Their analysis resulted in two main conclusions.

TRAFFIC IMPACT

The number of automobile trips generated by visitors, staff, students, and faculty coming to Caltech is far smaller than at other campuses because of Caltech's small size and the proportion of its students and faculty/staff living on or near the campus. Automobile traffic generated by Caltech therefore does not have a major impact on the surrounding streets. The increased automobile traffic due to the growth in the campus population will also be relatively small. Nonetheless, to minimize the impact of Caltech-related traffic on residential streets, future street and parking improvements should direct traffic along the two major arterials, California and Del Mar Boulevards.

Surveys of car ridership at Caltech conducted during the review of existing conditions and estimates of automobile trip generation demonstrated a low automobile usage, due to the fact that most students, more than half the campus population, live on or within walking distance of the campus. Surveys showed that only 25% of students living off campus drove to school.

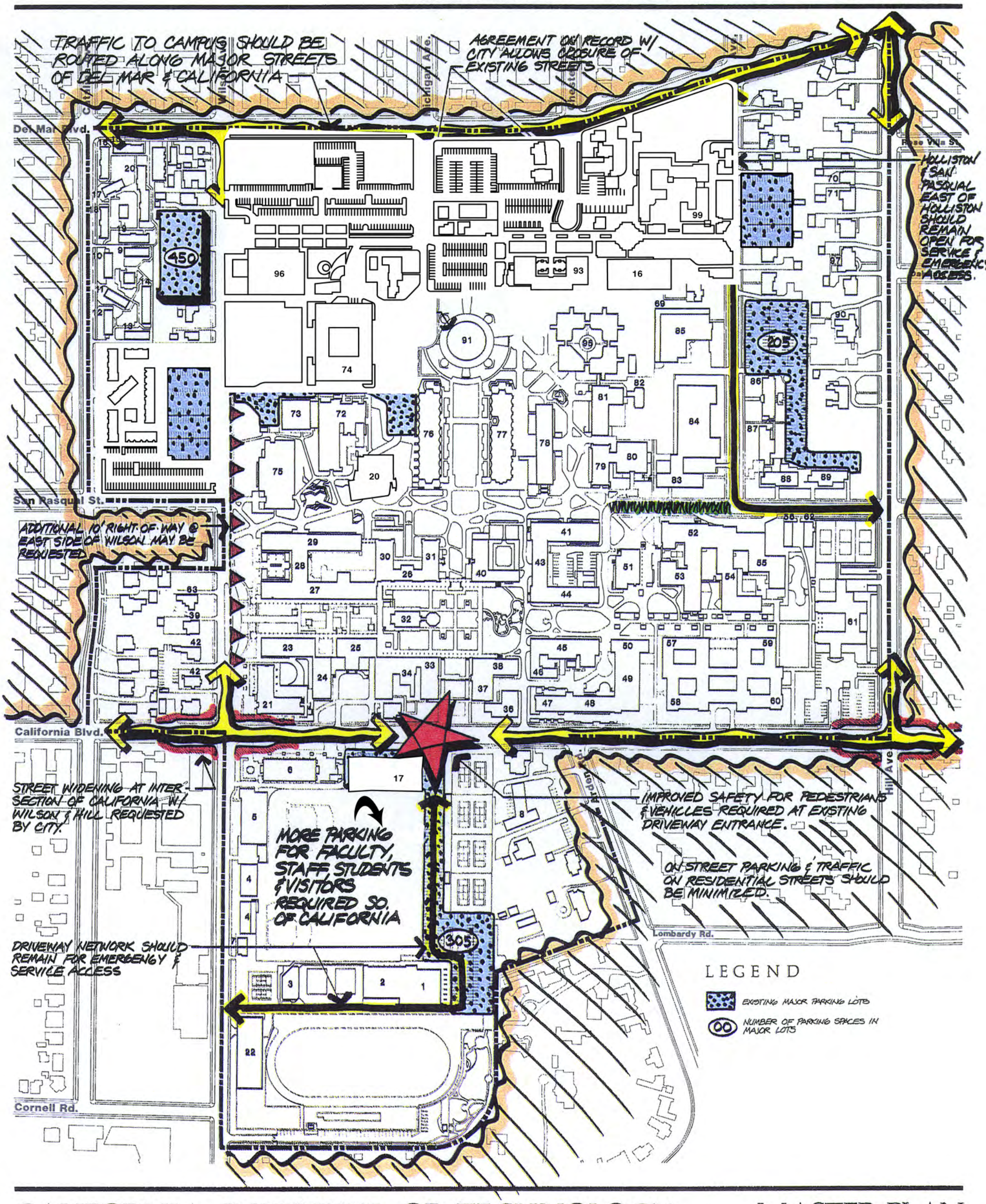
A parking utilization survey demonstrates that parking is required at a rate of approximately one space per two people at the campus, a very low level of demand. This is equivalent to a car ridership ratio of two persons per automobile, very high in the context of southern California, where the ratio is 1.2 persons per car on average.

The survey demonstrates that Caltech has far surpassed the goals of most Transportation Management Plans, which generally require 1.5 persons per car.

PARKING IMPACT

A comparison of the theoretical demand for parking with the number of spaces provided on campus indicated that Caltech currently has approximately the parking it needs for its students, staff, and faculty. However, two aspects of Caltech's parking situation lead to a significant impact on the neighborhood:

Circulation Constraints / Potentials



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

KURT MEYER PARTNERS

DECEMBER 2007

- There is insufficient visitor parking provided at the campus. To accommodate visitor parking demand, an increase of 10% in the amount of parking at the campus is recommended; and

- The distribution of parking is not balanced with the location of academic facilities on the campus. Most of the parking lots are located north of the existing campus, while academic facilities are currently centered near California Boulevard.

The sum of these two deficiencies has led to encroachment by Caltech's staff, students, and faculty, as well as visitors, onto the surrounding residential streets. Combined with a general lack of enforcement of the two-hour parking limit set on many of these streets, this situation is unacceptable to Caltech's neighbors.

STREET IMPROVEMENTS

Several improvements to public streets currently planned by the City affect Caltech's development.

Wilson Avenue

The ultimate cross section planned for Wilson Avenue is an 80-foot right-of-way with a 60-foot curb-to-curb road width. The current right-of-way on Wilson Avenue north of California Boulevard is 70 feet. This may require dedication of 10 feet of property on the east side of the street.

California Boulevard

California Boulevard is currently striped for four through-lanes and a left-turn lane but has only a 50-foot curb-to-curb width. The City's current policies call for widening the street where practical by five feet on both sides at major intersections to a point approximately 150 feet back from each intersection. This policy could affect the intersection of California Boulevard with both Wilson Avenue and Hill Avenue.

Internal Campus Streets

Weston Pringle & Associates' review of existing traffic and circulation at Caltech's campus concluded that the interior streets in the northern part of the campus between Hill Avenue and Wilson Avenue do not affect the adequate functioning of the City's or the campus's traffic network and can be abandoned. A system of service driveways will be sufficient to access new facilities in the north campus. The existing network of driveways south of California Boulevard should be maintained for service and emergency access.

PARKING DEMAND

Parking demand ratios were derived through field surveys administered in June 1986 (prior to construction of Catalina II and the parking structure on Wilson Avenue) for each segment of the population at Caltech. The current theoretical parking demand calculated by using these ratios is presented in Table 5.

TABLE 5: CURRENT PARKING DEMAND

POPULATION COMPONENT	PARKING RATIO	CURRENT POPULATION	CURRENT PRKG. DEMAND
Graduate Students, Off Campus	1:2.3	600	261
Graduate Students, On Campus*	1:1.5	396	264
Undergraduate Students, On Campus	1:2.5	812	325
Faculty and Staff	1:2.0	2,113	1,057
TOTALS		3,921	1,907

*Prior to construction of Catalina II

The total theoretical demand of 1,907 vehicles corresponds closely to the 1,919 off-street parking spaces currently located on the campus. Surveys conducted at existing parking lots verified that these ratios are an appropriate indicator of parking demand at Caltech. Based on these ratios and the estimated future campus population, the amounts of parking shown in Table 6 will be required to satisfy demand in the next 15 years.

TABLE 6: FUTURE PARKING DEMAND

POPULATION COMPONENT	PARKING RATIO	FUTURE POPULATION	FUTURE PRKG. DEMAND
Graduate Students, Off Campus	1:2.3	480	209
Graduate Students, On Campus*	1:1.5	720	480
Undergraduate Students, On Campus	1:2.5	845	338
Faculty and Staff	1:2.0	2,430	1,215
Vacancy/Guest Factor	10%	—	224
TOTALS		4,475	2,466

*Assumes 60% of graduate students are housed on campus.

THE PLAN

The Concept Plan identifies areas for the construction of new academic, residential, and parking facilities within a defined network of open spaces. Guidelines accompanying the Concept Plan define the height, location, and character of development to be expected within each area. The Concept Plan is structured to:

1. Respect and protect the surrounding neighborhoods by restricting development at campus edges to uses and buildings that are compatible with surrounding land uses.

2. Provide for the growth of Caltech's academic divisions while protecting the surrounding community by:

   - Providing an envelope for new buildings that limits the intensity of new development but provides Caltech a measure of flexibility in responding to funding and programs; and

   - Locating areas for development of new academic facilities proximate to the likely growth divisions at Caltech while buffering these areas from the surrounding community with nonacademic development.

3. Maintain open-space qualities of the existing campus in connection with new development by:

   - Extending the existing system of malls north to a new gateway entrance at Del Mar Boulevard, with a new east-west mall running from Holliston Avenue to Wilson Avenue; and

   - Sizing new facilities in scale with height and massing of existing buildings.

4. Minimize the traffic impact of new development on the surrounding community and provide for efficient vehicular circulation within the campus by:

   - Providing adequate and conveniently located parking; and

   - Creating an efficient system of on-campus service and auto-circulation paths.

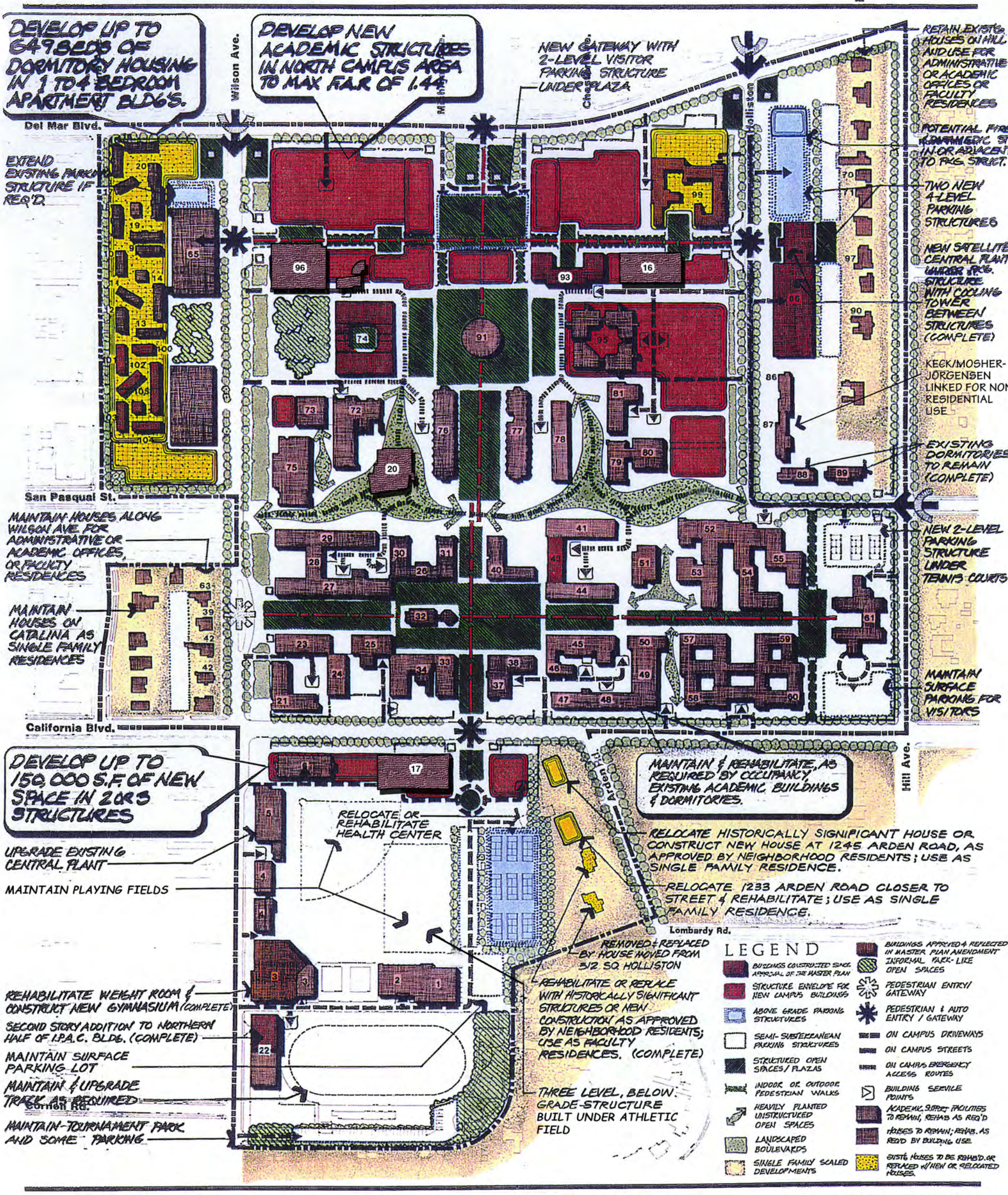
LEGEND FOR BUILDINGS IN CONCEPT PLAN

1, 2	Brown Gymnasium
3	Braun Athletic Facility
4, 5	Cooling Towers/Central Plant
6	Keith Spalding Building
7	Einstein Papers
16	Annenberg Center for Information Science & Technology *
17	Cahill Center for Astronomy & Astrophysics
20	Schlinger Laboratory for Chemistry & Chemical Engineering *
21	Mudd Laboratory - South
22	Morrisroe Astroscience Laboratory
23	Mudd Laboratory - North
24	Robinson Laboratory
25	Arms Laboratory
26	Gates Annex
27	Kerkhoff Laboratory
28	Alles Laboratory
29	Church Laboratory
30	Crellin Laboratory
31	Parsons-Gates Hall of Administration
32	Millikan Library
33	Bridge Laboratory - East Bridge Laboratory - West
34	Bridge Annex
37	Sloan Laboratory
38	Kellogg Radiation Laboratory
39	U.S. Geological Survey
39	U.S. Geological Survey
40	Dabney Hall
41	Spalding Laboratory
42	Treasurer's Office
43	Fairchild Library
44	Thomas Laboratory
45	Guggenheim Laboratory
46	Karman Laboratory
47	Downs Laboratory
48	Lauritsen Laboratory
49	Synchrotron
50	Firestone Laboratory
51	Winnett Student Center
52	Chandler Dining Hall
53	Page House
54	Lloyd House
55	Ruddock House
57	Fleming House
58	Dabney House
59	Ricketts House
60	Blacker House
61	Athenaeum
63	Security Office/Credit Union
65	North Wilson Ave. Parking Structure
66	Satellite Central Plant Holliston Ave. Parking Structure
70	Music House
71	Public Relations
72	Noyes Laboratory
73	Mead Laboratory
74	Beckman Institute
75	Braun Laboratory
76	Beckman Laboratory
77	Baxter Hall
78	Keck Laboratory
79	Powell Booth Laboratory for Computation Science
80	Jorgensen Laboratory
81	Steele Laboratory
86-87	Center for Student Services
88	Braun House
89	Marks House
90	Industrial Relations Center
91	Beckman Auditorium
93	Moore Laboratory
95	Watson Laboratory
96	Broad Center for Biological Sciences
97	Alumni House
99	Avery House
100-120	Catalina Graduate Housing (I, II, III)
123	Wilson Ave. Parking Structure-North
124	Wilson Ave. Parking Structure-South
126	Underground Parking Structure

* At the time of the five-year compliance review for the Master Plan, plans were submitted for these buildings buildings for City review; however approval was pending. Square footage for these buildings will be provided in the Master Plan in the next five-year compliance review.

The Concept Plan identifies various areas, called “envelopes,” for development of academic, residential, and parking facilities. These envelopes do not define specific buildings, but areas within which new buildings may be constructed. Design guidelines presented in this Master Plan define the size of these envelopes and control the height, setbacks, and other physical aspects of the buildings to be built within them.

Concept Plan



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

KURT MEYER PARTNERS

DECEMBER 2007

The Land Use Regulation Schedule in P.M.C. Section 17.40 is interpreted to permit the land uses listed in Table 7 on Caltech's campus. The correlation between these uses and the three envelope types referred to in the Master Plan is as follows:

- Academic envelopes -- these define areas for the development of academic, administrative, and support facilities listed in Table 7 under the Public/Semipublic, Commercial, Accessory, Temporary, and Nonconforming Uses, Structures, and Signs categories of Table 7 and as further limited by subsequent sections of the Concept Plan;

- Residential envelopes -- these envelopes define areas for development of residential facilities and associated land uses listed under the Residential, Accessory, Temporary, and Nonconforming Uses, Structures, and Signs categories of Table 7 and as further limited by subsequent sections of the Concept Plan; and

- Parking envelopes -- these envelopes define areas for development of parking and associated facilities as listed under the Parking, Accessory, Temporary, and Nonconforming Uses, Structures, and Signs categories of Table 7 and as further limited by subsequent sections of the Concept Plan.

ACADEMIC FACILITIES

The Concept Plan provides for the construction of new academic and administrative facilities in two areas of the campus. The majority of this space 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 envelope for each of these areas is sized to ensure that new development will match the scale of the original campus, while allowing sufficient development to meet Caltech's operational needs. In no event shall the total area of new academic and administrative area north of California Boulevard, and bounded by Holliston Avenue, Wilson Avenue, and Del Mar Boulevard, exceed 1.6 million gross square feet. The starting point for measurement of new development will be January 1988. The maximum site coverage of all buildings, existing and new, within this area shall not exceed 35%. This matches the site coverage of the original campus.

The limit established for new development is a floor area ratio (F.A.R.) of 1.44, using gross building area inclusive of usable basements, and net lot area, inclusive of building setbacks and vacated streets, within the campus boundary. This matches the F.A.R. of the original campus. The land area used for calculation of the F.A.R. for new academic facilities is that area between the existing campus and Del Mar Boulevard, bounded by the north face of Buildings 72, 73, 91, and 95, and the inside edge of the sidewalk at Wilson Avenue, Del Mar Boulevard, and Holliston Avenue (rough calculations indicate the area to be approximately 25 acres).

TABLE 7: PERMITTED LAND USES

LAND USES CATEGORY	Classification	Notes
Residential	Caretaker's Quarters	**(A)**
	Day Care, Limited	**(A)**
	Group Residential, including Multifamily Residential	**(A)**
	Single-Family Residential	**(A)**
Public/Semipublic	Charitable Uses	
	Clubs and Lodges	
	Colleges and Universities	
	Cultural Institutions	
	Day Care, General	
	Hospitals	**(B)**
	Maintenance and Service Facilities	**(C)**
	Parks and Recreation Facilities	
	Public Safety Facilities	**(C)**
	Religious Assembly	**(E)**
	Schools, Public or Private	
	Utilities, Major and Minor	**(C)**
Commercial	If incidental to and necessary to support legally established uses, the following uses shall be permitted: • Commercial Recreation and Entertainment • Communications Facilities, Small Scale • Eating and Drinking Establishments - With Beer and Wine Service - With Live Entertainment - With Outdoor Dining	
Parking	Parking Lots and Structures, for use by students, faculty members (visiting or permanent), or guests	
Accessory	Accessory Uses and Structures	**(C)**
Temporary	Circuses and Carnivals	**(C)**
	Commercial Filming, Limited	
	Live Entertainment	**(C)**
	Tents	**(C)**
Nonconforming Uses, Structures, and Signs		**(D)**
Notes	**A)** Limited to housing for students, employees, faculty members (visiting or permanent), or guests, except for apartments on Catalina Avenue.	
	B) Limited to infirmary or similar use.	
	C) Only permitted if necessary to support legally established uses.	
	D) As regulated by P.M.C. Chapter 17.76.	
	E) Conditional Use Permit Required.	

The following academic facilities have been built in the area north of the existing campus since January 1988.

TABLE 7B: NEW ACADEMIC DEVELOPMENT SINCE 1988

BLDG. NO.	BUILDING	YR. BUILT	GROSS AREA (SQ. FT.)
16	Annenberg Center for Information Science and Technology *	2009	
17	Cahill Center for Astronomy and Astrophysics	2008	100,000
20	Schlinger Laboratory *	2009	
43	Fairchild Library	1996	35,854
74	Beckman Institute	1989	163,288
93	Moore Laboratory	1995	88,000
96	Broad Center for Biological Sciences	2000	120,000
TOTAL			507,142

* **At the time of the third five-year compliance review for the Master Plan, plans were submitted for these buildings for City review; however, approval was pending. Square footage for these buildings will be provided in the Master Plan in the next five-year compliance review.**

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 the following page. No F.A.R. or site coverage limitations shall apply to this area other than those imposed by the size of the buildable envelope which encompasses approximately 2.5 acres of land. This level of development is equivalent to an F.A.R. of 1.44 at the envelope along California Boulevard. As of the third five-year compliance review, the gross 100,000 gross square feet Cahill Center for Astronomy and Astrophysics south of California Boulevard between Wilson Avenue and Arden Road is under construction. This building count towards the 150,000 square foot envisioned in this area.

RESIDENTIAL FACILITIES

The strategy identified for development of graduate and undergraduate dormitories provides for construction of facilities in two areas:

- New facilities for graduate students will be constructed along the east side of Catalina Boulevard, north of San Pasqual, extending the development concept that has already been implemented in Catalina I and II. Extending the density of development represented by these two projects may result in the construction of additional dormitory rooms within the area identified in the development strategy, in the form of one-, two-, three- or four-bedroom apartments for a total of up to 649 beds.

Catalina I and II provide 312 beds, Catalina III, built in 1988 provides 137 beds, leaving a remainder of 200 beds which can be included within the new dormitory rooms built in this area;

- A new undergraduate, graduate student, and faculty housing facility will be constructed at Del Mar Boulevard and Holliston Avenue to provide 136 beds for students and 5 faculty units, in the form of one-, two- and three-bedroom dormitories.

- With the conversion of the Keck and Mosher-Jorgensen from student housing to administrative offices in August 1999, the total 105 beds removed (54 beds in Keck and 51 beds in Mosher-Jorgensen) will be replaced elsewhere on campus either in Catalina 4 north of San Pasqual Street between Wilson and Catalina Avenues or the second phase of Avery on Del Mar Boulevard and Holliston Avenue.

- With the remainder of 200 beds available for new dormitories in the Catalina area and the replacement of beds (105) removed by the conversion of Keck and Mosher-Jorgensen from student housing to offices, a total of 305 beds remain for future addition within the identified envelopes in the Catalina area or Avery Phase 2.

- The 2006 amendment to the Master Plan allowed the following options for the North Undergraduate Houses (Lloyd, Page, and Ruddock),

    a. Rehabilitation of the existing three houses and small additions on the south side of each house; and the construction of a fourth house on the east side.
    b. Removal of the existing three houses and the construction of four new buildings in their place for undergraduate dormitories.

- The 2006 amendment to the Master Plan allowed for the demolition of the Braun and Marks Graduate Houses to be demolished and the construction of a new dormitory in its place.

The goal of the Master Plan for undergraduate and graduate housing is to provide Caltech-owned facilities on campus to house:

- 100% of the undergraduate student body; and
- 50% to 60% of the graduate student body.

ATHLETIC FACILITIES

To ensure the continued viability of the athletic program at Caltech, the Concept Plan provides for the following program in the area south of California Boulevard:

- An approximately 80-foot easterly expansion of the northern playing field width to reduce the conflict between concurrent soccer and baseball games;

- Rehabilitation of the Weight Room, Building 3, to accommodate a larger weight room and lockers;

- A new gymnasium in the form of a two-story addition in the parking lot west of Building 3 to provide additional basketball, volleyball, racquetball/squash and badminton facilities;

- With the approval of CUP #4253, which allowed for the construction of a three-level 700-space subterranean parking structure under the Athletic Field, the existing eight tennis courts remain at its current site, east of the new 700-space parking structure;

- Additional lighting at the south running track and playing field, sufficient to increase safety for nighttime use by Caltech personnel and neighborhood residents; and

- Miscellaneous ongoing improvements required to maintain or upgrade existing facilities, such as installation of an all-weather surface at the running track.

Rehabilitation of the Weight Room in Building No. 3 was completed in 1992. The two-story addition was completed in 1993, bringing the total square footage of the Braun Athletic Facility, Building No. 3 to 33,539 square feet. The additional lighting at the south running track and playing field was installed in 1990.

PARKING FACILITIES

The Concept Plan locates most of Caltech's parking in structures at three areas next to existing or new entry points onto the campus: the west side of Wilson Avenue, the east side of Holliston Avenue, and south of California Boulevard. While the parking structures are located at the perimeter of the campus, the surrounding neighborhoods are insulated from them by Caltech-related residential development.

One structure was built on Wilson Avenue in 1987 providing 443 spaces, and one was built on Holliston Avenue in 1994 providing 437 spaces.

Another parking structure on the west side of Wilson Avenue between Del Mar Boulevard and San Pasqual Street was completed in February 14, 1999. This four-level structure provided for 440 parking spaces.

With the approval of CUP #4253, a three level subterranean parking structure was completed in 2004. This structure provided for approximately 700 parking spaces.

Visitor Parking

Two concentrations of visitor parking are provided: at the gateway entrance to the campus at Del Mar Boulevard; and in a surface lot flanking the driveway entrance south of California Boulevard.

Miscellaneous Parking

The Concept Plan proposes the maintenance of the Athenaeum's surface parking lot, with closure of the driveway off of California Boulevard and, ultimately, creation of a new two-level parking structure under the tennis courts north of the Athenaeum. The houses that front on Wilson Avenue and Hill Avenue are programmed for ``a mix of residential and academic uses. To accommodate their need for parking, the strategy plan calls for development of additional surface lots within the backyards. Additional limited surface parking within the campus will be provided for disabled persons.

A surface parking lot will be maintained east of Building No. 1, south of California Boulevard, until Caltech pursues a plan amendment to designate the future use of the site.

FIRE & PARAMEDIC STATION

In accordance with preliminary discussions between Caltech and the Pasadena Fire Department, a fire and paramedic station of approximately 5,000 net square feet may be constructed within or immediately north of the northern parking structure on Holliston Avenue. The exact size and program for the facility will be defined in consultation with the Fire Department, and will be subject to the approval of Caltech's Board of Trustees.

Since the exact size, program, and site plan for a fire station is not adequately defined at this point to determine the potential environmental impacts resulting from such a facility, a Conditional Use Permit will be required for its construction. If a station is not built at the proposed location, the site shall revert to open space and the parking structure as shown on the Concept Plan, herein.

Seeking an arrangement for the location of a permanent Fire and Paramedic Station, the City formally entered into a letter agreement with Caltech on May 19, 1997. The terms of the letter were approved by the City Council on April 28, 1997. Among other provisions, the agreement stipulates that Caltech will lease three lots at the Southeast corner of Holliston and Del Mar to the City of Pasadena for the permanent location of a Fire and Paramedic Station. The letter agreement also provides for the City and Caltech to continue the current lease for space for the temporary Fire Station at 1138 E. Del Mar Blvd. until thirty (30) days after a certificate of occupancy is issued for a Fire Station on the Holliston site. The lease was terminated on March 17, 2002 when a Certificate of Occupancy was issued for the Fire Station on the Holliston site.

On March 17, 1999, CUP #3523 was approved that allowed for the construction of a 13,500-square foot fire station. The fire station was completed in March 2002.

DISPOSITION OF EXISTING FACILITIES

Academic/Support Facilities to Remain

Almost all of the existing academic and administrative buildings and dormitories are in good condition; the buildings listed in Tables 8 and 9 will be maintained in place for the life of this Master Plan.

While generally in good condition, the academic buildings on campus undergo a continuous process of interior remodelling to update spaces for new or changing experimental programs. Infrequently, the expansion or exterior alteration of existing facilities is suggested by programmatic requirements. A recent example of an exterior alteration is the installation of the Calder Arches at the Arnold and Mabel Beckman Laboratory of Chemical Synthesis. Therefore, while removal of these facilities is not envisioned under the Master Plan, the current program of rehabilitation and limited expansion will continue. Two existing facilities are programmed for an external addition or alteration:

- On December 11, 2006, the City Council approved an amendment to the Master Plan allowing an alternative location for the Mead Laboratory. The new location is north of San Pasqual Walk between the Beckman Behavioral and Biology Laboratory and Noyes Laboratory;

- A second story addition to the northern half of the I.P.A.C. Building, No.22, as previously approved under C.U.P. No.1460; The second story addition was completed in 1994 and the building was renamed the Morrisroe Astroscience Lab.

TABLE 8: DORMITORY FACILITIES TO REMAIN ON CAMPUS

BLDG NO.	BUILDING	YEAR BUILT	BLDG. AGE	POPU-LATION	NUMBER OF FLOORS	GROSS AREA (SQ.FT.)	NET * AREA (SQ.FT.)
100-120	Catalina I	1984	2	156	2	45,843	30,015
100-120	Catalina II	1986	1	156	2	53,262	45,200
57	Fleming House	1931	55	81	2	34,602	23,032
58	Dabney House	1931	55	63	2	26,604	14,834
59	Ricketts House	1931	55	75	2	33,571	22,372
60	Blacker House	1931	55	71	2	28,521	17,749
99	Avery House	1996		144	2	70,500	46,530
100-120	Catalina III	1988		138	3	53,728	45,930
TOTALS		--	--	884	--	346,631	245,662

TABLE 8B: DORMITORIES THAT MAY BE REMOVED OR REHABILITATED

BLDG NO.	BUILDING	YEAR BUILT	BLDG. AGE	POPU-LATION	NUMBER OF FLOORS	GROSS AREA (SQ.FT.)	NET * AREA (SQ.FT.)
53	Page House	1960	26	97	2	23,228	13,883
54	Lloyd House	1960	26	82	2	20,802	12,061
55	Ruddock House	1960	26	96	2	22,278	13,716
88	Braun House	1961	25	30	3	10,428	5,662
89	Marks House	1961	25	32	3	11,267	6,249
Totals				337		88,003	51,571

TABLE 9: ACADEMIC & ADMINISTRATIVE FACILITIES TO REMAIN ON-CAMPUS

BLDG. NO.	BUILDING	YEAR BUILT	BLDG. AGE	POPU-LATION	NUMBER OF FLOORS	GROSS AREA (SQ.FT.)	NET+ AREA (SQ.FT.)
1,2	Brown Gymnasium	1954	32	—	1	23,917	17,953
3	Braun Athletic Facility	1993		—	2	33,539	23,270
4,5	Cooling Towers/Central Plant	1967	19	—	1	21,165	1,098
6	Keith Spalding Building	1969	17	201	3	60,080	43,893
7	Administrative Process Engineering	1926		18	2	5,091	3,119
16	Annenberg Center for Information Science and Technology *****	2009		183	3		
17	Cahill Center for Astronomy and Astrophysics	2008		300	4	100,000	63,266
20	Schlinger laboratory for Chemistry and Chemical Engineering *****	2009		130	3		
21	Mudd Lab - South	1974	12	118	3	78,952	40,178
22**	Morrisroe Astroscience Lab (formerly IPAC)	1986		50	2	26,122	17,360
23	Mudd Lab - North	1938	48	53	3	49,273	29,899
24	Robinson Laboratory	1932	54	83	2	38,886	24,542
25	Arms Laboratory	1938	48	50	3	44,598	26,448
26	Gates Annex	1927	59	7	1	9,750	5,266
27	Kerckhoff Lab	1928	58	92	3	90,485	50,374
28	Alles Lab	1960	26	33	3	24,488	15,634
29	Church Lab	1955	29	71	2 & 3	77,554	45,310
30	Crellin Lab	1937	49	80	3	41,746	24,708
31	Parsons-Gates Hall of Administration	1917	69	50	3	27,852	13,883
32	Millikan Library	1967	19	45	10	58,344	41,357
33	Bridge Lab - East	1922	64	74	3	34,116	20,754
	Bridge Lab - West	1924	62	—	3	36,575	22,534
34	Bridge Annex	1925	61	24	2	7,236	4,764
37	Sloan Lab	1923	63	81	3 & 4	52,101	31,304
38	Kellogg Radiation Lab	1932	54	52	4	21,684	14,234
39	U.S. Geological Survey	1921	65	12	2	4,328	2,749
39***	U.S. Geological Survey	1920	66	13	2	3,250	2,800
40	Dabney Hall	1928	58	64	3	30,584	18,885
41	Spalding Lab	1957	29	112	3	63,070	37,307
42***	Treasurer's Office	1921	65	9	2	1,725	1,550

TABLE 9: ACADEMIC & ADMINISTRATIVE FACILITIES TO REMAIN ON-CAMPUS (CONT.)

BLDG. NO.	BUILDING	YEAR BUILT	BLDG. AGE	POPU-LATION	NUMBER OF FLOORS	GROSS AREA (SQ.FT.)	NET+ AREA (SQ.FT.)
43	Fairchild Library	1996		—	4	35,854	23,665
44	Thomas Lab	1945	41	97	3	53,832	33,673
45	Guggenheim Lab	1929	57	61	3	61,862	33,653
46	Karman Lab	1960	26	40	3	26,813	18,573
47	Downs Lab	1969	17	75	4	32,358	22,182
48	Lauritsen Lab	1969	17	94	4	55,396	28,386
49	Synchrotron	1933	53	—	1 *	24,536	14,981
50	Firestone Lab	1962	24	60	3	30,556	17,205
51	Winnett Student Center	1962	24	22	1 & 2	17,044	13,699
52	Chandler Dining Hall	1960	26	—	1	23,069	15,851
61	Athenaeum	1930	56	49	3	51,587	29,931
63	Admissions Office	1916	50	13	2	3,650	3,000
70	Music House	1925	61	4	2	3,138	1,890
71	Public Relations	1916	70	14	2	3,465	2,375
72	Noyes Lab	1967	19	141	1 & 3	91,047	55,377
73	Mead Lab	1973	13	2	1	8,010	6,420
74	Beckman Institute	1989		146	4	163,288	107,580
75	Braun Lab	1982	4	130	3	85,529	45,522
76	Beckman Lab	1974	12	67	3	77,964	41,496
77	Baxter Hall	1971	15	95	3	72,544	41,039
78	Keck Lab	1960	26	90	3	71,724	47,069
79	Powell Booth Laboratory for Computational Science	1963	23	33	2	21,197	13,088
80	Jorgensen Lab	1971	15	49	2	30,835	18,594
81	Steele Lab	1965	21	148	3	51,816	35,660
86	Center for Student Services ****	1961	25		3	42,937	26,499
87	Student Services ****	1961	25		3	****	****
90	Industrial Relations Center	1927	59	6	2	8,086	5,836
91	Beckman Auditorium	1964	22	—	1	20,710	12,395
93	Moore Laboratory	1995		80	4	88,000	58,080
95	Watson Lab	1982	4	48	1 & 2	39,559	26,074
96	Broad Center for Biological Sciences	2000	7		3	120,000	74,707
97	Alumni House	1917	69	10	2	5,303	2,810
TOTALS		—	—	—	—	2,488,220	1,521,749

\+ Net Area: The sum of all areas on all floors of a building assigned to, or available for assignment to, an occupant or department.

* Building contains high-bay space.

** The IPAC Building received a second floor addition in 1994 and was renamed; the total area measurements include this addition.

*** Building No. 42 was originally two buildings Named Keck Telescope North and South. The northernmost Building No. 42 was renumbered Building No. 39 as the second U.S. Geological Survey Building. The southernmost Building No. 42 was renamed as the Treasurer's Office.

**** Gross and Net Area totals for Building Nos. 86 and 87 are presented as combined total under Building No. 86.

***** At the time of the third five-year compliance review, for the Master Plan, plans were submitted for these buildings for City review; however, approval was pending. Square footage for these buildings will be provided in the Masster Plan in the next five-year compliance review.

Facilities that may be Removed

Existing facilities that may be removed, rehabilitated, or downsized during the next 15 years are listed in Table 10. In addition, storage and ground-maintenance sheds and other miscellaneous structures, scattered throughout the campus, may be removed as required to implement the open-space strategy.

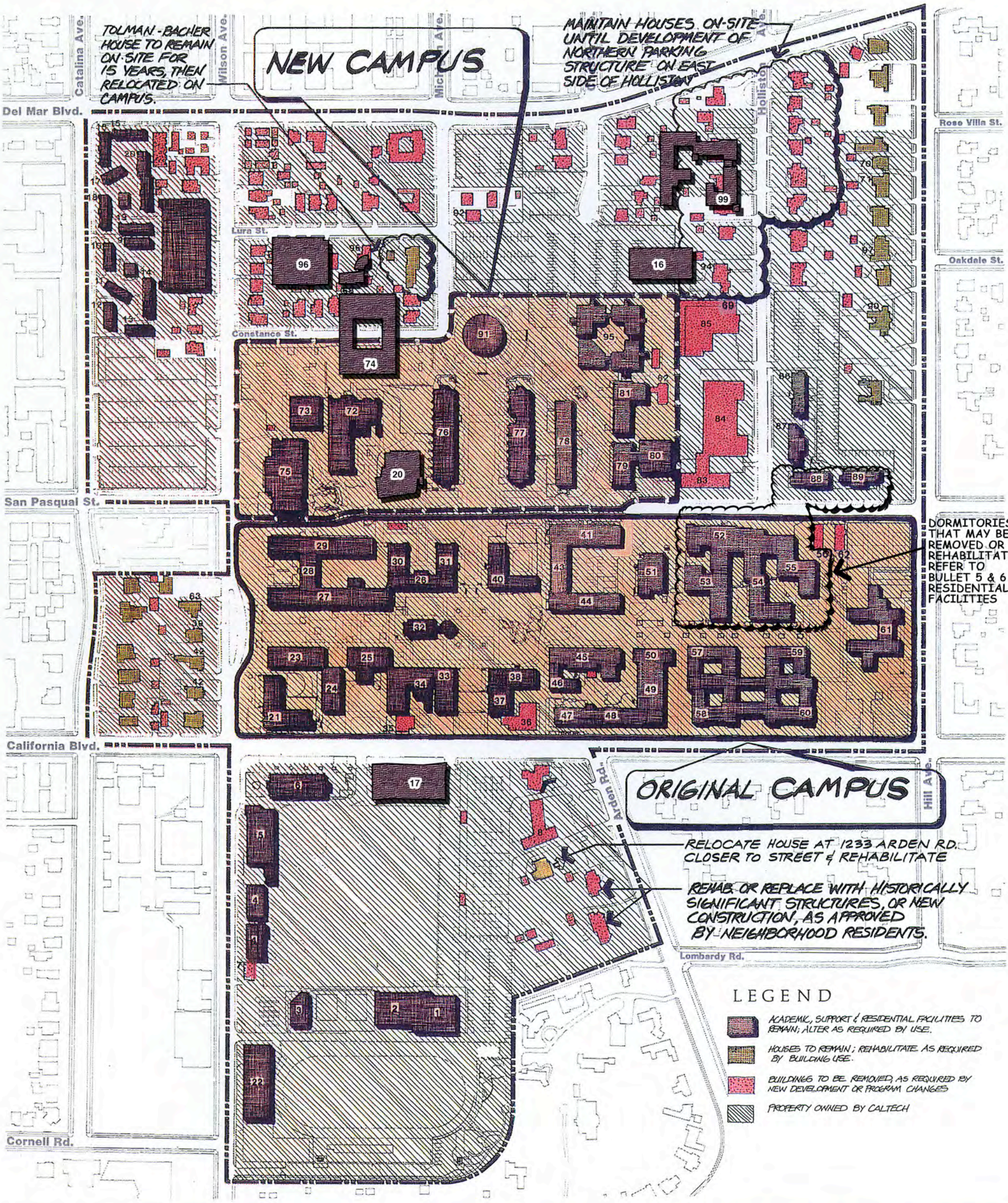
TABLE 10: FACILITIES THAT MAY BE REMOVED

BLDG. NO.	BUILDING	YEAR BUILT	POPU-LATION	GROSS AREA (SQ.FT.)	NET AREA (SQ.FT.)	YEAR REMOVED
7	Leakey Building	1952	5	1,383	900	1991
8	Young Health Center	1957	16	6,009	3,235	
35	Isotope Handling Lab	1964	0	2,719	1,264	
36	Sloan Annex	1931	33	7,611	5,765	
43*	Original Central Heating Plant	1926	0	7,058	4,879	1994
56	Housing Office	1930	35	1,591	1,340	
62	Housing Annex	1930	10	2,292	1,704	
69	Gravitational Physics Lab	1982	0	4,726	4,232	
82	Grounds Operation	1971		2,345	1,848	
83	Physical Plant Offices	1959	208	10,257	3,965	
84	Physical Plant Shops	1959		26,391	24,405	
85	Central Engineering	1966	28	30,068	26,332	

* Building was replaced with the Fairchild Library.

The Original Central Heating Plant was demolished in 1994 and was replaced with the Sherman Fairchild Library of Engineering and Applied Sciences, Building No. 43, which will remain on site for the life of the Master Plan.

Disposition of Existing Facilities



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

KURT MEYER PARTNERS

DECEMBER 2007

Single-Family Houses

Residential structures within the interior of the campus will be removed or demolished for development of new academic buildings, while those at the perimeter will be maintained for academic or residential purposes. Of the 92 single-family houses now existing within the campus boundaries, 23 will be maintained on-site for academic, administrative, or residential purposes, one will be relocated to a new site on campus, and four may be rehabilitated or replaced with historically significant houses from the northern portion of the campus, or new, as acceptable to the neighborhood. All other houses within the campus boundary will be removed or demolished during the development of new academic or residential facilities. The sequencing of this process is dealt with in more detail in the section on phasing and implementation. As is currently the case, Caltech will continue to rehabilitate and make additions to the retained housing stock and associated structures as required to accommodate the academic, administrative, or residential uses programmed for each.

Since July 1989, 27 houses have been relocated (twenty to Pasadena, five to Altadena, one to Downey and one to Eagle Rock). According to the Plan, twenty-five houses remain available for removal and twenty-four houses are retained.

As of the third five-year compliance review, one additional house, 300 S. Holliston Avenue, has been moved on November 4, 2004 to 965 Lincoln Avenue.

North Campus Houses

- The 11 existing houses fronting on Hill Avenue shall be retained on their current sites and used as academic or administrative offices or faculty residences. Individual houses may be converted from residential to academic/support offices and vice versa;

- The six houses fronting on the west side of Wilson Avenue, between California Boulevard and San Pasqual Street, shall be retained on their current sites and used as academic or administrative offices. Individual houses may be converted from residential to academic/support offices and vice versa;

- The six houses fronting on the east side of Catalina Avenue between California Boulevard and San Pasqual Street shall be retained on-site and used as single-family residences;

- The Tolman-Bacher House will remain on-site for 15 years. After that period, it shall be relocated to a new site within the campus.

As of the first five-year compliance review, all houses remained on site. One house was converted to academic use on both Hill Avenue and Wilson Avenue.

As of the third five-year compliance review, all houses remained on site and no additional houses on Hill Avenue and Wilson Avenue were converted to academic use.

Arden Road Houses

- The four houses on the west side of Arden Road, south of California Boulevard, shall be rehabilitated or removed and replaced with historically significant structures from the northern portion of the campus, as described herein, or new construction. The following historically significant houses are acceptable replacements:
  – 312 South Holliston Avenue
  – 344 South Holliston Avenue
  – 297 South Holliston Avenue
  – 345 South Michigan Avenue (Tolman-Bacher House), only if relocated to the site of 1221 Arden Road.

Caltech shall use its best efforts to relocate 312 South Holliston Avenue first to Arden Road.

- Application for a permit to demolish 1221 Arden Road shall be made within two weeks of adoption of the Master Plan. The house shall be demolished as soon as possible after the application is approved. One of the houses listed above shall be relocated to the site by 31 August 1990. The house at 1221 Arden Road was removed and replaced with the house from 312 South Holliston Avenue in 1991.

- The Cole House at 1227 Arden Road shall be rehabilitated within six months of adoption of the Master Plan and shall be maintained on its current site. The house was rehabilitated in 1990 and remains on site as of 1995.

- The house at 1245 Arden Road shall be removed at the time of construction of the parking structure and replaced only by one of the houses listed above. Upon removal and replacement of the house at 1245 Arden Road, landscaping shall be installed to reasonably camouflage the Young Health Center from the properties on Arden Road not owned by Caltech.

- The Cole House at 1227 Arden Road shall be rehabilitated within six months of adoption of the Master Plan and shall be maintained on its current site. The house was rehabilitated in 1990 and remains on site as of 1995.

- The Jorgensen House, at 1233 Arden Road, shall be moved forward on its present lot and rehabilitated on-site prior to construction of the parking structure south of California Boulevard.

  Approval of CUP #4253 allowed for the construction of a three-level 700-space subterranean parking structure under the Athletic

Field and approximately 210 feet from the nearest residence on Arden Road, reducing the potential impacts to these residences and allowing the retention of 1245 and 1233 Arden Road on its current sites.

- All existing, new, or relocated houses along Arden Road shall be maintained in good condition, consistent with the character and quality of typical houses in the neighborhood. New houses shall be of a size, style, and quality of construction consistent with typical houses in the neighborhood. All existing, new, or relocated houses along Arden Road shall be used as single-family residences for occupancy by Caltech faculty, professional staff, or distinguished visitors; houses shall not be occupied by students. Landscaping shall be maintained in good condition, including regular pruning of the trees, regular watering, and replacement of seasonal planting, if used.

Acts of God

If any existing academic, administrative, or residential structure is damaged by an act of God to an extent that makes rehabilitation economically infeasible, said structure may be demolished and, at Caltech's discretion, replaced by a structure of compatible program. Any building over 50 years old that has incurred significant damage caused by an act of God shall not be demolished unless a report by a licensed structural engineer, designated by Caltech to work in cooperation with the City, confirms that the damage constitutes a hazard to the life and safety of the public.

The open-space strategy provides for the organization of the campus around an extension of the existing system of open spaces. The strategy includes development of a new east-west axis running from Holliston Avenue to Wilson Avenue, and extension of the existing north-south axis past the Beckman Auditorium to a major new entry to the campus at Del Mar Boulevard and south across California Boulevard to athletic facilities and new parking structure. Existing open spaces at the campus shall be preserved for the life of this 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.

THE NORTH CAMPUS

An uninterrupted H shape structure of open spaces will result from this strategy and interconnect all points and buildings on the campus via an automobile-free pedestrian-circulation system. The existing park-like areas of the campus will be maintained and contained within the legs of the H.

East-West Axis

The organizing feature of the north campus is the new east-west axis, which runs from Holliston Avenue to Wilson Avenue and is set approximately on the centerline of the existing Lura Street. This will facilitate development of the axis and allow sufficient room north and south for new academic facilities and service.

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 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.

As of the third five-year compliance review, the Broad Center for Biological Sciences, completed in 2002, contributed to further establish the axis. With the proposal of the Walter and Leonore Annenberg Center for Information Science & Technology, the axis continue to be defined. At the time of the thrid five-year compliance review for the Master Plan, plans were submitted for this building to the City for review. Square footage for this building will be provided in the Plan in the next five-year compliance review.

Del Mar Gateway

A key element in the proposed Master Plan is the extension of the north-south axis past the Beckman Auditorium to Del Mar Boulevard and the creation of a major gateway to the campus at that location. This gateway will provide:

- An address for Caltech on a major traffic street within the City of Pasadena; and
- A forecourt and visitor parking area for the Beckman Auditorium.

Construction of this plaza will provide a formal entry to the campus and set the axial organization for future development of the remaining area between the existing campus and Del Mar Boulevard.

The new gateway at Del Mar Boulevard is designed to combine a landscaped forecourt, extending approximately 150 feet into the campus from the edge of the street, and a hardscaped plaza connecting the forecourt to the east-west axis. Substantial landscaping in the forecourt will be provided as a visual invitation to the campus.

Del Mar Boulevard

As a means of announcing Caltech and focusing attention on the gate-way entrance, street trees planted from Wilson Avenue to the fore-court and from the forecourt to Holliston Avenue should be consistent in variety but distinctly different in species and spacing from the Holly Oak found elsewhere along Del Mar Boulevard. Street trees east of Holliston Avenue and west of Wilson Avenue should be the Holly Oak. That area immediately in front of the forecourt should be devoid of street trees to lead the eye of the visitor into the campus.

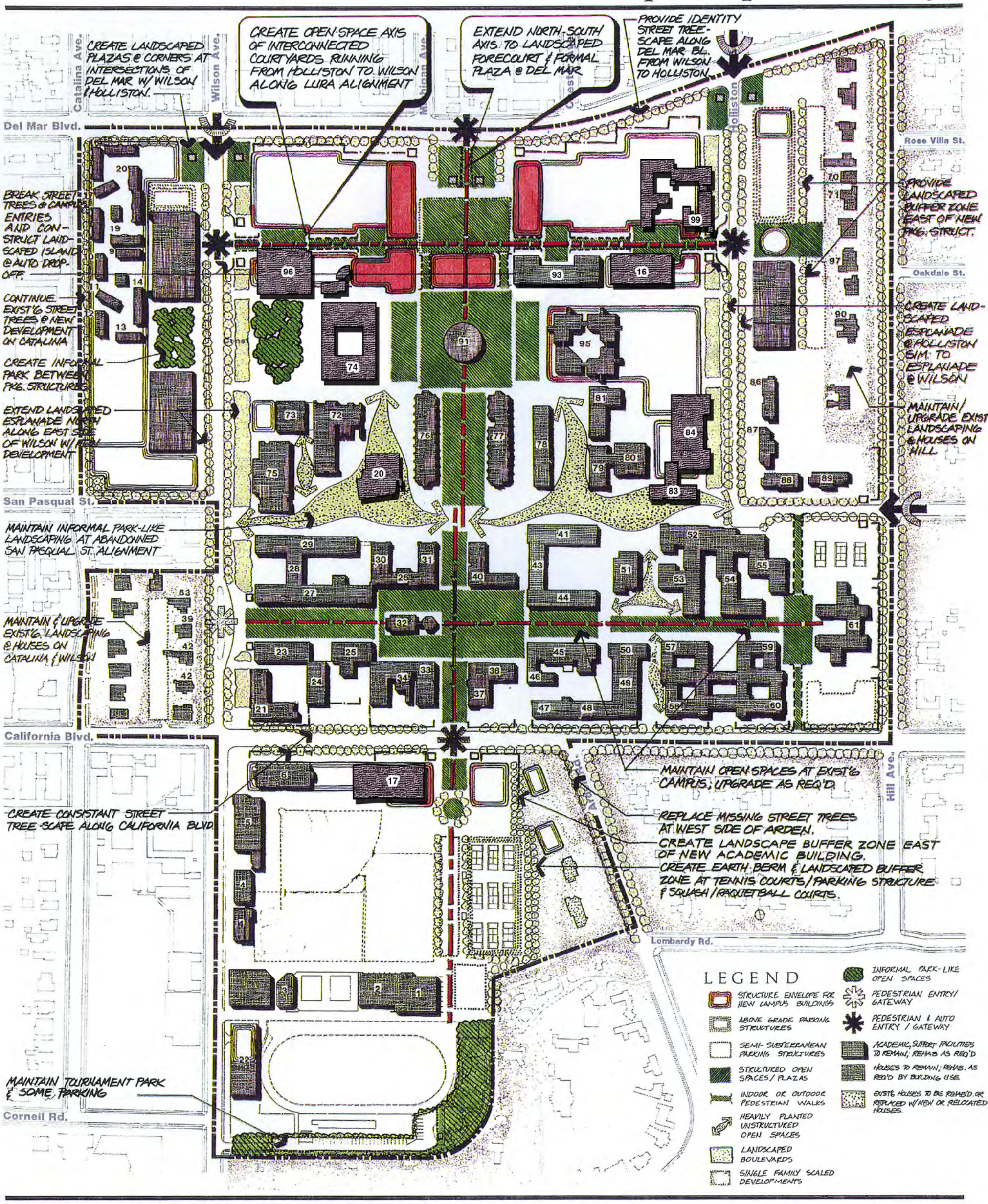
Landscaped open spaces will be provided at the southeast and south-west corners at the intersection of Wilson and Holliston Avenues with Del Mar Boulevard to announce automobile access to the campus.

Landscape treatment similar to that currently being developed along Wilson Avenue will be extended north on the east and west side of Wilson and Holliston Avenues to form continuous esplanades. This rather informal groving of mixed species of deciduous and evergreen trees is intended to create a soft green edge on both sides of these internal streets, reinforcing the continuity of open space and circulation across these corridors.

Interior Courtyards

The building envelopes suggested for construction on the north campus area will contain a series of independent but interconnected academic buildings. To promote an environment similar to the original campus, small courtyards, like that at Dabney Hall, may be developed in the spaces between individual buildings or between buildings and Del Mar Boulevard, as is currently the case between the Bridge Laboratory and California Boulevard.

Open Space Strategy



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

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KURT MEYER PARTNERS

DECEMBER 2007

Open Spaces at Dormitories

There is currently a lack of informal large open space near the campus graduate dormitories. The open-space strategy requires creation of *an* informally landscaped park between the two parking structures on Wilson Avenue and a large lawn area between Wilson Avenue and the Beckman Institute. These park-like spaces will add to the variety of open spaces at the campus and provide a needed amenity next to each of the dormitory areas. The open space developed between the parking structures on Wilson Avenue shall include a play area for children.

CALIFORNIA BOULEVARD

Development of new facilities south of California Boulevard will, by extending the north-south axis down to the athletic facilities, add cohesion to the campus and provide for an extension of the playing fields east to accommodate two full soccer fields. At the same time, it will visually reinforce a major entry point to the campus at California Boulevard.

In order to unify the campus frontage along California Boulevard and recognize the importance of the street as a primary traffic arterial within the community, it is important to establish a more consistent and appropriately scaled street-tree planting between Wilson and Hill Avenues.

The portion of the street where the campus is contiguous is presently identified with the very tall Washingtonia Palms. These trees identify the street from a great distance and provide a sense of orientation from within the campus. However, the passing vehicle or pedestrian does not benefit from these trees, which do not form a tree canopy or give a human scale to the street. Further east poorly pruned, unhealthy trees clutter the street image, while in other areas there is essentially no planting at this level.

The street frontage between Wilson Avenue and Arden Road should be made more uniform at the pedestrian and vehicular scale by interplanting the palms with a consistent row of dome-form trees. This will create a canopy for vehicles and pedestrians and provide a consistently planted screen in front of the uninterrupted architectural edge along this street. As in the case of Del Mar Boulevard, trees should not be planted in front of the gateway crossing at California. The effect of such a planting technique can be observed elsewhere in the community, most notably along Orange Grove Boulevard south of Colorado Boulevard. The tree canopy east of Arden Road should be augmented as required to achieve consistency of visual definition.

South Track and Playing Field

The south track and playing field will remain a building-free zone in accordance with prior agreements.

Tournament Park

Tournament Park has been the site of many historic events in the City of Pasadena, including the City's early Tournament of Roses.

The Park was given to Caltech by the City of Pasadena in 1981 under the condition that it be used for park, recreation, and athletic purposes, and that it be made available for use by the citizens of Pasadena. Caltech has refurbished Tournament Park and maintains it open during daylight hours for use by the campus population and the surrounding neighborhood. The open-space strategy recognizes Tournament Park's value to Caltech and the surrounding community as both a recreation area and a buffer zone, and its use will be continued in accordance with the terms of the deed restrictions. Caltech shall work directly with the entire group of neighbors whose properties are contiguous to the Tournament Park driveways, on maintaining an adequate landscape buffer between their properties and the campus. Caltech shall install plant material, mutually acceptable to Caltech and said neighbors, in the embankment contiguous to the south edge of the Tournament Park Driveway in areas where there are no existing trees on private or Caltech property to reasonably camouflage the Caltech campus from the properties contiguous to the driveway.

As a result of the first five-year compliance review, Caltech has installed signs at the north pedestrian gate and at the Wilson Avenue driveway in a manner that is visible to motorists and pedestrians and similar to those provided at city parks. In addition, new signs containing the park operation rules were installed at each pedestrian access point at the north and southwest ends of the park.

It was also found, during the first five-year compliance review, that provisions in the Master Plan and actual improvements made to the Tournament Park since 1985 ensure that adequate parking is provided on site for park users.

A line of utility poles exists along the south side of the Tournament Park Driveway and north of the homes along Arden Road. As of 31 January 1989, these poles provided electrical services to a house at 1137 Arden Road and the AQMD Monitoring Station on Caltech's property, north of the driveway. In addition, phone and cable TV service is provided via wires strung at approximately mid-height of said poles, to houses along the north side of the street from 1137 to 1091 Arden Road. Caltech shall pay the City of Pasadena to remove, within six months of adoption of the Master Plan and after relocation of electrical service to 1137 Arden Road, as much of the upper portion of said utility poles as permitted by governing regulations. This project was completed within the given timeframe.

LANDSCAPE GUIDELINES

The design of landscaping at new buildings should unify the open spaces between existing and new buildings and not simply address the immediate area around the new facility. Landscaped areas between new facilities within building envelopes should be consistent with the general character of the surrounding area. With the design of landscape at each new facility, an analysis of existing visual resources (both natural and man-made) and their relationship to the new facility, shall be made and be the basis for integration of new landscaping into the existing campus.

Landscaping at new facilities should promote a unified image for the campus and strengthen or at least maintain key existing patterns. To unify the campus environment, the Plant Palette presented in Table 11 is recommended for general use. Although there are always special planting requirements that will necessitate special plant types, this list should be considered a guideline for general campus open spaces and should be used whenever possible.

TABLE 11: PLANT PALETTE

CATEGORY& BOTANICAL NAME	COMMON NAME	USE
TREES		
Bauhina Blakeana	Hong Kong Orchid Tree	Flowering deciduous tree
Cedrus deodara	Deodar Cedar	Large conical evergreen tree
Cinnamomum camphora	Camphor Tree	Broad-dome evergreen tree
Eucalyptus citriodora	Lemon Scented Gum	Evergreen skyline accent tree
Ficus florida	Florida Ficus	Medium-size evergreen tree
Ficus rubiginosa	Rustyleaf Fig	Medium-size evergreen tree
Jacaranda mimosifolia	Jacaranda	Flowering deciduous tree
Larerstroemia indica, mixed varieties	Crape Myrtle	Small flowering specimen tree
Liquidambar styraciflua, mixed varieties	Sweet Gum	Upright medium deciduous tree
Magnolia grandiflora	Southern Magnolia	Dense flowering evergreen tree
Palms, mixed genus	Palm	Specialty accent tree
Pinus canariensis	Canary Island Pine	Vertical evergreen tree
Pinus pinea	Italian Stone Pine	Broad-dome evergreen
Pittosporum undulatum	Victorian Box	Medium-dense evergreen tree
Platanus racemosa	California Sycamore	Large specimen deciduous tree
Quercus agrifolia	Coast Live Oak	Dome-form evergreen tree
Quercus engelmannii	Engelman Oak	Dome-form evergreen tree
Sequoia sempervirens	Coast Redwood	Tall, dense evergreen tree
Tipauana tipu	Tipu Tree	Flowering deciduous lawn tree
Tristanis conferta	Brisbane Box	Evergreen background tree
SHRUBS		
Abelia grandiflora, mixed varieties	Abelia	Medium flowering evergreen shrub
Agapanthus africanus	Lily-of-the-Nile	Small flowering evergreen shrub
Asparagus sprengerii		Small evergreen shrub
Azalea, mixed hybrid varieties	Azalea	Small to medium flowering accent shrub

TABLE 11: PLANT PALETTE (CONT.)

CATEGORY& BOTANICAL NAME	COMMON NAME	USE
Camellia japonica, mixed varieties	Camellia	Medium to large flowering evergreen accent or background shrub
Camellia sasanqua, mixed varieties	Sasanqua	Medium flowering evergreen accent shrub
Escallonia exoniensis "Fradesi"	Pink Princess	Medium flowering evergreen shrub
Euonymus, mixed species and variety	Euonymus	Medium to large evergreen shrub
Gardenia jasinoides, mixed varieties	Gardenia	Medium flowering evergreen accent shrub
Ilex, mixed species and variety	Holly	Medium flowering evergreen accent shrub
Lantana, mixed hybrid varieties	Lantana	Small flowering evergreen shrub/ground cover
Ligustrum texanum	Privet	Small to medium evergreen border shrub
Magnolia soulangiana	Saucer Magnolia	Medium to large flowering deciduous accent shrub
Pittosporum tobira	Tobira	Medium evergreen size general use shrub
Pittosporum tobira "Variegate"	Variegated Tobira	Small evergreen general use shrub
Pittosporum viridiflorum	Cape Pittosporum	Large evergreen background shrub
Raphiolepis indica, mixed variety	India Hawthorn	Small to medium flowering evergreen shrub
Rosa, mixed species and variety	Rose	Medium flowering accent shrub
Strelitzia reginae	Bird of Paradise	Medium flowering evergreen accent shrub
Trachelospermum jasminioides	Star Jasmine	Small flowering evergreen shrub/ground cover
Xylosma congestum	Xylosma	Medium to large evergreen background shrub
VINES		
Clytostoma callistegioides	Violet Trumpet Vine	Flowering evergreen vine for pergolas, walls, and building facades
Distictis buccinatoria	Blood-red Trumpet Vine	Flowering evergreen vine for pergolas, walls, and building facades
Ficus pumila "Minima"	Creeping Fig	Evergreen vine for unpainted walls
Macfadyena unguis-cati	Yellow Trumpet Vine	Flowering deciduous vine for pergolas, walls, and building facades
Parthenocissus tricuspidata	Boston Ivy	Deciduous vine for unpainted walls
Wisteria sinensis	Chinese Wisteria	Flowering deciduous vine for pergolas and building facades
GROUND COVER		
Ajuga reptans, mixed varieties	Ajuga	Flowering evergreen ground cover for small areas
Campanula poscharskyana	Bellflower	Flowering evergreen ground cover
Gazania, mixed hybrid varieties	Gazania	Flowering evergreen accent ground cover
Hedera helix "California"	California Ivy	Ground cover for general use
Iberis sempervirens	Candytuft	Flowering evergreen ground cover for small areas
Lysimachia nummularia	Moneywort	Flowering evergreen ground cover for small areas
Potentilla verna	Cinquefoil	Flowering evergreen ground cover for general use
TURF		
"Derby" perennial ryegrass		Lawns throughout campus
"Marathon" hybrid tall fescue		Lawns throughout campus (alternative)
"Santa Ana" hybrid bermudagrass		Athletic field turf

Inventory of Specimen Trees

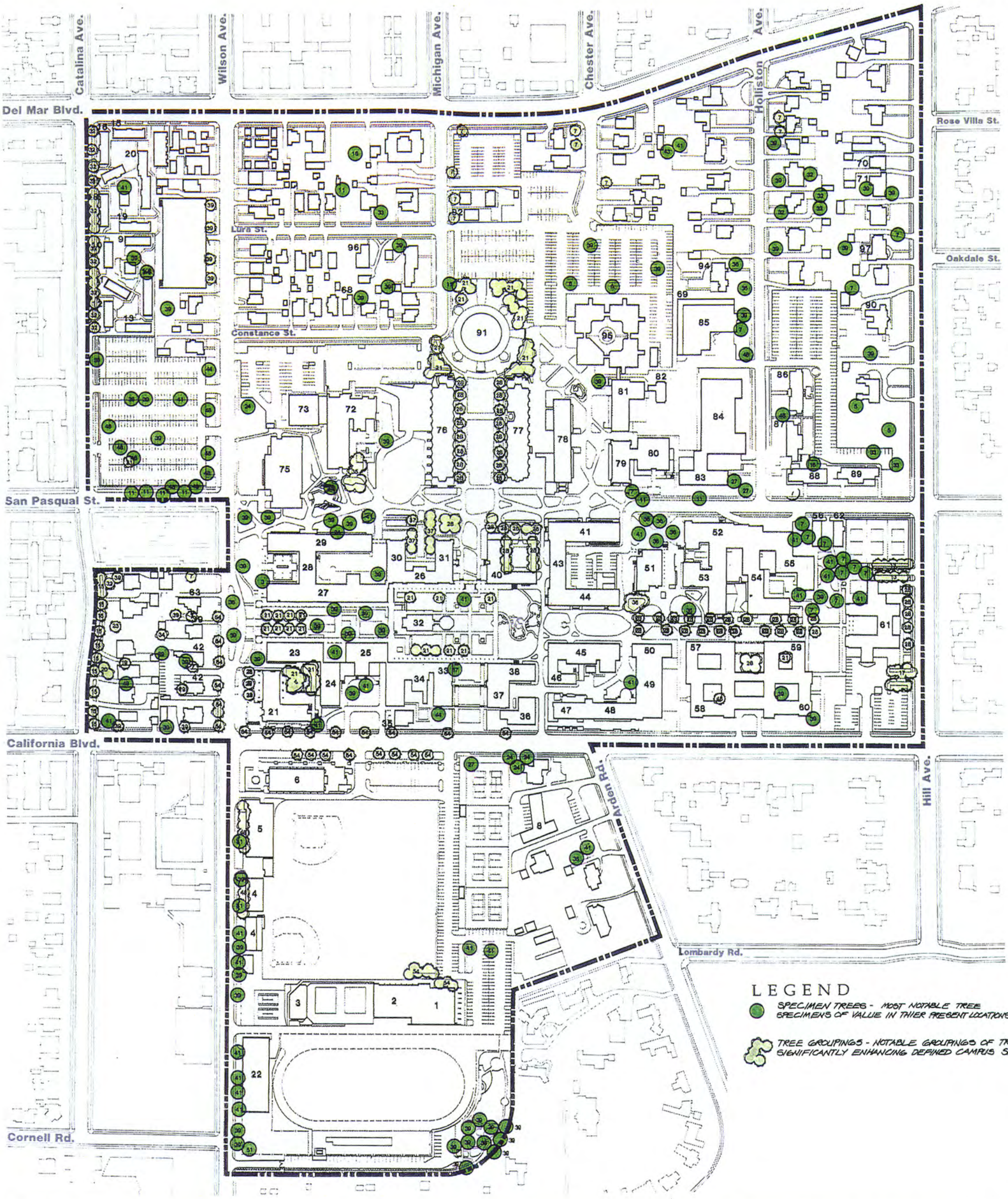
Open spaces at the existing campus contain a number of specimen trees and tree groupings. While not significant in numbers, the undeveloped areas north of the existing campus also contain some specimen trees. The accompanying Tree Inventory map identifies these specimen trees and tree groupings within the campus boundaries. Where possible these should be preserved under landscape designs for new and existing open spaces.

Caltech currently has a comprehensive annual landscape maintenance and improvement program. This shall be maintained in force for the life of this Master Plan.

LEGEND FOR TREE INVENTORY

1. Acacia melenoxylon
2. Alnus rhombifolia
3. Arbutus unedo
4. Arecastrum romanzoffianum
5. Betula verrucosa
6. Brachychiton populneum
7. Cedrus doedara
8. Celtis douglasii
9. Cerationia silqua
10. Chorrisia speciosa
11. Cinnamomum camphora
12. Citrus
13. Cupressus sempervirens
14. Cycas revoluta
15. Erythea armata
16. Eucalyptus camaldulensis
17. Eucalyptus citriodora
18. Eucalyptus ficifolia
19. Fraxinus uhdei
20. Ginkgo biloba
21. Jacaranda acutifolia
22. Juniperus californica
23. Lagerstroemia indica
24. Liquidambar styraciflua
25. Lyonothamus floribundus
26. Magnolia grandiflora
27. Metasequoia glyptostroboides
28. Olea europaea
29. Persea americana
30. Phoenix canariensis
31. Phoenix reclinata
32. Pinus canariensis
33. Pinus halepensis
34. Pittosporum eugenioides
35. Pittosporum undalatum
36. Platanus racemosa
37. Podocarpus gracilior
38. Pyrus kawakami
39. Quercus agrifolia
40. Quercus chrysolepis
41. Quercus englemanii
42. Quercus ilex
43. Quercus lobata
44. Quercus rubra
45. Raphis humilis
46. Schinus molle
47. Seaforthia elegans
48. Sequoia sempervirens
49. Strelitzia nicolai
50. Trachycarpus fortunei
51. Tristania conferta
52. Ulmus americana
53. Washingtonia filifera
54. Washingtonia robusta

Tree Inventory



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

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LANDSCAPING AT RESIDENTIAL STREETS

Landscaping is generally well established at the residential streets surrounding the campus: Hill Avenue, Catalina Avenue, and Arden Road. Existing landscaping and street trees in these areas shall be maintained in good condition and improved as required.

Arden Road

While consistent for most of the street's length, the tree canopy breaks down on the west side of the street in front of the Health Center, where two street trees have been removed. As a part of new construction in the area, these street trees shall be replaced. Landscaping at Arden Road and the houses along it shall be maintained in a condition complimentary to and consistent with the surrounding neighborhood. If historic houses are moved into the area or as new houses are constructed, existing landscape at the street shall be protected and not damaged.

LANDSCAPING AT SERVICE DRIVEWAYS

As described under the circulation and parking strategy, several service drives and courtyards will be required in order to provide vehicular-free pedestrian areas in the campus core. These driveways will emanate from Wilson Avenue, Del Mar Boulevard, and Holliston Avenue and should be landscaped on at least one side of the driving lane to establish a sense of context within the overall open-space network.

Following from the analysis of traffic and parking at Caltech, two objectives for the Master Plan were identified:

- To balance the location of parking and academic facilities and increase visitor parking. This will reduce the number of Caltech people parking on the surrounding residential streets; and

- To route traffic along the major streets to easily identified parking facilities for faculty, staff, and visitors at major entry points to the campus. This will minimize the overflow of Caltech-generated traffic onto the surrounding residential streets.

CIRCULATION STRATEGY

No changes to the major streets around the campus, other than those described under the Circulation Element of the Pasadena Comprehensive General Plan, are proposed by the circulation strategy. The circulation and parking strategy combine to direct Caltech's traffic along these major streets, utilizing them as the primary access routes to campus parking facilities.

Internal Streets

To create an automobile-free pedestrian campus, the circulation strategy closes all internal streets within campus boundaries except for Wilson Avenue, Holliston Avenue, and San Pasqual Street between Holliston and Hill Avenues. Internal streets will be vacated and closed in accordance with the existing agreement between Caltech and the City. While they will remain open, Holliston Avenue and San Pasqual Street will be vacated.

The City vacated all internal streets within the campus boundaries by Ordinance No. 2108 on March 28, 1989 and by Resolution No. 6127 on April 11, 1989. As of the first five-year compliance review, all streets remain open. Closing of streets will be accomplished as development occurs.

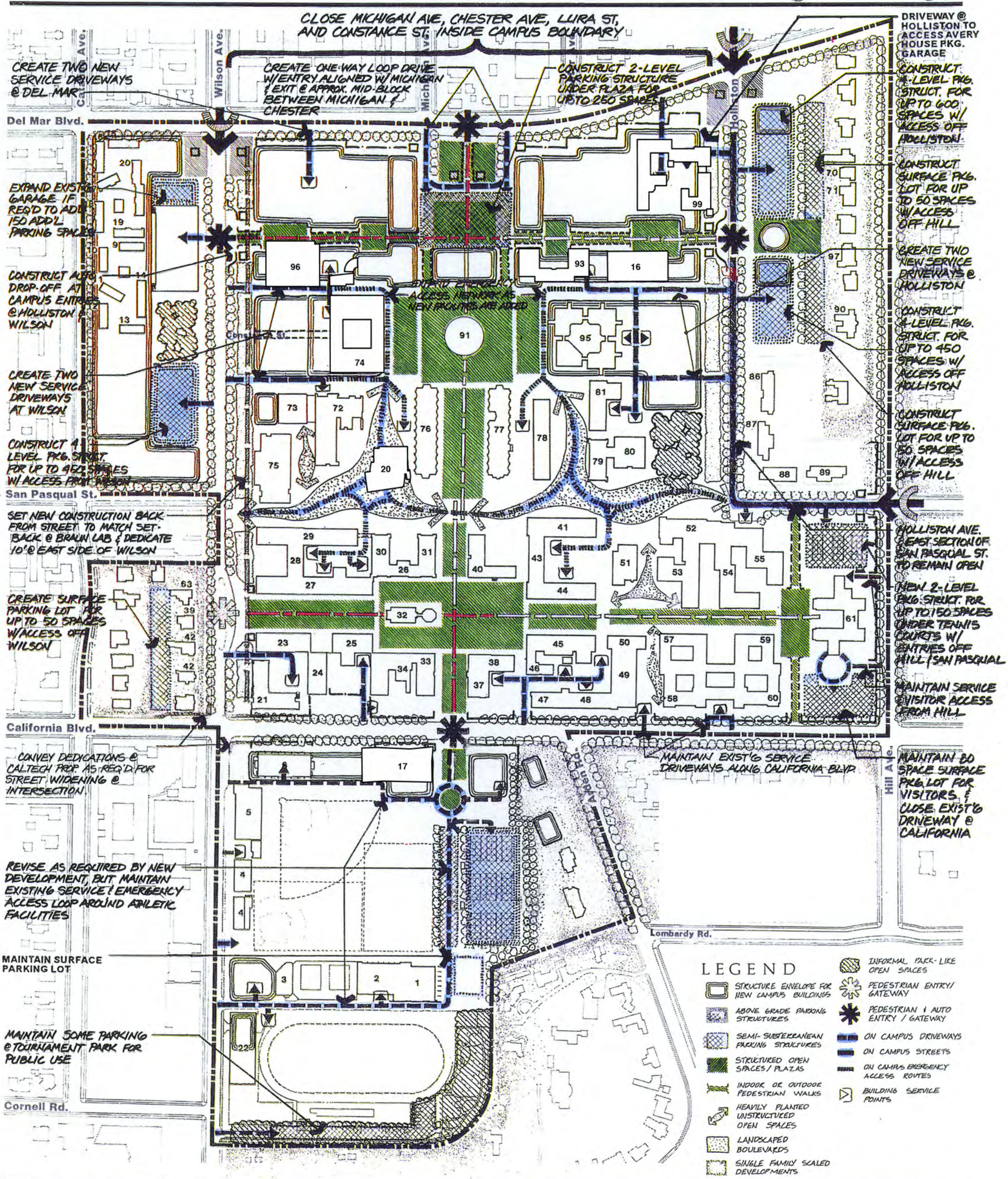
Lura Street, which is a private street north of the Broad Center for Biological Sciences, was converted to parking.

Service access driveways are brought into the campus off of Wilson Avenue and Holliston Avenue between the two major east-west malls. This limited penetration of defined driveways in conjunction with the existing network of serviceways is sufficient to service campus buildings and provide emergency access.

The envelopes proposed for new construction along Del Mar Boulevard provide for two driveways off the street into service yards between clusters of buildings. Additional service to buildings in

these areas will be provided from the loop driveway proposed at the new gateway; all service areas at buildings shall be screened by walls and not visible from public rights of way.

Circulation & Parking Strategy



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

KURT MEYER PARTNERS

DECEMBER 2007

Service access to existing facilities is proposed to remain unchanged; any new construction in this area shall not decrease, but where possible, increase the visual screening of service facilities.

The Del Mar Gateway

To provide safe and convenient access to the visitor parking structure proposed under the entrance at Del Mar Boulevard, a one-way loop driveway is proposed to enter the campus on line with Michigan Avenue and to exit approximately mid-block between Michigan Avenue and Chester Avenue. Expected traffic into and out of the visitor parking structure will not require signalization of the intersection at Michigan Avenue and Del Mar Boulevard, though a left-turn pocket for cars entering from the east should be provided at Del Mar Boulevard.

One driveway was provided off Holliston Avenue for access to the subterranean parking garage of the housing facilitiy (Avery House) at the southwest corner of Holliston Avenue and Del Mar Boulevard.

Gateway at California Boulevard

To reinforce the north-south axis and provide convenient and safer access for both vehicles and pedestrians to the parking structure south of California Boulevard, the driveway entrance is proposed to be relocated east to align with this axis.

CUP #4253 was approved to allow for the construction of a 700-space parking structure under the Athletic Field, west of the existing tennis courts, and approximately 210 feet from the nearest residence on Arden Road. The Master Plan initially envisioned a parking structure with two levels above grade and new tennis courts above. With approval of the CUP, the existing driveway entrance to the new 700-space parking structure and the eight tennis courts remaining at its current site.

Currently a pedestrian crossing signal controls both pedestrian and vehicular movements at this intersection. A full signal, slaved to both the existing signals at Wilson Avenue and Arden Road, is proposed. Analysis by Weston Pringle & Associates suggests that introduction of a full signal at this location will not impede traffic movement on California Boulevard but will increase safety at this intersection.

Emergency Vehicle Access

The existing system of on-site emergency fire access lanes will be maintained and augmented by the service driveways proposed at new development in the northern portion of the campus.

Many emergency access routes in the existing campus cross or follow pedestrian paths and sidewalks. Access to these emergency routes is closed to unauthorized vehicles by locked bollards. In the event of an emergency or fire, the Fire Department is notified and directed to the appropriate entrance onto the campus. At that entrance, personnel from Caltech's Physical Plant meet the Fire Department or other emergency vehicles and guide them to the event

location. The circulation strategy proposes the continuation of this agreement with the expanded service network.

IMPROVEMENTS TO PUBLIC STREETS

Certain improvements are currently planned by the City for public streets surrounding Caltech. The circulation strategy incorporates these existing plans. If not specified below, the timing of these improvements shall be set by the City's Department of Public Works and Transportation.

Street Dedications

In order to provide land for future street widenings adjacent to the Caltech campus, the following street dedications are necessary:

- Wilson Avenue -- a 10' x 50' strip of land is required along the frontage of 320 South Wilson when and if this property is purchased by Caltech. This will complete the Wilson Avenue dedications along the west side of the campus.

- Hill Avenue -- an 8' dedication is required along the west side of Hill Avenue from approximately 100' south to 370' south of Del Mar Boulevard. This area shall be dedicated as the land is acquired by Caltech. Additionally, a thin sliver of land along the west side of Hill Avenue immediately south of San Pasqual Street is also required. This area is presently owned by Caltech, and the sliver shall be dedicated along with the land to the north.

- California Boulevard -- in order to maintain a uniform 78' right-of-way width along this important secondary highway, Caltech shall dedicate a 5'-wide strip along the south side of California Boulevard between Wilson Avenue and Arden Road. Caltech shall dedicate a 3'-wide strip of land along the north side of California Boulevard, 170' west of Wilson Avenue, to allow for intersection safety widening.

Due to new policies of the adopted Mobility Element of the City's General Plan in 1992, the City has reduced the number of street widening projects to very few blocks not including those listed above. Thus, the listed street dedications had not been initiated as of the first five-year compliance review. However, if traffic warrants it and if local widenings and/or intersection modifications are necessary and consistent with the Mobility Element, the City may proceed with the pertinent street dedications listed above with the City Council's review and acceptance.

Wilson Avenue

While no plans exist within the City for the immediate widening of Wilson Avenue, new campus buildings along the east side of the street will be set back a distance sufficient to accommodate a possible 10' future widening of the street.

As of the third five-year compliance review, the last building constructed along the east side of Wilson Avenue was the Broad

Center for Biological Sciences, built in 2000, was set back approximately 90 feet to match the setback of the Braun Laboratory.

The existing street lighting system on Wilson Avenue, between Del Mar Boulevard and California Boulevard, consists of utilitarian lights and is substandard. To improve pedestrian and traffic safety, Caltech shall complete installation of a new street lighting system, on both east and west sides of the street. The type and hardware shall conform to current City policies; the locations shall be as approved by the Public Works and Transportation Department. Caltech shall initiate the diligent installation of the street lighting system at the time any facility exceeding 60,000 square feet is proposed or facilities that cumulatively exceed 75,000 square feet are proposed, whichever occurs first. This project was completed in 1995.

California Boulevard

The Public Works and Transportation Department has proposed a 3' to 5' widening of California Boulevard at its intersection with Wilson Avenue and Hill Avenue. This widening can be accommodated at the Wilson Avenue intersection and is recommended under the Master Plan. However, such widening at Hill Avenue could force a change to the parking and historic Athenaeum wall or reduce the width of parkway and/or sidewalk.

As the future role of California Boulevard is uncertain, no widening of the street is to be required or implemented until such time as the City Council approves, if ever, the widening.

The existing street lighting system on California Boulevard, between Wilson Avenue and Hill Avenue, consists of utilitarian lights (mounted on wood power-line poles) and is substandard. To improve pedestrian and traffic safety, a new street lighting system shall be installed by Caltech along both north and south sides of the subject frontage of California Boulevard. The type and hardware shall conform to current City policies; the locations shall be as approved by the Public Works and Transportation Department. Caltech shall initiate diligent installation of the street lighting system at the time any facility is constructed along the California Boulevard frontage.

The street lighting system on the north and south side of California Boulevard was also installed in 1995.

The existing pedestrian signal at the mid-block pedestrian entrance to the campus shall be reconstructed to control a new combined pedestrian crossing and commercial driveway to serve the new Tennis Court/Parking Structure south of California Boulevard. Caltech shall complete the signal reconstruction at the time the proposed Tennis Court/Parking Structure is built.

As of the third five-year compliance review, the pedestrian signal (mid-block on the north and south side of California Boulevard) between Wilson and Hill Avenues was reconstructed for pedestrian

crossing during the construction of the California Boulevard parking structure (CUP #4253).

Holliston & Wilson Avenue Gateways

The existing street lighting system on Hill Avenue, between Del Mar Boulevard and California Boulevard, consists of utilitarian lights (luminaries on wood poles) and is substandard. To improve pedestrian and vehicular traffic safety, Caltech shall pay the City to install a new standard street lighting system on the west side of the street. The type and hardware shall conform to current City policies; the locations shall be as approved by the Public Works and Transportation Department.

As of the first five-year compliance review, this project had been completed.

San Pasqual Street

This street is both an important vehicular and pedestrian access link from the campus to Lake Avenue. At night it does not present an inviting environment for pedestrians due to inadequate light levels along its length. Improved and increased street lighting should be provided by the City of Pasadena to compliment Caltech's improvements in the area.

Catalina Avenue

The existing street lighting system on Catalina Avenue between San Pasqual Street and California Boulevard consists of utilitarian lights and is substandard. To improve pedestrian and traffic safety, a new street lighting system shall be installed by Caltech along both sides of the street. The type and hardware shall be of a style complimentary to the historic homes along the street; the locations shall be as approved by the Public Works and Transportation Department. Caltech shall initiate the diligent installation of the street lighting system at the time any facility exceeding 60,000 square feet is proposed or facilities which cumulatively exceed 75,000 square feet are proposed, whichever occurs first.

As of the first five-year compliance review, this project had been awarded to a contractor.

As of the third five-year compliance, the street lighting system on both sides of Catalina Avenue between San Pasqual Street and California Boulevard had been installed (1995) at the expense of Caltech.

Holliston Avenue/ San Pasqual Street

Holliston Avenue and a portion of San Pasqual Street are proposed to remain open for internal campus vehicular circulation. If these streets are not vacated by the City, Caltech shall install a new street lighting system conforming to the City's standards. If these streets are vacated, Caltech may retain and continue to use the existing street lights, powered by the campus electrical system.

The City vacated these streets in 1989 and Caltech continues to use the existing street lights as of the third five-year compliance review.

At the intersection of the new east-west axis with Holliston and Wilson Avenues, drop-offs are recommended as ceremonial announcements of the entries. Island planters created by the driveways, while similar to that at the existing entry at Wilson Avenue, will not split traffic in the street and will be out of the public right-of-way.

On-Campus Lighting

In the February 2, 1993 letter to Bill Sato (the City Engineer) Caltech agreed to purchase in place the existing street lights within the campus bounds and either pay for City power on a metered program or reconnect the lights to the Caltech electrical circuit.

As of the third five-year compliance review, the existing street lights on Catalina and Wilson Avenues were reconnected to the Caltech electrical circuit. On Holliston Avenue, Caltech has offered to convert or pay the City to convert the existing street lights to the Caltech electrical circuit. As of this compliance review, the lights on Holliston Avenue are on the City's metered program.

PARKING STRATEGY

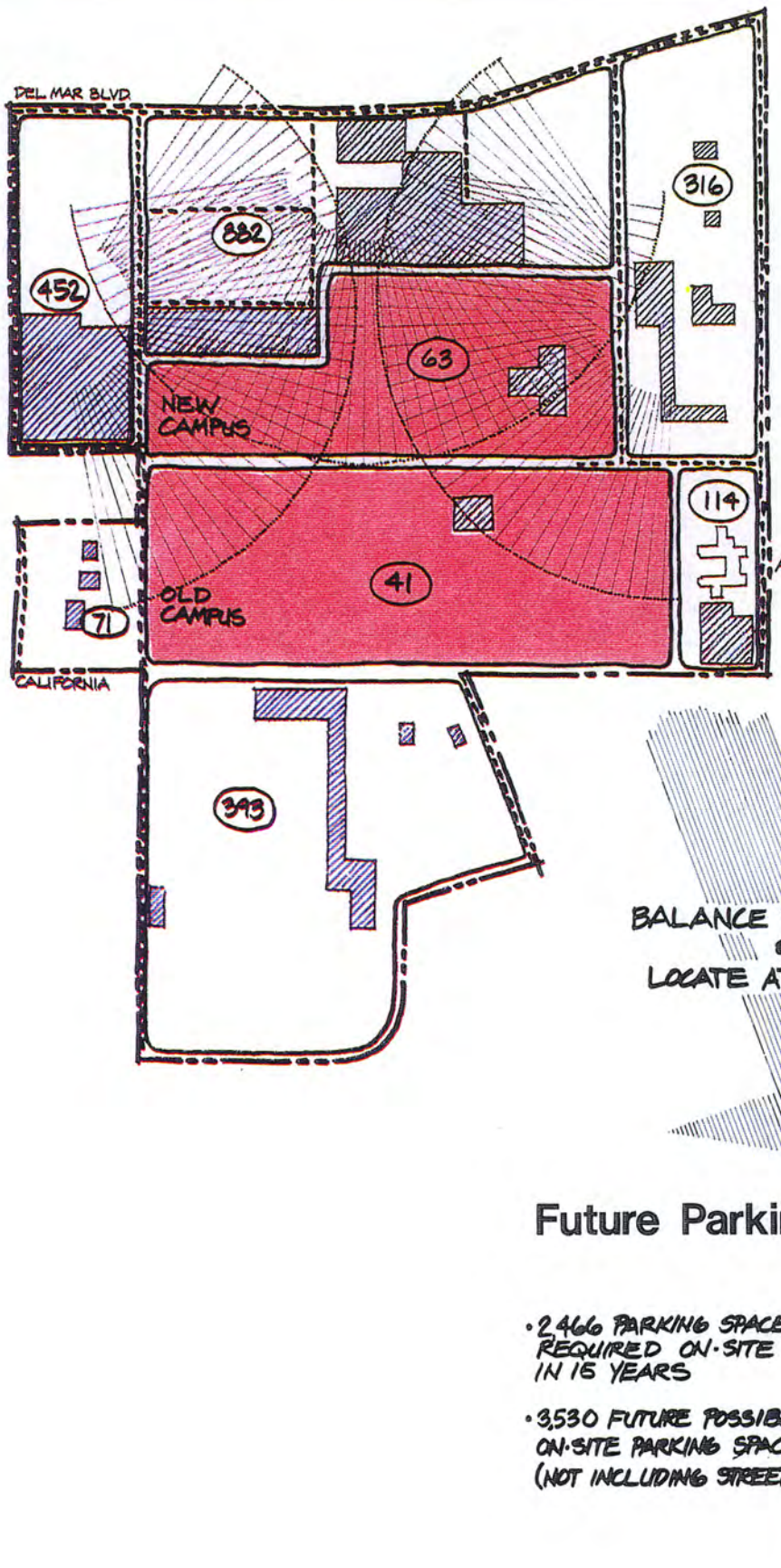
Future parking at the Caltech campus should be provided in accordance with the following formulae:

TABLE 12: PARKING RATIOS

POPULATION COMPONENT	PKG RATIO
• Graduate Students, Off Campus	1:2.3
• Graduate Students, On Campus	1:1.5
• Undergraduate Students	1:2.5
• Faculty & Staff	1:2.0
• Vacancy/Guest Factor	10%

Estimates of Caltech's population growth, in conjunction with these ratios, indicate that the demand for parking might reach 2,500 spaces within the next 15 years. Analysis of existing parking and car ownership habits validates the demand ratios used to generate this number.

Parking Strategy



Existing Parking (June,1986)

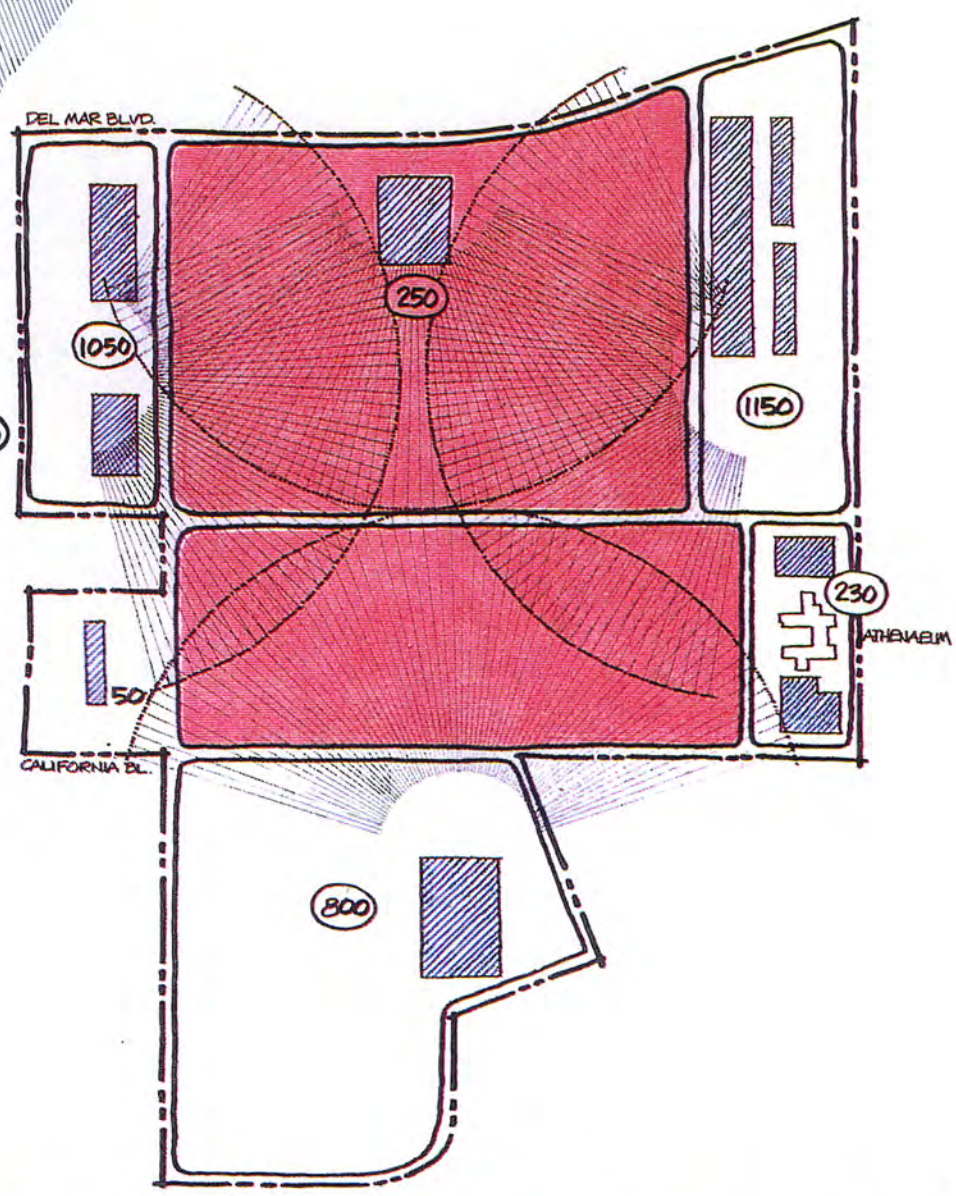
- 1,919 TOTAL ON SITE PARKING SPACES (EXCLUDES TOURNAMENT PARK)
- 413 TOTAL STREET PARKING SPACES (INSIDE CAMPUS BOUNDARY)

2,332 PARKING SPACES

BALANCE PARKING
&
LOCATE AT PERIMETER

Future Parking

- 2466 PARKING SPACES REQUIRED ON-SITE IN 15 YEARS
- 3,530 FUTURE POSSIBLE ON-SITE PARKING SPACES (NOT INCLUDING STREET SPACES)



However, the usage of on-street parking could not be quantified during the surveys of parking lot utilization. This unknown factor suggests that the parking strategy should allow for the construction of more parking than might be suggested by these estimates, to account for the anticipated loss of all on-street parking. For that reason, the proposed parking strategy will allow for the creation of approximately 3,500 parking spaces on-site, 1,000 more than the projected need. This will also give Caltech and the City flexibility in responding to the uncertainties associated with any projection and with changing demand for parking in future years. The diagram on the previous page illustrates the changes to parking at Caltech proposed under this strategy.

As of the first five-year compliance review, there were approximately 2,344 total parking spaces on-site.

As of the second five-year compliance review on October 27, 1999, there were approximately, 2,335 total parking spaces on-site.

As of the third five-year compliance review on December 12, 2007, the new parking structure under the Athletic Field provided 689 spaces; thus there were approximately 3,269 total parking spaces on-site.

Faculty, Staff & Student Parking

The parking strategy locates the majority of Caltech's parking in structures at three main areas on the campus perimeter at the major entry points:

- Up to 1,050 parking spaces in two four-level, above-grade parking structures on the west side of Wilson, one of which was built in 1987 and provides 443 parking spaces;

- Up to 1,050 parking spaces in two four-level, above-grade parking structures east of Holliston, one of which was built in 1994 and provides 437 parking spaces; and

- Up to 700 parking spaces in one three-level, semi-subterranean parking structure south of California Boulevard. A Conditonal Use Permit (CUP #4253) was approved to allow for the construction of a 700-space parking structure under the Athletic Field and to the west of the existing eight tennis courts. The Master Plan initially envisioned a parking structure with two levels above grade and new tennis courts above. The CUP found that the revised proposal reduced the potential impacts to the adjacent residences on Arden Road.

Location of major parking facilities in these three areas serves several purposes. First, it co-locates parking with the major entrances to the campus at Wilson Avenue, Holliston Avenue and California Boulevard, providing a readily identified connection between arrival at the campus and parking. This strategy will reduce the number of

vehicles searching the surrounding residential streets for Caltech and parking. Second, the three locations chosen for parking form a triangle which balances the parking at the campus by providing a substantial amount of parking for the first time south of California Boulevard.

Visitor Parking

Concentrations of visitor parking are provided in two areas:

- 250 parking spaces for general campus visitors and Beckman Auditorium users at the entrance to the campus at Del Mar Boulevard;
- 50 to 100 parking spaces in a surface lot flanking the driveway entrance south of California Boulevard.

As with the strategy for faculty, staff, and student parking, provision of visitor parking at both the new gateway at Del Mar Boulevard and the existing entrance at California Boulevard will reduce on-street parking on residential streets. In addition, a surface parking lot will be maintained east of Building No. 1, south of California Boulevard until Caltech pursues a plan amendment to designate the future use of the site.

Athenaeum Parking

The parking strategy proposes the maintenance of the Athenaeum's 80-space surface parking lot with closure of the driveway off California Boulevard and creation of a new two-level parking structure under the tennis courts north of the Athenaeum for up to 150 employee and undergraduate student parking spaces. Access to this structure would be from San Pasqual Street for the upper level and Hill Avenue for the lower level.

Parking at Houses

The houses that front on Wilson and Hill Avenues are programmed for a mix of residential and academic uses. The academic uses within these buildings require more parking than do residential uses. To accommodate this need, Caltech has to date created parking lots in the yards behind them. The parking strategy calls for development of additional surface lots within the backyards as required to meet demand. Up to 50 parking spaces will be provided behind the houses on Wilson, with up to 100 parking spaces in two surface lots behind the houses on Hill.

Parking for Disabled Persons

Parking for disabled persons is currently provided adjacent to most academic facilities at Caltech. Access to these spaces is sometimes along defined vehicular routes or, alternately, across pedestrian paths. In the latter case, access is restricted to disabled persons. Parking for disabled persons distant from the facilities is not effective. Therefore, the parking strategy proposes to locate limited amounts of parking for disabled persons either adjacent to or nearby new academic buildings in the north campus. As is currently the case, this parking will be provided on a building-by-building basis and located along defined driveways if possible. If this parking can

only be accessed across pedestrian paths, the current system of restrictions will be employed.

Bicycle Parking

The number of bicycle parking spaces shall be determined by the TDM Plan to be prepared by Caltech. For each bicycle parking space required, a stationary object shall be provided to which a user can secure both wheels and the frame of a bicycle with a user-provided 6-foot cable and lock. The stationary object may be either a freestanding bicycle rack, a wall-mounted bracket, or concrete blocks.

PARKING MANAGEMENT POLICY

Until recently, all of Caltech's parking has been provided in surface lots. Almost all spaces at Caltech are assigned under the following system:

- Individually assigned spaces are provided for all faculty members and senior staff, generally in proximity to the buildings within which they have offices;

- The remainder of Caltech's staff park in blocks of parking assigned to each department or division;

- Blocks of reserved parking for students are provided in certain lots near dormitories.

Often the reservation of a large percentage of parking leads to underutilization of available supply. However, Caltech's reservation system works well, since most of the people for whom the parking is reserved are on the campus for extended periods during the day. Field surveys confirmed that the utilization of parking at Caltech is high, suggesting that the reservation system is appropriate.

Recognizing the limited supply of land at the campus, the parking strategy continues a current trend toward provision of parking within structures. The current system of parking reservation may be employed in new structures. Redistribution of the parking at Caltech to a better balance with the location of academic and residential facilities will make the assignment of reserved and visitor parking even more effective.

Caltech shall conform with requirements of a major development under the City's Trip Reduction Ordinance in effect at the time of adoption of the Master Plan, including reserving preferential carpool spaces equivalent to 10% of total employee parking, reserving carpool/vanpool loading areas, and providing commuter matching services, bicycle parking facilities, and a commuter information center with bus schedules, ridesharing promotional materials, etc.

TRANSPORTATION DEMAND MANAGEMENT

Within 3 months of the effective date of the Master Plan's approval, Caltech shall have a Transportation Demand Management (TDM) Plan approved by the Department of Public Works and Transportation. Said Plan shall include ridesharing and alternative work hours strategies and program activities to be implemented and maintained at this site, and incorporating some or all of the strategies listed in the Trip Reduction Ordinance. The City of Pasadena's Transit/Commuter Services Coordinator shall be consulted during development of the Plan. Caltech's TDM plan was submitted, approved and updated every 6 months for the first 18 months of the 1989 Master Plan. Since 1991 a TDM plan is submitted annually by Caltech.

The TDM annual report submitted on September 3, 1999 to the Public Works and Transportation Department found Caltech was found in compliance with the condition of approval. Caltech maintains an average of vehicle ridership (AVR) of 1.6 surpassing the AVR goal of 1.5.

On December 1, 2006, a TDM plan was submitted by Caltech. The plan was reviewed by the Department of Transportation and Caltech was found to be in compliance with the conditions of approval. Caltech maintains an average vehicle ridership (AVR) of 1.50.

THE EXISTING CENTRAL PLANT

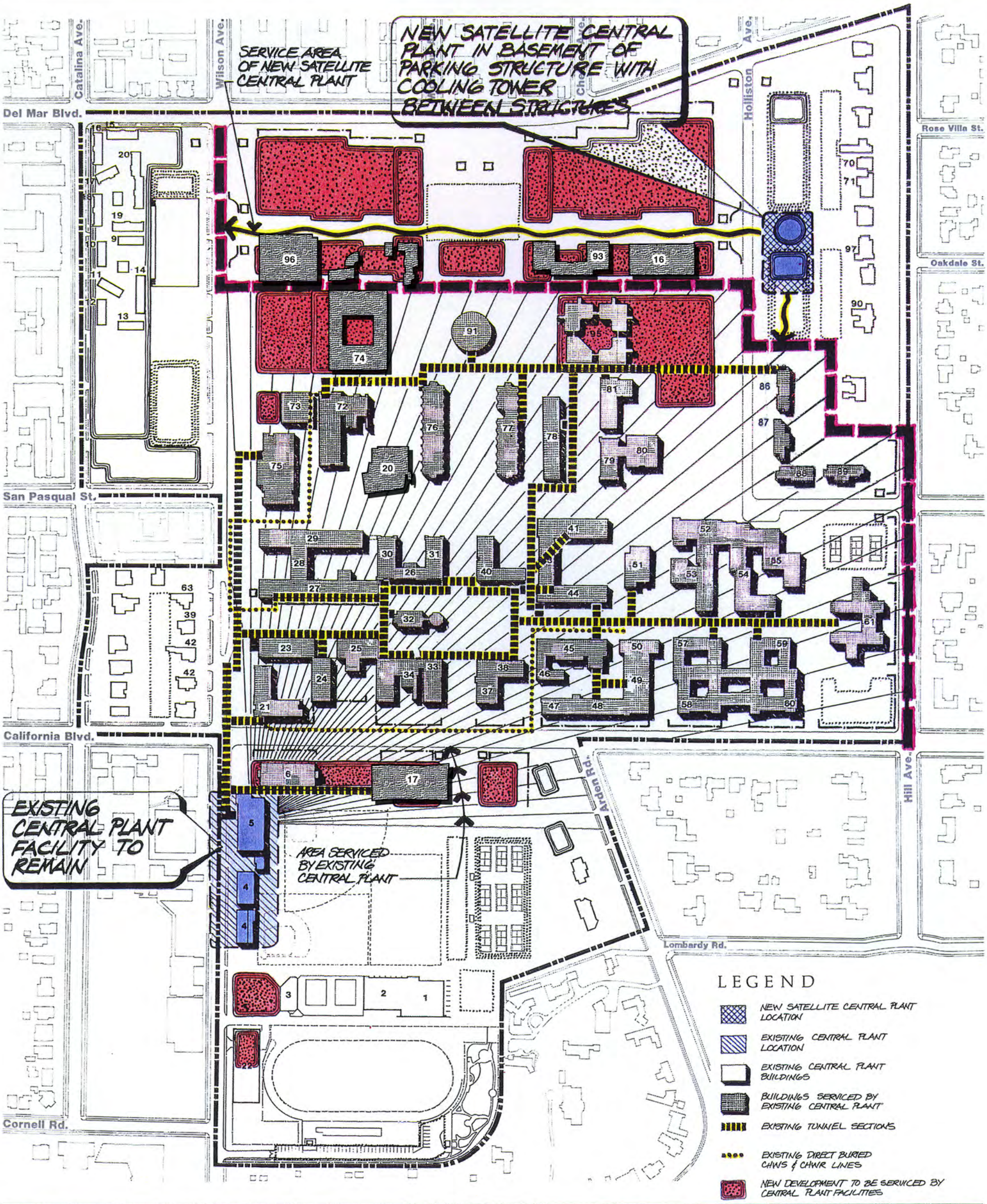
Most Caltech facilities are serviced by a Central Plant which is located along Wilson Avenue south of California Boulevard and west of the athletic playing fields. The Central Plant provides high-pressure steam, hot water, cold water, demineralized water, high-pressure air, and electricity. Most buildings on the system are connected to the Central Plant by a series of tunnels through which the utility lines are run.

The original Central Plant at Caltech, located in Building No. 43 until 1968, provided heating at the campus. The existing Central Plant was constructed in 1968 and introduced cogeneration to the campus.

From 1968 until 1982 the Central Plant contained three boilers, one refrigeration cogeneration unit (COG-I) for air conditioning, and ancillary support equipment. This cogeneration unit was made up of one steam-turbine-driven centrifugal chiller and two absorption chillers. A second, 1 MW electrical cogeneration unit (COG-II) was added in 1982. Much of the facility had, until that time, remained as shell space, with equipment being added incrementally over the years as the campus grew. The final increment, a 4.2 MW cogeneration and heat-recovery unit (COG-III), is scheduled for completion in June 1988. At that time, the plant facility will have been expanded to its full capacity. With a little over 2 million square feet of building space currently supplied by the system, Caltech's staff report that this last increment will support only 150,000 square feet of new space.

The steam generating capability of this final increment will allow some of Caltech's older boiler units to be shut down, and the electrical power generated will better balance Caltech's demand. Moreover, new technology as applied to the exhaust-gas treatment of the new unit will reduce air pollutants by approximately one-third at the existing plant facility.

Central Plant Strategy



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

KURT MEYER PARTNERS

DECEMBER 2007

THE SATELLITE CENTRAL PLANT

Development at Caltech has also reached the practical limit of the existing Central Plant distribution system. Currently steam pressure and differential chilled water pressure at the system's extremities are very low due to resistances within the supply lines. A new satellite Central Plant is therefore proposed by the Master Plan to be located under the southernmost parking structure along Holliston Avenue, with a cooling tower located between the two parking structures on Holliston. Existing utility tunnels will be rerouted, as required, by construction of this satellite facility and new academic buildings.

The new facility will be totally underground and concealed from view with the exception of the cooling tower, which shall take the form of a decorative fountain. The Central Plant, as well as the parking structures, will be set back approximately 120 feet from the houses that front on Hill Avenue, with a landscaped buffer zone between the two uses.

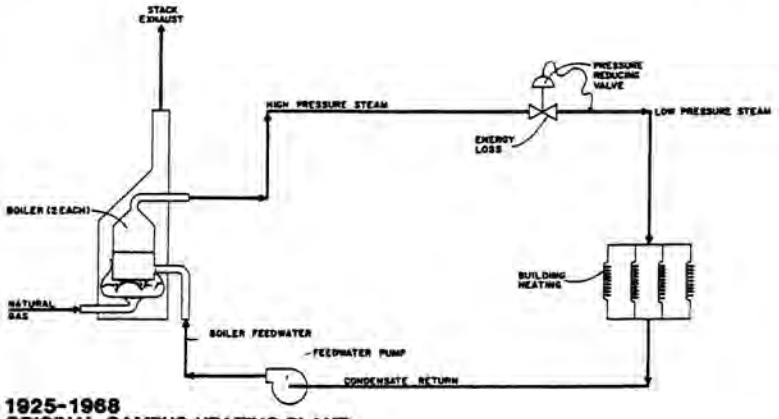
The floor area of the new satellite Central Plant will be similar to that at the existing facility and left partially empty for future use. Non-combustion equipment will be added incrementally to provide utility service for the ultimate build-out of the campus.

By applying the best available control technology, Caltech will be able to construct and operate the new facility without adverse air pollution impact.

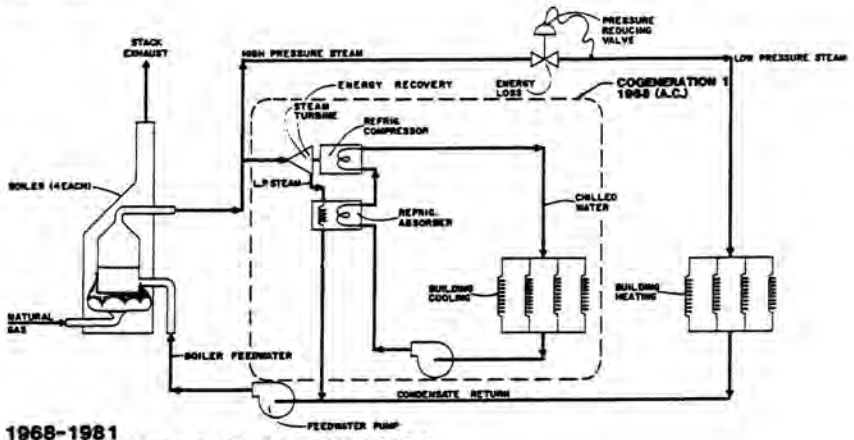
The capacity of the new facility will augment the existing central plant and together, the two facilities will support the projected additional academic and student residential facilities. It is expected that utility requirements per square foot of laboratory and research space will increase beyond present needs. Since the future peak demand requirements for the new campus probably will approximate those currently experienced at the existing campus, the total campus demand at ultimate build-out will probably double existing demand.

Even with increased cogeneration capabilities at the existing Central Plant on Wilson Avenue, Caltech will always be a net purchaser of electric power. The electrical generating units will be sized to be steam load following; that is, power generated will never exceed that which is a by-product of steam demand.

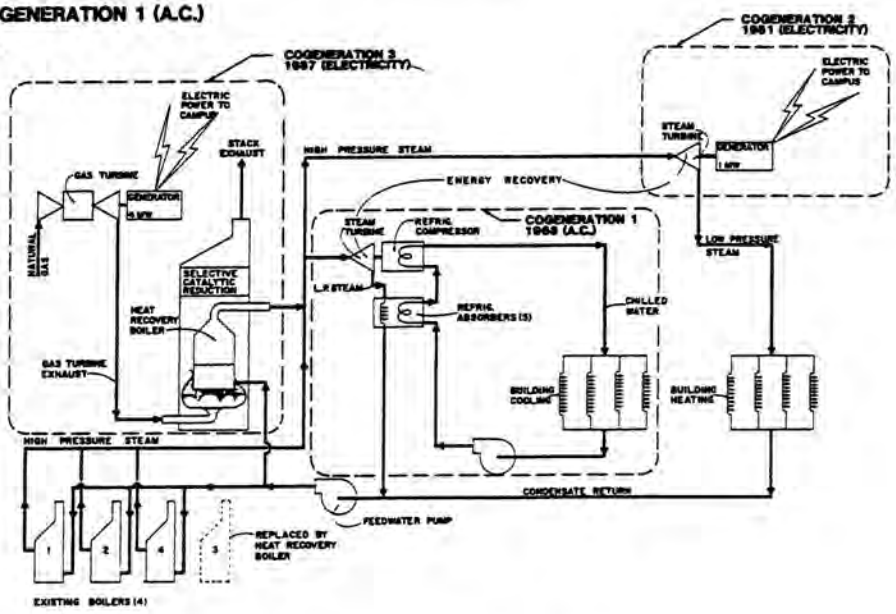
The construction of the new satellite Central Plant was completed in 1994, however, as of the first five-year compliance review it was not in use.



1925-1968
ORIGINAL CAMPUS HEATING PLANT



1968-1981
CENTRAL PLANT - COGENERATION 1 (A.C.)



1987-
CENTRAL PLANT - COGENERATION 2 & 3 (ELECTRICITY)

CAMPUS POWER DISTRIBUTION SYSTEM

The following improvements and expansion of Caltech's current power distribution system will be implemented in phase with new development on campus:

- For other than residential uses, new buildings constructed on the campus shall be serviced through Caltech's power system. There are currently three separate power substations on the campus, which are fed by separate City feeders. To accommodate the additional demand created by new development, Caltech may construct two new substations in the north campus area, to be fed separately.

  As of the third five-year compliance review, all new non-residential buildings continue to be serviced by Caltech's power system. No new substations had been constructed.

- Both existing and new graduate student apartments located on Catalina Avenue between Del Mar Boulevard and San Pasqual Street (including new graduate student housing to be built at the corner of San Pasqual Street and Wilson Avenue) will continue to be serviced directly by the City of Pasadena. Caltech will be billed based on a master meter at each complex and in turn will be responsible for billing residents as it chooses.

  As of the third five-year compliance review, all student housing in this area continues to be serviced by the City of Pasadena.

- The houses on Catalina Avenue and Arden Road shall remain in single-family use and be serviced directly by the City of Pasadena.

  As of the third five-year compliance, the houses in this area continue to be serviced by the City of Pasadena.

- The houses on Wilson Avenue between San Pasqual Street and California Boulevard, regardless of use, will continue to be serviced directly by the City of Pasadena. Caltech may, at its option, add these houses onto the campus's power distribution system.

  As of the third five-year compliance, the houses on the west side of Wilson Avenue continue to be serviced by the City of Pasadena.

- The houses along Hill Avenue will continue to be serviced directly by the City as long as their current uses are not changed. As the houses are newly converted to nonresidential uses, they will be removed from the City's power distribution system and hooked to Caltech's. The City reserves the right to ultimately withdraw power service from properties along the Hill Avenue frontage.

  As of the first five-year compliance review, the houses remain under City service. The conversion of one house to academic use

does not yet justify the expense of changing the service to Caltech. The City, however, reserves the right to withdraw power when appropriate. As of the third five-year compliance review, the conversion of 383 and 415 South Hill Avenue from residential to administrative use (Industrial Relations Center) and President's Residence have been changed to the Caltech's power system.

As of the third five-year compliance, the houses in this area continue to be serviced by the City of Pasadena.

SEWER SYSTEM

In order to separate Caltech from the public sewer system north of the campus, Caltech shall carry out one of the following options:

- Construct a new main in Del Mar Boulevard beginning at Michigan Avenue and flowing easterly to connect to the main in Hill Avenue; or

  As of the third five-year compliance, the new main on Del Mar Boulevard was completed (1998).

- Construct a new sewer main in Del Mar Boulevard beginning at Michigan Avenue and flowing westerly to connect to the main in Wilson Avenue, and to construct a main in Del Mar Boulevard beginning at Chester Avenue and flowing easterly to connect to the main in Hill Avenue.

One of the options shall be completed concurrent with the removal of either Michigan or Chester Avenue or prior to the fifteen-year review of the Master Plan, whichever occurs first. At such time, the on-campus sewers will become the property of and responsibility of Caltech. As of the date of publication, Caltech had paid the design deposit to the Public Works and Transportation Department. One option is scheduled for completion in 1998 as initiated by the Water & Power Department upon the review of the Moore Laboratory.

If and when those portions of Holliston Avenue and San Pasqual Street within the campus boundary are vacated by the City, existing sewer lines within their rights-of-way shall be disconnected from the City's system, taken over by Caltech, and maintained as part of the campus system.

As of the first five-year review, the City will pursue disconnection of these sewer lines concurrent with completion of the new sewer main in Del Mar.

As of the third five-year compliance, the existing sewer lines within Holliston Avenue and San Pasqual right-of-way was disconnected from the City's system and taken over and maintained by Caltech.

STORM-DRAIN SYSTEM

Caltech shall complete and upgrade the existing drainage system along Del Mar Boulevard to the extent necessary to protect the

campus from flooding from the street. This work shall be completed when the portion of Michigan Avenue from Lura Street north to Del Mar Boulevard is removed. Further upgrading of the storm-drain system within the boundaries of the campus is highly recommended but is Caltech's responsibility.

As of the first five-year compliance review, Caltech will upgrade the existing system when streets are actually closed due to new construction. New construction has not yet required street closure.

As of the third five-year compliance, no new construction has required street closure.

Presented in this section are the guidelines for building height, setback, and general architectural character. These guidelines are intended to implement the objectives of the Master Plan, which 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.

In order to meet these objectives and at the same time provide Caltech flexibility in the sizing, exact placement, and development timing of each new facility, the guidelines do not attempt to locate or illustrate the design of individual buildings. Instead, these guidelines have been structured to define envelopes within which individual buildings will be constructed. The description of these envelopes clearly defines the height of all buildings to be expected on Caltech's campus as well as the setbacks from surrounding and internal streets.

The open-space strategy sets the structure of internal open spaces and organizes the campus. The H-shaped pattern of open-space axes suggested for the campus and the envelopes defined for new academic buildings are designed 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.

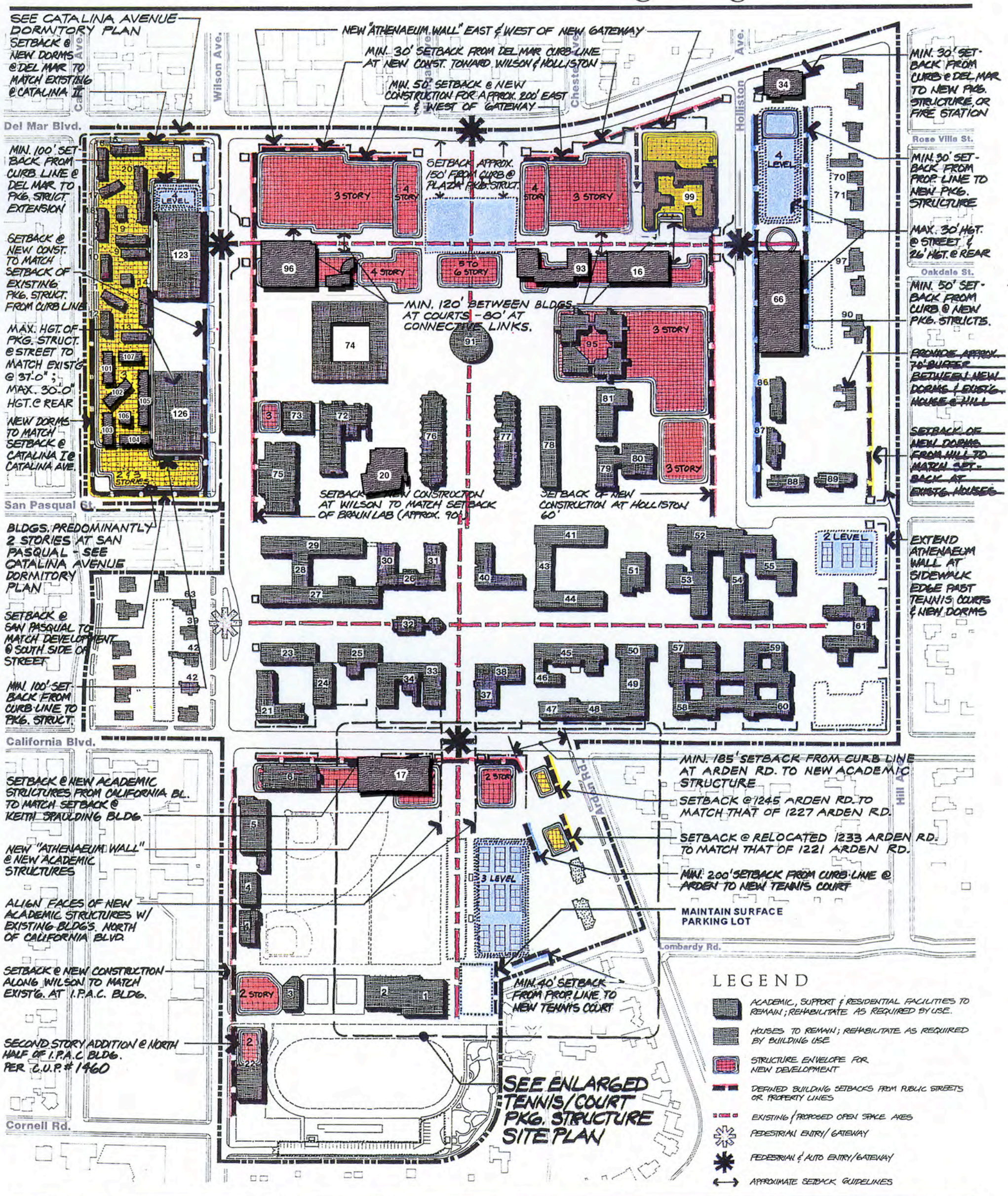
BUILDING HEIGHTS AND SETBACKS

The setback and maximum height of new structures shall be as shown on the accompanying map entitled "Building Heights and Setbacks." Building heights are presented in feet above natural or finish grade. Two types of building setback guidelines are presented: those which describe setbacks at public rights-of-way and Holliston Avenue and are mandatory; and those which describe internal building separations and are suggestions only. To provide a measure of flexibility for both the City and Caltech in the implementation of individual facilities, a five percent tolerance is allowed for all guidelines presented in this section. This tolerance shall apply only to building height, setback, and site coverage and shall not apply to the F.A.R. and/or total building area or dwelling unit limits established for the campus.

Building Setbacks

Unless otherwise noted in the text, all building and envelope setbacks are measured from the curb lines (as they exist at the adoption of the Master Plan) at the immediately adjacent public or private street. Building projections into setbacks at academic and support facilities shall comply with P.M.C. Section 17.64.170. Building projections into yards at residential facilities shall be permitted in accordance with P.M.C. Section 17.24.050 (RM-48) in effect as of the date of adoption of the Master Plan.

Building Heights & Setbacks



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

KURT MEYER PARTNERS

DECEMBER 2007

Building Heights

Building heights for new facilities to be constructed at the campus are presented in feet. The corresponding absolute building heights are as follows and shall be measured by means of a "warped plane," where points at an equal height above all corners of a building are connected with the resulting plane being applied to the maximum height dimensions, as prescribed in the Master Plan.

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:

- Mansard or pitched roofs may exceed the basic maximum permitted heights by 15 feet. Occupied space is allowed within this 15 feet; and

- Towers, spires, cupolas, chimneys, elevator penthouses, water tanks, flag poles, monuments, scenery lofts, radio and television antennas, fire towers, and similar structures or necessary mechanical appurtenances, covering not more than 25% of the ground area covered by the structure to which they are accessory, may exceed the basic maximum permitted heights by 15 feet.

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 buildings respectively, with the following exceptions:

- Mansard or pitched roofs may exceed the basic maximum permitted heights by 10 feet. Occupied space is allowed within this 10 feet; and

- Towers, spires, cupolas, chimneys, elevator penthouses, water tanks, flag poles, monuments, scenery lofts, radio and television antennas, and similar structures or necessary mechanical appurtenances, covering not more than 25% of the ground area covered by the structure to which they are accessory, may exceed the basic maximum permitted heights by 10 feet.

The alteration of existing, and construction of new, single-family houses shall be governed by P.M.C. Section 17.20.030 (RS-6) in effect as of the date of adoption of the Master Plan.

GUIDELINES FOR ACADEMIC FACILITIES

The structural envelopes for academic facilities are sized to allow construction of more than one building. The structural envelopes abutting Del Mar Boulevard might, for instance, contain anywhere up to seven new buildings.

Most new academic buildings will be 50' high, with one or two basement levels used for academic and administrative purposes. This corresponds to the scale of existing facilities (exclusive of penthouses for mechanical and elevator equipment) at the campus.

The programmatic and operational constraints for new buildings are different from those under which Caltech's original buildings were designed. Responding to this, new facilities will have larger footprints, more comparable to the Noyes or Braun Laboratories, with an average building width of 70 to 90 feet.

North Campus Facilities

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.

East-West Axis

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 of less than 80 feet. Individual buildings along the axis should be clustered to form courtyards. These courtyards may incorporate "corridor" elements, including arcades, tree alees and pedestrian paths." The "corridors", should terminated 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.

Del Mar Gateway

The roughly square, hardscaped plaza connecting the landscaped forecourt to the east-west axis will sit on top of the visitor parking structure, approximately 150 feet from the curb line at Del Mar Boulevard. Entry driveways will flank either side of the landscaped forecourt and descend underneath the plaza to a two-level underground parking structure. To accommodate the parking structure, the plaza itself will sit approximately five to six feet above the grade at the street. Given a drop of five to ten feet between Del Mar Boulevard and the open space around the Beckman Auditorium, the elevation of the plaza will ensure convenient access from visitor parking to the Beckman Auditorium. A multi-story unenclosed atrium at the central building is suggested to ensure a visual connection from the plaza to the open space at the auditorium.

Holliston & Wilson Avenues

To match the scale and character of the existing streetscape, new academic buildings along Wilson Avenue will be set back a distance from the street that matches the front yard of the Braun Laboratory (approximately 90 feet from the existing curb line). Buildings along

Holliston Avenue will be set back approximately 60 feet from the street to create a similar esplanade.

Del Mar Boulevard

Design guidelines proposed for Del Mar Boulevard are intended to create a streetscape similar to that seen on California Boulevard at the old campus but with a more formal edge than is recommended at Wilson and Holliston Avenues. This design is suggested to reinforce Del Mar Boulevard as a major new entrance to Caltech.

It is recommended that buildings be set back 30 and 50 feet from the curb line. The setback at buildings should increase from the minimum 30 feet near Holliston Avenue and to Wilson Avenue, to the maximum setback at the new gateway to emphasize this as an entrance into the campus.

As is the case at California Boulevard, private courtyards may be provided between new academic facilities and the street, and the Athenaeum Wall may be carried, with breaks at entry points, from Wilson Avenue to the gateway forecourt and from the forecourt to Holliston Avenue, to unify all buildings and present a consistent image to the street. Some buildings immediately adjacent to Del Mar Boulevard shall be designed with their long axis oriented north-south similar to many buildings along California Boulevard to take advantage of mountain views.

Walls may vary in height and setback from Del Mar to reinforce the graduated setback of new buildings and provide for planting between the wall and sidewalk, but any new wall shall be comparable in height with those along California Boulevard. Further variety could be provided by using transparent grillwork sections in the wall, allowing visual penetration into the campus while still conforming to the overall image consistency that the wall establishes.

California Boulevard Facilities

The structural envelope for new facilities south of California Boulevard will allow development of two or three new buildings in a line between the street and the playing fields. 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’.

As of the third five-year compliance, the height of the new proposed building, Cahill Building for Astronomy and Astrophysics is 50-feet, matching the height of the Keith Spalding Building.

Setback at new buildings in this area should match that at the Keith Spalding Building. The easternmost building should be set back a minimum of 185 feet from the curb line at Arden Road. A landscape buffer shall be planted at the east and south sides of this structure of sufficient density of planted material to insure that the structure will not be visible from properties not owned by Caltech along Arden

Road. Any delivery or loading dock at the building shall be enclosed and screened by a wall from view and shall not be accessed from Arden Road. Caltech shall work directly with the entire group of residents on Arden Road between California Boulevard and Cameron Drive in the selection of plants, trees, and other landscaping.

As of the third five-year compliance, the setback for the new proposed building, Cahill Building for Astronomy and Astrophysics is approximately 46 feet and matches the setback of the Keith Spalding Building.

The placement of these buildings realigns the driveway entrance on the south side of California Boulevard to match the north-south campus axis. However with the approval of CUP #4253 which allowed for the construction of a three level subterranean parking structure under the Athletic Field, the existing driveway entrance remain at its current location. To reinforce this axis, the east and west faces of new buildings at either side of the entry driveway should be set back an equal distance from the centerline of the axis and approximate the setback of buildings north of California Boulevard from the same axis.

To be consistent with the identification developed at the new campus entries at Wilson, Del Mar, and Holliston, pavilions of similar character may be employed at this new California entrance. A wall matching the existing Athenaeum wall may be constructed in front of new facilities in this area.

The Design of Perimeter Walls

This wall should in general be set back from the street a distance equal to the existing wall at the Keith Spalding Building with the same variety in heights and mass as proposed at Del Mar Boulevard. This wall should break at the new driveway and terminate at the east end of the easterly building to clearly signify the end of the academic campus and the start of the residential community along Arden Road.

The setback, height, and extent of new perimeter walls at the campus is specified under sections on North Campus and California Boulevard Facilities. The design of new perimeter walls at campus edges shall incorporate the design elements and style of those existing walls at the Athenaeum, as developed in the Kaufmann plan, or the walls along the north side of California Boulevard at Bridge Laboratory.

GUIDELINES FOR RESIDENTIAL FACILITIES

New student housing will be provided at two areas within the campus:

- New undergraduate, graduate and faculty dormitories will be constructed at Del Mar Boulevard and Holliston Avenue; and

- New graduate dormitories will be constructed along Catalina Avenue between San Pasqual Street and Del Mar Boulevard.

Catalina Dormitories

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 predominantly 25’ in height as shown on the Catalina Avenue Dormitories map. The setback of new dormitories along Catalina Avenue shall match that at the Catalina I development, approximately 25 feet from the property line. The setback of development along San Pasqual Street shall match that of the existing cooperative along the south side of the street, approximately 30 feet from the curb line. No buildings will be allowed within a 40' x 40' open space, measured from curbline, at the corner of San Pasqual and Catalina. The setback of new dormitories along Del Mar Boulevard between Wilson and Catalina Avenues should match the prevailing average setback of existing residential buildings along the street, one block either side of the site.

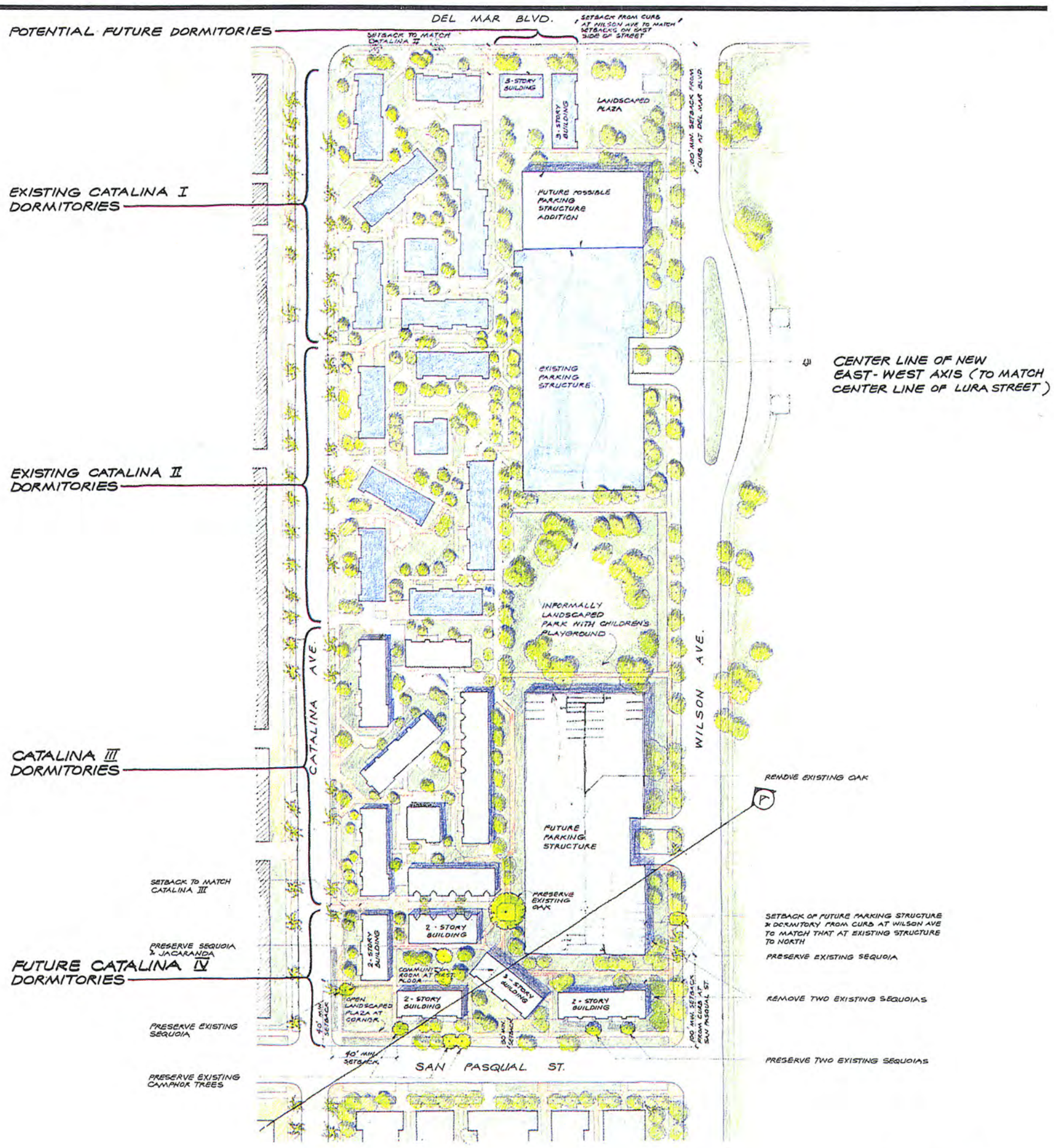
Holliston/San Pasqual Dormitories

Site plans for new facilities shall be in accordance with the Catalina Avenue Dormitory map. One building within Catalina IV, shall be turned at angles to the street to add variety. Existing trees noted on the map shall be protected during construction and preserved. Except for site area, site width, density, maximum building height, and front-yard setbacks, which are specified herein, new facilities should conform to P.M.C. Section 17.24.050 (RM-48) in effect as of the date of adoption of the Master Plan. Catalina III was built in 1988 and all applicable requirements were met.

Two of the existing dormitories in this area, Braun and Mark Houses, are used for student housing. Keck and Mosher-Jorgensen will be converted into nonresidential uses. The 105 beds given up by the conversion of Keck and Mosher-Jorgensen may be added to Catalina IV and Avery (second phase), in addition to their accumulated capacity as laid out in the first amendment to the Master Plan.

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 Bouelvard corridor. The siting, massing, and scale of the new construction will contribute to the establishment of the new east-west mall on the North Campus. The setback of the new facility along Holliston Avenue will be approximately 60 feet from the curb line and will comply with the Master Plan setback requirements along Del Mar Boulevard. The facility will include approximately 50 subterranean parking spaces with access from Holliston Avenue.

Catalina Avenue Dormitories



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

KURT MEYER PARTNERS

DECEMBER 2007

The building will be organized around three interconnected courtyards, with an attached arcade along the east-west mall. The main entry to the building will be from Holliston Avenue with a perimeter wall in a 20-foot-radius curved section to create an open space at the southwest corner of Del Mar Boulevard and Holliston Avenue. The majority of the existing trees will be retained or relocated on site.

Houses at Arden Road

Rehabilitated, relocated, or new houses along the west side of Arden Road, as specified in the Concept Section, shall be sited in accordance with the Tennis Court/Parking Structure Plan. New or relocated houses shall be placed in the same location as the houses they replace, with the same setbacks, unless specifically noted otherwise.

Single-Family Houses

Alterations and/or additions to single-family houses within campus boundaries, regardless of the uses within the structure, shall conform to P.M.C. Section 17.20.030 (RS-6) in effect as of the date of adoption of the Master Plan, except that standards relating to minimum lot area and width shall apply only to the construction of new or movement of existing houses. P.M.C. Section 17.20.030 (RS-2), in effect as of the date of adoption of the Master Plan, shall apply to houses on Arden Road.

PARKING FACILITIES

Structured parking facilities are recommended at three locations on the campus:

- One additional structure at the west side of Wilson Avenue;
- Two new structures at the east side of Holliston Avenue;
- One structure south of California Boulevard; and
- Additional parking, as provided, in smaller structures/lots at other areas of the campus.

The design of surface and structured parking facilities shall be in accordance with those sections of P.M.C. Chapter 17.68 adopted under the Plan Objectives and Applicability Section of this Master Plan.

Wilson Avenue Structures

One four-level parking structure currently exists on the west side of Wilson Avenue. The parking strategy proposes a second structure south of the existing one to be separated by a small park for use by the graduate students residing in the area. This structure will contain four levels and house approximately 450 cars. The height, setback, and design shall match that of the existing structure, which is 37'-0" high at the street and set back 38' off the street. Unlike the existing structure, the west half shall be constructed with one-half level below

grade and a maximum height of 30'-0" to the top of the parapet. The uppermost parking level shall not be lit; interior lighting shall be baffled and directed into the parking structure to minimize light spillage into the surrounding residential neighborhood. One structure was built in 1987 and provides 443 parking spaces.

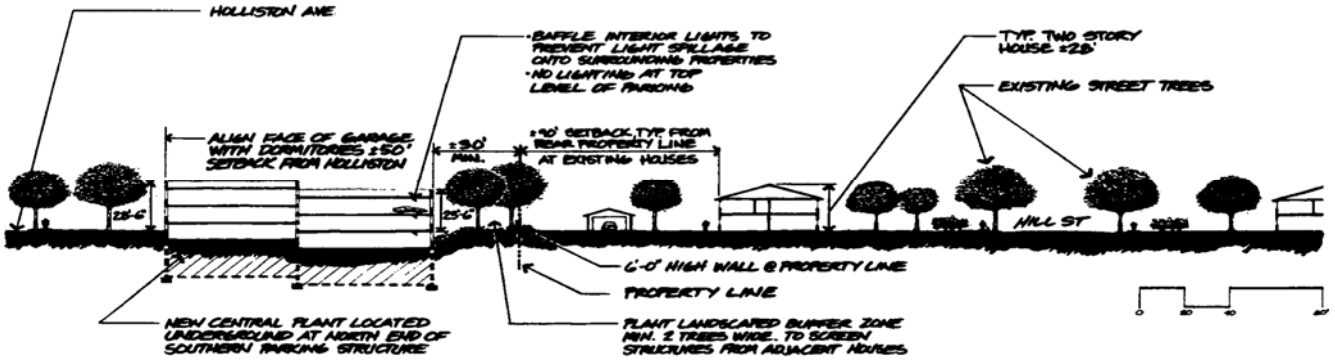
The existing parking structure may be expanded north to add an additional 150 parking spaces, but a minimum setback of 100' from curb line at Del Mar Boulevard should be maintained.

Holliston Avenue Parking Structures

A four-level parking structure located on the west side of Wilson Avenue between Del Mar Boulevard and San Pasqual Street was completed on February 14, 2000. This parking structure provides for 440-parking spaces.

Two parking structures are recommended for construction on the east side of Holliston Avenue. Both structures will provide four levels of parking. The southern structure will contain approximately 450 parking spaces and the northern structure, up to 600 spaces. The two structures will be separated by an open space centered on the east-west axis of the north campus. One structure was built in 1994 and provides 437 parking spaces.

To minimize the visual intrusion of these structures into the residential neighborhood along Hill Avenue, they should be designed with the first level of parking one-half level below grade. The structures should have a maximum height of approximately 30 feet at the street and 25 feet at the rear. A minimum 30-foot buffer zone should separate these structures from the property line to the east and should be heavily landscaped with trees. The minimum setback from the street should match that from the structures on Wilson Avenue, approximately 50 feet from the curb line. The northern parking structure should be set back a minimum 30 feet from the curb line of Del Mar Boulevard. The upper-most parking level should not be lit and interior lighting should be baffled and directed into the parking structure to minimize light intrusion into the surrounding residential neighborhood.

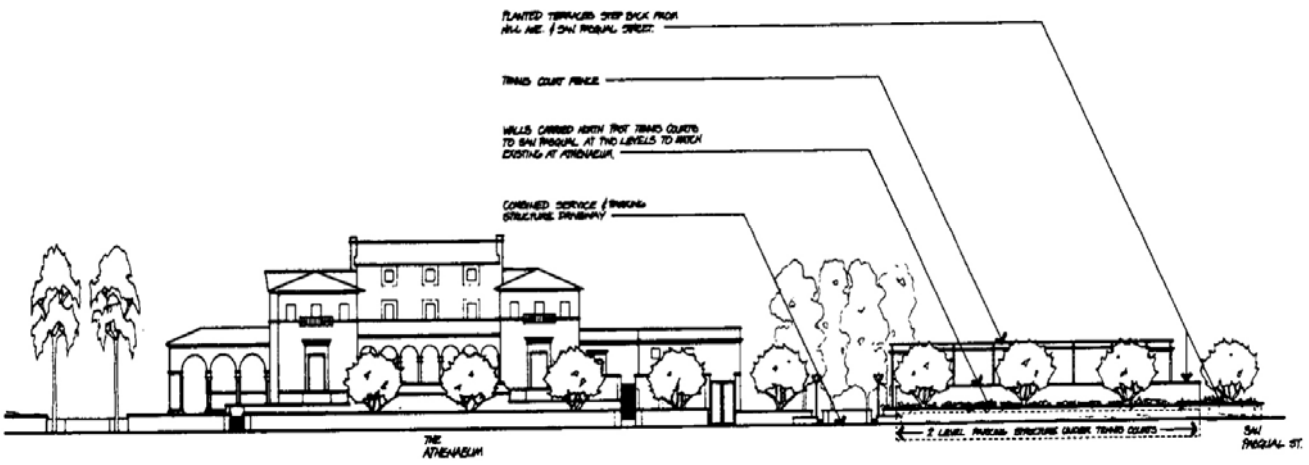


Athenaeum Parking

The parking strategy maintains the current supply of visitor parking south of the Athenaeum. The parking lot configuration will be revised with the closure of the driveway at California Boulevard. This will increase the efficiency of the lot and eliminate the hazard posed by the driveway's current location near the intersection of Hill Avenue and California Boulevard. The porte-cochere at the Athenaeum's entrance will be maintained.

A new two-level parking structure for approximately 150 cars is proposed underneath the tennis courts north of the Athenaeum. The level of the tennis courts will be raised approximately 6 feet. The two levels will not be interconnected by a ramp but entered separately, the upper level from San Pasqual Street and the lower level from Hill Avenue. This is possible because of the rise in elevation along San Pasqual Street. The grades in the area and the design in the exterior walls on the east side of the Athenaeum make it possible to carry these walls north along Hill Avenue to conceal the parking structure and integrate it into the landscape treatment at the Athenaeum.

Either as a separate project or in conjunction with the improvements to the tennis courts at the Athenaeum, the Athenaeum wall, which currently terminates at the north end of the Athenaeum, may be extended past the tennis courts, approximately 70 feet south of the house at 415 S. Hill Avenue. The wall may return a short distance west along the north and south side of San Pasqual Street to identify an entrance into the campus at this point.



Tennis Court Parking Structure

The Master Plan initially envisioned a parking structure with two levels above grade and new tennis courts above; however, an October 1, 2003, a Conditional Use Permit (CUP #4253) was approved to allow for the construction of a 700-space parking structure under the Athletic Field, west of the existing eight tennis courts and approximately 210 feet from the nearest residence on Arden Road. Vehicular access to the structure is limited to one entrance at the north end of the driveway off California Boulevard.

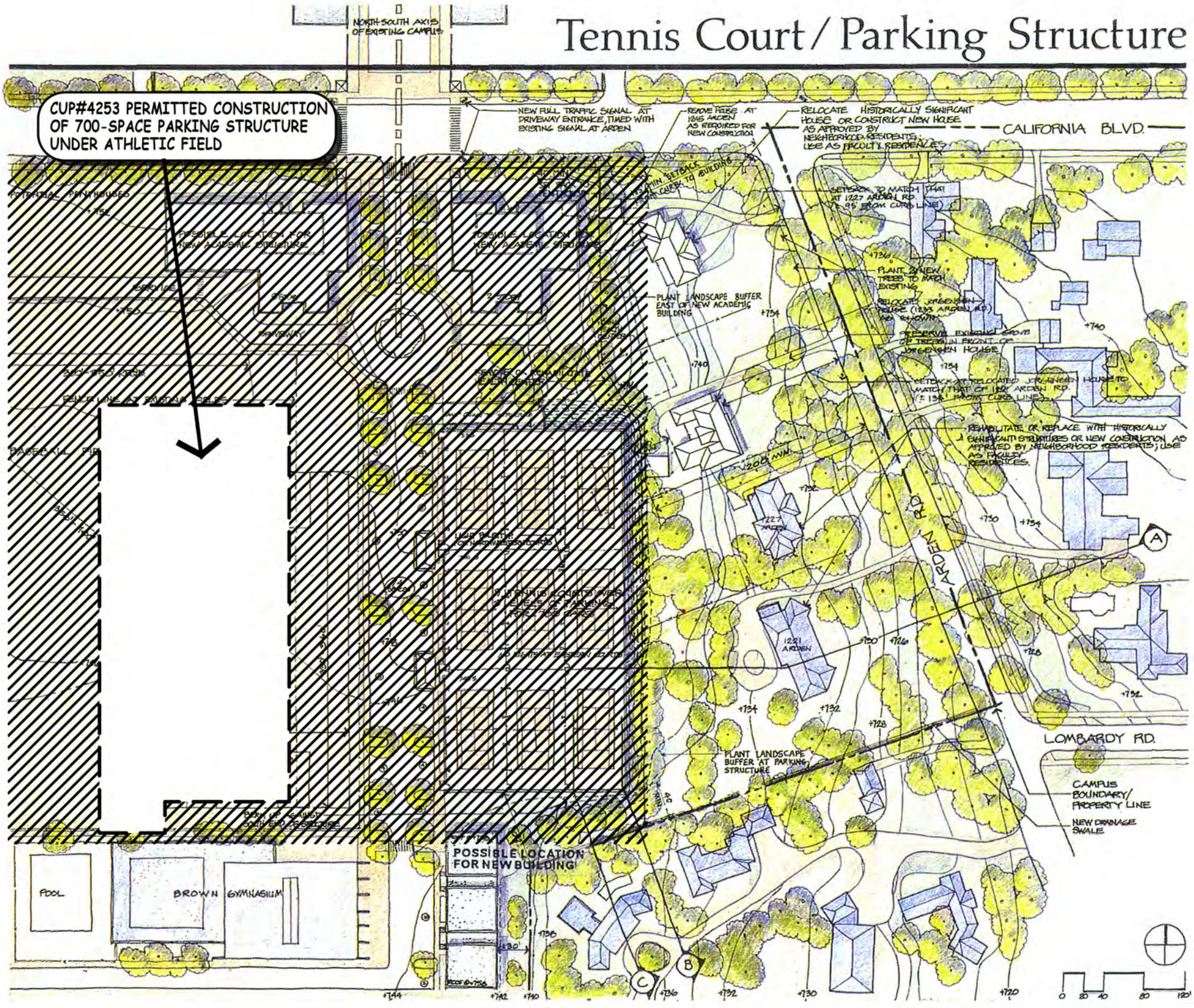
The new siting and design of the underground parking structure with approved conditions of approval reduces the potential impacts to the single-family neighborhoods south and east from any noise, light, and emissions that may result from this use.

Nine new tennis courts may replace the existing eight tennis courts and will be located east of the underground parking structure. Light standards at the tennis courts shall not exceed 30 feet in height. The landscape buffer planted east of the tennis courts shall be of sufficient density of plan material to ensure that levels of light penetration onto Arden Road from the tennis courts shall not exceed those generated by lights at the existing tennis courts.

A measurement of existing light levels along Arden Road during nighttime tennis-court operation hours shall be taken and filed with the City within six months of approval of the Master Plan. The measurements were filed in January 1990.

The terrain in the vicinity of the existing tennis courts slopes generally south and east, conducting surface drainage towards the houses immediately south of Caltech's property. Internal drains will be installed at the tennis courts to reduce the amount of run-off in the area. In conjunction with this project, a drainage swale along Caltech's southern property line will be installed to pick up any remaining surface run-off and conduct it to Arden Road.

Tennis Court / Parking Structure



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

KURT MEYER PARTNERS

DECEMBER 2007

ATHLETIC FACILITIES

Two new athletic facilities are proposed. The first is a two-story gymnasium at Wilson Avenue. The weight room at the west end of the existing pools was the first phase. The gymnasium itself will be built as an addition in the parking lot to the west. This facility was completed in 1992, and includes the six squash/racquetball courts that were intended to be built in a separate structure. Being fully enclosed, no light or noise from the activities within intrude into the surrounding neighborhood.

Relocation of the driveway from California Boulevard approximately 80 feet east will add to the playing fields and ease the existing conflict between the baseball diamond at the northwest corner and the soccer field in the southeast portion of the main field.

ARCHITECTURE

Academic Buildings

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 South 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 mind 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 Kaufmann, 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 or 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 buildings should not be designed in isolation, but address and seek to unify the architectural character of surrounding buildings;

- At the edges 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.

Residential Facilities

A consistent style has been established by the existing dormitories at Holliston/San Pasqual and Catalina Avenue. The architectural style of new dormitories along Catalina Avenue could match that of the Catalina I and II complexes or follow any one of a number of

residential developments in the area.

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.

Permits for major exterior alterations or major additions to any existing academic or residential facility visible from the public right-of-way will be reviewed by the Planning Director.

New construction of structures 25,000-50,000 square feet on the interior of the campus shall be reviewed by the Planning Director. New construction of structures of 25,000 square feet or more where any portion of the structure is within 300 feet of the curb face along Wilson Avenue, California Boulevard, Hill Avenue, and Del Mar Boulevard shall be reviewed by the Design Commission. New construction of structures over 50,000 square feet on the interior of the campus shall be reviewed by the Design Commission. In addition, as to the Planning Director's review for new construction of 25,000-50,000 square feet on the interior of the campus, at the request of the applicant, the Planning Director may defer review of these projects to 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 the facilities listed in Table 13 will be reviewed by the Historic Preservation Commission. The Secretary of the Interior's Standards for Rehabilitation shall apply to reviews affecting buildings listed in Table 13. Interior remodelling at existing facilities will not be reviewed under the Design Review process.

Academic/Support Facilities or Dormitories

As of the first five-year compliance review, no exterior alterations or additions had been made to the existing academic or support facilities that were visible from the public right-of-way. No alterations have been made to buildings more than 50 years old, other than what was provided for in the Master Plan (demolition of Building No. 43).

As of the third five-year compliance, no exterior alterations or additions had been made to the exisitng academic or support facilities that were visible from the public right-of-way. Recent development proposals such as the Cahill Building for Astronomy and Astrophysics and the Walter and Leonore Annenberg Center for Information Science and Technology have received Design Commission review and approval.

The plan development review process ensures review of all construction projects by staff on behalf of the Director. In addition,

the following projects have received design review as of the first five-year compliance review: Moore Laboratory, the Holliston parking structure and Satellite plant, Avery House, the addition to the I.P.A.C. building and the Braun Gymnasium.

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 on secondary elevations will not be reviewed under the Design Review process.

As of the first five-year compliance review, there have been two (2) alteration projects under this category and both received the required reviews.

As of the third five-year compliance, no major exterior or additons to elevations of single-family houses that are visible from Del Mar Boulevard, Wilson Avenue, California Boulevard, Hill Avenue, Catalina Avenue, and Arden Road have been proposed.

TABLE 13: FACILITIES WHERE MAJOR EXTERIOR ALTERATIONS OR ADDITIONS WILL BE REVIEWED BY THE HISTORIC PRESERVATION COMMISSION FOR COMPLIANCE WITH THE SECRETARY OF INTERIOR STANDARDS FOR REHABILITATION

BLDG NO.	BUILDING	YR. BUILT	GROSS AREA (SQ. FT.)
23	Mudd Laboratory – North	1938	49,273
24	Robinson Laboratory	1932	38,886
25	Arms laboratory	1938	44,598
26	Gates Annex	1927	9,750
27	Kerckhoff Lab	1928	90,485
30	Crellin Lab	1937	41,746
31	Parsons-Gate Hall of Administration	1917	27,852
33	Bridge Lab – East	1922	34,116
	Bridge Lab – West	1924	36,575
34	Bridge Annex	1925	7,236
38	Kellogg Radiation Lab	1932	21,684
40	Dabney Hall	1928	30,584
44	Thomas Lab	1945	53,832
45	Guggenheim Lab	1929	61,862
49	Synchrotron Lab	1933	24,536
61	Athenaeum	1930	51,587
91	Beckman Auditorium	1964	20,710
57-60	South Undergraduate Houses	1931	123,298

Note: This list includes all academic/support facilities and dormitories 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.

As of the third five-year compliance, no major exterior alterations or additions to the existing buildings listed in Table 13 have been proposed.

IMPLEMENTATION & PHASING GUIDELINES

While the Master Plan provides the basis for an agreement between the City and Caltech governing campus development for the next 15 years, the building envelopes established by the design guidelines will, given Caltech's past rate of growth, probably require up to 40 years to build out. The purpose of the Master Plan therefore is twofold:

- To define the scope and structure of the final campus; and
- To guide all interim steps.

The future of scientific research is difficult, if not impossible, to predict. Since construction of new facilities at Caltech has been and will continue to be programmatically driven, it is impossible to predict the timing of future facilities. Therefore, the Master Plan provides expansion areas for all Caltech academic divisions, irrespective of the near-term growth potential of each. The demand for new research will determine which of these areas will develop and at what rate:

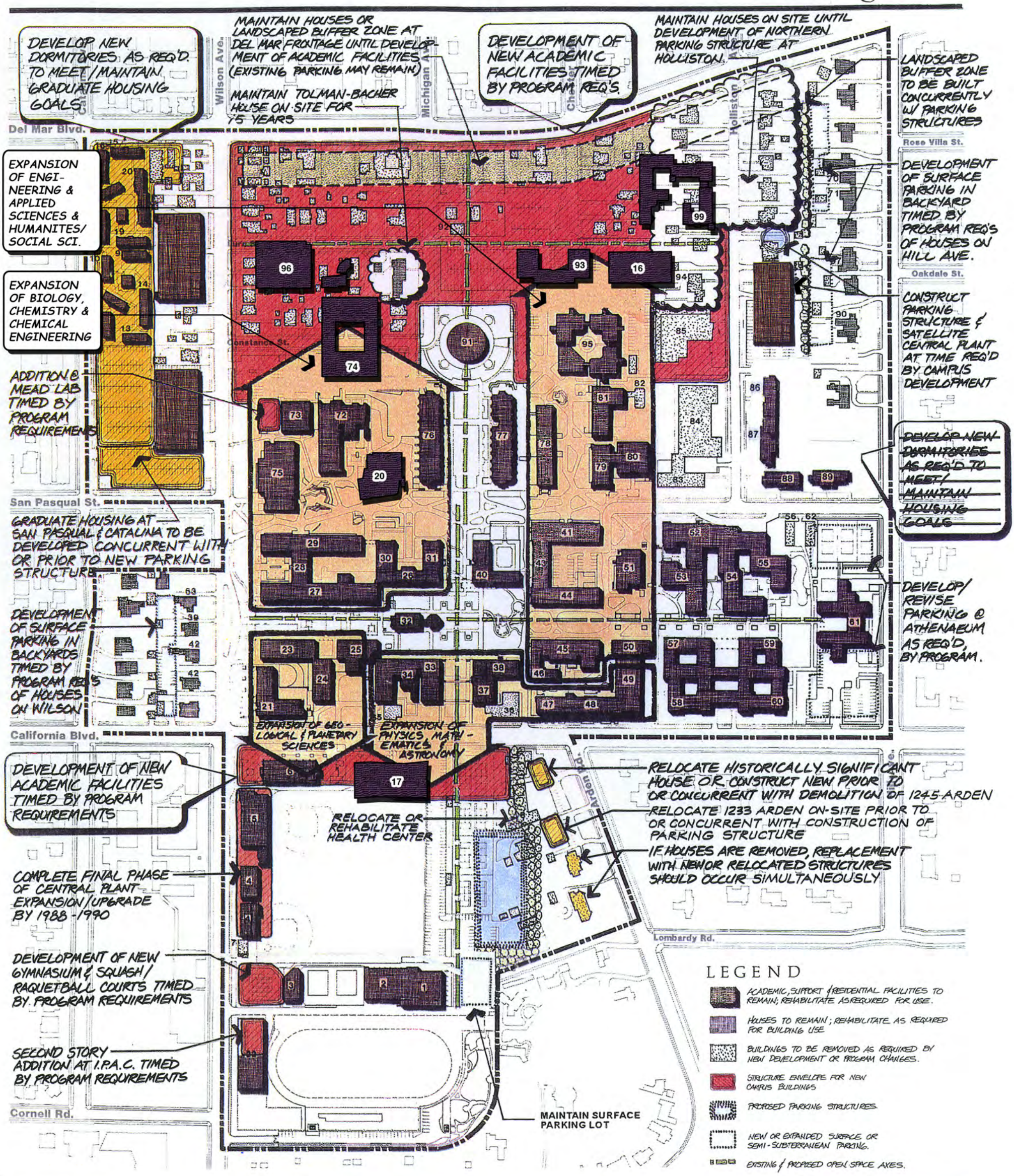
- As new chemistry or biology facilities are required, the northwest quadrant will be developed;
- As new facilities for engineering and applied sciences and the humanities and social sciences are required, the northeastern portion of the campus will be developed; and
- As new facilities for physics, mathematics and astronomy and for geological and planetary sciences are required, the southern frontage of California Boulevard will be developed.

The sequencing of development will not affect Caltech's ability to implement the final campus configuration envisioned by the Master Plan.

Guidelines presented in this section coordinate new construction during the buildout of the Master Plan to ensure that its objectives will be continuously met. Key issues that will arise during interim development of Caltech's campus are:

- Development at campus edges and its impacts on the surrounding community;
- The numerical and geographic balance of the campus population and parking; and
- The disposition of existing houses within the campus boundaries and the supply of student housing.

Phasing Plan



CALIFORNIA INSTITUTE OF TECHNOLOGY MASTER PLAN

0 50 100 200 400

KURT MEYER PARTNERS

DECEMBER 2007

PHASING

The phasing strategy presents two types of guidelines to address each of these issues: those which address the timing of new development (academic/administrative facilities, student residential facilities, and circulation/parking facilities); and those which address the physical environment in specific areas.

Student Housing Facilities

The percentage of the undergraduate and graduate student body housed in facilities on campus, whether dormitories or single-family houses, should never drop below the percentage housed on campus at adoption of this Master Plan.

Parking & Circulation

Off-street parking should be maintained at the campus in accordance with the formulae presented in the parking strategy. Concurrent with construction of new academic, administrative, or residential facilities, new parking facilities should be provided if required to maintain this balance.

New parking facilities should strive to geographically balance parking at the campus relative to the distribution of academic facilities.

The buffering and/or mitigation measures required for each of the proposed parking structures should be in place prior to or concurrent with construction. For example:

- The landscaped buffer zone required east of the parking structures on Holliston Avenue shall be implemented concurrent with their construction;

- Graduate student housing on Catalina Avenue and San Pasqual Street shall be constructed concurrent with or prior to construction of the southern parking structure on Wilson Avenue;

- The landscape buffers and the new, rehabilitated, or relocated houses on Arden Road shall be completed in accordance with the section below on California Boulevard and Arden Road Guidelines.

Prior to the vacation and closure of streets in the north campus area, affected public utilities should be re-routed, or easements provided for them, in accordance with the guidelines presented in the section on campus utilities.

The traffic signal at the relocated driveway entrance to the new parking structure south of California Boulevard should be installed at the time of construction of the structure.

Emergency and service access shall be provided to each new academic, administrative, or residential facility in accordance with the circulation strategy.

As of the first five-year review, the landscaped buffer zone required

east of the parking structures was implemented for the first structure built on Holliston Avenue. The second structure had not been built. The southern parking structure on Wilson Avenue had not been built. Student housing on the corner of Catalina and San Pasqual (Catalina IV) had not been built. The landscape buffers and the rehabilitated or relocated houses on Arden Road were completed in accordance with the section on California Boulevard and Arden Road Guidelines (for more information refer to Arden Road Houses, pages 64-65).

Vacation of streets within the north campus area occurred in 1989. Streets will be closed as development occurs. Work is in progress to upgrade the public utilities affected by street vacation and closure of streets. Caltech is also assuming responsibility of some of those utilities (for more information refer to Campus Utilities Section, pages 79-84). CUP #4253 allowed for the construction of a parking structure south of California Boulevard. A three level 700 parking space fully subterranean garage beneath the Athletic Field was completed in 2005. Emergency and service access had been provided for each new academic, administrative or residential facility in accordance with the circulation strategy.

Open Space

With development of each new facility (academic, administrative, residential, or parking), open-space improvements in the immediate vicinity of the new facility should be provided in accordance with the open-space strategy. For example, the setback area from the street to new facilities should be developed in conformance with the open-space strategy at the time of construction of the new facility. Interim open spaces in these areas which will later be occupied by buildings should be developed to be compatible with the ultimate buildout of the open-space strategy.

As of the third five-year compliance review, applicable requirements had been met by Caltech for those developments which had occurred.

Property Acquisition

Nine single-family parcels in the northern area of the campus were not owned by Caltech. Two lie along Hill Street, where the houses are to be retained for academic or residential purposes; one is at the southwest corner of Holliston Avenue and Del Mar Boulevard in a future open-space area; two lie along the west side of Wilson Avenue north of San Pasqual Street in future open-space areas; and one lies on the west side of Wilson Avenue south of San Pasqual Street in an area where the houses are to be retained and used for academic purposes. Only three of the parcels not owned by Caltech lie within the area designated for development of new academic facilities. Two are at the extreme east and west ends of the new campus area at Wilson Avenue and Holliston Avenue. Therefore, acquisition of non-Caltech-owned parcels is not an obstacle to implementation of the Master Plan. Acquisition of property must precede construction of

new facilities if the proposed project encompasses property not owned by Caltech. Buffer zones, adequate to mitigate short-term visual, noise, or air pollution impacts, shall be provided between new facilities and non-Caltech-owned parcels of land within the campus.

As of the third five-year compliance review, nine properties had been acquired by Caltech. The only remaining property that is not owned by Caltech is 391 S. Wilson Avenue. *(See page 8 for a listing of properties purchased by Caltech).*

NORTH CAMPUS GUIDELINES

The following interim guidelines are presented for development within the north campus area. These guidelines deal with edge treatments at public rights-of-way, interim land uses, and the disposition of existing single-family houses within the area.

Interim Land Uses

The existing apartments and houses in the north campus area are used for a variety of purposes, including academic and administrative offices, support services such as the Child Care Center and Beckman Ticket Office, faculty residences, and student dormitories. Additional land in the area is used for surface parking. During the buildout of the Master Plan, houses remaining in the area will continue to be used for the variety of uses described above and rehabilitated or altered as required to accommodate such uses. Their use may be changed during the interim period. Additional surface parking may be developed within the area under the constraints of the buffer-zone guidelines presented below.

As of the third five-year compliance review, applicable requirements had been met by Caltech.

Open-Space Buffer Zone

During the buildout of the Master Plan, the street frontage at Del Mar Boulevard should continue to be occupied by the existing houses or apartment buildings until new academic facilities are constructed in their place. Alternately, a 50-foot-deep landscaped buffer zone measured from the curb line may be developed. If interim surface parking is constructed within the north campus area, it shall be set back behind the buffer zone and concealed from view by landscaped berms or walls, 3'-6" in height. Existing parking lots may continue to encroach into this buffer zone.

As of the third five-year compliance review, the houses occupying the site for the Avery House remained at the location until development occurred.

Removal of Existing Houses

The removal of existing houses in the north campus area shall be linked to the construction of new academic and administrative facilities and/or associated parking. Houses shall not be removed until a need for new facilities is identified, and shall be maintained in good condition up to the time of relocation or demolition. However, when funding or a need for a new facility is identified, either the

funding source or program will typically require a rapid development and construction schedule. To respond to these constraints and, at the same time, provide a time frame within which the attempt may be made to relocate, rather than demolish, houses in the area, existing houses shall be publicly offered for relocation, free of charge, for the following periods prior to demolition:

- For houses or courts on Constance, Lura, Michigan, Wilson, Chester, and Del Mar, a nine-month advertisement period shall be provided; and

- For houses or courts on Holliston Avenue, the advertisement period shall be 18 months.

As of the third five-year compliance review, 300 S. Holliston Avenue was advertised for relocation. Caltech had adhered to the 18-month advertising time requirements. The house was relocated to 965 Lincoln Avenue.

The advertisement periods shall run from the time notification is given to the Cultural Heritage Commission of the intent to remove houses. Before houses may be offered for relocation, funding for a replacement project must be in place. The advertisement shall be made in a form mutually acceptable to the City and Caltech. If at the end of the advertisement period no signed contract for relocation of the houses in question is in place, the houses may be demolished or relocated at Caltech's option. No building or house shall be demolished prior to issuance of a construction permit, either complete or staged, and completion of all discretionary reviews for the replacement project or required preliminary improvements for said project.

Caltech had adhered to the advertising time requirements and the review processes for all houses removed or relocated, as of the third five-year compliance review.

Caltech shall provide a coordinator to facilitate and coordinate the relocation of houses. This coordinator shall work with potential receivers of houses to help them understand the process and shall coordinate with involved individuals and City departments to help the process move smoothly. Priority for relocation shall be given to houses rated in either Category 1 (potential National Register status) or Category 2 (potential City landmark status), and the bungalow court on Wilson as an intact unit.

As of the first five-year compliance review, a coordinator was provided for all relocated houses and priority for relocation was given to both Category 1 and 2 houses as required.

The Tolman-Bacher House will remain on-site for 15 years. After that period it shall be relocated to a new site within the campus. A complete historic evaluation and comprehensive structural evaluation to determine the significance and movability of the Tolman-Bacher House shall be submitted to the Cultural Heritage Commission within six months of approval of the Master Plan.

The Cultural Heritage Commission reviewed the evaluation in 1990. The Commission agreed that the house should remain on site for a 15-year period ending on July 2, 2004.

Within the constraints imposed by programmatic needs, site availability, and adjacency requirements, existing houses along Holliston Avenue will remain in their current location until development of the northern parking structure on the east side of Holliston Avenue or academic facilities on the west side. However, the three houses on the east side of this street at 328, 344, and 360 South Holliston Avenue will be relocated or demolished in the early stage of development of the north campus to permit construction of the southern structure and the new satellite Central Plant. Houses may be removed at any time, and without the notification described above, if they are to be relocated to Arden Road. Plans for the relocation of the three houses at 328, 344, and 360 South Holliston Avenue should begin immediately to insure their successful relocation prior to development of the satellite Central Plant.

CALIFORNIA BOULEVARD & ARDEN ROAD GUIDELINES

Both 328 and 360 South Holliston were relocated to Altadena in 1991 and 344 South Holliston was relocated within Pasadena in 1991.

Apartments should not be subject to the relocation procedures described herein.

The interrelationship between the timing of construction of the new parking structure, new academic facilities, and new or relocated single-family houses along Arden Road shall be in accordance with the following guidelines:

- The new or relocated house to replace 1245 Arden Road shall be placed on-site concurrently with removal of the existing house;

- If the houses at 1227 and 1221 Arden Road are removed, they shall be replaced immediately with new construction or relocated houses;

- The landscape buffer zones required at the easternmost academic building, and the tennis court shall be installed concurrently with construction and be of sufficient maturity to provide adequate visual screening at occupancy of each facility;

- The Young Health Center may continue to exist at its current

location or be trimmed or removed;

- When and if the Young Health Center is removed, the landscape buffers at the easternmost academic building and parking structure shall be extended across the vacant site as required to provide the visual screening required at each facility;

- The parking and maintenance storage lots south and east of the existing tennis courts may continue to be used for storage of automobiles and maintenance materials and equipment until construction of the parking structure; and

- All drainage improvements required to mitigate water runoff should be implemented concurrently with construction of the parking structure.

As of the third five-year compliance review, the house at 1245 Arden Road remained on site, the house at 1227 Arden Road had been rehabilitated in 1990 and remained on site, and the house at 1221 Arden Road had been replaced with the house from 312 South Holliston in 1990 and remained on site. CUP #4253 allowed for the construction of the south California Boulevard parking structure. The parking structure was completed in 2005. The existing eight tennis courts remained at its current site. The Young Health Center remained on site.

APPENDIX

INTERPRETATIONS

The following interpretations are based on the text and page numbers of the Caltech Master Plan of July 1989.

City of Pasadena

100 NORTH GARFIELD AVENUE
P.O. BOX 7115. PASADENA. CA 91109-7215

PLANNING DEPARTMENT
818/405-4009

March 29, 1990

Mr. Greg Van Der Werff
Director of Property Management
California Institute of Technology
Mail Code 115-6
Pasadena, California 91125

Dear Mr. Van Der Werff:

As , we discussed, where uncertainty exists regarding the interpretation of any provision of the Master Plan, the Plan provides the Zoning Administrator with the authority to determine the intent of the provision.

Enclosed please find the interpretations of those provisions we agreed required clarification, dated March 29, 1991, and approved by the City's Zoning Administrator, Denver Miller.

Please feel free to contact me if you have any questions concerning the above.

Sincerely,

Roderick A. Olguin
Project Planner

cc: Anne Odell
Denver Miller
Hall Daily

CALIFORNIA INSTITUTE OF TECHNOLOGY
MASTER DEVELOPMENT PLAN INTERPRETATION

DATE: March 29, 1991

MASTER PLAN PROVISION: Fire and Paramedic Station (Page 49)

UNCERTAINTY REQUIRING INTERPRETATION: Location of the fire station with respect to Holliston Ave. parking structure

INTERPRETATION: Page 49 of the Master Plan indicates that a fire and paramedic station may be constructed within or immediately north of the northern parking structure on Holliston Avenue. It further states that if the station is not built at that location, the site is to be open space and the parking structure as shown on the Concept Plan. On page 44 of the Master Plan, the Concept Plan notes a "Potential Fire & Paramedic station in or adjacent to parking structure" but the graphic illustrates the station as being within the structure. Because provisions outlined on page 8 of the Plan state that if there is a conflict between the text and graphics, "the text shall control over the graphic", the location of the station can be within or adjacent to (on the north) the parking structure.

Denver E. Miller
Zoning Administrator

CALIFORNIA INSTITUTE OF TECHNOLOGY
MASTER DEVELOPMENT PLAN INTERPRETATION

DATE: March 29, 1991

MASTER PLAN PROVISION: Arden Road Houses (Page 53)

UNCERTAINTY REQUIRING INTERPRETATION: Clarification of the timing and disposition of 1221, 1227, 1233, and 1245 Arden Road houses

INTERPRETATION: On page 53 of the Master Plan it states that "The four houses on the west side of Arden Road ... shall be rehabilitated or removed and replaced" with identified acceptable replacements, as described in the Plan, "or new construction." This provision is interpreted to allow the option of new construction only after rehabilitation or replacement cannot be carried out, as determined by the City, and as summarized below.

INTERPRETATION: On page 53 of the Master Plan it states that "three (single-family houses) may be rehabilitated or replaced with historically significant houses from the northern portion of the campus, or new, as acceptable to the neighborhood." This provision is interpreted to refer to the four houses on the west side of Arden Road and should state that "four (not three) may be rehabilitated or replaced ..." The disposition of the four Arden Road houses are as summarized below.

INTERPRETATION: On page 54 of the Master Plan it states that "The Jorgensen House, at 1233 Arden Road, shall be moved forward on its present lot and rehabilitated." No reference to what triggers the relocation and rehabilitation is provided as was for other Arden Road houses listed. However, according to the Phasing Plan graphic on page 100, the on-site relocation of 1233 Arden is to occur prior to or concurrent with construction of the adjacent parking structure. The Tennis Court/Parking Structure graphic on page 95 illustrates that, in order to build the new parking structure, 1233 Arden must be relocated. Therefore, the timing for moving 1233 Arden Road is prior to construction of the parking structure as summarized below.

INTERPRETATION: In accordance with the provision of the Master Plan on page 8, that states that "the text shall control over the graphic." Therefore, it is interpreted that the provisions of the Master Plan, as summarized below, regarding Arden Road Houses supersede any conflicting text in the graphic found on page 95 of the Master Plan.

INTERPRETATION: On page 105 of the Master Plan it states that "If the houses at 1227 and 1221 Arden Road are removed, they shall be replaced immediately with new construction or relocated houses." This provision is interpreted to allow removal of 1227 Arden Road and new construction at 1227 or 1221 Arden Road only after rehabilitation or replacement cannot be carried out, as determined by the City, and as summarized below.

Timing and disposition of 1221, 1227, 1233, and 1245 Arden Road houses:

* 1221 Arden Road demolished and replaced with 312 (first choice), 344, 297 S. Holliston, or 345 S. Michigan (Tolman-Bacher House) by August 31, 1990.

* 1245 Arden Road demolished and replaced with one of the houses listed above at the time the parking structure south of California is constructed. (Location of replacement house as illustrated on page 95 of the Master Plan)

* 1227 Arden Road rehabilitated and maintained on-site within 6 months of adoption of the Master Plan.

* 1233 Arden Road moved forward (as illustrated on page 95 of the Master Plan) and rehabilitated on-site prior to construction of the parking structure south of California.

Denver E. Miller
Zoning Administrator

CALIFORNIA INSTITUTE OF TECHNOLOGY
MASTER DEVELOPMENT PLAN INTERPRETATION

DATE: March 29, 1991

MASTER PLAN PROVISION: Removal of Existing Houses (Page 104)

UNCERTAINTY REQUIRING INTERPRETATION: Applicability of relocation procedures for apartments

INTERPRETATION: Page 104 of the Master Plan states "Apartments should not be subject to the relocation procedures described herein." Relocation procedures regarding "houses or courts" described in the Master Plan and Resolution 6149 approving the conditions of approval of the Master Plan are intended to reference the single-family houses and two courts in the north campus area and not existing student dormitories and apartments.

Denver E. Miller
Zoning Administrator

ACKNOWLEDGMENTS

CALIFORNIA INSTITUTE OF TECHNOLOGY

The Caltech Master Plan has been prepared by the Institute's Business and Finance organization, under the direction of Vice President David W. Morrisroe. Internally, the planning process has been periodically reviewed by the President's Management Council and by the Buildings and Grounds Committee of the Caltech Board of Trustees.

- Greg Van Der Werff, Manager of the Master Plan Project, Director of Property Management
- Robert E. Fort, Director of Physical Plant

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