

DRAFT ENVIRONMENTAL IMPACT REPORT

Downtown Plan Amendments



City of Santa Cruz

SCH NO: 2017022050

July 2017

DRAFT

ENVIRONMENTAL IMPACT REPORT

DOWNTOWN PLAN AMENDMENTS

SCH NO. 2017022050

PREPARED FOR

CITY OF SANTA CRUZ

Planning and Community Development Department

PREPARED BY

DUDEK

Santa Cruz, California

July 2017

TABLE OF CONTENTS

1	INTRODUCTION.....	1-1
1.1	Purpose of the EIR.....	1-1
1.2	Project Overview.....	1-2
1.3	Scope of the EIR	1-3
1.4	Environmental Review and Approval Process	1-4
1.5	Organization of EIR	1-7
2	SUMMARY	2-1
2.1	Introduction	2-1
2.2	Project Overview.....	2-1
2.3	Areas of Controversy or Concern.....	2-1
2.4	Summary of Alternatives	2-2
2.5	Summary of Impacts and Mitigation Measures.....	2-3
2.6	Issues to Be Resolved.....	2-10
3	PROJECT DESCRIPTION	3-1
3.1	Project Location and Setting	3-1
3.2	Project Background.....	3-2
3.3	Project Objectives	3-2
3.4	Project Components	3-4
3.6	Project Approvals and Use of EIR.....	3-14
4	ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION MEASURES	
4.0	Introduction	4-1
4.1	Aesthetics.....	4.1-1
4.2	Air Quality and Greenhouse Gas Emissions	4.2-1
4.3	Biological Resources	4.3-1
4.4	Cultural and Tribal Cultural Resources.....	4.4-1
4.5	Hydrology and Water Quality	4.5-1
4.6	Public Services	4.6-1
4.7	Transportation and Traffic	4.7-1
4.8	Water and Wastewater Utilities	4.8-1
4.9	Land Use.....	4.9-1
5	OTHER CEQA CONSIDERATIONS.....	5-1
5.1	Significant and Unavoidable Impacts.....	5-1
5.2	Significant Irreversible Environmental Changes	5-1
5.3	Growth Inducing Impacts.....	5-3
5.4	Cumulative Impacts	5-4
5.5	Project Alternatives	5-14

6	REFERENCES AND LIST OF PREPARERS.....	6-1
6.1	Agencies and Persons Contacted	6-1
6.2	References	6-1
6.3	EIR Team	6-8

APPENDICES

- A. Notice of Preparation (NOP) & Initial Study
- B. NOP Comments
- C. Proposed Plan and Ordinance Text Amendments
- D. Buildout Assumptions
- E. Air Quality and Greenhouse Gas Emissions Calculations – Available on CD & City Website
- F. Traffic Level of Service Calculations – Available on CD & City Website

FIGURES

1-1	Project Location	3-17
1-1	Downtown Recovery Plan Boundaries and Subareas.....	3-18
2-1	Lower Downtown Project Study Area.....	3-19
3-1	Existing and Proposed Additional Height Zones.....	3-20
3-2	Schematic of Proposed Height Distribution on Development Sites.....	3-21
3-3	Possible Height Distribution along Pacific Avenue	3-22
3-4	Possible Height Distribution along Front Street	3-23
3-5	Proposed Additional Height and Stepbacks Along Front Street/Riverfront Corridor	3-24
3-6	Project Development Areas	3-25
4.1-1	Photos of Downtown and Project Area	4.1-19
4.1-2	Downtown Taller Buildings	4.1-20
4.1-3A	Visual Simulation of Proposed Project Along Riverwalk.....	4.1-21
4.1-3B	Visual Simulation of Proposed Project Along Pacific Avenue.....	4.1-22
4.1-3A	Visual Simulation of Proposed Project Along Front Street.....	4.1-23
4.3-1	Front Street – Riverfront Corridor Shadow Study	4.1-23
4.7-1	Existing PM Peak Hour Traffic Volumes.....	4.7-25
4.7-2	Project Trip Distribution.....	4.7-26
4.7-3	Project Trip Assignment	4.7-27
4.7-4	PM Peak Hour Traffic Volumes with Project	4.7-28
5-1	Cumulative PM Peak Hour Trips	5-31

TABLES

3-1	Summary of Key Proposed DRP Amendments	3-6
3-2	Summary of Pacific Avenue Retail District Development Standards.....	3-10
3-3	Summary of Front Street/Riverfront District Development Standards	3-11
3-4	Potential Development/Buildout Assumptions with Downtown Plan Amendments.....	3-16
4.1-1	Buildings in Downtown That Exceed 50 Feet in Height	4.1-7
4.2-1	North Central Coast Air Basin Attainment Classification.....	4.2-8

4.2-2	Estimated Maximum Daily Operational Project Emissions	4.2-21
4.2-3	Estimated Annual Operational Project Greenhouse Gas Emissions.....	4.2-22
4.5-1	Sea Level Rise Projections in California	4.5-10
4.6-1	School Capacities and Enrollments	4.6-6
4.6-2	School Capacities and Projected Enrollments	4.6-12
4.6-3	General Plan 2030 Plans and Actions That Reduce Parks Impacts	4.6-14
4.7-1	Intersection Level of Service Definitions	4.7-7
4.7-2	Existing Intersection Weekday PM Peak Hour Levels of Service.....	4.7-9
4.7-3	Existing Highway Traffic Volumes and Peak Hour Levels of Service.....	4.7-10
4.7-4	Project Trip Generation	4.7-18
4.7-5	Intersection Weekday PM Peak Hour Levels of Service Definitions With Project	4.7-20
4.7-6	Highway Traffic Volumes and Peak Hour Levels of Service with Project	4.7-21
5-1	City Cumulative Projects	5-6
5-2	Intersection Weekday Cumulative PM Peak Hour Intersections Levels of Service.....	5-13
5-3	Summary of Alternatives	5-18
5-4	Potential Development/Buildout Assumptions With Existing General Plan and Downtown Recovery Plan	5-19
5-4	Comparison of Impacts of Project Alternatives.....	5-29

INTENTIONALLY LEFT BLANK

CHAPTER 1 INTRODUCTION

1.1 PURPOSE OF THE EIR

This EIR has been prepared for the City of Santa Cruz (City), which is the lead agency for the project. This EIR has been prepared in accordance with the California Environmental Quality Act (CEQA), which is found in the California Public Resources Code, Division 13, and with the State CEQA Guidelines, which are found in Title 14 of the California Code of Regulations, commencing with section 15000.

As stated in the CEQA Guidelines section 15002, the basic purposes of CEQA are to:

- ☐ Inform governmental decision-makers and the public about the potential, significant environmental effects of proposed activities.
- ☐ Identify the ways that environmental damage can be avoided or significantly reduced.
- ☐ Prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible.
- ☐ Disclose to the public the reasons a governmental agency approved the project in the manner the agency chose if significant environmental effects are involved.

Pursuant to State CEQA Guidelines section 15121, an EIR is an informational document which will inform public agency decision-makers and the public generally of the significant environmental effects of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the project. The public agency shall consider the information in the EIR along with other information which may be presented to the agency. While the information in the EIR does not control the ultimate decision about the project, the agency must consider the information in the EIR and respond to each significant effect identified in the EIR by making findings pursuant to Public Resources Code section 21081.

This EIR is being prepared as a “Program EIR” pursuant to section 15168 of the State CEQA Guidelines. A program EIR is an EIR which may be prepared on a series of actions that can be characterized as one large project and are related geographically, by similar environmental effects, as logical parts in the chain of contemplated actions, or in connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program. A program EIR can provide a more exhaustive consideration of effects and alternatives than would be practical in an EIR on an individual action and can ensure consideration of cumulative impacts. A program EIR can be used as part of the environmental review for later individual projects to be carried out pursuant to the project previously analyzed in the program EIR, where impacts have been adequately addressed in the program EIR. For later individual projects proposed in the areas covered by the plans and amendments covered in this EIR, the City will

determine whether the individual project or subsequent activity is within the scope of this Program EIR, meaning it is an activity within the same project as analyzed in the program EIR or within the same geographic area encompassed by the program EIR. Depending on the City's determination, including whether new effects could occur or new mitigation measures would be required, the analysis for later projects could range from no new CEQA document to a new EIR. The City potentially could apply one or more CEQA "streamlining" tools when it considers later projects, such as the focused analytical routes offered under Public Resources Code sections 21155.2 and 21083.3 and CEQA Guidelines sections 15152, 15182, 15183, and 15183.3. If appropriate and applicable to a proposed project, the City may also consider one or more statutory or categorical exemptions. The State CEQA Guidelines encourage agencies to tier the environmental analyses which they prepare for separate but related projects, including general plans, zoning changes, and development projects.

Pursuant to CEQA (Public Resources Code section 21002), public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures which would substantially lessen the significant environmental effects of such projects. Pursuant to section 15021 of the State CEQA Guidelines, CEQA establishes a duty for public agencies to avoid or minimize environmental damage where feasible. In deciding whether changes in a project are feasible, an agency may consider specific economic, environmental, legal, social, and technological factors. According to the State CEQA Guidelines, "feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors. This section further indicates that CEQA recognizes that in determining whether and how a project should be approved, a public agency has an obligation to balance a variety of public objectives, including economic, environmental, and social factors, and an agency shall prepare a "statement of overriding considerations" as to reflect the ultimate balancing of competing public objectives when the agency decides to approve a project that will cause one or more significant effects on the environment. The environmental review process is further explained below in subsection 1.4.

1.2 PROJECT OVERVIEW

This Environmental Impact Report (EIR) addresses the potential environmental effects of a series of proposed amendments to the following adopted plans and regulations; a full description of all project components is provided in the Chapter 3.0, Project Description, of this EIR.

- ☐ Downtown Recovery Plan: Amendment to extend Additional Height Zone A, modify Additional Height Zone B, and modify development standards
- ☐ General Plan 2030: Amendment to modify Floor Area Ratio for the Regional Visitor Commercial land use designation in the downtown area
- ☐ Local Coastal Plan (LCP): Amendment to Land Use Plan text to modify San Lorenzo Urban River Plan land use development policies

- ☐ Zoning Code sections: Amendment to Municipal Code Section 24.10, Part 24, Central Business District (CBD), of the Zoning Code to modify extension area regulations and add Parklet standards.

1.3 SCOPE OF THE EIR

An Initial Study and Notice of Preparation were prepared for the project and are included in Appendix A. The Initial Study identifies potentially significant impacts and discusses issues that were found to result in no impacts or less-than-significant impacts. The discussions in the Initial Study of impacts that are not being addressed in detail in the text of the Draft EIR are intended to satisfy the requirement of CEQA Guidelines section 15128 that an EIR “shall contain a statement briefly indicating the reasons that various possible significant effects of a project were determined not to be significant and therefore were not discussed in detail in the EIR.”

Based on the analyses in the Initial Study and responses to the Notice of Preparation (as discussed below), this EIR evaluates potentially significant impacts for the topics listed below. The EIR also evaluates topics required by CEQA and CEQA Guidelines, including growth inducement, project alternatives, and cumulative impacts. The environmental analysis for this EIR includes:

- ☐ Aesthetics
- ☐ Air Quality and Greenhouse Gas Emissions
- ☐ Biological Resources
- ☐ Cultural Resources and Tribal Cultural Resources
- ☐ Hydrology and Water Quality
- ☐ Public Services (Fire and Police Protection Services, Parks and Recreation, Schools, Solid Waste)
- ☐ Transportation and Traffic
- ☐ Water and Wastewater Utilities
- ☐ Land Use – Plan and Policy Review

The focus of the environmental review process is upon significant environmental effects. As defined in section 15382 of the CEQA Guidelines, a “significant effect on the environment” is:

... a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment. A social or economic change related to a physical change may be considered in determining whether a physical change is significant.

In evaluating the significance of the environmental effect of a project, the State CEQA Guidelines require the lead agency to consider direct physical changes in the environment and reasonably foreseeable indirect physical changes in the environment which may be caused by the project (CEQA Guidelines section 15064[d]). A direct physical change in the environment is a physical change in the environment which is caused by and immediately related to the project. An indirect physical change in the environment is a physical change in the environment which is not immediately related to the project, but which is caused indirectly by the project. An indirect physical change is to be considered only if that change is a reasonably foreseeable impact which may be caused by the project.

CEQA Guidelines section 15064(e) further indicates that economic and social changes resulting from a project shall not be treated as significant effects on the environment, although they may be used to determine that a physical change shall be regarded as a significant effect on the environment. In addition, where a reasonably foreseeable physical change is caused by economic or social effects of a project, the physical change may be regarded as a significant effect in the same manner as any other physical change resulting from the project.

1.4 ENVIRONMENTAL REVIEW AND APPROVAL PROCESS

1.4.1 Scoping

Under CEQA, the lead agency for a project is the public agency with primary responsibility for carrying out or approving the project, and for implementing the requirements of CEQA. CEQA Guidelines section 15083 authorizes and encourages an early consultation or scoping process to help identify the range of actions, alternatives, mitigation measures, and significant effects to be analyzed and considered in an EIR, and to help resolve the concerns of affected regulatory agencies, organizations, and the public. Scoping is designed to explore issues for environmental evaluation, ensuring that important considerations are not overlooked and uncovering concerns that might otherwise go unrecognized.

A Notice of Preparation (NOP) for this EIR was circulated for a 30-day comment period on February 14, 2017. The NOP, with an Initial Study as an attachment, was circulated to the State Clearinghouse and to local, regional, and federal agencies in accordance with State CEQA Guidelines. The NOP also was sent to organizations and interested citizens that have requested notification in the past for the proposal project or any project. Additionally, the NOP was circulated to owners of property contiguous to the project site in accordance with the City's CEQA Guidelines. The Initial Study and NOP are included in Appendix A. A public scoping meeting also was held at a Planning Commission meeting on June 15, 2017.

Written comments were received from three public agencies (California Coastal Commission, Caltrans and FEMA), two organizations (Friends of San Lorenzo River Wildlife and Sierra Club), and five individuals (Candace Brown, Gillian Greensite, Debbie Hencke, Jane Mio, and Jack

Nelson). These letters are included, in Appendix B. Both the written comments and oral comments received at the scoping meeting have been taken into consideration in the preparation of this EIR for comments that address environmental issues. Comments received during the scoping period regarding environmental issues generally include the following concerns, which are further discussed in the EIR chapters that discuss the relevant topic:

- ☐ Aesthetics and impacts to the visual character of the surrounding area;
- ☐ Biological impacts to San Lorenzo River habitat, including potential impacts to birds;
- ☐ Flood hazards and effects of climate change and sea level rise;
- ☐ Drainage and water quality impacts;
- ☐ Traffic and parking impacts; and
- ☐ Provision of public access and recreation along the river.

1.4.2 Public Review of Draft EIR

The Draft EIR will be published and circulated for review and comment by the public and other interested parties, agencies, and organizations for a public review period from July 26, 2017 through September 8, 2017. Written comments on the Draft EIR may be submitted to the City of Santa Cruz at the address below or may be submitted by email to Ron Powers at rpowers@cityofsantacruz.com, by 5:00 pm on September 8, 2017.

Ron Powers, Principal Planner
City of Santa Cruz Planning and Community Development Department
809 Center Street, Room 107
Santa Cruz, CA 95060

The Draft EIR will be available for public review during the comment period at the following locations:

- ☐ City of Santa Cruz Planning and Community Development Department, located at 809 Center Street, Room 107.
- ☐ Reference Desk of the Downtown Public Library, located at 224 Church Street.
- ☐ Online at: <http://www.cityofsantacruz.com/departments/planning-and-community-development/environmental-documents>.

The City of Santa Cruz encourages public agencies, organizations, community groups, and all other interested persons to provide written comments on the Draft EIR prior to the end of the 45-day public review period. Section 15204(a) provides guidance on the focus of review of EIRs, indicating that in reviewing draft EIRs, persons and public agencies “should focus on the sufficiency of the document in identifying and analyzing the possible impacts on the environment and ways in which the significant effects of the project might be avoided or mitigated,” and that comments are most helpful when they suggest additional specific

alternatives or mitigation measures that would provide better ways to avoid or mitigate the significant environmental effects. This section further states that: “CEQA does not require a lead agency to conduct every test or perform all research, study, and experimentation recommended or demanded by commenters. When responding to comments, lead agencies need only respond to significant environmental issues and do not need to provide all information requested by reviewers, as long as a good faith effort at full disclosure is made in the EIR.”

1.4.3 Final EIR / Project Approval

Following the close of the public and agency comment period on this Draft EIR, responses will be prepared for all comments received during the public review period that raise CEQA-related environmental issues regarding the project. The responses will be published in the Final EIR. The Final EIR will include written responses to any significant environmental issues raised in comments received during the public review period in accordance with State CEQA Guidelines section 15088. The Final EIR also will include Draft EIR text changes and additions that become necessary after consideration of public comments.

The Final EIR document, which includes the Draft EIR document, will be presented to the City Planning Commission for consideration of the proposed actions and recommendation to the City Council. The City Council will make the final decision on the proposed General Plan amendment, rezoning and permit applications. The Planning Commission and the City Council must ultimately certify that it has reviewed and considered the information in the EIR, that the EIR has been completed in conformity with the requirements of CEQA, and that the document reflects the City’s independent judgment.

Pursuant to sections 21002, 21002.1 and 21081 of CEQA and sections 15091 and 15093 of the State CEQA Guidelines, no public agency shall approve or carry out a project for which an EIR has been certified which identifies one or more significant effects unless both of the following occur:

- (a) The public agency makes one or more of the following findings with respect to each significant effect:
 - 1. Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effects on the environment.
 - 2. Those changes or alterations are within the responsibility and jurisdiction of another public agency and have been, or can and should be, adopted by such other agency.
 - 3. Specific economic, legal, social, technological, or other considerations, including considerations for the provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or alternatives identified in the environmental impact report.
- (b) With respect to significant effects which were subject to a finding under paragraph (3) of subdivision (a), the public agency finds that specific overriding economic, legal,

social, technological, or other benefits of the project outweigh the significant effects on the environment.

Although these determinations (especially regarding feasibility) are made by the public agency's final decision-making body based on the entirety of the agency's administrative record as it exists after completion of a final EIR, the draft EIR must provide information regarding the significant effects of the proposed project and must identify the potentially feasible mitigation measures and alternatives to be considered by that decision-making body.

1.4.4 Adoption of Mitigation Monitoring & Reporting Program

CEQA requires that a program to monitor and report on mitigation measures be adopted by a lead agency as part of the project approval process. CEQA requires that such a program be adopted at the time the agency approves a project or determines to carry out a project for which an EIR has been prepared to ensure that mitigation measures identified in the EIR are implemented. The Mitigation Monitoring and Reporting Program will be included in the Final EIR, although it is not required to be included in the EIR.

1.5 ORGANIZATION OF EIR

The content and format of this Draft EIR are designed to meet the requirements of CEQA and the CEQA Guidelines (sections 15122 through 15132). This Draft EIR is organized into the following chapters:

- ❑ **Chapter 1, Introduction**, explains the CEQA process; describes the scope and purpose of this Draft EIR; provides information on the review and approval process; and outlines the organization of this Draft EIR.
- ❑ **Chapter 2, Summary**, presents an overview of the project; provides a summary of the impacts of the project and mitigation measures; provides a summary of the alternatives being considered; includes a discussion of known areas of controversy; and lists the topics not carried forward for further analysis.
- ❑ **Chapter 3, Project Description**, provides information about the location, setting, and background for the project; identifies project-specific objectives; provides a detailed description of the project elements and components; and lists the likely approvals for the project.
- ❑ **Chapter 4, Environmental Setting, Impacts, and Mitigation Measures**, explains the approach to the environmental analysis for this EIR, and provides environmental setting, impacts, and mitigation measures for the topics identified for inclusion in the EIR. Each topical section in this EIR presents information in three parts. The "Environmental Setting" section provides an overview of the existing conditions on and adjacent to the

project site. Local, State and federal regulations also are identified and discussed, when relevant.

The “Impacts and Mitigation Measures” section provides an outline of the criteria used to evaluate whether an impact is considered significant based on standards identified in the California Environmental Quality Act (CEQA) and State CEQA Guidelines. Agency policies or regulations and/or professional judgment also are used to further define what actions may cause significant effects. Any project feature or element that may cause impacts, as well as project features that may serve to eliminate or reduce impacts, will be identified and addressed for both direct and reasonably foreseeable indirect impacts. Mitigation measures that would reduce significant impacts are identified. The significance of the impact after mitigation also is identified. For impacts found to be less-than-significant, mitigation measures are not required, but where relevant, the EIR recommends project modifications or appropriate conditions of approval.

- ❑ **Chapter 5, Other CEQA Considerations**, This section evaluates the topics required to be included in an EIR, including significant unavoidable impacts, irreversible impacts growth inducement, cumulative impacts, and project alternatives.
- ❑ **Chapter 6, References and EIR Preparation**, identifies all agencies contacted during the preparation of the EIR, all references that were cited or utilized in preparation of the EIR and individuals who were involved in preparing this Draft EIR and the individuals who provided information.
- ❑ **Appendices** contain additional information used in preparing this Draft EIR. Appendix A contains the Notice of Preparation and Initial Study, and Appendix B includes comment letters that were submitted in response to the NOP. Appendix C includes the revised plan text amendments. Appendix D includes the development buildout assumptions developed by City Planning and Community Development Department staff. Appendix E includes calculations of air emissions prepared for this EIR, and Appendix F includes the traffic calculations prepared for the City.

CHAPTER 2 SUMMARY

2.1 INTRODUCTION

This chapter provides a brief description of the proposed project, known areas of controversy or concern, project alternatives, all potentially significant impacts identified during the course of this environmental analysis, and issues to be resolved. This summary is intended as an overview and should be used in conjunction with a thorough reading of the EIR. The text of this report, including figures, tables and appendices, serves as the basis for this summary.

2.2 PROJECT OVERVIEW

This Environmental Impact Report (EIR) addresses the potential environmental effects of construction of This Environmental Impact Report (EIR) addresses the potential environmental effects of a series of proposed amendments to the following adopted plans and regulations; a full description of all project components is provided in the Chapter 3.0, Project Description, of this EIR.

- ☐ Downtown Recovery Plan: Amendment to extend Additional Height Zone A, modify Additional Height Zone B, and modify development standards
- ☐ General Plan 2030: Amendment to modify Floor Area Ratio for the Regional Visitor Commercial land use designation in the downtown area
- ☐ Local Coastal Plan (LCP): Amendment to Land Use Plan text to modify San Lorenzo Urban River Plan land use development policies
- ☐ Zoning Code sections: Amendment to Municipal Code Section 24.10, Part 24, Central Business District (CBD), of the Zoning Code to modify extension area regulations and add Parklet standards.

2.3 AREAS OF CONTROVERSY OR CONCERN

The City of Santa Cruz, as the Lead Agency, has identified areas of concern based on the Initial Study and Notice of Preparation (NOP), which are included in Appendix A. In response to the NOP, letters of comment were received from three agencies (California Coastal Commission, Caltrans and FEMA), two organizations (Friends of San Lorenzo River Wildlife and Sierra Club), and five individuals (Candace Brown, Gillian Greensite, Debbie Hencke, Jane Mio, and Jack Nelson). An agency and public scoping also was held at the Planning Commission meeting on June 15, 2017 to receive public comments on the scope of the EIR's analyses and project alternatives. Both the written comments and oral comments received at the scoping meeting

have been taken into consideration in the preparation of this EIR for comments that address environmental issues.

Written comments on the NOP and oral comments received at the scoping meeting raised the following environmental concerns, some of which may be areas of controversy:

- ☐ Aesthetics and impacts to the visual character of the surrounding area;
- ☐ Biological impacts to San Lorenzo River habitat, including potential impacts to birds;
- ☐ Flood hazards and effects of climate change and sea level rise;
- ☐ Drainage and water quality impacts;
- ☐ Traffic and parking impacts; and
- ☐ Provision of public access and recreation along the river.

2.4 SUMMARY OF ALTERNATIVES

CEQA Guidelines require that an EIR describe and evaluate alternatives to the project that could eliminate significant adverse project impacts or reduce them to a less-than-significant level. The following alternatives are evaluated in Section 5.5.

- ☐ No Project – Required by CEQA
- ☐ Alternative 1 – Reduced Height for Expanded Additional Height Zone A to 75 feet and Elimination of Additional Height Zone B
- ☐ Alternative 2 – Reduced Height for Additional Height Zone A to 75 feet along Pacific/Front and Reduced Height for Additional Height Zone B to 60 feet along the San Lorenzo River with Development Standard Modifications: eliminate encroachment over property line and require 10-foot setback above 50 feet

Table 5-5 in Section 5 of this EIR presents a comparison of project impacts between the proposed project and each alternative. None of the alternatives, including the No Project Alternative would eliminate significant project impacts and cumulative impacts related to traffic, although all alternatives would result reduce the level of impact. Table 5-5 (on the next page) presents a comparison of project impacts between the proposed project and the alternatives. Excluding the No Project Alternative, Alternative 1 – Reduced Height for Additional Height Zone A and Elimination of Additional Height Zone B – is considered the environmentally superior alternative of the alternatives considered. Although it would not reduce significant impacts to less-than-significant levels, it could result in the greatest reduction of traffic and water demand impacts and reduce some of the other identified significant impacts. However, it would not fully meet project objectives.

2.5 SUMMARY OF IMPACTS AND MITIGATION MEASURES

All impacts identified in the subsequent environmental analyses are summarized in this section. This summary groups impacts of similar ranking together, beginning with significant unavoidable impacts, followed by significant impacts that can be mitigated to a less-than-significant level, followed by impacts not found to be significant. The discussions in the Initial Study of impacts that are not being addressed in detail in the text of the Draft EIR are intended to satisfy the requirement of CEQA Guidelines section 15128 that an EIR “shall contain a statement briefly indicating the reasons that various possible significant effects of a project were determined not to be significant and therefore were not discussed in detail in the EIR.” The Initial Study is included in Appendix A of this EIR. A summary of less-than-significant and no impacts identified in the Initial study is presented at the end of this section.

2.5.1 Significant Unavoidable Impacts

The following impacts were found to be potentially significant, and while mitigation measures have been identified in some cases, the impact cannot be reduced to a less-than-significant level. Section 5.5, Project Alternatives, examines alternatives to eliminate or reduce the level of significance of these impacts.

Cumulative Impacts

The proposed project will contribute to significant cumulative traffic impacts at six locations in the project vicinity and along state highways. Future development projects within the area of the proposed plan amendments will be required to pay the City’s traffic impact fee. However, payment of the traffic impact fee and the associated improvements would not mitigate impacts to a less-than-significant level at three intersections: Ocean Street/Water Street, Highway 1/Highway 9, and Chestnut Street/Mission Street. Improvements could be made to the other intersections to achieve an acceptable LOS of D.

MITIGATION 5-1: Require future development projects within the downtown area to contribute fair-share payments for improvements at the following intersections: Front/Soquel (signal timing and lane modifications); Front/Laurel (westbound lane addition and north and south right-turn overlap); and Pacific/Laurel (southbound left-turn lane addition).

With implementation of Mitigation 5-1, significant cumulative impacts at three intersections would be mitigated, and the project’s contribution would not be cumulatively considerable. Future development projects in the downtown area would be required to pay the City’s traffic impact fees for improvements at the other three intersections, but planned improvements would not result in acceptable levels of service, and no other feasible improvements have been identified. Therefore, cumulative traffic

impacts remain significant at three City intersections and along state highways this is a significant cumulative impact, and the project's contribution to cumulative traffic impacts would be cumulatively considerable at these locations.

2.5.2 Significant Impacts

The following impacts were found to be potentially significant, but could be reduced to a less-than-significant level with implementation of identified mitigation measures should the City's decision-makers impose the measures on the project at the time of final action on the project.

Impacts Evaluated in EIR

Biological Resources

Impact 4.3-2: Indirect Impacts to Sensitive Riparian Habitat. Future development of taller buildings as a result of the proposed Downtown Plan amendments could result in indirect impacts to birds in the area that could lead to bird mortalities.

- MITIGATION 4.3-2:** Revise Downtown Plan to include standard for design guidance for bird-safe structures along the San Lorenzo River, including:
- Minimize the overall amount of glass on building exteriors facing the San Lorenzo River.
 - Avoid mirrors and large areas of reflective glass.
 - Avoid transparent glass skyways, walkways, or entryways, free-standing glass walls, and transparent building corners.
 - Utilize glass/window treatments that create a visual signal or barrier to help alert birds to presence of glass. Avoid funneling open space to a building façade.
 - Strategically place landscaping to reduce reflection and views of foliage inside or through glass.
 - Avoid or minimize up-lighting and spotlights.
 - Turn non-emergency lighting off (such as by automatic shutoff), or shield it, at night to minimize light from buildings that is visible to birds, especially during bird migration season (February - May and August - November).

Impact 4.3-3: Indirect Impacts to Nesting Birds. Future development as a result of the proposed Downtown Plan amendments could result in disturbance to nesting birds if any are present in the vicinity of construction sites along the San Lorenzo River.

MITIGATION 4.3-3: Require that a pre-construction nesting survey be conducted by a qualified wildlife biologist if construction, including tree removal, adjacent to the San Lorenzo River is scheduled to begin between March and late July to determine if nesting birds are in the vicinity of the construction sites. If nesting raptors or other nesting species protected under the MBTA are found, construction may need to be delayed until late-August or after the wildlife biologist has determined the nest is no longer in use or unless a suitable construction buffer zone can be identified by the biologist. (Citywide Creeks and Wetlands Management Plan Standard 12).

Public Services

Impact 4.6-1c: Schools. Adoption of the proposed plan amendments could indirectly result in increased population associated with potential development that would generate elementary school student enrollments that could exceed capacity of existing schools.

MITIGATION: No mitigation measures are required beyond payment of school impact fees that will be collected at the time of issuance of a building permit.

Impact 4.6-2: Parks and Recreation. Adoption of the proposed plan amendments could indirectly result in increased population associated with potential development that could be accommodated by the Plan that would result in increased demand for parks and recreational facilities that could result in some deterioration of existing parks and recreational facilities.

MITIGATION: With implementation of the proposed General Plan 2030 goals, policies and actions that set forth measures to avoid and minimize adverse impacts on parks and recreational facilities as summarized on Table 4.6-2 and required payment of park fees, the proposed project's indirect impact on parks and recreational facilities would be considered less-than-significant.

Impacts Evaluated in Initial Study (Appendix A)

Noise

Noise-1: Exposure to Noise. Future development in the project area would be exposed to exterior and / or interior noise levels that exceed local and state requirements. However, the project area is not within locations that would expose people to noise in excess of established standards.

MITIGATION NOISE-1: Require preparation and implementation of acoustical studies for future residential development along Front Street to specify building design features that meet state interior sound levels.

2.5.3 Less-Than-Significant Impacts

The following impacts were found to be less-than-significant. Mitigation measures are not required.

Impact 4.1-1: Scenic Views. Future development accommodated by the proposed plan amendments would not eliminate or substantially adversely affect, modify, or obstruct a visually prominent or significant public scenic vista.

Impact 4.1-3: Visual Character of the Surrounding Area. The proposed project would result in amendments to the DRP and General Plan that would allow increased heights of 20 to 35 feet over existing allowable standards, and future development could result in taller and more massive buildings. With implementation of required development standards for massing, required percentage variation of heights, and upper-level skyline variation, future buildings would be of similar height and scale as the other taller buildings in the downtown area, which already contains several multi-story buildings of varied height, and would not substantially degrade the visual character of the surrounding area.

Impact 4.1-4: Introduction of Light and Glare. The proposed project would result in amendments to the DRP and General Plan that would allow increased heights and building coverage, and future development would include exterior and interior lighting typical of residential developments, but would not result in introduction of a major new source of light or glare.

Impact 4.2-1: Criteria Pollutant Emissions. Future development and growth accommodated by the proposed project would result in emissions of criteria pollutants, but would not exceed adopted thresholds of significance, violate any air quality standard or contribute substantially to an existing or projected air quality violation.

Impact 4.2-2: Greenhouse Gas (GHG) Emissions. Future development and growth accommodated by the proposed project would result in GHG emissions, which are not considered significant.

- Impact 4.3-1: Indirect Impacts to Special Status Species and Aquatic Habitat.** Future development of taller buildings as a result of the proposed Downtown Plan amendments could result in indirect impacts to riparian and aquatic special status species due to increased shading due to increased building heights, but would not substantially affect habitats.
- Impact 4.4-1: Archaeological and Tribal Cultural Resources.** Future development accommodated by the proposed plan amendments could result in impacts to archaeological, historical archaeological, human remains, and/or tribal cultural resources. However, City requirements for cultural resource investigations would ensure that future development projects assess and mitigate potential impacts (4a, 4b, 4e).
- Impact 4.4-2: Historic Resources.** Future development accommodated by the proposed plan amendments could result in impacts to historical resources (4c), however, site-specific redevelopment could occur under existing conditions without the proposed plan amendments.
- Impact 4.4-3: Paleontological Resources.** Future development accommodated by the proposed plan amendments could result in impacts to unknown paleontological resources discovered during construction. However, adherence to City procedures would not result in significant impacts.
- Impact 4.5-1: Stormwater Drainage.** Future development accommodated by the proposed plan amendments could result in stormwater runoff, but would not substantially alter the existing drainage pattern of the area, substantially increase the rate or amount of surface runoff, exceed the capacity of existing or planned storm drain facilities, cause downstream or off-site drainage problems, or increase the risk or severity of flooding in downstream areas.
- Impact 4.5-2: Water Quality.** Future development accommodated by the proposed plan amendments could result in water quality degradation to San Lorenzo River from automobile oils and greases carried in stormwater runoff. Project grading could also result in erosion and potential downstream sedimentation if not properly managed.
- Impact 4.5-3: Flood Hazards.** Future development accommodated by the proposed plan amendments could result in exposure to flood hazards, including watercourse flooding, sea level rise or tsunamis. (5d-g). However, with compliance with federal flood requirements and implementation of City plans and programs, the proposed project would not lead to indirect impacts related to exposure to flood hazards.

- Impact 4.6-1a: Fire Protection.** Adoption of the proposed plan amendments could indirectly result in increased population density associated with potential new development accommodated by the Plan that would result in increased fire protection and emergency service demands. Existing and future development and growth within the City would result in the need to construct new or expanded fire stations, however, the impacts of fire station construction or expansion are not expected to be significant.
- Impact 4.6-1b: Police Protection.** Adoption of the proposed plan amendments could indirectly result in increased population associated with potential development that could be accommodated by the Plan that would result in increased police protection service demands. However, future development and growth would not result in the need to construct new or expanded police facilities.
- Impact 4.6-3: Solid Waste.** Adoption of the proposed plan amendments could indirectly result in increased population associated with potential development that could be accommodated by the Plan, which could result in indirect generation of solid waste that could be accommodated within the remaining landfill capacity.
- Impact 4.6-4: Energy Use.** Adoption of the proposed plan amendments could indirectly result in increased population associated with potential development that could be accommodated by the Plan, which could result in indirect increased energy demands, which would not be wasteful or an inefficient use of resources.
- Impact 4.7-1: Circulation System Impacts.** The project will result in an increase in daily and peak hour trips, but would not cause existing or planned intersections to operate at an unacceptable Level of Service (LOS) or further degrade intersections that already operate at an unacceptable LOS.
- Impact 4.7-2: Highway Segment Impacts.** The project will result in an increase in daily and peak hour trips, but would not result in a change to an unacceptable LOS along state highway segments.
- Impact 4.8-1: Water Supply.** Adoption of the proposed plan amendments could indirectly result in intensified development with a demand for potable water in a system that, under existing conditions, has adequate supplies during average and normal years, but is subject to potential supply shortfalls during dry and critically dry years. The additional project demand would not result in a substantial increase during dry years and would not be of a magnitude to affect the level of curtailment that might be in effect.

Impact 4.8-2: Wastewater Treatment. Adoption and implementation of the proposed plan amendments could indirectly result in increased development and population growth that would result in indirect generation of wastewater that could be accommodated by the existing wastewater treatment plant.

2.5.4 No Impacts

The State CEQA Guidelines section 15128 require that an EIR contain a statement briefly indicating the reasons that various possible significant effects of a project were determined not to be significant and were therefore not discussed in detail in the EIR. Through the Initial Study, NOP scoping process, and EIR, the City of Santa Cruz determined that the proposed project would have no impact on the environmental issues outlined below, and thus, are not further analyzed in the EIR. See the Initial Study in Appendix A for further discussion.

Impacts Evaluated in EIR

Impact 4.1-2: Scenic Resources. Future development accommodated by the proposed plan amendments would not result in elimination or a substantial adverse effect to scenic resources.

Impact 4.7-3: Project Access. The project will not result in creation of hazards due to design of the project circulation system or introduction of incompatible uses.

Impact 4.7-4: Emergency Access. The project will not result in inadequate emergency access.

Impact 4.7-5: Transit, Pedestrian and Bicycle Travel. The project will not conflict with adopted policies, plans, or programs regarding public transit, bicycle or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Impact 4.9-1: Conflicts with Policies and Regulations. The proposed project will not conflict with policies or regulations adopted for the purpose of avoiding or mitigating an environmental effect, and therefore, will result in *no impact* related to consistency with local plans and policies.

Impacts Evaluated in Initial Study (Appendix A)

- Agricultural and Forest Resources
- Hazards and Hazardous Materials, except Wildland Fire Risk
- Mineral Resources
- Noise: Generation of Vibration, Location Within Airport Land Use Plan

2.6 ISSUES TO BE RESOLVED

CEQA Guidelines section 15123 requires the Summary to identify “issues to be resolved including the choice among alternatives and whether or how to mitigate the significant effects.” This EIR has presented mitigation measures and project alternatives, and the City Planning Commission and City Council will consider the Final EIR when considering the proposed project. In considering whether to approve the project, the Planning Commission and City Council will take into consideration the environmental consequences of the project with mitigation measures and project alternatives, as well as other factors related to feasibility. “Feasible” means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors (State CEQA Guidelines, section 15364). Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context), and whether the proponent can reasonably acquire, control, or otherwise have access to the alternative site (or already owns the alternative site). No one of these factors establishes a fixed limit on the scope of reasonable alternatives. The concept of feasibility also encompasses the question of whether a particular alternative or mitigation measure promotes the underlying goals and objectives of a project. Moreover, feasibility under CEQA encompasses “desirability” to the extent that desirability is based on a reasonable balancing of the relevant economic, environmental, social, legal, and technological factors.

CHAPTER 3 PROJECT DESCRIPTION

3.1 PROJECT LOCATION AND SETTING

The City of Santa Cruz is located along the northern shore of Monterey Bay, approximately 75 miles south of San Francisco, 25 miles south of San Jose and 40 miles north of Monterey (see Figure 1-1). The City occupies a picturesque location between the Pacific Ocean and the Santa Cruz Mountains and is bordered by parks, open space, and residential uses on the north, open space lands on the west, the Monterey Bay on the south, and a portion of the unincorporated urban community of Live Oak on the east. The City's western and northern borders are mostly defined by publicly- and privately-owned open space and agricultural lands, with the Monterey Bay on the south. Within the City, city-owned open space lands help establish a greenbelt around the City.

The project area is located within the Downtown Recovery Plan (DRP) planning area that covers approximately 69 acres. Boundaries of the DRP plan area generally are: Laurel Street on the south, Cedar and Center Streets on the west, River and Water Streets on the north, and the top of the west levee of the San Lorenzo River on the east. The DRP identifies the following four subareas, which are also referenced as sub-districts in the Central Business District (CBD). The area covered by the DRP and subareas are shown on Figure 1-2.

- a. *Pacific Avenue Retail District*, including a one-half block depth for all parcels fronting onto Pacific Avenue between Water and Laurel Streets;
- b. *Front Street/Riverfront Corridor*, including the one-half block depth of property on the west side of Front Street, and all parcels adjacent to the riverfront between Water and Laurel Streets;
- c. *Cedar Street "Village" District*, generally situated between the Pacific Avenue Retail District on the east and Center Street on the west; and
- d. *North Pacific Area*, situated between Water Street, River Street, and the Mission Hill escarpment.

The proposed project, as described in the following sections, would affect future development intensity within an approximate 12-acre portion of the lower DRP planning area that generally includes the lower parts of the Pacific Avenue Retail District and Front Street/Riverfront Corridor. The project area is shown on Figure 2-1 and is generally bounded by Laurel Street on the south; the San Lorenzo River on the east; Cathcart Street and Soquel Avenue on the north; and Cedar Street on the west. This area is developed primarily with a mix of commercial uses with some upper floor office and residential uses. The area also includes the Metro Station (approximately 1.5 acres), owned and operated by the Santa Cruz Metropolitan Transit District that serves as the bus plaza for the downtown area.

3.2 PROJECT BACKGROUND

The Downtown Recovery Plan (DRP) was adopted in 1991 to guide reconstruction of the 1989 Loma Prieta earthquake as the earthquake destroyed significant portions of downtown Santa Cruz. The intent was to establish policies, development standards and guidelines to direct the recovery process toward the rebuilding after the earthquake. In addition to an Introduction, Summary, and Implementation Strategy, the DRP includes the following components:

- ☐ Land Use Plan for four subareas (Chapter 3)
- ☐ Development Standards and Design Guidelines (Chapter 4)
- ☐ Circulation and Parking Plan (Chapter 5)
- ☐ Streetscape and Open Space Plan (Chapter 6).

An EIR on the DRP was prepared in 1991 and adopted by the City Council in 1991 with certification of an Environmental Impact Report prepared on the Plan. The DRP was adopted as a specific plan (pursuant to California Government Code requirements) to implement policies in the downtown area. The 1991 EIR prepared for the DRP estimated that the development program established by the DRP would result in a total of 656 residential units, 990,000 gross square feet of office space and 1,329,257 gross feet of commercial retail space. Prior to the earthquake, the downtown area supported 311 housing units, mostly residential hotels containing single-room occupancy (SRO) units and approximately 1,130,00 square feet of retail space and 431,300 square feet of office space (EIP Associates, 1991, DEIR volume).

The DRP has been modified several times over the past 25 years with the most recent change in 2016 to relocate the downtown sign regulations from the DRP to Chapter 24 of the Zoning Code. Implementation of the DRP also included amendments to the Zoning Code. Specifically, DRP Chapter 4—Development Standards and Design Guidelines—is incorporated by reference in Part 24 of the Zoning Code, the Central Business District (CBD).

The City Planning and Community Development Department and the Planning Commission began review of the development standards for the Pacific Avenue Retail District and the Front Street/Riverfront Corridor at the request of the City Council in October 2014. The Planning Commission established two subcommittees to review and develop recommendations. The recommended amendments were forwarded to the City Council, and in October 2016, the City Council directed staff to initiate environmental review on the proposed amendments.

3.3 PROJECT OBJECTIVES

Section 15124 of the State CEQA Guidelines indicates that the EIR Project Description shall include a statement of the objectives sought by the proposed project. A clearly written statement of objectives will help the lead agency develop a reasonable range of alternatives to

evaluate in the EIR and will aid the decision makers in preparing findings or a statement of overriding considerations, if necessary. The statement of objectives should include the underlying purpose of the project.

The existing DRP includes a set of “first principles” intended to guide redevelopment of the downtown area. These principles address the appearance and height of buildings, new housing opportunities, accessibility and circulation, open space and streetscape, and parking.

The following are the project objectives provided by City staff.

1. Support the following First Principles of the Downtown Plan:
 - *Form and Character.* New buildings should be allowed to develop individual character while retaining qualities of the historic townscape. Issues of articulation, materials, signage, setbacks, scale, massing, form, bulk, solar access and height are critical.
 - *Housing.* Significant new housing opportunities should be targeted throughout the downtown, including Pacific Avenue, the San Lorenzo riverfront, and South of Laurel. Housing should be comprised of a mix of apartments and condominiums. SRO housing should be replaced and dispersed throughout the downtown area.
 - *Accessibility.* A downtown that aesthetically integrates access as a primary design criterion for all improvements to ensure increased opportunities for the public to participate in commercial, governmental, residential, social and cultural activities.
 - *Open Space and Streetscape.* A strong network of public and private open spaces (streets, sidewalks, public parks, plazas, passageways and courtyards) that creates a socially active and pedestrian-oriented downtown core should be emphasized.
 - *Circulation.* Downtown should be predominantly pedestrian in nature; movement should be carefully structured to reinforce the character of the place. Pedestrian, bicycle, and transit access to the downtown should be enhanced.
 - *Parking.* Parking in the downtown core should continue to be provided by the Parking District in a centralized fashion, to maximize shared use and minimize the quantity of stored vehicles.
2. Increase opportunities for all types of housing in downtown.
3. Encourage and incentivize maximum public access to the San Lorenzo River.
4. Achieve superior connections to the San Lorenzo River above the existing DRP and existing SLURP policies consistent with Section 30211 of the Coastal Act.
5. Ensure that development adjacent to the Riverwalk will be designed to prevent impacts to the adjacent sensitive San Lorenzo River and will incentivize clean-up of degraded areas along the levee.

6. Enhance opportunities to view and interact with the San Lorenzo River as a coastal resource.
7. Create development standards that will incentivize development of key east-west public passageways between Pacific Avenue and the Riverwalk.

3.4 PROJECT COMPONENTS

The proposed project consists of a series of amendments to the following adopted City plans and regulations:

- ☐ Downtown Recovery Plan: Amendment to extend Additional Height Zone A, modify Additional Height Zone B, and modify development standards
- ☐ General Plan 2030: Amendment to modify Floor Area Ratio for the Regional Visitor Commercial land use designation
- ☐ Local Coastal Plan (LCP): Amendment to Land Use Plan text to modify San Lorenzo Urban River Plan land use development policies
- ☐ Zoning Code sections: Amendment to Municipal Code Section 24.10, Part 24, Central Business District (CBD), of the Zoning Code to modify extension area regulations and add Parklet standards.

Each of these project components is further explained in the next section.

3.4.1 Proposed Plan and Zoning Code Amendments

Downtown Recovery Plan Amendments

The proposed DRP amendments include minor revisions to text, reorganization of text, elimination of outdated text, addition of new text and exhibits, and modifications to development guidelines and standards. The focus of the amendment is to expand the location of “Additional Height Zones” and revise the Chapter 4 Development Standards. The primary proposed modification would increase allowable building heights in the lower Pacific Avenue and lower Front Street areas between Cathcart and Laurel Streets and along the San Lorenzo River between Laurel and Soquel Avenue. According to the City, these changes were initiated to provide more opportunities for housing in the core of the downtown. Increasing densities in the downtown is consistent with the overarching objectives of the City to maintain a compact downtown with a dense urban core in exchange for retaining a greenbelt around the City. The DRP amendment also includes: modifications to the format of the original DRP with the creation of a Use Chart for ground level and upper level uses; consolidating language relating to design guidelines and development standards; and the renaming of the plan to eliminate the word “Recovery” from the title that was formerly associated with the post-earthquake reconstruction

that is now mostly complete. Key proposed changes are summarized in Table 3-1 and further described in the following sections. All DRP text revisions can be viewed on the City’s website at: <http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development/downtown-recovery-plan-amendments>.

Development Standards and Design Guidelines

Land Uses. The proposed amendments continue to support and promote mixed-use development opportunities within the DRP area, but references to specific sites have been eliminated, including references to potential residential development on city-owned parking lots along Cedar Street. The proposed Plan revisions do indicate that “the Plan encourages the most intensive development along Pacific Avenue and the Front Street/Riverfront corridor, where it can most benefit from shared parking and convenient transit, and where higher density development is most appropriate” with acknowledgement that there are opportunities for redevelopment of existing structures along lower Pacific Avenue and Front Street.

The proposed amendments consolidate former text on permitted uses into a new table that identifies permitted uses for both ground level and upper level uses for each of the four CBD subdistricts, as well as the required level of permit approvals for each use. This modification allows for easier reference to allowed uses and provides notes about particular uses. Neither the existing DRP nor the proposed amendments provide an exhaustive list of all potential and foreseen uses for the CBD subdistricts. The proposed DP does include more uses not mentioned in the original DRP, including required Community Care, Family Day Care and Supportive and Transitional Housing uses that are required by State Law. Ground level parking has been added as a conditional (or administrative use) along Front Street if certain criteria are met (provision of some public parking, garage doesn’t extend to street corners, one curb cut per garage). The proposed revisions include prohibition of marijuana dispensary facilities as a result of the passage of state Proposition 64, the ballot measure to allow personal recreational use of marijuana. The proposed DP also includes a provision that allows the Zoning Administrator to determine whether a proposed unlisted use would be considered similar in nature to other listed uses that support the objectives of the DP and the CBD.

Building Heights and Stepbacks. The primary change associated with the proposed amendment is to expand the area of “Additional Height” zones along lower Pacific Avenue and the River Street/Riverfront corridor. The proposed amendments would allow increases in allowable maximum building heights in three locations as shown on Figure 3-1 as described in the following sections. Additionally, the amendments propose an increase the base height along Pacific Street between Water and Laurel Streets from 50 to 55 feet and along the west side of Front Street.

TABLE 3-1: Summary of Key Proposed DRP Amendments

Chapter	Existing	Proposed
Introduction, Executive Summary, Chapters 1, 2 and 3	Downtown Recovery Plan	Revisions refer to the plan as Downtown Plan (DP), except where specifically referring to the original document.
	The 1989 Loma Prieta earthquake is the baseline for describing character of the CBD zone. Language indicating historic character or historic fabric of the CBD meant pre-1989 earthquake character.	Text has been modified to note that the City has had 25 years of post-earthquake development and recognizes that the CBD character has changed.
	Summary of the Plan Recommendations	Revised text clarifies that language reflects recommendations in 1991.
	References to flood improvements.	Updated to reflect improvements to the San Lorenzo River levee made since the Loma Prieta earthquake.
	Descriptions and boundaries of the four CBD subdistricts - Pacific Avenue Retail, Front Street / Riverfront Corridor, Cedar Street Village Corridor, and North Pacific.	The general descriptions of the purposes and character of these four areas remain the same. The height map is moved to Chapter 4 with the other Development Standards.
	Reference and description of the High Density Overlay (HDO) District.	Text eliminated as the HDO District was repealed in 2016.
Chapter 4	The DRP was formatted to describe allowable uses for each of the four CBD subdistricts, including by ground floor and upper floor uses, written in paragraph form.	Reorganizes the allowable uses for all the CBD districts into a table format, similar to the Citywide Zoning Ordinance update format that will be more consistent with all zoning districts in the future. Adds two tables: one for ground level uses and one for upper floor uses.
	Prohibited uses are listed within Chapter 4 of the Plan. The Plan also includes a list of amortized uses that are to be phased out by October 2020.	Adds Medical and Recreational marijuana service providers to the list of prohibited uses within the Central Business District. No change is proposed for the types of uses that are listed to be phased out of the CBD by October 2020.
	Existing “Additional Height Zones” are located generally north of Cathcart and west of Front Street.	Expands zones of additional height to areas along lower Pacific Avenue and lower Front Street.
Chapters 5, 6 and 7	Circulation-Parking, Open Space-Streetscape and Implementation	No revisions to Chapters 5, 6 and 7 are proposed with this update.
Appendices	Appendix 3 – Sign Regulations	Appendix 3 – Downtown Sign regulations previously were moved to the Zoning Code, Chapter 24.12.
	5 – Floor Area Ratio (ordinance)	Appendix 5 – Floor Area Ratio ordinance appendix deleted as it is now identified in the General Plan 2030.
	6 – Additional Height Zone C (specific to upper Pacific Avenue)	Appendix 6 – The Additional Height Zone C is integrated with Additional Height Zone A in Chapter 4.
	7 – Live Entertainment (ordinance)	Appendix 7 – Live Entertainment ordinance is in the Zoning Code Chapter 24.
List of Maps and Diagrams	Land Use Concept	Land Use Concept remains unchanged.
	Height Housing Zone A – Additional Height Standards Zone B – Additional Height Standards	Height Map relocated to Chapter 4. Housing Map deleted as it represented the High Density Overlay Zone that is obsolete with the General Plan 2030. Additional Height Zones A and B are in Chapter 4.

- ❑ *Additional Height Zone A – to 75 Feet:* The proposed amendment would extend the existing “Additional Height Zone A” to the area along Pacific Avenue between Cathcart Street and Laurel Street and to the area along the west side of Front Street between Cathcart Street and Soquel Avenue. Additional Height Zone A, which currently is applied to Pacific Avenue north of Cathcart, would allow building heights to 75 feet on sites 15,000 to 50,000 square feet in size. Current allowable heights for these areas are 50 to 60 feet. The proposed change also reduces the minimum property size to which the additional height may be applied from 20,000 to 15,000 square feet.
- ❑ *Additional Height Zone A - to 85 Feet:* The proposed amendment would establish a maximum height of 85 feet in Additional Height Zone A for the area between the east side of Pacific Avenue and the west side of Front Street (between Cathcart and Laurel) and on the west side of Front Street between Cathcart and Soquel Avenue for projects on aggregated parcels larger than 50,000 square feet.
- ❑ *Additional Height B - to 70 Feet:* The proposed amendment changes the “Additional Height Zone B¹” to cover properties located on the east side of Front Street between Soquel Avenue and Laurel Street. The amendment would allow additional heights to 70 feet over the base height limit of 50 for properties larger than 15,000 square feet in size. The DRP amendments performance criteria is provided that requires recessed building breaks, skyline architectural variation and integrated rooftop design.

Uninhabitable mechanical penthouses continue to be permitted to exceed the maximum building height (to a maximum height of 65 feet, except 60 feet for the Front Street/Riverfront corridor) with a 15-foot setback, which is reduced from the 25-foot setback in the current plan.

The proposed amendments also modify upper floor stepback requirements. A stepback is generally an upper floor setback from the edge of the building to help break up building mass. The proposed amendments would change the existing upper level 42 or 52 degree stepback standard to standard that would allow a certain percentage of a site to have heights over a specified limit. According to City staff, this “volumetric approach” is intended to ensure both vertical and horizontal building variation to avoid monolithic structures.

- ❑ For sites that are eligible for additional height in Additional Height Zone A, the footprint of portions of the building at or below 55 feet shall be at least 40% of the total site area; portions of the building footprint above 55 feet to a height of 75 feet may comprise up to 60% of the site area. For assembled sites greater than 50,000 square feet, buildings may achieve an 85-foot height for up to 20% of the total area in the area proposed for this additional height allowance. Figure 3-2 provides a schematic that shows proposed distribution of building height on different size sites.

¹ The existing Additional Height Zone B consists of two areas along Pacific Avenue that are now included in the proposed expansion of Additional Height Zone A. The existing Additional Height Zone C at the northern end of the DRP area is now included into Additional Height Zone A.

Along Pacific Avenue, portions of buildings that exceed the maximum base height of 55 feet may occupy up to 55% of the length of the property line along the street or 200 feet, whichever is less. Any additional height above the base height must be set back from the building wall by at least 15 feet. An example of the potential distribution of height that is included in the proposed revised Downtown Plan is shown on Figure 3-3.

Along Front Street, portions of buildings that exceed the maximum base height of 55 feet may occupy up to 60% of the length of the property line along the street or 180 feet, whichever is less with the proposed amendment. Any additional height above the base height must be set back from the building wall by at least 15 feet.

- ❑ For the Front Street/Riverfront Corridor, the proposed amendments require a minimum 10-foot setback from Front Street for development above 50 feet in height and at least 50% of the building frontage along Front Street and Soquel Avenue shall have a 10-foot setback for development above 50 feet (See Figure 3-4). Along the west side of the Riverwalk, a 10-foot setback from the exterior building face would be required for development above 50 feet. The proposed amendments allow up to 25% of the Riverwalk building frontage to encroach into the required 10-foot setback area to provide massing variation. See Figure 3-4, which depicts heights and setbacks along Front Street and adjacent to the San Lorenzo River. The proposed amendments also permit top floor cantilevered portions of the building to encroach over the property line a maximum of 5 feet in order to provide architectural interest to the façade, which shall not exceed 25 percent of the total building frontage along the riverfront.
- ❑ Along Laurel Street, Cathcart Street and Soquel Avenue, portions of buildings that exceed the maximum base height of 55 feet may occupy up to 60% of the length of the property line or 150 feet, whichever is less. Any additional height above the base height must be set back from the building wall by at least 15 feet.
- ❑ Along the Maple Street extension to Front Street, the proposed amendment requires the building frontage to be stepped back by 10 feet above a height of 50 feet. In addition to the 'build to' line, the Maple Street building face shall incorporate at least one recessed break, open to the sky, no less than 25 feet wide and no less than 10 feet in depth from Maple Street (see Figure 3-4).

Development Standards and Design Guidelines. The proposed amendments reorganize and combine Guideline language with Development Standard language in Chapter 4 with generally minor text revisions. A new section has been added that consolidates requirements and performance criteria for Additional Height areas, and another new section provides consolidated Storefront Standards and Guidelines that are applicable to the entire CBD zone. A new standard has been added that requires new development to provide for public passageways between the Riverwalk and Front Street at or near the extension of along Cathcart Street, Elm Street and Maple Street.

Tables 3-2 and 3-3 summarize changes in development standards and design guidelines for the Pacific Avenue Retail District and Front Street/Riverfront Corridor, respectively.

Other DRP Text Revisions

The proposed DRP amendments includes other revisions, including removing references to the High Density Overlay (HDO) District, which was repealed in 2016 due to redundancy with the adopted *General Plan 2030* and Housing Element. The HDO had been adopted for the Pacific Avenue corridor between Water and Elm Streets, which provided density bonuses amounting to an additional 2.0 FAR for residential development within commercial mixed-use projects. The zone became obsolete with the adoption of the *General Plan 2030* in 2012 as the Regional Visitor Commercial land use designation (applicable to the downtown area) includes new floor area ratio (FAR) ranges that supersede the HDO district.

The Draft Plan includes language to require the sloped side of the river levee between the levee and the private property to be filled with earth to achieve a similar elevation between the Riverwalk and the adjacent private development for the purposes of encouraging more connections to the Riverwalk. The original DRP did encourage filling along the levee, but the proposed language makes this public objective a mandatory design feature for new development.

The proposed amendment would require any development along the west side of Front Street between Cathcart Street and Laurel Street to dedicate sufficient property to result in a sidewalk depth of at least 12 feet. Development along Laurel Street between Pacific Avenue and Front Street would also require a setback to result in at least a 12 foot sidewalk. Additionally, specific parcels are identified and standards provided for future pedestrian extensions from Elm Street and Maple Street to Front Street and the San Lorenzo River. Buildings fronting the 10-foot Maple Street alley between Pacific Avenue and Front Street shall be set back 20 feet to provide for a 50-foot wide public paseo, lane or street. In recognition of this required dedication, the proposed amendment indicates that aggregated parcels meeting the size for additional height would not be required to provide on-site parking, but pay parking fees to the Downtown Parking District in lieu of meeting the on-site parking requirements. Specified properties are required to dedicate a 30-foot wide publicly accessible pedestrian connection as an extension of Elm Street between Pacific Avenue and Front Street, and the passageway shall be integrated into the design of the development.

TABLE 3-2: Summary of Pacific Avenue Retail District Development Standards

Standard	Existing	Proposed
Base Height	50 feet (maximum)	Increase to 55 feet (maximum)
Additional Height	Additional height not permitted south of Metro Center. 75' maximum height for properties eligible for additional height north of Metro Center. Project sites eligible for additional height must be at least 20,000 square feet in size.	Extend Additional Height zone south of Soquel Avenue to Laurel Street. Allow up to 60% of site area to be 75 feet in height and up to 20% of site up to 85' for eligible properties, subject to massing standards. Project sites eligible for additional height must be at least 15,000 square feet in size.
Uses within Additional Height Zone.	Maximum of 5 levels of commercial and 5 levels of residential above 1 level of required pedestrian-oriented ground level commercial.	Allow 6 levels of residential development above 1 level of required pedestrian-oriented ground level commercial.
Additional Height Stepbacks on Pacific Avenue	On west side, setback above 50' to create 42° solar access plane to opposite sidewalk. On east side setback so that no more than 30% of additional height is visible.	Replace terraced stepbacks with volumetric massing standards that avoid large monolithic buildings. Limit additional height to: a footprint no greater than 60% of the total site area with two-story variation between building masses.
Additional Height Stepbacks on East-West Streets	Setback above 50' to create 52° solar access plane to opposite sidewalk.	Limit additional height to • a maximum of 55% of Pacific Avenue frontage or 200' whichever is less, • 60% of east-west street frontages or 130', • 60% of Front Street frontages or 180', • and 50% of the Maple Avenue Paseo frontage. Provide recessed space with 15' minimum depth and 25' width to distinguish between volumes. Treat this recessed space in a manner that creates a positive pedestrian/streetscape environment.
Additional Height Stepbacks on Front Street	Not applicable. Maximum height along Front Street is 50'.	
Public Connections between Pacific Ave and Front St.	No specific requirements. All buildings are built to the property line of the street with some exceptions. No interior side yard setbacks stipulated.	Require all new development to physically dedicate and/or to make a fair share financial contribution to the creation of publicly accessible connections along or near the extension of Maple (50 feet) and Elm (40 feet) Streets. Require upper level stepbacks of 10 feet above 50 feet. A recessed break, open to the sky, is required along Maple Street of no less than 25 feet in width with a depth of at least 10 feet.

TABLE 3-3: Summary of Front Street/Riverfront District Development Standards

Standard	Existing	Proposed
Base Height	50' (max)	No change to maximum base height.
Uses within Base Height:	3 floors of commercial or 3 floors of residential above 1 level of commercial.	No change for buildings within the base height.
Additional Height	Additional height not permitted south of Metro Center.	Establish Additional Height Zone B, between Soquel Avenue and Laurel Street. Allow buildings up to 70 feet for properties that meet specific Performance Criteria that promote high quality public access to the river, appropriate treatment of the riverfront edge and commitment to manage and maintain riverfront open space.
Ground Level Uses	Commercial uses required along Front Street.	Add live-work as a permitted ground level use along Front Street.
Building Stepbacks	Any development above 35' is required to step back at least 10' from the street.	Require at least 50% of Front and Laurel Street frontages to step back by 10 feet above a height of 50 feet. Require a stepback of 10 feet above 50 feet on frontages facing the Riverwalk. Buildings Adjacent to River Street, east-west streets, and publicly accessible passageways shall step back at least 10 feet from the street for any height above 35 feet.
Upper Level Standards	Not specified in current plan.	Require top floor area to not exceed 60% of the site area if the project includes a publicly accessible passageway to the river. If no passageway is included within the project, require the top floor to not exceed 60% of the floor area below.
Public Connections to River	No specific standard. Guidelines ask for pedestrian access between Front Street and the Riverwalk.	Require all new development to physically dedicate and/or to make a fair share financial contribution to the creation of publicly accessible connections along or near the extensions of Cathcart, Maple and Elm Streets, at widths of 60, 50 and 40 feet respectively.
Building Length	No standard.	Limit building to 250' of lineal street frontage. A minimum 30' break between buildings must be provided.

General Plan 2030 Amendment

The existing General Plan 2030 was updated and adopted by the City Council in June 2012. The proposed General Plan amendment would revise General Plan text to increase the upper level of permissible floor area ratio (FAR) for the Regional Visitor Commercial (RVC) land use designation in the downtown area from 3.5 to 5.0². (See Appendix C for text revision.) The RVC designation currently is applied to all of the area within the boundaries of the DRP.

The purpose of this modification is to reflect the changes to the Additional Height Zone A in the Downtown Plan, which would allow for a potential height of up to 85 feet for a portion of a development site that meets the criteria for additional height under the proposed DRP amendment. While the FAR is proposed to be modified, no changes to underlying zone districts are proposed.

Local Coastal Plan Amendments

A portion of the downtown and project study area lies within the coastal zone. Pursuant to the California Coastal Act, the City has a Local Coastal Plan (LCP) that was certified by the California Coastal Commission (CCC). The LCP consists of a land use plan, implementing ordinances and maps applicable to the coastal zone portions of the City, and applies to all private and public projects located within the coastal zone. The Land Use Plan consists of: text; policies, programs and maps; Area Plan coastal policies and maps; and a Coastal Access Plan. The Implementation Plan consists of ordinances and regulations used to implement the Land Use Plan, including sections in the Zoning Code. The City is in the process of updating and revising the LCP Land Use Plan as a separate document from the General Plan. The LCP applies to private and public projects located within the coastal zone.

Chapter 4 of the Downtown Recovery Plan is incorporated by reference in the CBD zone district, and the district is part of the implementation section of the LCP. Thus, revisions to the DRP Chapter 4 require review and approval by the California Coastal Commission as part of an LCP amendment.

In addition to the development standards of Chapter 4, there are several LCP policies that are proposed to be modified. Since the original certification of the City's LCP in 1985, additional plans have been prepared and policies incorporated into the LCP as amendments. The City adopted the San Lorenzo Urban River Plan (SLURP) in 2003 as a resource management protection plan for the river. Subsequent to the City Council approval, several resource-related and land use policies were included in the LCP and approved by the CCC as an amendment to the City's LCP. There are nine coastal policies based on the SLURP that pertain to development along

² FAR is the gross floor area permitted on a site divided by the total net area of the site. For example, on a site with 10,000 net sq. ft. of land area, a FAR of 1.0 will allow a maximum of 10,000 gross square feet of building floor area to be built. On the same site, a FAR of 3.5 would allow 35,000 sq. ft. of floor area,

Front Street within the coastal zone. The proposed amendment would modify one policy, eliminate the other existing eight policies, and add two new LCP policies. The LCP policies proposed for deletion address maintenance of 50-foot building heights along Front Street, provision of public amenities, and building architecture. Appendix C lists the policies proposed for deletion with an explanation provided by City Planning Department staff.

The proposed new LCP SLURP policies are:

- ☐ Require new development projects to incorporate design features that encourage active engagement with the Riverwalk such as: filling adjacent to the Riverwalk and landscaping, providing direct physical access to the Riverwalk, including appropriate active commercial and/or residential uses adjacent to the Riverwalk, or providing a combination of these and/or other design features that support the resource enhancement and river engagement policies of the San Lorenzo Urban River Plan.
- ☐ Require new development projects to incorporate pedestrian and/or bicycle connections between Front Street and the Riverwalk at appropriate locations such as the extensions from Maple Street and near Elm Street.

Zoning Code Amendments

The project includes amendments to Part 24 of the Municipal Code, Commercial Business District that is part of the Zoning Code. Minor text revisions are proposed in several sections as shown in Appendix C, and the two primary changes relate to outdoor extension areas and parklets:

- ☐ Municipal Code section 24.10.2340, Extension Areas. The proposed amendment specifies that this section is applicable to the Central Business District and to properties to the San Lorenzo Riverwalk as areas for outdoor restaurant and business extension in order to enhance the pedestrian ambiance of the downtown and the San Lorenzo Riverwalk, by introducing uses attractive to pedestrians into the pedestrian environment, configured and arranged in ways which activate and enliven the public streets and the San Lorenzo Riverwalk.
- ☐ Municipal Code section 24.10.2341, Parklets. The proposed amendments add a new section that regulates construction of “parklets”. The purpose of parklets is to enhance the pedestrian ambiance of the CBD zone district by creating useable outdoor spaces that encourage a sense of community and that provide a tool for economic development. The new sections include requirements for design, construction and operation.

3.4.2 Potential Buildout with Proposed Amendments

Adoption of the proposed plan and code amendments would not directly result in development, and the proposed amendments do not include site-specific development. However, the proposed amendments would expand and specify the geographical areas in which increased

building heights may be allowed, which could result in additional building floors as part of future redevelopment in the area. Therefore, the amendments could lead to reasonably foreseeable indirect physical changes in the environment.

City Planning Department staff developed an estimate of potential buildout without and with the proposed amendments for the purpose of identifying and evaluating potential indirect environmental impacts resulting from new development that could be accommodated by the project. The affected area was divided into three segments as shown on Figure 3-6 to include the Riverfront area, the area between the east side of Pacific and Front Street, and the area to the west of Pacific Avenue. City staff identified broad development assumptions for these areas, which are included in Appendix D.

Table 3-4 at the end of this section summarizes potential development based on City staff estimates. The proposed amendment to expand the existing “Additional Height Zones” could result in a net increase of approximately 711 residential units and approximately 2,200 square feet of office space with a net decrease of approximately 14,700 square feet of commercial building space over existing conditions within the study area. In comparison, City staff estimates that potential redevelopment under the adopted *General Plan 2030* without the proposed DRP amendments could result in a net increase of approximately 437 residential units with a decrease of approximately 24,000 square feet of commercial and 5,000 square feet of office uses.

At this time there are no development applications currently pending before the City. However, there have been development inquiries and discussions between private developers and City staff. The Santa Cruz Metropolitan Transit District also had been pursuing a mixed-use transit, parking, and residential project on the downtown Metro Station site, but there are no current project plans for this development.

3.5 PROJECT APPROVALS & USE OF EIR

As indicated in the Section 1.0, Introduction, the EIR is an informational document for decision makers. The EIR includes a “program-level” analysis. As defined by the State CEQA Guidelines section 15168, a Program EIR is prepared for a series of actions that can be characterized as one large project and are related geographically, by similar environmental effects, as logical parts in the chain of contemplated actions, or in connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program.

The City of Santa Cruz is the lead agency and responsible for approving the proposed amendments to the DRP, General Plan and LCP. After certification, this EIR may be used by the City as a “first tier” document for later projects as authorized by section 15183 of State CEQA Guidelines. Reviews of later projects under this provision would be required to consider any project-specific impacts that were not adequately addressed in this EIR. The specific later

projects are not known at this time, but could include, for example, site-specific development projects.

For later individual projects proposed in the areas covered by the plans and amendments covered in this EIR, the City will determine whether the individual project or subsequent activity is within the scope of this Program EIR, meaning it is an activity within the same project as analyzed in the program EIR or within the same geographic area encompassed by the program EIR. Depending on the City's determination, including whether new effects could occur or new mitigation measures would be required, the analysis for later projects could range from no new CEQA document to a new EIR. The City potentially could apply one or more CEQA "streamlining" tools when it considers later projects, such as the focused analytical routes offered under Public Resources Code sections 21155.2 and 21083.3 and CEQA Guidelines sections 15152, 15182, 15183, and 15183.3. If appropriate and applicable to a proposed project, the City may also consider one or more statutory or categorical exemptions.

Other public agencies that have review or approval authority of the project include:

- ☐ California Coastal Commissions: Approval of LCP amendment

TABLE 3-4: Potential Development/Buildout Assumptions with Downtown Plan Amendments

	Area X Riverfront	Area Y E. Pacific/W. Front Pacific Station	Area Z W. Pacific	Totals	Change from Existing Conditions (Includes demolition and reconstruction)
Baseline/Existing Conditions					
Property Area	146,000 sf (3.35 acres)	222,200 sf (5.10 acres)	148,800 sf (3.42 acres)	517,000 sf (11.87 acres)	N/A
Commercial	62,000 sf	74,864 sf	182,836 sf	319,700 sf	N/A
Office	N/A	56,105 sf	65,761 sf	121,866 sf	N/A
Residential	N/A	113 units	56 units	169 units	N /A
Parking	164 spaces	186 spaces	97 spaces	447 spaces	N /A
Buildout Assumptions with Proposed Downtown Plan Amendments (Units are totals, reflecting both demolition and reconstruction)					
Commercial	73,171 sf	47,000 sf	184,836 sf	305,007 sf	-14,693 sf
Office	18,296 sf	40,000 sf	65,761 sf	124,057 sf	+2,191 sf
Residential	321 units	483 units	76 units	880 units	+711 units
Parking	397 spaces	1,924 spaces	117 spaces	2,438 spaces	+1,991 spaces

SOURCE: City of Santa Cruz Planning and Community Development Department

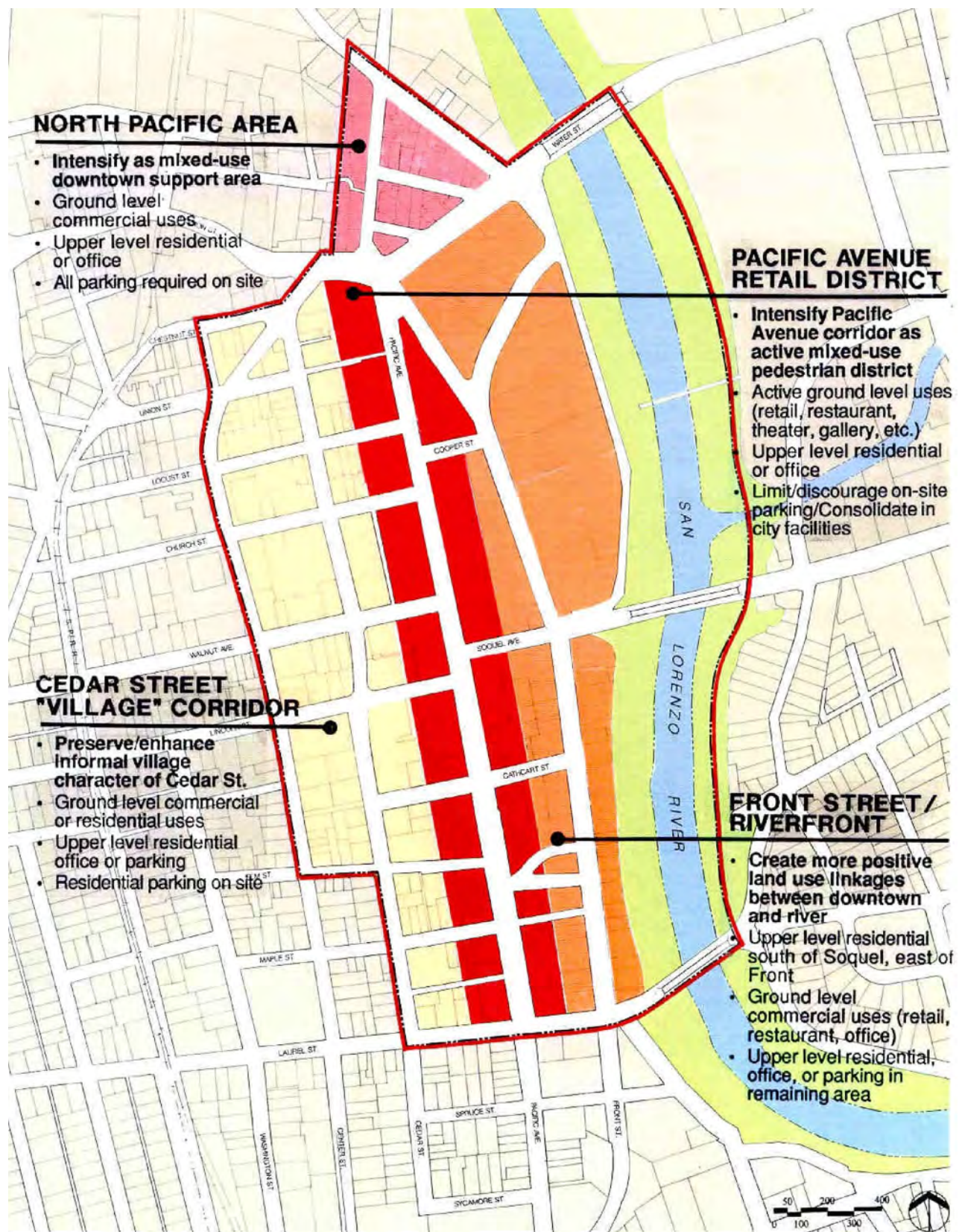


SOURCE: Bing Maps (accessed 2017)

DUDEK

City of Santa Cruz Downtown Plan Amendments EIR

**FIGURE 1-1
Project Location**



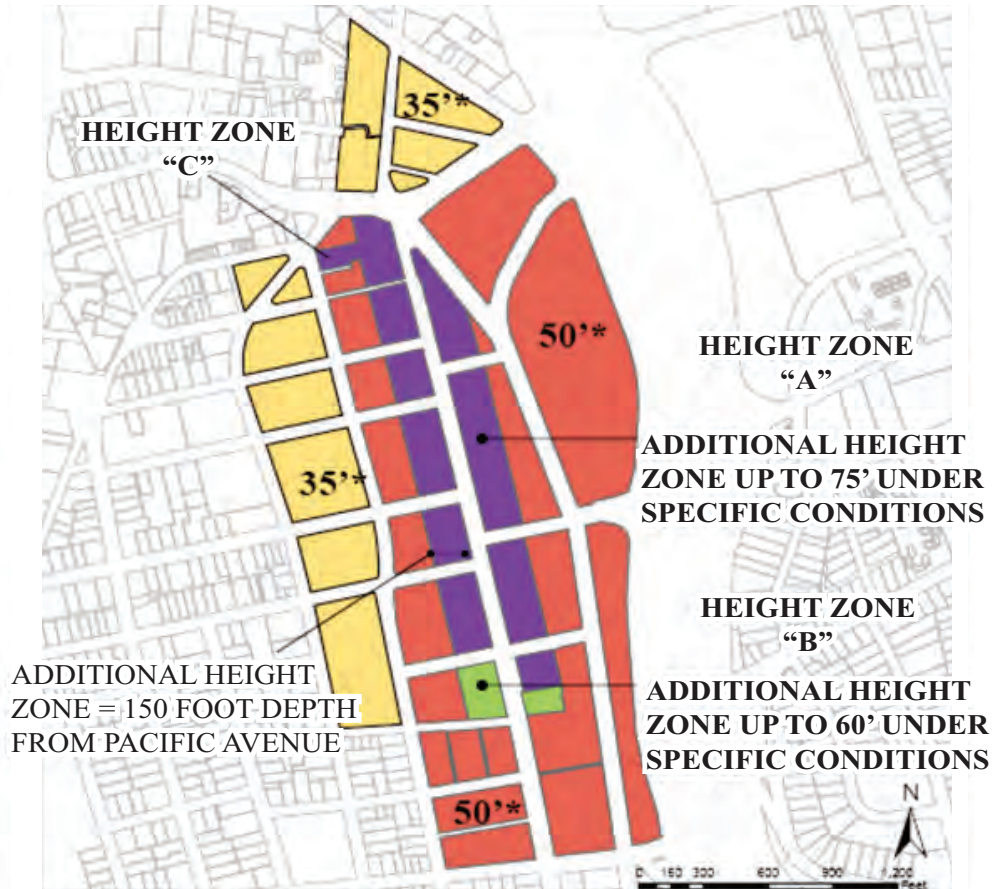


SOURCE: Bing (accessed 2017), County of Santa Cruz

FIGURE 2-1
Lower Downtown Project Study Area

City of Santa Cruz Downtown Plan Amendments EIR

Existing Additional Height Zones



Proposed Additional Height Zones

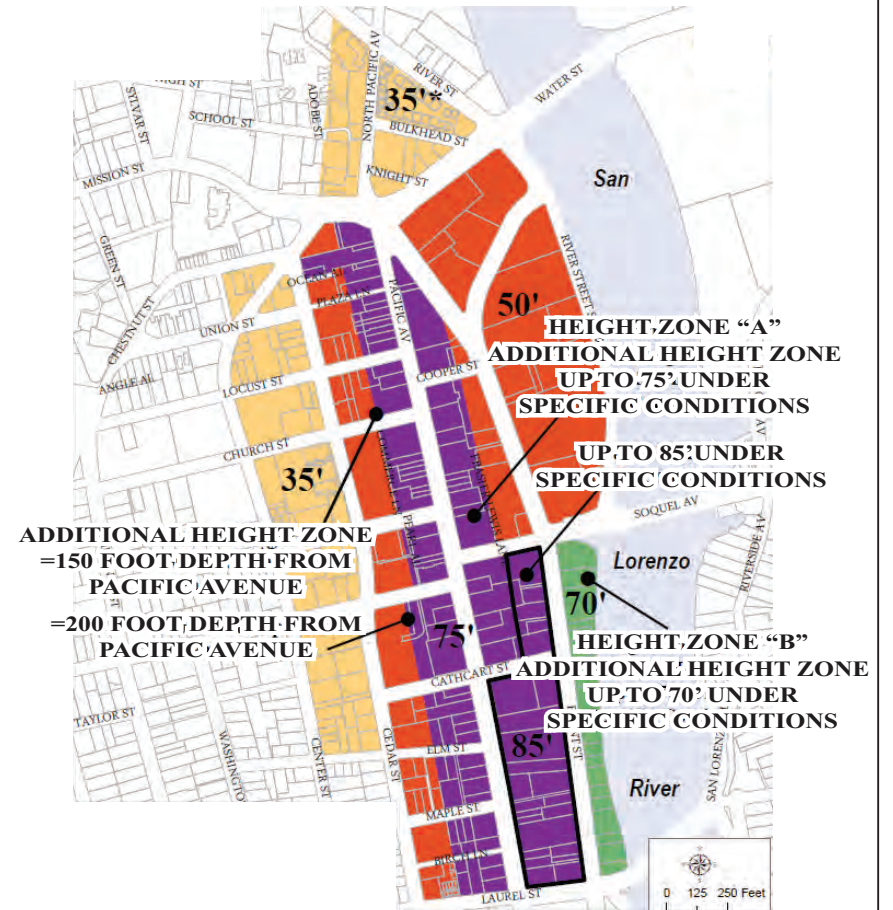
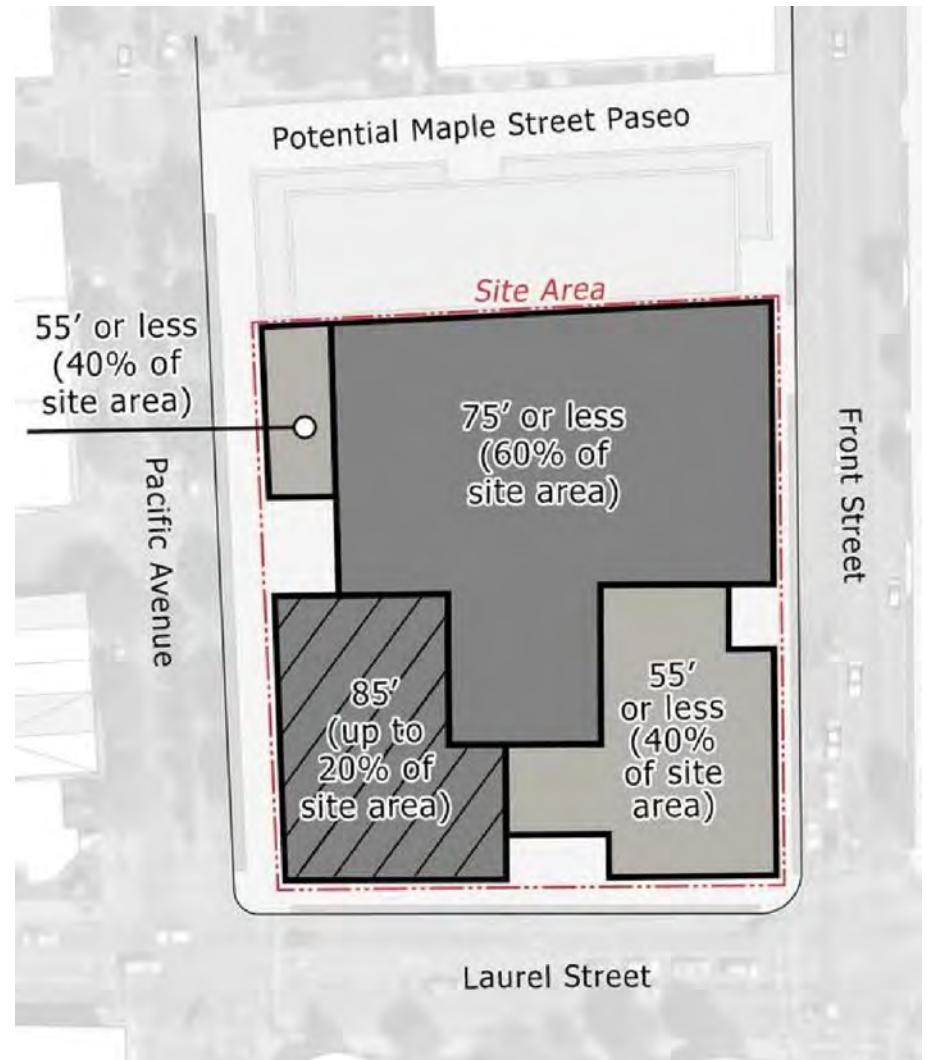


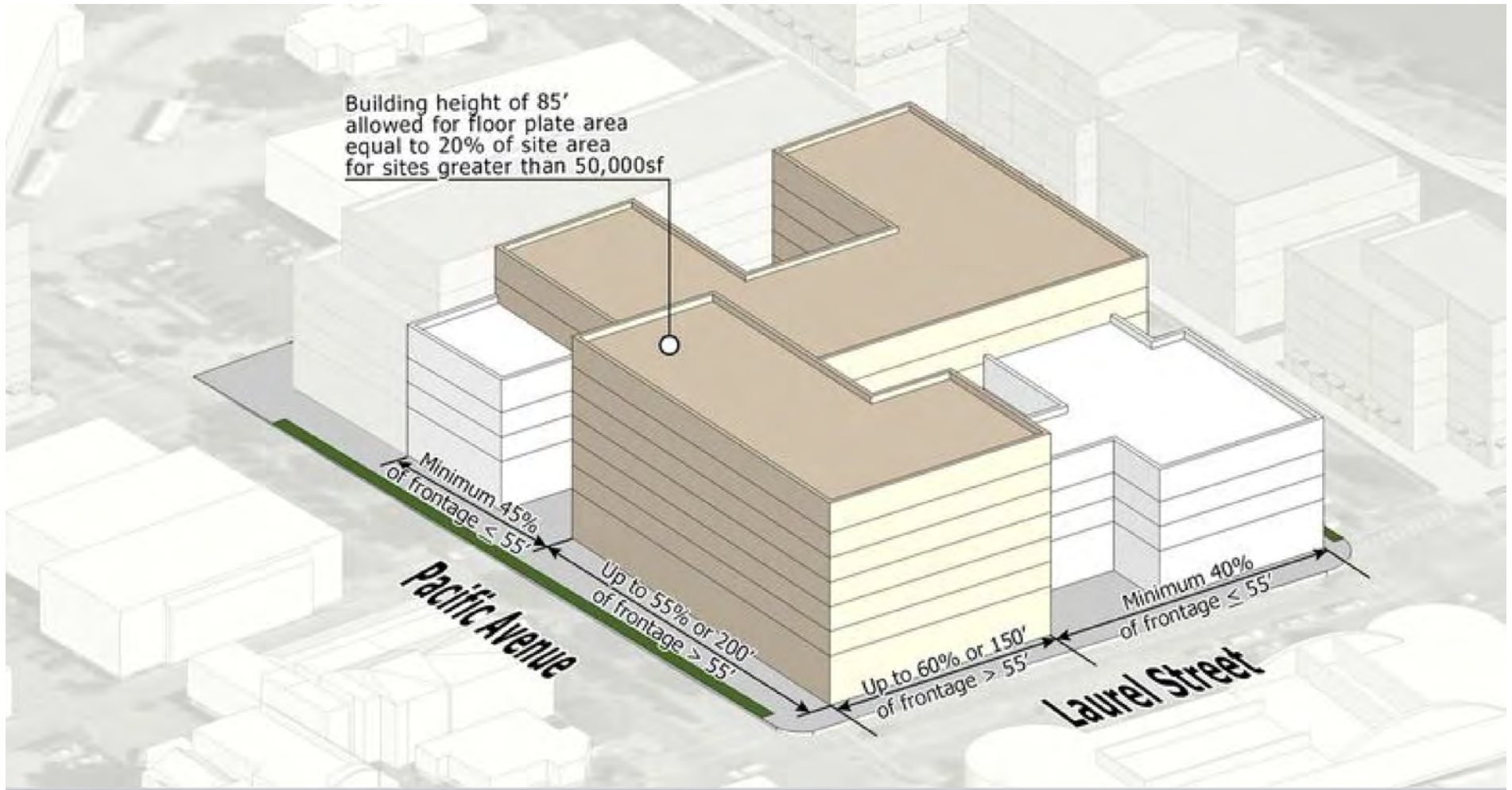
FIGURE 3-1
Existing and Proposed Additional Height Zones

**Proposed distribution of additional height
for sites 15,000~ 50,000 sq. ft.**

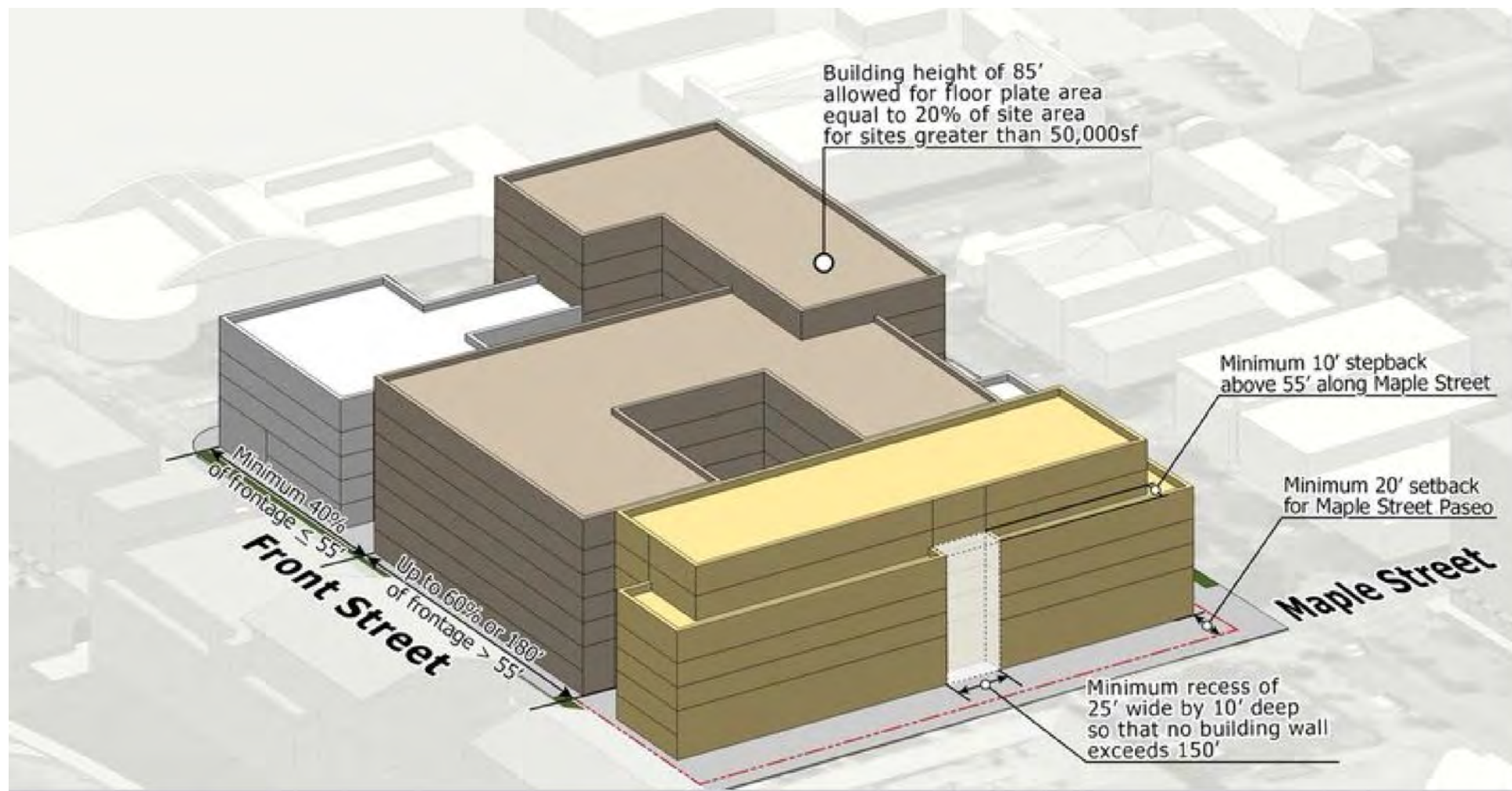


**Proposed distribution of additional height
for sites larger than 50,000 sq. ft.**

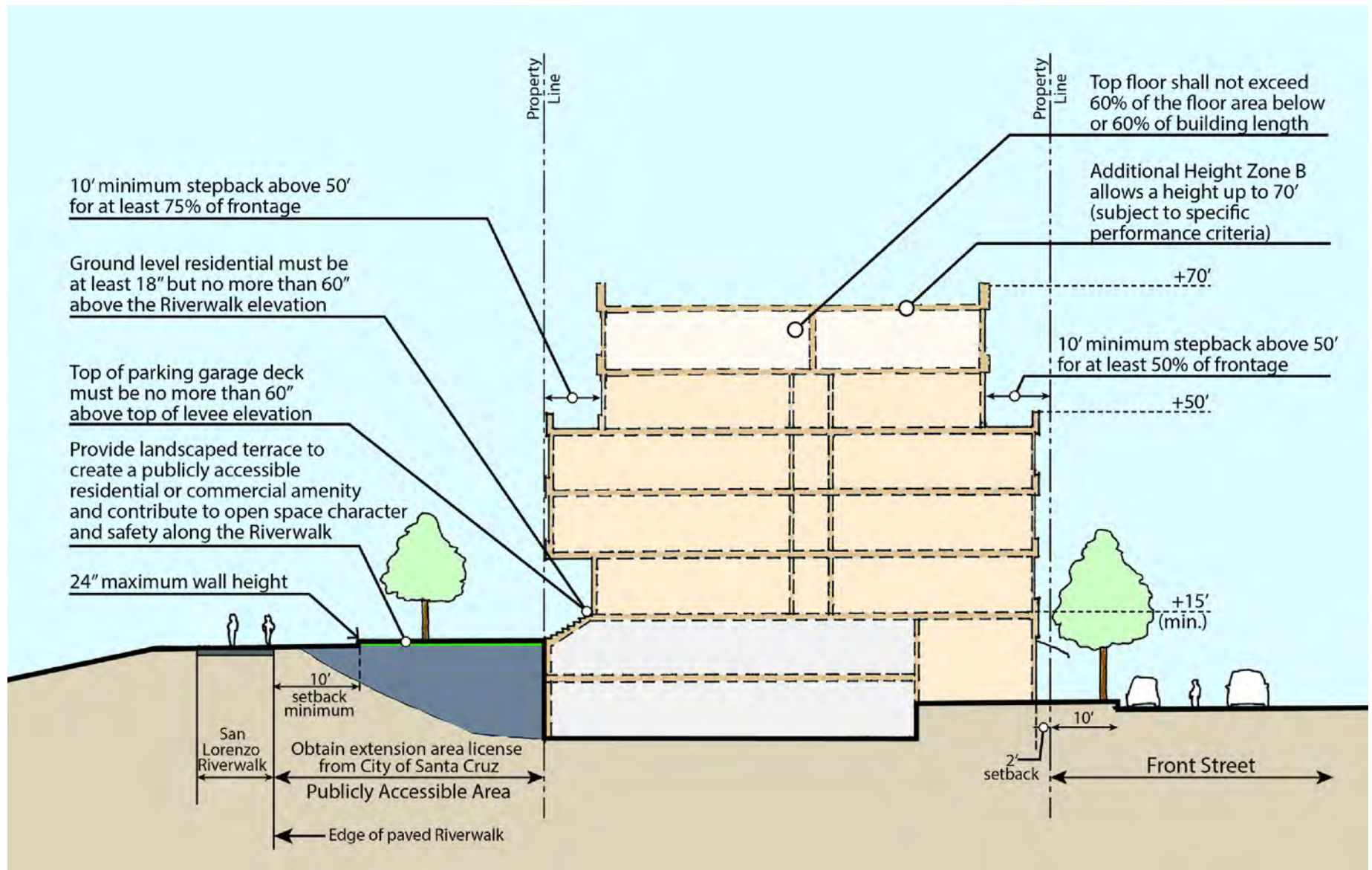




Example of possible distribution of frontage heights along Pacific Avenue and Laurel Street.



Example of possible distribution of frontage heights along Front Street and the Maple Street Paseo



SOURCE: City of Santa Cruz

FIGURE 3-5
Proposed Additional Height and Setbacks Along Front Street/Riverfront Corridor



CHAPTER 4

ENVIRONMENTAL EVALUATION INTRODUCTION

The following sections evaluate the environmental impacts of the proposed residential project:

- 4.1 Aesthetics
- 4.2 Air Quality & Greenhouse Gas Emissions
- 4.3 Biological Resources
- 4.4 Cultural Resources
- 4.5 Hydrology
- 4.6 Public Services and Utilities
- 4.7 Transportation and Traffic
- 4.8 Water Supply and Wastewater Treatment
- 4.9 Land Use

Each section in Chapter 4 generally follows the same format and consists of the following subsections:

- ❑ **ENVIRONMENTAL SETTING:** This section describes the existing physical environment and applicable laws and regulations relevant to a discussion of impacts in the topic category. The Environmental Setting sections provide a general overview of the existing conditions throughout the City related to the topic being addressed. Local, State, and federal regulations also are identified and discussed, when relevant.
- ❑ **ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES:** The Environmental Impacts and Mitigation Measures section identifies thresholds of significance used to evaluate whether an impact is considered significant, based on standards identified in or criteria derived from the California Environmental Quality Act (CEQA) and State CEQA Guidelines. In some cases, agency policies and regulations or professional judgment are used to further define CEQA standards of significance.

This section first identifies issues for which no impacts have been identified. The section then evaluates and analyzes significant or potentially significant project impacts, states the level of significance prior to mitigation, and proposes mitigation measures (in bold) that can reduce such impacts. A statement regarding the level of significance of each impact after mitigation follows the mitigation measures for that impact. For impacts found to be less than significant, mitigation measures are not required, but where relevant, the EIR recommends project modifications or appropriate conditions of approval.

INTENTIONALLY LEFT BLANK

4.1 AESTHETICS

This section analyzes impacts of the proposed project related to aesthetics based on a visual assessment conducted as part of the preparation of this EIR, which includes consideration of photo simulations prepared for the City Planning and Community Development Department by McCann Adams Studio. This section also draws from the City of Santa Cruz *General Plan 2030* EIR (SCH#2009032007), which was certified on June 26, 2012, regarding background information on aesthetics and scenic views. The General Plan EIR is available for review at the City of Santa Cruz Planning and Community Development Department (809 Center Street, Room 107, Santa Cruz, California) during business hours: Monday through Thursday, 8 AM to 12 PM and 1 PM to 5 PM. The General Plan EIR is also available online on the City's website at: <http://www.cityofsantacruz.com/departments/planning-and-community-development/general-plan-2030>.

Public and agency comments related to visual impacts were received during the public scoping period in response to the Notice of Preparation (NOP). Issues raised in these comments include:

- ☐ Concerns were raised regarding potential impacts of the proposed new height standards along Front Street and to public views along the Riverwalk and adjacent public recreational facilities.
- ☐ The CEQA analysis should include a visual resource analysis that includes visual simulations from all appropriate public vantage points, including from both sides of the Riverwalk, the Soquel Avenue and Laurel Street bridges, and San Lorenzo Park.
- ☐ Story poles should be erected along the river levee to assess visual impacts of the heights of new buildings.
- ☐ The EIR should evaluate alternatives to the proposed new height standards that meet most of the project objectives but also reduce potential aesthetic impacts.

To the extent that issues identified in public comments involve potentially significant effects on the environment according to the California Environmental Quality Act (CEQA) and/or are raised by responsible agencies, they are identified and addressed within this EIR. Public comments received during the public scoping period are included in Appendix B.

4.1.1 Environmental Setting

Regulatory Setting

There are no known federal regulations regarding aesthetics or project design review. City regulations and permits related to development and design standards are summarized in the following section.

In 2013, Senate Bill 743 was passed that changed CEQA as codified in California Public Resources Code section 21099, which became effective in January 2014. Under this law, projects located

within one-half mile of a major transit stop or facility are considered “transit-oriented development”. Pursuant to section 21099(d)(1), aesthetic and parking impacts of a residential, mixed-use residential, or employment center project on an infill site within a transit priority area shall not be considered significant impacts on the environment. Section 21099(d)(2)(A) further indicates that this subdivision does not affect, change, or modify the authority of a lead agency to consider aesthetic impacts pursuant to local design review ordinances or other discretionary powers provided by other laws or policies. This change does not affect the analysis of the proposed Downtown Plan amendments as the aesthetics issue exemption does not apply to plans, but it could apply to future CEQA analyses of specific development projects.

City Regulations and Permits

Zoning Regulations

Chapter 24.12 of the City of Santa Cruz Zoning Code provides community design standards related to site layout, parking, landscaping, fencing and other design features. The Zoning Code (Municipal Code section 24.22.162) defines building height as the vertical distance from average grade to the average midpoint of the highest pitched roof. Section 24.12.150 of the Zoning Code indicates that the height limitations do not apply to roof structures for the housing of elevators, stairways, tanks, ventilating fans, air conditioning, or similar equipment used solely to operate and maintain a building.

The Central Business District (CBD) zone (Municipal Code Chapter 24.10, Part 24) implements the Land Use Plan, Development Standards and Design Guidelines of the Downtown Recovery Plan (DRP). It supports the purpose of the Plan, in the context of the General Plan, which aims to make downtown the urban center of the city, with the many functions a city center serves. This section of the Zoning Code is also part of the Local Coastal Implementation Plan. Section 24.10.2301, Uses, Development Standards and Design Guidelines, also adopts by reference and includes Chapter 4 of the DRP, as amended, in the CBD zone district. This section indicates that the policies and regulations set forth in Chapter 4 of the DRP shall control all uses in the CBD, Central Business District, and its four subdistricts: Pacific Avenue Retail District; Front Street Riverfront Corridor; Cedar Street Village Corridor; and North Pacific Area.

Chapter 4 of the DRP identifies land uses, development standards and design guidelines for each of the four subdistricts. Elements addressed include:

- ☐ Building heights
- ☐ Building massing and setbacks
- ☐ Building façade guidelines, including window treatments, roofs, building materials, colors and landscaping
- ☐ Storefront guidelines
- ☐ Pedestrian passages and courtyards

Chapter 4 also allows additional height above the 50-foot base feet under certain conditions with a requirement that a detailed visual analysis of the proposed building be prepared to determine the visual impact of the development. See Figure 3-1 in Section 3, Project Description, which shows the existing areas where additional building height may be allowed.

Required Permits

Design Permit. The City’s Zoning Code requires a “design permit” for most new construction in the City of Santa Cruz, including new construction of commercial structures and multiple dwellings containing three or more dwelling units. The purpose of the design permit is to promote the public health, safety and general welfare through the review of architectural and site development proposals and through application of recognized principles of design, planning and aesthetics and qualities typifying the Santa Cruz community. Pursuant to the Design Permit requirements (Zoning Code Section 24.08.430), findings must be made that address 17 identified criteria before the City issues a design permit. Chapter 24.12 of the Zoning Code provides “Community Design Standards” that address general site design standards, parking, advertising and signs, underground utilities, historic preservation, and other provisions for specific uses. The criteria to be addressed in findings for a Design Permit include:

1. Consistency with physical development policies of the General Plan and Local Coastal Program (LCP), if located in the coastal zone.
2. Compatible exterior design and appearance with other existing buildings and structures in neighborhoods which have established architectural character worthy of preservation.
3. Respect design principles in terms of maintaining a balance of scale, form and proportion, using design components which are harmonious, and materials and colors which blend with elements of the site plan and surrounding areas.
4. Site planning that takes into account uses other than that of a proposed project.
5. Orientation and location of buildings, structures, open spaces and other features to maintain natural resources including significant trees, maintain a compatible relationship to and preserve solar access of adjacent properties, and minimize alteration of natural land forms.
6. Protection of views along the ocean and of scenic coastal areas, and where appropriate and feasible, restore and enhance visual quality of visually degraded areas.
7. Site layout to minimize the effect of traffic conditions on abutting streets.
8. Encourage alternatives to travel by automobile where appropriate, through the provision of facilities for pedestrians, bicyclists, and public transit.
9. Provision of open space and landscaping which complement buildings and structures.
10. Reasonably protect against external and internal noise, vibration and other factors which may tend to make the environment less desirable and respect the need for privacy of adjacent residents.
11. Provision of complementary signs.

12. Structural designs to take advantage of natural elements such as solar radiation, wind, and landscaping for heating, cooling and ventilation.
13. Incorporation of water-conservation features and landscaping.
14. Reuse of heat generated by machinery in industrial zones.
15. Design of buildings in industrial zones to make use of natural lighting wherever possible.
16. Solar heating systems for hot tubs and swimming pools.
17. Compatible siting and design along West Cliff Drive streetscape.

Planned Development Permit

The Planned Development Permit (PD) regulations in the Zoning Code (24.08.720) allow a variation in height not to exceed one story or 20 percent of height limit (in feet) above what is allowed in the district in which the project is located, with approval of a Planned Development Permit. Properties must be 20,000+ square feet in size and meet other requirements for the additional height to be considered. Five findings must be made with the approval of a Planned Development Permit related to consistency with the General Plan, LCP, and other regulations; variations that serve public purposes and are coordinated with surrounding development; and provision of amenities. Overall, the amenity level of the development and the amount of open space shall be greater than what would have been permitted by the underlying district regulations.

Study Area

The project area consists of the area covered by the Downtown Recovery Plan and the Central Business District zone, and specifically the lower downtown area generally between Soquel Avenue and Laurel Street on the north and south, and Cedar Street and the San Lorenzo River on the west and east. (Locations are shown on Figures 1-2 and 2-1 in Section 3, Project Description.) The proposed project includes a General Plan amendment to the land use designation text for the downtown portion of the Regional Visitor Commercial land use designation. The study area includes properties adjacent to the western San Lorenzo River levee.

The study area includes the Santa Cruz Metro Transit Center (Pacific Station) that serves areas within the City and County. This transit center qualifies as a major transit stop when evaluating projects for CEQA purposes per SB743, as codified in Public Resources Code 21099, transit priority projects. All of the properties within the defined study area are located within one-half mile or less from the METRO Pacific Station. The proximity of future development to this transit facility has a direct relationship on the applicability of CEQA with respect to evaluating aesthetic impacts for project-level impact analysis. See Section 4.1.2, Impacts and Mitigation Measures, for further discussion.

Regional Setting

The visual character of the City of Santa Cruz is influenced by a blend of natural features, historic neighborhoods and other development. Santa Cruz is strongly characterized by its coastal location along Monterey Bay, which defines the city's entire southern boundary. Open space areas, including those that make up the City's greenbelt, also are significant contributors to Santa Cruz's natural setting. The Santa Cruz Mountains and its foothills on the north provide a backdrop of open space views and offer panoramic views of the City and ocean (City of Santa Cruz, April 2012, DEIR volume). Key natural and open space features include:

- ☐ The coastline and beaches,
- ☐ The San Lorenzo River and other watercourses, parks and open space, and
- ☐ The background view of the Santa Cruz Mountains.

According to the City's General Plan, varied topography shapes the city's character and creates many public views throughout the community, including views of Monterey Bay and the City as a whole. Arroyos and steep coastal cliffs are identified as providing the greatest variation in the City's topography. Other features include pronounced hills—most notably the coastal terraces of the UCSC campus, Pogonip, the Carbonera area, and DeLaveaga Park; smaller hills—such as Beach Hill and Mission Hill—act as community landmarks; and shallow slopes toward Monterey Bay (City of Santa Cruz, June 2012). Ridgelines along Escalona Drive and Grandview Street mark significant changes of elevation.

Open space areas, including those that make up the City's Greenbelt, are significant contributors to Santa Cruz's natural setting and aesthetic quality. Pogonip, DeLaveaga Park, Arana Gulch, Neary Lagoon, Younger Lagoon, Antonelli Pond, Arroyo Seco Canyon, the Moore Creek Preserve, and the Jessie Street Marsh are identified in the General Plan as being important natural features that provide scenic amenities and contribute to the identity of surrounding residential neighborhoods (City of Santa Cruz, June 2012).

Visual Character of the Project Area

The project area is located within downtown Santa Cruz and is located to the west of the San Lorenzo River. The visual character of downtown is defined by existing development, as well as views of and along the San Lorenzo River at some elevated locations, such as bridges and from the Riverwalk. Downtown is characterized by a mix of primarily commercial buildings, some of which have upper floor office and residential units. The area supports a mix of both pre- and post- Loma Prieta earthquake constructed structures with a variety of architectural styles and building heights. Most of the buildings constructed after the earthquake are located north of Cathcart Street.

Rows of deciduous trees line both sides of Pacific Avenue and create a broad canopy along the street except during the winter months. The streetscape has a varied but uniform appearance

with a mix of buildings. Front Street is characterized by a mix of older buildings south of Soquel Avenue and has few street trees than Pacific Avenue.

The San Lorenzo River is a prominent natural and visual feature in the City and is prominently visible from numerous locations in the downtown, including the Soquel Avenue and Broadway Bridges. From these vantage points views of the river are the predominant visual feature, which is framed by the Santa Cruz Mountains to the north and Beach Hill to the south. Existing development is mostly visible along the west side of the river levee.

The project area subject to changes in building height is located along Pacific Avenue and Front Street generally between Laurel Street on the south and Cathcart Street on the north, with the west side of Front Street up to Soquel Avenue. The area is characterized by a mix of commercial structures with some upper floor office uses. South of Cathcart, residential uses are limited primarily to the building at 1010 Pacific Avenue. Buildings along Front Street are a mix of mostly older buildings of varying architectural styles, sizes and heights. The older buildings along Front Street are generally one story and approximately 16-20 feet in height. Buildings are a mix of two and three stories along Pacific Avenue and generally one story in height along Front Street. There is less street tree landscaping along lower Front Street. Photos of representative views in the project area and downtown are shown on Figure 4.1-1.

The area along Pacific Avenue north of Cathcart is within the Additional Height Zone A as set forth in the existing DRP, as is the property at 1010 Pacific Avenue. Properties in this zone may be allowed additional building heights to 75 feet over the base height of 50 feet in specified conditions. Most of the buildings downtown are approximately 50 feet in height, which is the base building height required by DRP, except for areas along Cedar Street that have a 35-foot height limit. Some existing older buildings in the project area south of Cathcart are one or two stories and less than 50 feet in height. Rooftop mechanical equipment that often extends the base height limits as permitted by the DRP and City regulations. Buildings that exceed 50 feet in height are summarized on Table 4.1-1, some of which are shown on Figure 4.1-2. The tallest building in the project area is located at 1010 Pacific Avenue, which is 66.5 feet in height (76.5 feet to top of elevator structure).

Scenic Views

Within the City of Santa Cruz, prominent scenic views are primarily those that are oriented toward Monterey Bay and the Pacific Ocean or toward the Santa Cruz Mountains that frame the northern boundary of Santa Cruz (City of Santa Cruz, April 2012, DEIR volume). There are no designated scenic highways or roads within the City. The General Plan 2030 defines a scenic highway or scenic route as “a highway, road, drive, or street that, in addition to its transportation function, provides opportunities for the enjoyment of natural and man- made scenic resources and access or direct views to areas or scenes of exceptional beauty or historic or cultural interest.” None of the streets in the project area meet this definition, with the exception of a portion of Beach Street in the beach area.

TABLE 4.1-1: Buildings in Downtown That Exceed 50 Feet in Height

Building	Building Height in Feet
1547 Pacific - Approved	60 feet-5 stories
1375 Pacific, Rittenhouse Building	• 80 feet – Top of Mechanical Equipment/Elevator • ~ 50 feet – Top of Stepback Parapet
110 Cooper Street at Pacific, Cooper House	• 80 feet – Top of Penthouse Roof • ~ 50 feet – Top of Stepback Parapet
1344 Pacific, Hotel Palomar	92 feet
Front Street/Soquel Parking Garage	58.5 – Top of Tower Elevator
1200 Pacific, Redtree Building	64.5 – Building Height
1124 Pacific, Del Mar Theater	Estimated 60 feet with marquee
1101 Pacific, University Town Center	69.5 – Top of Roof
1010 Pacific	• 76.5 – Top of Elevator Penthouse • 66.5 – Top of 6th Floor • 50.0 – Top of Parapet
725 Front St.	~52 feet, plus elevator equipment room

The Santa Cruz downtown is an area characterized by primarily commercial, but also office and some upper floor residential uses. According to maps developed for the City's *General Plan 2030* and included in the General Plan EIR, the project site is not within a mapped scenic panoramic view (City of Santa Cruz, April 2012, DEIR volume-Figure 4.3-1). Urban views, including those of the downtown project area, are identified along the San Lorenzo levee (Ibid.). The existing LCP identifies Beach Hill as part of an urban skyline with "visually distinctive structures" (City of Santa Cruz, 1994-Map CD-3).

The prominent views along the river levee are those of the river corridor, adjacent riparian vegetation where it exists, and distant mountains to the north. To the south, views of some buildings on Beach Hill are available at some locations from the project area. In locations where views of the downtown area are available, the views are dominated by structural development with some landscaping and significant street tree canopy along Pacific Avenue, especially north of Cathcart.

Scenic Resources

The San Lorenzo River is east of a portion of the downtown study area and is a prominent natural and open space feature in the area. The DRP indicates that the river offers potential as an open space, habitat and a recreational amenity and provides opportunities for creation of linkages to the downtown. The DRP recommends creation of a riverfront connection at the terminus of Cathcart Street and the enhancement of that street as a strong pedestrian and visual linkage between Pacific Avenue and the river. Other pedestrian linkages to the river are suggested opposite from the Metro Center in the vicinity of Elm Street, and across from the existing Maple Street alley.

Landmarks are distinctive built and natural features that are highly visible or that help to define the identity of a particular place. In addition, to historical landmarks as discussed in Section 4.3, Cultural Resources, the General Plan 2030 defines “landmark” as a visually prominent or outstanding structure or natural feature that functions as a point of orientation or identification. The City has approximately 35 City-listed historic landmarks and approximately 600 listed historic structures, some of which may also be considered scenic resources depending on the visual prominence and the character of the building (City of Santa Cruz, April 2012, DEIR volume). In downtown, the Civic Center, Town Clock are identified as visual landmarks in the City’s General Plan. The Boardwalk and Santa Cruz Wharf are identified as landmarks in the beach area, and none are identified along Ocean Street.

4.1.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies and/or guidelines; and agency and professional standards, a project impact would be considered significant if the project would:

- 1a Eliminate or substantially adversely affect, modify, or obstruct a visually prominent or significant public scenic vista, public viewing area, or public view corridor, including views of the ocean, to and along the shoreline, and panoramic background mountain views;
- 1b Eliminate or substantially adversely affect significant scenic resources along a scenic highway or designated scenic roadway, including, but not limited to, visually prominent trees, rock outcrops, or historic buildings, or visually prominent trees or historic-landmark buildings in other locations within the City;
- 1c Substantially degrade the existing visual character or quality of the surrounding area-- i.e., be incompatible with the scale of the surrounding area or substantially detract from the aesthetic character of the neighborhood; or
- 1d Create a new source of substantial light or glare that would adversely affect daytime or nighttime views or activities in the area, or pose a nuisance. This includes ambient nighttime illumination levels that would be increased beyond the property line, or use of highly reflective building materials.

As previously indicated, Public Resources Code section 21099, effective January 2014, defines projects located within one-half mile of a major transit stop or facility as considered transit oriented development. Section 21099(d)(1) further indicates that: “Aesthetic and parking impacts of a residential, mixed-use residential, or employment center project on an infill site within a transit priority area shall not be considered significant impacts on the environment.” While, this provision does not apply to the proposed Plan amendments, it may be applicable to future development projects as the study area is within one-half mile of the Santa Cruz Metro Transit Center, a major transit facility. State law continues to allow local jurisdictions the ability

to consider design review as part of a discretionary permit project level evaluation, including consideration of aesthetic impacts pursuant to local design review ordinances or other discretionary powers provided by other laws or policies.

Analytical Method

The proposed project consists of amendments to the City's Downtown Recovery Plan, General Plan, Local Coastal Plan and Zoning Code regarding development in the downtown area, Central Business District and in areas designated RVC in the General Plan. The proposed project would not directly result in new development. However, the proposed Downtown Plan amendment would expand areas for potential additional building height that could accommodate intensified redevelopment of existing developed sites. The proposed General Plan amendment would increase FAR in areas within downtown that are designated as RVC in the General Plan. The proposed LCP and Zoning Code amendments would not result in changes that could indirectly lead to intensified development or air emissions. The Zoning Code amendments consist of minor text revisions to the Central Business District zone related to references to the Downtown Plan and outdoor extension areas. The revisions also add a new section on "parklets", which is intended to enhance the pedestrian ambiance of the CBD zone district by creating useable outdoor spaces.

The analysis reviews the potential increased heights and intensified development that could occur as a result of the proposed amendments based site visits to view the study area from different vantage points in the vicinity to characterize the visual setting and visibility of the project area. Six massing studies were prepared for the City Planning and Community Development Department by McCann Adams Studio to show existing and proposed allowable building heights superimposed on photos. Representative views were developed along the San Lorenzo River, Front Street and Pacific Avenue. The EIR evaluates the potential changes to the visual character of the downtown based on both existing conditions and the incremental difference between what is allowed under the existing Downtown Recovery Plan and what would potentially be allowed with the proposed amendments that form the project for CEQA purposes.

Impacts and Mitigation Measures

The following analysis assesses impacts on scenic views (1a), scenic resources (1b), the visual character of the site and surrounding area (1c), and light and glare (1d).

Impact 4.1-1: Scenic Views. Future development accommodated by the proposed plan amendments would not eliminate or substantially adversely affect, modify, or obstruct a visually prominent or significant public scenic vista. Therefore, project would result in a *less-than-significant impact* to scenic views (1a).

Future development in the area as a result of the proposed Downtown Plan amendment could be constructed at taller heights than currently permitted, but taller buildings would not obstruct or remove scenic views in the downtown. There are no mapped panoramic views across or from the downtown area as shown in the City's General Plan 2030 EIR (City of Santa Cruz, April 2012, DEIR volume-Figure 4.3-1). However, taller buildings adjacent to San Lorenzo River would be visible from locations along the levee Riverwalk and from Laurel Street and Soquel Avenue bridges. The buildings would be in locations of existing buildings and would not block views of the river. Effects of new development on the visual character of the area as a result of the proposed Plan amendments is discussed in Impact 4.1-3.

Development along the river would obscure a portion of distant mountain views to the north, which would also occur under the allowed existing heights without the proposed amendments. However, these areas are limited, and most distant mountain views would be maintained. Depending on the actual height and extent of future development, a portion of the distant view Beach Hill could be blocked. However, from the levee or Soquel Avenue bridge, the view of Beach Hill is primarily of the upper canopy and not the older Victorian structures that are identified as "distinctive" in the LCP. Furthermore, it is a minor part of the background view from vantage points in which the river is the primary component of views. Therefore, no significant impacts to scenic views would occur as a result of the proposed project.

The proposed General Plan amendment would revise General Plan text to increase the upper level of permissible floor area ratio (FAR) for the RVC land use designation in the downtown from 3.5 to 5.0. FAR is the gross floor area permitted on a site divided by the total net area of the site. For example, on a site with 10,000 net sq. ft. of land area, a FAR of 1.0 will allow a maximum of 10,000 gross square feet of building floor area to be built. On the same site, a FAR of 3.5 would allow 35,000 sq. ft. of floor area, which is the current limit in the downtown RVC designation. The proposed increase in FAR to 5.0 would allow 50,000 square feet of building, or essentially five floors on the entire site. Future development needs to comply with the Downtown Plan standards for the based height (currently 55 feet along Pacific Avenue and 35 feet along Front Street. If the Additional Height Zones are not amended it might be possible to achieve a larger building along Pacific Avenue, but the Front Street height would not allow a full 5.0 FAR. This increase in FAR without a height increase is similar to what other development has achieved through Planned Developments on some parcels larger than 20,000 square feet in the downtown. As a result, the proposed General Plan amendment would not result in substantially larger buildings based on the existing height limitations and the General Plan amendment would not result in any potential significant impacts to scenic views.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.1-2: Scenic Resources. Future development accommodated by the proposed plan amendments would not result in elimination or a substantial adverse effect to scenic resources, and there would be *no impact* to a scenic resource (1b).

The project areas are not located adjacent to or in proximity to a local or state scenic highway or road. All of the project study area is currently developed and there are no known scenic resources in the study area, except for the Beach Boardwalk, which is an identified visual landmark. The San Lorenzo River is an important natural feature in the area. While street trees exist in some portions of the study area, no individual tree is visually prominent, and landscaping would be provided with any future development. The proposed project would not affect adjacent natural features of the San Lorenzo River. Neither the proposed project nor subsequent development on the site would have an adverse effect on scenic resources as none are present on the project site. Therefore, the proposed Plan amendments would not indirectly lead to impacts on scenic resources.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.1-3: Visual Character of the Surrounding Area. The proposed project would result in amendments to the DRP and General Plan that would allow increased heights of 20 to 35 feet over existing allowable standards, and future development could result in taller and more massive buildings. With implementation of required development standards for massing, required percentage variation of heights, and upper-level skyline variation, future buildings would be of similar height and scale as the other taller buildings in the downtown area, which already contains several multi-story buildings of varied height, and would not substantially degrade the visual character of the surrounding area (1c). This is considered a *less-than-significant impact*.

The proposed project would extend the zones for Additional Height Zones to three new areas:

- ☐ Additional Height Zone A (up to 75 feet in height) along the west side of Pacific Avenue between Cathcart and Laurel,
- ☐ Additional Height Zone A (up to 85 feet in height) on the west side Front Street and east side of Pacific between Laurel and Soquel, and
- ☐ Additional Height Zone B (up to 70 feet in height) along the east side of Front adjacent to the San Lorenzo River.

The proposed amendments also would increase the base building height from 50 to 55 feet for the Additional Height Zone A areas, but the base height east of Front Street would remain at 50 feet. Under the existing DRP, development along Pacific Avenue must conform to the base height requirements, except where Additional Heights may be applied. The proposed DRP amendment

would decrease the property size eligible for additional height from 20,000 to 15,000 square feet. The maximum height for mechanical equipment would increase from 55 to 65 feet with a reduction in the mechanical equipment setback from 25 to 15 feet.

The combined result of the proposed DRP amendments would be potential development of larger and more massive buildings. However, the proposed DRP amendment includes standards to limit the percentage of coverage of buildings with allowed additional height. For Additional Height Zone B, upper floor stepbacks/setbacks also would be required along the Front/Riverfront Corridor. The proposed amendments modify the Additional Height Zone A upper floor stepback requirements. A stepback is generally an upper floor setback from the edge of the building to help break up building mass. The proposed amendments would change the existing upper level 42 or 52 degree stepback standard to standard that would allow a certain percentage of a site to have heights over a specified limit. According to City staff, this “volumetric approach” is intended to ensure both vertical and horizontal building variation to avoid monolithic structures. In addition to the upper level requirements for Additional Height Zone B and the maximum height percentages in Additional Height Zone A, all of the study area includes a requirement for recessed breaks or horizontal variations to avoid long blank walls. Further description of upper floor coverage and stepbacks with the proposed amendments is provided below.

- ❑ For sites that are eligible for additional height in Additional Height Zone A, the footprint of portions of the building at or above 55 feet to a height of 75 feet may comprise up to 60% of the site area. For assembled sites greater than 50,000 square feet, buildings may achieve an 85-foot height for up to 20% of the total area in the area proposed for this additional height allowance. Figure 3-2 in Section 3 of this EIR provides a schematic that shows proposed distribution of building height on different size sites.

Along Pacific Avenue, portions of buildings that exceed the maximum base height of 55 feet may occupy up to 55% of the length of the property line along the street or 200 feet, whichever is less. Any additional height above the base height must be set back from the building wall by at least 15 feet. An example of the potential distribution of height that is included in the proposed revised Downtown Plan is shown on Figure 3-3 in Section 3.

Along Front Street, portions of buildings that exceed the maximum base height of 55 feet may occupy up to 60% of the length of the property line along the street or 180 feet, whichever is less with the proposed amendment. Any additional height above the base height must be set back from the building wall by at least 15 feet.

- ❑ For the Front Street/Riverfront Corridor, the proposed amendments require a minimum 10-foot stepback from Front Street for development above 50 feet in height and at least 50% of the building frontage along Front Street and Soquel Avenue must have a 10-foot stepback for development above 50 feet. Along the west side of the Riverwalk, a 10-foot setback from the exterior building face would be required for development above 50 feet. The proposed amendments allow up to 25% of the Riverwalk building frontage to encroach into the required 10-foot setback area to provide massing variation. See Figure 3-4 in Section 3, which depicts heights and stepbacks along Front Street and adjacent to the San Lorenzo River. The proposed amendments also permit top floor

cantilevered portions of the building to encroach over the property line a maximum of 5 feet in order to provide architectural interest to the façade, which shall not exceed 25 percent of the total building frontage along the riverfront.

- ❑ Along Laurel Street, Cathcart Street and Soquel Avenue, portions of buildings that exceed the maximum base height of 55 feet may occupy up to 60% of the length of the property line or 150 feet, whichever is less. Any additional height above the base height must be set back from the building wall by at least 15 feet.
- ❑ Along the Maple Street extension to Front Street, the proposed amendment requires the building frontage to be stepped back by 10 feet above a height of 50 feet. In addition to the 'build to' line, the Maple Street building face shall incorporate at least one recessed break, open to the sky, no less than 25 feet wide and no less than 10 feet in depth from Maple Street .

Figures 4.1-3A through 4.1-3C provide diagrams superimposed on photographs that show outlines of potential building mass with additional heights as seen from the San Lorenzo River, Pacific Avenue and Front Street, respectively. The diagrams do not represent actual projects or architecture as no project applications have been submitted, but they are intended to conceptually represent the upper limits of structural massing that could occur over time. The building mass depicted may or may not occur. Furthermore, achieving the maximum heights illustrated in the diagram can only occur on properties that meet the minimum parcel sizes required by the DRP for additional height; the illustrations assume that parcels have been combined in order to be eligible for additional heights. It is noted that as part of the EIR scoping process, a request was made that story poles be erected along the river levee for the entire comment period for the public to assess the visual impact of the heights of new buildings. However, use of story poles is more typically done at a project level and in certain situations where photosimulations may not be appropriate. The project consists of a series of plan amendments, and there are no specific building locations or designs proposed at this time. To erect story poles on all of the private properties potentially affected by the DRP amendments is not feasible, and furthermore, it would be speculative to try to predict where the tallest portions of the buildings would potentially be located. The photosimulations, while not required under CEQA, provide a scaled, accurate depiction of potential building mass as seen from pedestrian viewpoints, sufficient to inform the public and City decision makers about the hypothetical appearance of full buildout under the DRP amendments.

The purpose of Figures 4.1-3A through 4.1-3C is to illustrate a reasonable worst-case scenario at buildout under the existing and proposal DRP development standards. As can be seen, potential future worst-case development could appear more massive than existing development in all locations compared to existing conditions. However, illustrating the worst-case scenario does not typically reflect actual development pattern over time. The diagrams also show existing height limits that have been in effect since 1991, but very few properties in the downtown are built to the existing additional height limits. Nonetheless, the illustrations show that the additional future buildings could appear more massive than existing development, although this change would be noticeable even with more buildout under the existing 50-foot height limits

generally in the areas south of Cathcart. There is no required presumption under CEQA that taller buildings are necessarily a substantial adverse change in the existing visual environment. Such determinations are made on a case-by-case basis at a lead agency's discretion and in consideration of the relevant environmental setting or context, which here, is a nearly fully developed urban area. Future proposed buildings with additional height would not be considered to be substantially out of scale with other existing buildings in the downtown area. There are about a dozen existing buildings in downtown that exceed 55 feet in height.

Additionally, under the existing Planned Development regulations, a 20% increase in height could be allowed for properties larger than 20,000 square feet with specified findings. Thus, some buildings could reach a height of 60 feet under existing regulations without the proposed project amendments. In addition to the existing Planned Development process, which is an existing procedure that could allow for heights to exceed the underlying base height, the State Density Bonus law allows for a full story or floor to be provided as a possible concession, in exchange for providing a 100 percent affordable housing project. Granting such a concession as mandated under state law could also result in buildings about 10 feet taller than the underlying development standards.

Although, it is not known how future projects will be developed, it is conservatively concluded that the proposed expansion of Additional Height Zones could lead to taller and more massive development. According to the DRP, the intent of the existing additional height standards "is not to create a five-story downtown, but rather to preserve the overall character and scale of the historic core while allowing some intensification and increased height on larger parcels". There is no evidence from the aesthetic analysis that leads to the conclusion that the proposed development standards would promote the development of a uniformly five-story downtown, any more than the existing development standards (particularly along the east of Front Street) have led to the development of a continuous three-story, or 50-foot downtown. Based on the historic development pattern in the City, a varied-height downtown is the most likely result of the DRP amendments.

Both existing and proposed DRP development standards include design guidelines to break up overall building mass, including limits on upper floor coverage where additional heights are achieved and required upper floor stepbacks in some areas. As a result, building mass would be broken up and there would not be full coverage of the additional upper floors where additional heights may be allowed. The proposed Plan amendments also require building recesses, and the existing and revised building and storefront design standards and guidelines in the DRP serve to break up building mass. Other design guidelines call for variation in rooflines along Pacific Avenue. Although maximum height of mechanical equipment would increase with the proposed amendments, the proposed amendments require that rooftop equipment be completely concealed from view and integrated within the architectural design of the building. The use of landscaped roof terraces and gardens is also recommended. In the Front/Riverfront Corridor, the proposed amendments promote skyline variation, the top floor shall not exceed 60% of the floor area below or 60% of the building length as measured along Front Street or the Riverwalk. An

exception may be considered where the project includes a publicly accessible passageway to the Riverwalk. In this area, the DRP requires creative and integrated roof designs.

Thus, existing and proposed design guidelines include design standards that will result in buildings of variable height, massing and architectural treatments, and the extent of allowable additional height is restricted to larger properties, i.e., 15,000 square feet. The design guidelines address many architectural features, including building facades and windows, as well as building materials, colors and lighting. For example, building facades are required to provide visual variation at specified intervals with use of architectural elements, building materials or building planes in order to avoid large expanses of horizontal or vertical wall surface. Furthermore, continued landscaping with street trees along Pacific and Front Street, as well as along on the inland side of the Riverwalk, will further screen building mass in all areas. The dense canopy along Pacific often screens upper floors from a distance softens views of larger buildings and maintains a pedestrian-level scale, as shown on the photos to the right. With implementation of requirements to limit upper floor heights, provision of stepbacks, implementation of design treatments to minimize building mass, and compliance with the Downtown Plan development standards and design guidelines, potential intensified development resulting from additional allowed heights would not significantly alter the visual character of the study area from what might be developed under the allowable standards or taller buildings that have been constructed in the downtown area.



This conclusion also is consistent with state law that will be applicable to future mixed-use projects proposed in the downtown area. As previously indicated, CEQA provides that aesthetic impacts of a residential, mixed-use residential, or employment center project on an infill site within a transit priority area shall not be considered significant impacts on the environment, although design review would still be required pursuant to local City requirements and regulations.

In allowing additional building heights, both the existing DRP and proposed amendments require the City to make findings including that: a) the additional height will contribute to an improved social and economic environment by including new housing; and b) the form of the development promotes the appearance of a grouping of buildings rather than large, monolithic building masses. Furthermore, both the existing Plan and proposed amendment require that development projects provide a visual analysis for the Additional Height Zone A. The

requirement, including three-dimensional perspectives is added as part of the proposed amendment for Additional Height Zone B to determine the visual impact of the views from key locations, including views from Front Street and from the Soquel and Laurel bridges and the levee opposite the project site from a pedestrian level view. Architectural and design features of future proposed projects, as well as compliance with the Downtown Plan development and design standards and guidelines will be further reviewed by City staff as part of the Design Permit process.

The proposed General Plan amendment also would revise General Plan text to increase the upper level of permissible floor area ratio (FAR) for the RVC land use designation in the downtown area from 3.5 to 5.0. As discussed in Impact 4.1-1, future development would need to comply with existing height limits established in Downtown Plan. It is possible that some future development could result in slightly more massive buildings along Pacific Avenue under the existing Downtown Recovery Plan standards than would otherwise be allowed under the existing FAR designation, however, buildings would not be taller or substantially degrade the visual character of these areas.

Mitigation Measures

No mitigation measures are required as the proposed incremental increase in height regulations of the project would not lead to a substantial degradation of the visual character of the surrounding area.

Impact 4.1-4: Introduction of Light and Glare. The proposed project would result in amendments to the DRP and General Plan that would allow increased heights and building coverage, and future development would include exterior and interior lighting typical of residential developments, but would not result in introduction of a major new source of light or glare (1d). Thus, this is considered a *less-than-significant impact*.

Future development accommodated by the proposed project would not result in introduction of a major new source of light or glare, although there will be introduction of windows and exterior building lighting typically associated with commercial development. This type of lighting would be oriented so as to not create offsite light. Windows along Pacific are required to be recessed. Furthermore, the use of reflective or tinted glass is prohibited on ground floors.

Exterior building lighting will be further reviewed as part of the Design Permit review for future site-specific developments, and the project will be conditioned to install lighting such that it is directed downward and does not create light onto adjacent properties. The DRP requires buildings to low-level lighting in the building façade. Therefore, the project would not result in a significant impact related to creation of a new source of substantial light or glare.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

INTENTIONALLY LEFT BLANK





1200 Pacific - 64.5 feet tall



1375 Pacific Avenue - 50 feet tall



1010 Pacific - 66.5-76.5 feet tall



1101 Pacific ~ 69.5 feet tall



VIEW FROM SOQUEL BRIDGE LOOKING SOUTH ALONG THE RIVERWALK

Draft: March 27, 2017



VIEW FROM LAUREL BRIDGE LOOKING NORTH ALONG THE RIVERWALK

Draft: March 27 2017

NOTE: This line diagram visual simulation does not represent actual projects or architecture. The diagram is intended to conceptually represent the upper limits of development mass that could occur over a period of decades. The mass depicted in this diagram may or may not ever be built. For the purposes of evaluating potential environmental impacts, the diagrams are intentionally exaggerated to illustrate a reasonable worst-case scenario at build-out under the existing and proposed regulations. Illustrating the worst-case scenario does not typically reflect actual development pattern over time. The diagram also shows the existing height limits and setback requirements, which have been in effect since 1991. Very few of the existing properties in the downtown are built to these existing limits. Achieving the maximum heights illustrated in this diagram can only occur on properties that meet the minimum parcel sizes required by the Downtown Plan. This illustration assumes that parcels have been combined in order to meet the standards necessary to achieve the maximum build out.



Draft: March 27, 2017



Draft: March 27, 2017

NOTE: This line diagram visual simulation does not represent actual projects or architecture. The diagram is intended to conceptually represent the upper limits of development mass that could occur over a period of decades. The mass depicted in this diagram may or may not ever be built. For the purposes of evaluating potential environmental impacts, the diagrams are intentionally exaggerated to illustrate a reasonable worst-case scenario at build-out under the existing and proposed regulations. Illustrating the worst-case scenario does not typically reflect actual development pattern over time. The diagram also shows the existing height limits and setback requirements, which have been in effect since 1991. Very few of the existing properties in the downtown are built to these existing limits. Achieving the maximum heights illustrated in this diagram can only occur on properties that meet the minimum parcel sizes required by the Downtown Plan. This illustration assumes that parcels have been combined in order to meet the standards necessary to achieve the maximum build out.



VIEW FROM THE NIAC BUILDING LOOKING NORTH ALONG FRONT STREET

Draft: March 27, 2017



VIEW NEAR LAUREL STREET LOOKING NORTH ALONG PACIFIC AVENUE

Draft: March 27, 2017

NOTE: This line diagram visual simulation does not represent actual projects or architecture. The diagram is intended to conceptually represent the upper limits of development mass that could occur over a period of decades. The mass depicted in this diagram may or may not ever be built. For the purposes of evaluating potential environmental impacts, the diagrams are intentionally exaggerated to illustrate a reasonable worst-case scenario at build-out under the existing and proposed regulations. Illustrating the worst-case scenario does not typically reflect actual development pattern over time. The diagram also shows the existing height limits and setback requirements, which have been in effect since 1991. Very few of the existing properties in the downtown are built to these existing limits. Achieving the maximum heights illustrated in this diagram can only occur on properties that meet the minimum parcel sizes required by the Downtown Plan. This illustration assumes that parcels have been combined in order to meet the standards necessary to achieve the maximum build out.

4.2 AIR QUALITY AND GREENHOUSE GAS EMISSIONS

This section analyzes impacts of the proposed project related to project air emissions, including greenhouse gas (GHG) emissions, based on air quality modeling conducted as part of the preparation of this EIR. The results of the air modeling are summarized in this section, and are included in Appendix E. This section also draws from the City of Santa Cruz *General Plan 2030* EIR (SCH#2009032007), which was certified on June 26, 2012, regarding background information on climate change. The General Plan EIR is incorporated by reference in accordance with section 15150 of the State CEQA Guidelines. Relevant discussions are summarized below under the “Climate Change” subsection. The General Plan EIR is available for review at the City of Santa Cruz Planning and Community Development Department (809 Center Street, Room 107, and Santa Cruz, California) during business hours: Monday through Thursday, 8 AM to 12 PM and 1 PM to 5 PM. The General Plan EIR is also available online on the City’s website at: <http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development/general-plan>.

Public and agency comments related to air quality and emissions were received during the public scoping period in response to the Notice of Preparation (NOP). Issues raised in these comments include:

- ☐ Potential creation of a “urban heat island” due to an increase in building mass.

To the extent that issues identified in public comments involve potentially significant effects on the environment according to the California Environmental Quality Act (CEQA) and/or are raised by responsible agencies, they are identified and addressed within this EIR. Public comments received during the public scoping period are included in Appendix B.

4.2.1 Environmental Setting

Regulatory Setting

Air quality within the Monterey Bay region is addressed through the efforts of various federal, state, regional, and local government agencies. These agencies, as discussed below, work jointly, as well as individually, to improve air quality through legislation, regulations, planning, policy making, education, and a variety of programs.

Criteria Air Pollutants

Criteria air pollutants are defined as pollutants for which the United States Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) have established ambient air quality standards, or criteria, for outdoor concentrations to protect public health. The standards identify levels of “criteria pollutants” that are regarded as the maximum levels of ambient (background) air pollutants considered to have an adequate margin of safety necessary

to protect the public health and welfare. The standards are designed to protect the most sensitive people from illness or discomfort. Criteria pollutants include ozone (O₃), nitrogen dioxide (NO₂), carbon monoxide (CO), sulfur dioxide (SO₂), coarse particulate matter (PM₁₀), fine particulate matter (PM_{2.5}), and lead. In California, sulfates (SO₄), hydrogen sulfide (H₂S), vinyl chloride, and visibility-reducing particles are also regulated as criteria air pollutants. An area is designated as “in attainment” when it is in compliance with the federal and/or state standards as further discussed below.

Federal. The federal Clean Air Act (FCAA), passed in 1970 and last amended in 1990, forms the basis for the national air pollution control effort. The EPA is responsible for implementing most aspects of the FCAA, including setting National Ambient Air Quality Standards (NAAQS) for criteria air pollutants; setting hazardous air pollutant standards; approving state attainment plans; setting motor vehicle emissions standards; issuing stationary source emissions standards and permits; and establishing acid rain control measures, stratospheric O₃ protection measures, and enforcement provisions.

The NAAQS describe acceptable air quality conditions designed to protect the health and welfare of citizens of the nation. The NAAQS (other than for O₃, NO₂, SO₂, PM₁₀, PM_{2.5}, and those based on annual averages or arithmetic mean) are not to be exceeded more than once per year. NAAQS for O₃, NO₂, SO₂, PM₁₀, and PM_{2.5} are based on statistical calculations over 1- to 3-year periods, depending on the pollutant. The FCAA requires the EPA to reassess the NAAQS at least every five years to determine whether adopted standards are adequate to protect public health based on current scientific evidence. States with areas that exceed the NAAQS must prepare a state implementation plan that demonstrates how those areas will attain the standards within mandated time frames.

State. The FCAA delegates the regulation of air pollution control and the enforcement of the NAAQS to the states. The CARB, a department of the California Environmental Protection Agency (CalEPA), oversees air quality planning and control throughout California. Its responsibility lies with ensuring compliance with the California Clean Air Act (CCAA) and its amendments, as well as responding to the FCAA requirements and regulating emissions from motor vehicles sold in California. It also sets fuel specifications to further reduce vehicular emissions. CARB establishes the California Ambient Air Quality Standards (CAAQs), pursuant to the CCAA, which are generally more restrictive than the NAAQS. These standards apply to the same criteria pollutants as the FCAA and also include SO₄, H₂S, visibility reducing particles, and vinyl chloride.

The CAAQs describe adverse conditions; pollution levels must be below these standards before an air basin can attain the standard. Air quality is considered “in attainment” if pollutant levels are continuously below the CAAQs and violate the standards no more than once each year. The CAAQs for O₃, CO, SO₂ (1-hour and 24-hour), NO₂, PM₁₀, PM_{2.5}, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded.

Regional. Regulatory oversight for air quality in the North Central Coast Air Basin (NCCAB) in which the City of Santa Cruz is located, rests at the regional level with the Monterey Bay Unified Air Pollution Control District (MBUAPCD),¹ the CARB at the state level, and the EPA Region IX office at the federal level. The MBUAPCD is one of 35 air districts established to protect air quality in California. The NCCAB is comprised of Santa Cruz, Monterey, and San Benito Counties. The MBUAPCD has primary responsibility for local air quality by controlling air pollution from stationary sources of air pollution. The District has adopted a number of rules affecting both stationary and area-wide sources of emissions for the purpose of achieving the state and federal ambient air quality standard (AAQS) for O₃.

The CCAA requires each nonattainment district in the state to adopt a plan showing how the CAAQS for O₃ would be met with subsequent updates every three years. The MBUAPCD adopted its first Air Quality Management Plan (AQMP) in 1991 and has subsequently updated the AQMP seven times.

Local. The City of Santa Cruz addresses odors and pollutants in its Municipal Code. Section 24.14.264 prohibits emission of odorous gases or matter in readily detectable quantities. Section 24.14.272 prohibits emissions from any source that exceed permissible amounts or limits established by the MBUAPCD.

Toxic Air Pollutants

A substance is considered toxic if it has the potential to cause adverse health effects in humans, including increasing the risk of cancer upon exposure or acute and/or chronic non-cancer health effects. A toxic substance released into the air is considered a toxic air contaminant (TAC). TACs are identified by federal and state agencies based on a review of available scientific evidence. Examples include certain aromatic and chlorinated hydrocarbons, certain metals, and asbestos. TACs are generated by a number of sources, including stationary sources such as dry cleaners, gas stations, combustion sources, and laboratories; mobile sources such as automobiles; and area sources such as landfills. Adverse health effects associated with exposure to TACs may include carcinogenic (i.e., cancer-causing) and noncarcinogenic effects. Noncarcinogenic effects typically affect one or more target organ systems and may be experienced from short-term (acute) or long-term (chronic) exposure to a given TAC.

Federal. At the federal level, TACs are identified as Hazardous Air Pollutants (HAPs). The 1977 FCAA amendments required the EPA to identify National Emission Standards for Hazardous Air Pollutants (NESHAPS) to protect public health and welfare. HAPs include certain volatile organic chemicals, pesticides, herbicides, and radionuclides that present a tangible hazard based on scientific studies of exposure to humans and other mammals. Under the 1990 FCAA Amendments, which expanded the control program for HAPs, 189 substances and chemical families were identified as HAPs.

¹ The District has changed its name to the Monterey Bay Air Resources District (MBARD). In this report, references to agency publications or guidance that predate the official name change use MBUAPCD.

State. The state Air Toxics Program was established in 1983. The California TAC list identifies more than 700 pollutants, of which carcinogenic and non-carcinogenic toxicity criteria have been established for a subset of these pollutants pursuant to the California Health and Safety Code. The state list includes the federal HAPs. The Air Toxics “Hot Spots” Information and Assessment Act of 1987 (AB 2588) seeks to identify and evaluate risk from air toxics sources; however, AB 2588 does not regulate air toxics emissions. TAC emissions from individual facilities are quantified and prioritized. “High-priority” facilities are required to perform a health risk assessment, and if specific thresholds are exceeded, are required to communicate the results to the public in the form of notices and public meetings.

Diesel particulate matter (DPM) was identified as a TAC by the state of California in 1998. The CARB developed a comprehensive strategy to control DPM emissions. In 2000, CARB approved a Diesel Risk Reduction Plan to reduce diesel emissions from new and existing diesel-fueled vehicles and engines. The regulation is anticipated to result in an 80 percent decrease in statewide diesel health risk by 2020 compared with to the diesel risk in 2000 (CARB 2000). Additional regulations apply to new trucks and diesel fuel, including the On-Road Heavy Duty Diesel Vehicle (In-Use) Regulation, the On-Road Heavy Duty (New) Vehicle Program, and the In Use Off-Road Diesel Vehicle Regulation, and the New Off-Road Compression-Ignition (Diesel) Engines and Equipment program. All of these regulations and programs have timetables by which manufacturers must comply and existing operators must upgrade their diesel powered equipment.

Regional. Air quality control agencies, including the MBUAPCD, must incorporate air toxics control measures into their regulatory programs or adopt equally stringent control measures as rules within six months of adoption by CARB. The MBUAPD also regulates TACs from new or modified sources under Rule 1000, a Board-approved protocol that applies to any source which requires a permit to construct or operate pursuant to MBUAPCD regulations and has the potential to emit carcinogenic or noncarcinogenic TACs. The MBUAPCD’s Rule 1000 also requires sources of carcinogenic TACs to install best control technology and reduce cancer risk to less than one incident per 100,000 population. Sources of noncarcinogenic TACs must apply reasonable control technology. The MBUAPCD also implements Rule 1003, Air Toxic Emissions Inventory and Risk Assessments, which establishes and implements the Air Toxics Hot Spots Act. Rule 1003 also requires that any increased cancer risk resulting from an existing facility’s emissions is less than one incident per 100,000 population (Monterey Bay Unified Air Pollution Control District, February 2008).

Study Area

Regional Setting and Climate

The project study area includes a portion of the downtown area in the City of Santa Cruz. The project study area is located within the NCCAB, which is just south of the San Francisco Bay Area

Air Basin, and covers an area of 5,159 square miles. The NCCAB consists of the counties of Santa Cruz, San Benito, and Monterey. Topography and meteorology heavily influence air quality. In the project vicinity, the northwest sector of the basin is dominated by the Santa Cruz Mountains, which exert a strong influence on atmospheric circulation, which results in generally good air quality. Small inland valleys such as Scotts Valley with low mountains on two sides have poorer circulation than at Santa Cruz on the coastal plain (Monterey Bay Air Pollution Control District, February 2008).

The semi-permanent high pressure cell in the eastern Pacific is the basic controlling factor in the climate of the NCCAB. In the summer, the high pressure cell is dominant and causes persistent west and northwest winds over the entire California coast. Air descends in the Pacific High, forming a stable temperature inversion of hot air over a cool coastal layer of air. The onshore air currents pass over cool ocean waters to bring fog and relatively cool air into the coastal valleys. The warmer air aloft acts as a lid to inhibit vertical air movement (Monterey Bay Unified Air Pollution Control District, February 2008).

Sensitive Receptors

The MBUAPCD's *CEQA Guidelines* (Guidelines) defines a sensitive receptor generically as any residence including private homes, condominiums, apartments, and living quarters; educational facilities such as preschools and kindergarten through grade twelve (K-12) schools; daycare centers; and health care facilities such as hospitals or retirement and nursing homes. Sensitive receptors include long-term care hospitals, hospices, prisons, and dormitories or similar live-in housing. The MBUAPCD's Guidelines indicate that identification of sensitive receptors in the vicinity of a project site should be determined as part of the CEQA review with an analysis of whether a project would expose sensitive receptors to significant amounts of pollution. The sensitive receptors closest to the project study area are residential uses located along Pacific Avenue within the study area.

Effects of Air Pollutants

Ozone, the primary constituent of smog, is not directly emitted but is formed in the atmosphere over several hours from combinations of various precursors in the presence of sunlight. Nitrogen oxides (NO_x) and reactive organic gases (ROGs, also termed volatile organic compounds or VOCs) are considered to be the primary compounds, or precursors, contributing to the formation of ozone. Ozone is viewed as both a secondary pollutant and a regional pollutant. The primary sources of ROG within the planning area are on- and off-road motor vehicles, cleaning and surface coatings, solvent evaporation, landfills, petroleum production and marketing, and prescribed burning. The primary sources of NO_x are on- and off-road motor vehicles, stationary source fuel combustion, and industrial processes (Monterey Bay Unified Air Pollution Control District, August 2008). Short-term exposure to O₃ results in injury and damage to the lung, decreases in pulmonary function, and impairment of immune mechanisms (Ibid.).

Coarse particulates refer to particulate matter less than 10 microns in diameter (PM₁₀). In 1997, EPA adopted a fine particulate matter standard of 2.5 microns or less in diameter (PM_{2.5}), and CARB adopted an annual PM_{2.5} standard in 2002. PM₁₀ and PM_{2.5} are respirable particulate matter that are classified as primary or secondary depending on their origin. Primary particles are unchanged after being directly emitted (e.g., road dust) and are the most commonly analyzed and modeled form of PM₁₀. Because it is emitted directly and has limited dispersion characteristics, this type of PM₁₀ is considered a localized pollutant. In addition, secondary PM₁₀ can be formed in the atmosphere through atmospheric chemical and photochemical reactions.

PM₁₀ and PM_{2.5} are respirable particulate matter and because of their small size, they can be inhaled deep into the lungs and are therefore a health concern. Key health effects categories associated with PM include: premature mortality; aggravation of respiratory and cardiovascular disease; changes in lung function and increased respiratory symptoms; and altered respiratory defense mechanisms (Monterey Bay Unified Air Pollution Control District, February 2008).

Carbon monoxide (CO) is an odorless, colorless gas that is emitted by mobile and stationary sources as a result of incomplete combustion of hydrocarbons or other carbon-based fuels. Because it is directly emitted from combustion engines, CO can have adverse localized impacts, primarily in areas of heavy traffic congestion. Because it is emitted directly and has limited dispersion characteristics, CO is considered a localized pollutant (Monterey Bay Unified Air Pollution Control District, February 2008).

When CO combines with hemoglobin in the blood, the oxygen-carrying capacity of the blood is reduced and the release of oxygen is inhibited or slowed. This condition puts the following at risk: patients with angina, persons with other cardiovascular diseases, chronic obstructive lung disease, or asthma; persons with anemia, and fetuses. At higher levels, CO also affects the central nervous system. Symptoms of exposure may include headaches, dizziness, sleepiness, nausea, vomiting, confusion, and disorientation (Monterey Bay Unified Air Pollution Control District, February 2008). At high concentrations, CO can reduce the oxygen-carrying capacity of the blood and cause unconsciousness and death.

Existing Air Quality Conditions

Ambient Air Quality Standards

As indicated above, AAQS are set to establish levels of air quality that must be maintained to protect the public from the adverse effects of air pollution. State standards are established to protect public health, including the most sensitive members of the population. National standards include a primary standard to protect public health and a secondary standard to protect the public welfare including property, vegetation, and visibility. However, the numerical values for both standards are the same (Monterey Bay Unified Air Pollution Control District, August 2008). As indicated above, the federal and state governments have established AAQS for

six criteria pollutants: ozone, CO, NO₂, SO₂, PM₁₀, PM₂₅, and lead. State standards also include SO₄, H₂S, visibility reducing particles, and vinyl chloride.

Local Ambient Air Quality and Attainment Status

Ambient air quality is monitored at nine stations within the NCCAB. The network includes seven stations operated by the MBUAPCD and one station operated by the National Park Service at the Pinnacles National Monument. The monitoring stations operated by the MBUAPCD are part of the State and Local Air Monitoring Systems (SLAMS) network, and are located in Santa Cruz, Scotts Valley, Felton, Hollister, King City, Salinas, and Carmel Valley. The MBUAPCD also carries out wood smoke monitoring as needed, including seasonal monitoring of wood stove use in areas like the San Lorenzo Valley area in Santa Cruz County, large controlled burns such as those conducted at Fort Ord and some of those conducted for agricultural management, and for catastrophic events such as large structural fires and wildfires.

Designations in relation to state standards are made by the CARB, while designations in relation to national standards are made by the EPA. State designations are updated annually, while the national designations are updated either when the standards change or when an area requests re-designation due to changes in air quality. Designations are made according to air basin, and in some cases designations are made at the county level (Monterey Unified Air Pollution Control District, August 2008). Designations are made for each criteria pollutant according to the categories listed below. Nonattainment designations are of most concern because they indicate that unhealthy levels of the pollutant exist in the area, which typically triggers a need to develop a plan to achieve the applicable standards (Ibid.).

- ❑ **Attainment** – Air quality in the area meets the standard.
- ❑ **Nonattainment Transitional** – Air quality is approaching the standard (State only).
- ❑ **Nonattainment** – Air quality in the area fails to meet the applicable standard.
- ❑ **Unclassified** – Insufficient data to designate area, or designations have yet to be made.

Table 4.2-1 summarizes the attainment status for criteria pollutants in the NCCAB. In summary, the NCCAB is designated as a nonattainment area for state O₃ standards and PM₁₀ standards. The NCCAB is designated as unclassified or attainment for all other state and federal standards (California Air Resources Board, 2016; U.S. EPA, 2017).

CO emissions are generated by motor vehicles from traffic. Congested intersections with a large volume of traffic have the greatest potential to cause high-localized concentrations of carbon monoxide. Air pollutant monitoring data indicate that CO levels have been at healthy levels (i.e., below state and federal standards) for years, reflecting improvements in tailpipe emissions controls. As a result, the region has been designated as attainment/unclassified for the standard. Ambient air quality monitoring at a station in Santa Cruz measured CO concentrations and found that highest measured level over any eight-hour averaging period during the last three years is

less than 1.0 parts per million (ppm), compared to the ambient air quality standard of 9.0 ppm (City of Santa Cruz, April 2012, DEIR volume).

TABLE 4.2-1: North Central Coast Air Basin Attainment Classification

Pollutant	Averaging Time	Designation/Classification
Federal Standards		
O ₃	8 hours	Unclassifiable/Attainment
NO ₂	1 hour, annual arithmetic mean	Unclassifiable/Attainment
CO	1 hour; 8 hours	Unclassifiable/Attainment
SO ₂	24 hours; annual arithmetic mean	Unclassifiable/Attainment
PM ₁₀	24 hours	Unclassifiable/Attainment
PM _{2.5}	24 hours; annual arithmetic mean	Unclassifiable/Attainment
Lead	Quarter; 3-month average	Unclassifiable/Attainment
State Standards		
O ₃	1 hour; 8 hours	Nonattainment (Transitional) ^a
NO ₂	1 hour; annual arithmetic mean	Attainment
CO	1 hour; 8 hours	Monterey Co. – Attainment
		San Benito Co. – Unclassified
		Santa Cruz Co. – Unclassified
SO ₂	1 hour; 24 hours	Attainment
PM ₁₀	24 hours; annual arithmetic mean	Nonattainment
PM _{2.5}	Annual arithmetic mean	Attainment
Lead ^b	30-day average	Attainment
SO ₄	24 hours	Attainment
H ₂ S	1 hour	Unclassified
Vinyl chloride ^b	24 hours	No designation
Visibility-reducing particles	8 hours (10:00 a.m.–6:00 p.m.)	Unclassified

Sources: CARB 2016; EPA 2017.

Notes: CO = carbon monoxide; H₂S = hydrogen sulfide; NO₂ = nitrogen dioxide; O₃ = ozone; PM₁₀ = coarse particulate matter; PM_{2.5} = fine particulate matter; SO₂ = sulfur dioxide; SO₄ = sulfates

^a Nonattainment-transitional is a subcategory of the nonattainment designation category for state standards that indicates that the area is nearing attainment.

^b CARB has identified lead and vinyl chloride as TACs with no threshold level of exposure for adverse health effects determined.

Odors

Odors represent emissions of one or more pollutants that are a nuisance to healthy persons and may trigger asthma episodes in people with sensitive airways. Pollutants associated with objectionable odors include sulfur compounds and methane. Typical sources of odors include landfills, rendering plants, chemical plants, agricultural uses, wastewater treatment plants, and

refineries. Odors are a complex problem that can be caused by minute quantities of substances (Monterey Bay Unified Air Pollution Control District, February 2008). Because people have mixed reactions to odors, the nuisance level of an odor varies. There are no known sources of objectionable odors in the vicinity of the proposed project.

Air Basin Plans

Air Quality Management Plan

The 1991 AQMP for the Monterey Bay Area was the first plan prepared in response to the CCAA of 1988 that established specific planning requirements to meet the O₃ standard. The Act requires that the AQMP be updated every three years. The most recent update was adopted in March 2017, and is an update to the elements included in the 2012 AQMP for the years 2012-2015. The primary elements updated from the 2012 AQMP include the air quality trends analysis, emission inventory, and mobile source programs.

The NCCAB is a nonattainment area for the CAAQS for both O₃ and PM₁₀. The AQMP addresses only attainment of the O₃ CAAQS. Attainment of the PM₁₀ CAAQS is addressed in the MBUAPCD's Particulate Plan, which was adopted in December 2005 and is summarized further below. Maintenance of the 8-hour NAAQS for O₃ is addressed in the District's "Federal Maintenance Plan for the Monterey Bay Region," which was adopted in March 2007 and also is summarized below.

A review of the air monitoring data for 2013-2015 indicates that there were fewer exceedance days compared to previous periods (MBARD, March 2017). The long-term trend shows progress has been made toward achieving O₃ standards. The number of exceedance days has continued to decline during the past 10 years despite population increases (Ibid.).

The MBUAPCD's 2017 AQMP identifies a continued trend of declining O₃ emissions in the NCCAB primarily related to lower vehicle miles traveled. Therefore, the MBUAPCD determined progress was continuing to be made toward attaining the 8-hour O₃ standard during the three-year period reviewed (Monterey Bay Air Resources District, March 2017).

Federal Maintenance Plan

The "Federal Maintenance Plan" (May 2007) presents the strategy for maintaining the NAAQS for O₃ in the NCCAB. It is an update to the 1994 Federal Maintenance Plan, which was prepared for maintaining the 1-hour NAAQS for O₃ that since has been revoked and is superseded by the current 8-hour O₃ standard. Effective June 15, 2004, the U.S. EPA designated the NCCAB as an attainment area for the 8-hour NAAQS for O₃. The plan includes an emission inventory for the years 1990 to 2030 for VOC and NO_x, the two primary O₃ precursor gases, as explained above. A contingency plan is included to ensure that any future violation of the standard is promptly corrected (Monterey Bay Unified Air Pollution Control District, May 2007).

Particulate Matter Plan

The purpose of the “Particulate Matter Plan” (December 2005) is to fulfill the requirements of Senate Bill 655, which was approved by the California Legislature in 2003 with the objective of reducing public exposure to particulate matter. The legislation requires CARB, in conjunction with local air pollution control districts, to adopt a list of the most readily available, feasible, and cost-effective control measures that could be implemented by air pollution control districts to reduce ambient levels of particulate matter in their air basins (Monterey Bay Unified Air Pollution Control District, December 2005). The Plan’s proposed activities include control measures for fugitive dust, public education, administrative functions, and continued enhancements to the MBUAPCD’s Smoke Management and emission reduction incentive programs.

Climate Change

A full discussion of global climate change is presented in the *General Plan 2030* EIR (DEIR pages 4.12-1 to 4.12-20 and FEIR pages 3-26 to 3-27), which is incorporated by reference; key elements of the discussion are summarized below and have been updated where relevant. Climate change refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns over a period of time. Climate change may result from natural factors, natural processes, and human activities that change the composition of the atmosphere and alter the surface and features of the land. Significant changes in global climate patterns recently have been associated with global warming, an average increase in the temperature of the atmosphere near the Earth’s surface, attributed to accumulation of greenhouse gas (GHG) emissions in the atmosphere. GHGs trap heat in the atmosphere, which in turn heats the surface of the Earth. Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities. Climate change models predict changes in temperature, precipitation patterns, water availability, and rising sea levels, and these altered conditions can have impacts on natural and human systems in California that can affect California’s public health, habitats, ocean and coastal resources, water supplies, agriculture, forestry, and energy use.

Greenhouse Gas Emissions

GHGs include, but are not limited to, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), O₃, fluorinated gases (hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF₆) and nitrogen trifluoride (NF₃)), chlorofluorocarbons (CFCs), and hydrochlorofluorocarbons (HCFCs), in addition to water vapor.² Some GHGs, such as CO₂, CH₄, and N₂O, occur naturally and are emitted to the atmosphere through natural processes and human activities. Of these gases, CO₂ and CH₄ are emitted in the greatest quantities from human activities. Some industrial gases

² California Health and Safety Code 38505 identifies seven GHGs that CARB is responsible to monitor and regulate to reduce emissions: CO₂, CH₄, N₂O, SF₆, HFCs, PFCs, and NF₃.

are also GHGs that have a much greater heat-absorption potential than CO₂, include fluorinated gases, such as HFCs, PFCs, and SF₆, which are associated with certain industrial products and processes.

According to the U.S. EPA's *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2014* (U.S. Environmental Protection Agency 2016), total United States GHG emissions were approximately 6,870.5 million metric tons (MMT) CO₂E³ in 2014. The primary GHG emitted by human activities in the United States was CO₂, which represented approximately 80.9 percent of total GHG emissions (5,556.0 MMT CO₂E). The largest source of CO₂, and of overall GHG emissions, was fossil-fuel combustion, which accounted for approximately 93.7 percent of CO₂ emissions in 2014 (5,208.2 MMT CO₂E). Total United States GHG emissions have increased by 7.4 percent from 1990 to 2014, and emissions increased from 2013 to 2014 by 1.0 percent (70.5 MMT CO₂E). Since 1990, United States GHG emissions have increased at an average annual rate of 0.3 percent; however, overall, net emissions in 2014 were 8.6 percent below 2005 levels (Ibid.).

According to California's 2000–2014 GHG emissions inventory (2016 edition), California emitted 441.5 MMT CO₂E in 2014, including emissions resulting from out-of-state electrical generation (California Air Resources Board 2016). As with nationwide emissions, the primary GHG emitted by human activities in California was CO₂, which represented approximately 84.3 percent of total GHG emissions. The largest sources of GHG emissions in California were transportation and industrial uses, followed by electric power production from both in-state and out-of-state sources, residential and commercial activities, agriculture, high global-warming potential substances, and recycling and waste (Ibid.).

During the 2000 to 2014 period, per capita GHG emissions in California have continued to drop from a peak in 2001 of 13.9 MT per person to 11.4 MT per person in 2014, representing an 18 percent decrease. In addition, total GHG emissions in 2014 were 2.8 MMT CO₂E less than 2013 emissions. The declining trend in GHG emissions, coupled with programs that will continue to provide additional GHG reductions going forward, demonstrates that California is on track to meet the 2020 target of 431 MMT CO₂E (California Air Resources Board 2016).

California Regulations and Plans

The State of California passed the Global Warming Solutions Act of 2006 (AB 32), which requires reduction of GHG emissions generated within California. The Governor's Executive Order S-3-05 and AB 32 (Health and Safety Code, Section 38501 et seq.) both seek to achieve 1990 emissions levels by the year 2020. Executive Order S-3-05 further requires that California's GHG emissions

³ The Intergovernmental Panel on Climate Change (IPCC) developed the Global Warming Potential (GWP) concept to compare the ability of each greenhouse gas to trap heat in the atmosphere relative to another gas. The reference gas used is CO₂, and GWP weighted emissions are measured in teragrams (or million metric tons) of CO₂ equivalent (Tg CO₂E). A million metric tons of CO₂ equivalent also is referenced as MMTCO₂E (City of Santa Cruz, April 2012, DEIR volume).

be 80 percent below 1990 levels by the year 2050. Senate Bill 32 requires the CARB to ensure that statewide GHG emissions are reduced to 40 percent below 1990 levels by 2030.

In 2007 the CARB approved a statewide limit on the GHG emissions level for year 2020 consistent with the determined 1990 baseline (427 million metric tons (MMT) CO₂E). In 2008, the CARB adopted the *Climate Change Scoping Plan: A Framework for Change (Scoping Plan)* in accordance with Health and Safety Code Section 38561. The *Scoping Plan* establishes an overall framework for the measures that will be adopted to reduce California's GHG emissions for various emission sources/sectors to 1990 levels by 2020. CARB determined that achieving the 1990 emissions level in 2020 would require a reduction in GHG emissions of approximately 28.5 percent from the otherwise projected 2020 emissions level; i.e., those emissions that would occur in 2020, absent GHG-reducing laws and regulations (referred to as "Business-As-Usual" [BAU]).

The *Scoping Plan* identified 18 emissions-reduction measures that address cap-and-trade programs, vehicle gas standards, energy efficiency, low carbon fuel standards, renewable energy, regional transportation-related greenhouse gas targets, vehicle efficiency measures, goods movement, solar roofs program, industrial emissions, high speed rail, green building strategy, recycling, sustainable forests, water, and air. The key elements of the *Scoping Plan* include the following:

1. Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
2. Achieving a statewide renewable energy mix of 33 percent;
3. Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system and caps sources contributing 85 percent of California's GHG emissions;
4. Establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets;
5. Adopting and implementing measures pursuant to existing state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard (LCFS 17 Cal. Code Regs. Section 95480 et seq.); and
6. Creating targeted fees, including a public goods charge on water use, fees on high global warming potential (GWP) gases, and a fee to fund the administrative costs of the State of California's long-term commitment to AB 32 implementation.

In the 2011 Final Supplement to the *Scoping Plan's* Functional Equivalent Document, the CARB revised its estimates of the projected 2020 emissions level in light of the economic recession and the availability of updated information about GHG reduction regulations. Based on the new economic data, the CARB determined that achieving the 1990 emissions level by 2020 would require a reduction in GHG emissions of 21.7 percent (down from 28.5 percent) from the BAU conditions. When the 2020 emissions level projection was updated to

account for newly implemented regulatory measures, including Pavley I (model years 2009–2016) and the Renewable Portfolio Standard (12 to 20 percent), the CARB determined that achieving the 1990 emissions level in 2020 would require a reduction in GHG emissions of 16 percent (down from 28.5 percent) from the BAU conditions.

In 2014, the CARB adopted the *First Update to the Climate Change Scoping Plan: Building on the Framework (First Update)*. The stated purpose is to “highlight California’s success to date in reducing its GHG emissions and lay the foundation for establishing a broad framework for continued emission reductions beyond 2020, on the path to 80 percent below 1990 levels by 2050.” The *First Update* found that California is on track to meet the 2020 emissions reduction mandate established by AB 32, and noted that California could reduce emissions further by 2030 to levels squarely in line with those needed to stay on track to reduce emissions to 80 percent below 1990 levels by 2050 if the state realizes the expected benefits of existing policy goals.

In conjunction with the *First Update*, the CARB identified “six key focus areas comprising major components of the state’s economy to evaluate and describe the larger transformative actions that will be needed to meet the state’s more expansive emission reduction needs by 2050.” Those six areas are: 1) energy; 2) transportation (vehicles/equipment, sustainable communities, housing, fuels, and infrastructure); 3) agriculture; 4) water; 5) waste management; and, 6) natural and working lands. The *First Update* identifies key recommended actions for each sector that will facilitate achievement of Executive Order S-3-05’s 2050 reduction goal. Based on the CARB’s research efforts presented in the *First Update*, it has a “strong sense of the mix of technologies needed to reduce emissions through 2050.” Those technologies include energy demand reduction through efficiency and activity changes; large-scale electrification of on-road vehicles, buildings and industrial machinery; decarbonizing electricity and fuel supplies; and, the rapid market penetration of efficient and clean energy technologies.

As part of the *First Update*, the CARB recalculated the state’s 1990 emissions level using more recent global warming potentials identified by the Intergovernmental Panel on Climate Change. Using the recalculated 1990 emissions level (431 MMT CO₂E) and the revised 2020 emissions level projection identified in the 2011 Final Supplement, the CARB determined that achieving the 1990 emissions level by 2020 would require a reduction in GHG emissions of approximately 15 percent (instead of 28.5 percent or 16 percent) from the BAU conditions. The update also recommends that a statewide mid-term target and mid-term and long-term sector targets be established toward meeting the 2050 goal established by EO S-3-05 (i.e., reduce California’s GHG emissions to 80 percent below 1990 levels), although no specific recommendations are made. The declining trend in GHG emissions, coupled with programs that will continue to provide additional GHG reductions going forward, demonstrates that California is on track to meet the 2020 target of 431 MMT CO₂E (California Air Resources Board, May 2014).

On January 20, 2017, CARB released The *2017 Climate Change Scoping Plan Update (Second Update)* for public review and comment (California Air Resources Board, January 2017). This

update proposes the CARB’s strategy for achieving the states 2030 GHG target, including continuing the Cap-and-Trade Program through 2030 and includes a new approach to reduce GHGs from refineries by 20 percent. The *Second Update* incorporates approaches to cutting super pollutants from the Short Lived Climate Pollutants Strategy (such as black carbon), acknowledges the need for reducing emissions in agriculture and highlights the work underway to ensure that California’s natural and working lands increasingly sequester carbon. When discussing project-level GHG emissions reduction actions and thresholds, the *Second Update* states “achieving no net increase in GHG emissions is the correct overall objective, but it may not be appropriate or feasible for every development project. And the inability to mitigate a project’s GHG emissions to zero does not necessarily imply a substantial contribution to the cumulatively significant environmental impact of climate change under CEQA.”

For local governments, the *Second Update* replaced the initial Scoping Plan’s 15% reduction goal with a recommendation to aim for a community-wide goal of no more than 6 MT CO₂E per capita by 2030 and no more than 2 MT CO₂E per capita by 2050, which are consistent with the state’s long-term goals. These goals are appropriate for the plan level (city, county, subregional, or regional level, as appropriate), but not for specific individual projects because they include all emissions sectors in the State. The *Second Update* recognized the benefits of local government GHG planning (e.g., through climate action plans (CAPs)) and provide more information regarding tools the CARB is working on to support those efforts. It also recognizes the CEQA streamlining provisions for project level review where there is a legally adequate CAP. It is expected that CARB will consider the *Second Update* for approval in the spring or summer 2017.

The Scoping Plan recommends strategies for implementation at the statewide level to meet the goals of AB 32, Senate Bill 32 and the Executive Orders and establishes an overall framework for the measures that will be adopted to reduce California’s GHG emissions. A project is considered consistent with the statutes and Executive Orders if it meets the general policies in reducing GHG emissions in order to facilitate the achievement of the state’s goals and does not impede attainment of those goals. As discussed in several cases, a given project need not be in perfect conformity with each and every planning policy or goals to be consistent. A project would be consistent, if it will further the objectives and not obstruct their attainment.

City of Santa Cruz Climate Action Plan

The City’s *General Plan 2030* includes goals, policies, and actions on climate change, including reducing community-wide GHG emissions 30 percent by 2020, reducing GHG emissions 80 percent by 2050 (compared to 1990 levels), and for all new buildings to be emissions-neutral by 2030. In October 2012, the City adopted a *Climate Action Plan* (CAP) that outlines the actions the City will take over the next 10 years to reduce GHGs by 30 percent and to implement the policies and actions identified in the *General Plan 2030*. The CAP addresses citywide GHG reduction strategies. The CAP provides City emissions inventories, identifies an emissions reduction target for the year 2020, and includes measures to reduce energy use, reduce vehicle trips, implement water conservation programs, reduce emissions from waste collection, increase use of solar systems, and develop public partnerships to aide sustainable practices. Measures are outlined

for the following sectors: municipal, residential, commercial, and community programs. The CAP includes an implementation chapter that identifies tracking and reporting of the success of the measures, including City staff responsibilities.

4.2.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies, and/or guidelines; and agency and professional standards, a project impact would be considered significant if the project would:

- 2a Conflict with or obstruct implementation of the air quality management plan;
- 2b Violate any air quality standards or contribute substantially to an existing or projected air quality violation, i.e. result in generation of emissions of or in excess of 137 pounds per day for ROG or NO_x, 550 pounds per day of carbon monoxide, 150 pounds per day of sulfur oxides (SO_x), 82 pounds per day of PM₁₀ (due to construction with minimal earthmoving on 8.1 or more acres per day or grading/excavation site on 2.2 or more acres per day for PM₁₀), and/or 55 pounds per day of PM_{2.5} pursuant to impact criteria for significance developed by the MBARD (MBUAPCD, “CEQA Air Quality Guidelines,” February 2008 and February 2016);
- 2c Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
- 2d Expose sensitive receptors (i.e., residents, schools, hospitals) to substantial pollutant concentrations, i.e. those that exceed the MBUAPCD standards identified above and/or toxic air contaminants that exceed health exposure rates;
- 2e Create objectionable odors in substantial concentrations, affecting a substantial number of people, which could result in injury, nuisance, or annoyance to a considerable number of persons, or would endanger the comfort, health, or safety of the public;
- 2f Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or
- 2g Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

The State CEQA Guidelines do not prescribe specific methodologies for performing a GHG emissions assessment, establish specific thresholds of significance, or mandate specific mitigation measures. Rather, the CEQA Guidelines emphasize the lead agency’s discretion to determine the appropriate methodologies and thresholds of significance that are consistent with the manner in which other impact areas are handled in CEQA. Global climate change is a

cumulative impact; a project participates in this potential impact through its incremental contribution combined with the cumulative increase of all other sources of GHGs. There are currently no established thresholds for assessing whether the GHG emissions of a project in the NCCAB would be considered a cumulatively considerable contribution to global climate change, except the MBUAPCD has an adopted guideline for stationary source projects in which a project would not have not a significant GHG emissions impact if the project emits less than 10,000 MT/yr CO₂E or complies with regulations or requirements adopted to implement a statewide, regional or local plan for the reduction or mitigation of GHG emissions (Monterey Bay Unified Air Pollution Control District, February 2016).

Analytical Method

The proposed project consists of amendments to the City's Downtown Recovery Plan, General Plan, Local Coastal Plan and Zoning Code regarding development in the downtown area and Central Business District. The proposed project would not directly result in new development. However, the proposed Downtown Plan amendment would expand areas for potential additional building height that could accommodate intensified redevelopment of existing developed sites. City staff estimates that the proposed amendments could indirectly lead to development, resulting in a potential net increase of 711 new residential units and 2,200 square feet of office space with a net decrease of approximately 14,700 square feet of commercial building space over existing conditions within the downtown area. The proposed General Plan amendment would increase FAR in areas designated as RVC in the General Plan. The proposed LCP and Zoning Code amendments would not result in changes that could indirectly lead to intensified development or air emissions.

The air quality analysis used the California Emissions Estimator Model (CalEEMod), which is currently being recommended by the MBUAPCD. The CalEEMod Version 2016.3.1 was used to estimate potential project-generated criterial pollutant and GHG emissions with projected buildout resulting from the proposed plan amendments, including an estimated reduction in existing commercial uses. No specific development projects are proposed, and no project-site specific development applications have been submitted to the City. City Planning Department staff estimate that potential development and buildout estimated for the purpose of assessing environmental impacts would occur over 25 years. Construction emissions cannot be determined in the absence of specific development projects with identified construction schedules and equipment. Emissions from the operational phase of future development supported by the project and for the reduced commercial area were estimated using CalEEMod default emission factor values for mobile, area, and energy sources. In addition, project-specific trip generation and water demand rates identified in this EIR were incorporated into CalEEMod. Model outputs and assumptions are included in Appendix E.

Impacts and Mitigation Measures

As described in the Initial Study (see Appendix A), exposure to diesel emission during construction would result in a less-than-significant impact (2d), and the project would not result in creation of objectionable odors (2e). Thus, no further discussion is required for these topics. The project would not conflict with or obstruct implementation of the AQMP (2a) or conflict with GHG reduction plans (2g) as explained below. The impact analyses address criteria pollutant emissions and potential violation of an air quality standard (2b) and GHG emissions (2f). Cumulative impacts (2c) are addressed in Chapter 5, CEQA Considerations.

Conflicts with Adopted Plans – No Impact

Effective September 1, 2011 the MBUAPCD Board approved a new procedure for determining whether a residential project conflicts with the District's adopted AQMP. The procedure uses AMBAG's adopted housing unit forecast instead of population, and the MBUAPCD has developed a spreadsheet to assist jurisdictions with developing calculations, which was used to determine whether the proposed project conflicts with the AQMP as described below.

The City had 23,693 existing dwelling units as of January 1, 2017, and approximately 389 residential units have been constructed, are under construction or have been approved. With existing units, approved units and the proposed project increase of 711 residential units, there would be a total of 24,793 dwelling units within the City. Development that could occur as a result of the proposed project is estimated to occur over the next 20-25 years. Housing units with the addition of the proposed project would be below the current AMBAG forecast of 28,297 dwelling units for the year 2030 and 29,335 units in the year 2035. The proposed project with buildout under the General Plan and accounting for units that have been constructed and occupied since the General Plan was adopted, would result in approximately 27,244 dwelling units, which is within AMBAG forecasts for 2030 and 2035. Therefore, growth that could be accommodated by the proposed project is consistent with the AQMP, and would not conflict with or obstruct implementation of the AQMP (2a).

With regards to GHG reduction plans, the Scoping Plan, approved by CARB on December 12, 2008, provides a framework for actions to reduce California's GHG emissions and requires CARB and other state agencies to adopt regulations and other initiatives to reduce GHGs. As such, the Scoping Plan is not directly applicable to specific projects. In the Final Statement of Reasons for the Amendments to the CEQA Guidelines, the California Natural Resources Agency (CNRA) observed that "[t]he [Scoping Plan] may not be appropriate for use in determining the significance of individual projects because it is conceptual at this stage and relies on the future development of regulations to implement the strategies identified in the Scoping Plan" (California Natural Resources Agency, 2009). Under the Scoping Plan, however, there are several state regulatory measures aimed at the identification and reduction of GHG emissions. CARB and other state agencies have adopted many of the measures identified in the Scoping Plan. Most of these measures focus on area source emissions (e.g., energy usage, high-GWP GHGs in consumer products) and changes to the vehicle fleet (i.e., hybrid, electric, and more fuel-efficient vehicles)

and associated fuels (e.g., LCFS), among others. The Scoping Plan recommends strategies for implementation at the statewide level to meet the goals of AB 32 and establishes an overall framework for the measures that will be adopted to reduce California’s GHG emissions. The project would comply with all applicable regulations adopted in furtherance of the Scoping Plan to the extent required by law.

The proposed project consists of amendments to the City’s Downtown Recovery Plan, General Plan, LCP and Zoning Code to accommodate intensified development in the downtown area. To this extent, the proposed amendments are consistent with the sustainable transportation and land use planning goals set forth in the City’s Climate Action Plan that encourage higher density development along transit corridors and activity centers to support efficient, accessible, and sustainable transportation options. Based on the preceding considerations, the proposed project would not result in conflicts with an applicable plan, policy or regulation adopted for the purpose of reducing GHG emissions (2g)

Urban Heat Island Effect – No Impact

A comment was raised regarding the potential for subsequent development under the proposed Plan amendments to create an “urban heat island.” The phrase “urban heat island” refers to the effect of urbanized areas on surface and air temperature compared to their rural surroundings. Buildings, roads, and other “hardscape” create an island of higher temperatures within the regional landscape. As described by the EPA, “[u]rban heat islands are caused by development and the changes in radiative and thermal properties of urban infrastructure as well as the impacts buildings can have on the local microclimate—for example tall buildings can slow the rate at which cities cool off at night. Heat islands are influenced by a city’s geographic location and by local weather patterns, and their intensity changes on a daily and seasonal basis” (U.S. Environmental Protection Agency, 2008). The term is generally used to refer to community-wide effects, particularly for large metropolitan cities. Increased temperatures due to the urban heat island effect may lead to increased energy consumption, which has implications for air quality and GHG emissions. In addition to energy-related increases in air emissions, elevated air temperatures increase the rate of ground-level O₃ formation.

Some cities have adopted strategies to deal with these environmental impacts, such as increasing vegetation and using more energy-efficient building materials. These strategies are often part of more general energy savings or “sustainability” practices and are not identified as “urban heat island effect” mitigation, but nevertheless they provide the benefits of reducing surface and atmospheric heat islands.

In the present case, the downtown area is within an existing urbanized and developed area. The proposed amendment would allow an increment of increased height, but the area already supports existing development, paved areas as well as larger buildings, street trees and landscaping. The area is not within a rural setting and future development would not be of the magnitude to result in creation of the effect referred to as an “urban heat island.” Future development would be subject to the City’s General Plan 2030, Zoning Code and Green Building

standards regrading energy efficiency. Furthermore, this potential effect is not related to pollutant or greenhouse gas emissions or the thresholds of significance identified for impact analysis, and no further review is required under CEQA.

Impact 4.2-1: Criteria Pollutant Emissions. Future development and growth accommodated by the proposed project would result in emissions of criteria pollutants, but would not exceed adopted thresholds of significance, violate any air quality standard or contribute substantially to an existing or projected air quality violation (2b). This is a *less-than-significant* impact.

Construction Emissions

Future development accommodated by the proposed plan amendments would result in construction-related emissions that could affect air quality by increasing O₃ precursor and particulate matter emissions for an area that already exceeds California ambient air quality standards for these pollutants. Construction activities include demolition, excavation, grading, vehicle trips (including workers, deliveries and hauling), and vehicle travel on paved and unpaved surfaces. Vehicle and equipment exhaust would generate pollutant emissions. Construction projects may also generate DPM emissions from diesel-fueled equipment.

The proposed project could indirectly lead to new development that could result in generation of particulate emissions from entrained dust, off-road equipment, vehicle emissions, architectural coatings, and asphalt pavement application during construction. Entrained dust results from the exposure of earth surfaces to wind from the direct disturbance and movement of soil, resulting in PM₁₀ and PM_{2.5} emissions. Particulate matter emissions can vary daily, depending on various factors, such as the level of activity, type of construction activity taking place, type of equipment in operation, and weather conditions. Internal combustion engines used by construction equipment, vendor trucks (e.g., delivery trucks), and worker vehicles would result in emissions of ROG, NO_x, CO, PM₁₀, and PM_{2.5}. The application of architectural coatings, such as exterior application/interior paint and other finishes, and application of asphalt pavement would also produce ROG emissions. Based on MBUAPCD CEQA Guidelines (2008), exhaust emissions from these typical construction activities generally would not result in a significant impact because their emissions are already accounted for in the emissions inventories of the state- and federally-required air plans, and they would not have a significant impact on the attainment and maintenance of the O₃ AAQS.

The scale and timing of construction is unknown, and construction activities would be variable throughout the day and overall construction period. The City's General Plan requires future development projects to implement applicable MBARD control measures and/or air quality mitigations in the design of new projects as set forth in the District's "CEQA Guidelines". The Guidelines provide screening levels for potential significant impacts, and projects that are cover 2.2 or more acres may be required to implement dust suppression measures during construction unless future project-level construction-emissions modeling indicates that pollutant thresholds established by the MBARD would not be exceeded. Therefore, implementation and application

of General Plan policies and MBARD recommended measures, if required, would reduce any future significant project construction emissions to a less-than-significant level.

Operational Emissions

Future development and growth accommodated by the proposed project would generate criteria pollutant emissions from vehicular traffic, area sources (consumer products, architectural coatings, landscaping equipment), and energy sources (natural gas appliances, space and water heating). The reduced commercial area would result in an associated reduction in emissions from these sources. The emissions associated with on-road mobile sources include running and starting exhaust emissions, evaporative emissions, brake and tire wear, and fugitive dust entrainment. The CalEEMod model was utilized to estimate operational emissions for the year 2040, which is the closest selectable year in the model to the earliest year that the project is expected to be built out over 25 years. Default trip rates in CalEEMod were adjusted to match the weekday trips provided by the traffic consultant for the project (Kimley Horn, May 2017). Default water demand estimates in CalEEMod were also adjusted to match the values provided in the City Urban Water Management Plan.

Table 4.2-2 summarizes the results of the emissions modeling. As shown, daily emissions associated with project operation would not exceed the MBUAPCD significance thresholds. The project emissions would be below the significance thresholds adopted by MBUAPCD for evaluating impacts to O₃ and particulate matter, and, thus, the project would not contribute substantially to existing or projected violations of those standards. Therefore, emissions of criteria pollutants associated with operation of the proposed project would result in a less-than-significant impact.

CO emissions from traffic generated by the project would be the pollutant of concern at the local level. Congested intersections with a large volume of traffic have the greatest potential to cause high-localized concentrations of CO. As indicated above, air pollutant monitoring data indicate that CO levels have been at healthy levels (i.e., below state and federal standards) for years, reflecting improvements in tailpipe emissions controls. As a result, the region has been designated as attainment/unclassified for the standard. The MBUAPCD's CEQA Guidelines indicated that a project could result in potentially significant CO emissions if the project would result in a decrease in intersection or road level of service (LOS) from D or better to E or F or increase delays by more than 10 seconds at intersections that operate at E or F. As discussed in Chapter 4.5, Traffic and Transportation, the project would not result in a decrease in intersection LOS to E or F. The project would result in approximately 237 weekday PM peak hour trips distributed to numerous intersections, however, the project would not result in a decrease in operations to a LOS below D, and would result in less than 10 seconds delay at intersections operation at LOS E. Thus, the proposed project does not meet the criteria for potential indirect CO emissions, and the project does not have the potential to cause a CO violation at affected intersections to which the project contributes traffic.

TABLE 4.2-2: Estimated Maximum Daily Operational Project Emissions

Emission Source	ROG	NO _x	CO	SO _x	PM ₁₀	PM _{2.5}
	(pounds per day)					
Increased Residential and Office Uses						
Area	19.9	0.7	58.6	0.0	0.3	0.3
Energy	0.3	2.6	1.1	0.0	0.2	0.2
Mobile	2.4	10.7	30.8	0.1	18.4	5.0
Subtotal	22.6	14.0	90.6	0.1	19.0	5.5
Reduced Commercial Uses						
Area	0.4	0.0	0.0	0.0	0.0	0.0
Energy	0.0	0.0	0.0	0.0	0.0	0.0
Mobile	0.3	1.1	2.5	0.0	1.3	0.3
Subtotal	0.6	1.1	2.5	0.0	1.3	0.3
Total Net Increase	22.0	12.9	88.1	0.1	17.7	5.2
Emission threshold [1]	137	137	550	150	82	55
Threshold exceeded?	No	No	No	No	No	No

[1] Monterey Bay Unified Air Pollution Control District, February 2008, February 2016.

Notes: Emissions were modeled with CalEEMod 2016.3.1. The maximum of summer or winter values are included above and the totals may not sum exactly due to rounding. In addition, project emissions are based on the "Mitigated" CalEEMod outputs in order to incorporate the 2016 Title 24 standards (i.e., residences and commercial uses that comply with 2016 Title 24 are 28% and 5% more efficient than 2013 Title 24, respectively), high efficiency outdoor lighting, and the 75% waste diversion consistent with State standards (Assembly Bill 341), even though compliance with these standards would not be considered actual mitigation. For the Reduced Commercial scenario, only the 75% waste diversion was assumed with no building energy improvements, since this scenario represents existing uses that would be demolished.

ROG = reactive organic gases; NO_x = oxides of nitrogen; CO = carbon monoxide; SO_x = sulfur oxides; PM₁₀ = coarse particulate matter; PM_{2.5} = fine particulate matter.

Area sources = consumer product use, architectural coatings, and landscape maintenance equipment. Energy sources = natural gas appliances. Mobile sources = on-road vehicles.

See Appendix E for detailed results.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.2-2: Greenhouse Gas (GHG) Emissions. Future development and growth accommodated by the proposed project would result in GHG emissions, which are not considered significant (2f). Therefore, this is a *less-than-significant* impact.

Development accommodated by the proposed project is expected to occur over the next 25 years. No stationary source emissions (such as emergency generators) are anticipated with future residential and office space accommodated by the project. Future development would result in GHG emissions from vehicular traffic, area sources (landscaping maintenance), electrical generation, natural gas consumption, water supply and wastewater treatment, and solid waste. The reduced commercial area would result in an associated reduction in emissions from these

sources. Project-specific trip generation rates and indoor water use consistent with the City Urban Water Management Plan were incorporated into the CalEEMod model. As shown in Table 4.2-3, the proposed project is estimated to result in a net increase of approximately 4,053 MT of CO₂E per year.

TABLE 4.2-3: Estimated Annual Operational Project Greenhouse Gas Emissions

	MT CO ₂	MT CH ₄	MT N ₂ O	MT CO ₂ E
<i>Increased Residential and Office Uses</i>				
Area Sources	12.0	0.0	0.0	12.3
Energy	1,813.4	0.1	0.0	1,825.1
Mobile	2,297.2	0.1	0.0	2,298.8
Solid Waste	16.7	1.0	0.0	41.4
Water Supply and Wastewater	37.5	1.0	0.0	68.9
Subtotal	4,176.8	2.2	0.0	4,246.5
<i>Reduced Commercial</i>				
Area Sources	0.0	0.0	0.0	0.0
Energy	34.4	0.0	0.0	34.6
Mobile	155.1	0.0	0.0	155.2
Solid Waste	0.8	0.0	0.0	1.9
Water Supply and Wastewater	1.2	0.0	0.0	2.2
Subtotal	191.5	0.0	0.0	193.9
Total Net Increase				4,052.6

Notes: Emissions were modeled with CalEEMod 2016.3.1. The annual emission totals may not sum exactly due to rounding. Project emissions are based on the "Mitigated" CalEEMod outputs in order to incorporate the 2016 Title 24 standards (i.e., residences and commercial uses that comply with 2016 Title 24 are 28% and 5% more efficient than 2013 Title 24, respectively), high efficiency outdoor lighting, and the 75% waste diversion consistent with State standards (Assembly Bill 341), even though compliance with these standards would not be considered actual mitigation. For the Reduced Commercial scenario, only the 75% waste diversion was assumed with no building energy improvements, since this scenario represents existing uses that would be demolished.

MT CO₂ – metric tons carbon dioxide; MT CH₄ – metric tons methane; MT N₂O – metric tons nitrous oxide; MT CO₂E – metric tons carbon dioxide equivalent

See Appendix E for detailed results.

The project site is located within the NCCAB under the jurisdiction of the MBARD, which to date, has not adopted significance criteria or thresholds for land use projects. However, in February 2013, a staff report to the District Board indicated that the staff's current recommendation is to further review a GHG threshold of 2,000 MT CO₂E per year for land-use projects or compliance with an adopted GHG Reduction Plan/Climate Action Plan (Monterey Bay Unified Air Pollution Control District, February 2013). This recommendation was made after considering AB 32 goals and scoping plan measures that would reduce regional emissions and MBUAPCD staff's review of thresholds adopted or considered in other air districts throughout the state. The threshold was considered based on projects that would contribute 75-90 percent of future GHG emissions. Other air districts in the State have adopted a threshold of 1,100 MT CO₂E per year for land-use

projects, including the Bay Area Air Quality Management District, Sacramento Metropolitan Air Quality Management District, and San Luis Obispo County Air Pollution Control District (Association of Environmental Professionals 2016). Both the Bay Area and San Luis Obispo air districts also have per service population (i.e., residents plus employees) GHG emission thresholds of 4.6 and 4.9 MT CO₂E per year, respectively, for land-use projects (Ibid.).

Neither the City of Santa Cruz nor the MBUAPCD has adopted GHG emission significance thresholds. The project's estimated GHG emissions (about 4,053 MT/ CO₂E year) would exceed the significance threshold for development projects of 1,100 MT CO₂E per year used in neighboring air districts and the 2,000 MT of CO₂E per year threshold that had been under consideration by the MBUAPCD. However, the per service population emissions for operations would be about 2.4 MT CO₂E per year (based on 4,053 MT CO₂E per year divided by 1,728 service population of the project), which is substantially less than the thresholds established in neighboring air districts.

These quantitative thresholds are based on 2020 reduction goals and although the project buildout is estimated to be approximately 25 years, there are no established protocols or thresholds of significance for post-2020 future-year analysis (i.e., compliance with the Senate Bill 32 goal of reducing GHG emissions to 40% below 1990 levels by 2030 and Executive Order S-3-05 goal of reducing GHG emissions to 80% below 1990 levels by 2050). However, CARB forecasts that compliance with the current Scoping Plan puts the state on a trajectory of meeting these long-term GHG goals, although the specific path to compliance is unknown (CARB 2014). As discussed previously, the project would comply with all applicable state and local GHG reduction regulations and would not conflict with the state's trajectory toward future GHG reductions. In addition, since the specific path to compliance for the state in regards to the long-term goals will likely require development of technology or other changes that are not currently known or available, specific additional mitigation measures for future projects developed as a result of the proposed plan amendments would be speculative and cannot be identified at this time.

With respect to future GHG targets under Senate Bill 32 and Executive Order S-3-05, CARB has also made clear its legal interpretation that it has the requisite authority to adopt whatever regulations are necessary, beyond the AB 32 horizon year of 2020, to meet the reduction targets in 2030 and in 2050; this legal interpretation by an expert agency provides evidence that future regulations will be adopted to continue the state on its trajectory toward meeting these future GHG targets. Additionally, the City's *General Plan 2030* EIR estimated GHG emissions that could result in 2030 from potential development and buildout accommodated by the plan that included 3,350 residential dwelling units and approximately 3,140,000 additional square feet of new commercial, office, and industrial uses. The General Plan EIR analysis determined that the GHG emissions levels associated with potential buildout that would be accommodated by the General Plan would not be considered substantial compared to long-term forecasts and state and regional targets, and would be less than forecast statewide per capita emission rates. The preceding considerations support the conclusion that the project-level emissions are less than

significant and less than cumulatively considerable. Thus, the impact is considered less than significant.

It is expected that GHG emissions resulting from the proposed project would be partially offset by the incorporation of energy and water conserving features and “green” building designs that would be required under City and State building regulations, including the City’s Green Building requirements. Furthermore, the City’s *General Plan 2030* seeks to reduce citywide contribution to greenhouse gas emissions through land use planning, program development, investment in energy efficient infrastructure, and increased use of renewable energy. Green building policies and actions incorporate energy efficiency measures, water stewardship, use of sustainable building materials derived from renewable resources, reduction of waste through recycling and reuse, and smart growth and sustainable development practices. In addition to defining shorter-term strategies to address likely impacts of climate change on city infrastructure and resources, the City must also set planning goals to minimize future risks of sea level rise and climate change.

The City’s General Plan 2030 includes one goal with four policies and 19 accompanying actions that address climate change, including preparation and implementation of a “Climate Action Plan” to attain emissions reductions goals, which has been completed. In particular, the City seeks to achieve a 30% reduction in GHG emissions by 2020 and 80% by 2050 (NRC4.1.1) with all new development being carbon neutral by the year 2030. Other policies and actions seek to reduce vehicle emissions by 30% (NRC4.1.3) in addition with other transportation policies to reduce vehicle trips, and promote energy efficiency. Table 4.2-3 summarizes policies that directly or indirectly reduce greenhouse gas emissions and impacts. Additionally, policies in other chapters of the draft General Plan support local, state and federal actions to reduce carbon dioxide and GHG emissions (HZ2.1.1, HZ2.1.2) and efforts to improve local energy efficiency (NRC7.1), including a reduction in gas and electricity consumption (NRC7.1.1). A number of policies are also directed to reducing automobile trips and creating sustainable development and land use patterns, which would result in further reductions of automobile trips; Goal LU1 and supporting policies and actions seek sustainable land uses within the City.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

4.3 BIOLOGICAL RESOURCES

This section analyzes impacts of the proposed project on biological resources based on a review of existing city plans and review of potential impacts upon riparian and aquatic habitats and species by Dudek biologists and Kittleson Environmental Consulting as part of the preparation of this EIR. This section also draws from the City of Santa Cruz General Plan 2030 EIR (SCH#2009032007), which was certified on June 26, 2012, regarding background information on regulatory setting and sensitive habitats. The General Plan EIR is incorporated by reference in accordance with section 15150 of the State CEQA Guidelines. Relevant discussions are summarized in subsection 4.3.1. The General Plan EIR is available for review at the City of Santa Cruz Planning and Community Development Department (809 Center Street, Room 107, Santa Cruz, California) during business hours: Monday through Thursday, 8 AM to 12 PM and 1 PM to 5 PM. The General Plan EIR is also available online on the City's website at:

<http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development/general-plan>.

Public and agency comments related to air quality and emissions were received during the public scoping period in response to the Notice of Preparation (NOP). Issues raised in these comments include:

- ☐ Analysis of impacts on San Lorenzo River habitat and wildlife, including establishing the appropriate setback of new development, and potential impacts from shading resulting from the proposed building heights.
- ☐ Impacts to birds due to new taller buildings and associated shading, glare from east-facing windows, new lighting, and more people in the area.
- ☐ Evaluation of the "urban heat island" effect on riparian habitat.

To the extent that issues identified in public comments involve potentially significant effects on the environment according to the California Environmental Quality Act (CEQA) and/or are raised by responsible agencies, they are identified and addressed within this EIR. Public comments received during the public scoping period are included in Appendix B.

4.3.1 Environmental Setting

Regulatory Setting

Federal Regulations

The United States Fish and Wildlife Service (USFWS) is responsible for the protection of terrestrial and freshwater organisms through the federal Endangered Species Act and the Migratory Bird Treaty Act, while the National Oceanic and Atmospheric Administration National Fisheries (NOAA Fisheries) is responsible for protection of anadromous fish (fish that live most of

their adult life in saltwater but spawn in freshwater) and marine wildlife. The U.S. Army Corps of Engineers (ACOE) has primary responsibility for protecting wetlands and jurisdictional “other waters of the U.S.” under Section 404 of the Clean Water Act. A brief summary of relevant laws is provided below, and a full description is provided on pages 4.8-1-4,8-6 of the General Plan 2030 EIR (Draft EIR volume), which is incorporated by reference.

Federal Endangered Species Act. The federal Endangered Species Act (ESA) of 1973 (Title 16 United States Code, Section 1531 *et seq.*, as amended) prohibits federal agencies from authorizing, permitting or funding any action that would result in biological jeopardy to or take of a species listed as threatened or endangered. NOAA Fisheries jurisdiction under the ESA is limited to the protection of marine mammals and fish and anadromous fish; all other species are within USFWS jurisdiction. ESA defines “take” to mean to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Exemptions to the prohibitions against take may be obtained through coordination with the USFWS through interagency consultation for projects with federal involvement (i.e., funded, authorized, or carried out by a Federal agency) pursuant to Section 7 of the ESA; or through the issuance of an incidental take permit under Section 10(a)(1)(B) of the ESA if the applicant submits a habitat conservation plan (HCP) that meets statutory requirements including components to minimize and mitigate impacts associated with the take.

Birds of Conservation Concern. USFWS’ *Birds of Conservation Concern* (BCC) (2008) was developed to fulfill the mandate of the 1988 amendment to the Fish and Wildlife Conservation Act (Public Law 100-653 (102 Stat. 3825) to “identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act (ESA) of 1973” (U.S. Fish and Wildlife Service, September 2015). The overall goal of the Birds of Conservation Concern is to accurately identify the migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the highest conservation priorities. The bird species included on the BCC lists include nongame birds, gamebirds without hunting seasons, ESA candidate, proposed endangered or threatened, and recently delisted species.

Migratory Bird Treaty Act. All migratory birds and their nests are federally protected under the Migratory Bird Treaty Act of 1918 (MBTA) (Title 16 United States Code, Section 703-712 as amended; 50 Code of Federal Regulations Section 21; and 50 Code of Federal Regulations Section 13) and by California Department of Fish and Wildlife codes that support the act. The MBTA makes it unlawful to “take” any migratory bird or raptor listed in the 50 Code of Federal Regulations Section 10, including their nests, eggs or products.

Wetlands and Waters of the U.S. The ACOE has regulatory authority for activities within wetlands under the Clean Water Act (CWA, 1977, as amended), which serves as the primary federal law protecting the quality of the nation’s surface waters. Section 404 of the CWA establishes a program to regulate discharge of dredged or fill material into “waters of the United States,” which is administered by the ACOE. The term “waters” includes wetlands and non-

wetland bodies of water that meet specific criteria as defined in the Code of Federal Regulations. In general, a permit must be obtained before fill can be placed in wetlands or other waters of the U.S. The type of permit depends on the amount of acreage and the purpose of the proposed fill, subject to discretion of the Corps. Under Section 404, general permits may be issued on a nationwide, regional, or state basis for particular types of activities that will have only minimal adverse impacts. Individual permits are required for projects with potentially significant impacts.

Under section 401 of the CWA, the California Regional Water Quality Control Boards (RWQCB) have regulatory authority over actions in waters of the U.S. through issuance of water quality certifications, which are issued in combination with permits issued by the ACOE under section 404 of the Clean Water Act. A 401 Certification is required from the RWQCB whenever improvements are made within Jurisdictional Waters of the U.S.

State Regulations

The California Department of Fish and Wildlife (CDFW) administers the California Endangered Species Act and protects streams and water bodies through the Streambed Alteration Agreement under Section 1600 of the California Fish and Game Code (CFG 2005).

California Endangered Species Act. The 1984 California Endangered Species Act (CESA) (Fish & Game Code, Section 2050-2098) declares that deserving plant or animal species be given protection by the State because they are of ecological, historic, educational, recreational, aesthetic, economic, and scientific value to the people of the State. Under state law, plant and animal species may be formally designated rare, threatened, or endangered by official listing by the CDFW. CESA authorizes that entities may take plant or wildlife species listed as endangered or threatened under FESA and CESA, pursuant to a federal incidental take permit issued in accordance with Section 10 of the FESA, if the CDFW certifies that the incidental take statement or incidental take permit is consistent with CESA (Fish & Game Code, Section 2080.1(a)). Section 2081(b) and (c) of the CESA allows CDFG to issue an incidental take permit for a state-listed threatened and endangered species only if specific criteria are met. These criteria can be found in Title 14 CCR, Sections 783.4(a) and (b).

Species of Special Concern and Fully Protected Species. In addition to lists of designated Endangered, Threatened, and Rare plant and animal species, the CDFW maintains a list of animal “Species of Special Concern,” most of which are species whose breeding populations in California may face extirpation. Although these species have no legal status under the CESA, the CDFW recommends considering these species during analysis of proposed project impacts to protect declining populations, and to avoid the need to list them as threatened or endangered in the future. These species may “be considered rare or endangered [under CEQA] if the species can be shown to meet the criteria”. Additionally, the California Fish and Game Code contains lists of vertebrate species designated as “Fully Protected” (California Fish & Game Code 3511 [birds], 4700 [mammals], 5050 [reptiles and amphibians], and 5515 [fish]. No Section 2081(b) permit

may authorize the take of “fully protected” species and “specified birds.” If a project is planned in an area where a species or specified bird occurs, an applicant must design the project to avoid all take; the CDFG cannot provide take authorization under CESA.

Streambed Alteration Agreements. Jurisdictional authority of the CDFW over stream areas is established under Section 1600 of the Fish and Game Code, which pertains to activities that would disrupt the natural flow or alter the channel, bed, or bank of any lake, river, or stream. Section 1602 of the Fish and Game Code stipulates that it is unlawful to substantially divert or obstruct the natural flow or substantially change the bed, channel or bank of any river, stream or lake without notifying the CDFG, incorporating necessary mitigation, and obtaining a Streambed Alteration Agreement. Typical activities that require a Streambed Alteration Agreement include excavation or fill placed within a channel, vegetation clearing, structures for diversion of water, installation of culverts and bridge supports, cofferdams for construction dewatering, and bank reinforcement.

Native Plant Protection. The Native Plant Protection Act of 1977 (NPPA) and implementing regulations pursuant to Section 1900 et seq. of the Fish and Game Code designate rare and endangered plants, and provide specific protection measures for identified populations. It is administered by the CDFG. The NPPA was enacted to “preserve, protect and enhance endangered or rare native plants of this state.” The NPPA defines a plant as endangered when its prospects of survival and reproduction are in immediate jeopardy from one or more causes. A rare plant is defined as a plant species that, though not presently threatened with extinction, occurs in such small numbers throughout its range that it may become endangered if its present environment worsens. The NPPA prohibits the take or sale of rare and endangered species in California, except for some exemptions provided by the law.

The California Native Plant Society has prepared and regularly updated an “Inventory of Rare and Endangered Vascular Plants of California.” In general, the CDFW qualifies plant species on List 1B (Plants Rare, Threatened, or Endangered in California and Elsewhere) or List 2 (Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere) of the California Native Plant Society’s (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* for consideration under CEQA. Species on CNPS List 3 (Plants About Which We Need More Information--A Review List) or List 4 (Plants of Limited Distribution--A Watch List) may, but generally do not, qualify for consideration under CEQA.

Local Regulations

Local Coastal Program (LCP). The Coastal Act defines an “environmentally sensitive area” as “any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments” (Coastal Act section 30107.5). The City’s existing certified LCP identifies the following sensitive habitats: wetlands, riparian habitat, grasslands,

mima mounds¹ and habitats that support Ohlone tiger beetle, tidewater goby, burrowing owl, California brown pelican, Monarch butterfly, pigeon guillemot, black swift, Santa Cruz tarplant or American peregrine falcon (City of Santa Cruz, 1994-Map EQ-9). Existing LCP policies seek to preserve and enhance the character and quality of riparian and wetland habitats (EQ 4.2). A separate Creeks Management Plan and policies related to the San Lorenzo River also are part of the LCP as further described below.

General Plan 2030. Four habitat types found within the City of Santa Cruz are recognized as sensitive habitat types: freshwater wetland, salt marsh, riparian forest and scrub, and coastal prairie portions of grassland habitats. Except for freshwater wetland, these habitat types correspond to habitat types that the CNDDDB has designated as “high priority.” In addition, coastal bird habitat is considered sensitive habitats because of high biological diversity. Additionally, any area supporting a special status species would also be considered a sensitive habitat. Locally, the overwintering monarch butterfly habitat is considered sensitive due to its restricted range and CNDDDB ranking as rare. Its habitat is also identified in the City’s existing General Plan as being a sensitive habitat. The General Plan sets forth protocols for evaluation of sensitive habitat and sensitive species. For riparian areas, this includes compliance with the *City-Wide Creeks and Wetlands Management Plan*.

Management Plans. Resource management and park plans have been adopted by the City for management of City-owned open space areas. Two plans are pertinent to the project area. The *City-Wide Creeks and Wetlands Management Plan* was adopted by the City in 2007 and approved by the California Coastal Commission as a Local Coastal Plan amendment in October 2007. The *San Lorenzo River Urban Management Plan* was adopted in 2003 for the portion of the river south of Highway 1. Policies developed from recommendations in this plan were included in the LCP as a Coastal Commission-approved LCP amendment in 2004.

The *City-Wide Creeks and Wetlands Management Plan* was adopted by the City Council to provide a comprehensive approach to managing all creeks and wetlands within the City. Long-term goals to manage these resources include reduction and/or elimination of pollutants; improvement of water quality; improvement and restoration of natural habitat; and increased public awareness of the value of watershed quality. The Management Plan recommends development setbacks along each watercourse in the City based on biological, hydrological, and land use characteristics for various watercourse types. The recommended setbacks within a designated management area includes a riparian corridor, a development setback area, and an additional area that extends from the outward edge of the development area. The riparian corridor² is adjacent to the watercourse and is the width of a riparian and/or immediate watercourse influence area and is measured from the centerline of the watercourse. The

¹ Mima mounds are A land form of small, distinct raised hummocks amidst shallow depressions, usually supporting native grasslands (City of Santa Cruz, 1994).

² The riparian corridor is intended to provide an adequate riparian width to maintain or enhance habitat and water quality values. Allowable uses within the riparian corridor are limited.

development setback area³ is the area outward from the edge of the designated riparian corridor where development is restricted, providing a buffer between the riparian corridor and development. The management area, riparian corridor, and development setback area distances vary depending on the watercourse area and its categorization.⁴ All distances are measured from the centerline of the watercourse outward as shown on the above schematic. The *Plan* establishes the requirements for obtaining a Watercourse Development Permit, and specifies uses permitted within the designated management area, development setback area and riparian corridor. The *management area* is the area where the watercourse regulations would apply.

The *San Lorenzo Urban River Plan* (SLURP) is the outcome of a planning process initiated by City Council in 1999 to update previous plans for the San Lorenzo River that guided flood control, vegetation restoration and public access improvements along the San Lorenzo River. Only the lower portion of the river is within the coastal zone. The need for updated plans was a result of the river levee improvement project in the late 1990s, listing of steelhead and coho salmon as federally threatened species, and federal designation of the San Lorenzo River as critical habitat for these species. The Plan contains recommendations for habitat enhancement, as well as public access and ideas to promote river-oriented development. One of the key goals of the plan is to enhance and restore biotic values of the river, creek and marsh fish and wildlife habitat.

The SLURP includes the Lower *San Lorenzo River and Lagoon Management Plan* as an appendix, which provides resource management and restoration recommendations within the constraints of providing flood protection. Management and restoration recommendations address: annual vegetation management; summer lagoon water level management; enhancement of the aquatic, shoreline and riparian habitats; and marsh restoration.

Municipal Code Regulations. Section 24.14.080 of the City’s Municipal Code includes provisions to protect wildlife habitat and protected species for areas specified in the City’s existing General Plan (Maps EQ-8 and EQ-9). Section 24.08.21 also regulates development adjacent to city watercourses, consistent with provisions of the adopted *City-Wide Creeks and Wetlands Management Plan*, including requirements for issuance of a “watercourse development permit.” The City of Santa Cruz also regulates heritage trees and shrubs through a Heritage Tree Ordinance. Chapter 9.56 of the City Municipal Code defines heritage trees, establishes permit requirements for the removal of a heritage tree, and sets forth tree replacement requirements as adopted by resolution by the City Council. City regulations require tree replacement for removal of a heritage tree to consist of replanting three 15-gallon size trees or one 24-inch size specimen for each heritage tree approved for removal.

³ The development setback width is intended to provide an appropriate water quality and habitat buffer between the riparian corridor and development within the remaining management area. New development generally would be limited in this area to landscaping and limited pervious surfaces.

⁴The 25 feet outward from the edge of the development setback is intended to provide an adequate area for permit review and to be consistent with the *Management Plan* goals and City of Santa General Plan/LCP policies to maintain or enhance water quality or riparian habitat values.

Study Area

The project area consists of the downtown area generally covered by the Downtown Recovery Plan (DRP) and the Central Business District zone, and specifically the lower downtown area generally between Soquel Avenue and Laurel Street on the north and south, and Cedar Street and the San Lorenzo River on the west and east. (Locations are shown on Figures 1-2 and 2-1 in Section 3, Project Description.) The proposed project includes an amendment to the land use designation text for the downtown portion of Regional Visitor Commercial land use designation. The study area includes properties adjacent to the western San Lorenzo River levee.

Existing Habitat Areas

The downtown area, including the project area, is developed and does not support special status species or sensitive habitat. However, the eastern edge of the project area is situated along the western San Lorenzo River levee. The San Lorenzo River and associated habitats in the project area are described in the following section. Properties designated RVC in the City's General Plan are located within developed areas and are not within sensitive habitat areas.

San Lorenzo River Setting

The San Lorenzo River is the major watercourse through the City and a major physical feature in the City. The river originates in the Santa Cruz Mountains and traverses through the center of the City. The study area is located adjacent to an approximate .26-mile segment of the river between Soquel Avenue and Broadway.

Following severe flooding in downtown Santa Cruz in the winters of 1938, 1941, and 1955, the ACOE completed a flood control project along San Lorenzo River in 1959 that straightened and confined the river within its current configuration. The project created a channelized flood control channel for the river's lower 2.5 miles below Highway 1. The project included rip-rap levee banks, removal of all vegetation from the banks, and dredging of the river channel bottom with an excavated channel. Operation and maintenance for the original project included annual excavation of the channel, but this proved to be economically and environmentally infeasible for the City (Dudek, August 2016). Significant flood improvements along the river were completed in 2000 as part of the ACOE's San Lorenzo River Flood Control and Environmental Restoration Project. This project raised the river levee heights, provided landscaping and improved the pedestrian/bicycle path on the levee, and rehabilitated three of the four downtown bridges (over the San Lorenzo River) to increase flood flow capacity. The habitat enhancement efforts focused on the land side of the levees in the study area which were landscaped with native trees, shrubs, and groundcover.

The project area is within the "Transitional Reach" of the San Lorenzo River as described in the SLURP. This reach includes the area from Laurel Street Bridge to the Water Street Bridge. Water

levels in this area are influenced by seasonal closures at the downstream river mouth. When a sandbar creates a closed lagoon at the river mouth, this reach fills with freshwater; at times when there is no sandbar closure, extreme tides can bring saltwater into this reach. During most of the year, this reach is freshwater and includes important riparian habitat areas along San Lorenzo Park to the north of the study area (City of Santa Cruz, June 2003).

San Lorenzo River Habitats

The habitat types most common along the San Lorenzo River within the City of Santa Cruz are ruderal grassland, mixed riparian forest, willow thickets, freshwater marsh, and brackish water tule marsh. The three most prevalent plant communities along the river in the project area are urban landscape, ruderal grassland and mixed riparian forest (City of Santa Cruz, June 2003, Appendix C).

Native riparian tree species present include arroyo willow (*Salix lasiolepis*), white alder (*Alnus rhombifolia*), yellow willow (*Salix lucida* ssp. *lasiandra*), black cottonwood (*Populus trichocarpa*), redwood (*Sequoia sempervirens*) and box-elder (*Acer negundo*). Broadleaf cattail (*Typha latifolia*), floating primrose (*Ludwigia peploides* ssp. *peploides*), and longroot smartweed (*Persicaria amphibia*) are most common in the freshwater marsh habitats in the upstream area, and California bulrush (*Schoenoplectus californicus*) becomes the dominant marsh plant along the water's edge in the downstream areas subject to tidal influence and brackish lagoon conditions. The levee crests are paved and the levee-top ruderal community is regularly mowed and weed-whipped for fire suppression and offers relatively little habitat value (Kittleson Environmental Consulting, January 2016).

Waterside levee slopes throughout the project area are dominated by ruderal grassland with scattered coyote brush (*Baccharis pilularis*), red valerian (*Centranthus ruber*), fennel (*Foeniculum vulgare*), field mustard (*Brassica rapa*) and ice plant (*Carpobrotus edulis*). Dominant species include perennial ryegrass (*Festuca perennis*), wild oat (*Avena fatua*), Himalayan blackberry (*Rubus armeniacus*) and ripgut brome (*Bromus diandrus*). Rip-rap, rock slope protection underlies the waterside levee embankments and is exposed in many places just below the levee crest. Soils placed by the ACOE contractors over newly placed rip-rap on the east side levee have partially eroded in the 15 years since placement, and rock is now visible within the ruderal grasses on the upper slope. Abundant California ground squirrels (*Spermophilus beecheyi*) are present throughout the levees (Kittleson Environmental Consulting, January 2016).

Landside levee slopes were landscaped with a broad assemblage of native trees, shrubs and forbs during the 1999-2003 San Lorenzo River Flood Control Improvement Project. Fence line trees and adjacent landscape shrubs represent a broad mix of native and introduced species (Kittleson Environmental Consulting, January 2016).

San Lorenzo River from the Soquel Avenue Bridge to the Railroad trestle bridge near the river mouth covers approximately 47 acres and is characterized by a single, wide channel that is less heavily vegetated with willow riparian vegetation on its margins and is characterized by

relatively abundant bulrush occurring in a narrow band along both sides of the water's edges. In addition to the numerous ruderal species mentioned above, weedy species such as kikuyugrass (*Pennisetum clandestinum*) and yellow sweet clover (*Melilotus albus*) are prevalent along much of the waterside levee toe (Kittleson Environmental Consulting, January 2016).

The river supports fish species, and a variety of wildlife species utilize the river habitats, particularly avian species. A fall bird survey conducted in 2015 reported that 103 species of birds were observed between the river mouth and Highway 1 during September, October and November 2015. A total of 9,036 birds were identified and counted, representing a wide range of year-round resident waterfowl, wading birds, raptors, songbirds, and migratory species (Kittleson Environmental Consulting, January 2016).

San Lorenzo River Maintenance

The City of Santa Cruz conducts annual vegetation thinning and periodic sandbar “ripping” in certain areas to minimize channel roughness and to facilitate sediment transport through the reach. The City holds a ACOE Section 404 nationwide permit (NWP File 268761S) and obtains CDFW Streambed Alteration Agreements for these activities. River channel maintenance also is permitted by a 5-year Streambed Alteration Agreement (SAA) issued by the CDFW. The SAA allows for routine maintenance activities, including removal of sediment, vegetation and logs in channel beds and vegetation control on banks. The SAA includes 66 “avoidance and minimization measures” to avoid or minimize adverse impacts to fish and wildlife resources, including tree and vegetation replacement under specified conditions. The annual maintenance program limits the size of riparian trees to less than four inches in diameter at breast height, and creates 4 to 10-foot wide riparian strands of immature willow, alder, cottonwood, and California sycamore (*Platanus racemosa*) at the levee toes and on the edges of instream islands. This annual maintenance activity significantly limits bird nesting opportunities by creating sparse riparian patches. The semi-annual bed-ripping activities required to maintain hydraulic capacity in this reach also result in dry sand and gravel bar habitats in the areas upstream of the Water Street Bridge (Kittleson Environmental Consulting, January 2016). Within the project area, typical maintenance is limited to vegetation thinning, mowing, and landscaping of landside levee slopes.

Sensitive Habitat Areas

Sensitive habitats generally include riparian habitat and corridors, wetlands, habitats for legally protected species and CDFW Species of Special Concern, areas of high biological diversity, areas providing important wildlife habitat, and unusual or regionally restricted habitat types. The California Natural Diversity Data Base (CNDDDB), managed by CDFW, maintains a working list of “high priority” habitats for inventory (i.e., those habitats that are rare or endangered within the borders of California). CNDDDB “high priority” habitats are generally considered sensitive habitats under CEQA.

The project area is currently developed. According to maps developed for the City’s General Plan 2030 and included in the General Plan EIR, the project area is not within a mapped sensitive

habitat area (City of Santa Cruz, April 2012, DEIR volume). However, the project area is located adjacent to the San Lorenzo River levees, and the river is mapped as a sensitive riparian habitat in the General Plan 2030. The river also supports special status species as described in the following section. The southern portion of the project study area is located within the coastal zone. The segment of the San Lorenzo River adjacent to the project area also is mapped as sensitive riparian habitat in the City's LCP (City of Santa Cruz, 1994, Map EQ-9).

Special Status Species

Special-status species include species listed as Threatened or Endangered under provisions of the federal ESA and species listed as Rare, Threatened, or Endangered by the state of California under provisions of the CESA and NPPA. Species formally proposed for federal listing by the USFWS are afforded limited legal protection under ESA. Other special-status plant species are those on List 1A, List 1B, or List 2 of the California Native Plant Society (CNPS) *Inventory of Rare and Endangered Vascular Plants of California*. These species are subject to state regulatory authority under CEQA. California "Species of Special Concern" are given special consideration by the CDFW because they are biologically rare, very restricted in distribution, declining throughout their range, or at a critical stage in their life cycle when residing in California or taxa that are closely associated with a habitat that is declining in California (e.g., wetlands) (City of Santa Cruz, April 2012, DEIR volume).

No plant species listed as threatened or endangered by the USFWS or the CDFW are expected to occur in the study area. No species ranked by the California Native Plant Society (CNPS) on List 1 were observed or are expected to be present.

Special status wildlife species known to occur or have potential to occur within the San Lorenzo River and lower San Lorenzo River adjacent to the Main Beach include steelhead (*Oncorhynchus mykiss*), coho salmon (*Oncorhynchus kisutch*), tidewater goby, western pond turtle (*Emys marmorata*), tricolored blackbird (*Agelaius tricolor*), and yellow warbler (*Setophaga petechia*). These species are found within the San Lorenzo River habitats. Steelhead and coho salmon are anadromous fish, spending time in both freshwater and saltwater. The coho salmon population in the San Lorenzo River is identified as being nearly extirpated, however the watershed is identified as a focus population for recovery by the NOAA Fisheries (Dudek, August 2016).

Some bird species are only occasional visitors, such as osprey (*Pandion haliaetus*), a CDFW Watch List (WL) species; olive-sided flycatcher (*Contopus cooperi*), a Species of Special Concern (SSC); and migrating willow flycatchers (*Empidonax traillii*), which are state-listed as endangered (SE), but only where they nest. Others use the area for foraging but do not nest there (e.g., merlin (*Falco columbarius*; WL), peregrine falcon (*Falco peregrinus*; state fully protected and federally delisted), and Vaux's swift (*Chaetura vauxi*; CSC). Brown pelican (*Pelecanus occidentalis*), double-crested cormorant (*Phalacrocorax auritus*), and yellow warbler (*Dendroica petechia brewsteri*), all Species of Special Concern have been reported along the river (City of Santa Cruz, April 2012, DEIR volume).

The California red-legged frog (*Rana draytonii*) is a federally listed threatened species that was historically widely distributed in the central and southern portions of California. The species requires still or slow-moving water during the breeding season, where it deposits large egg masses, usually attached to submergent or emergent vegetation. Breeding typically occurs between December and April, depending on annual environmental conditions and locality. CRLFs are known to exist in the upper San Lorenzo River watershed in Bean Creek and Mountain Charlie Gulch approximately 8 miles north but are not known to occur at proposed project site. The closest known breeding site is the pond at the University of California Santa Cruz (UCSC) Arboretum approximately 1.9 miles west of the project area. The Arboretum pond is in the headwaters of the Moore Creek watershed, which drains the far west side of the city of Santa Cruz. CRLFs are also known to occur in the lower Moore Creek Preserve and the upper reaches of Antonelli Pond, approximately 2.5 miles southwest of the proposed project site (Dudek, August 2016).

CRLFs are not known to occur in the San Lorenzo River or the nearby Neary Lagoon Wildlife Preserve. Other studies in the project area indicate that the species appears to have been extirpated from the lower San Lorenzo River drainage, and the area was excluded from the USFWS critical habitat designation (City of Santa Cruz, July 2005). Additionally, scouring flows that occur during winter and into early spring probably make the river unsuitable for breeding.

Discussion of special status species known to occur in the project area is provided below.

- ❑ *Central California Coast (CCC) Steelhead (Oncorhynchus mykiss)*. The Central California Coast (CCC) steelhead is a federally-listed threatened species. The CCC steelhead ESU (Evolutionarily Significant Unit) includes steelhead in coastal California streams from the Russian River to Aptos Creek, and the drainages of Suisun Bay, San Pablo Bay, and San Francisco Bay, California. CCC steelhead occur in the San Lorenzo River; the river, including the project area, is designated as critical habitat for CCC steelhead. “Critical habitat” is habitat key to the survival of threatened and endangered species, which may require special management considerations or protection. Essential features of critical habitat for steelhead in the project area are estuarine areas free of obstruction and excessive predation with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders and side channels; and juvenile and adult forage, including aquatic macroinvertebrates and fishes, supporting growth and maturation (Hagar Environmental Science, March 2015). Although variation occurs in coastal California, steelhead usually live in freshwater for one to three years in central California, then spend an additional one to three years in the ocean before returning to their natal stream to spawn.

Steelhead are present in the project area throughout the year and use the reach for migration to and from the upper watershed during winter and spring, typically from

December through mid-June. The project area provides habitat for migrating steelhead adults and smolts, and the reach to the east of the project area serves as juvenile rearing habitat when lagoon habitat conditions are favorable in summer and fall.

In general, the reach downstream of Soquel Avenue Bridge has limited willow riparian habitat and has narrow tule stands along the edge of water. The riverbed is generally flat and composed primarily of sand with some gravel. Depths are less than 2 feet, but vary with the tides when the lagoon is open. Large instream woody debris, overhanging riparian trees and other potential fish cover are limited in the project reach.

- ❑ *Central California Coast (CCC) Coho Salmon (*Oncorhynchus kisutch*)*. The Central California Coast (CCC) coho salmon is a state and federally-listed endangered species. The CCC coho salmon ESU (Evolutionarily Significant Unit) ranges from Punta Gorda in southern coastal Humboldt County to Aptos Creek in Santa Cruz County, and the drainages of San Francisco Bay, California. CCC coho salmon historically have occurred in San Lorenzo River. The San Lorenzo River, including the project area, is designated as critical habitat for CCC coho salmon. For coho salmon, essential habitat types in the project area include: juvenile (smolt) migration corridors and adult migration corridors.

The San Lorenzo River is at the extreme southern end of the range of coho salmon. Recent information documents CCC coho salmon abundance is very low. A self-sustaining run of wild coho has been presumed to be extirpated from the San Lorenzo River since the drought of the late 1980s. Small numbers of adult coho salmon have been observed in the San Lorenzo River in recent years during trapping operations conducted at the Felton Diversion Dam by the Monterey Bay Salmon and Trout Project. The number of coho captured peaked at 183 adults in 1989-1990. In most years, however, few coho have been captured. Possible origins for these fish include: straying from more hospitable nearby drainages including San Vicente, Scott and Waddell Creeks; return of hatchery reared fish released in various locations in the San Lorenzo drainage; and returns from natural production in the basin. No juvenile coho salmon were captured during electrofishing surveys conducted throughout the San Lorenzo River watershed (including both mainstem and tributary locations) between 1994 and 2002 (Hagar Environmental Science, March 2015). The coho salmon population in the San Lorenzo River is identified as being nearly extirpated, however the watershed is identified as a focus population for recovery by the National Marine Fisheries Service (Ibid.).

- ❑ *Tidewater Goby*. Tidewater goby (*Eucyclogobius newberryi*) is a federally-listed endangered species, but has been proposed for reclassification as threatened. Tidewater goby also is a State Species of Special Concern. The San Lorenzo River, including the project area, is not within the designated critical habitat for tidewater goby. The tidewater goby is a small, short-lived species that inhabit coastal brackish water habitats entirely within California, ranging from Del Norte County near the Oregon border to northern San Diego County. The species is uniquely adapted to coastal lagoons and the

uppermost brackish zone of larger estuaries, rarely invading marine or freshwater habitats. Tidewater gobies are known to be preyed upon by native species such as small steelhead, prickly sculpin (*Cottus asper*), and staghorn sculpin (*Leptocottus armatus*) (Hagar Environmental Science, March 2015).

Certain physical or biological features and habitat characteristics are believed to be required to sustain the species' life-history processes. These include persistent, shallow (in the range of approximately 0.3 to 6.6 feet), still-to-slow-moving lagoons, estuaries, and coastal streams with salinity up to 12 ppt, that contain one or more of the following:

- a) Substrates (e.g., sand, silt, mud) suitable for the construction of burrows for reproduction;
- b) Submerged and emergent aquatic vegetation that provides protection from predators and high flow events; or
- c) Presence of a sandbar(s) across the mouth of a lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary, thereby providing relatively stable water levels and salinity (Hagar Environmental Science, March 2015).

Tidewater goby are present in the San Lorenzo Lagoon and have been observed in the project area. Tidewater goby was identified in the San Lorenzo Lagoon and lower Branciforte Creek Flood Control Channel in 2004. Prior to that time, the species was not known to occupy the San Lorenzo River or Lower Branciforte Creek. During dewatering for major embankment construction by the ACOE, 11 tidewater goby were found in the San Lorenzo River lagoon and, later that fall, numerous tidewater gobies were found in the lower, tidally influenced reach below Ocean Street in the Branciforte Creek concrete channel. Tidewater goby were observed as far upstream as the Water Street Bridge during instream debris removal activities in 2016 (Kittleson, personal communication, 2017).

- ☐ *California Species of Special Concern.* Western pond turtle (*Emys marmorata*) and yellow warbler are California "species of special concern," which are taxa given special consideration because they are biologically rare, very restricted in distribution, declining throughout their range, or at a critical stage in their life cycle when residing in California or taxa that are closely associated with a habitat that is declining in California (e.g., wetlands) (City of Santa Cruz, September 2011). Western pond turtles are known to occur in the San Lorenzo River adjacent to the project area, although they are not known to breed in the project area (Kittleson, personal communication, May 2017). At least one individual Western pond turtle has been observed in the upper transitional reach of the river, in 2015, 2016, and 2017. No western pond turtle records are known from the lower transitional reach in the project area, but suitable habitat exists throughout the lower San Lorenzo River.

Yellow warbler is a potential nesting bird species that occurs in occasional high numbers in migration seasons. Yellow warblers seem to favor willow riparian woodlands in the project area and an average of 3.6 yellow warblers per visit were observed in the fall 2015 surveys. No breeding records are known from the project impact area, but that may reflect a paucity of breeding season observations (Kittleson Environmental Consulting, June 2016).

Tricolored blackbird is a potential nesting bird species that utilizes dense wetland vegetation like that found along San Lorenzo River north of the Water Street Bridge. There are no records of tricolored blackbird nesting activity in the lower San Lorenzo River or elsewhere in the San Lorenzo Watershed (Kittleson Environmental Consulting, June 2016).

Wildlife Movement and Breeding

San Lorenzo River provides habitat for migrating steelhead adults and smolts. For coho salmon, essential habitat types include juvenile (smolt) and adult migration corridors. Although variation occurs in coastal California, steelhead usually live in freshwater for one to three years in central California, then spend an additional one to three years in the ocean before returning to their natal stream to spawn. Steelhead may spawn one to four times over their life. Adult CCC steelhead typically immigrate from the ocean to freshwater between December and April, peaking in January and February, and juveniles migrate as smolts to the ocean from January through May, with peak emigration occurring in April and May (Dudek, August 2016).

Wildlife corridors are segments of land that provide a link between these different habitats while also providing cover. Wildlife dispersal corridors, also called dispersal movement corridors, wildlife corridors or landscape linkages, are features whose primary wildlife function is to connect at least two significant or core habitat areas and which facilitate movement of animals and plants between two or more otherwise disjunct habitats (City of Santa Cruz, April 2012, DEIR volume). Three main corridors have been identified within the City that could provide connectivity between core habitats within or adjacent to the city: western corridor (Moore Creek), central corridor (San Lorenzo River and major tributaries), and eastern corridor (Arana Gulch). The San Lorenzo River and two of its main tributaries, Branciforte Creek and Carbonera Creek, create a potential wildlife corridor in the central portion of the City. Here, a relatively narrow strip of riparian habitat could provide opportunities for wildlife movement between the San Lorenzo River lagoon region and core habitat located within and adjacent Pogonip, UC Santa Cruz, and Henry Cowell (via the San Lorenzo River) and DeLaveaga Park, via Branciforte and Carbonera Creeks (Ibid.).

There are areas along the San Lorenzo River of known bird nesting sites. Native cliff swallows (*Petrochelidon pyrrhonota*), northern rough-winged swallows (*Stelgidopteryx serripennis*) and black phoebes (*Sayornis nigricans*) nest on the bridges that cross the San Lorenzo River. Non-native rock pigeons (*Columba livia*) and house sparrows (*Passer domesticus*) also make use of

the bridges. Other native bird species including pie billed grebe (*Podilymbus podiceps*), marsh wren (*Cistothorus palustris*), song sparrow (*Melospiza melodia*), Anna's hummingbird (*Calypte anna*) and hooded oriole (*Icterus cucullatus*) have been observed nesting in the emergent marsh wetland and willow/cottonwood riparian habitats in the transitional reach of the San Lorenzo River. While killdeer (*Charadrius vociferus*) are known to nest downstream in Mike Fox Park, no ground nesting birds are known to successfully nest in the project area, due to regular human disturbance on the levee slopes and limited available habitat between the levees.

San Lorenzo River Plans

The *City-wide Creeks and Wetlands Management Plan* establishes requirements for structural setbacks and development standards and guidelines that would be applicable to future development along watercourses within the City. Properties within the “management area” defined in the Plan must comply with provisions of the Plan regarding riparian and development setbacks unless an area is governed by a specific management plan. Within the project area, the eastern edges of some properties on the east side of Front Street between Laurel Street and Soquel Avenue are within the defined management area of the San Lorenzo River. Riparian and development setbacks for the San Lorenzo River are not established in the Creeks Plan, but rather, according to the Creeks Plan, all projects in this area are subject to provisions of the SLURP.

The project area is within the “Transitional Reach” of the San Lorenzo River in the SLURP. This reach includes the area from Laurel Street Bridge to the Water Street Bridge. Recommended improvements in the study area include:

- Front Street Plaza at Cathcart or Maple Lane: Construction river view plaza; add riverway makers, directional and interpretive and public art opportunities
- Mimi de Marta Park:
- Urban Interface Connections – the goal of the urban interface connections in the Transitional Reach is to provide features that connect downtown areas with the river via “green corridors” of trees and landscaping via Cathcart St and Maple Lane to the River.

The project area also is located along the “Front Street Riverfront Area” identified in the SLURP as a significant riverfront area that is a prime opportunity site to engage the community with the river with improved public access being a primary goal of the SLURP. Twelve existing specific recommendations for this area are included in the SLURP; those pertinent to the discussion of biological resources include:

- ☐ Maintain maximum heights to 50 feet with development above 35 feet in height stepping back at least 10 feet at an angle not to exceed 42 degrees.
- ☐ Maintain the ten-foot setback area between residential and commercial uses adjacent to the levee trail from the western edge of the trail. The setback area should be filled to raise the adjacent ground-level use to the same elevation as the levee trail. This area should also incorporate outdoor public seating or visually accessible garden space for

residential development. Trees planted as part of the San Lorenzo Flood Control Improvement Project should be maintained and incorporated into new development.

4.3.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies, and/or guidelines; and agency and professional standards, a project impact would be considered significant if the project would:

- 3a Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or US Fish and Wildlife Service;
- 3b Have a substantial adverse effect, either directly or through habitat modifications on; or substantially reduce the number or restrict the range of any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;
- 3c Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- 3d Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- 3e Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;
- 3f Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or state habitat conservation plan;
- 3g Substantially reduce the habitat of a fish or wildlife species;
- 3h Cause a fish or wildlife population to drop below self-sustaining levels; or
- 3i Threaten to eliminate a plant or animal community.

Analytical Method

The proposed project consists of amendments to the City's Downtown Recovery Plan, General Plan, Local Coastal Plan and Zoning Code regarding development in the downtown area and Central Business District. The proposed project would not directly result in new development. However, the proposed Downtown Plan amendment would expand areas for potential additional building height that could accommodate intensified redevelopment of existing developed sites.

The proposed General Plan amendment would increase FAR in downtown areas designated as RVC in the General Plan. The proposed LCP and Zoning Code amendments would not result in changes that could indirectly lead to intensified development. The impact analysis is based on review by local biologist, Gary Kittleson (Kittleson Environmental Consulting) in consultation with Dudek biologists, including review of existing data and studies.

Impacts and Mitigation Measures

The proposed Downtown Plan and General Plan amendments would expand areas for potential additional building height that could accommodate intensified redevelopment of existing developed sites. Thus, future development would not remove or alter sensitive habitat (3b, 3g) or result in permanent fill of wetlands or future development with wetlands or waters of the U.S., and thus would not result in direct or indirect impacts to wetland habitat (3c). The project area is within an existing developed area, and future redevelopment would not affect wildlife movement along the river corridor as future development would be within the existing development footprint in the downtown area. Therefore, adoption and implementation of the proposed plan amendments would not directly or indirectly substantially interfere with wildlife movement or with established wildlife corridors (3d). The proposed amendments to not conflict with policies or regulations protecting biological resources (3e) and there are no Habitat Conservation or Natural Community Plans in the area (3f). The proposed project would not directly or indirectly cause a fish or wildlife species to drop below self-sustaining levels or threaten to eliminate a plant or animal community (3h, 3i).

A comment was raised regarding the potential for subsequent development under the proposed Plan amendments to create an “urban heat island” that would affect riparian vegetation. The phrase “urban heat island” refers to the effect of urbanized areas on surface and air temperature compared to their rural surroundings. Buildings, roads, and other “hardscape” create an island of higher temperatures within the regional landscape. This is addressed in Section 4.2, Air Quality and Greenhouse Gas Emissions.

The following impact analyses address potential indirect impacts to special status species (3a) and sensitive habitat (3b) within the San Lorenzo River corridor, potential impacts to nesting species (3d).

Impact 4.3-1: Indirect Impacts to Special Status Species and Aquatic Habitat. Future development of taller buildings as a result of the proposed Downtown Plan amendments could result in indirect to impacts to riparian and aquatic special status species due to increased shading due to increased building heights, but would not substantially affect habitats (3a). This is considered a *less-than-significant* impact

Additional building height and the resultant increase in shade is not likely to impact the established native riparian tree species in the area. Arroyo willow, white alder, black

cottonwood, and box-elder are all shade-tolerant tree species that are scattered singly along the linear landside slope of the levee and along the water's edge. The maturing landside riparian trees were planted for habitat enhancement and landscape value during the 1999-2003 levee raising project, and some are now greater than 50 feet in height. The waterside riparian trees in lower San Lorenzo River are all subject to regular vegetation management, which limits the size of both individual trees and the width of the riparian buffer zone on the riverbank. Riparian species along the project reach are deciduous and lose leaves during the winter.

Under the proposed building height increases, adjacent riparian habitat will receive less sunlight in late afternoon in winter months, when the potential impact to trees is lessened by their deciduous state. Shading would not substantially change during other times of the year as shown on Figure 4.3-1, which illustrates the change in shadows created by taller buildings with the proposed additional height. As a result, no adverse impacts related to shading are anticipated to either the landside or waterside riparian species.

Cattail, matted water primrose, water smartweed, and tule/bulrush are the dominant marsh plants along the water's edge, which will receive less sunlight in late afternoon in winter months. Due to the distance from proposed structures, increased shade is not anticipated to affect the marsh vegetation. The levee crests are paved and the levee-top ruderal community is regularly mowed and weed-whipped for fire suppression and offers relatively little habitat value under existing or proposed conditions (Kittleson Environmental Consulting, January 2016).

Water temperatures in the lagoon are unlikely to be impacted by the additional building heights. The existing lack of shaded riverine aquatic habitat in the lower San Lorenzo River results in high water temperatures in the lagoon system, particularly in the late summer and fall. These high temperature conditions can be deleterious to salmonid species. High water temperatures and poor water quality conditions are exacerbated by seasonal lagoon closures and low flow conditions into the lagoon. Increased building shadows will not affect direct mid-day solar inputs during any season. High water temperatures are not an issue during winter when added late-afternoon shade may fall on the project reach.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.3-2: Indirect Impacts to Sensitive Riparian Habitat. Future development of taller buildings as a result of the proposed Downtown Plan amendments could result in indirect impacts to birds in the area that could lead to bird mortalities (3b). This is a *potentially significant* impact

The proposed project would not result in new development, and potential future development that could occur as a result of the proposed plan amendments would not be located within riparian or other sensitive habitat areas. Thus, there would be no direct removal of habitat.

Future buildings would be set back from the western edge of the river levee by at least 10 feet which is consistent with City plans. The City-wide Creeks and Wetlands Management Plan references the SLURP as the guiding management plan for the area. The SLURP recommends a 10-foot setback between development and the western edge of the river levee, which also is a SLURP LCP policy. Both the existing and proposed Downtown Plan and LCP policies maintain this setback area, although the LCP policy includes minor language revisions related to use of publicly accessible lands (see revisions in Appendix C). The SLURP recommendations also seek to improve and enhance public access/use of the levee and adjacent areas. The proposed DRP amendment requires that residential and outdoor commercial uses adjacent to the Riverwalk not be sited closer than 10 feet from the western edge of the physical walkway, except where “people-oriented” commercial uses incorporate public access points to the Riverwalk. Therefore, future development accommodated by the Plan amendments would be sited to be consistent with the required setbacks.

The project will result in amendments to the DRP that would allow additional building heights under specified conditions. The proposed project includes both expansion of the Additional Height Zone south of Soquel Avenue along the river and elimination of the SLURP LCP policy to limit heights to 50 feet in the Front Street/Riverfront area. This policy is proposed to be eliminated due to the proposed additional height allowance. The policy was taken from the SLURP, which was intended as a resource protection programmatic guide and not a land use planning document. (See Section 4.9, Land Use, for further discussion.)

Generally building heights along the San Lorenzo River between Soquel Avenue and Broadway could increase from 50 feet under existing plans to 70 feet with the proposed amendments. The extent of the potential increase height would be limited; the proposed Downtown Plan amendments require the top floor of Front Street properties to not exceed 60% of the floor below and 60% of the building length, thereby avoiding a linear wall of building mass. The Downtown Plan allows for consideration or an exception to these standards when a publicly accessible accessway is included as part of the project site upon approval by the City Council upon a positive recommendation by the Planning Director. Additionally, along the west side of the Riverwalk along San Lorenzo River, a 10-foot setback from the exterior building face would be required for development above 50 feet, and the 10-foot setback would be required for at least 50% of the building frontage along Front Street above a height of 50 feet. However, the proposed amendments allow up to 25% of the Riverwalk building frontage to encroach into the required 10-foot setback area to provide massing variation. The proposed amendments also permit top floor cantilevered portions of the building to encroach over the property line a maximum of 5 feet in order to provide architectural interest to the façade, which shall not exceed 25 percent of the total building frontage along the riverfront. Nonetheless, the potential additional building would not likely result in full coverage of additional floors.

Concerns have been raised regarding potential hazards taller buildings may pose hazards to birds due to placement of reflective windows and/or lighting. Glass windows on buildings of all kinds are a known hazard to birds and cause the deaths of as many as a billion birds a year in the

United States alone (Klem, March 2009). Individual buildings have been estimated to cause one to ten deaths per building per year, while at least one study documented commercial buildings at one location to cause as many as 55 deaths per year (Klem, March 2009, Hager et al., September 2008). The hazard of buildings to birds can vary depending on several aspects of building design, including the amount of glass used, the type of glass used, and the proportion of windows reflecting surrounding vegetation (American Bird Conservancy, 2015, Klem et al., March 2009). The two primary hazards of glass for birds are reflectivity and transparency. Viewed from outside buildings, transparent glass often appears highly reflective. Reflective glass presents birds with the appearance of safe routes, shelter, and food. Buildings surrounded by lush landscaping may attract more birds, and reflections of vegetation in windows adjacent to these habitats may lure birds. Green spaces inside buildings, too, may entice birds to inaccessible habitat.

Windowed courtyards and open-topped atria can be hazardous, especially if they are landscaped. Birds fly into developed spaces, and when flushed may attempt try to leave by flying directly toward reflections. Glass skywalks, handrails and building corners with glass are also dangerous because birds can see through them to sky or habitat on the other side. As the amount of glazing increases on a building, the threat also increases. A study in New York found a 10% increase in the area of reflective and transparent glass on a building façade correlated with a 19-32% increase in the number of fatal collisions, in spring and fall, when visiting migrants are present (Klem et al, March 2009).

At night, artificial light degrades the quality of migratory corridors. Flood lights on tall buildings or intense lights that emit light fields that entrap birds reluctant to fly from a lit area into a dark one. This type of lighting has resulted in documented mass mortalities of birds (Evans Ogden, September 1996). Lights disrupt birds' orientation. Birds may cluster around such lights, increasing the likelihood of collisions with the structure or each other. In addition to the hazard from collisions, vital energy stores are consumed in such nonproductive flight. The combination of fog and light doubly affects birds' navigation and orientation (Ibid.). Migrating birds typically fly at heights over 500 feet, but often descend to lower altitudes during bad weather, where they may encounter artificial light from buildings. Water vapor in fog or mist refracts light, greatly increasing the illuminated area around light sources. Birds circle in the illuminated zone, appearing disoriented and unwilling or unable to leave (Evans Ogden, September 1996). They are likely to succumb to lethal collisions, exhaustion, and predators.

A notable, established monitoring program of bird-building collisions is NYC Audubon's Project Safe Flight in Manhattan. Project Safe Flight documented over 5,400 collisions between 1997-2008. Another study (Gelb and Delacretaz, 2009) analyzed this data to determine the critical contributing factors for the structures with the largest number of bird fatalities. The study looked at the 10 most deadly collision sites and found the combination of open space, vegetation, and large windows (greater than 1 meter x 2 meter) to be more predictive of death than building height. The frequency of collisions is highest along façades that have lush exterior vegetation and either reflective or transparent windows. The majority of the collisions occurred

during the daytime and involved migrant species. High-rise buildings and night lighting presented less risk than windows adjacent to open spaces two and half acres or greater in size. The majority of collisions are likely due to high collision sites that feature glass opposite exterior vegetation. The most dangerous building in this study was not a high-rise, but instead was a 6-story office building adjacent to densely vegetated open space.

Increasing the limits on building heights adjacent to the San Lorenzo River could result in impacts to birds from two causes: (1) an increase in the area of glass that would result in mortality to birds mistaking the reflective glass as safe passage to habitat beyond, and (2) an increase in the amount of lighting and the resultant potential for mortality of birds related to disorientation during migration. Most strikes to buildings due to reflective windows are thought to occur closer to the ground (American Bird Conservancy, 2015). Therefore, effects from reflective glass may be lower below 50 feet than above. Also, effects from reflective glass above 50 feet would be partly minimized by the proposed setback requirements that floors above 50 feet occupy no more than 60% of the area of the floor below and no more than 60% of the building length, and that floors above 50 feet be restricted by a 10-foot setback from the building face where it fronts the Riverwalk along the San Lorenzo River. Because of these restrictions, particularly the setbacks from the building face, relatively little surrounding vegetation would be reflected in these upper floors, a factor that should further limit bird mortality, based on data presented in Klem et al. (March, 2009), which showed the proportion of glass reflecting vegetation was a significant predictor of glass strikes.

However, even given these considerations, the generally accepted notion that greater amounts of glass at any height, during any season, and during day or night results in higher mortality from glass strikes, suggests that the increase in the amount of glass along the San Lorenzo River would likely result in an increase in bird mortality. Additional lighting may also result in increased bird mortality from the increased limit on building height. Therefore, the effects of the increased limit on the heights of buildings along the San Lorenzo River because of increased area of reflective glass and an increase in night-time lighting is a *potentially significant impact*.

Mitigation Measures

Implementation of the following mitigation measure will reduce the impact to a less-than-significant level.

- MITIGATION 4.3-2:** Revise Downtown Plan to include standard for design guidance for bird-safe structures along the San Lorenzo River, including:
- Minimize the overall amount of glass on building exteriors facing the San Lorenzo River.
 - Avoid mirrors and large areas of reflective glass.
 - Avoid transparent glass skyways, walkways, or entryways, free-standing glass walls, and transparent building corners.

- Utilize glass/window treatments that create a visual signal or barrier to help alert birds to presence of glass. Avoid funneling open space to a building façade.
- Strategically place landscaping to reduce reflection and views of foliage inside or through glass.
- Avoid or minimize up-lighting and spotlights.
- Turn non-emergency lighting off (such as by automatic shutoff), or shield it, at night to minimize light from buildings that is visible to birds, especially during bird migration season (February - May and August - November).

Impact 4.3-3: Indirect Impacts to Nesting Birds. Future development as a result of the proposed Downtown Plan amendments could result in disturbance to nesting birds if any are present in the vicinity of construction sites along the San Lorenzo River (3d). This is a *potentially significant* impact

While the project will not directly result in new construction that would affect nesting birds, future development accommodated by the proposed amendments could result in impacts to nesting birds at the time of construction. However, measures in the City-wide Creeks and Wetlands Management Plan include pre-construction surveys where construction may affect nesting birds in order to prevent disturbance if nesting is occurring when construction is initiated. Tree removal during the breeding season (generally March 1 to August 1) also could result in direct mortality to nesting avian species protected under the Migratory Bird Treaty Act (MBTA) due to destruction if active nest sites are present. Construction activity for a prolonged period could affect nesting adults and result in nest abandonment or failure. This is considered a *potentially significant impact*. Implementation of the pre-construction nesting surveys as set forth in the adopted Creeks Plan would reduce impacts to a less-than-significant level.

Mitigation Measures

Implementation of the following mitigation measure will reduce the impact to a less-than-significant level.

MITIGATION 4.3-3: Require that a pre-construction nesting survey be conducted by a qualified wildlife biologist if construction, including tree removal, adjacent to the San Lorenzo River is scheduled to begin between March and late July to determine if nesting birds are in the vicinity of the construction sites. If nesting raptors or other nesting species protected under the MBTA are found, construction may need to be delayed until late-August or after the wildlife biologist has determined the nest is no longer in use or unless a suitable construction buffer zone can be identified by the biologist. (Citywide Creeks and Wetlands Management Plan Standard 12).



4.4 CULTURAL AND TRIBAL CULTURAL RESOURCES

This section analyzes impacts of the proposed project on cultural resources based on a review of existing city plans. Cultural resources encompass paleontological, archaeological, and historic resources. Paleontology is the study of plant and animal fossils; paleontological resources generally are more than 10,000 years old. Archaeology is the study of prehistoric human activities and cultures. Historic resources are associated with the more recent past. In California, historic resources are typically associated with the Spanish, Mexican, and American periods in the state's history (City of Santa Cruz, April 2012, DEIR volume).

This section draws from the City of Santa Cruz *General Plan 2030* EIR (SCH#2009032007), which was certified on June 26, 2012, regarding background information on cultural resources within the City. The General Plan EIR is incorporated by reference in accordance with section 15150 of the State CEQA Guidelines. Relevant discussions are summarized in subsection 4.4.1. The General Plan EIR is available for review at the City of Santa Cruz Planning and Community Development Department (809 Center Street, Room 107, Santa Cruz, California) during business hours: Monday through Thursday, 8 AM to 12 PM and 1 PM to 5 PM. The General Plan EIR is also available online on the City's website at:

<http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development/general-plan>.

Public and agency comments related to visual impacts were received during the public scoping period in response to the Notice of Preparation (NOP). Issues raised in these comments include:

- ☐ Concern regarding potential degradation of the historic district.
- ☐ Concern regarding displacement and/or loss of organizations supporting arts and local cultural events.

To the extent that issues identified in public comments involve potentially significant effects on the environment according to the California Environmental Quality Act (CEQA) and/or are raised by responsible agencies, they are identified and addressed within this EIR. The concern regarding possible displacement of organizations that support arts, music, dance and other cultural programs is not an environmental issue pursuant to CEQA. Public comments received during the public scoping period are included in Appendix B.

4.4.1 Environmental Setting

Regulatory Setting

The following overview of prehistory and history is summarized from the General Plan 2030 EIR (pages 4.9-2 - 4.9-5), which is incorporated by reference.

Federal Regulations

National Register of Historic Places. Federal regulations for cultural resources are primarily governed by Section 106 of the National Historic Preservation Act (NHPA) of 1966, which applies to actions taken by federal agencies. The goal of the Section 106 review process is to offer a measure of protection to sites that are determined eligible for listing on the National Register of Historic Places (NRHP). The criteria for determining NRHP eligibility are found in Title 36 Code of Federal Regulations (CFR) Part 60. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and affords the federal Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings.

National Historic Landmarks. National Historic Landmarks are nationally significant historic places designated by the Secretary of the Interior because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States. They are places where nationally significant historical events occurred, that are associated with prominent Americans that represent pivotal ideas that shaped the nation, that teach Americans about their ancient past, or that are premier examples of design or construction.

State Regulations

California Register of Historical Resources. The California Register of Historical Resources (California Register) is a guide to cultural resources that must be considered when a government agency undertakes a discretionary action subject to CEQA. The California Register helps government agencies identify, evaluate, and protect California's historical resources, and indicates which properties are to be protected from substantial adverse change (Pub. Resources Code, Section 5024.1(a)). The California Register is administered through the State Office of Historic Preservation (SHPO) that is part of the California State Parks system. A resource must be significant at the local, state, or national level in accordance with one or more of the following criteria set forth in the State CEQA Guidelines at Section 15064.5(a)(3).

In addition to meeting these criteria, the California Register requires that sufficient time must have passed to allow for scholarly perspective, which is generally 50 years according to SHPO publications. The California Register also requires a resource to possess integrity, which is defined as "the authenticity of a historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance." Archaeological resources can sometimes qualify as "historical resources" (State CEQA Guidelines, Section 15064.5(c)(1)). In addition, Public Resources Code Section 5024 requires consultation with SHPO when a project may impact historical resources located on State-owned land.

Two other programs are administered by the state: California Historical Landmarks and California "Points of Interest." California Historical Landmarks are buildings, sites, features, or events that are of statewide significance and have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other historical value. California Points of Interest are buildings, sites, features, or events that are of local (city or

county) significance and have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other historical value.

Native American Consultation. Senate Bill 18 (SB 18; Government Code Sections 65352.3, 65352.4) requires that prior to the adoption or amendment of a general plan proposed on or after March 1, 2005, a city or county must consult with Native American tribes with respect to the possible preservation of, or the mitigation of impacts to, specified Native American places, features, and objects located within that jurisdiction. The project requires an amendment to the City's General Plan and the City has complied with the requirements of SB 18.

Assembly Bill 52 (AB 52) went into effect July 1, 2015, and requires lead agencies to consult with all California Native American tribes that have requested formal consultation at the onset of a project, or when a NOP is released. AB 52 also establishes a new class of resources to be evaluated – Tribal Cultural Resources.

Human Remains. Section 7050.5 of the California Health and Safety Code states that in the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the remains are discovered has determined whether or not the remains are subject to the coroner's authority. If the human remains are of Native American origin, the coroner must notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission will identify a Native American Most Likely Descendant (MLD) to inspect the site and provide recommendations for the proper treatment of the remains and associated grave goods. CEQA Guidelines Section 15064.5 directs the lead agency (or applicant), under certain circumstances, to develop an agreement with the Native Americans for the treatment and disposition of the remains.

California Public Resources Code Section 5097.5 prohibits excavation or removal of any "vertebrate paleontological site...or any other archaeological, paleontological or historical feature, situated on public lands, except with express permission of the public agency having jurisdiction over such lands." Unauthorized disturbance or removal is a misdemeanor.

California Environmental Quality Act. State CEQA Guidelines Section 15064.5 defines a "historical resource." If a cultural resource in question is an archaeological resource, CEQA Guidelines Section 15064.5(c)(1) requires that the lead agency first determine if the resource is a historical resource as defined in Section 15064.5(a). If the resource qualifies as a historical resource, potential adverse impacts must be considered in the same manner as a historical resource (California Office of Historic Preservation 2001a:5). If the archaeological resource does not qualify as a historical resource but does qualify as a "unique archaeological resource," then the archaeological resource is treated in accordance with Public Resources Code Section 21083.2 (see also CEQA Guidelines Section 15069.5(c)(3)).

Local Regulations

The City, as part of its status as a Certified Local Government, has a historic preservation ordinance. The historic preservation ordinance (HPO) provides for the protection, enhancement, and perpetuation of significant cultural resources in the GP Area. The HPO provides the statutory framework for local preservation decisions, and contains sections governing the following topics:

- ❑ Historic District Designation (Part 2, Chapter 24.06);
- ❑ Historic Landmark Designation (Section 24.12.420);
- ❑ Archaeological Resource Procedures (Section 24.12.430);
- ❑ Procedure for Amending Historic Building Survey (Section 24.12.440);
- ❑ Procedure: New Construction in Historic Districts (Section 24.12.450);
- ❑ Historic Alteration Permit (Part 10, Chapter 24.08);
- ❑ Historic Demolition Permit (Part 11, Chapter 24.08); and
- ❑ Historic Overlay District (Part 22, Chapter 24.10).

Study Area

The project area consists of the downtown area generally covered by the Downtown Recovery Plan (DRP) and the Central Business District zone, and specifically the lower downtown area generally between Soquel Avenue and Laurel Street on the north and south, and Cedar Street and the San Lorenzo River on the west and east. (Locations are shown on Figures 1-2 and 2-1 in Section 3, Project Description.) The proposed project includes an amendment to the land use designation text for the downtown portion of Regional Visitor Commercial land use designation. The study area includes properties adjacent to the western San Lorenzo River levee.

Historical Background

The following overview is summarized from the General Plan 2030 Draft EIR (pages 4.9-6 – 4.9-16), which is incorporated by reference. (For details on the prehistory and history of the area see pages 4.9-6 -4.9-9.)

Archaeological Resources

Archaeological Resources

A total of 27 documented archaeological sites have been identified within the City's General Plan planning area, of which 20 sites are prehistoric archaeological sites and seven sites are archaeological sites with both a prehistoric and historical component (City of Santa Cruz, April 2012, DEIR volume). Diocarbon and obsidian hydration data indicate that present-day Santa Cruz was occupied beginning in the Early Period, from at least 1750 B.C. and quite possibly earlier. Two sites are considered eligible for listing in the National Register of Historic Places based on the important information they contain for understanding the prehistory of the region. The

Native American Heritage Commission (NAHC) sacred lands file did not list cultural resources in the City (Ibid.).

According to maps included in the General Plan EIR (Figure 4.9-1) and included in the General Plan, all of the project study area is identified as being within a “sensitive” archaeological area in which exemptions to archaeological investigations may apply for specified types of projects. This designation applies to parcels that do not have recorded archaeological sites, but are located within sensitive areas based on review and analysis conducted for the General Plan 2030.

State Assembly Bill 52, effective July 1, 2015, recognizes that California Native American prehistoric, historic, archaeological, cultural, and sacred places are essential elements in tribal cultural traditions, heritages, and identities. The law establishes a new category of resources in the California Environmental Quality Act called “tribal cultural resources” that considers the tribal cultural values in addition to the scientific and archaeological values when determining impacts and mitigation. Public Resources Code section 21074 defines a “tribal cultural resource” as either:

- (1) Sites, features, places, cultural landscapes, sacred places and objects with cultural value to a California Native American tribe that is either listed, or determined to be eligible for listing, on the national, state, or local register of historic resources, or
- (2) A resource determined by the lead agency chooses, in its discretion and supported by substantial evidence, to treat as a tribal cultural resource.

The California Public Resources Code section 21084.2 now establishes that “[a] project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment.” The Public Resources Code requires a lead agency to consult with any California Native American tribe that requests consultation and is traditionally and culturally affiliated with the geographic area of a proposed project.

Native American Consultation

To date, the City has not been contacted by Native American tribes requesting notification of projects.

Prior to the adoption or amendment of a general plan, Government Code Sections 65352.3 and 65352.4 require a city or county to consult with local Native American tribes that are on the contact list maintained by the Native American Heritage Commission. The purpose is to preserve or mitigate impacts to places, features, and objects described in Public Resources Code Sections 5097.9 and 5097.993 (Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine located on public property) that are located within a city or county's jurisdiction.

On behalf of the City of Santa Cruz, Dudek contacted Native American tribes and tribal organizations pursuant to the requirements of California Government Code Section 65352.3 (implementation of Senate Bill 18) as part of the preparation of this EIR. On May 24, 2017, a letter was sent to the Native American Heritage Commission (NAHC) in Sacramento requesting a Senate Bill 18 consultation list. NAHC responded that the NAHC Sacred Lands File was completed for the project area, and none were identified. Letters were sent to the tribes and tribal organizations identified by the NAHC to notify them of their opportunity to consult with the City regarding the General Plan Update. No responses to this notification have been received by the City.

Historic Archaeological Resources

Most of the City has the potential to contain historical archaeological deposits. However, some areas exceed this nominal potential and are categorized as sensitive, and other areas have heightened sensitivity due to the presence or proximity of recorded archaeological deposits. There are documented occurrences of archaeological deposits dating to the Spanish and Mexican periods in California. These eras are of high interest due to the relative paucity of intact, recoverable deposits associated with these periods. Sites associated with similar communities have had significant archaeological research value and have been found to be historically significant.

Historic development trends affect whether historical archaeological deposits may be present. Two prominent historical periods occurred in Santa Cruz – the Mission Period and American Period. Mission Santa Cruz was established on the banks of the San Lorenzo River in September 1791, and quickly absorbed the surrounding Native American Ohlone population. Another colonial institution, Villa de Branciforte, was established on the other side of the San Lorenzo River across from Mission Santa Cruz in 1797. In 1834, the California missions were secularized, and Mission Santa Cruz lands came under the control of Villa de Branciforte. The second period began in 1848 when California was ceded to the United States under the Treaty of Guadalupe Hidalgo.

According to maps included in the General Plan EIR (Figure 4.9-2) and included in the General Plan, all of the project study area is identified as being within a “sensitive” historical archaeological area the area that was associated with the American Period of development with the area along Ocean Street also associated with the Mission Period. Within this designation, exemptions to archaeological investigations may apply for specified types of projects. One area at Front and Cathcart Streets is identified as a highly sensitive historical archaeological area.

Historic Resources

As one of California’s oldest settlements, founded in 1791, Santa Cruz has many historical buildings. As a result of the City’s *Historic Preservation Plan*, adopted in 1974 as an element of the General Plan, the Historic Preservation Commission and the Historic Preservation Ordinance

(Section 24.12.400 of the City’s Zoning Ordinance) were established to protect the City’s historic resources. Historic districts may be designated pursuant to criteria and procedures in the Zoning Ordinance as further described below. The City of Santa Cruz has designated historic buildings and landmarks as further described below. Permits are required for alteration or demolition of listed historic buildings or landmarks pursuant to the City of Santa Cruz Municipal Code Chapter 24.08 requirements.

Five styles—and several substyles—of architecture have been identified in the City:

- ❑ Spanish Mission and Spanish Colonial Style (1791-1846),
- ❑ Salt Box (c. 1850-1870),
- ❑ Romantic styles (c. 1850s-1920),
- ❑ Victorian styles (c. 1880s-1900), and
- ❑ Eclectic styles (1895-1975).

Historic Districts

Historic districts may be designated pursuant to criteria and procedures in the Zoning Ordinance (Part 2 of Section 24.06). A proposed historic district must be a geographically definable area possessing a significant concentration or continuity of sites, buildings, structures, or objects unified by past events, or aesthetically by plan or physical development, and the collective value of the historic district taken together may be greater than the value of each individual structure. Additionally, Part 22 of Section 24.10 of the City’s Zoning Ordinance sets forth parameters for establishing historic overlay districts within the City. The purpose of this district is to provide a means to preserve and enhance areas of historic, architectural, and engineering significance located within the city. There are two existing designated local historic districts (Mission Hill and Downtown Neighborhood) and one National Register district (Cowell Limes Work District). Potential historic districts are located in the Beach Hill and Ocean View Street neighborhoods (City of Santa Cruz, April 2012, DEIR volume). While a portion of downtown is located within the Downtown Neighborhood historic district, the project study that is subject to Additional Height Zones is not located within this district.

Historic Buildings and Landmarks

In 1976, the City completed a “Historic Building Survey,” which identified and evaluated historic and architecturally significant buildings. The survey, conducted by the firm of Charles Hall Page and Associates, identified 306 properties and structures on the basis of historical and cultural, environmental and architectural significance. Volume I of the survey covered architectural development in the City from approximately 1850 to 1930. The Survey’s evaluation of individual buildings considered historical and architectural significance, importance to the neighborhood, desecration of original design, and physical condition, and assigned each an overall rating of exceptional, excellent, good or fair. All properties in the 1976 survey were officially listed and

protected under the City historic preservation policies and regulations (City of Santa Cruz, Santa Cruz Historic Building Survey Volume III).

In 1989, Volume II of the City Historic Building Survey was produced, which catalogues a total of 330 additional structures from three categories: significant buildings from 1930 to 1950; important structures not included in the first survey; and significant vernacular buildings from 1850 to 1910, the latter of which comprise approximately one half of the structures in Volume II. Neighborhood context was emphasized in Volume II, with a focus on contiguous rows of historic buildings. More than 250 of properties in Volume II of the Survey have been listed officially as historic resources (City of Santa Cruz, Santa Cruz Historic Building Survey Volume II). Additionally, as part of the development of Volume II, some of the properties were removed from the master list of historic properties because of demolition that occurred due to damage from the Loma Prieta Earthquake.

In 2013, Volume III of the City Historic Building survey was completed. Volume III of the Survey was prepared for the City under the direction of Leslie Dill, historic architect. The prior survey volumes were used as a framework, and the Historic Context Statement (City of Santa Cruz, 2000) as the guide, in helping identify properties that are worthy of consideration for inclusion in the City's list of historic resources. The Historic Context Statement for the City of Santa Cruz prepared by historian Susan Lehmann describes three themes for understanding the historic development of Santa Cruz: economic development from 1850 to 1950; residential, commercial and institutional architecture from 1850 to 1950; and institutions from 1850 to 1950. Volume III of the survey applies these themes to specific neighborhoods.

The establishment of the California Register of Historical Resources in 1993, and the adoption of guidelines to the California Environmental Quality Act in 1999 that pertain to historic resources, has resulted in a more rigorous framework for the identification and evaluation of historic properties by local jurisdictions. The methods for conducting surveys are specified in National Register Bulletin 24, Guidelines for Local Surveys: a Basis for Preservation Planning. The Secretary of the Interior, through the National Park Service, has developed the National Register program and prepared a number of associated bulletins that address the study and registration of the full range of cultural resources that community planners may encounter. Surveys were prepared consistent with the Secretary of Interior's Standards for Identification.

The City of Santa Cruz has adopted criteria under Municipal Code Section 24.12.440 for listing properties as historic resources. The property can be a building, site, or object, and to be considered, must meet one seven criteria. A historic district must meet two additional criteria. These criteria were also used in the preparation of the surveys.

In 2013, approximately 150 properties were considered, photographed, and given consideration for further research and evaluation. At the direction of City Council an opt-out option was provided for property owners. Of the 139 properties approved by City Council to be included in the Historic Building List, 55 property owners chose to opt-out.

Currently, 623 buildings (569 from Survey I/II and 54 from Survey III), 27 walls, stairways, steps or curbs, as well as 5 hitching posts, hitching rails or mounting blocks are listed in the City's Historic Survey. Buildings of greatest historical and architectural significance have been designated "landmarks" pursuant to section 24.12.430 of the City's Zoning Ordinance. Currently there are 24 designated landmarks in the City. Fourteen properties are listed on the National Register of Historic Places and the following three sites are listed in the California Historical Landmarks: Site of Mission Santa Cruz, Site of Center of Villa Branciforte and the Santa Cruz Beach Boardwalk.

The following locally listed structures are located within the project study area:

- ☐ 112 Elm Street (Survey I/II)
- ☐ 117 Elm Street (Survey I/II)
- ☐ 418 Front Street (Survey III)
- ☐ 428 Front Street (Survey III)
- ☐ 429 Front Street (Survey III)
- ☐ 514-518 Front Street (Survey III)
- ☐ 216 Laurel Street (Survey I/II)
- ☐ 115 Maple Street (Survey I/II)
- ☐ 811 Pacific Avenue (Survey I/II)
- ☐ 1120-1126 Pacific Avenue (Survey I/II)
- ☐ 1132 Pacific Avenue (Survey I/II)
- ☐ 1134 Pacific Avenue (Survey I/II)

Paleontological Resources

Paleontological resources are fossilized remains of plants and animals, and associated deposits. The Society of Vertebrate Paleontology has identified vertebrate fossils, their taphonomic and associated environmental indicators, and fossiliferous deposits as significant nonrenewable paleontological resources.

The cultural resources investigation conducted as part of the General Plan Update identified 48 vertebrate fossil localities within five miles of Santa Cruz. These localities have yielded 786 recorded vertebrate fossil specimens that have been found in the Santa Margarita Sandstone, Santa Cruz Mudstone, Purisima Formation, and from the Late Pleistocene terrace deposits in and near the General Plan planning area. Based on a literature review, four geologic units in the General Plan area are known to contain fossils: Late Pleistocene alluvium; the Purisima

Formation; the Santa Cruz Mudstone; and the Santa Margarita Sandstone (City of Santa Cruz, April 2012, DEIR volume).

As shown on Figure 4.9-5 of the General Plan (City of Santa Cruz, April 2012, DEIR volume), the project area is underlain with Holocene alluvium. Though Holocene alluvium is generally considered too young to contain paleontological resources, this geologic unit is moderately sensitive for paleontological resources because it is underlain by sedimentary geologic units that have a high paleontological sensitivity (City of Santa Cruz, April 2012, DEIR volume).

4.4.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies, and/or guidelines; and agency and professional standards, a project impact would be considered significant if the project would:

- 4a Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5 or to a unique archaeological resources to tribal cultural resources (see definitions below);
- 4b Disturb any human remains, including those interred outside of formal cemeteries;
- 4c Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5 (see definition below) to include physical demolition, destruction, relocation, or alteration of historic resources or of the immediate surroundings of historic resources, such that the significance of the resources would be materially impaired (see definition below);
- 4d Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; or
- 4e Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or b) a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

CEQA defines a “*unique archaeological resource*” as an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets one or more of the following criteria:

- ❑ Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information; or
- ❑ Has a special and particular quality such as being the oldest of its type or the best available example of its type; or
- ❑ Is directly associated with a scientifically recognized important prehistoric or historic event or person (PRC §21083.2(g)).

CEQA (Public Resources Code section 21974) defines a “*tribal cultural resource*” as either of the following:

- (1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:
 - (A) Included or determined to be eligible for inclusion in the California Register of Historical Resources.
 - (B) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.
- (2) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1.

State CEQA Guidelines Section 15064.5 defines a *historical resource* as:

- ❑ A resource listed in, or determined to be eligible for listing in, the California Register;
- ❑ A resource listed in a local register of historical resources.
- ❑ Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California...Generally, a resource shall be considered by the lead agency to be “historically significant.” Generally a resource is considered historically significant if it meets criteria for listing in the California Register of Historical Resources, including:
 - Is associated with events that made a significant contribution to the broad patterns of California’s history and cultural heritage.
 - Is associated with the lives of people important in our past.
 - Embodies the distinctive characteristics of a type, period, region, or method of construction, represents the work of an important creative individual, or possesses high artistic values.

- Has yielded or may be likely to yield information important in prehistory or history; OR
- ☐ A resource determined to be a historical resource by a project's lead agency.

CEQA Guidelines Section 15064.5(b) defines a “*substantial adverse change*” to a historical resource as: “physical demolition, destruction, relocation or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired. The significance of an historical resource is *materially impaired* when a project demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for inclusion in, the California Register of Historical Resources or in registers meeting the definitions in Public Resources Code 5020.1(k) or 5024.1(g).

Analytical Method

The proposed project consists of amendments to the City’s Downtown Recovery Plan, General Plan, Local Coastal Plan and Zoning Code regarding development in the downtown area and Central Business District. The proposed project would not directly result in new development. However, the proposed Downtown Plan amendment would expand areas for potential additional building height that could accommodate intensified redevelopment of existing developed sites. The proposed General Plan amendment would increase FAR in downtown areas designated as RVC in the General Plan. The proposed LCP and Zoning Code amendments would not result in changes that could indirectly lead to intensified development. The following impact analyses is based on review of existing data and studies. The analyses are based on review of existing studies and City requirements for evaluation of cultural resources.

Impacts and Mitigation Measures

The following impact analyses address potential impacts to archeological and tribal cultural resources (4a, 4b, 4e), historic resources (4c), and paleontological resources (4d).

Impact 4.4-1: Archaeological and Tribal Cultural Resources. Future development accommodated by the proposed plan amendments could result to impacts to archaeological, historical archaeological, human remains, and/or tribal cultural resources. However, City requirements for cultural resource investigations would ensure that future development projects assess and mitigate potential impacts (4a, 4b, 4e). This is a *less-than-significant* impact.

The proposed project would not result in new development, but could result in intensified development in the project study area. Potential redevelopment of existing properties could occur without the proposed project. The City’s General Plan includes a policy that requires preparation of archaeological investigations for any project located within a sensitive

archaeological area (HA1.2.2). The investigation must include archival research, site surveys and necessary supplemental testing as may be required, conducted by a qualified archaeologist, and the significance of identified resources shall be ascertained in accordance with CEQA definitions. The measure requires that the report identify significant impacts and outline mitigation measures if significant impacts are identified, including, but not limited to recovery options and onsite monitoring by an archaeologist during excavation activities. A written report describing the archeological findings of the research or survey shall be provided to the City. This General Plan Action also allows exemption for minor project that generally involve spot excavation to a depth of 12 inches or less below existing grade. Exempt projects may include: building additions, outdoor decks, or excavation in soil that can be documented as previously disturbed.

Additionally, the City's accidental discovery procedures (Municipal Code Section 24.12.430) would also apply to properties in the study area in the event construction encounters unidentified archaeological deposits. This regulation requires that construction be stopped if archaeological resources are encountered during construction, and that the Planning Director be notified and the discovery analyzed. If determined not be an archaeological resource, construction could proceed, but it is determined to be a resource, implementation of appropriate measures would be required.

Future development projects within sensitive archaeological areas are required to prepare these investigations prior to project approval, and any recommendations are included as Conditions of Approval. Therefore, the City's policies and regulations ensure that archaeological and tribal cultural resources are addressed and mitigated as part of further development proposals. Thus, the project would not indirectly lead to potentially significant impacts. Additionally, it is noted that redevelopment of properties in the study area could occur without the proposed project.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.4-2: Historic Resources. Future development accommodated by the proposed plan amendments could result in impacts to historical resources (4c), however, site-specific redevelopment could occur under existing conditions without the proposed plan amendments (4c). Therefore, this is a *less-than-significant* impact.

The proposed project would not result in new development, but could result in intensified development in the project study area with future development. Potential redevelopment of existing properties could occur without the proposed project. There are 12 structures within the study area that are listed in the City's Historic Building Survey, and may be considered a historic resource. Future development projects would be subject to conducting historical evaluations to determine whether the structure is a historic resource that could be significantly impacted under the definition of CEQA. If a significant impact is identified, appropriate mitigation measures would be required and/or a project-specific CEQA review to consider substantial alteration or

demolition of a historic resource that would substantially and materially alter the significance of the resource. Since redevelopment of properties could occur without the proposed project, the proposed amendments would not lead to development that might not otherwise occur, but only allow for some intensification of development. Therefore, the proposed project would not result in new impacts.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.4-3: Paleontological Resources. Future development accommodated by the proposed plan amendments could result to impacts to unknown paleontological resources discovered during construction. However, adherence to City procedures would not result in significant impacts (4d). Therefore, this is a *less-than-significant* impact.

According to maps developed for the City's *General Plan 2030* and included in the General Plan EIR, the project study area is mapped as Holocene Alluvium geologic formation. Although this formation is generally considered too young to contain paleontological resources, it is considered moderately sensitive for paleontological resources because it is underlain by sedimentary geologic units that have a high paleontological sensitivity (City of Santa Cruz, April 2012, DEIR volume). The General Plan Action HA1.2.3 requires the City to notify applicants within paleontologically sensitive areas of the potential for encountering such resources during construction and condition approvals that work will be halted and resources examined in the event of encountering paleontological resources during construction. If the find is significant, the City would require treatment of the find in accordance with the recommendations of the evaluating paleontologist. Treatment may include, but is not limited to, specimen recovery and curation or thorough documentation

Therefore, the City's policies ensure that paleontological resources are addressed and mitigated as part of further development proposals. Thus, the project would not indirectly lead to potentially significant impacts. Additionally, it is noted that redevelopment of properties in the study area could occur without the proposed project.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

4.5 HYDROLOGY AND WATER QUALITY

This section analyzes impacts of the proposed project related to hydrology and water quality based on a review of existing city plans and other exiting data. This section also draws from the City of Santa Cruz *General Plan 2030* EIR (SCH#2009032007), which was certified on June 26, 2012, regarding background information on regulatory setting and surface and groundwater hydrology. The General Plan EIR is incorporated by reference in accordance with section 15150 of the State CEQA Guidelines. Relevant discussions are summarized in subsection 4.3.1. The General Plan EIR is available for review at the City of Santa Cruz Planning and Community Development Department (809 Center Street, Room 107, Santa Cruz, California) during business hours: Monday through Thursday, 8 AM to 12 PM and 1 PM to 5 PM. The General Plan EIR is also available online on the City's website at:

<http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development/general-plan>.

Public and agency comments related to hydrology and water quality were received during the public scoping period in response to the Notice of Preparation (NOP). Issues raised in these comments include:

- ☐ Potential risks of flood hazards, impacts from flooding and requirements for buildings to be elevated if located within a floodplain.
- ☐ Use of Low Impact Development Best Management Practices and standards should be evaluated in the EIR to reduce or eliminate runoff and pollution discharges into the River.

To the extent that issues identified in public comments involve potentially significant effects on the environment according to the California Environmental Quality Act (CEQA) and/or are raised by responsible agencies, they are identified and addressed within this EIR. Public comments received during the public scoping period are included in Appendix B.

4.5.1 Environmental Setting

Regulatory Setting

The following overview summarizes key regulations regarding hydrology and water quality. See the General Plan 2030 EIR (DEIR volume, pages 4.7-1 – 4.7-5), which is incorporated by reference, for further discussion on regulations.

Federal and State Regulations

The Federal Emergency Management Agency (FEMA) – a former independent agency that became part of the new Department of Homeland Security in March 2003 – is tasked with responding to, planning for, recovering from, and mitigating against disasters. Formed in 1979 under an executive order by President Jimmy Carter to merge many of the separate disaster-

related responsibilities of the federal government into one agency, FEMA is responsible for determining flood elevations and floodplain boundaries based on U.S. Army Corps of Engineers studies and approved agencies studies and for coordinating the federal response to floods, earthquakes, hurricanes, and other natural or man-made disasters and providing disaster assistance to states, communities and individuals. FEMA distributes the Flood Insurance Rate Maps (FIRMS), which are used in the National Flood Insurance Program (NFIP). These maps identify the locations of special flood hazard areas (SFHAs), including the 100-year flood zone.

The U.S. Environmental Protection Agency (EPA) is the lead federal agency responsible for water quality management. The Clean Water Act of 1972 (CWA, codified at 33 United States Code Sections 1251-1376) is the primary federal law that regulates the discharge of pollutants to waters of the United States from any point source. Section 401 of the CWA requires water quality certification for any activity, including the construction or operation of a facility, which may result in any discharge into navigable waters. Section 404 of the CWA requires a permit for the discharge of dredged fill material into navigable waters at specified disposal site. In 1987, amendments to the CWA added Section 402(p), which establishes a framework for regulating non-point source stormwater discharges under the National Pollutant Discharge Elimination System (NPDES). Various elements of the CWA address water quality, and they are discussed below.

The California State Water Resources Control Board (State Board) and the nine Regional Water Quality Control Boards (RWQCB) have the responsibility in California to protect and enhance water quality, both through their designation as the lead agencies in implementing the Section 319 non-point source program of the federal Clean Water Act, and through the state's primary water pollution control legislation, the Porter-Cologne Water Quality Control Act of 1969, codified in Division 7 of the California Water Code). Under the Act, the State must adopt water quality policies, plans, and objectives that protect the State's waters for the use and enjoyment of the people. Such "waters of the State" include streams, groundwater, isolated wetlands, and other bodies of water that are not under federal jurisdiction as "waters of the United States" (under the Clean Water Act). The Act sets forth the obligations of the SWRCB and RWQCBs to adopt and periodically update water quality control plans (Basin Plans). Basin Plans are the regional water quality control plans required by both the CWA and Porter-Cologne Act in which beneficial uses, water quality objectives, and implementation programs are established for each of the nine regions in California. The Act also requires waste dischargers to notify the RWQCBs of their activities through the filing of Reports of Waste Discharge (RWD) and authorizes the SWRCB and RWQCBs to issue and enforce waste discharge requirements (WDRs), National Pollutant Discharge Elimination System (NPDES) permits, Section 401 water quality certifications, or other approvals.

Urban runoff and other "non-point source" discharges are regulated by the 1972 Federal Clean Water Act (CWA), through the National Pollutant Discharge Elimination System (NPDES) permit program that has been implemented in two phases through the California Regional Water Quality Control Boards (RWQCB). Phase I regulations, effective since 1990, require NPDES

permits for stormwater discharges for certain specific industrial facilities and construction activities, and for municipalities with a population size greater than 100,000. Phase II regulations expand the NPDES program to include all municipalities with urbanized areas and municipalities with a population size greater than 10,000 and a population density greater than 1,000 persons per square mile. Phase II regulations also expand the NPDES program to include construction sites of one to five acres (City of Santa Cruz, April 2012, DEIR volume).

Construction activity on projects that disturb one or more acres of soil must obtain coverage under the State's General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 99-08-DWQ). Construction activity subject to this permit includes clearing, grading, and disturbances to the ground such as stockpiling or excavation. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must list best management practices (BMPs) that the discharger will use to protect stormwater runoff and the placement of those BMPs.

Local Regulations

Stormwater Management Program. The City of Santa Cruz (City) has developed a Storm Water Management Program (SWMP) in order to fulfill the requirements of the Phase II NPDES General Permit for Discharges of Storm Water from Small Municipal Separate Storm Sewer Systems (MS4) (General Permit) and to reduce the amount of pollutants discharged in urban runoff. In compliance with the Phase II regulations, the City's comprehensive SWMP is designed to reduce the discharge of pollutants to the Maximum Extent Practicable (MEP) and to protect water quality (City of Santa Cruz, April 2012, DEIR volume).

In 1998, the City of Santa Cruz adopted an ordinance for "Storm Water and Urban Runoff Pollution Control" (Chapter 16.19 of the city's Municipal Code) as part of its Storm Water Management Program in accordance with the RWQCB's requirements. The ordinance identifies prohibited discharges and required Best Management Practices (BMPs) for construction and new development.

As indicated above, construction activity on projects that disturb one or more acres of soil must obtain coverage under the State's General Permit for Discharges of Storm Water Associated with preparation and implementation of a SWPPP and BMPs to protect water quality during construction. The proposed project would result in grading and development that would disturb over one acre, and thus, the project would be subject to preparing a SWPPP. The City's regulatory requirements and BMPs, as detailed in the "Stormwater Best Management Practices Manual" published by the City's Public Works Department, must be implemented.

The project is subject to the Central Coast Post-Construction Requirements that were enacted by the CCRWQCB in July 2013. Based on the amount of impervious area created by the project, which is greater than 22,500 SF, the project has to meet Tiers 1 thru 4 (Site Design, Water Quality Treatment, Runoff Retention and Peak Flow Management).

Municipal Code Requirements. The Zoning Ordinance, Title 24 of the Municipal Code, currently contains provisions to ensure that new development is designed and constructed in a manner that limits alteration of drainage patterns, prevents erosion, and minimizes long-term impacts on water quality. Chapter 24.14 – Environmental Resource Management – contains a section on Conservation Regulations that includes general provisions for drainage and erosion controls. Section 24.14.050 requires that a drainage plan be submitted for projects, both large and small, when existing drainage patterns would be altered by new construction. A drainage plan must be submitted and reviewed as part of the project approval. In addition, the ordinance requires that stormwater runoff resulting from project development be minimized.

Section 24.14.060 requires preparation and implementation of an erosion control plan for all projects within or adjacent to an erosion hazard area and for development proposals located on slopes in excess of 10 percent. The section sets forth the requirements for the plan.

The Grading Ordinance is a subset of Title 18, Buildings and Construction, of the City’s Municipal Code and is included in Chapter 18.45 – Excavation and Grading Regulations.” It provides technical regulations of grading and excavation, in conjunction with the Environmental Resource Management provisions (Municipal Code, Title 24, Chapter 24.14), in order to safeguard life, health, safety and the public welfare; protect fish and wildlife, riparian corridors and habitats, water supplies, and private and public property, and to protect the environment from the effects of flooding, accelerated erosion and/or deposition of silt. The ordinance accomplishes this by providing guidelines, regulations, and minimum standards for clearing, excavation, cuts, fills, earth moving, grading operations (including cumulative grading), water runoff and sediment control. In addition, the ordinance includes provisions regarding administrative procedures for issuance of permits and approval of plans and inspections during construction and subsequent maintenance. Section 18.45.110 also provides erosion control requirements for cut/fill slopes in addition to the requirements outlined in Section 24.14.060.

Study Area

The project area consists of the downtown area generally covered by the Downtown Recovery Plan (DRP) and the Central Business District zone, and specifically the lower downtown area generally between Soquel Avenue and Laurel Street on the north and south, and Cedar Street and the San Lorenzo River on the west and east. (Locations are shown on Figures 1-2 and 2-1 in Section 3, Project Description.) The study area includes properties adjacent to the western San Lorenzo River levee. Since the proposed project includes an amendment to the land use designation text for the Regional Visitor Commercial land use designation, the study area also includes downtown lands located within this designation.

Regional Hydrological Setting

The City of Santa Cruz encompasses approximately 12 square miles between the Monterey Bay and the Santa Cruz Mountains and lies on a narrow coastal plain at the mouth of the San Lorenzo

River. A total of 39 miles of watercourses occur within the City (City of Santa Cruz, April 2012, DEIR volume).

The San Lorenzo River originates in the Santa Cruz Mountains and is the largest drainage in the region. The river flows southward from the Santa Cruz Mountains, traverses through the center of the City, and forms a major physical feature of the region. The downtown area of the City of Santa Cruz is situated on the floodplain of the lower San Lorenzo River.

The San Lorenzo River drains a 138-square mile watershed, featuring forested and urbanized areas within the City and Santa Cruz County. Within the City limits, the lower San Lorenzo River flows southward from the Sycamore Grove area of Pogonip through the center of Santa Cruz, to Monterey Bay. The lower 2.5 miles (south of Highway 1) are channelized in a levee flood control project developed in cooperation with the U.S. Army Corps of Engineers (ACOE) in the late 1950s (City of Santa Cruz, April 2012, DEIR volume). Significant flood improvements along the river were completed in 2000 as part of the ACOE's San Lorenzo River Flood Control and Environmental Restoration Project. This project raised the river levee heights, provided landscaping and improved the pedestrian/bicycle path on the levee, and rehabilitated three of the four downtown bridges (over the San Lorenzo River) to increase flood flow capacity. The habitat enhancement efforts focused on the landside of the levees in the study area which were landscaped with native trees, shrubs, and groundcover.

Stormwater Drainage

The City's storm drain system is comprised of a wide variety of conveyance systems such as underground pipes, small open drainage channels, creeks, and the San Lorenzo River. The system includes numerous storm drain inlets and catch basins (approximately 1,450) throughout the City, and five pump stations that discharge stormwater directly into the San Lorenzo River (City of Santa Cruz, April 2012, DEIR volume).

In general, the City's downtown area drains to the San Lorenzo River. Although some stormwater reaches the river by absorption and gravity, the five pump stations along the river were installed in order to transfer the majority of the stormwater over (actually through) the river levees. There are three pump stations located on the west side of the river and two on the east side (City of Santa Cruz, April 2012, DEIR volume).

State and federal storm water regulations require development and remodeling projects to incorporate design standards BMPs in order to reduce pollutant and storm water discharges to the Maximum Extent Practicable. All future development projects will be subject to the City's mandatory BMPs, including the use of Low Impact Development (LID). LID is a site design approach that uses techniques to slow and infiltrate storm water, mimicking the natural, pre-development hydrology. LID design strategies can be applied to most new or redevelopment projects to meet storm water regulations, reduce downstream flooding and protect natural resources (City of Santa Cruz (City of Santa Cruz, 2014).

The project study areas are primarily located with “Urban Sustainability Areas” defined in the City’s BMP Manuals. These areas encompass the City’s business centers and primary transportation corridors where the City’s General Plan 2030 vision is to promote “Smart Growth” concepts of high density mixed-use development. Certain exemptions to stormwater retention requirements are allowed for high-density projects that meet specified requirements.

Water Quality

Urban development often results in the degradation of water quality due to the introduction of pollutants and erosion due to construction and development. Development and pervious pavement can result in increased runoff and higher velocities in creeks and streams. These changes can, in turn, cause erosion. Urban pollutants may include toxic metals, hydrocarbons, nutrients, suspended solids, and many other chemicals (City of Santa Cruz, April 2012, DEIR to treat stormwater runoff in compliance with federal and state laws.

The primary pollutants of concern in the City watersheds are sediment and silt and fecal indicator bacteria. The City has targeted these primary pollutants of concern in the SWMP because certain water bodies within the City are listed on the Clean Water Act Section 303(3) list as impaired for these specific pollutants as further discussed below (Ibid.). As previously indicated, the City’s SWMP is a comprehensive program to reduce the amount of pollutants discharged in urban runoff and to improve and protect water quality that includes requirements for stormwater treatment in development projects in accordance with the federal state requirements.

The Clean Water Act requires states to identify and prepare a list of water bodies that do not meet water quality objectives, and to establish Total Maximum Daily Loads (TMDL) for each water body to ensure attainment of water quality objectives. The City of Santa Cruz storm drain system (MS4) discharges into four water bodies that are currently on the 303(d) list of impaired water bodies, one of which is the San Lorenzo River. The San Lorenzo River is listed for: sediment, nutrients and pathogens. The City’s SWMP addresses the primary pollutants of concern through City measures and BMPs to the Maximum Extent Practicable.

Flood Hazards

Flooding and coastal storms present essentially the same risks and are frequently related types of hazards in the City of Santa Cruz. A flood is a natural event for rivers and streams. Coastal storms can cause increases in tidal elevations (called storm surge) wind speed and erosion as well as flooding. Floodplains are lowlands adjacent to rivers, lakes and oceans that are subject to recurring floods (City of Santa Cruz, September 2013).

The City of Santa Cruz Climate Adaptation Plan considers flooding and severe coastal storms to be a considerable, potential risk to the city and its residents. Intense, increased rainfall may lead

to larger flood flows. Noted in the CAP are the potential for greater storm surges, wind speeds and resultant coastal erosion. These events are predicted to occur more frequently due to climate change impacts, including the impacts from sea level rise (City of Santa Cruz, 2013).

Flood Hazards

The San Lorenzo River runs through the downtown corridor and the majority of the downtown area is in the San Lorenzo floodplain. Flooding along the coast of Santa Cruz may occur with the simultaneous occurrence of large waves and storm swells during the winter. When storms occur simultaneously with high tides, flood conditions including flooding at the mouth of the San Lorenzo River are exacerbated.

The downtown area and a portion of the beach area are located within the 100-year floodplain of the San Lorenzo River. The Flood Insurance Rate Map (FIRM) is an official map of a community for which the Federal Insurance and Mitigation Administration has delineated the Special Flood Hazard Area. All known areas of the City subject to natural flooding hazards have been designated and mapped by the Federal Emergency Management Agency (FEMA), such as the 100 year floodplain boundaries which appear on FEMA's Flood Insurance Rate Maps (City of Santa Cruz, 2013).

The City of Santa Cruz has worked to improve the flood capacity of the San Lorenzo River levees over the past twenty years. In 2002, FEMA re-designated much of the downtown and beach area from A-11 to the A-99 Flood Zone designation in recognition of the significant flood improvements resulting from the San Lorenzo River Flood Control and Environmental Restoration Project. Under the A-99 designation, new buildings and improvements are no longer mandated to meet FEMA flood construction requirements (City of Santa Cruz, 2013).

The City's adopted "Local Hazard Mitigation Plan, 2012-2017" includes measures that the City intends to implement in response to flood hazards. The City addresses land use within the flood plain in the General Plan as well as actively enforcing building and zoning codes, and other land use regulations concerning development within the 100-year flood plain. The City will continue to work with FEMA and the Army Corps of Engineers to minimize impacts of flooding in Santa Cruz.

High Tide intrusion into the San Lorenzo River and Downtown. The downtown area is situated on the San Lorenzo River floodplain that is underlain by permeable sands and gravels so that the groundwater level beneath the City is essentially the same as the river level. During high tides, and when the San Lorenzo River has been dammed by the sand bar that typically forms across the river mouth in mid- to late summer, the impounded water level rises, at times extending upstream as far as the Highway One bridge. There appears to be a direct connection between the elevation of the water table and the level of the San Lorenzo River. The resulting elevated water table historically led to ground water seeping into the basements of the downtown buildings, resulting in the need for pumping and dewatering during construction. The City Public Works Department pumps ground water as much as 15 hours a day from beneath the

Locust Street parking garage when the river backs up in the summer months (Griggs, Haddad, January 2011).

Due to sediment accumulation in the San Lorenzo River flood control channel, many of the gravity outlets that were constructed to carry water from the low lying areas next to the levees back into the river began to be covered over years ago. The City has replaced flap gates with these new valves on the San Lorenzo River.

Tsunami Hazards

A tsunami is a series of waves generated by an impulsive disturbance in the ocean or in a small, connected body of water. Tsunamis are produced when movement occurs on faults in the ocean floor, usually during very large earthquakes. An earthquake anywhere in the Pacific can cause tsunamis around the entire Pacific basin. Since the Pacific Rim is highly seismically active, tsunamis are not uncommon, although there has been minimal damage and loss of life in Santa Cruz during recorded history (City of Santa Cruz, 2013). However, a tsunami generated by a 9.0 magnitude earthquake in Japan in March 2011 reached Santa Cruz and caused substantial damage to the Santa Cruz Small Craft Harbor. The National Oceanic and Atmospheric Administration operates a tsunami warning system, giving several hours' notice to allow evacuation of threatened areas to prevent injuries.

There are two primary types of tsunami vulnerability in Santa Cruz. The first is a distant source tsunami from elsewhere in the Pacific Ocean. This type of tsunami is capable of causing significant destruction in Santa Cruz. However, this type of tsunami would usually allow time for the Tsunami Warning System for the Pacific Ocean to warn at risk and threatened coastal areas in time for evacuation (City of Santa Cruz, 2013). The more vulnerable risk to the City of Santa Cruz is a tsunami generated as the result of an earthquake along one of the many earthquake faults in the region. A local source tsunami generated by an earthquake on any of the faults affecting Santa Cruz would arrive just minutes after the initial shock. The lack of warning time from such a nearby event would result in higher casualties than if it were a distant tsunami (Ibid.). The City's mitigation strategy includes continuation of an up-to-date Emergency Operations Plan, an effective public information program and continuing collaborative efforts with the County, other Cities, agencies and community organizations to facilitate collaborative efforts in providing up-to-date tsunami mapping, preparation, information, warning dissemination and education.

According to maps prepared for the *General Plan 2030* and included in the General Plan EIR, the downtown and beach areas are located within a potential tsunami inundation area, as are most of the downtown and beach areas of Santa Cruz (City of Santa Cruz, April 2012, DEIR volume-Figure 4.7-2).

Sea Level Rise Hazards

The rise in global sea level is attributed to the thermal expansion of ocean water and the melting of mountain glaciers and ice sheets around the globe. Sea level rise will result in direct and indirect impacts including increased risk of flooding, storm surges and inundations, erosion, and shoreline retreat. Average global sea level has risen between five to nine inches during the 20th century as reported by the International Panel on Climate Change (IPCC), nearly one-tenth of an inch each year (California Environmental Protection Agency, August 2013). Along California's coast, sea level already has risen by an average of seven inches over the last century – three inches at Los Angeles, eight inches at San Francisco, and an estimated six inches at La Jolla near San Diego (Ibid.).

Although sea level rise is not a new phenomenon, having been a major natural component of coastal change throughout time, the current concern is that with increased global warming and melting of ice sheets on Greenland and West Antarctica, the rate of change may increase. The "State of California Sea-Level Rise Guidance Document" (March 2013) provides guidance for incorporating sea-level rise projections into planning and projects in California in response to Governor Schwarzenegger's Executive Order S-13-08, issued on November 14, 2008 that directed state agencies to plan for sea level rise and coastal impacts. According to this document¹, sea level rise is projected (using the year 2000 as a baseline) as: 0.13-0.98 feet between 2000 and 2030; 0.39-2.0 feet between 2000-2050; and 1.38-5.48 feet between 2000 and 2100 (see Table 4.5-1). Impacts of sea level rise in California include flooding and inundation, increased coastal erosion, changes in sediment supply and movement, and saltwater intrusion to varying degrees along the California coast (California Coastal Commission, August 2015).

Portions of downtown and beach areas have been mapped as being within areas of sea level rise. As sea level continues to rise, seawater could extend farther upstream in the San Lorenzo River flood control channel more frequently, and rising gradually to higher elevations. This would lead to a rise in the water table beneath downtown, likely resulting in the need for more pumping and implementation of other adaptation strategies (Griggs, Haddad, January 2011).

In response to impacts of climate change, including rising sea levels, the City has prepared a "Climate Adaptation Plan" with funding from FEMA. The objectives of this Plan are to identify and evaluate the potential impacts of climate change on the City of Santa Cruz, analyze the severity of the hazards that the City faces, and develop potential adaptation responses to reduce the risk and exposure of the City to these hazards. The potential risks were identified in a "Vulnerability Study", prepared as a collaborative effort between the City's Adaptation Team and

¹ The State of California supported the preparation of the 2012 National Research Council's Report, *Sea-Level Rise for the Coasts of California, Oregon and Washington: Past, Present, and Future*, which is currently considered the best available science on sea level rise for California (California Coastal Commission, August 2015). This estimate is current reference by California: a) March 2013-"State of California Sea Level Rise Document"; b) August 2013-"Indicators of Climate Change in California"; and c) August 2015-"California Coastal Sea Level Rise Policy Guidance."

University of California (UCSC) scientists. The study identified potential facilities vulnerable to risks of sea level rise, including beaches, West Cliff Drive, the City's wastewater treatment facility and the Santa Cruz Harbor (Griggs, Haddad, January 2011). The study also addressed coastal storm and cliff erosions hazards, as well as the potential for increased precipitation and flooding.

TABLE 4.5-1: Sea Level Rise Projections for California

TIME PERIOD	NORTH OF CAPE MENDOCINO	SOUTH OF CAPE MENDOCINO
By 2030	2 – 9 in (-4 – +23 cm)	2 – 12 in (4 – 30 cm)
By 2050	-1 – 19 in (-3 – + 48 cm)	5 – 24 in (12 – 61 cm)
By 2100	4 – 56 in (10 – 143 cm)	17 – 66 in (42 – 167 cm)

SOURCE: National Research Council, 2012 as cited in State of California Sea Level Rise Document, 2013

Based on the Vulnerability Study, the Climate Adaptation Plan identifies 41 priorities and actions to respond to specific risks and hazards related to climate change. Priority actions include #A-9 to protect downtown and the beach area from San Lorenzo River flooding. Activities under consideration for this priority action include evaluation of levees and/or dredging the river to improve water flow. Climate change mitigation and adaptation planning also was identified as a critical action item in the City's Local Hazard Mitigation Plan. FEMA reviews and approves LHMPs and requires an update on a five-year cycle.

4.5.2 Impacts and Mitigation Measures

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies, and/or guidelines; and agency and professional standards, a project impact would be considered significant if the project would:

- 5a Substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river in a manner that could result in substantial off-site erosion or siltation;
- 5b Substantially increase the rate or amount of surface runoff, which would exceed capacity of existing or planned storm drain facilities, cause downstream or off-site drainage problems, or increase the risk or severity of flooding in downstream areas;
- 5c Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality;
- 5d Result in construction of habitable structures within a 100-year floodplain as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard

delineation map, which would expose people or structures to a significant risk of loss, injury or death due to flooding;

- 5e Locate structures within a 100-year flood hazard area that would impede or redirect flood flows;
- 5f Expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of the failure of a levee or dam;
- 5g Expose people or structures to a significant risk of loss, injury or death as a result in inundation by seiche, tsunami, or mudflow.

Analytical Method

The proposed project consists of amendments to the City's Downtown Recovery Plan, General Plan, Local Coastal Plan and Zoning Code regarding development in the downtown area and Central Business District. The proposed project would not directly result in new development. However, the proposed Downtown Plan amendment would expand areas for potential additional building height that could accommodate intensified redevelopment of existing developed sites. The proposed General Plan amendment would increase FAR in areas designated as RVC in the General Plan, but would not lead to development on sites not already considered in the General Plan and General Plan EIR. The proposed LCP and Zoning Code amendments would not result in changes that could indirectly lead to intensified development. The following impact analyses are based on review of existing data and studies.

Impacts and Mitigation Measures

The following impact analyses address potential stormwater impacts (5a, 5b), water quality impacts (5c), and exposure to flood (5d-f) or tsunami (5g) hazards.

Impact 4.5-1: Stormwater Drainage. Future development accommodated by the proposed plan amendments could result in stormwater runoff, but would not substantially alter the existing drainage pattern of the area, substantially increase the rate or amount of surface runoff, exceed the capacity of existing or planned storm drain facilities, cause downstream or off-site drainage problems, or increase the risk or severity of flooding in downstream areas (4a, 4b). This is considered a *less-than-significant impact*.

The proposed project would not directly result in new development, but could lead to intensified development in the project study area. The study area is currently developed or paved, and stormwater runoff would not be expected to substantially increase as the area already is developed with impervious surfaces. Stormwater runoff from future development sites would be conveyed to existing storm drainage facilities that ultimately discharge into the San Lorenzo River. Existing City regulations will serve to manage stormwater runoff from future development accommodated by the proposed Plan amendments. Additionally, General Plan policies and

actions require that new development maintain pre-development runoff levels (CC5.1.8). Therefore, the compliance with the City's stormwater regulations will be required of future developments that may result from the proposed project. Thus, the project would not indirectly lead to potentially significant stormwater or drainage impacts. Additionally, it is noted that redevelopment of properties in the study area could occur without the proposed project.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.5-2: Water Quality. Future development accommodated by the proposed plan amendments could result in water quality degradation to San Lorenzo River from automobile oils and greases carried in stormwater runoff. Project grading could also result in erosion and potential downstream sedimentation if not properly managed (4c). However, with compliance with City stormwater regulations and implementation of required controls, this is considered a *less-than-significant impact*.

As indicated in the Impact 4.5-1 discussion, the proposed project would not directly result in new development, but could lead to intensified development in the project study area. The study area is currently developed, and it is expected future development would include enclosed parking garages instead of paved lots. Future development projects will be required to comply with the City's stormwater regulations and required BMPs, which require pre-treatment of runoff. Compliance with City regulations, which were adopted pursuant to federal and state requirements, would include the required measures to protect water quality as determined at the project level, and the proposed project would not indirectly result in a substantial degradation of surface water quality.

Grading for future development projects will be subject to City approval of a grading permit, which includes an approved erosion control plan. For projects over one acre in size, preparation of a Stormwater Pollution Prevention Plan (SWPPP) also is required pursuant to the State's NPDES program. The purpose of a SWPPP is to identify sources of sediment and other pollutants that affect the quality of stormwater discharges and to describe and ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in stormwater as well as non-stormwater discharges. For projects over one acre in size, a Notice of Intent also is filed with the SWPPP to the RWQCB. The project will be subject to these requirements. Preparation and implementation of the SWPPP and required erosion control plan will ensure that future development projects would not cause any increase in sedimentation, turbidity, or hazardous material concentrations within downstream receiving waters.

With compliance with City stormwater regulations and BMPs, and implementation of SWPPP and erosion control plans as may be required, potential water quality degradation would be controlled, resulting in a less-than-significant impact.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.5-3: Flood Hazards. Future development accommodated by the proposed plan amendments could result in exposure to flood hazards, including watercourse flooding, sea level rise or tsunamis. (5d-g). However, with compliance with federal flood requirements and implementation of City plans and programs, the proposed project would not lead to indirect impacts related to exposure to flood hazards (5d-g). This is considered a *less-than-significant impact*.

Future development accommodated by the proposed general plan could be subject to flood hazards in limited areas. These include areas of the downtown that are located in the San Lorenzo River floodplain, although recent levee improvements have increased flood protection in these areas. As sea level continues to rise, seawater could extend farther upstream in the San Lorenzo River flood control channel more frequently, and rising gradually to higher elevations. This would lead to a rise in the water table beneath downtown. This area of the City has always been vulnerable to an elevated water table but this will become a more significant issue in the future, likely resulting in the need for more pumping and implementation of other adaptation strategies (Griggs, Haddad, January 2011). Recommendations include continued monitoring of City pump stations along the San Lorenzo River with installation of additional monitoring wells and increase pumping capacity as necessary (Ibid.). The City's adopted Climate Adaptation Plan includes a high priority action to implement measures to protect downtown from flooding.

The proposed project would not lessen or worsen the potential for tsunami damage, although it would indirectly lead to intensified development with an increase in the number of people potentially exposed to a tsunami hazards. However, because dangerous tsunamis typically have originated at such a great distance, it is possible to issue fairly long-range warnings of their approach and evacuate people if necessary. Thus, the City's efforts to continue to periodically update its emergency evacuation procedures for tsunami hazard areas as well as coordination with other agencies as outlined in the City's adopted Hazard Mitigation Plan would respond to this concern.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

INTENTIONALLY LEFT BLANK

4.6 PUBLIC SERVICES

This section analyzes impacts of the proposed project on the following public services; water and wastewater utility service is addressed in section 4.8:

- ☐ Fire Protection Services
- ☐ Police Protection Services
- ☐ Parks and Recreation
- ☐ Schools
- ☐ Solid Waste Disposal
- ☐ Energy – Electrical and Natural Gas Utilities

This section also draws from the City of Santa Cruz *General Plan 2030* EIR (SCH#2009032007), which was certified on June 26, 2012, regarding background information on regulatory setting. The General Plan EIR is incorporated by reference in accordance with section 15150 of the State CEQA Guidelines. Relevant discussions are summarized in subsection 4.3.1. The General Plan EIR is available for review at the City of Santa Cruz Planning and Community Development Department (809 Center Street, Room 107, Santa Cruz, California) during business hours: Monday through Thursday, 8 AM to 12 PM and 1 PM to 5 PM. The General Plan EIR is also available online on the City's website at:

<http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development/general-plan>.

Public and agency comments were received during the public scoping period in response to the Notice of Preparation (NOP). No comments were received regarding public services. Public comments received during the public scoping period are included in Appendix B.

4.6.1 Environmental Setting

Regulatory Setting

There are a number of state laws and regulations governing the provision of specified services. These are discussed in the General Plan 2030 EIR (DEIR volume) on pages 4.6-1-4.6-2, 4.6-5-4.6-6, 4.6-20, 4.6-21-4.6-22, and 4.6-25, which is incorporated by reference. Key applicable regulations are summarized for each service in the following sections.

Study Area

The project area consists of the downtown area generally covered by the Downtown Recovery Plan (DRP) and the Central Business District zone, and specifically the lower downtown area generally between Soquel Avenue and Laurel Street on the north and south, and Cedar Street and the San Lorenzo River on the west and east. (Locations are shown on Figures 1-2 and 2-1 in

Section 3, Project Description.) The study area includes properties adjacent to the western San Lorenzo River levee.

Service providers include the City of Santa Cruz for all services, except for schools, which is provided by Santa Cruz City Schools.

Fire Protection Services

The City of Santa Cruz Fire Department is an all hazard emergency response and fire protection agency that serves the City, the University of California at Santa Cruz (UCSC), and participates in mutual aid responses within the County and State. The Fire Department also provides various contract services within the County. Agreements include a long-term contract for full fire protection services with UCSC, specialized arrangements for seasonal lifeguards with the City of Capitola and the Santa Cruz Port District, and an automatic aid agreement with County Fire/CalFire into Paradise Park. The City of Santa Cruz Fire Department maintains mutual aid agreements with all surrounding fire agencies to provide, and receive, aid on an as needed basis. The department is also a participant in the California Fire Assistance Agreement (CFAA) which allows for statewide mutual aid..

The Fire Department provides a variety of services which include fire protection, marine rescue, technical rope/cliff rescue, advanced life support/paramedic, and hazardous materials emergency response. In addition, the department serves the community through a wide array of non-emergency interactions by providing fire prevention, community risk reduction, public education, disaster preparedness training, and ongoing emergency management preparation.

Existing Facilities and Operations

The City of Santa Cruz Fire Department operates out of four fire stations, including a station at the University of California at Santa Cruz, and houses its administrative functions at a separate office downtown. The Department also maintains a Marine Rescue Headquarters (Station Five) on the Municipal Wharf. The Department has seven fire engines, two fire trucks, and other related vehicles and.

The Fire Department has 66 staff, including 21 firefighters/paramedics, 15 fire engineers, 15 fire captains, 3 battalion chiefs, 1 training chief, 1 marine safety office, 1 marine safety captain, 1 fire prevention technician, 1 fire inspector, 1 deputy fire marshal, 1 PMA/OES manager, and 2 administrative staff. Additionally, the Fire Department utilizes 70 seasonal and 20 year-round part-time staff within the Marine Safety Division. Each shift has 18 assigned personnel. The Fire Department has a minimum staffing standard of 15 firefighters and one battalion chief on duty per day.

The number of service calls received by the fire department in 2016 was approximately 8,200 calls. The majority of the calls are for non-fire emergencies, with about 65% of the calls being for

medical assistance. Average response times from each of the four fire stations is approximately 5 minutes. The Department's goal is to respond to emergency medical calls in less than five minutes 90% of the time and to fire emergency calls within eight minutes 90% of the time.

Fire Station #1 at 711 Center Street is within the downtown area and closest to the project area. Discussions with Fire Department staff indicate that the facility size is inadequate for equipment, personnel, and storage (Frawley, personal communication, May 2017). The Department does not have a Training Facility, the construction of which was included as a recommendation in the Department's "Three Year Strategic Plan, 2009-2011." The Plan also recommends improvements to apparatus bays at Stations One and Three to accommodate new equipment, and investigation of constructing a new fire station at the present Station Two location and relocation of Station Four (Marine Rescue Headquarters) (City of Santa Cruz, April 2012, DEIR volume).

Police Protection Services

The City of Santa Cruz Police Department provides crime protection and prevention activities throughout the City, including patrols, response to calls, education and community outreach. Its range of services include patrol, investigations, traffic, parks unit, neighborhood enforcement team, gang unit, dive team, hostage negotiation team, tactical team and School Resource officer. The Department recently initiated an application for mobile phones/IPADs that allows citizens to download Crime Alerts and crime tips. The City has mutual aid agreements with county law enforcement (Sheriff's Office, Capitola, Scotts Valley, Watsonville, California Highway Patrol, State Parks and UCSC Police Departments).

The Police Department operates out of one police station/headquarters, located in downtown Santa Cruz. The Department's existing facility and vehicles are adequate for the existing population, although additional storage space is needed (Martinez, personal communication, May 2017). The Department is currently staffed by 94 authorized sworn officer positions and 28 non-sworn (civilian) positions, including four community service officers and three administrative staff (City of Santa Cruz Police Department, 2015). The Department plans to begin a study on staffing levels, starting in the summer of 2017 (Martinez, personal communication, May 2017).

With a finite amount of resources, the city is divided into five patrol beats that are designed to maximize coverage and provide efficient response to calls for service: West, East, Beach, Central, and Downtown (City of Santa Cruz Police Department, 2015). The Department has divided the City into five main beats, and handled 103,592 calls in 2015 (Ibid.). Approximately 40% of the annual calls are for service in the Downtown area 2017 (Martinez, personal communication, May 2017). The average response time is four minutes, 22 seconds, which is under the Department's target of four minutes, 30 seconds. Dispatching services are provided through the Santa Cruz Consolidated Emergency Communications Center.

Parks and Recreation

Santa Cruz offers residents and visitors a wide range of parks, open space, beaches, trails, and recreational opportunities. The operates and maintains a range of neighborhood parks, community/regional parks, community facilities, and recreational programs. Most of these parks, facilities and programs are operated and maintained by the City Parks and Recreation Department. Some facilities and programs are operated and organized in partnership with community organizations.

The City has responsibility for manages, maintains and operates more than 1,700 acres of parks and open space lands, including various community/recreational facilities. In addition to maintaining the existing park system, the City must develop new parks or add amenities within existing parks to meeting community recreational needs. The City also manages the Heritage Tree Program, Urban Forest Program, as well as maintains street and median landscaping within public rights-of-way. Within the City limits, open space and beaches are also provided on State-owned lands, including three State Park units and the University of California campus.

The General Plan 2030 established per capita goals for neighborhood and community parks to ensure adequate parks throughout the City. The City's standard is provide neighborhood parks at a ratio of 2.0 acres per 1,000 people with a service radius of ½ mile. The City's goad for community parks is 2.5 acres per 1,000 people with a service radius of 1.5 miles. The City is currently underserved for neighborhood and community parks and requires a total of 57 acres to meet these goals (City of Santa Cruz, February 2017). The City is in the process of preparing a Parks Master Plan; a draft plan was released in February 2017.

There are several neighborhorhood and community parks within proximity to the downtown area. The Mimi de Marta Dog Park is located in the vicinity of the project area. In the project area, the San Lorenzo Riverwalk also provides opportunities for access and recreation. Public access is provided by a continuous paved pathway/service road on each side of the levee, extending approximately 2.5 miles on each levee from Highway 1 southward. A new pedestrian-bicycle path and bridge over Branciforte Creek is being constructed. The Riverwalk's multi-use paved trails not only promote connectivity to and from the project area, but also provide opportunities for running, walking, bicycling, or bird watching. According to the Draft Parks Master Plan,

Improved public access is addressed in the *San Lorenzo Urban River Plan*. This document is the outcome of a planning process initiated by City Council in 1999 to update plans for the San Lorenzo River, Jessie Street Marsh, and Branciforte Creek. The plan serves as a guide for restoring and managing natural resources, riverfront development, and public access improvements for the lower San Lorenzo River. It includes conceptual ideas to promote river-oriented development, site specific recommendations for public areas along the river, and restoration recommendations. The SLURP provides recommendations for locations and designs of plazas, unpaved nature loops, interpretive signage and bird viewing locations. Lighting along

the Riverwalk and exercise equipment on the west side of the river south of Laurel Street were recently added. The existing Downtown Recovery Plan also identifies opportunities for public space within the downtown area to include areas along Cedar Street, near the Civic Center and along the San Lorenzo River.

The City imposes a “Parks and Recreation Facilities Tax” (pursuant to Chapter 5.72 of the Municipal Code) on new residential development (including mobile homes) within the City, payable at the time of issuance of a building permit. The collected taxes are placed into a special fund, and “shall be used and expended solely for the acquisition, improvement and expansion of public park, playground and recreational facilities in the city” (section 5.72.100). Projects that have dedicated land or fees in accordance with Municipal Code Chapter 23.28 requirements for subdivisions are exempt from this tax.

Schools

Schools and educational services are provided to City residents by the Santa Cruz City Schools (SCCS), as well as a number of private schools, for grades K through 12. SCCS is composed of two separate districts: the Elementary District (K-6) and the High School District (7-12), governed by a common board and administration. The Elementary District draws students from the City of Santa Cruz and in County locations including Davenport and Soquel. It includes six schools serving approximately 2,000 students. The second district includes two middle schools, three high schools, an independent studies program and a home school program serving a population of 4,660 students (Santa Cruz City Schools, 2017).

The proposed project would be served by SCCS schools including Westlake Elementary, Mission Hill Middle School, and Santa Cruz High School. The capacity of each school serving the project is provided in the City’s General Plan EIR (City of Santa Cruz 2012). The SCCS study found that enrollment was under capacity and that enrollment is forecasted to decline over the next ten years (Decision Insite, 2016). The study incorporated current enrollment capacity, feeder district data, county birth rates and plans for new housing in the forecasting methodology.

Current enrollment data as reported by the State Department of Education was compared to capacity as reported in the City’s General Plan, which is summarized on Table 4.6-1. The middle school and high school have enrollments that are under capacity based on data reported by the state (California Department of Education, 2017). However, Westlake Elementary is very close to capacity.

Local school districts are empowered under state law to impose school impact fees, which are collected by local governments at the time of building permit issuance. The Santa Cruz City Elementary and High School Districts currently charge school impact fees.

TABLE 4.6-1: School Capacities and Enrollments

School	Capacity ¹	Current Enrollment
Westlake Elementary	604	569
Mission Hill Middle	690	594
Santa Cruz High	1,362	1,027
Total	2,656	2,190

Source: City of Santa Cruz 2012, Decision Insite, 2016 and California Department of Education, 2017.

1. As reported in the City's General Plan (City of Santa Cruz 2012).

Solid Waste Disposal

Solid waste collection and disposal, including recycling services, are provided by the City of Santa Cruz to residents, businesses and institutions within the City's boundaries, is provided at the Resource Recovery Facility (RRF), which includes a sanitary landfill, recycling center, green waste drop-off area, and Household Hazardous Waste Drop-Off Facility. The City owns and operates this facility, including a Class III sanitary landfill, which is located approximately three miles west of the City off Highway 1 on Dimeo Lane. The site covers 100 acres with approximately 70 acres available for disposal use, and the City's RRF. The RRF only accepts municipal solid waste and serves as a sorting facility to remove any recyclable or composting materials. The Recycling Center accepts a variety of recyclable materials.

In the mid-1990s the permitted disposal area of the landfill increased from 40 to 67 acres. The additional acreage was designed with a liner system that meets EPA requirements for new municipal solid waste landfills. The new area replaced the former leachate evaporation ponds, which were cleaned and closed in 1997. The expansion increased the life of the landfill by approximately 30 years at that time, but the lifespan has been increased through implementation of additional waste reduction measures (City of Santa Cruz, April 2012, DEIR volume).

The City's solid waste operations are in full compliance with federal, state, and local air, water and waste regulations for collection vehicles, processing operations, and landfill disposal operations. The City has implemented several best management practices to improve its solid waste services, including a landfill gas collection system that is used to run an engine to produce electricity and use of bio-diesel for collection and landfill equipment to reduce CHG emissions (City of Santa Cruz, April 2012, DEIR volume).

The City of Santa Cruz met the state-mandated waste diversion goals of 25% of their 1990 waste-streams from landfill disposal by 1995 and 50% by 2000 through community education and the implementation of expanded curbside recycling programs. In the year 2000, the City established a Zero-Waste goal with the ultimate intention of eliminating the City's need for a landfill. As of

2015, the City had achieved a diversion rate of 65-68%, which exceeds the state requirements (City of Santa Cruz, April 2012, DEIR volume).

Assuming growth trends similar to the past 10-15 years in the City of Santa Cruz, the RRF has more than adequate capacity to accommodate all municipal solid waste generated by City residents, visitors and businesses. Based on continued waste reduction, annual aerial surveys, and calculations, the landfill is estimated to have capacity through the year 2056 (City of Santa Cruz, April 2012, DEIR volume). State law requires that facilities begin planning for future waste disposal/reuse facilities at least 15 years in advance of existing landfill closure dates, which would be around the year 2043.

Electrical and Natural Gas Utilities

Pacific Gas and Electric Company (PG&E) provides electrical and natural gas service to the City. Incorporated in California in 1905, PG&E is one of the largest combination natural gas and electric utilities in the United States. PG&E and other utilities in the state are regulated by the California Public Utilities Commission (City of Santa Cruz, April 2012-DEIR volume). It currently provides service to approximately 16 million people throughout a 70,000-square-mile service area in northern and central California from Eureka in the north to Bakersfield in the south, and from the Pacific Ocean in the west to the Sierra Nevada in the east. The service area includes 106,681 circuit miles of electric distribution lines, 18,466 circuit miles of interconnected transmission lines. 42,141 miles of natural gas distribution pipelines and 6,438 miles of transportation pipelines. PG&E and other utilities in the state are regulated by the California Public Utilities Commission (Pacific Gas and Electric Company, 2017).

The state's per capita electrical use has been the lowest or one of lowest of any state in the nation (California Energy Commission, 2017, U.S. Energy Information Administration, 2017). California is among the top states in the nation in net electricity generation from renewable resources. The state leads the nation in net electricity generation from solar, geothermal, and biomass. California is also a leading producer of electricity from conventional hydroelectric power and from wind, ranking fourth in the nation in both. In 2014, California became the first state in the nation to get more than 5% of its utility-scale electricity generation from its solar resource (U.S. Energy Information Administration, 2017). In 2015, California ranked fourth in the nation in conventional hydroelectric generation, second in net electricity generation from all other renewable energy resources, and first as a producer of electricity from biomass, geothermal, and solar energy (Ibid.).

In 2015, the latest year for which data are available, residential, commercial and industrial energy users in the City of Santa Cruz consumed about 245 million kilowatt-hours of electricity and about 12 million therms of natural gas from PG&E. PG&E's power mix in 2015 included 30% from renewable sources, 25% from natural gas, 23% from nuclear, 17% from unspecified sources and 6% large hydropower plants.

There are also over 2,000 residential solar PV systems and about 60 commercial solar PV systems that provide renewable electricity within the City. All residential, commercial, and industrial PG&E electricity accounts will be opted into Monterey Bay Community Power's (MBCP) community choice energy program in Spring 2018. At that time, switching the City's overall electricity procurement to MBCP will increase the proportion of electricity supplied from renewable sources from 30% (with PG&E) to 50% and eventually consumers may elect to pay a premium for electricity from 100% renewable sources.

In 2015, the latest year for which data are available, the City of Santa Cruz's municipal operations consumed about 14 million kilowatt-hours of electricity (~5.7% of overall City use) and about 433,000 therms of natural gas (~3.7% of overall City use). The power mix for municipal operations includes 43% natural gas (from PG&E), 29% electricity (from PG&E), 23% from methane capture and conversion to electricity at the wastewater treatment facility, and 5% solar PV. Methane capture and conversion to electricity and solar PV are considered renewable energy sources. The City plans to install solar PV to increase the proportion of overall energy use met by solar PV from 5% in 2016 to 11% by 2018 and 16% by 2020.

Studies have demonstrated the value and cost-effectiveness of weather-stripping, replacing single pane windows, old appliances and lighting, and increasing insulation in reducing energy use and saving money. Significant energy and cost savings have already been achieved through the implementation of such measures throughout the City of Santa Cruz, although further savings could be achieved (City of Santa Cruz Climate Action Program, October 2012). Over the past 15 years, the combined influences of energy efficiency rebate programs, a public education campaign, and significant increases in energy prices have led to a 22% reduction in energy use within Santa Cruz homes. While this drop in energy use is significant, home energy use in Santa Cruz is again on the rise, but still far below 1996 levels (Ibid.).

In 2007, Santa Cruz became one of the first municipalities in the nation to require new construction to include the adoption of environmentally superior building materials and designs. Builders in Santa Cruz now use best practices for their construction projects that enhance building energy efficiency and water conservation as well as to improve air quality, waste reduction and recycling, and erosion and runoff control. The Green Building Program currently includes residential and commercial development (City of Santa Cruz Climate Action Program, September 2010). Reviews conducted as part of the preparation of the City's draft "Climate Action Plan" indicates that an "award-winning" home under the City's Green Building Program produces a home that is more efficient than standard homes built in 2008 and almost twice as efficient as homes built in 1990 (City of Santa Cruz, September 2010).

The AMBAG Energy Watch Program is a partnership between AMBAG and PG&E, which seeks to reduce energy use in the Monterey Bay region by providing the resources listed below to eligible PG&E customers.

- energy assessments and audits
- direct installation of energy efficient equipment

- technical assistance and financial incentives for energy efficient retrofits in municipal buildings
- energy efficiency seminars and training courses in the region.
- information on other PG&E energy efficiency programs and services

Additionally, the Monterey Bay Regional Energy Plan was prepared by AMBAG to update goals and actions Program regarding energy use in the Monterey Bay region. A draft update to the 2006 Plan reported that the Energy Watch Program tracked and reported the following energy savings in 2008 throughout the region: 5,201,582 kilowatt hours (kWh) for municipalities; 17,697,292 kWh the hospitality industry; and 1,293,653 kWh for residential uses (City of Santa Cruz, April 2012, DEIR volume).

4.6.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies, and/or guidelines; and agency and professional standards, a project impact would be considered significant if the project would:

- 6a Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or need for new or physical altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:
 - Fire Protection
 - Police Protection
 - Schools;
- 6b Increase the use of existing neighborhood and community parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated;
- 6c Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment;
- 6d Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs; or
- 6e Result in the wasteful or inefficient use of energy.

Analytical Method

The proposed project consists of amendments to the City's Downtown Recovery Plan, General Plan, Local Coastal Plan and Zoning Code regarding development in the downtown area and Central Business District. The proposed project would not directly result in new development. However, the proposed Downtown Plan amendment would expand areas for potential additional building height that could accommodate intensified redevelopment of existing developed sites. City staff estimates that the proposed amendments could indirectly lead to development, resulting in a potential net increase of 711 new residential units and 2,200 square feet of office space with a net decrease of approximately 14,700 square feet of commercial building space over existing conditions within the downtown area. The proposed General Plan amendment would increase FAR in downtown areas designated as RVC in the General Plan. The proposed LCP and Zoning Code amendments would not result in changes that could indirectly lead to intensified development. Future service demands and impacts resulting from the project are assessed based on review existing plans and consultation with staff of agencies responsible for provision of services addressed in this section.

Impacts and Mitigation Measures

The project does not include facilities or require construction or expansion of recreational facilities (6c). The following impact analyses address potential indirect impacts to public services (6a), neighborhood and community parks (6b), landfill capacity (6d), and energy usage (6e).

Impact 4.6-1a: Fire Protection. Adoption of the proposed plan amendments could indirectly result in increased population density associated with potential new development accommodated by the Plan that would result in increased fire protection and emergency service demands. Existing and future development and growth within the City would result in the need to construct new or expanded fire stations, however, the impacts of fire station construction or expansion are not expected to be significant (6a). Therefore this is considered is a *less-than-significant* impact

The proposed project would not directly result in new development, but could lead to intensified development in the project study area with an increased downtown population. According to the City's Fire Department, the existing downtown fire station is inadequate in terms of space and equipment to meet existing needs, which would be further impacted by development and growth that would be accommodated by the proposed project. Should expansion be proposed, it is likely that expanded or new fire facilities would be within developed downtown and/or eastside locations. Expansion or new construction would be considered infill development on sites surrounded by development. New development and growth accommodated by the draft plan would not reduce response times. However, existing and future growth would require new or physically altered fire protection facilities (Frawley, personal communication, May 2017), but

locations for expansion or construction are within developed areas and are not expected to result in significant physical impacts.

The Department's current need for a Training Facility, however, will continue in the future, and the Department plans to investigate the possibility of consolidating administration and training facilities with future fire station improvements, including potential reconstruction of Fire Station Two and relocation of Fire Station One. No sites have been identified for potential relocation. Fire Station Two is located adjacent to a city-owned, paved, public parking lot. If future expansion were to occur at this location, there are no significant impacts are expected to occur, as the site is within a developed urban area.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.6-1b: Police Protection. Adoption of the proposed plan amendments could indirectly result in increased population associated with potential development that could be accommodated by the Plan that would result in increased police protection service demands. However, future development and growth would not result in the need to construct new or expanded police facilities (6a). This Therefore this is considered is a *less-than-significant* impact

The proposed project would not directly result in new development, but could lead to intensified development in the project study area with an increased downtown population. According to the City's Police Department, there are adequate police protection facilities to serve the potential development and growth accommodated by the proposed project and plan amendments. No additional equipment or facilities will be needed to maintain acceptable response times and service levels (Martinez, personal communication, May 2017). New development and growth accommodated by the proposed project would not reduce response times or require new or physically altered police protection facilities that could result in significant physical impacts (Ibid.). Furthermore, it is expected that the change in use and redevelopment will lead to a reduction in crime and calls for service in the project area (Ibid.).

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.6-1c: Schools. Adoption of the proposed plan amendments could indirectly result in increased population associated with potential development that would generate elementary school student enrollments that could exceed capacity of existing schools (6a). This is considered is a *potentially significant* impact.

The proposed project would not directly result in new development, but could lead to intensified development in the project study area, resulting in increased student enrollments. To

determine whether the project would result in increased demand for school facilities, potential new enrollment as a result of the project was estimated using Census tract data for downtown Santa Cruz. Project school generation was then compared to existing enrollment and capacity.

American Community Survey 5-year Census data provides information on the number of households with children and enrollment. Based on data for the Census tract that contains the project, 11% of households have children and the average household size is 1.83 (American Community Survey 5-year 2011-2015 Table S1101). Census enrollment data shows that the split of enrollment between elementary, middle, and high school is 51%, 27%, and 23% respectively in this Census tract (American Community Survey 5-year 2011-2015 Table S1401). Given the small household size in the project area, it was assumed that households with children are likely to have one child. Applying this information to the project yields a result of 79 new children. It was assumed that all these children would be enrolled in school, which is a conservative assumption as some of these children would be below school-age. Using these assumptions and the Census data split for enrollment the project would generate 40 new elementary school students, 21 middle school students and 18 high school students.

Based on this approach, it is anticipated Santa Cruz High and Mission Hill Middle Schools would remain under capacity with the project. Westlake Elementary School may exceed capacity with the project as shown on Table 4.6-2. However, the development that may occur as a result of the proposed project plan amendments would occur over time; redevelopment of the study area is estimated to occur over 25+ years. School enrollment associated with future development also would increase over time.

TABLE 4.6-2: School Capacities & Projected Enrollments

School	Capacity ¹	Current Enrollment	Enrollment from Project	Percent Capacity with Project
Westlake Elementary	604	569	40	101 – 111%
Mission Hill Middle	690	594	21	89 – 98%
Santa Cruz High	1,362	1,027	18	77 – 92%
TOTAL ALL GRADES	2,656	2,190	79	

Source: City of Santa Cruz 2012, Decision Insite 2016, and California Department of Education 2017.

Notes:

1. As reported in the City's General Plan (City of Santa Cruz 2012).

The General Plan 2030 (2012) includes a number of policies that serve to mitigate potential impacts to existing school facilities as a result of new residential development and population growth including ensuring and planning for adequate school sites (CC8.2, CC8.2.2) and cooperating with the school district to monitor impacts of housing on elementary school populations (CC8.1.1). The General Plan also encourages joint-use facilities that combine educational and community uses (CC8.2.1). SCCS staff indicated that enrollment resulting from growth accommodated by the City's General Plan 2030 could be accommodated within existing

school facilities, including using Natural Bridges Elementary School, if needed. Additionally, the school district collects school impact fees that can be used for facility expansion and/or installation of classroom modules. Such expansion, if required, would be located within existing development footprints and would not be expected to result in significant physical impacts.

The proposed project would not directly result in new development, but increased population resulting from development accommodated by the project could increase student enrollments in grades K-12, which could exceed existing school facility capacities at one school depending on the timing and rate of growth. With required payment of school impact fees to fund necessary facility expansion and/or additions, in conjunction with potential reuse of the former Natural Bridges Elementary School if needed, the impact would be mitigated to a less-than-significant level. Potential addition or expansion of school classroom facilities is not expected to result in significant physical impacts due to the location of existing facilities within developed footprints.

Mitigation Measures

No mitigation measures are required beyond payment of school impact fees that will be collected at the time of issuance of a building permit.

Impact 4.6-2: Parks and Recreation. Adoption of the proposed plan amendments could indirectly result in increased population associated with potential development that could be accommodated by the Plan that would result in increased demand for parks and recreational facilities that could result in some deterioration of existing parks and recreational facilities (6b). Therefore this is considered is a *potentially significant* impact.

The proposed project would not directly result in new development, but could lead to intensified development in the project study area, resulting in increased population and in increased demands for park and recreational facilities. Census data for the tract that contains the downtown project study area shows an average household size of 1.83 (American Community Survey 5-year 2011-2015, Table S1101). Based on this data the proposed project could indirectly result in an increase in the downtown residential population, which currently houses approximately 1,300 people. As previously discussed, the City currently does not meet the desired level of service for neighborhood and community parks and is deficient by approximately 57 acres. Thus, existing developed neighborhood parks could be considered at capacity use, in general, based on the City's park service standards. Based on the City's parks standards set forth in the General Plan, the indirect population that could result from the project would result in the need for approximately 4.5 acres of additional park land.

The proposed project consists of a series of plan amendments and no specific development projects are proposed at this time. At a program level, the City has embarked on the preparation of a Parks Master Plan to identify park needs and improvements. It is expected that this plan will be considered by the City Council in late 2017. Additionally, the City's General Plan 2030 includes a number of policies that serve to mitigate potential impacts to existing parks and

recreation facilities as a result of new residential development and population growth. The policies, which are summarized on Table 4.6-3, address development of new parks which would lessen the projected increased use of existing parks, as well as, maintenance of existing parks and recreational facilities. The General Plan seeks to update and modify park system and park services to accommodate changes in the population and its recreational need (PR1.1.1). A number of policies and actions seek to provide a system of parks and recreational facilities (PR1.1.1), planning for new parks and facilities (PR1.1.2, PR1.1.4), evaluating and acquiring parks (PR1.1.3, PR3.2 [parcels that provide access to City-owned open space lands]), developing new or expanding existing athletic fields (PR1.2.2), and coordinating with local schools to expand park and recreation opportunities (PR1.2.1, PR1.2.3). To this end, the plan establishes service standards (PR1.3, PR1.3.2, PR1.3.3), seeks to ensure that adequate park land is provided in conjunction with new development (PR1.3.1), and requires park dedication or payment of in-lieu fees from new development (PR1.7, PR1.7.1). While specific new park locations are not designated in the proposed General Plan 2030, the policies and actions set forth a strategy to plan and acquire additional park lands in the future. The plan also seeks to ensure that ongoing maintenance needs are addressed in the development and funding plans for any new or expanded parks, recreational facilities, or open space areas (PR1.3.4, PR1.10). Maintenance of the City's Parks and Facilities tax also is recommended (PR1.9, PR1.9.1, PR1.9.2).

TABLE 4.6-3: General Plan 2030 Policies & Actions that Reduce Parks Impacts

Type of Measure / Action	Policies / Actions
PLAN & PROVIDE FOR NEW PARKS	• Provide & manage parks: PR1.1 • Develop and maintain city Master Parks Plan: PR1.1.2, PR1.1.4 (plan for adequate parks and recreation facilities) • Level of Service standards: PR1.3, PR1.3.2, PR1.3.3 • Evaluate lands for small parks: PR1.1.3 • Coordinate with schools to expand parks: PR1.2.1, PR1.2.3 • Examine developing new or expanding existing athletic fields: PR1.2.2 • Development park dedication or in-lieu fees: PR1.7, 1.7.1 • Maintain a Parks and Recreation Facilities excise tax on new construction: PR1.9, PR1.9.1, PR1.9.2 • Acquire parcels that provide access to City-owned open space lands and coast: PR3.2
ENSURE MAINTENANCE & MANAGEMENT	• Ensure ongoing maintenance: PR1.3.4 • Identify maintenance funding sources: PR1.10 • Protect & Manage open space: LU2.3 LU2.3.1, LU2.3.2, LU2.3.3, LU2.3.4 (UCSC), LU3.11 • Greenbelt Management: LU2.3.3, LU3.11.3, NRC6.3
PROVIDE ACCESS TO OPEN SPACE LANDS & COAST	• Assure access to open space lands and coast: PR1.6.5, PR3.1 • Coastal access: PR3.2, PR3.3, PR3.3.5 • Access to river & riparian: NRC1.1, NRC1.1.2
PROVIDE TRAILS	▪ Provide and maintain Integrated trail system: PR4.1, PR4.1.1 ▪ Provide and maintain trails in parks: PR4.2, PR4.2.1, PR4.2.2 ▪ Require development to dedicate trails or easements along planned trail routes: PR4.2.3

Furthermore, the City imposes a “Parks and Recreation Facilities Tax” (pursuant to Chapter 5.72 of the Municipal Code) on new residential development (including mobile homes) within the City, payable at the time of issuance of a building permit. The collected taxes collected are placed into a special fund, and “shall be used and expended solely for the acquisition, improvement and expansion of public park, playground and recreational facilities in the city” (section 5.72.100). Projects that have dedicated land or fees in accordance with Municipal Code Chapter 23.28 requirements for subdivisions are exempt from this tax.

Mitigation Measures

With implementation of the proposed General Plan 2030 goals, policies and actions that set forth measures to avoid and minimize adverse impacts on parks and recreational facilities as summarized on Table 4.6-2 and required payment of park fees, the proposed project’s indirect impact on parks and recreational facilities would be considered less-than-significant.

Impact 4.6-3: Solid Waste. Adoption of the proposed plan amendments could indirectly result in increased population associated with potential development that could be accommodated by the Plan, which could result in indirect generation of solid waste that could be accommodated within the remaining landfill capacity (6d). This Therefore this is considered is a *less-than-significant* impact.

The proposed project would not directly result in new development, but could lead to intensified development in the project study area, resulting in increased residential and employee population and that would result in increases in solid waste generation. This would be offset by an estimated decrease in existing commercial uses by approximately 14,000 square feet. The City’s population is estimated to increase by approximately 1,300 residents as a result of the proposed plan amendments. No development projects are proposed at this time, but development indirectly accommodated by the proposed project is estimated by City staff to occur over 25 years. Thus, impacts to the City’s landfill are not expected to be significant as the landfill has been estimated to have a remaining capacity through the year 2058 (City of Santa Cruz, April 2012, DEIR volume).

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.6-4: Energy Use. Adoption of the proposed plan amendments could indirectly result in increased population associated with potential development that could be accommodated by the Plan, which could result in indirect increased energy demands, which would not be wasteful or an inefficient use of resources (6e). This is considered is a *less-than-significant* impact.

Future development would be accommodated by the proposed Plan amendments could result in increased development with consumption of electricity and natural gas for lighting, heating and cooling of residences and other buildings. Energy use resulting from potential new development was factored into the greenhouse gas emissions calculations as discussed in Section 4.2, Air Quality and Greenhouse Gas Emissions. The analysis indicates that residential and commercial uses that comply with the 2016 California Title 24 are 28% and 5% more efficient, respectively, than the 2013 Title 24, and energy efficiency will increase as older buildings are replaced.

Overall, the future consumption of electrical and natural gas resources would not represent unnecessary, inefficient, or wasteful use of resources given the ongoing implementation of the City's Climate Action Plan and General Plan 2030 policies that address lighting and energy conservation measures. Specifically, General Plan GOAL NRC7 seeks to reduce energy use with a significant production and use of renewable energy. Its four policies and accompanying actions would promote reduction of electricity and natural gas consumption, use of renewable energy sources, and use of energy-efficient lighting, vehicles, and water fixtures and appliances.

In addition, new structures will be required to be constructed in accordance with specifications contained in Title 24 of the California Code of Regulations and the City's Green Building Regulations. Anticipated changes in state building and energy efficiency requirements to help reduce greenhouse gas emissions will also reduce the rate of energy consumption increases. Such measures have been factored into California energy forecasts which predict an overall reduction in per capita use of electricity due to energy efficiency standards and conservation.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

4.7 TRAFFIC & TRANSPORTATION

This section analyzes traffic and transportation impacts of the proposed project based on the trip generation, distribution and level of service analyses prepared by Kimley-Horn (May 2017) that was reviewed by the City of Santa Cruz Public Works Department staff and consulting traffic engineer, Ron Marquez. A summary of the methodology is included in Appendix F of this document.

Public and agency comments related to traffic and transportation were received during the public scoping period in response to the Notice of Preparation (NOP). Issues raised in these comments include:

- ☐ Traffic should be considered in the EIR.

To the extent that issues identified in public comments involve potentially significant effects on the environment according to the California Environmental Quality Act (CEQA) and/or are raised by responsible agencies, they are identified and addressed within this EIR. Public comments received during the public scoping period are included in Appendix B.

4.7.1 Environmental Setting

Regulatory Setting

A number of local, regional and state agencies are involved with transportation planning and implementation of transportation programs and improvements within the City of Santa Cruz. The City maintains local roadways and transportation facilities. The California Department of Transportation (Caltrans) has jurisdiction over State highway segments that traverse the City, including portions of Highways 1, 9, and 17. To address roadway and intersection improvements needed as a result of impacts of new development, the City has developed a “Traffic Impact Fee” (TIF) program. The TIF is applied to new development and redevelopment and is collected at the time of issuance of building permits (see discussion below in the “Planned Transportation Improvements” subsection for more details). The City also is active in acquiring transportation funding from federal, state, and local sources.

Other local and regional agencies responsible for transportation services and/or transportation planning are summarized below.

- ☐ *The Association of Monterey Bay Area Governments (AMBAG)* is the federally designated Metropolitan Planning Organization (MPO) for transportation planning activities in the tri-county Monterey Bay region (Santa Cruz, Monterey and San Benito counties). It is the lead agency responsible for developing and administering plans and programs to maintain eligibility and receive federal funds for the transportation systems in the region. AMBAG conducts regional transportation planning activities through its Metropolitan Transportation Plan (MTP), the Metropolitan Transportation Improvement Program

(MTIP), maintenance of a regional travel demand model and demographic forecasts. AMBAG works with regional transportation planning agencies, transit providers, the Monterey Bay Unified Air Pollution Control District (MBUAPCD), state and federal governments, and organizations having interest in or responsibility for transportation planning and programming.

- ❑ *The Santa Cruz Regional Transportation Commission (SCRTC)* is the State designated Regional Transportation Planning Authority (RTPA) for transportation planning activities in Santa Cruz County. SCRTC oversees planning and funding programs for local and countywide projects within Santa Cruz County using state and federal transportation funds. The City of Santa Cruz has one City representative on the 12-member SCRTC board and some City transportation projects are funded through grant programs administered by the SCRTC.
- ❑ *The Santa Cruz Metropolitan Transit District (SCMTD)* provides transit services throughout Santa Cruz County.

Study Area

The project area consists of the downtown area generally covered by the Downtown Recovery Plan (DRP) and the Central Business District zone, and specifically the lower downtown area generally between Soquel Avenue and Laurel Street on the north and south, and Cedar Street and the San Lorenzo River on the west and east. (Locations are shown on Figures 1-2 and 2-1 in Section 3, Project Description.) The study area includes properties adjacent to the western San Lorenzo River levee.

Since the proposed project includes an amendment to the land use designation text for the Regional Visitor Commercial land use designation, the study area also includes lands located within this designation. In addition to the downtown area, the Regional Visitor Commercial (RVC) land use designation is applied to sites in the Beach area and upper Ocean Street adjacent.

The City's "Transportation Impact Study Guidelines" (2011), requires a traffic impact analyses to be conducted where a project would result in an increase of 50 or more trips during the weekday PM peak hour. In the City of Santa Cruz, the PM peak hour (between 4 PM and 6 PM) generally has the highest number of trips compared to the AM peak hour (between 7 AM and 9 AM) or the midday peak hour (City of Santa Cruz, April 2012-DEIR), and is considered the peak hour period for traffic impact studies in the City.

Based on the Transportation Impact Study Guidelines and the trip generation of the project, study intersections were selected for evaluation by the City Public Works Department and include those listed below. AM and PM peak traffic count data was collected on Thursday, May 22, 2014 and Tuesday November 17, by Kimley-Horn Associates.

1. Front Street / Laurel Street
2. Pacific Avenue / Laurel Street
3. Front Street / Cathcart Street
4. Front Street / Metro Station Driveway
5. Pacific Avenue / Metro Station Driveway
6. Pacific Avenue / Maple Street
7. Pacific Avenue / Front Street / Mission-Water Street
8. Front Street / Soquel Avenue
9. Pacific Avenue / Cathcart Street
10. Soquel Avenue / Pacific Avenue
11. Ocean Street / Water Street
12. Highway 1 / Highway 9
13. Chestnut Street / Mission Street / Highway 1

Roadway Network

Local Streets and Roads

Project site access will be provided primarily from Pacific Avenue, Front Street, Laurel Street and Soquel Avenue. Other local streets and roads include Maple Street, Elm Street and Cathcart Street.

Pacific Avenue is a north-south street and is classified as arterial in the City of Santa Cruz General Plan (City of Santa Cruz, June 2012). Between Laurel Street and Cathcart Street it is a two lane divided roadway. North of Cathcart Street, Pacific becomes a one-way roadway. There is two hour metered on-street parallel parking and sidewalks are present on both sides of the street. SCMTD buses use Pacific Avenue to enter Pacific Station, a large transit center providing regional service to the City of Santa Cruz.

Front Street is a north-south two lane arterial with left turn pockets. Between Cathcart Street and Soquel Avenue, Front Street becomes three lanes. Sidewalks and bicycle lanes are present on both sides of the street. Metered on-street parallel parking is provided on the east side of the street as well. Front Street provides direct access to three surface parking lots and one parking structure. SCMTD buses use Front Street to enter and exit the Metro Station transit center.

Laurel Street is an east-west arterial with left turn pockets. Bicycle lanes and sidewalks are present on both sides of the street. There is no on-street parking allowed on Laurel Street in the study area.

Soquel Avenue is an east-west arterial that provides a major east-west connection over the San Lorenzo River to downtown and to the eastern portion of the City. Near the study area it is a four lane roadway with sidewalks and bicycle lanes on both sides of the street. Limited, metered, parallel parking is provided on both sides of the street between Pacific Avenue and Front Street.

Water Street is an east-west four lane arterial with left turn pockets between Center Street and Branciforte Avenue east of the study area. At its intersection with Center Street, Water Street becomes Mission Street. Between Chestnut Street Extension and Center Street, Mission Street is a two lane arterial. There are bicycle lanes on both sides of the street and crosswalks at every intersection within the study area. There is on-street twelve hour metered parallel parking on the north side of the street between Center Street and River Street. East of Pacific Avenue twelve hour metered on-street parallel parking is available on the south side of the street until River Street.

Cedar Street is a north-south two lane arterial parallel to Pacific Avenue. There are bicycle lanes on both sides of the street and crosswalks at every intersection in the study area. Metered on-street parallel parking is provided as well as access to several paid surface parking lots and parking structure. At its intersection with Laurel Street, vehicles are restricted to right turns only southbound.

River Street is a north-south arterial that parallels the San Lorenzo River. It connects to State Route 9 at its northern terminus with State Route 1. South of Water Street it splits into River Street and S. River Street. River Street terminates at Front Street and S. River Street terminates at Soquel Avenue. Bicycle lanes are provided on both sides of the roadway on River Street between Front Street and State Route 9. While there is no bicycle facility on S. River Street the San Lorenzo Riverwalk runs parallel to it. (See below for more information on the San Lorenzo Riverwalk.) There are textured colored crosswalks connecting to the pedestrian bridge over the San Lorenzo River at the Regal Cinemas theater. Twelve hour metered on-street parallel parking is provided on the west side of S. River Street and on the east side of River Street between Front Street and S. River Street.

State Highways

State highways that are in the vicinity of the project site include segments of State Routes 1 and 17; State Route 1 is located approximately 1/2 mile driving distance northwest of the project site. Though referenced as “state routes” in Caltrans documents, the more common term, “highway”, is used in this EIR. Highways 1 and 17 serve regional traffic, including motorists who commute to jobs in the Santa Clara Valley and motorists who travel into Santa Cruz County for recreational opportunities offered in the county (City of Santa Cruz, April 2012, DEIR volume).

Highway 1 provides access to San Francisco to the north and Monterey to the south. Regionally, Highway 1 is the major inter- and intra-county route for Santa Cruz County. Within the City of Santa Cruz, it is oriented in an east-west direction, although the interregional alignment of Highway 1 is primarily north-south. It is a four-lane arterial along Mission Street from the west

side of Santa Cruz to Chestnut Street Extension, a four-lane expressway between Mission Street-Chestnut Street and River Street, and a four-lane freeway east of River Street. The speed limit on Highway 1 is 25 mph along Mission Street, 45 mph along the expressway section, and 55 and 65 mph on the freeway sections. Recurrent congestion results in queuing on Highway 1 that extends for several miles during peak hours. Accidents, events, and other incidents in the corridor can further increase congestion related delays in either direction, on any day, including weekends (City of Santa Cruz, April 2012, DEIR volume).

Highway 9 is a multi-lane highway between Highway 1 and Encinal Street. It is two-lanes north of Encinal Street that connects the City of Santa Cruz with the San Lorenzo Valley, and eventually, Saratoga and Los Gatos.

Highway 17 connects Santa Cruz with Scotts Valley and San Jose and other Santa Clara County communities. It is a four-lane freeway north of the Highway 1/ Highway 9 intersection. Highway 17 is the primary route between the Santa Clara Valley and Santa Cruz County that serves as both a commute route for Santa Cruz County residents that work in Santa Clara County and as a route for recreational visitors that come to Cruz County. Congestion occurs both during weekday commute times and on summer weekends. This winding, four-lane road has steep sections, frequent road crossings, and substandard median shoulders and outside shoulders for most of its length. In addition to the challenging roadway configuration, weather-related conditions such as thick fog, heavy rains and mudslides affect roadway operations (City of Santa Cruz, April 2012, DEIR volume).

Other Transportation Modes

Pedestrian and Bicycle Facilities

Pedestrian facilities within the study area include sidewalks, crosswalks, ADA ramps and pedestrian signal heads. The sidewalks on Pacific Avenue are 10 to 25 feet wide and crosswalks with ADA ramps are provided at every intersection. The sidewalks on Front Street are generally 8 to 10 feet wide and crosswalks are provided at intersections as well as in front of the Pacific Station transit center. Bicycle amenities include bicycle parking (located at Pacific Station), Class II facilities (bicycle lanes) and the San Lorenzo Riverwalk.

The San Lorenzo Riverwalk is a north-south bicycle and pedestrian path that follows the San Lorenzo River in Santa Cruz for approximately 2.5 miles. The paved trail is on the river levee on both the east and west sides of the river, except for a short segment in the vicinity of the County Building north of Soquel Avenue, which is currently under construction. A pedestrian/bicycle bridge north of Soquel Avenue connects both sides of the levee trail system, and can be accessed from River Street, approximately 750 feet north of the project site.

Public Transit Service

Public transit service in the City and County of Santa Cruz is provided by the Santa Cruz Metropolitan Transit District (SCMTD). Pacific Station, located on the east side of Pacific Avenue between Elm Street and Maple Street, is the largest transit center for SCMTD bus service. There are four bus departure lanes and a staffed customer service information booth. All routes except 33-34, 55, and 72-79 service the station. In September 2016, SCMTD implemented a large service reduction to address funding shortfalls. This reduction affected some of the routes servicing Pacific Station, however it is still provides high frequency service.

Existing Traffic Conditions

According to City data, from the years 2010 to 2014, 63% of commuters within the City drove alone, 11% walked, 10% bicycled, 8% carpooled, 6% took the bus, and 2% used other modes such as taxi, motorcycle (City of Santa Cruz, 2016 Annual Traffic Safety Report). This data shows significant progress towards the City's Climate Action Plan goals to increase biking and walking and decrease single-occupancy vehicle use within the City. Santa Cruz has one of the highest bicycle mode splits in the country, and a lower "Drive Alone" mode split than most California cities (Ibid.).

Vehicle Traffic

Vehicle traffic conditions are measured by average daily traffic (ADT), peak hour traffic volumes, level of service (LOS), average delay, and/or volume to capacity (V/C) ratio. Average daily traffic is the total number of cars passing over a segment of the roadway, in both directions on an average day. Peak hour volumes are the total number of cars passing over a roadway segment during the peak hour in the morning (AM) or afternoon/evening (PM) (City of Santa Cruz, April 2012, DEIR Volume).

To evaluate the performance of roadways and levels of traffic congestion, many jurisdictions, including the city of Santa Cruz, use LOS. "Level of Service" is a qualitative measure that describes the level of traffic congestion and delay at intersections based on the amount of vehicle traffic that a roadway or intersection can accommodate and factors such as maneuverability, driver dissatisfaction, and delay. Traffic flow along roadways is typically controlled by the volume and capacity of the nearest intersection, therefore intersections are analyzed using LOS as an indicator of congestion. Intersections are rated based on a scale of LOS "A" through LOS "F," with LOS A representing free-flowing conditions and LOS F representing congested conditions. The intermediate levels of service represent incremental levels of congestion and delay between these two extremes. Table 4.7-1 relates the operational characteristics to each associated LOS category for signalized and unsignalized intersections.

The signalized intersection LOS methodology addresses the LOS for the intersection as a whole, whereas LOS methodology for unsignalized intersections computes delay for the minor

movements. The critical volume to capacity ratio (V/C) is another measure of the operating conditions of an intersection as opposed to LOS. It is not the average of all the movements at the intersection and is not used as a measure to define the levels of service.

The City of Santa Cruz General Plan 2030 seeks to maintain LOS D or better at signalized intersections during the PM peak hour (Action M3.1.3). However, the General Plan also accepts a lower level of service and higher congestion at major regional intersections if necessary improvements would be prohibitively costly or result in significant, unacceptable environmental impacts (Action M3.1.4).

Caltrans, which has jurisdiction over state highways, endeavors to maintain a target LOS at the transition between LOS C and D. However, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS (Caltrans, December 2002). If an existing State highway facility is operating at less than the appropriate target LOS, the existing LOS should be maintained (Ibid.).

TABLE 4.7-1: Intersection Level of Service Definitions

Level of Service	Description	Signalized (sec/veh.)	Unsignalized (sec/veh.)*
A	Free flow with no delays. Users are virtually unaffected by others in the traffic stream.	≤ 10	≤ 10
B	Stable traffic. Traffic flows smoothly with few delays.	>10 – 20	>10 – 15
C	Stable flow but the operation of individual users becomes affected by other vehicles. Modest delays.	>20 – 35	>15 – 25
D	Approaching unstable flow. Operation of individual users becomes significantly affected by other vehicles. Delays may be more than one cycle during peak hours.	>35 – 55	>25 – 35
E	Unstable flow with operating conditions at or near the capacity level. Long delays and vehicle queuing.	>55 – 80	>35 – 50
F	Forced or breakdown flow that causes reduced capacity. Stop and go traffic conditions. Excessive long delays and vehicle queuing.	> 80	> 50

*Two-way stop control intersection

SOURCE: Transportation Research Board, *Highway Capacity Manual 2010*, National Research Council as cited in City of Santa Cruz General Plan 2030 EIR.

Intersection Levels of Service

Intersection turning movement counts were conducted on Thursday, May 22, 2014 and Tuesday November 17, 2015 at the study intersections during the PM peak period (4:00 pm to 6:00 pm). From these counts the peak one-hour period was identified. Figure 4.7-1 shows the traffic volumes during the PM peak one-hour period. LOS for the project traffic study intersections was calculated using methods defined in the *Highway Capacity Manual, 2010 and 2000* (HCM) and Synchro 8 traffic analysis software. HCM 2010 was used for all intersections except for the intersection of Pacific Avenue / Front Street / Mission-Water Street due to the presence of a fifth approach at this location, which HCM 2010 cannot analyze correctly. Therefore, HCM 2000 was used to analyze this study intersection. The delay and corresponding LOS for each of the study intersections was calculated.

Table 4.7-2 shows the resulting LOS based on approach to the intersection. All intersections operate at an acceptable LOS except Highway 1 / Highway 9 and Chestnut Street / Mission Street, which operate at LOS E.

State Highway Operations

Based on the most recent (2015) Caltrans Traffic Census Program (Caltrans 2015) data, the annual average daily traffic (AADT) on state highways within Santa Cruz is as follows:

- ❑ Highway 1
 - At Highway 17, AADT is approximately 61,000 to 86,000 trips with 4,950 to 6,300 trips occurring during the peak hour.
 - At Emeline Street Connection, AADT is approximately 85,000 to 86,000 trips with approximately 5,900 to 6,300 trips occurring during the peak hour.
 - At Morrissey Boulevard, AADT is approximately 85,000 to 94,000 trips with 5,900 to 6,300 trips occurring during the peak hour.
- ❑ Highway 17, at Pasatiempo (between Santa Cruz and Scotts Valley). AADT is approximately 67,000 to 70,000 trips with 5,700 to 6,000 trips occurring during the peak hour.
- ❑ Highway 9 within Santa Cruz City Limits. AADT is approximately 5,000 to 5,200 trips with 530 to 550 trips occurring during the peak hour as measured at the City limits, north of Encinal.

Review by the City's consulting traffic engineer, Ron Marquez, indicates that the highway segments in the vicinity of the project site are operating at LOS of C and D during the peak hour as summarized on Table 4.7-3.

TABLE 4.7-2: Existing Intersection Weekday PM Peak Hour Levels of Service

#	Intersection	Control Type	Jurisdiction	Threshold ²	Existing Conditions ¹		
					PM Peak Hour		
					Movement	Delay ³	LOS
1	Front Street / Laurel Street	Signal	Santa Cruz	D	Overall	30.8	C
2	Pacific Avenue / Laurel Street	Signal	Santa Cruz	D	Overall	17.9	B
3	Front Street / Cathcart Street	Signal	Santa Cruz	D	Overall	19.0	B
4	Front Street / Metro Station Access	Signal	Santa Cruz	D	Overall	4.9	A
5	Pacific Avenue / Metro Station Access	SSSC	Santa Cruz	D	Overall	1.1	A
		<i>Worst Approach</i>	Santa Cruz	D	WB	11.4	B
6	Pacific Avenue / Maple Street	AWSC	Santa Cruz	D	Overall	8.1	A
7	Pacific Avenue / Front Street / Mission-Water Street	Signal	Santa Cruz	D	Overall	20.2	C
8	Front Street / Soquel Avenue	Signal	Santa Cruz	D	Overall	21.9	C
9	Pacific Avenue / Cathcart Street	AWSC	Santa Cruz	D	Overall	8.8	A
10	Soquel Avenue / Pacific Avenue	SSSC	Santa Cruz	D	Overall	3.6	A
		<i>Worst Approach</i>		D	WB	10.3	B
11	Ocean Street / Water Street	Signal	Santa Cruz	D	Overall	35.3	D
12	Highway 1 / Highway 9	Signal	Caltrans	C-D	Overall	71.7	E
13	Chestnut Street / Mission Street / Highway 1	Signal	Caltrans	C-D	Overall	74.1	E

Source: Kimley-Horn May 2017.

Notes:

1. Analysis performed using HCM 2010 methodologies, except for Intersection 7 where HCM 2000 methodology was applied.
2. The City of Santa Cruz has established LOS D as the minimum acceptable LOS for overall intersection operations during the AM and PM peak hours. Caltrans maintains a standard of between LOS C and D.
3. Delay indicated in seconds/vehicle.
4. Intersections that fall below the LOS threshold are shown in **bold**.

TABLE 4.7-3: Existing Highway Traffic Volumes and Peak Hour Levels of Service

Segment	Direction	Number of Lanes	Volume	Max Flow Rate for C	Max Flow Rate for D	LOS
Route 1: Route 9 to Route 17	N	2	2,080	2,761	3,444	C
	S	2	3,120	2,761	3,444	D
Route 1: Route 17 to Emeline	N	2	2,820	2,761	3,444	D
	S	2	1,880	2,761	3,444	C
Route 17: Route 1 to Pasatiempo	N	3	3,300	3,888	5,165	C
	S	3	2,700	3,888	5,165	C
Peak hour volumes from Caltrans 2015						
Peak hour factor-.92, free flow speed – 55, heavy vehicle factor-.985 (Exhibit 11-17 HCM 2010)						

SOURCE: Ron Marquez, Traffic Engineer Consultant

Planned Transportation System Improvements

Metropolitan Transportation Improvement Program

AMBAG, as an MPO, is required by state and federal laws to develop and adopt a Metropolitan Transportation Improvement Program (MTIP), a multi-year transportation project program that includes multi-modal projects, including but not limited to major highway, arterial, transit, bikeway and pedestrian projects. The 2016 MTIP is a four-year program that covers the federal fiscal years from October 1, 2016 through September 30, 2020. The MTIP implements the 2035 Monterey Bay Area Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) adopted by the AMBAG Board of Directors in June 2014. The 2035 MTP/SCS is a financially constrained document and includes identified transportation improvement projects for the region. Once the projects are included in the MTP, they become eligible for inclusion in the MTIP and FSTIP. The projects included in the 2016 MTIP are consistent with the 2035 MTP/SCS (AMBAG, September 2016). Planned projects in the vicinity of Ocean Street and Ocean Street Extension include improvements to the Highway/9 intersection, Highway 1 auxiliary lanes (Soquel Avenue to 41st Avenue), and High Occupancy Vehicle (HOV) lanes between the Morrissey and San Andreas interchanges.

City of Santa Cruz Planned Improvements

The City's adopted Capital Improvements Program (CIP) is a multi-year schedule of projects with their associated costs and proposed funding sources. The CIP represents the best efforts to allocate available resources toward projects that maximize benefit and address the most critical needs. Major improvements on the current 2018-2020 CIP include: Highway 1 / Highway 9-River Street intersection improvement (programmed for 2018/19) described below; intersection improvements at the Ocean Street/Water Street intersection (programmed for completion in 2018); Branciforte Creek bike/pedestrian bridge path connection on the San Lorenzo River levee (under construction); and preliminary work to replace the Highway 1 bridge over the San Lorenzo River.

The City of Santa Cruz has adopted a “Traffic Impact Fee” (TIF) program based on future projected trips generated for each new development or redevelopment project. The TIF program, originally adopted in June 2005, evaluated over 60 intersections and identified numerous projects within the City which were needed in order to address the effects of cumulative development, and established fees. The fees are used to fund planned improvements at intersections and roadways included in the program. New development and redevelopment projects are required to pay traffic impact fees, which are paid at the time of building permit issuance. The TIF was updated in November 2012 to reflect traffic conditions associated with buildout accommodated by the City’s General Plan as identified in the City’s *General Plan 2030* EIR. All of the projects noted above are TIF program intersections, except for the Highway 1 bridge project. The program also funds bike and pedestrian projects (15% of fees collected) and neighborhood improvement projects adjacent to significant development (5% of fee collected).

Bicycle and Pedestrian Improvements

The City’s recently adopted *Active Transportation Plan* (2017) includes the following paths that are included in the FY2018-2020 CIP: Branciforte Creek Connection to complete the levee path over Branciforte Creek and under the Soquel Bridge, Monterey Bay Sanctuary Scenic Trail Network Segment 7 along the railroad track on the west side of the City, and the San Lorenzo River Trestle Bridge trail widening project. The Plan also includes numerous other infill and improvements to existing bike and pedestrian facilities.

Regional Transportation Plan Improvements

The SCCRTC periodically completes a Regional Transportation Plan (RTP) and Regional Transportation Improvement Program (RTIP) according to state guidelines to guide short- and long-range transportation planning and project implementation for the county. This 2014 RTP provides guidance for transportation policy and projects through the year 2035. Projects identified in the RTP that are within the project vicinity include:

- Highway 1/Highway 9 Intersection Modifications (also on City CIP and MTIP).
- Highway 1 bridge replacement over San Lorenzo River (also on City CIP).
- Highway 17: Preparation of study to determine long-range solutions to access, operations and safety on this route.
- Branciforte Creek multi-use path and bridge (also on City CIP and under construction)
- Ocean Street Widening from Soquel to East Cliff
- Hwy 1/Mission St at Chestnut/King/Union Intersection Modification
- Pacific Station: Bike Station
- River St/River Street South Intersection Modification
- Water Street Signal Synchronization
- Soquel/Branciforte/Water (San Lorenzo River to Branciforte) Bike Lane Treatments

Planned State Highway Improvements

Highway 1. As indicated above, improvements for the Highway 1 Soquel to Morrissey Auxiliary Lanes Project are complete. In addition, the SCCRTC has been working with Caltrans and the Federal Highway Administration since 1986 on studies for longer-term improvements to Highway 1. The current Caltrans Route Concept Report for Highway 1 includes the addition of HOV lanes to Highway 1 to reduce congestion, encourage carpooling, expand express bus service, and improve safety in the Watsonville to Santa Cruz corridor. (Caltrans, April 2006). This project will add a lane in each direction from Morrissey Boulevard in the City of Santa Cruz to San Andreas/Larkin Valley Road. Caltrans' *Corridor System Management Plan* for Routes 1 and 183 also supports HOV lanes on Highway 1 in conjunction with other transportation demand management strategies (Caltrans, October 2011).

A Draft EIR for the Highway 1 Corridor Investment Program was prepared and released for public review and comment in November 2015 (Caltrans and FHWA, November 2015). The Draft EIR considers three alternatives including an HOV Lane alternative with auxiliary lanes and a Transportation System Management alternative without HOV lanes. A final decision on the preferred alternative has not been made yet. The Draft EIR provides a program level analysis of the Highway 1 corridor alternatives using a two tiered approach. Tier I is a long term, program-level analysis for the future of the Highway 1 corridor between Santa Cruz and Aptos. The Tier I concept for the corridor would be built over time through a series of smaller incremental projects (referred to as Tier II projects). The Tier II analysis includes project-level analysis of smaller incremental projects within the Tier I corridor which would move forward based on available funding. Each of the Tier II projects would undergo separate environmental and public review. Caltrans received a total of 263 letters, emails, and recorded comments from public agencies, organizations and individuals, on the Draft EIR. Based on review of the comments received, the project team has identified a need to update the air quality, natural environment, and traffic operations studies, as well as reporting of the cumulative impacts of the project alternatives prior to completion and release of a Final EIR.

Caltrans has prepared and approved a "Corridor System Management Plan" (CSMP) for Highway 1 from the junction of Highway 68 in Monterey County to King Street/Mission Street in Santa Cruz. The following strategies will be used to manage State Route 1 over the next 20 years:

- Cost-effective maintenance and preservation of the roadway.
- Support improvement of transit service, including new express bus service on HOV lanes if implemented in the Santa Cruz corridor.
- Support land use and transportation planning efforts through participating in local development review and regional planning efforts.
- Reduce congestion through transportation demand management to increase the use of transit, improve bicycle and pedestrian programs, and encourage programs such as carpools, ridesharing, telecommuting, and park-and-ride facilities.

- Implement Intelligent Transportation Systems/Traveler Information/Traffic Management to improve incident management and provide real time traveler information which helps reduce delay.
- Increase modal options such as Caltrain and integrate transit, bicycle and pedestrian transportation into a coordinated multimodal system.
- Collaborate with local partners on a ramp metering plan.
- Operational Improvements, including auxiliary lanes, intersection improvements, and other system refinements to enhance existing services and reduce delay.
- Upgrade intersections to maximize throughput on the State highway and parallel routes.
- Increase the capacity, operational efficiency and connections on parallel roads to reduce local traffic demand on Highway 1.
- Improve mobility, accessibility, reliability, reduce congestion and improve safety by improving capacity on the existing system (Caltrans, October 2011).

Highway 17. Highway 17 connects Santa Cruz with Scotts Valley and San Jose and other Santa Clara County communities. It is a four-lane freeway north of the Highway 1/ Highway 9 intersection. The highway is the primary route between the Santa Clara Valley and Santa Cruz County that serves as both a commute route for Santa Cruz County residents that work in Santa Clara County and for recreational visitors that come to Cruz County. Congestion occurs both during weekday commute times and on summer weekends. This winding, four-lane road has steep sections, frequent road crossings, and substandard median shoulders and outside shoulders for most of its length. In addition to the challenging roadway configuration, weather-related conditions such as thick fog, heavy rains and mudslides affect roadway operations (City of Santa Cruz, April 2012-DEIR volume). According to the Transportation Concept Report for State Route 17 in District 5, (Caltrans District 5, January 2006), the target level of service for Highway 17 between Ocean Street and Scotts Valley is LOS E. The highway segment between Santa Cruz and Scotts Valley is considered to be a four-lane freeway (Caltrans, January 2006).

Highway 9. The current Caltrans Route Concept Report for Highway 9 includes recommendations to widen the shoulders to accommodate bicycle traffic, widening to four lanes from the junction of Highway 1 and Highway 9 to the Santa Cruz city limits, and other left turn improvements outside of the City of Santa Cruz (Caltrans, September 2007).

The Highway 1/Highway 9-River Street intersection, which is controlled by a signal, currently operates at LOS E during the both the PM and Design Day peak hours, which does not meet Caltrans standards. The City is working with Caltrans to implement lane modifications at this intersection. The improvements require Caltrans approval and an encroachment permit. With implementation of these improvements, the intersection would continue to operate at LOS E during the existing PM peak hours, but the average delay would be reduced by approximately 20 seconds.

The following improvements are identified for the Highway 1/Highway 9-River Street intersection, and are included in the current City Traffic Impact Fee (TIF) Program:

- Northbound Approach: Modify the intersection to consist of one left/thru, one-thru, two right lanes and a bike lane; add one northbound lane on Highway 9 and a shoulder/bike lane.
- Southbound Approach: Modify the intersection to consist of two-left, one-left/thru, one-thru, one right lane and a bike lane.
- Eastbound Approach: Reconstruct to consist of two left, three through, and one right-turn lanes.
- Upgrade all sidewalks and access ramps to meet ADA requirements.

Currently, a Project Report, preliminary engineering and associated studies, and environmental review are complete. Construction is anticipated in 2018.

4.7.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies and/or guidelines; and agency and professional standards, a project impact would be considered significant if the project would:

- 7a Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit (see discussion of City standards below);
- 7b Change the level of service of a State Highway roadway segment from acceptable operation (LOS A, B, or C) to deficient operation (LOS D, E or F) or result in a change in LOS for a segment currently operating at a deficient level based on Caltrans significance criteria¹;
- 7c Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;
- 7d Substantially increase hazards due to a design feature (for example, sharp curves or dangerous intersections) or incompatible uses (for example, farm equipment);

¹ Caltrans. December 2002. "Guide for the Preparation of Traffic Impact Studies."

- 7e Result in inadequate emergency access; or
- 7f Conflict with adopted policies, plans, or programs regarding public transit, bicycle or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

The City of Santa Cruz General Plan 2030 strives to maintain a LOS of “D” or better as the acceptable level of service for intersections. A significant impact would result if LOS dropped below a “D” level of service or where a project would contribute traffic increases of more than three percent at intersections currently operating at unacceptable levels (E or F), as further described below. This criteria is applied only to intersections within the City’s jurisdiction, but not to Caltrans intersections. The City’s General Plan 2030 also accounts for accepting a LOS below “D” at major regional intersections where improvements would be prohibitively costly or result in significant, unacceptable environmental impacts. There are no other adopted plans, ordinances, or policies that establish “measures of effectiveness” for the performance of the circulation system.

For City intersections that already operate at unacceptable levels of service (E or F), the City considers project impacts to be significant if congestion will worsen measurably at the intersection as a result of the project. “Measurably worse” is considered to be a three percent increase in trips at the affected intersection. The City has used the three percent significance criterion for project trip contribution at existing impacted intersections, except for Caltrans-maintained intersections (which are subject to the criteria in 3b above), in part based on directives in the City’s existing General Plan to accept a certain level of congestion during peak hours at major intersections, as well as to reflect variations in daily traffic volumes. The three percent criterion has been used throughout the City and is based upon the likelihood that a project will result in an observable increase in congestion at a given intersection or road segment. This is based in part on information provided by Caltrans, in the yearly “Traffic Volumes” reports, which identifies the standard deviation expected with regard to reliability of traffic count data. The standard deviation ranges indicate a 12 percent deviation at 10,000 vehicle trips, meaning that if a traffic count totals 10,000 vehicles per day, then approximately 90 percent of the time, the actual traffic counts will lie within a range of 8,800 to 11,200 vehicles. Thus, the three percent reflects this variation in daily traffic conditions (California Department of Transportation, June 2015).

Regarding Caltrans’ intersections and other Caltrans maintained facilities, the Caltrans Traffic Impact Study Guidelines (Caltrans 2002) state that Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on State highway facilities. As such, LOS C through D is considered to be acceptable traffic operations during the peak hour at intersections maintained by Caltrans. The Guidelines also state that if an existing State highway facility is operating at less than the appropriate target LOS, the existing MOE (LOS) should be maintained (Caltrans, 2002).

Vehicle Miles Traveled

In September 2013 Governor Brown signed Senate Bill 743 which made significant changes to how transportation impacts are to be assessed under CEQA. SB 743 directs the Governor's Office of Planning and Research (OPR) to develop a new metric to replace LOS as a measure of impact significance and suggests vehicle miles travelled as that metric. According to the legislation, upon certification of the guidelines, automobile delay, as described solely by LOS shall not be considered a significant impact (Section 21009(a)(2)). SB 743 also creates a new CEQA exemption for certain projects that are consistent with the regional Sustainable Communities Strategy.

OPR has released draft CEQA Guidelines to address this requirement; however, at the time this analysis was completed the Guidelines have not been finalized or certified. It is anticipated that the revisions to the CEQA Guidelines will be finalized in 2017. According to the most recent draft CEQA Guidelines released by the OPR, lead agencies would have a grace period of two years to update and adopt new thresholds once the final Guidelines have been adopted. The City of Santa Cruz will update its transportation standards of significance to reflect SB 743 once the state has finalized the guidelines. Because there are no adopted thresholds and the revised State CEQA Guidelines' have not yet been certified, vehicle miles travelled is not utilized as a standard of significance in this EIR. However, VMT estimates are provided in the Impact 4.7-1 discussion as an informational item.

Analytical Method

The proposed project consists of amendments to the City's Downtown Recovery Plan, General Plan, Local Coastal Plan and Zoning Code regarding development in the downtown area and Central Business District. The proposed project would not directly result in new development. However, the proposed Downtown Plan amendment would expand areas for potential additional building height that could accommodate intensified redevelopment of existing developed sites. City staff estimates that the proposed amendments could indirectly lead to development, resulting in a potential net increase of 711 new residential units and 2,200 square feet of office space with a net decrease of approximately 14,700 square feet of commercial building space over existing conditions within the downtown area. The proposed General Plan amendment would increase FAR in areas designated as RVC in the General Plan, but would not lead to development on sites not already considered in the General Plan and General Plan EIR. The proposed LCP and Zoning Code amendments would not result in changes that could indirectly lead to intensified development.

A project traffic impact study was prepared for the project in accordance with City requirements. As indicated, above, the City of Santa Cruz uses LOS To evaluate the performance of roadways and levels of traffic congestion. The project traffic impact study was based on intersection turning movement counts taken on Thursday, May 22, 2014 and Tuesday November 17, 2015 at the study intersections during the PM peak period (4:00 pm to 6:00 pm), from which the PM peak hour was determined.

The traffic study computed intersection LOS using the 2010 and 2000 HCM methodology and Synchro 8 software. The result of the HCM calculations is an estimate of average control delay at the intersection which corresponds to an LOS grade as shown in Table 4.7-1 above. Project trip generation is provided in the traffic impact study, and traffic distributed on city streets utilizing the City's traffic model that was developed as part of the General Plan 2030 using Traffix software. AMBAG maintains a regional travel demand model, but it was not used as the City's model is more detailed and specific to conditions in the City. The study scenarios analyzed include existing conditions, existing with the project, and cumulative conditions, including the project. The traffic impact analysis also includes evaluation of other travel modes based on adopted regional plans and review with City of Santa Cruz staff.

Impacts and Mitigation Measures

As described in the Initial Study (see Appendix A), there are no adopted congestion management programs² for the project area (7c). The following impact analyses address impacts to City streets and intersections (7a) and state highways (7b), the potential to substantially increase hazards or result in inadequate emergency access (7d-e), and potential project conflicts with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities or impacts to the performance of these facilities (7f).

Traffic Impacts

Impact 4.7-1: Circulation System Impacts. The project will result in an increase in daily and peak hour trips, but would not cause existing or planned intersections to operate at an unacceptable Level of Service (LOS) or further degrade intersections that already operate at an unacceptable LOS (7a). Therefore, the impact is *less than significant*.

A LOS analysis was completed to comply with City regulations, and as discussed above, LOS is the performance measure used to evaluate the effectiveness of the circulation system. In order to identify the potential traffic impacts of the project using LOS, a multi-step process was utilized. The first step is calculating trip generation, which estimates the total arriving and departing traffic during a peak hour and on a daily basis. Trip generation was estimated for the project by applying vehicle trip generation rates to the project development based on land use. Figure 4.7-2 shows the downtown project area zones and study intersections. Trip rates specific to the downtown area were used from the City of Santa Cruz General Plan EIR (City of Santa Cruz 2012). The project area was divided into zones and trip generation was calculated separately for each zone. Trip generation calculations include a 40 percent trip reduction due to proximity to the downtown transit center, mixed use development, bicycle use and walking trips. The project

² The Code of Federal Regulations, Title 23 Volume 1, adopted in April 2005 require Transportation Management Areas (TMAs) to prepare Congestion Management Programs. TMAs are defined as urbanized areas with a population over 200,000. There are eight such areas in California plus Santa Barbara that asked to be included (City of Santa Cruz, 2012).

would generate 293 weekday PM peak hour trips (188 in and 106 out) between 4 and 6 PM and 2,627 daily trips as summarized on Table 4.7-4.

TABLE 4.7-4: Project Trip Generation

Land Uses	Size	Units	Daily Trips	PM Peak Hour		
				Total Peak Hour	IN	OUT
Trip Generation Rates ¹						
Commercial		1,000 Sq Ft	44.32	2.71	44%	56%
Office		1,000 Sq Ft	11.01	1.49	17%	83%
Townhomes ²		Dwelling Unit(DUs)	7.50	0.62	65%	35%
Apartments		DUs	6.65	0.62	65%	35%
Trips Generated						
Area X - Riverfront						
Commercial	11,171	Sq Ft	496	30	13	17
Office	18,296	Sq Ft	202	27	5	22
Townhomes	321	DUs	2,408	199	129	70
Apartments	0	DUS	0	0	0	0
Area X Total Trips			3,106	256	147	109
40% Reduction for Downtown Area ³			(1,242)	(102)	(59)	(44)
Area X Net Trips			1,864	154	88	65
Area Y - E. Pacific/W. Front Pacific Station						
Commercial	(27,864)	Sq Ft	(1,236)	(76)	(33)	(43)
Office	(16,105)	Sq Ft	(178)	(24)	(4)	(20)
Townhomes	0	DUs	0	0	0	0
Apartments	370	DUs	2,462	229	149	80
Area Y Total Trips			1,048	129	112	17
40% Reduction for Downtown Area ³			(419)	(52)	(45)	(7)
Parking Garage						
Added Trips ⁴				52	26	26
Area Y Net Trips			629	129	93	36
Area Z - W. Pacific						
Commercial	2,000	Sq Ft	90	5	2	3
Office	0	Sq Ft	0	0	0	0
Townhomes	0	DUs	0	0	0	0
Apartments	20,000	DUs	134	12	8	4
Area Z Total Trips			224	17	10	7
40% Reduction for Downtown Area ³			(90)	(7)	(4)	(3)
Area Z Net Trips			134	10	6	4
Total Project Trips			2,627	293	188	106

Source: Kimley Horn, May 2017.

Notes:

1. Trip generation rates obtained from Appendix C of the City of Santa Cruz General Plan 2030 EIR.
2. ITE Land Use 270 Rates used for Townhomes per City direction (email correspondence with Ron Marquez dated 04/22/16).
3. 40% Reduction for mixed use development in Downtown Santa Cruz per City direction (email correspondence with Ron Marquez dated 04/22/16).
4. Required parking per City Code= 414+880+871=2,165 spaces. With 20% reduction=1,732, so 259 additional spaces (1,991-1,732) that will generate traffic. 10% in the AM peak = 26 trips; 20% in the PM peak = 52 trips.

The second step of the forecasting process is trip distribution, which identifies the origins and destinations of inbound and outbound project traffic. These origins and destinations are typically based on demographics and existing or anticipated travel patterns in the study area. Figure 4.7-2 shows the trip distribution that was applied to the study area roadway network.

The third step is traffic assignment, which involves the allocation of project traffic to streets and intersections in the study area. Traffic distribution patterns are indicated by percentage orientation, while traffic assignment allocates specific volume forecasts to individual roadway links and intersection turning movements throughout the study area. Figure 4.7-3 depicts project trip assignment.

With the forecasting process complete and project traffic assignments developed, the impact of the project is identified by comparing operational (LOS) conditions with and without the project at the study intersections. Table 4.7-5 summarizes the PM peak hour LOS at the study intersections for Existing Conditions with and without the project. See Figure 4.7-4 for intersection traffic volumes with the addition of project traffic.

As shown, traffic associated with the project will not degrade LOS to below acceptable levels at any of the study intersections under the jurisdiction of the City. The two Caltrans intersections of Highway 1 / Highway 9 and Chestnut Street / Mission Street would continue operate at LOS E as a result of the proposed project. There are improvements identified for the Highway 1/Highway 9-River Street intersection as discussed above, which are included in the current City Traffic Impact Fee (TIF) Program, and the Chestnut Street / Mission Street intersection is included in the RTIP. The improvements are already required under existing conditions without the project. Traffic associated with the project does not further degrade the LOS at the two Caltrans intersections, and would not substantially increase delay. Therefore, based on the significance criteria discussed above, traffic associated with the project would not cause existing or planned intersections to operate at an unacceptable Level of Service (LOS) or further degrade intersections that already operate at an unacceptable LOS. Therefore, the impact is less than significant.

For informational purposes, a per capita VMT resulting from potential development accommodated by the proposed plan amendments was estimated utilizing trip length information from the California Statewide Travel Demand Model and percentages for different trip types, i.e., home to work, included in the CalEEMod air emissions model. Estimated new net development, including reduction in commercial uses, is estimate to result in a total of weekday VMT of 14,059 trips. Based on U.S. Census data for the downtown area and employee projections in the City's General Plan 2030 EIR, total residential and employee population is estimated at approximately 1,280, which results in a weekday per capita VMT of 11.0. According to the Santa Cruz County Regional Transportation Commission, VMT per capita within Santa Cruz County is estimated to decrease by 17% from approximately 15.3 to approximately 12.5 between 2005 and 2035 (Santa Cruz County Regional Transportation Commission. Although no VMT standards have been developed within the City, this preliminary project per capita VMT

estimate shows that VMT would be below existing and projected county-wide estimates, which in large part is a reflection of the project's location downtown and in proximity to transit, bicycle and pedestrian facilities.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

TABLE 4.7-5: Intersection Weekday PM Peak Hour Levels of Service with Project

#	Intersection	LOS Threshold ¹	Existing Conditions ²			Existing Plus Project Conditions ²		
			PM Peak Hour			PM Peak Hour		
			Movement	Delay ³	LOS	Movement	Delay ³	LOS
1	Front Street / Laurel Street	D	Overall	30.8	C	Overall	31.2	C
2	Pacific Avenue / Laurel Street	D	Overall	17.9	B	Overall	18.5	B
3	Front Street / Cathcart Street	D	Overall	19.0	B	Overall	18.9	B
4	Front Street / Metro Station Driveway	D	Overall	4.9	A	Overall	5.1	A
5	Pacific Avenue / Metro Station Driveway	D	Overall	1.1	A	Overall	1.1	A
		D	WB	11.4	B	WB	11.6	B
6	Pacific Avenue / Maple Street	D	Overall	8.1	A	Overall	8.2	A
7	Pacific Avenue / Front Street / Mission-Water Street	D	Overall	20.2	C	Overall	21.1	C
8	Front Street / Soquel Avenue	D	Overall	21.9	C	Overall	23.1	C
9	Pacific Avenue / Cathcart Street	D	Overall	8.8	A	Overall	8.9	A
10	Soquel Avenue / Pacific Avenue	D	Overall	3.6	A	Overall	3.6	A
		D	WB	10.3	B	WB	10.3	B
11	Ocean Street / Water Street	D	Overall	35.3	D	Overall	35.6	D
12	Highway 1 / Highway 9	C-D	Overall	71.7	E	Overall	74.1	E
13	Chestnut Street / Mission Street / Highway 1	C-D	Overall	74.1	E	Overall	73.8	E

Impact 4.7-2: Highway Segment Impacts. The project will result in an increase in daily and peak hour trips, but would not result in a change to an unacceptable LOS along state highway segments (7a). This is a *less-significant impact*.

The project will result in approximately 38 to 59 additional PM peak hour trips along Highway 1 and 20 additional peak hour trips along Highway 17, representing a 0.2 to 1.8 percent increase. All of the study highway segments would operate at acceptable levels of service according the LOS targets established by Caltrans as summarized on Table 4.7-6.

TABLE 4.7-6: Highway Traffic Volumes and Peak Hour Levels of Service

Segment	Direction	Number of Lanes	Max Flow Rate for C	Max Flow Rate for D	Existing		Existing plus Project			
					Volume	LOS	Project Trips	Volume	Percent Change	LOS
Route 1: Route 9 to Route 17	N	2	2,761	3,444	2,080	C	38	2,118	1.8%	C
	S	2	2,761	3,444	3,120	D	21	3,141	0.7%	D
Route 1: Route 17 to Emeline	N	2	2,761	3,444	2,820	D	24	2,844	0.9%	D
	S	2	2,761	3,444	1,880	C	14	1,894	0.7%	C
Route 17: Route 1 to Pasatiempo	N	3	3,888	5,165	3,300	C	7	3,307	0.2%	C
	S	3	3,888	5,165	2,700	C	13	2,713	0.5%	C
Peak hour volumes from Caltrans 2015										
Peak hour factor-.92, free flow speed – 55, heavy vehicle factor-.985 (Exhibit 11-17 HCM 2010)										

SOURCE: Ron Marquez, Traffic Engineer Consultant

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Access and Hazards

Impact 4.7-3: Project Access. The project will not result in creation of hazards due to design of the project circulation system or introduction of incompatible uses (7d). Therefore, the project would result in *no impact*.

The proposed project does not include any design features that would change vehicle circulation or access. The project includes some minor changes to clarify the locations of pedestrian access to open space and areas around downtown. However, these changes do not result in hazardous features such as sharp curves or dangerous intersections. Therefore, there is no impact as a result of the project.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4,7-4: Emergency Access. The project will not result in inadequate emergency access (7e). Therefore, the project would result in *no impact*.

There are no proposed changes to vehicle circulation and the proposed project does not modify emergency access from existing conditions. Therefore, there is no impact related to emergency access.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Transit, Pedestrian and Bicycle Travel

Impact 4.7-5: Transit, Pedestrian and Bicycle Travel. The project will not conflict with adopted policies, plans, or programs regarding public transit, bicycle or pedestrian facilities, or otherwise decrease the performance or safety of such facilities (7f). Therefore, the project would result in *no impact*.

The Santa Cruz City Council recently accepted an Active Transportation Plan (ATP) (City of Santa Cruz, February 2017). The ATP includes a number of recommendations including programs and projects to create an integrated network of walkways and bikeways that connect neighborhoods to employment centers, commercial land uses, educational facilities, and recreational opportunities. The recommended projects in the ATP are prioritized and ranked based on a number of criteria including crash data, proximity to trip generators, traffic counts and public comments.

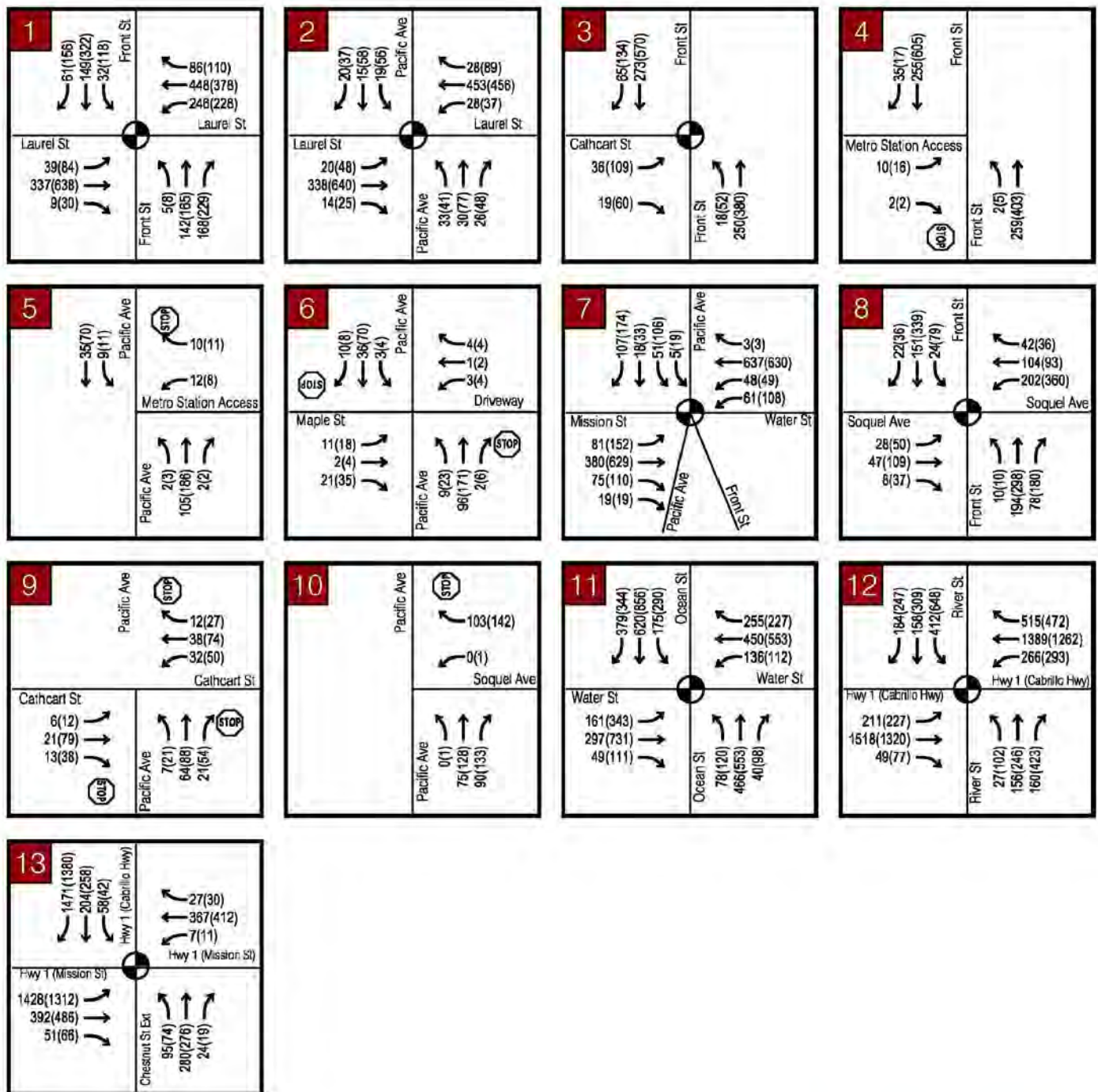
The SCMTD completes a Short Range Transit Plan (SRTP) every five years that contains a review of procedures and an analysis of existing services that results in service improvements and investments. The most recent SRTP (SCMTD 2013) contains a number of policy, practice, and service recommendations. Policy and practice recommendations primarily address SCMTD infrastructure. In 2016, SCMTD underwent a comprehensive operational analysis to reduce operating expenses in order to address a structural deficit of \$6.5 million. The operating analysis resulted in a number of service changes that help to reduce operating costs and superseded the recommendations in the SRTP.

The Downtown Recovery Plan has a strong emphasis on pedestrian scale design and accessibility and includes a new pedestrian connection between Pacific Avenue and Front Street in the vicinity of Elm Street as well as bicycle access at the Elm Street extension to the San Lorenzo Riverwalk. None of the design features in the Downtown Recovery Plan conflict with the ATP or the SRTP and the design emphasis on pedestrians supports the objectives and goals of the ATP. Therefore, there is no impact related to conflicts with plans or programs related to active transportation and transit.

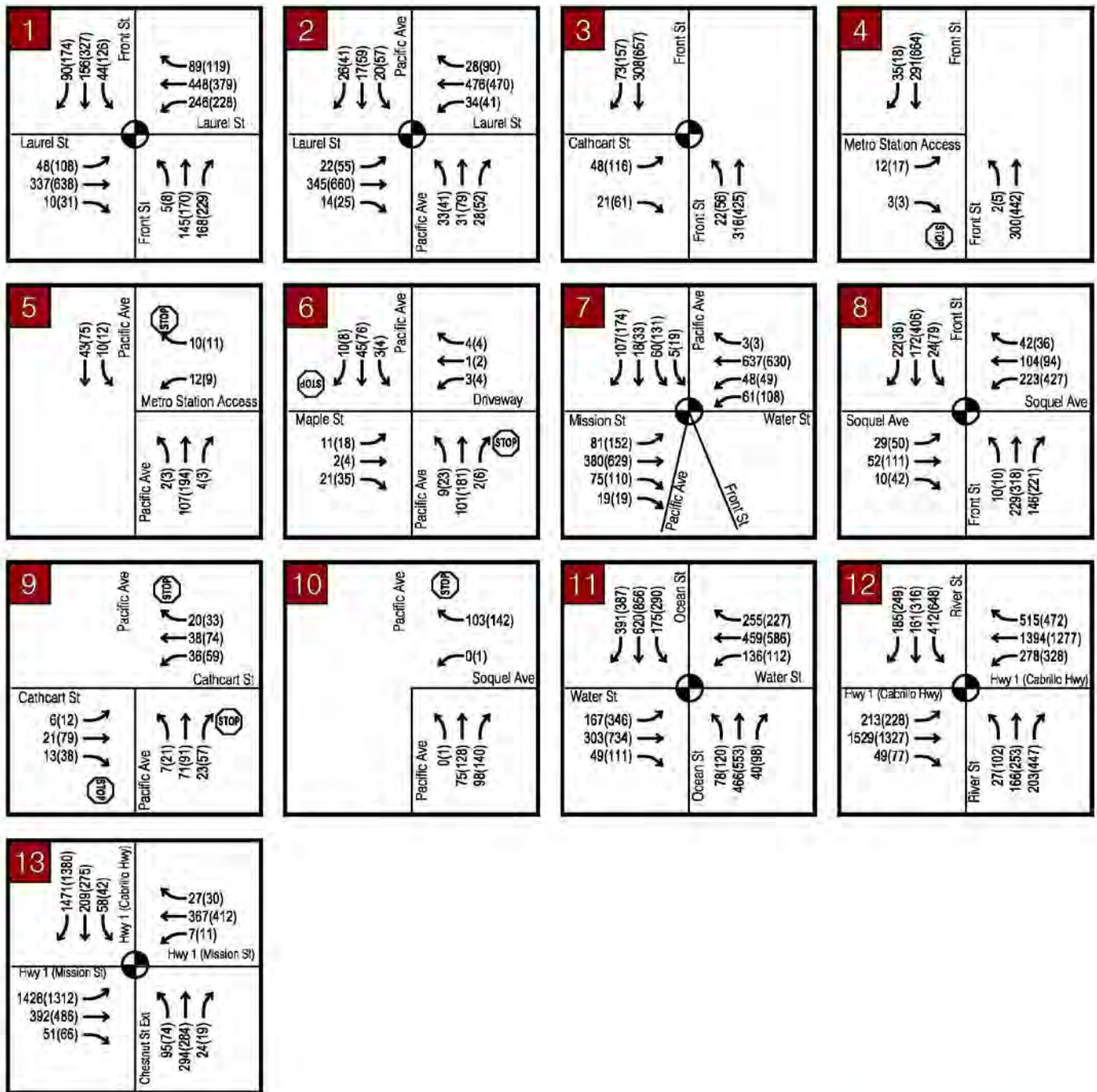
Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

INTENTIONALLY LEFT BLANK



LEGEND	
	INTERSECTION #
	TRAFFIC SIGNAL
	STOP SIGN
XX(X)	AM(PM) PEAK HOUR VOLUMES



4.8 WATER SUPPLY AND WASTEWATER TREATMENT

This section analyzes impacts of the project's potable water demand on municipal water supplies. This section draws from the City of Santa Cruz *2015 Urban Water Management Plan* (UWMP), which was adopted in August 2016 in accordance with state law. The UWMP, which must be updated every five years, evaluates water supply and demand within the City's water service area over the next 20 years. The 2015 UWMP is incorporated by reference in accordance with section 15150 of the State CEQA Guidelines, and relevant discussions are summarized in section 4.8.1. The 2015 UWMP Plan is available for review at the City of Santa Cruz Water Department (212 Locust Street, Suite A, Santa Cruz, California) during business hours: Monday through Thursday, 8 AM to 12 PM and 1 PM to 5 PM. The plan also is available for review on the City's website at: <http://www.cityofsantacruz.com/government/city-departments/water/2015-urban-water-mgmt-plan>.

This section also draws from the City of Santa Cruz *General Plan 2030* EIR (SCH#2009032007), which was certified on June 26, 2012, regarding background information on the City's wastewater treatment facility. The General Plan EIR is incorporated by reference in accordance with section 15150 of the State CEQA Guidelines. Relevant discussions are summarized in subsection 4.3.1. The General Plan EIR is available for review at the City of Santa Cruz Planning and Community Development Department (809 Center Street, Room 107, Santa Cruz, California) during business hours: Monday through Thursday, 8 AM to 12 PM and 1 PM to 5 PM. The General Plan EIR is also available online on the City's website at: <http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development/general-plan/draft-eir-for-the-draft-general-plan-2030>.

Public and agency comments related to water supply / water service were received during the public scoping period in response to the Notice of Preparation (NOP). Issues raised in these comments include:

- ☐ Consideration of solving issues regarding water storage for drought years and sewage treatment for areas along San Lorenzo River served by septic systems.

To the extent that issues identified in public comments involve potentially significant effects on the environment according to the California Environmental Quality Act (CEQA) and/or are raised by responsible agencies, they are identified and addressed within this EIR. Public comments received during the public scoping period are included in Appendix B. It is noted that the comment received in response to the NOP addresses a general issue and does not provide a specific comment regarding the scope of review for the proposed project in this EIR, and is noted. Background information on the City's water and wastewater systems are provided in this section.

4.8.1 Environmental Setting

Regulatory Setting

State Regulations

Water Supply Assessments. In 2001, Senate Bill (SB) 610 amended California law regarding review of water availability for large projects (Section 10910 et seq. of the Water Code; Section 21151.9 of the Public Resources Code [CEQA]; see also Section 15155 of the State CEQA Guidelines). Pursuant to SB 610, preparation of a “water supply assessment” (WSA) is required for projects subject to CEQA that meet specified criteria regarding project size: projects of 500 or more residential units, 500,000 square feet or more of retail commercial space, 250,000 square feet or more of office commercial space, 500 or more hotel rooms, specified industrial uses, or a project that would result in a water demand equal to or greater than the amount needed to serve a 500-unit residential project. These assessments, prepared by “public water systems” responsible for service, address whether there are adequate existing or projected water supplies available to serve proposed projects over a 20-year period, in addition to existing demand and other anticipated development in the service area. The proposed project does not meet the above size requirements that would trigger the preparation of a WSA.

Sustainable Groundwater Management. In 2014, California enacted the “Sustainable Groundwater Management Act” to bring the state’s groundwater basins into a more sustainable regime of pumping and recharge. The legislation provides for the sustainable management of groundwater through the formation of local groundwater sustainability agencies (GSAs) and the development and implementation of groundwater sustainability plans (GSPs), and requires GSAs and GSPs for all groundwater basins identified by the California Department of Water Resources (DWR) as high or medium priority. The law also authorizes the intervention of the State Water Resources Control Board in the event that no GSA, or equivalent local authority, is formed for a high- or medium-priority basin, or if an adequate GSP is not submitted for those basins. Additionally, it establishes criteria for the sustainable management of groundwater and authorizes DWR to establish best management practices for groundwater (California Department of Water Resources, December 2016).

The City of Santa Cruz is part of the Santa Cruz Mid-County Groundwater Basin formed pursuant to this legislation. The portion of the City’s water service area not represented by the Agency is a remaining portion of the previously designated West Santa Cruz Terrace Basin and this basin is not currently managed by a GSA and may undergo further modification.

Wastewater Treatment. The Clean Water Act (CWA) regulates the discharge of pollutants to waters of the United States from any point source, enacted in 1972. The California State Water Resources Control Board (State Board) and the nine Regional Water Quality Control Boards (RWQCB) have the authority in California to protect and enhance water quality, including administration of the National Pollutant Discharge Elimination System (NPDES) permit program

for discharges, storm water and construction site runoff. The discharge of treated wastewater is included in the NPDES program. The RWQCB regulates operations and discharges from sewage systems through the NPDES permit. Further discussion is provided on pages 4.6-21 to 4.6-22 of the General Plan 2030 EIR (DEIR volume), which is incorporated by reference.

Local Regulations

Water Supply. Title 16 of the City’s Municipal Code addresses water, sewers, and other public services. Title 16 chapters relevant to water service include:

- Chapter 16.01 Water Shortage Regulations and Restrictions
- Chapter 16.02 Water Conservation
- Chapter 16.03 Plumbing Fixture Retrofit Regulations
- Chapter 16.04 Water Services
- Chapter 16.05 Loch Lomond Recreation Area, Watershed Lands and Riparian Conservation Areas
- Chapter 16.06 Regulation of Water Wells
- Chapter 16.08 Sewer System: Graywater Systems (section 16.08.065)
- Chapter 16.09 Water System Improvements
- Chapter 16.10 Desalination Plant – Voter Approval
- Chapter 16.11 Water Service Accounts
- Chapter 16.13 Unified Utilities Billing System
- Chapter 16.14 System Development Charges
- Chapter 16.15 Water Use
- Chapter 16.16 Water –Efficient Landscaping
- Chapter 16.24 Utility Service Area Expansion

The City of Santa Cruz has enacted several ordinances regarding water conservation. Chapter 16.01 identifies regulations and restrictions during declared times of water shortages. Chapter 16.02 sets forth water conservation provisions to prevent the waste or unreasonable use or method of use of water. Chapter 16.16 sets forth requirements for water-efficient landscaping and also is intended to comply with the California Government Code section 65591 et seq., the Water Conservation in Landscaping Act. The regulations are applicable to applicants for new, increased, or modified water service within the City’s water service area. On June 28, 2011, the City Council adopted Ordinance 2011-04, which amends the Municipal Code and adds a new section (16.08.065) to allow graywater use for irrigation. Graywater is wastewater that originates from showers, bathtubs, bathroom sinks, and clothes washing machines.

Wastewater Treatment. Chapter 16.08 (“Sewer System Ordinance”) of the City of Santa Cruz Municipal Code regulates discharge to sanitary sewer and requires that all wastewater be discharged to public sewers, with the exception of graywater as allowed by Municipal Code Chapter 16.08. Septic tanks and cesspools are not allowed within city boundaries except as specified for limited conditions in Chapter 6.20 of the Municipal Code.

Study Area

The project area consists of the downtown area generally covered by the Downtown Recovery Plan (DRP) and the Central Business District zone, and specifically the lower downtown area generally between Soquel Avenue and Laurel Street on the north and south, and Cedar Street and the San Lorenzo River on the west and east. (Locations are shown on Figures 1-2 and 2-1 in Section 3, Project Description.) The proposed project includes an amendment to the floor area ratio for the downtown portion of Regional Visitor Commercial land use designation. The study area includes properties adjacent to the western San Lorenzo River levee.

Service providers include the City of Santa Cruz for water supply and wastewater treatment.

City Water Service Area

The City of Santa Cruz Water Department serves approximately 24,535 connections in an approximate 20-square mile area. The service area includes the entire City of Santa Cruz, adjoining unincorporated areas of Santa Cruz County, a small part of the City of Capitola, and coastal agricultural lands north of the city. The current population residing in the Santa Cruz water service area is estimated to be 95,251 people. Approximately two thirds of the total population, almost 64,000, lives inside the City limits. Within the City, about 9,100 people including students, faculty, staff, and their families reside on the University of California Santa Cruz campus (City of Santa Cruz, August 2016).

City Wastewater Treatment Service Area

The City of Santa Cruz wastewater treatment facility (WWTF) serves the cities of Santa Cruz and Capitola and parts of unincorporated Santa Cruz County. In addition to the City of Santa Cruz, the WWTF serves the Santa Cruz County Sanitation District and Community Service Areas (CSA) 10 and 57; for further description, see pages 4.6-23 to 4.6-24 of the City's General Plan 2030 EIR (DEIR volume), which is incorporated by reference. The City also provides capacity for the City of Scotts Valley to discharge its treated wastewater into the Pacific Ocean via the City's discharge.

4.8.1.1 Water Service

City Water Service System

Water Supply Sources

The City's water system is comprised of four main sources of supply: San Lorenzo River diversions (including the Tait wells); North Coast spring and creeks; Loch Lomond Reservoir; and the Beltz wells. Over the past decade, the North Coast sources represented 26 percent of the total water supply, the San Lorenzo River represented 55 percent, Newell Creek (Loch Lomond

Reservoir) represented 14 percent, and Beltz wells contributed the remaining 5 percent (City of Santa Cruz, August 2016).

The San Lorenzo River is the City's largest source of water supply. The main surface water diversion, known as the San Lorenzo River Diversion, is located adjacent to the coast pump station on Highway 9 near the City limits just north of Highway 1. Use of this source dates back to the 1870s and was consolidated under public ownership in 1917. The Tait Street Diversion is supplemented by shallow, auxiliary wells located directly across the river, the Tait wells. The other diversion on the San Lorenzo River is Felton Diversion, which is an inflatable dam and intake structure built in 1974, located about 6 miles upstream from the Tait Street Diversion. When the diversion is being operated, water is pumped from this diversion through the Felton Booster Station to Loch Lomond Reservoir. While the City is the largest user of water from the San Lorenzo River basin, two other water districts, several private water companies, and numerous individual property owners share the San Lorenzo River watershed as their primary source for drinking water supply (City of Santa Cruz, August 2016).

The North Coast water sources consist of surface diversions from three coastal creeks and a natural spring located approximately 6 to 8 miles northwest of downtown Santa Cruz. These sources are: Liddell Spring, Laguna Creek, Reggiardo Creek, and Majors Creek. The use of these sources by the City dates back as far as 1890 (City of Santa Cruz, August 2016).

Loch Lomond Reservoir is located near the town of Ben Lomond in the Santa Cruz Mountains. The reservoir was constructed in the 1960s and has a maximum capacity of 2,810 million gallons (mg). In addition to providing surface water storage, the reservoir and surrounding watershed are used for public recreation purposes, including fishing, boating, hiking, and picnicking (swimming and wading are prohibited). In addition to the City, the San Lorenzo Valley Water District is entitled by contract to receive a 314.4 acre-feet per year (AFY) of the water stored in Loch Lomond Reservoir (City of Santa Cruz, August 2016).

The Beltz well system consists of four production wells and two water treatment plants located in the eastern portion of the City water service area. The facilities were originally acquired by the City from the Beltz Water Company in 1964. The majority of the groundwater production of the City's Beltz well field is in a geographical area identified as the Santa Cruz Mid-county Groundwater Basin. Groundwater from this basin is used by the City, the Soquel Creek and Central Water Districts, several small water systems, and numerous private rural water wells. Even though groundwater constitutes only about five percent of the City's water supply, it is a crucial component of the water system for meeting peak season demands, maintaining pressure in the eastern portion of the distribution system, and weathering periods of drought (City of Santa Cruz, August 2016).

Water System Production and Operations

The Water Department follows a variety of policies, procedures and legal restrictions in operating the City's water supply system, and the amount of water produced from each of the City surface water sources is controlled by different water rights and operational agreements. A summary of water rights held by the City of Santa Cruz is provided on page 6-10 of the 2015 UWMP that is incorporated by reference. In general, the system is managed to use available flowing sources to meet daily demands as much as possible. Groundwater and stored water from Loch Lomond are used primarily in the summer and fall months when flows in the coast and river sources decline and additional supply is needed to meet higher daily water demands. In accordance with requirements of its water rights, the City releases a minimum flow of 1.0 cfs from storage in Loch Lomond Reservoir to support fishery resources beneath the dam (City of Santa Cruz, August 2016).

Water production has fluctuated over the past ten years; annual production has ranged from a high of nearly 3,800 million gallons per year (MGY) in 2006 to a low of approximately 2,500 MGY in 2015 (City of Santa Cruz, August 2016). The 2015 water production rate represents production volumes experienced under severe drought conditions during a second year of rationing with emergency water shortage regulations and state-mandated local restrictions in effect.

The 2015 UWMP estimates a 20-year water supply at about 3,200 MGY in the year 2035 based on deliveries for average years, projected water demands, and available surface water flows consistent with ecosystem protection goals regarding fish habitat.

Water is treated at the City's Graham Hill Water Treatment Plant (GHWTP), except for groundwater, which is treated as part of the Beltz well system. The GHWTP complies with all drinking water standards set by the US Environmental Protection Agency and the State Water Resources Control Board Division of Drinking Water (DDW). GHWTP is a conventional surface water treatment plant that was commissioned in 1960 with a capacity of 12 million gallons per day (MGD) plant and has undergone an expansion and numerous plant improvements over the last 55 years. Currently the plant can process up to 16 MGD and a year-round average production of 10 MGD. Continued investment in the plant through replacement and upgrade projects will enhance the water quality treatment process and respond to changes in regulation to maintain an adequate, safe, and reliable supply of water available to the service area. Groundwater treatment occurs within the Beltz well system, and the current operational capacity for production in the Beltz system is approximately 1 MGD when the City draws groundwater (City of Santa Cruz, August 2016).

Water Demand

Water demand in the City's water service area has fluctuated over the past 10 years. The 2015 UWMP indicates that water consumption in the service area ranged between nearly 3,800 MGY in 2006 to approximately 2,500 MGY in 2015 (City of Santa Cruz, August 2016). The 2015 water demand was during the second year of a severe drought with water use restrictions and rationing in place.

The adopted 2015 UWMP forecasts a 20-year water demand forecast at approximately 3,200 MGY. This is slightly reduced from the estimated 3,500 MGY forecast in the 2010 UWMP due to continuing conservation efforts (City of Santa Cruz, August 2016). Until recently, the general trend in system demand was one in which water use rose roughly in parallel with account and population growth over time, except during two major drought periods in the late 1970s and the early 1990s. Around 2000, this pattern changed and system demand began a long period of decline, accelerated by pricing changes, drought, economic downturn, and other factors (Ibid.). The UWMP predicts a decrease in water use of approximately 100 MGY over the next 20 years despite regional population growth forecasts.

Water Supply Reliability and Constraints

There are several constraints and challenges that affect the long-term reliability of the City's water supplies. The primary constraint relates to potential water shortfalls during multi-year droughts. In addition, the City also faces other challenges that potentially could affect water supplies, including: potential flow releases associated with a Habitat Conservation Plan (HCP) currently under development, the outcome of water rights petitions, groundwater availability and climate change issues.

Supply Variability and Availability During Droughts

The City's primary water supply reliability issue relates to potential shortfalls during dry and critically dry years. The City Council-appointed Water Supply Advisory Committee¹ issued the following problem statement, which also is included in the 2015 UWMP, that summarizes the key water supply issues within the City's water service area:

Santa Cruz's water supply reliability issue is the result of having only a marginally adequate amount of storage to serve demand during dry and critically dry years when the system's reservoir doesn't fill completely. Both expected requirements for fish flow releases and anticipated impacts of climate change will turn a marginally adequate situation into a seriously inadequate one in the coming years. Santa Cruz's lack of storage makes it particularly vulnerable to multi-year droughts. The key management strategy currently available for dealing with this vulnerability is

¹ See discussion in the following subsection regarding WSAC.

to very conservatively manage available storage. This strategy typically results in regular calls for annual curtailments of demand that may lead to modest, significant, or even critical requirements for reduction. In addition, the Santa Cruz supply lacks diversity, thereby further increasing the system's vulnerability to drought conditions and other risks. The projected worst-year gap between peak-season available supply and demand during an extended drought is about 1.2 billion gallons. While aggressive implementation of conservation programs will help reduce this gap, conservation alone cannot close this gap. The Committee's goal is to establish a reasonable level of reliability for Santa Cruz water customers by substantially decreasing this worst-year gap while also reducing the frequency of shortages in less extreme years.

As described above, the City's water supply is almost exclusively from local surface water sources whose yield varies from year to year depending on the amount of rainfall received. The water system is capable of meeting demands during normal and wet years, but is vulnerable to shortage in extended dry periods or critically dry periods. The City predicts that future water demand will be met for 90 percent of all normal water years and that existing and planned sources of water available to the City over the next twenty years will meet the predicted service area total annual water demand of about 3,200 to 3,300 MGY (City of Santa Cruz, August 2016).

The UWMP's projections for the year 2035 show a shortfall of approximately 40 MGY during normal periods, 528 MGY during single dry year periods, and 1,250 to 1,639 MGY during multiple dry year periods. The City has not previously seen shortages in normal water years, but expected reductions in water production for ecosystem protection are likely to result in small shortages (1-3 percent) prior to 2020. However, operationally the City predicts sufficient water supplies in normal years to meet demand even though a slight deficit seems to exist in the modelled projections (City of Santa Cruz, August 2016).

In an extreme multi-year drought, available water supplies are estimated to be 25 to 50 percent less than what is available during normal years depending on the severity and duration of the dry years. In multi-year or critical drought conditions, the combination of very low surface flows in the coast and river sources and depleted storage in Loch Lomond Reservoir reduces available supply to a level which cannot support average dry season demands. Compounding the situation is the need to retain a certain amount of water in the reservoir to provide supply if drought conditions continue into the following year. The existing system is not able to provide a reliable supply during multi-year droughts or prolonged periods of drier than normal hydrologic conditions (City of Santa Cruz, August 2016). As the City chose to create a representative average year by using the historic record, the inclusion of the dry years and critically dry years within the average may explain the predicted small deficit. It is important to note that the City predicts the supply and demand volumes to be in balance for 90% of all normal water years for 2020-2035.

Ecosystem Protection

The amount of North Coast water supply sources may change in the future depending on the outcome of a Section 10 Incidental Take Permit application and HCP under development. Since 2002, the City of Santa Cruz has been working toward the development of an HCP that covers effects on anadromous fish incidental to operation and maintenance of the water system, which may result in “take” of threatened and/or endangered species. An HCP is an operational avoidance and minimization and mitigation plan prepared under Section 10 of the Federal Endangered Species Act (FESA) and Section 2081 of the California Fish and Game Code for incidental take of federally or state-listed threatened and endangered species. The City initiated the HCP process because the streams from which the City diverts water currently support steelhead trout (*Oncorhynchus mykiss*), a federally-listed “threatened” species, and the San Lorenzo River and Laguna Creek support coho salmon (*Oncorhynchus kisutch*), a federally and state listed “endangered”.

The City has been actively meeting with the federal and state agencies on HCP-related issues and has conducted a number of studies, but permitting has not yet been completed yet. These studies have evaluated what limiting factors may be affecting the threatened and endangered anadromous fish in these streams and measures that the City can take to avoid and minimize effects of its operations on these species. Because these studies indicate that habitat conditions in these streams could be improved with increased instream flows, the City began voluntarily diverting less flow in 2007 on an interim basis in connection with the pursuit of FESA and CESA take authorization as well Streambed Alteration Agreements for its diversion facilities. Although permit negotiations are ongoing, the City forecasts that ultimate compliance will result in less water being available from the City’s surface water sources for supply in future years compared to the past. This, in turn, will place greater reliance on water stored in Loch Lomond Reservoir to meet the community’s annual water needs and exacerbate the potential vulnerability to shortages described above (City of Santa Cruz, August 2016).

Water Rights Petitions

The City is addressing two water rights issues that may affect the City’s water supply. In 2008, the City submitted petitions to the State Water Resources Control Board (SWRCB) to address a historical oversight in the language of the City’s water rights documents for Newell Creek and the San Lorenzo River at Felton (Felton Diversion) and to request a time extension for the full development of the 3,000 acre-feet permit to divert water from the San Lorenzo River at Felton and to add the rights of direct diversion at Newell Creek and the Felton Diversion. The City’s intent is to eliminate technical constraints for operations of its water supplies. Recently completed water supply planning work done by the Water Supply Advisory Committee (described in more detail below) identified water from the Felton Permits as being critical to meeting the City’s projected future demand (City of Santa Cruz, August 2016).

Groundwater Availability and Management

The City has joined with the Soquel Creek and Central Water Districts, the County of Santa Cruz, and private well representatives to form the Santa Cruz Mid-County Groundwater Agency (MGA), the local GSA created pursuant to the requirements of the California Sustainable Groundwater Management Act. The MGA will oversee the preparation of a cooperative groundwater management plan for the now redefined Santa Cruz Mid-County Groundwater Basin, which includes the former Soquel Valley Basin and portions of three adjacent basins – the West Santa Cruz Terrace Basin, the former Santa Cruz Purisima Formation Basin, and the original Pajaro Valley Basin. The Soquel Valley Basin was identified by the State as a groundwater basin subject to critical conditions of overdraft (California Department of Water Resources, December 2016). Over-pumping in the Soquel-Aptos Basin resulted in a groundwater overdraft condition and seawater intrusion along the coast. The portion of the Purisima aquifer from which the City pumps has been recognized locally as being threatened by potential over-pumping with an ongoing risk of seawater intrusion that could jeopardize the future production of the City's groundwater sources (City of Santa Cruz, August 2016).

Climate Change

As the City of Santa Cruz water supply consists of only local sources maintained and recharged by natural processes, the potential effects related to climate change could greatly impact the sources of supply. According to the 2015 UWMP, it is widely accepted that climate change may make the future hydrology drier than the historical record maintained in the region, and general forecasts describe deviation in the seasonal patterns of rainfall with longer and more severe droughts. Additionally, the annual average temperature in the region may increase leading to variability in the rate of evaporative processes that can greatly impact local sources and watersheds. Climate change impacts are likely to be a contributor to a less reliable supply and also a driver for strengthening demand management planning (City of Santa Cruz, August 2016).

Water Supply Planning and Water Shortage Contingency Plan

Given water supply reliability issues discussed in the previous section, the City of Santa Cruz has actively considered and pursued water supply and demand management projects over the past 20 years to supply options and to enhance the reliability of the system. In October 2013, the City Council directed City staff to develop a detailed engagement program for a community examination of water supply issues. City staff developed a framework for a Water Supply Advisory Committee (WSAC), and the Council approved the 14-member WSAC in March 2014. The purpose of the WSAC, as established by Council-approved WSAC charter on June 24, 2014, was to “explore, through an interactive, fact-based process, the City's water profile, including supply, demand and future threats, and analyze potential solutions to deliver a safe, adequate, reliable and environmentally sustainable water supply, and develop strategy recommendations for City Council consideration”. The WSAC completed their work in October 2015, and the City Council accepted their Final Report in late 2015 that included the following recommendations for water augmentation strategies:

- ☐ Additional water conservation with a goal of achieving an additional 200 to 250 million gallons of demand reduction by the year 2035.
- ☐ Passive recharge of regional aquifers by working to develop agreements for delivering surface water as an in lieu supply to the Soquel Creek Water District and/or Scotts Valley Water District so they can “rest their wells”, help aquifers recover and store water that can become available to the City of Santa Cruz Water Department in drought years.
- ☐ Active recharge of regional aquifers by using existing and some potential new infrastructure in the regionally shared Purisima aquifer in the Soquel-Aptos basin and/or in the Santa Margarita/Lompico/Butano aquifers in the Scotts Valley area to store water that can be available for use by Santa Cruz in drought years.
- ☐ A potable water supply using advanced treated recycled water as its source, as a supplemental or replacement supply in the event the groundwater storage strategies described above prove insufficient to meet the Plan’s goals of cost effectiveness, timeliness and yield. In the event advanced treated recycled water does not meet the needs, desalination would become the last element (City of Santa Cruz, August 2016).

Upon acceptance of the WSAC report by City Council, development began on the supply augmentation strategy work plan that further defines the components of the implementation plan and timeline included in the WSAC Final Report. The work plan is comprised of the following parts:

- ☐ Water Conservation or Demand Management (Strategy 1)
- ☐ In lieu water transfers with neighboring agencies (Strategy 1 Element 1)
- ☐ Aquifer Storage and Recover (Strategy 1 Element 2)
- ☐ Advanced Treated Recycled Water or Seawater Desalination (Strategy 2 Element 3)

The initial phase of the supply augmentation strategy involves enhancement of the existing conservation programs as well as evaluation of the feasibility alternative future supply projects focused on solving the 1.2 billion gallon annual (or 1,200 MGY) shortfall identified in the WSAC report under multiple year droughts. An updated Water Conservation Master Plan was completed in 2016 to define the next generation of water conservation activities. The draft plan includes 35 measures for implementation by 2021, many of which are already underway. The projected per capita water use in gallons per person per day (gpcd) is expected to decline to about 92 gallons per person per day, far below the City’s 2020 target of 110 gpcd, and continuing to decline to a level of about 78 gpcd by 2035 (City of Santa Cruz, August 2016).

The City also is working with the Soquel Creek and Scotts Valley Water Districts (SqCWD, SVWD) on an in-lieu transfer project. In-lieu transfers include short-term and long-term projects that would deliver excess City water to SqCWD and/or the Scotts Valley Water District during winter

that would reduce pumping from regional aquifers and assist with groundwater recharge and recovery. The short-term project utilizes existing infrastructure that connects the SqCWD and the City water system and uses surplus water from the City's North Coast sources. A pilot program is in place to collect information related to physical operations, water quality, response of groundwater levels, and the potential to develop a larger and/or long-term project. The long-term project may include higher volumes of water transfers including those from the San Lorenzo River, which would require modifications to the City's water rights. An aquifer storage and recovery (ASR) study is also underway that is looking at regional options for groundwater injection, storage, and future extraction in order to actively recharge regional aquifers. A portion of the water delivered using in-lieu transfers or ASR facilities would be effectively banked in the aquifers to be extracted and returned to the City when needed in future dry years. The City's current work plan indicates that the feasibility of both in-lieu and ASR programs are projected to be understood by the end of 2020 (City of Santa Cruz, March 6, 2017).

Advanced treated recycled water or desalinated water would be developed as a supplemental or replacement supply in the event the groundwater storage strategies described above prove insufficient to meet the plan's goals of cost-effectiveness, timeliness and yield. If it is determined that recycled water cannot meet the City's shortfall needs, desalinated seawater would be used. A recycled water feasibility study is underway, and a desalination project feasibility update is expected to be initiated in May 2017. The City's current work plan indicates that both studies will be complete by the end of the year.

The City will determine which element or elements to pursue based on the outcome of the studies currently in progress.

Additionally, in 2009, the City of Santa Cruz completed a comprehensive update of its Water Shortage Contingency Plan. Since then, the City has had to declare a water shortage in five of the past seven years, including a Stage 3 Water Shortage Emergency in both 2014 and 2015. The City's Water Shortage Contingency Plan describes the conditions which constitute a water shortage and provides guidelines, actions, and procedures for managing water supply and demands during a declared water shortage. The primary focus of the plan is on measures that reduce customer demand for water, but it also covers actions that can be implemented to stretch or increase the water supply (City of Santa Cruz, August 2016).

4.8.1.2 Wastewater Treatment

The City of Santa Cruz owns and operates a regional wastewater treatment facility (WWTF), located on California Street adjacent to Neary Lagoon, that provides secondary level of treatment. The City treats sewage from domestic and industrial sources and discharges the treated effluent into the Pacific Ocean under the provisions of a waste discharge permit (NPDES No. CA0048194) issued by the California RWQCB, Central Coast Region (Order No. R3 - 2005 - 0003). Monterey Bay, into which the region's treated wastewater is disposed, was designated in 1992 as a National Marine Sanctuary. Wastewater influent and effluent characteristics are

carefully monitored for compliance with state water quality requirements. The City also participates in a regional receiving water monitoring program with other dischargers in the Monterey Bay area (City of Santa Cruz Water, April 2012, DEIR volume).

Treatment Levels and Plant Capacity

The City's WWTF was upgraded in 1998 to provide secondary treatment in order to meet state and federal waste discharge requirements, and currently produces wastewater of a quality that would be classified as Disinfected Secondary-23. The treatment process consists of a series of steps, including screening, aerated grit removal, primary sedimentation, trickling filter treatment, solids contact, secondary clarification, and ultraviolet disinfection (City of Santa Cruz, April 2012, DEIR Volume).

The WWTF is not currently permitted for and does not now produce recycled water for offsite reuse. The current level of treatment is not sufficient for general irrigation without additional treatment and facility upgrades. In addition to the treatment upgrades, a distribution system, including pumps, meters, storage facilities, and separate piping would be required to convey the recycled water to customers (City of Santa Cruz, April 2012, DEIR volume). The City of Santa Cruz is actively investigating the feasibility of recycled water.

The WWTF has a permitted wastewater treatment capacity of 17.0 million gallons per day (mgd). In 2016, the WWTP treated 3.3 billion gallons of wastewater effluent at an average daily rate of 9.04 mgd (Ibid.). The Santa Cruz County Sanitation District has treatment capacity rights of 8 mgd at the City of Santa Cruz WWTF. The City contributes approximately 5.0 mgd with a remaining capacity of 4.0 mgd. The Sanitation District contributes 5.5 mgd with a remaining capacity of 2.5 mgd. Approximately 50% of the wastewater treated at the plant is generated within the City of Santa Cruz. The total remaining treatment plant capacity, therefore, is 7.5 mgd.

Treated Effluent Disposal

The treated effluent is disposed into the Monterey Bay via a deep ocean outfall constructed in 1987. The outfall extends 12,250 feet on the ocean bottom and terminates one mile offshore at a depth of approximately 110 feet below sea level. A 1,200-foot diffuser at the end of the pipe provides an initial dilution of greater than 139 parts seawater to one part wastewater (City of Santa Cruz, April 2012, DEIR volume). The City of Scotts Valley discharges its treated effluent via the City's ocean outfall. The Scotts Valley Wastewater Treatment Plant has a permitted capacity of 1.5 million gpd and treats water to secondary and tertiary levels. Secondarily treated effluent that is not used for recycled water is transmitted via a main to Santa Cruz and discharged to the ocean through the outfall shared with the City of Santa Cruz.

Wastewater Collection

The City of Santa Cruz wastewater collection system serves approximately 15,000 connections. The collection system includes 23 pump stations and over 160 miles of sewer pipeline ranging in size from 6 to 54 inches in diameter. The City has a hydraulic model for the sewer system, and continues to focus on collections system projects that reduce infiltration and inflow into the system (City of Santa Cruz, April 2012, DEIR Volume).

4.4.2 Impacts and Mitigation Measures

Standards of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies, and/or guidelines; and agency and professional standards, a project impact would be considered significant if the project would:

- 8a Have insufficient water supplies available to serve the project from existing entitlements and resources, and/or require new or expanded entitlements to serve the project;
- 8b Require or result in the construction of new water treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; or
- 8c Substantially deplete groundwater supplies or interfere substantially with groundwater recharge.
- 8d Result in wastewater flows exceed sewer line or treatment plant capacity or contribute substantial increases to flows in existing sewer lines that exceed capacity.

Analytical Method

The proposed project consists of amendments to the City's Downtown Recovery Plan, General Plan, Local Coastal Plan and Zoning Code regarding development in the downtown area and Central Business District. The proposed project would not directly result in new development. However, the proposed Downtown Plan amendment would expand areas for potential additional building height that could accommodate intensified redevelopment of existing developed sites. City staff estimates that the proposed amendments could indirectly lead to development, resulting in a potential net increase of 711 new residential units and 2,200 square feet of office space with a net decrease of approximately 14,700 square feet of commercial building space over existing conditions within the downtown area. The proposed General Plan amendment would increase FAR in areas designated as RVC in the General Plan, but would not lead to development on sites not already considered in the General Plan and General Plan EIR. The proposed LCP and Zoning Code amendments would not result in changes that could indirectly lead to intensified development. The following impact analyses are based on review of existing data and studies.

Project water demand is estimated based on water demand rates developed as part of the City's 2015 Urban Water Management Plan update. The impact analysis is based on findings of the 2015 UWMP and consultation with City of Santa Cruz Water Department staff. Wastewater generation was reviewed based on review of existing data in the General Plan and review with City staff.

Impacts and Mitigation Measures

No impacts were identified regarding existing or expanded water treatment facilities (8b) as explained below. As indicated in the Initial Study (Appendix A), the project would not affect groundwater recharge (8c). The following analysis assesses impacts to the City of Santa Cruz water supplies as a result of water demand associated with development of the proposed project (8a) and potential impacts to wastewater treatment (8d).

New or Expanded Facilities – No Impact. The City Water Department indicates that the proposed project will not result in the need to construct or expand its water treatment facility or other water infrastructure/facilities to accommodate future water demand resulting from the proposed project (6b) (Goddard, City of Santa Cruz Water Department, personal communication, March 2017). The project would require new domestic, irrigation and fire service connections from existing infrastructure to serve the project, all of which are available. Therefore the project will result in no impacts from the construction of new or expanded water facilities.

Impact 4.8-1: Water Supply. Adoption of the proposed plan amendments could indirectly result in intensified development with a demand for potable water in a system that, under existing conditions, has adequate supplies during average and normal years, but is subject to potential supply shortfalls during dry and critically dry years. The additional project demand would not result in a substantial increase during dry years and would not be of a magnitude to affect the level of curtailment that might be in effect (8a). Therefore, the impact is considered a *less-than-significant impact*.

The proposed project would not directly result in new development, but could lead to intensified development in the project study area, resulting in increased water demand over the next 25 years. Based on water demand rates documented in the City's adopted 2015 UWMP, the proposed project could result in a water demand of approximately 29 MGY based on City of Santa Cruz Water Department rates for multi-family dwelling units and office and commercial uses. This demand represents less than one-hundredth of one percent of the total estimated future water demand within the City's service area. Furthermore, the demand is within the amount of new multi-family dwellings considered in demand forecasts for the 2015 UWMP.

The 2015 UWMP documents a trend of declining water demand since the year 2000, and total water demand is projected to decline over the 20-year UWMP period due to continued implementation of conservation programs and other measures. However, as indicated above,

projections for the year 2035 estimate a shortfall of approximately 40 MGY during normal periods, 528 MGY during single dry year periods, and 1,639 MGY during multiple dry year periods (City of Santa Cruz, August 2016). Current water supplies are adequate during average and normal years to serve the project. During periods of dry years and drought, water customers would be subject to water curtailment as enacted by the City. A multiple dry year scenario would require more substantial curtailment of all water customers. However, the proposed project's minimal demand (less than one hundredth of one percent of the total water service area demand) would not have significant effects on the levels of water supply or curtailment that would be required throughout the service area. Therefore, the impact of increased water demand on water supplies due to the proposed project is considered less than significant as there are sufficient supplies from existing sources to serve the project.

Furthermore, the City continues to administer its water conservation program, has completed a Conservation Master Plan, and is implementing a water augmentation plan. The City has defined water supply augmentation strategies that are being studied in order to provide increased production between 2020 and 2035 to address potential drought shortages. The plan includes the pursuit of the following portfolio of options: continued and enhanced conservation programs; passive recharge of regional aquifers; active recharge of regional aquifers; and a potable supply using advanced treated recycled wastewater or desalinated water if recycled water did not meet City needs. These prospective sources are still under evaluation. A water transfer pilot program is underway for the passive recharge strategy.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.8-2: Wastewater Treatment. Adoption and implementation of the proposed plan amendments could indirectly result in increased development and population growth that would result in indirect generation of wastewater that could be accommodated by the existing wastewater treatment plant (8d). Therefore, the impact is considered a *less-than-significant impact*.

The proposed project would not directly result in new development, but could lead to intensified development in the project study area, resulting in increased water demand over the next 25 years. The City Public Works Department generally estimates wastewater flows as a percentage of water use (City of Santa Cruz, April 2012, DEIR volume). Based on the water demand rates identified in the Impact 4.8-1 discussion, it is estimated that development accommodated by the proposed project would equate to an average daily wastewater flow increase of approximately 0.060 mgd. This amount is well within the remaining treatment plant capacity – both the permitted capacity as well as the City's remaining portion (4.0 mgd).

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

4.9 LAND USE

This section reviews existing land uses in the vicinity, and applicable policies and regulations that pertain to the project as identified for review in the State CEQA Guidelines.

Public and agency comments related to land use were received during the public scoping period in response to the Notice of Preparation (NOP). Issues raised in these comments include:

- ☐ The standard of review for Local Coastal Plan-Land Use Plan amendments is that they must be consistent with Chapter 3 policies of the Coastal Act.
- ☐ The EIR should evaluate appropriate land use and zoning designations for the locations adjacent to and near the Riverwalk along Front Street, such as mixed-used zoning with visitor-serving and coastal recreational uses.
- ☐ EIR should provide explanation of why San Lorenzo River Urban River Plan (SLURP) policies are being eliminated.
- ☐ Potential conflicts with development patterns in the area due to changes in density resulting from the General Plan and zoning amendments at the City's "urban edge".

To the extent that issues identified in public comments involve potentially significant effects on the environment according to the California Environmental Quality Act (CEQA) and/or are raised by responsible agencies, they are identified and addressed within this EIR. Public comments received during the public scoping period are included in Appendix B. The comment regarding consideration of other land use and zoning designations is noted, but is not within the scope of the proposed amendments. It is noted, however, that both the Community Commercial General Plan designation and the Downtown Recovery Plan encourage mixed uses.

4.9.1 Environmental Setting

Regulatory Setting

The City of Santa Cruz General Plan 2030, the Local Coastal Plan, and Title 24 (Zoning) of the Municipal Code govern land use and development for parcels within City limits. The southern portion of the project area is located within the coastal zone as is the beach area that would be affected by the proposed General Plan amendment.

Vicinity Land Uses

The project area is located within downtown Santa Cruz and is located to the west of the San Lorenzo River. The area is characterized by a mix of primarily commercial buildings, some of which have upper floor office and residential units. The area supports a mix of both pre- and post- Loma Prieta earthquake constructed structures with a variety of architectural styles and

building heights. Most of the buildings constructed after the earthquake are located north of Cathcart Street.

The project area subject to changes in building height is located along Pacific Avenue and Front Street generally between Laurel Street on the south and Cathcart Street on the north, with the west side of Front Street up to Soquel Avenue. The area is characterized by a mix of commercial structures, some of which have upper floor office uses. South of Cathcart, residential uses are limited primarily to the building at 1010 Pacific Avenue. Buildings along Front Street are a mix of mostly older buildings of varying architectural styles, sizes and heights. The older buildings along Front Street are generally one story and approximately 16-20 feet in height. Buildings are a mix of two and three stories along Pacific Avenue and generally one story in height along Front Street. There is less street tree landscaping along lower Front Street. Photos of representative views in the project area and downtown are shown on Figure 4.1-1.

Relevant Plans and Zoning Regulations

General Plan

All areas within the project study area are designated “RVC” (Regional Visitor Commercial) with a 0.25 to 3.5 floor area ratio (FAR) in the City’s existing *General Plan 2030*. This designation applies to areas that emphasize a variety of commercial uses that serve Santa Cruz residents as well as visitors. Mixed-use development is strongly encouraged in RVC districts. Areas designated RVC include:

- ☐ **Downtown Santa Cruz.** Emphasizes a mix of regional office and retail uses, residential and mixed-use developments, restaurants, and visitor attractions such as entertainment venues. The Downtown Recovery Plan provides detailed requirements for this area.
- ☐ **South of Laurel.** Emphasizes mixed-use and residential development along with visitor-serving and neighborhood commercial uses to connect the Beach Area with Downtown Santa Cruz. The Beach and South of Laurel Comprehensive Area Plan provides detailed requirements for this area.
- ☐ **Beach Area.** Emphasizes visitor-serving commercial uses such as hotels, motels, restaurants, and amusement parks, as well as residential and mixed-use development in the Beach Area neighborhoods. The Beach and South of Laurel Comprehensive Area Plan provides detailed requirements for this area.

For most areas designated RVC, the minimum and maximum development intensity is specified in the Downtown Recovery Plan or the Beach and South of Laurel Comprehensive Area Plan. In areas that are designated RVC but are not addressed in an Area Plan, the minimum FAR is 0.25 and the maximum is 1.75.

Local Coastal Plan

A portion of the downtown and project study area lies within the coastal zone. Pursuant to the California Coastal Act, the City has a Local Coastal Plan (LCP) that was certified by the California Coastal Commission (CCC). The LCP consists of a land use plan, implementing ordinances and maps applicable to the coastal zone portions of the City, and applies to all private and public projects located within the coastal zone. The Land Use Plan consists of: text; policies, programs and maps; Area Plan coastal policies and maps; and a Coastal Access Plan. The Implementation Plan consists of ordinances and regulations used to implement the Land Use Plan, including sections in the Zoning Code. The City is in the process of updating and revising the LCP Land Use Plan as a separate document from the General Plan. The LCP applies to private and public projects located within the coastal zone. Additionally, Chapter 4 of the Downtown Recovery Plan is incorporated by reference in the CBD zone district, and the district is part of the implementation section of the LCP.

In addition to the development standards of Chapter 4, there are several LCP policies that are proposed to be modified. Since the original certification of the City's LCP in 1985, additional plans have been prepared and policies incorporated into the LCP as amendments. The City adopted the San Lorenzo Urban River Plan (SLURP) in 2003 as a resource management protection plan for the river. Subsequent to the City Council approval, several resource-related and land use policies were included in the LCP and approved by the CCC as an amendment to the City's LCP. There are nine coastal policies based on the SLURP that pertain to development along Front Street within the coastal zone.

Downtown Recovery Plan

The Downtown Recovery Plan (DRP) was adopted in 1991 to guide reconstruction of the 1989 Loma Prieta earthquake as the earthquake destroyed significant portions of downtown Santa Cruz. The intent was to establish policies, development standards and guidelines to direct the recovery process toward the rebuilding after the earthquake. In addition to an Introduction, Summary, and Implementation Strategy, the DRP includes the following components:

- ☐ Land Use Plan for four subareas (Chapter 3),
- ☐ Development Standards and Design Guidelines (Chapter 4)
- ☐ Circulation and Parking Plan (Chapter 5)
- ☐ Streetscape and Open Space Plan (Chapter 6).

The DRP has been modified several times over the past 25 years with the most recent change in 2016 to relocate the downtown sign regulations from the DRP to Chapter 24 of the Zoning Code. Implementation of the DRP also included amendments to the Zoning Code. Specifically, DRP Chapter 4—Development Standards and Design Guidelines—is incorporated by reference in Part 24 of the Zoning Code, the Central Business District (CBD).

Zoning Code

The downtown areas are zoned “Commercial Business District” (CBD). This district implements the Land Use Plan, Development Standards and Design Guidelines of the DRP. It is intended to refine the Plan in the area of land use and regulations. It supports the purpose of the DRP, in the context of the General Plan, which aims to make downtown the urban center of the city, with the many functions a city center serves. This section of the Zoning Ordinance is also part of the Local Coastal Implementation Plan. The DRP and CB is divided into four subareas, in order to enhance the character of each by special consideration of the character of each. The Lower Pacific Avenue subdistrict has been added and consists of the CBD District South of Laurel Street. The Lower Pacific Avenue subdistrict is intended to implement the policies of the South of Laurel Plan and is separate from the Downtown Recovery Plan. The project study area is located with the Pacific Avenue Retail subdistrict and the Front Street/Riverfront subdistrict.

4.9.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies and/or guidelines; and agency and professional standards, a project impact would be considered significant if the project would:

- 9a. Physically divide an established community;
- 9b. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect; or
- 9c. Conflict with any applicable Habitat Conservation Plan or Natural Community Conservation Plan.

Analytical Method

Site visits of the project vicinity were conducted to ascertain surrounding land uses and development. Relevant City plans were reviewed with regards to land use concerns or policy issues with which the project might result in potential conflicts.

Impacts and Mitigation Measures

As described in the Initial Study (see Appendix A), the project site is located within the developed downtown area of the City, as well as the developed beach area and upper Ocean Street area. The proposed development would not physically divide an established community (9a). There are no adopted Habitat Conservation or Community Conservation Plans in the project area (9c).

The following impact analyses address potential project conflicts with any applicable land use plan, policy, or regulations adopted for the purpose of avoiding or mitigating an environmental effect (9b) .

Impact 4.9-1: Conflicts with Policies and Regulations. The proposed project will not conflict with policies or regulations adopted for the purpose of avoiding or mitigating an environmental effect, and therefore, will result in *no impact* related to consistency with local plans and policies.

The following discussion provides an overview of consistency with local plans and policies. The proposed project consists of a series of amendments to the following adopted City plans. Amendment to Municipal Code Section 24.10, Part 24, Central Business District (CBD), of the Zoning Code to modify extension area regulations and add Parklet standards.

- ☐ Downtown Recovery Plan: Amendment to extend Additional Height Zone A, modify Additional Height Zone B, and modify development standards as fully described in Chapter 3, Project Description.
- ☐ General Plan 2030: Amendment to modify Floor Area Ratio for the Regional Visitor Commercial land use designation in the downtown area. The reason for General Plan Amendment is that the CBD zone is the primary zone district that implements the broader RVC General Plan land use designation. The modifications proposed for the CBD additional height Zone A between Pacific Avenue and Front Street would potentially allow for upper level floor area that could exceed the existing 3.5 FAR.
- ☐ Local Coastal Plan (LCP): Amendment to Land Use Plan text to modify San Lorenzo Urban River Plan land use development policies. There are several LCP policies that are proposed to be modified. Since the original certification of the City's LCP in 1985, additional plans have been prepared and policies incorporated into the LCP as amendments. The City adopted the San Lorenzo Urban River Plan (SLURP) in 2003 as a resource management protection plan for the river. Subsequent to the City Council approval, several resource-related and land use policies were included in the LCP and approved by the CCC as an amendment to the City's LCP. There are nine coastal policies based on the SLURP that pertain to development along Front Street within the coastal zone. The proposed amendment would modify one policy, eliminate the other existing eight policies, and add two new LCP policies.

The LCP policies proposed for deletion address maintenance of 50-foot building heights along Front Street, provision of public amenities, and building architecture. Appendix C lists the policies proposed for deletion with an explanation provided by City Planning Department staff. The primary reason for deletion is either the language is from a process that is now outdated or applies to properties outside of the coastal zone. It is

also noted that the SLURP was intended as a resource protection programmatic guide and not a land use planning document regarding policies on building height. Since the adoption of the SLURP, the City has undertaken a comprehensive effort to update the principal land use document for the area – the Downtown Recovery Plan. Development standards for this area are appropriately located in the DRP and not within the Local Coastal Plan. However, the following three policies proposed for elimination address building height and views, but would be inconsistent with proposed Downtown Plan amendments if those are approved. The proposed amendment includes elimination of the SLURP LCP policy to limit heights to 50 feet in the Front Street/Riverfront area. The policies related to building heights, mass and views; see section 4.1 of this EIR, Aesthetics, for a full discussion of impacts of the proposed amendments on building height, massing and overall aesthetic and visual character of the study areas.

- SRFA – 1 Maintain existing development standards in the Downtown Recovery Plan (DRP) for the Front Street Riverfront Area including principal permitted uses for ground-level and upper-floors, conditional uses, and height and step back requirements. Maintain maximum height restriction to 50 feet with development above 35 feet in height stepping back at least 10 feet at an angle not to exceed 42 degrees. (DRP, p. 47-50)
- SRFA – 10 Maintain views from both taller downtown buildings to the River and from the River trail to distant mountains and ridges, avoiding creation of a development “wall” between the downtown and the River.
- SRFA – 11 Preserve views along the Front Street area to and from Beach Hill, a significant historic feature in this area.

The proposed new LCP SLURP policies are:

- Require new development projects to incorporate design features that encourage active engagement with the Riverwalk such as: filling adjacent to the Riverwalk and landscaping, providing direct physical access to the Riverwalk, including appropriate active commercial and/or residential uses adjacent to the Riverwalk, or providing a combination of these and/or other design features that support the resource enhancement and river engagement policies of the San Lorenzo Urban River Plan.
- Require new development projects to incorporate pedestrian and/or bicycle connections between Front Street and the Riverwalk at appropriate locations such as the extensions from Maple Street and near Elm Street.

California Coastal Commission (CCC) staff have indicated that the standard of review for a LCP amendment is consistency with policies in the Coastal Act. Coastal Act consistency will be made by the CCC at the time the LCP amendment is reviewed.

In accordance with Appendix G of the state CEQA Guidelines, the review focuses on potential project conflicts with policies or regulations adopted for the purpose of avoiding or mitigating an environmental impact. There are no apparent conflicts between the proposed project and applicable plans, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect, as summarized in Table 4.9-1 at the end of this section. It is also noted that the proposed Downtown Plan amendments are consistent with General Plan Action CD2.1.7 that calls for an update to the Downtown Recovery Plan to reflect Santa Cruz's successful recovery from the 1989 Loma Prieta earthquake and "to respond to current opportunities and challenges."

The City's General Plan includes a number of policies and actions to promote use of alternative transportation modes. In accordance with significance criteria 3f in Section 4.8 of this EIR, Transportation and Traffic, the General Plan mobility policies were reviewed to determine potential project conflicts with adopted plans, plans or programs regarding public transit, bicycle or pedestrian facilities. The project would not conflict with any such policies as summarized on Table 4.9-1.

It is noted that there are other policies in these plans which are applicable to the project, and which address a broader range of land use, project design, circulation, and planning concerns. Project consistency with local adopted plans and policies will be determined ultimately by the City Council. Because the policy language found in any city or county general plan is often susceptible to varying interpretations, it is often difficult to determine, in a draft EIR, whether a proposed project is consistent or inconsistent with such policies. Case law interpreting the Planning and Zoning Law (Gov. Code, § 65000 et seq.) makes it clear that: (i) the ultimate meaning of such policies is to be determined by the elected city council, as opposed to city staff and EIR consultants, applicants, or members of the public; and (ii) the city council's interpretations of such policies will prevail if they are "reasonable," even though other reasonable interpretations are also possible (*See No Oil, Inc. v. City of Los Angeles* (1987) 196 Cal.App.3d 223, 245-246, 249.) Courts also have recognized that, because general plans often contain numerous policies emphasizing differing legislative goals, a development project may be "consistent" with a general plan, taken as a whole, even though the project appears to be inconsistent or arguably inconsistent with some specific policies within a given general plan (*Sequoyah Hills Homeowners Association v. City of Oakland* (1993) 23 Cal.App.4th 704, 719). Furthermore, courts strive to "reconcile" or "harmonize" seemingly disparate general plan policies to the extent reasonably possible (*No Oil, supra*, 196 Cal.App.3d at p. 244).

Consistency with Regional Plans

The State CEQA Guidelines section 15125(d) require that a discussion be provided regarding any inconsistencies between a proposed project and applicable general and regional plans. Examples of other regional plans include air quality plans, water quality control plans, regional transportation plans, regional housing allocation plans, habitat conservation plans and regional land use plans. As discussed in section 4.2 of this EIR, Air Quality and Greenhouse Gas Emission, the project would not conflict with the Monterey Bay Unified Air Pollution Control District's "Air

Quality Management Plan”. There are no provisions in the current Basin Plan¹ (water quality) that are applicable to the proposed project. There are no Habitat Conservation Plans in the project area or other regional plans with which the project may be in conflict. Applicable regional transportation plans are discussed in Section the TRANSPORTATION and TRAFFIC (Chapter 4.4) section of this EIR. The proposed project consists of residential development and does conflict with regional housing allocation plans.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

¹ Regional Water Quality Control Board, Central Coast Region. June 2011. “Water Quality Control Plan for the Central Coastal Basin.”

TABLE 7-1: Potential Project Conflicts with City of Santa Cruz General Plan Policies

[POLICIES RELATED TO MITIGATING ENVIRONMENTAL IMPACTS]

Element	Policy Number	Policy	Potential Conflict
General Plan 2030			
COMMUNITY DESIGN	CD1.2	Ensure that the scale, bulk and setbacks of new development preserve important public scenic views and vistas.	NO CONFLICT: Future development would not impact public scenic views.
	CD3.2	Ensure that the scale, bulk and setbacks of new development preserve public views of city landmarks where possible.	NO CONFLICT: Future development would not affect public views or City landmarks as none exist in the vicinity of the project.
LAND USE	LU1.3	Ensure that facilities and services required by a development are available, proportionate, and appropriate to development densities and use intensities.	NO CONFLICT: Public services are available.
MOBILITY	M3.1.3	Strive to maintain the established “level of service” D or better at signalized intersections.	NO CONFLICT: Project traffic would not result in a decrease in level of service below D at any signalized intersection.
	M3.3.4	Mitigate safety, noise, and air quality impacts from roadways on adjacent land uses through setbacks, landscaping, and other measures.	NO CONFLICT WITH MITIGATION: No significant air emission impacts were identified. Inclusion of structural design features to attenuate exterior noise levels is a required mitigation measure for future development.
CIVIC AND COMMUNITY FACILITIES	CC5.1.8	Require new development to maintain predevelopment runoff levels.	NO CONFLICT: Future development accommodated by the proposed Plan amendments will be required to comply with the City’s stormwater requirements and regulations.
	CC5.1.9	Reduce stormwater pollution.	NO CONFLICT: Future development would be in compliance with City requirements.
HAZARDS, SAFETY AND NOISE	H22.2.1	Require future development projects to implement applicable Monterey Bay Unified Air Pollution Control District (MBUAPCD) control measure and/ or air quality mitigations in the design of new projects as set forth in the District’s “CEQA Guidelines.”	NO CONFLICT: No significant air emission impacts were identified, and no mitigation is required.
	H23.1.1	Require land uses to operate at noise levels that do not significantly increase surrounding ambient noise.	NO CONFLICT: No significant impacts were identified related to project increases in ambient noise levels.

TABLE 7-1: Potential Project Conflicts with City of Santa Cruz General Plan Policies

[POLICIES RELATED TO MITIGATING ENVIRONMENTAL IMPACTS]

Element	Policy Number	Policy	Potential Conflict
	HZ3.1.6	Require evaluation of noise mitigation measures for projects that would substantially increase noise.	NO CONFLICT WITH MITIGATION: Inclusion of structural design features in future development to attenuate exterior noise levels is a required mitigation measure.
PARKS, RECREATION, AND OPEN SPACE	PR1.3.1	Ensure that adequate park land is provided in conjunction with new development.	NO CONFLICT: Future projects will be required to pay park dedication fee.
	PR4.2.3	Require development projects located along planned trail routes to dedicate trails or trail easements.	NO CONFLICT: Proposed Downtown Plan amendments require dedication of access along Cathcart, Maple and Elm Street extensions.
NATURAL RESOURCES	NRC1.2.1	Evaluate new uses for potential impacts to watershed, riverine, stream, and riparian environments.	NO CONFLICT WITH MITIGATION: Potential indirect significant impacts to birds as a result of future construction of taller buildings can be mitigation to a less-than-significant level .
AND CONSERVATION	NRC2.1.3	Evaluate development for impacts to special-status plant and animal species.	NO CONFLICT: No potentially significant impacts to special status plant or wildlife species were identified.
LCP Land Use Plan			
COMMUNITY DESIGN	2.2	Preserve important public views and viewsheds by ensuring that the scale, bulk and setback of new development does not impede or disrupt them.	NO CONFLICT: Future development would not impact public scenic views.

CHAPTER 5

CEQA CONSIDERATIONS

Section 15126 of the California Environmental Quality Act (CEQA) Guidelines requires that all aspects of a project must be considered when evaluating its impact on the environment, including planning, acquisition, development, and operation. The EIR must also discuss (1) significant environmental effects of the proposed project, (2) significant environmental effects that cannot be avoided if the proposed project is implemented, (3) significant irreversible environmental changes that would result from implementation of the proposed project, and (4) growth-inducing impacts of the proposed project. Chapter 2, Summary, and Sections 4.1 through 4.7 of this EIR provide a comprehensive identification and evaluation of the proposed project's environmental effects, mitigation measures, and the level of impact significance both before and after mitigation. This section addresses the other required topics identified above, as well as cumulative impacts and project alternatives.

5.1 SIGNIFICANT UNAVOIDABLE IMPACTS

The State California Environmental Quality Act (CEQA) Guidelines require a description of any significant impacts, including those that can be mitigated but not reduced to a level of insignificance (section 15126.2(b)). Where there are impacts that cannot be alleviated without imposing an alternative design, their implications and the reasons why the project is being proposed, notwithstanding their effect, should be described. This EIR identified no significant unavoidable project impacts. Significant cumulative impacts were identified for traffic, water supply and schools, but the project's contribution is not cumulatively considerable, except for cumulative traffic impacts.

5.2 SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES

The State CEQA Guidelines require a discussion of significant irreversible environmental changes with project implementation, including uses of nonrenewable resources during the initial and continued phases of the project (section 15126.6(c)). The Guidelines indicate that use of nonrenewable resources during the initial and continued phases of the project may be irreversible since a large commitment of such resources makes removal or nonuse thereafter unlikely. Primary impacts and particularly, secondary impacts (such as highway improvement which provides access to a previously inaccessible area) generally commit future generations to similar uses. Irreversible damage can also result from environmental accidents associated with the project. Section 15227 further requires this discussion only for adoption of a plan, policy or ordinance by a public agency; the adoption by a Local Agency Formation Commission (LAFCO) of a resolution making determinations; and projects which require preparation of an EIS under the National Environmental Policy Act (NEPA). Since the proposed project consists of amendments

to the Downtown Recovery Plan, General Plan and Local Coastal Plan, a discussion of significant irreversible changes is provided below.

As indicated, in section 15126.2(c):

Uses of nonrenewable resources during the initial and continued phases of the project may be irreversible, since a large commitment of such resources makes removal or nonuse thereafter unlikely. Primary impacts and, particularly, secondary impacts (such as highway improvement which provides access to a previously inaccessible area) generally commit future generations to similar uses. Also, irreversible damage can result from environmental accidents associated with the project. Irretrievable commitments of resources should be evaluated to assure that such current consumption is justified.

According to section 15126.2(c), a project would generally result in a significant irreversible impact if:

- The project would involve a large commitment of nonrenewable resources during initial and continued phase of the project;
- Primary and secondary impacts would generally commit future generations to similar uses;
- The project would involve uses in which irreversible damage could result from environmental accidents; or
- The proposed consumption of resources is not justified (e.g., the project involves the wasteful use of energy).

Future development accommodated by the proposed plan amendments could result in intensified development in the downtown on sites that are already utilized for urban development and are surrounded by urban development. Both the Downtown Plan and General Plan encourage a mix of land uses in this area. Thus, the proposed Plan would not commit future generations to uses that do not already exist.

Future development would result in the permanent and continued consumption of electricity, natural gas, and fossil fuels. Development accommodated by the proposed plan amendments would irretrievably commit nonrenewable resources to the construction and maintenance of buildings, infrastructure and roadways. Energy demands would result for construction, lighting, heating and cooling of residences, and transportation of people within, to and from the City. However, the consumption of these resources would not represent unnecessary, inefficient, or wasteful use of resources given the implementation of proposed policies that address water, lighting and energy conservation measures. Several policies in the General Plan 2030 promote energy conservation, which could minimize or incrementally reduce the consumption of these resources. Specifically, GOAL NRC7 seeks to reduce energy use with a significant production and

use of renewable energy. Its four policies and accompanying actions would promote reduction of electricity and natural gas consumption, use of renewable energy sources, and use of energy-efficient lighting, vehicles, and water fixtures and appliances. See Section 4.6 for further discussion.)

In addition, new structures will be required to be constructed in accordance with specifications contained in Title 24 of the California Code of Regulations, the City's Green Building Regulations and City regulations regarding water conservation. Anticipated changes in state building and energy efficiency requirements to help reduce greenhouse gas emissions will also reduce the rate of energy consumption increases. However, future construction activities would result in the irretrievable commitment of nonrenewable energy resources, primarily in the form of fossil fuels (including fuel oil, natural gas, and gasoline) for automobiles and construction equipment.

Irreversible changes to the physical environment could occur from accidental release of hazardous materials associated with future development activities. However, environmental accidents would be minimized adherence to federal, state and local regulations. Future development accommodated by the proposed General Plan would be required to comply with all applicable federal, state and local laws regarding, transportation, storage, use and disposal of hazardous materials, which reduces the likelihood and severity of accidents that could result in irreversible environmental damage. Compliance with State and federal hazardous materials regulations would reduce the potential for accidental release of hazardous materials to a less-than-significant level.

No other irreversible changes are expected to result from the adoption and implementation of the proposed amendments.

5.3 GROWTH INDUCEMENT

CEQA requires that any growth-inducing aspect of a project be discussed in an EIR. This discussion should include consideration of ways in which the project could directly or indirectly foster economic or population growth in adjacent and/or surrounding areas. Projects which could remove obstacles to population growth (such as major public service expansion) must also be considered in this discussion. According to CEQA, it must not be assumed that growth in any area is necessarily beneficial, detrimental or of little significance to the environment.

The proposed project would result in a net increase of approximately 711 residential units and 2,200 square feet of office space as well as a net decrease of approximately 14,700 square feet of commercial building space over existing conditions within the study area. Thus, the project would directly foster population growth. The potential increase in office space would be offset by a potential reduction in commercial space, and thus, the project would not be expected to induce substantial economic growth.

The current City of Santa Cruz population is 64,632, and there are an estimated 23,635 housing units in the City. Census data for the tract that contains the downtown project shows an average household size of 1.83 (American Community Survey 5-year 2011-2015 Table S1101), which is slightly below the citywide average household size of 2.4 persons. Based on this data future development accommodated by the proposed plan amendments could result in a population increase of 1,301 to 1,706 persons based on household sizes of 1.83 and 2.4, respectively.

The Association of Monterey Bay Area Governments (AMBAG) develops population and housing forecasts for the region. The current forecast for the City of Santa Cruz in 2020 is 66,860 people and 26,890 housing units. With the additional housing units and population potentially resulting from the proposed project, the City of Santa Cruz will still be below these forecasts. Furthermore, it is expected that development pursuant to the proposed amendments will occur over a 25-year period. Therefore, population and housing growth due to the project is not substantial.

The project does not include offsite improvements or extension of water or sewer into undeveloped areas, and thus, the project site would not remove obstacles to development and population growth. Therefore, the project would not indirectly foster population or economic growth.

5.4 CUMULATIVE IMPACTS

State CEQA Requirements

The State CEQA Guidelines section 15130(a) requires that an EIR discuss cumulative impacts of a project “when the project’s incremental effect is cumulatively considerable.” As defined in Section 15355, a cumulative impact consists of an impact that is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts. As defined in section 15065(a)(3), “cumulatively considerable” means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects. Where a lead agency is examining a project with an incremental effect that is not “cumulatively considerable,” the lead agency need not consider the effect significant.

CEQA requires an evaluation of cumulative impacts when they are significant. When the combined cumulative impact associated with the project’s incremental effect and the effects of other projects is not significant, the EIR shall briefly indicate why the cumulative impact is not significant and is not discussed in further detail in the EIR. Furthermore, according to the California State CEQA Guidelines section 15130 (a)(1), there is no need to evaluate cumulative impacts to which the project does not contribute.

An EIR may determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus not significant when, for example, a project funds its fair share of a mitigation measure designed to alleviate the cumulative impact. An EIR shall examine reasonable, feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects.

The discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide detail as great as that provided for the impacts that are attributable to the project alone. The discussion should be guided by standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified project contributes.

CEQA section 21094(e)(1) states that if a lead agency determines that a cumulative effect has been adequately addressed in a prior environmental impact report, that cumulative effect is not required to be examined in a later EIR. The section further indicates that cumulative effects are adequately addressed if the cumulative effect has been mitigated or avoided as a result of the prior EIR and adopted findings or can be mitigated or avoided by site-specific revisions, imposition of conditions or other means in connection with the approval of the later project (subsection (e)(4)). If a cumulative impact was addressed adequately in a prior EIR for a general plan, and the project is consistent with that plan or action, then an EIR for such a project need not further analyze that cumulative impact, as provided in section 15183(j). Therefore, future projects that are determined to be consistent with the General Plan after it is adopted may rely on this analysis to streamline their environmental review. Since, the proposed project is not consistent with the adopted General Plan in that a General Plan amendment and rezoning are part of the project, the General Plan EIR analyses are not used.

Cumulative Analysis

Cumulative Growth and Projects

Discussion of cumulative impacts may consider either a list of past, present, and probable future projects producing cumulative impacts or a summary of growth projections contained in an adopted plan that evaluates conditions contributing to cumulative impacts, such as those contained in a General Plan. The Santa Cruz City Council adopted an updated General Plan in 2012 and certified the accompanying EIR. The analyses in the EIR provide an assessment of cumulative impacts within the City with projected growth in the next 20 years. The buildout estimated for the General Plan EIR assumed the following additional development in the downtown: 299 residential units, and approximately 38,900 and 4,500 square feet of commercial and office space, respectively. Most of this estimated development has occurred, is under construction or has approved permits. Table 5-1 identifies recently constructed, approved, and pending projects within the city of Santa Cruz. Projects within or near downtown are shown in bold typeface.

Table 5-1: City Cumulative Projects (As of May 31, 2017)

Name/Address	Description	Status
Under Construction		
2200 Delaware	395,400 sf industrial; 248 maximum residential units (197,100 sf)	1 st phase complete
912 Western Drive	3-lot minor land division	Under construction
407 Broadway (Hyatt)	106-room hotel	Under construction
150 Jewell	48 unit memory care facility	Under construction
555 Pacific	94 small ownership units (SOU's)/5,000 square feet of commercial space	Under construction
716-724 Seabright (Seabright Breakers)	11 Townhouses	Under construction
710 Emeline	Demo. Single-family residence and construct triplex	Under construction
716 Darwin	15 apartments	Under construction
1804-1812 Ocean Street Extension	11 Townhouses	Under construction
313-321-325 Riverside Ave. (Courtyard Marriott)	151-room hotel with meeting room, pool, exercise room - replace 3 existing motels (64 rooms and manager unit) for net increase in 87 rooms	Under construction
618 Windsor	5 apartments	Under construction
514 Frederick	4 townhome units	Under construction
1314-1400 Ocean	8,400 sf commercial development	Under construction
301 Beach	Add 5 rooms to an existing hotel	Under construction
745 Ocean (Starbucks)	2,000 sf coffee shop	Under construction
131 Bixby	Duplex	Under construction
Approved		
1547 Pacific (Park Pacific)	63 residential units and 5,750 square feet commercial	Approved
350 Ocean	63 apartments (with demolition of 20 existing apartments & 2 SFD) and 6,800 sf retail	Approved
215 Beach (La Bahia)	165 Room Hotel	Approved
430 South Branciforte	Lot split	Approved
738 Pacheco	Three lot subdivision	Approved
1800 Soquel	32 condominium units, 4,000 sq. ft. commercial space	Approved
214 Plymouth	Three lot subdivision and construction of a duplex on each new lot.	Approved
800 Soquel	Two units above 2,600 sq. ft. commercial space	Approved
230 Grandview	Demolish SFR and construct 12 apartment units	Approved
2415 Mission	14 apartment units	Approved
413 Laurel	Convert office building to two residential units and one commercial space	Approved
135 Vista Branciforte	Minor Land Division to create three lots from two	Approved
108 Sycamore	10 room hotel	Approved
630 Water	Add 20 SRO units to existing mixed use development	Approved
716 Monterey	Lot split	Approved
2424 Mission	Demolish 32 room hotel and construct 60 room hotel	Approved
148 Sunnyside	Construct two units (demolish single family dwelling)	Approved
225 Meder	Four townhouse units	Approved
630 Water	Add 20 SRO units to existing mixed use development	Approved
Pending Applications		
1930 Ocean Street Extension	40 condominium units	Pending application
1013 Pacific	Demolish existing mixed-use building and construct 18	Pending application

Table 5-1: City Cumulative Projects (As of May 31, 2017)

Name/Address	Description	Status
	condos and 4,300 sq. ft. commercial space	
232 River	12 condominium units	Pending application
1024 Soquel	13 apartment units, 1,600 sq. ft. commercial space	Pending application
515 Soquel	Demolish commercial building and construct 51 SRO units and two duplexes	Pending application
708-720 Water	Demolish commercial buildings and residences and construct a 56-unit apartment complex	Pending application
231 Surfside	Lot split	Pending application
550 Second	60 room hotel	Pending application
530 S. Branciforte	Four condominium units	Pending application
2656 Mission	New industrial/warehouse building	Pending application
769 N Branciforte	Three townhouse units	Pending application
135 Dubois	Self-storage facility	Pending application
335 Golf Club Drive	10-unit housing for developmentally disabled	Pending application
724 Darwin	Two duplexes	Pending application
515 Fair	Lot split, three condominiums, single family home, and ADU on historic site	Pending application
1547 Pacific	Add 16 units to approved condominium building	Pending application
801 River	Convert two story office building to triplex	Pending application

There are several projects that are being discussed within the City although there are no current permit applications or site plans:

- ☐ New Library and Public Parking Garage: 113; 119 Lincoln Street; (Cathcart/Cedar parking lot) that is being discussed that would result in relocation of the existing library with net increase of 14,000 square feet for library administration and increase in public parking spaces. The existing library (44,000 square feet) would be converted to office use.
- ☐ Calvary Church Residential Development: 524; 532; 538 Center Street and two City-owned parcels (Parking lot on Center Street) for which a 77-unit housing project is being discussed with retention of the existing church.
- ☐ Sports Stadium (Warriors): expansion is under consideration that would result in a net increase in Net increase of 1,100-1 600 seats from 2,400 existing to 3,500-4,000

These projects are considered reasonably foreseeable since they are under active discussion. Since the proposed project consists of plan amendments that could result in additional development over time, the General Plan EIR buildout assumptions is the scenario used for the following cumulative analyses. The cumulative scenario includes General Plan buildout and University of California Santa Cruz (UCSC) growth and development as addressed in the General Plan EIR plus the potential new development resulting from the proposed project plus the above three projects.

Cumulative Impact Analysis

Aesthetics. The geographic area for consideration of cumulative impacts would be the project study area from which project locations may be visible. There are no other cumulative projects that are within the same viewshed as the project site. Therefore, no cumulative aesthetics impacts have been identified.

Air Quality and Greenhouse House Emissions. The geographic area for consideration of cumulative impacts would be the North Central Coast Air Basin in which the project site is located. According to MBUAPCD CEQA Guidelines, “A consistency analysis and determination serve as the project’s analysis of cumulative impacts on regional air quality. Project emissions which are not consistent with the AQMP (Air Quality Management Plan) are not accommodated in the AQMP and will have a significant cumulative impact unless offset.” As discussed in Section 4.2 of this EIR, Air Quality and Greenhouse Gas Emissions, the project was found to be consistent with the AQMP based on use of the District’s methodology. Therefore, the project’s contribution to cumulative air emissions would not be cumulatively considerable. As further discussed in Section 4.2, GHG emissions and effects on global climate change extends beyond the local air basin and is a world-wide issue. Based on the analyses in that section, the project’s contribution to global GHG emissions is not cumulatively considerable.

Biological Resources. The geographic area for consideration of cumulative impacts would be the project areas and areas adjacent to the San Lorenzo River. Since most of the development estimated as part of the General Plan EIR has occurred or is underway, and no projects are adjacent to the San Lorenzo River, no potential cumulative impacts to biological resources have been identified.

Cultural Resources. The geographic area for consideration of cumulative impacts would be the project site and areas supporting cultural resources similar to those found in the project area. This EIR considers all potential development in the downtown area. Additionally, impacts to cultural resources are site specific. There are no other areas where other cumulative projects and growth would overlap. Both the City’s General Plan 2030 and the University’s adopted 2005 LRDP and certified EIR include policies and measures to conduct appropriate review for cultural resources and provide site-specific mitigation as may be required. With implementation of measures required by the City and UCSC for review and mitigation of potential cultural resource impacts associated with new development, potential site-specific impacts would be less than significant. Thus, there would be no significant cumulative impacts related to cultural resources.

Geology and Soils. The geographic area for consideration of cumulative impacts would be the project site and areas within similar seismic or geologic hazard areas as the proposed project. All cumulative projects greater than four units in size would be subject to City requirements for preparation of geotechnical studies. Individual projects would be designed based on site-specific conditions. Therefore, no significant cumulative impacts have been identified regarding geology and soils.

Hydrology and Water Quality. The geographic area for consideration of cumulative impacts would be the project site and areas within the same drainage area in which the project site is located. There are no other cumulative projects that are within the same drainage area as the project site. Therefore, there are no known cumulative impacts related to hydrology and water quality.

Noise. The geographic area for consideration of cumulative impacts would be the project site and areas with similar exposure to noise levels as the project site. There are no other cumulative projects that would be exposed to noise levels similar to the proposed project, and the project would not contribute to cumulative noise impacts.

Public Services and Utilities. The geographic area for consideration of cumulative impacts would be the City of Santa Cruz service area in which the project site is located. All City services supplied to the project site include the entire City, except for water service, which also includes areas located outside the City.

Fire and Police Protection and Solid Waste. The City's Fire and Police Departments and the City's Resource Recovery Center (landfill) serve City residents. No significant cumulative impacts have been identified with buildout under the City's General Plan and other cumulative growth, i.e. UCSC growth, and no new or expanded police or solid waste facilities are needed to serve cumulative growth, including the proposed project.

Cumulative development and growth could result in the need for expanded fire facilities. According to the City's Fire Department, the existing downtown fire station is inadequate in terms of space and equipment to meet existing needs, which would be further impacted by development and growth that would be accommodated by the proposed project and other cumulative development. Should expansion be proposed, it is likely that expanded or new fire facilities would be within developed downtown and/or eastside locations. Expansion or new construction would be considered infill development on sites surrounded by development. However, existing and future growth may require new or physically altered fire protection facilities, but locations for expansion or construction are within developed areas and are not expected to result in significant physical impacts. Therefore, no significant cumulative impact related to fire protection services is anticipated.

Schools. Potential cumulative development that could affect school enrollment includes development and growth within the City and surrounding areas as well as the proposed project. As discussed in Section 4.6 of this EIR, Public Services and Utilities, approximately 80 new students would be generated by future development projects accommodated by the proposed project. The City's General Plan EIR reported a cumulative enrollment estimate of approximately 1,765 students over the next 20 years with cumulative growth in the City and as a result of growth at UCSC, and some schools may exceed capacity depending on the timing of growth. The General Plan 2030 EIR concluded that this is a potentially significant cumulative impact. With

required payment of school impact fees to fund necessary facility expansion and/or additions, in conjunction with use of the former Natural Bridges Elementary School, the impact would be mitigated to a less-than-significant level (City of Santa Cruz, April 2012, DEIR volume).

Potential addition or expansion of school classroom facilities is not expected to result in significant physical impacts due to the location of existing facilities within developed footprints, and future enrollment could be accommodated without construction of new schools, although some expansion of existing facilities may be necessary (Ibid.). It is not known which campuses may need to be expanded in the future to accommodate the additional enrollment. The project's incremental contribution to this impact (approximately 80 students) is not cumulatively considerable as the required payment of school impact fees would mitigate the project's cumulative contribution such that it would no longer be considered cumulatively considerable.

Parks and Recreation. The General Plan 2030 EIR concluded that cumulative population growth accommodated by the proposed General Plan and UCSC would not result in significant cumulative impacts to parks as increased use of existing parks is expected to be spread out throughout the City so that no substantial deterioration would occur at any one facility. Cumulative impacts resulting from citywide development growth, including the proposed project and UCSC growth, would not result in a significant impact to parks such that a substantial deterioration would occur at any one facility. Furthermore, the City imposes a "Parks and Recreation Facilities Tax" (pursuant to Chapter 5.72 of the Municipal Code) on new residential development (including mobile homes) within the City, payable at the time of issuance of a building permit. The collected taxes are placed into a special fund, and "shall be used and expended solely for the acquisition, improvement and expansion of public park, playground and recreational facilities in the city" (section 5.72.100). Projects that have dedicated land or fees in accordance with Municipal Code Chapter 23.28 requirements for subdivisions are exempt from this tax.

Wastewater Treatment. The geographical area for the analysis of cumulative wastewater impacts includes the area served by the City's wastewater treatment facility (WWTF), which includes the City of Santa Cruz and lands within the Santa Cruz Sanitation District (south to Seascap) and two small county service areas. The City and County each have specified rights to treatment capacity. Wastewater generated by cumulative growth within the City is estimated at approximately 1.35 mgd (City of Santa Cruz, April 2012, DEIR volume). There is adequate remaining capacity within the City's treatment allocation (4.0 mgd remaining) to accommodate cumulative growth with the proposed project. There is adequate capacity to serve cumulative growth within the Santa Cruz County Sanitation District service area (Ibid.). Thus, cumulative impacts on wastewater treatment would be less than significant.

Water Supply. The geographical area for the analysis of cumulative water supply impacts includes the area served by the City's Water Department. Background on the existing and projected future demand and supplies is provided in Section 4.6, Water Supply – Service. As indicated, the 2015 UWMP predicts water supply shortfalls by the year 2035 of 40 approximately

MGY in normal rainfall years, 528 MGY during a single dry year, and 1,639 MGY in multiple dry year periods even though demand is forecast to decrease. Without augmented water supplies, cumulative future water demand during dry periods is considered a potentially significant cumulative impact on water supplies.

As discussed in Section 4.8, the City continues to administer its water conservation program, has completed a Conservation Master Plan, and is implementing a water augmentation plan. The City has defined water supply augmentation strategies that are being studied in order to provide reliable production during drought shortages between 2020 and 2035 to address potential drought shortages. The plan includes the pursuit of the following portfolio of options: continued and enhanced conservation programs; passive recharge of regional aquifers; active recharge of regional aquifers; and a potable supply using advanced treated recycled wastewater or desalinated water (if recycled water did not meet City needs). A water transfer pilot program is underway for the passive recharge strategy. Supply volumes for the other augmentation elements have not yet been defined, and specific projects have not been selected or constructed, as these prospective sources are still under evaluation. Thus, the long-term provision of augmented water supplies is under development, but uncertain.

The proposed project would result in a net increase in water demand of approximately 29.0 MGY, which is not considered substantial in relation to the estimated future demand in the City's water service area of approximately 3,200 MGY. The project would be subject to City requirements for installation of water conserving fixtures and landscaping in accordance with City Municipal Code and building requirements. Under drought conditions, the project, like other City customers, would be required to curtail water use by varying amounts, depending on the severity of the drought and the level of curtailment set in place by the City. In addition, the project will pay the required "System Development Charge" for the required new service connection. This charge as set forth in Chapter 16.14 of the City's Municipal Code is intended to mitigate the water supply impacts caused by new development in the City of Santa Cruz water service area, and the funds are used for construction of public water system improvements and conservation programs.

The increase in water demand due to the proposed project would not substantially exacerbate water supply reliability in the future or during a drought because the amount of additional demand when spread across all service area customers would not result in any noticeable increase in the curtailment in customer use that would otherwise be implemented during drought conditions. Additionally, the project payment of the System Development Charge and implementation of other water conservation measures would mitigate the project's contribution to cumulative water supply impacts. Therefore, the project's incremental contribution to a significant cumulative water supply impact would not be cumulatively considerable.

Traffic and Transportation. The geographic area for consideration of cumulative impacts would be those areas of the street network to which the project would contribute trips. Cumulative traffic impacts were analyzed in the *General Plan 2030* EIR based on estimated buildout

accommodated by the General Plan, a number of approved and reasonably foreseeable projects, and long-range growth anticipated for UCSC.

Cumulative traffic volumes were obtained from the City of Santa Cruz 2030 General Plan traffic model for this analysis, which included UCSC development, and was modified to account for a growth factor of 5 percent, which would cover the three projects being discussed that were not included in the General Plan buildout (see page 5-7). Improvements included in the City of Santa Cruz Traffic Impact Fee (TIF) program were assumed to be in place for the cumulative analysis. Weekday PM peak cumulative trips, including the proposed project, are shown on Figure 5-1 at the end of this section.

Cumulative intersection levels of service are summarized on Table 5-2. The following six intersections would operate at an unacceptable level of service under cumulative conditions:

- ☐ Front Street/Laurel Street,
- ☐ Pacific Avenue/Laurel Street,
- ☐ Front Street/Soquel Avenue,
- ☐ Ocean Street/Water Street,
- ☐ Highway 1/Highway 9, and
- ☐ Chestnut Street/Mission Street.

Improvements are planned as part of the City's TIF program at three intersections: Ocean Street/Water Street, Highway 1/ Highway 9, and Chestnut Street/Mission Street, but would not improve operations to an acceptable LOS, although delays may be reduced. The other three impacted intersections are not included in the City's Traffic Impact Fee program as significant cumulative impacts were not identified as part of the General Plan 2030 EIR analysis. Cumulative traffic along state highways would contribute to existing and future unacceptable levels of service.

Review by the City's traffic consultant indicates that the other three intersections can be improved to an acceptable level. The Pacific/Laurel intersection LOS can be improved to D with the addition of a southbound left-turn lane, which would require shortening the median. The Front/Laurel intersection LOS can be improved to D with the addition of a westbound lane and right-turn overlap for the north and south right turns. The Front/Soquel intersection LOS can be improved to D with the modification of the signal phasing and separation of the combined westbound through/left turn lane.

The proposed project will contribute to significant cumulative traffic impacts at six locations in the project vicinity and along state highways. Future development projects within the area of the proposed plan amendments will be required to pay the City's traffic impact fee. However, payment of the traffic impact fee and the associated improvements would not mitigate impacts to a less-than-significant level at three intersections: Ocean Street/Water Street, Highway 1/ Highway 9, and Chestnut Street/Mission Street.

TABLE 5-2: Intersection Weekday Cumulative PM Peak Hour Levels of Service with Project

#	Intersection	Control Type	LOS Threshold ¹	Cumulative Plus Project Conditions ²		
				PM Peak Hour		
				Movement	Delay ³	LOS
1	Front Street / Laurel Street	Signal	D	Overall	100.2	F
2	Pacific Avenue / Laurel Street	Signal	D	Overall	105.9	F
3	Front Street / Cathcart Street	Signal	D	Overall	23.5	C
4	Front Street / Metro Station Driveway	Signal	D	Overall	6.4	A
5	Pacific Avenue / Metro Station Driveway	SSSC	D	Overall	1.7	A
		<i>Worst Approach</i>	D	WB	10.5	B
6	Pacific Avenue / Maple Street	AWSC	D	Overall	7.7	A
7	Pacific Avenue / Front Street / Mission-Water Street	Signal	D	Overall	32.3	C
8	Front Street / Soquel Avenue	Signal	D	Overall	59.9	E
9	Pacific Avenue / Cathcart Street	AWSC	D	Overall	8.3	A
10	Soquel Avenue / Pacific Avenue	SSSC	D	Overall	4.3	A
		<i>Worst Approach</i>	D	WB	9.5	A
11	Ocean Street / Water Street	Signal	D	Overall	228.1	F
12	Highway 1 / Highway 9	Signal	C-D	Overall	269.2	F
13	Chestnut Street / Mission Street / Highway 1	Signal	C-D	Overall	344.0	F

Source: Kimley-Horn, May 2017.

Notes:

1. The City of Santa Cruz has established LOS D as the minimum acceptable LOS for overall intersection operations during the AM and PM peak hours. However, under the existing General Plan, the City accepts a lower LOS (F) at some major regional intersections per existing Circulation Policy 5.1.2.
2. Analysis performed using HCM 2010 methodologies, except for Intersection 7 where HCM 2000 methodology was applied as explained above.
3. Delay is shown in seconds/vehicle.
4. Intersections that fall below the LOS threshold are shown in **bold**.

Intersection operations could be improved at the other three impacted intersections that the project would contribute cumulative trips. However, these improvements are not included in the TIF program as significant cumulative impacts were not identified in the General Plan 2030 EIR at

these locations. Thus, the proposed project's contribution at these three intersections would be considered cumulatively considerable due to resulting unacceptable LOS with addition of project trips. The following mitigation requires future development to contribute fair share contributions to fund the identified improvements at the following intersections: Front/Soquel, Front/Laurel and Front/Pacific.

MITIGATION 5-1: Require future development projects within the downtown area to contribute fair-share payments for improvements at the following intersections: Front/Soquel (signal timing and lane modifications); Front/Laurel (westbound lane addition and north and south right-turn overlap), and Pacific/Laurel (southbound left-turn lane addition).

With implementation of Mitigation 5-1, significant cumulative impacts at three intersections would be mitigated, and the project's contribution would not be cumulatively considerable. Future development projects in the downtown area would be required to pay the City's traffic impact fees for improvements at the other three intersections, but planned improvements would not result in acceptable levels of service, and no other feasible improvements have been identified. Therefore, cumulative traffic impacts remain significant at three City intersections and along state highways this is a significant cumulative impact, and the project's contribution to cumulative traffic impacts would be cumulatively considerable at these locations.

5.5 PROJECT ALTERNATIVES

According to State CEQA Guidelines (section 15126.6), an EIR shall describe a range of reasonable alternatives to the project or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. The guidelines further require that the discussion focus on alternatives capable of eliminating significant adverse impacts of the project, or reducing them to a level of insignificance even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly. The alternatives analysis also should identify any significant effects that may result from a given alternative. An EIR need not consider every conceivable alternative to a project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation. An EIR is not required to consider alternatives which are infeasible.

The lead agency is responsible for selecting a range of potentially feasible project alternatives for examination, and must publicly disclose its reasoning for selecting those alternatives. The range of alternatives is governed by a "rule of reason" that requires the EIR to set forth only those potentially feasible alternatives necessary to permit a reasoned choice. The alternatives shall be limited to those that would avoid or substantially lessen any of the significant effects of the

project. Of those alternatives, the EIR need examine in detail only those that the lead agency determines could feasibly attain most of the basic objectives of the project. An EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative. Alternatives in an EIR must be “potentially feasible.” Agency decision makers ultimately decide what is “actually feasible.”

“Feasible” means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors (State CEQA Guidelines, section 15364). Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context), and whether the proponent can reasonably acquire, control, or otherwise have access to the alternative site (or already owns the alternative site). None of these factors establishes a fixed limit on the scope of reasonable alternatives. The concept of feasibility also encompasses the question of whether a particular alternative or mitigation measure promotes the underlying goals and objectives of a project. Moreover, feasibility under CEQA encompasses “desirability” to the extent that desirability is based on a reasonable balancing of the relevant economic, environmental, social, legal, and technological factors.

Summary of Significant Impacts and Project Objectives

Significant Project Impacts

The following potentially significant impacts have been identified, all of which can be mitigated to a less-than-significant level, except for cumulative traffic, which would remain significant and unavoidable.

- ☐ **Biological Resources** - Impact 4.3-2: Indirect Impacts to Sensitive Riparian Habitat.
Future development of taller buildings as a result of the proposed Downtown Plan amendments could result in indirect impacts to birds in the area that could lead to bird mortalities.
- ☐ **Biological Resources** - Impact 4.3-3: Indirect Impacts to Nesting Birds.
Future development as a result of the proposed Downtown Plan amendments could result in disturbance to nesting birds if any are present in the vicinity of construction sites along the San Lorenzo River.
- ☐ **Public Services** - Impact 4.6-1c: Schools.
Adoption of the proposed plan amendments could indirectly result in increased population associated with potential development that would generate elementary school student enrollments that could exceed capacity of existing schools.

☐ **Public Services** - Impact 4.6-2: Parks and Recreation.

Adoption of the proposed plan amendments could indirectly result in increased population associated with potential development that could be accommodated by the Plan that would result in increased demand for parks and recreational facilities that could result in some deterioration of existing parks and recreational facilities.

☐ **Noise** - Noise-1: Exposure to Noise.

Future development in the project area would be exposed to exterior and / or interior noise levels that exceed local and state requirements. However, the project area is not within locations that would expose people to noise in excess of established standards.

☐ **Cumulative Traffic Impacts.**

The proposed project will contribute to significant cumulative traffic impacts at six locations.

Summary of Project Objectives

1. Support the following First Principles of the Downtown Plan:

- *Form and Character.* New buildings should be allowed to develop individual character while retaining qualities of the historic townscape. Issues of articulation, materials, signage, setbacks, scale, massing, form, bulk, solar access and height are critical.
- *Housing.* Significant new housing opportunities should be targeted throughout the downtown, including Pacific Avenue, the San Lorenzo riverfront, and South of Laurel. Housing should be comprised of a mix of apartments and condominiums. SRO housing should be replaced and dispersed throughout the downtown area.
- *Accessibility.* A downtown that aesthetically integrates access as a primary design criterion for all improvements to ensure increased opportunities for the public to participate in commercial, governmental, residential, social and cultural activities.
- *Open Space and Streetscape.* A strong network of public and private open spaces (streets, sidewalks, public parks, plazas, passageways and courtyards) that creates a socially active and pedestrian-oriented downtown core should be emphasized.
- *Circulation.* Downtown should be predominantly pedestrian in nature; movement should be carefully structured to reinforce the character of the place. Pedestrian, bicycle, and transit access to the downtown should be enhanced.
- *Parking.* Parking in the downtown core should continue to be provided by the Parking District in a centralized fashion, to maximize shared use and minimize the quantity of stored vehicles.

2. Increase opportunities for all types of housing in downtown.

3. Encourage and incentivize maximum public access to the San Lorenzo River.
4. Achieve superior connections to the San Lorenzo River above the existing DRP and existing SLURP policies consistent with Section 30211 of the Coastal Act.
5. Ensure that development adjacent to the Riverwalk will be designed to prevent impacts to the adjacent sensitive San Lorenzo River and will incentivize clean-up of degraded areas along the levee.
6. Enhance opportunities to view and interact with the San Lorenzo River as a coastal resource.
7. Create development standards that will incentivize development of key east-west public passageways between Pacific Avenue and the Riverwalk.

Alternatives Considered

Section 15126.6(c) of State CEQA Guidelines indicates that the range of potential alternatives shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects. The EIR should briefly describe the rationale for selecting the alternatives to be discussed.

The EIR also should identify any alternatives that were considered by the lead agency but were rejected as infeasible, and briefly explain the reasons underlying the lead agency's determination. Among the factors that may be used to eliminate alternatives from detailed consideration in an EIR are: (1) failure to meet most of the basic project objectives, (2) infeasibility, or (3) inability to avoid significant environmental impacts. The City considered other locations for additional height zones in the downtown area, but none were identified. The Additional Height Zone A already exists along Pacific Avenue north of Cathcart.

Based on the above discussion, the following section evaluates the following alternatives:

- ☐ No Project – Required by CEQA
- ☐ Alternative 1 – Reduced Height for Expanded Additional Height Zone A to 75 feet and Elimination of Additional Height Zone B
- ☐ Alternative 2 – Reduced Height for Additional Height Zone A to 75 feet along Pacific/Front and Reduced Height for Additional Height Zone B to 60 feet along the San Lorenzo River with Development Standard Modifications: eliminate encroachment over property line and require 10-foot setback above 50 feet

Each alternative is described and analyzed below, and the ability to meet project objectives is addressed. Table 5-3 summarizes key components of the alternatives.

Table 5-3: Summary of Alternatives

	Proposed Project	No Project	Alternative 1	Alternative 2
Project Size-Net Change Over Existing Conditions				
▪ Residential Units	711	437	437	645
▪ Commercial Square Footage	(-14,695 sf)	(-23,990 sf)	(-14,695 sf)	(-14,695 sf)
▪ Office Square	2,190 sf	(-5,205 sf)	2,190 sf	2,190 sf
Impacts				
▪ Daily Trips	2,627	1,075	1,339	2,275
▪ Peak Hour Trips	293	119	132	214
▪ Annual Water Demand (MGY)	29	16.6	17.4	26.1

No Project Alternative

Section 15126.6(e) of the State CEQA Guidelines requires that the impacts of a “no project” alternative be evaluated in comparison to the proposed project. Section 15126(e) also requires that the No Project Alternative discuss the existing conditions that were in effect at the time the Notice of Preparation was published, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services.

Project Description. Under the No Project Alternative, none of the proposed DRP, General Plan, LCP or Municipal Code amendments would be implemented. Additional Height zones would not be extended along Pacific Avenue, Front Street or the San Lorenzo River. However, redevelopment could occur under the existing General Plan and Downtown Recovery Plan without the amendments. Under the No Project Alternative, none of the project impacts identified in this EIR would occur. However, since redevelopment of the downtown area could occur without the amendments, some level of development would be reasonably expected to occur over the next 25 years.

City Planning Department staff developed an estimate of potential buildout without the proposed amendments to identify potential development under the existing DRP. The affected area was divided into three segments as shown on Figure 3-6 in section 3, Project Description. City staff identified broad development assumptions for these areas, which are included in Appendix D. Table 5-4 summarizes potential development under existing plans without the proposed project. City staff estimates indicate that development under existing plans could result in a net increase of approximately 437 residential units and a net decrease of approximately 23,990 square feet of commercial and 5,100 square feet of office space over existing conditions. Development under existing plans without the proposed amendment could result in approximately 274 fewer residential units than the proposed project and a greater decrease in commercial and office square footage than the proposed project.

**TABLE 5-4: Potential Development/Buildout Assumptions
With Existing General Plan and Downtown Recovery Plan**

	Area X Riverfront	Area Y E. Pacific/W. Front Pacific Station	Area Z W. Pacific	Totals	Change from Existing Conditions (Includes demolition and reconstruction)
Baseline/Existing Conditions					
Property Area	146,000 sf (3.35 acres)	222,200 sf (5.10 acres)	148,800 sf (3.42 acres)	517,000 sf (11.87 acres)	N/A
Commercial	62,000 sf	74,864 sf	182,836 sf	319,700 sf	N/A
Office	N/A	56,105 sf	65,761 sf	121,866 sf	N/A
Residential	N/A	113 units	56 units	169 units	N /A
Parking	164 spaces	186 spaces	97 spaces	447 spaces	N /A
2030 General Plan – No Amendments (Units are totals, reflecting both demolition and reconstruction)					
Commercial	65,875 sf	47,000 sf	182,836 sf	295,711 sf	-23,989
Office	11,000 sf	40,000 sf	65,761 sf	116,761 sf	-5,105
Residential	190 units	360 units	56 units	606 units	+437
Parking	265 spaces	1,610 spaces	97 spaces	1,972 spaces	+1,525

SOURCE: City of Santa Cruz Planning and Community Development

Impacts. Since redevelopment of downtown properties could occur under existing conditions without the proposed plan amendments, some of the impacts identified in this EIR could result at some unknown time in the future and at an unknown magnitude depending on the proposal as discussed in the following section.

- ❑ **Aesthetics:** Under this alternative, the Additional Height Zones would not be extended along Pacific and Front Streets or along the San Lorenzo River. The existing base height would remain at 50 feet. Under the existing DRP, all buildings must conform to the 50-foot base height requirements. Along Pacific Avenue, the second story must be at least 50 percent of the first floor area and located toward the street frontage. Uninhabitable mechanical penthouses are permitted to a maximum height of 55 feet, provided that such penthouses are set back a minimum of 25 feet from any exposed face of the buildings and are out of the pedestrian's view. Sloping roofs also are permitted up to a maximum height of 55 feet, provided that they do not penetrate a 42 degree angle measured back from the 50-foot Base Height eaves line.

The existing Additional Height Zone B would remain in effect under the No Project Alternative, which affects approximately 10 properties south of Cathcart Street. The additional building height limit for these properties, if they meet the eligibility criteria, is 60 feet. Uninhabitable mechanical penthouses are permitted to project 5 feet above the approved additional height of building, provided that such penthouses are set back a

minimum of 25 feet from any exposed face of the building and are out of the pedestrian's view.

Under the No Project alternative, additional heights of 20 to 35 feet above the 50-foot base height limit would be eliminated. Figures 4.1-3A through 4.1-3C in Section 4.1, Aesthetics, show the base height limit under existing plans as well as with the potential additional heights with the proposed plan amendments as seen from the San Lorenzo River, Pacific Avenue and Front Street, respectively. The diagrams do not represent actual projects or architecture, but show potential building mass depicted, which may or may not occur. The diagrams do not show any architectural designs that typically would be employed to break up building mass.

The less-than-significant impacts on the visual character of the surrounding area would be reduced with elimination of the expanded Additional Height Zones. Future development would be allowed to construct buildings to the 50-foot base height limit, similar to existing downtown building heights north of Cathcart Street. Required street tree plantings, if similar to those along Pacific, would substantially screen upper levels from many pedestrian-level views. Since development would be consistent with development in the downtown area north of Cathcart, there would be no substantial change or degradation to visual character of the project area. Thus, eliminating the incremental height increase of 20 to 35 feet above the 50-foot base height with the No Project alternative would eliminate less-than-significant aesthetic impacts when compared to the Project.

- ❑ **Air Quality and Greenhouse Gas Emissions:** This alternative would result in potentially less future development than the proposed project with an accompanying reduction in vehicle trips, energy use and water use. Thus, this alternative would result in a reduced level of air emissions than the less-than-significant impact identified for the proposed project.
- ❑ **Biological Resources:** Under this alternative additional building heights of 20 to 35 feet above the 50-foot base height limit would be eliminated. While any new development would be taller than existing development in the study area, impacts related to shading would be reduced with minor shading impacts occurring only for a limited duration during the winter, which were not found to result in significant impacts to aquatic habitat or species. Potential indirect impacts to birds in the area would be reduced with the lower heights along the San Lorenzo River Riverwalk, but not eliminated, as potential concerns regarding reflective glass and lighting would also be a concern under the No Project Alternative. Similarly, potential construction-related disturbance to nesting birds could also occur under this alternative. Mitigation for both these impacts would be required as with the proposed project.
- ❑ **Cultural Resources:** Under this alternative, the potential for increased building heights would be eliminated, but future development could occur within the same overall development area as the proposed project. Since the overall development footprint

would not change, potential impacts to cultural resources (archaeological, tribal cultural, historical, or paleontological) would remain unchanged.

- ❑ **Hydrology and Water Quality:** Under this alternative, the potential for increased building heights would be eliminated, but future development could occur within the same overall development area as the proposed project. Potential impacts related to hydrology and water quality would remain unchanged.
- ❑ **Public Services:** Potential future development under the No Project alternative would result in 274 fewer residential units than the proposed project with a net decrease in commercial and office space. As a result, residential and employee population would be reduced with an accompanying reduction in demand for public services. Significant impacts related to schools and park and recreational facilities would be reduced but not eliminated. Other identified less-than-significant fire protection, police protection, and solid waste disposal impacts also would be reduced.
- ❑ **Traffic and Transportation:** Under this alternative, the potential for increased building heights would be eliminated, which would result in decreased potential development intensity. Thus, this alternative would result in reduced daily and peak hour trips as summarized on Table 5-4. Daily and peak hour trips would be reduced by approximately 60%. The less-than-significant impacts identified for the proposed project would be further reduced with the No Project alternative.
- ❑ **Water Supply and Wastewater Utilities:** Under this alternative, the potential for increased building heights would be eliminated, which would result in decreased potential development intensity. Potential future development under the No Project Alternative with existing General Plan and DRP provisions could lead to an increase in water demand of approximately 16.6 MGY based on water demand rates for multi-family homes identified in the City's adopted 2015 Urban Water Management Plan and commercial and office demand rates in the General Plan 2030 EIR. This alternative would reduce estimated project water use by more than half of the estimated project demand. Wastewater generation would also be substantially reduced, although no significant impacts were identified for either of these utilities.
- ❑ **Noise:** This alternative would result in fewer residential units potentially constructed in the downtown area. However, given the location portions of the study area adjacent to streets with future predicted higher noise levels, there would still be exposure of future residential units to roadway noise. The mitigation requiring an acoustical study to determine building design and materials still would still be needed.
- ❑ **Cumulative Traffic Impacts:** This alternative would result peak hour trips by approximately 60% of what is estimated with the proposed project. Significant cumulative traffic impacts would be reduced, but not to a less-than-significant level at three intersections that cannot be improved to acceptable levels (Highway 1/Highway 9, Mission/Chestnut, and Ocean/Water).
- ❑ **Other Impacts:** No new impacts have been identified with this alternative.

Ability to Meet Project Objectives. The No Project Alternative would meet three project objectives. With no proposed plan changes, the existing DRP would continue to support the First Principles of the plan (#1), and housing opportunities would continue to be encouraged (#2). Any development would need to meet existing DRP development standards for sensitive siting and design next to the river (#5). The No Project alternative would not include the incentives to create two new linkages to the San Lorenzo River and Riverwalk through extensions of Elm and Maple Streets, and would not fully meet the project objectives to increase public access. (#3, 4, 6, 7).

Alternative 1 - Reduced Height for Expanded Additional Height Zone A and Elimination of Additional Height Zone B

Project Description. This alternative includes expansion of Additional Height Zone A as with the proposed project, but the maximum height for the Additional Height Zone A would be limited to 75 feet with elimination of the 85 maximum height limit along the east side of Pacific Avenue and the west side of Front Street. This would result in an additional height limit that is consistent with existing limits for this zone as applied to Pacific Avenue north of Cathcart Street. Additionally, the proposed Additional Height Zone B would be eliminated so no additional height above the existing 50-foot base height would be permitted on the east side of Front Street and along the River.

Based on City Planning Department staff review, the maximum height limit change from 85 to 75 feet would affect the size of individual residential units, potentially eliminating a mezzanine feature, but the overall number of units and non-residential square footage would not change from the proposed project. Due to Building Code requirements, the increased height from 75 to 85 feet would allow for a mezzanine feature but would not allow for an additional building floor without changing the construction type to meet high-rise building standards. The elimination of the proposed Additional Height Zone B area would result in the same potential development as allowed under the existing DRP without the proposed plan amendments for the Front Street/Riverfront area. The commercial and office square footage estimated for the lower floors would not change from the proposed project in any location. Potential development under this alternative could result in a net increase of approximately 437 residential units, a net increase of approximately 2,190 square feet of office use, and a net decrease of approximately 14,690 square feet of commercial building space over existing conditions.

Impacts. Potential impacts of this Alternative are discussed in the following section.

- ☐ **Aesthetics:** Under this alternative, the Additional Height Zone A would be limited to 75 feet, resulting in a reduction of maximum building height from 85 to 75 feet along the east side of Pacific Avenue and the west side of Front Street. There would be no increase in additional building heights over the existing 50-foot base height along the east side of Front Street and along the San Lorenzo River Riverwalk.

Future development would be required to construct buildings to the 50-foot base height limit with a maximum floor area percentage above the 50-foot base height in Additional Height Zone A. Buildings developed to the existing base height limits would be similar to existing downtown building heights north of Cathcart Street. Required street tree plantings, if similar to those along Pacific, would substantially screen upper levels from many pedestrian-level views. Potential development along Pacific would be taller than existing development along Pacific south of Cathcart (except for the existing building at 1010 Pacific) and may be considered out of character with some existing buildings. However, development along Pacific and Front and adjacent to the San Lorenzo River would be consistent with development in the downtown area north of Cathcart and would not result in a significant degradation of the visual character of the surrounding area. Thus, Alternative 1 would reduce less-than-significant impacts on aesthetics compared to the proposed project.

- ❑ **Air Quality and Greenhouse Gas Emissions:** This alternative would result in potentially less future development than the proposed project with an accompanying reduction in vehicle trips, energy use and water use. Thus, this alternative would result in a reduced level of air emissions than the less-than-significant impact identified for the project.
- ❑ **Biological Resources:** Under this alternative additional building heights above the 50-foot base height limit along the San Lorenzo River would be eliminated. While any new redevelopment could be taller than existing development on the east side of Front Street, impacts related to shading would be reduced with minor shading effects occurring during winter, which were not found to result in significant impacts to aquatic habitat or species. Potential indirect impacts to birds in the area would be reduced with the lower heights, but not eliminated, as potential concerns regarding reflective glass and lighting would also be a concern under the No Project Alternative. Similarly, potential construction-related disturbance to nesting birds could also occur under this alternative. Mitigation for both these impacts would be required as with the proposed project.
- ❑ **Cultural Resources:** Under this alternative, the potential for increased building heights would be eliminated, but future development could occur within the same overall development area as the proposed project. Since the overall development footprint would not change, potential impacts to cultural resources (archaeological, tribal cultural, historical, or paleontological) would remain unchanged.
- ❑ **Hydrology and Water Quality:** Under this alternative, the potential for increased building heights would be eliminated, but future development could occur within the same overall development area as the proposed project. Potential impacts related to hydrology and water quality would remain unchanged.
- ❑ **Public Services:** Potential future development under the this alternative would result in 274 fewer residential units than the proposed project with a net increase in office space and a net decrease in commercial space the same as the project. As a result, residential population would be reduced with an accompanying reduction in demand for public

services. Significant impacts related to schools and park and recreational facilities would be reduced but not eliminated. Other identified less-than-significant fire protection, police protection, and solid waste disposal impacts also would be reduced.

- ❑ **Traffic and Transportation:** Under this alternative, the potential for increased building heights adjacent to the San Lorenzo River would be eliminated, which would result in decreased potential development intensity. Thus, this alternative would result in reduced daily and peak hour trips as summarized on Table 5-4. Daily and peak hour trips would be reduced by approximately 50%. The less-than-significant impacts identified for the proposed project would be further reduced with the No Project alternative.
- ❑ **Water Supply and Wastewater Utilities:** Under this alternative, the potential for increased building heights would be eliminated, which would result in decreased potential development intensity. Potential future development under the No Project Alternative with existing General Plan and DRP provisions could lead to an increase in water demand of approximately 17.4 MGY based on water demand rates for multi-family homes identified in the City's adopted 2015 Urban Water Management Plan and commercial and office demand rates in the General Plan 2030 EIR. This alternative would reduce estimated project water use by more than half of the proposed project demand. Wastewater generation would also be substantially reduced, although no significant impacts were identified for either of these utilities.
- ❑ **Noise:** This alternative would result in fewer residential units potentially constructed in the downtown area. However, given the location portions of the study area adjacent to streets with future predicted higher noise levels, there would still be exposure of future residential units to roadway noise. The mitigation requiring an acoustical study to determine building design and materials still would still be needed.
- ❑ **Cumulative Traffic Impacts:** This alternative would result peak hour trips by approximately 50% of what is estimated with the proposed project. Significant cumulative traffic impacts would be reduced, but not to a less-than-significant level at three intersections that cannot be improved acceptable levels (Highway 1/Highway 9, Mission/Chestnut, and Ocean/Water).
- ❑ **Other Impacts:** No new impacts have been identified with this alternative.

Ability to Meet Project Objectives. Alternative 1 would meet three project objectives. With no proposed plan changes, the existing DRP would continue to support the First Principles of the plan (#1), and housing opportunities would continue to be encouraged, although with reduced opportunities (#2). Any development would need to meet existing DRP development standards for sensitive siting and design next to the river (#5). This alternative would include the incentives to create two new linkages to the San Lorenzo River and Riverwalk through extensions of Elm and Maple Streets, although incentives may be limited with elimination of additional building heights. Thus, this alternative would partially meet the project objectives to increase public access. (#3, 4, 6, 7).

Alternative 2 - Reduced Height for Expanded Additional Height Zones A and B

Project Description. Under this alternative, the proposed expansion of the Additional Height Zones would be modified. The Alternative includes expansion of Additional Height Zone A as with the proposed project, but the maximum height for the Additional Height Zone A would be limited to 75 feet with elimination of the 85 maximum height limit along the east side of Pacific Avenue and the west side of Front Street. This would result in an additional height limit that is consistent with existing limits for this zone as applied to Pacific Avenue north of Cathcart Street. Additionally, the maximum building heights in the Additional Height Zone B would along the east side of Front Street and adjacent to the San Lorenzo River would be reduced from 70 to 60 feet. The proposed Development Standards would be modified under this alternative to eliminate encroachment over property line and to require a 10-foot setback for buildings above 50 feet.

Based on City Planning Department staff review, the maximum height limit change from 85 to 75 feet would affect the size of individual residential units, potentially eliminating a mezzanine feature, but the overall number of units and non-residential square footage would not change from the proposed project. Due to Building Code requirements, the increased height from 75 to 85 feet would allow for a mezzanine feature but would not allow for an additional building floor, without changing the construction type to meet high-rise building standards. However, reduction of maximum height from 70 to 60 feet in the Additional Height Zone B would in elimination of a top floor, resulting in a reduction of housing units from the proposed project. The commercial and office square footage estimated for the lower floors would not change from the proposed project. As a result, potential development under this alternative could result in a net increase of approximately 645 residential units, a net increase of approximately 2,190 square feet of office use, and a net decrease of approximately 14,690 square feet of commercial building space over existing conditions.

Impacts. Potential impacts of this Alternative are discussed in the following section.

Impacts. Potential impacts of this Alternative are discussed in the following section.

- ☐ **Aesthetics:** Under this alternative, there would be a 10-foot reduction in maximum building heights in both Additional Height Zone A and B. Potential development along Front Street adjacent to the San Lorenzo River and along Pacific Avenue would be taller than existing development along Pacific Avenue and Front Street south of Cathcart (except for the existing building at 1010 Pacific) and may be considered out of character with some existing buildings. However, potential future development would be consistent with the Additional Height Zone permitted north of Cathcart, and thus, would not result in a significant degradation of the visual character of the surrounding area. Thus, the Alternative 2 would slightly reduce less-than-significant impacts on aesthetics.
- ☐ **Air Quality and Greenhouse Gas Emissions:** This alternative would result in potentially less future development than the proposed project with an accompanying reduction in

vehicle trips, energy use and water use. Thus, this alternative would result in a reduced level of air emissions than the less-than-significant impact identified for the project.

- ❑ **Biological Resources:** Under this alternative, additional maximum building heights along the San Lorenzo River would be reduced by 10 feet. While any new development would be taller than existing development in the study area, impacts related to shading would be slightly reduced with minor shading effects during winter, which were not found to result in significant impacts to aquatic habitat or species. Potential indirect impacts to birds in the area would be reduced with the lower heights, but not eliminated, as potential concerns regarding reflective glass and lighting would also be a concern under the No Project Alternative. Similarly, potential construction-related disturbance to nesting birds could also occur under this alternative. Mitigation for both these impacts would be required as with the proposed project.
- ❑ **Cultural Resources:** Under this alternative, the potential for increased building heights would be eliminated, but future development could occur within the same overall development area as the proposed project. Since the overall development footprint would not change, potential impacts to cultural resources (archaeological, tribal cultural, historical, or paleontological) would remain unchanged.
- ❑ **Hydrology and Water Quality:** Under this alternative, the potential for increased building heights would be eliminated, but future development could occur within the same overall development area as the proposed project. Potential impacts related to hydrology and water quality would remain unchanged.
- ❑ **Public Services:** Potential future development under this alternative would result in 66 fewer residential units than the proposed project with the same net increase in office space and a net decrease in commercial space as with the proposed project. As a result, residential population would be reduced with an accompanying reduction in demand for public services. Significant impacts related to schools and park and recreational facilities would be reduced but not eliminated. Other identified less-than-significant fire protection, police protection, and solid waste disposal impacts also would be reduced.
- ❑ **Traffic and Transportation:** Under this alternative, the potential for increased building heights adjacent to the San Lorenzo River would be eliminated, which would result in decreased potential development intensity. Thus, this alternative would result in reduced daily and peak hour trips as summarized on Table 5-4. Daily and peak hour trips would be slightly less than the proposed project. The less-than-significant impacts identified for the proposed project would be further reduced with the No Project alternative.
- ❑ **Water Supply and Wastewater Utilities:** Under this alternative, the potential for increased building heights would be eliminated, which would result in decreased potential development intensity. Potential future development under the No Project Alternative with existing General Plan and DRP provisions could lead to an increase in water demand of approximately 26 MGY based on water demand rates for multi-family

homes identified in the City's adopted 2015 Urban Water Management Plan and commercial and office demand rates in the General Plan 2030 EIR. This alternative would reduce estimated project water use by more than half of the proposed project demand. Wastewater generation would also be substantially reduced, although no significant impacts were identified for either of these utilities.

- ❑ **Noise:** This alternative would result in fewer residential units potentially constructed in the downtown area. However, given the location portions of the study area adjacent to streets with future predicted higher noise levels, there would still be exposure of future residential units to roadway noise. The mitigation requiring an acoustical study to determine building design and materials still would still be needed.
- ❑ **Cumulative Traffic Impacts:** This alternative would slightly reduce peak hour trips from those estimated with the proposed project. Significant cumulative impacts would remain with the project's contribution being cumulatively considerable.
- ❑ **Other Impacts:** No new impacts have been identified with this alternative.

Ability to Meet Project Objectives. Alternative 2 would meet three project objectives. With no proposed plan changes, the existing DRP would continue to support the First Principles of the plan (#1), and housing opportunities would continue to be encouraged, although with reduced opportunities (#2). Any development would need to meet existing DRP development standards for sensitive siting and design next to the river (#5). This alternative would include the incentives to create two new linkages to the San Lorenzo River and Riverwalk through extensions of Elm and Maple Streets and would meet the project objectives to increase public access, although incentives may be limited with a reduction of additional building heights. Thus, this alternative would partially meet the project objectives to increase public access (#3, 4, 6, 7).

Environmentally Superior Alternative

According to CEQA Guidelines section 15126.6(e), if the environmentally superior alternative is the "no project" alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives. Furthermore, Sections 21002 and 21081 of CEQA require lead agencies to adopt feasible mitigation measures or feasible alternatives in order to substantially lessen or avoid otherwise significant adverse environmental effects, unless specific social or other conditions make such mitigation measures or alternatives infeasible. Where the environmentally superior alternative also is the no project alternative, CEQA Guidelines in Section 15126(d)(4) requires the EIR to identify an environmentally superior alternative from among the other alternatives.

In the present case, none of the alternatives, including the No Project Alternative would eliminate significant project impacts and cumulative impacts related to traffic, although all alternatives would result reduce the level of impact. Table 5-5 presents a comparison of project impacts between the proposed project and the alternatives. Excluding the No Project Alternative, Alternative 1 – Reduced Height for Additional Height Zone A and Elimination of

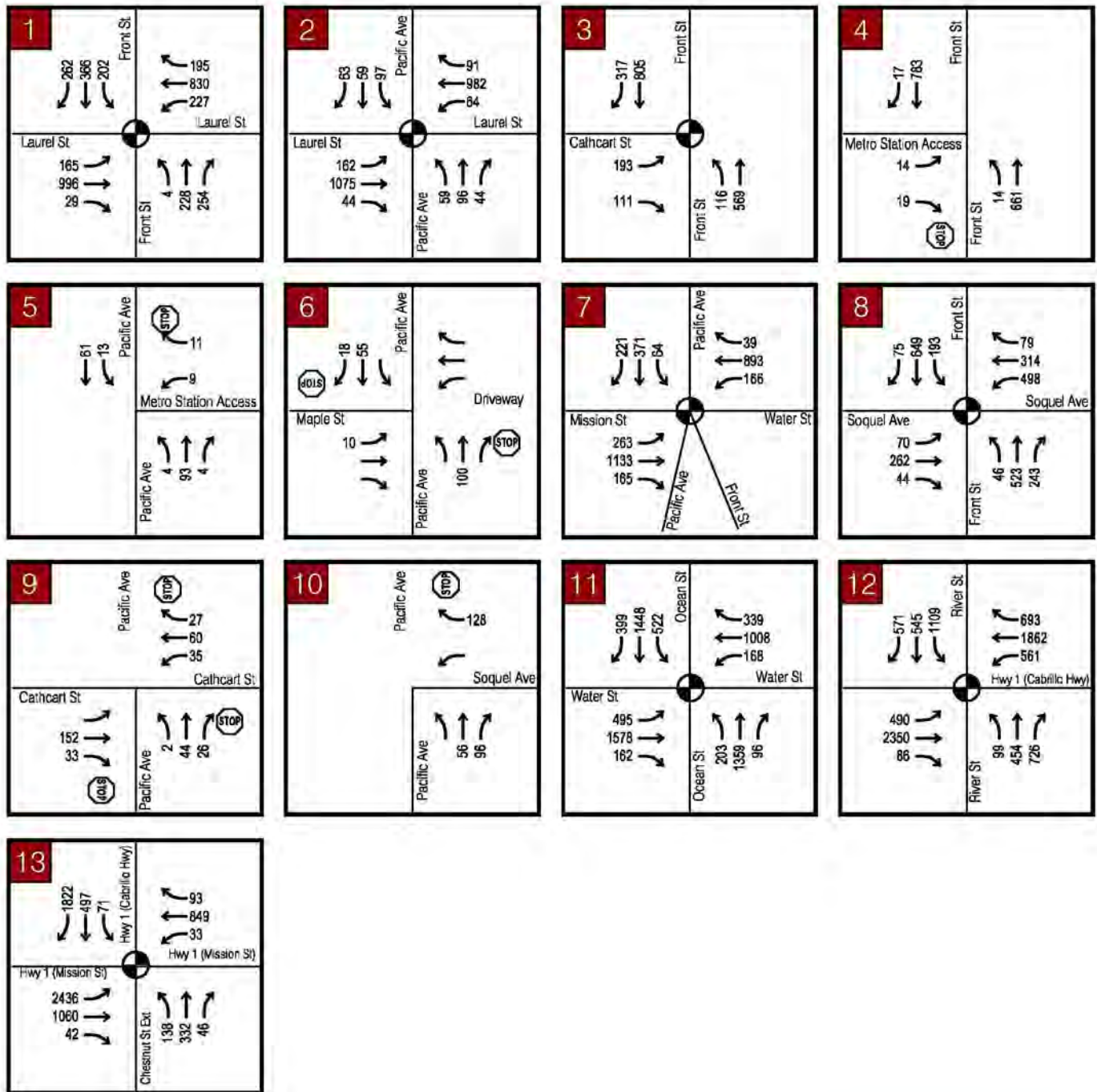
Additional Height Zone B – is considered the environmentally superior alternative of the alternatives considered. Although it would not reduce significant impacts to less-than-significant levels, it could result in the greatest reduction of traffic and water demand impacts and reduce some of the other identified significant impacts. However, it would not fully meet project objectives.

Table 5-5 is on the next page.

Table 5-5: Comparison of Impacts of Project Alternatives

Environmental Issue	PP	NP	ALT 1	ALT 2
Aesthetics 4.1-1: Scenic Views	LS	LS -	LS -	LS -
Aesthetics 4.1-3: Degradation of Visual Character	LS	LS-	LS -	LS -
Aesthetics 4.1-4: Light and Glare	LS	LS -	LS -	LS -
Air Quality 4.2-1: Pollutant Emissions	LS	LS -	LS -	LS -
Air Quality 4.2-2: GHG Emissions	LS	LS -	LS -	LS -
Biological Resources 4.3-1: Aquatic Habitat/Species	LS	LS -	LS	LS
Biological Resources 4.3-2: Riparian Habitat-Birds	LSM	LSM -	LSM	LSM
Biological Resources 4.3-3: Nesting Birds	LSM	LSM	LSM	LSM
Cultural Resources 4.4-1: Archaeological Resources	LS	LS	LS	LS
Cultural Resources 4.4-2: Historical Resources	LS	LS	LS	LS
Cultural Resources 4.4-3: Paleontological Resources	LS	LS	LS	LS
Hydrology 4.5-1: Stormwater Drainage	LS	LS	LS	LS
Hydrology 4.5-2: Water Quality	LS	LS	LS	LS
Hydrology 4.5-3: Flood Hazards	LS	LS	LS	LS
Public Services 4.6-1a: Fire Protection	LS	LS -	LS -	LS -
Public Services 4.6-1b: Police Protection	LS	LS -	LS -	LS -
Public Services 4.6-1c: Schools	LSM	LSM -	LSM -	LSM -
Public Services 4.6-2: Parks and Recreation	LSM	LSM -	LSM -	LSM -
Public Services 4.6-3: Solid Waste	LS	LS -	LS -	LS -
Traffic 4.7-1: Circulation System Impacts	LS	LS -	LS -	LS -
Traffic 4.7-2: Highway Impacts	LS	LS -	LS -	LS -
Water & Wastewater 4.8-1: Water Supply	LS	LS -	LS -	LS -
Water & Wastewater 4.8-2: Wastewater	LS	LS -	LS -	LS -
Noise: Exposure to Noise	LSM	LSM -	LSM -	LSM -
Cumulative Traffic	SU	SU -	SU -	SU -
New Significant Impacts		None	None	None
Notes: PP = Proposed Project NP = No Project ALT1 = Reduced Height for Expanded Additional Height Zone A and Elimination of Additional Height Zone B ALT2 = Reduced Height for Additional Height Zone A to 75 feet along Pacific/Front and Reduced Height for Additional Height Zone B to 60 feet along the San Lorenzo River with Development Standard Modifications Impact without Mitigation / Impact with Mitigation NI = No Impact LS = Less than significant impact S = Significant LSM = Less than significant with mitigation SU = Significant unavoidable impact + = Greater adverse impact than proposed project - = Lesser adverse impact than proposed project				

INTENTIONALLY LEFT BLANK



CHAPTER 6

REFERENCES AND LIST OF PREPARERS

6.1 AGENCIES AND PERSONS CONTACTED

City of Santa Cruz

City Manager's Office: Tiffany Wise-West

Fire Department: Jim Frawley, Dave Sasscer

Planning and Community Development Department: Ron Powers, Alex Khoury, Eric Marlatt

Public Works Department: Chris Schneider, Agnes Toppe, Steve Wolfman, Ron Marquez (Traffic Consultant)

Parks and Recreation Department: Noah Downing, Mauro Garcia

Police Department: Rick Martinez

Water Department: Toby Goddard, Katie Moore, Sarah Easley Perez

6.2 REFERENCES

AMBAG, Association of Monterey Bay Area Governments.

- a) September 14, 2016. "Monterey Bay Metropolitan Transportation Improvement Program (MTIP) FFY 2016-17 to 2019-20." Online at: http://ambag.org/programs/met_transp_plann/MTIP_2016-17_to2019-20/2016_MTIP-FullDocument.pdf
- b) June 2014. "Monterey Bay Metropolitan Transportation Plan." Online at: http://ambag.org/programs/met_transp_plann/documents/2035_AmendNo1/AMBAG_2035MTP-SCS_AmendmentNo1_January2017.pdf

American Bird Conservancy, New York City Audubon. 2015. "Bird-Friendly Building Design." Available online at: https://abcbirds.org/wp-content/uploads/2015/05/Bird-friendly-Building-Guide_2015.pdf.

Association of Environmental Professionals. October 16, 2016. "Final White Paper, Beyond 2020 and Newhall: A Field Guide to New CEQA Greenhouse Gas Thresholds and Climate Action Plan Targets for California.

California Air Resources Board (CARB).

- a) January 20, 2017. "THE 2017 Climate Change Scoping Plan Update." Online at: https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf.

- b) June 17, 2016. "California Greenhouse Gas Inventory – 2016 Edition." Online at: <http://www.arb.ca.gov/cc/inventory/data/data.htm>.
- c) May 2016. "Area Designation Maps/State and National." Last updated May 5, 2016. Accessed May 25, 2017. <http://www.arb.ca.gov/desig/adm/adm.htm>.
- d) May 2014. "First Update to the Climate Change Scoping Plan Building on the Framework Pursuant to AB 32 – The California Global Warming Solutions Act of 2006. Online at: https://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.
- e) December 12, 2008. *Climate Change Scoping Plan: A Framework for Change*. Online at: https://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf.

California Coastal Commission. August 2015. California Coastal Sea Level Rise Policy Guidance."

California Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT) with science support provided by the Ocean Protection Council's Science Advisory Team and the California Ocean Science Trust. March 2013 update. "State of California Sea-Level Rise Guidance Document."

California Department of Education, Educational Demographics Unit. "District and School Enrollment by Grade-Enrollment by Grade for 2016-17." Available online at: <http://dq.cde.ca.gov/dataquest/> (Accessed 7/7/17).

California Department of Finance. May 2017. "E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2017 with 2010 Census Benchmark." Available online at: <http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-5/>.

Caltrans, California Department of Transportation.

- a) 2015. "2015 Traffic Volumes on the California State Highway System." Online at: <http://www.dot.ca.gov/trafficops/census/>
- b) October 2011. "State Routes 1 & 183 Corridor System Management Plan." Online at: http://www.dot.ca.gov/dist05/planning/csmpl_mon_1.htm.
- c) September 2007. "Transportation Planning Fact Sheet: State Route 9 in Santa Cruz County." Online at: http://www.dot.ca.gov/dist05/planning/sys_plan_docs/tcr_factsheet_combo/scr_sr9_tcrfs.pdf
- d) April 2006. "Transportation Concept Report for State Route 1 in District 5." Online at: http://www.dot.ca.gov/dist05/planning/sys_plan_docs/tcr_factsheet_combo/scr_sr1_tcrfs.pdf
- e) January 2006. "Transportation Concept Report for State Route 17 in District 5." Online: http://www.dot.ca.gov/dist05/planning/sys_plan_docs/tcr_factsheet_combo/scr_sr17_tcrfs.pdf

- f) December 2002. “Guide for the Preparation of Traffic Impact Studies.” Online at:
http://www.dot.ca.gov/hq/tpp/offices/ocp/igr_ceqa_files/tisguide.pdf

California Department of Water Resources. December 2016. “California’s Groundwater, Working Toward Sustainability.” Bulletin 118, Interim Update 2016.

California Energy Commission. 2017. “U.S. Per Capita Electricity Use by State.” Available online at: http://www.energy.ca.gov/almanac/electricity_data/us_per_capita_electricity.html.

California Environmental Protection Agency. Office of Environmental Health Hazard Assessment. August 2013. “Indicators of Climate Change in California.”

California Natural Resources Agency. December 2009. “Final Statement of Reasons for Regulatory Action: Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB 97.”

City of Santa Cruz.

- a) Not Dated. Adopted. “Capital Improvement Program Budget Fiscal Years 2017-2019.”
- b) Not Dated. City of Santa Cruz Climate Adaptation Plan, 2012-2017.
- c) February 28, 2017. “Active Transportation Plan.” Available online at:
<http://www.cityofsantacruz.com/home/showdocument?id=59168>.
- d) Not Dated. “2016 Annual Traffic Safety Report.” Available online at:
<http://www.cityofsantacruz.com/home/showdocument?id=57466>.
- e) March 6, 2017. “Water Supply Augmentation Strategy, Quarterly Work Plan Update.” City Council Agenda Report for 3/14/17, Attachment 1.
- f) March 5, 2017. “Joint Meeting of the Santa Cruz City Council and Water Commission: briefing on City Water Supply Advisory Committee Final Report on Agreements and Recommendations.” City Council Agenda Report for 3/14/17, Attachment 1.
- g) “Annual Report 2015.” Available online at:
<http://www.cityofsantacruz.com/home/showdocument?id=52906>.
- h) Adopted August 23, 2016. *2015 Urban Water Management Plan*. Prepared by City of Santa Cruz Water Department. Available online at:
<http://www.cityofsantacruz.com/government/city-departments/water/2015-urban-water-mgmt-plan>.
- i) January 27, 2016. “City of Santa Cruz Draft 2015-2023 Housing Element.” Adopted June 26, 2012. *General Plan 2030*. Available online at:
<http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development/general-plan>.
- j) Revised 2014. “Storm Water Best Management Practices For Private and Public Development Projects, Chapter 6B of the Best Management Practices Manual for the City’s Storm Water Management Program.”

- k) 2013. Approved by FEMA on May 20, 2014. City of Santa Cruz Local Hazard Mitigation Plan, 2012-2017.
- l) March 2013. *Santa Cruz Historic Building Survey: Volume III*. Prepared by Archives & Architecture, LLC.
- m) March 2013. *Resolution No. NS-28,621: Exhibit A, List of Properties in Volume III Historical Building Survey by Address with Opt-Outs Indicated*.
- n) June 26, 2012. Adopted. *General Plan 2030*. Available online at: <http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development/general-plan>.
- o) April 2012. City of Santa Cruz *General Plan 2030* Final EIR. [SCH#2009032007] Certified June 26, 2012. Includes Draft EIR document, dated September 2011. Available online at: <http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development/general-plan>.
- p) Adopted by City Council on February 28, 2006 and certified by the California Coastal Commission on May 9, 2008. *City-wide Creeks and Wetlands Management Plan*. Available online at: <http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development-2/area-plans-planning-documents-projects/city-wide-creeks-and-wetlands-management-plan>
- q) July 2005a. "San Lorenzo River Bicycle-Pedestrian Bridge and Spur Trails Biological Evaluation." (05-Cruz-San Lorenzo River Bicycle-Pedestrian Bridge)
- r) Adopted June 24, 2003. *San Lorenzo Urban River Plan*. Prepared by City of Santa Cruz San Lorenzo Urban River Plan Task Force with assistance from Rivers, trails and Conservation Assistance Program of the National Park Service. Available online at: <http://www.cityofsantacruz.com/home/showdocument?id=61131>
- s) October 20, 2000. *Historic Context Statement for the City of Santa Cruz*. Prepared by Susan Lehmann.
- t) October 25, 1994. *The City of Santa Cruz General Plan and Local Coastal Program 1990-2005*. [Local Coastal Program portion] Available online at: <http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development/general-plan>
- u) June 13 1995. *List of Properties on the Historical Building Survey – by Address*. Updated in 2008.
- v) May 1989. *Santa Cruz Historic Building Survey: Volume II*. Prepared by John Chase, Daryl Allen and Jeanne Gordon.
- w) 1976. *Santa Cruz Historic Building Survey: Volume I*. Prepared by Charles Hall Page & Associates, Inc.

Decision Insite. January 2016. *Analysis of Enrollment Projections: Fall 2016*. Prepared for Santa Cruz City Schools. Available online at:

http://sccs.net/UserFiles/Servers/Server_222705/File/Board%20Books/Books%202015-16/Board%20Book%201-13-16%20Final%20Duplex.pdf.

Dudek. August 2016. "San Lorenzo River Flood Control Stable Channel and Beach Nourishment Pilot Project Existing Conditions Report." Prepared for City of Santa Cruz.

EIP Associates. July 1991. "Final City of Santa Cruz Downtown Recovery Plan Environmental Impact Report." SCH#90031009. Includes Draft EIR document, dated May 1991. Prepared for City of Santa Cruz Redevelopment Agency.

Evans Ogden, Lesley, J. September, 1996. "Collision Course: The Hazards of Lighted Structures and Windows to Migrating Birds." A Special Report for the World Wildlife Fund Canada and the Fatal Light Awareness Program. University of Nebraska, Lincoln.

Federal Highway Administration (FHWA) and State of California Department of Transportation (Caltrans). November 2015. "Tier I and Tier II Draft Environmental Impact Report/Environmental Assessment." Online at:

<https://sccrtc.org/projects/streets-highways/hwy1corridor/environmental-documents/>

Gelb, Yigal, and Nicole Delacretaz. 2009. "Windows and Vegetation: Primary Factors in Manhattan Bird Collisions." *Northeastern Naturalist*. 16(3):455-470.

Gary Griggs, Brent Haddad. January 22, 2011. "City of Santa Cruz city Climate Change Vulnerability Assessment."

Hager, Stephen, B., Heidi Trudell, Kelly J. McKay, Stephanie M. Crandall, and Lance Mayer. September 2008. "Bird Density and Mortality at Windows." *The Wilson Journal of Ornithology*. 120(3):550-564. 8

Kittleson Environmental Consulting and Bryan Mori Biological Consulting.

- a) June 2016. "Existing Conditions: Fish and Wildlife Resources San Lorenzo River Highway 1 to Water Street Bridge." Prepared for Dudek and City of Santa Cruz.
- b) January 2016. "Lower San Lorenzo River 2015 Fall Migration Bird Surveys." Prepared for Santa Cruz City Council City of Santa Cruz, CA.

Klem, D. Jr. February, 1990. "Collisions Between Birds and Windows: Mortality and Prevention." *Journal of Field Ornithology*. 61(1): 120-128.

Klem, D. Jr., Christopher Farmer, Nicole Delacretaz, Yigal Gelb, Peter Saenger. March 2009. "Architectural and Landscape Risk Factors Associated with Bird-Glass Collisions in an Urban Environment." *The Wilson Journal of Ornithology*. 121(1):126-134.

Monterey Bay Air Pollution Control District (MBUAPCD).

- a) February 2016. "Guidelines for Implementing the California Environmental Quality Act." Revised February 2016.
- b) 2015. "NCCAB (NCCAB) Area Designations and Attainment Status". Online at: <http://mbuapcd.org/wp-content/uploads/2015/01/attainment-status-january-2015.pdf>
- c) May 2013. Memorandum Regarding "Santa Cruz Crematory Screening Risk Assessment for Proposed Crematory Relocation."
- d) May 24, 2013. Letter to Randy Krassow, Santa Cruz Cemetery Corporation regarding "Health Risk Assessment for Santa Cruz Crematory."
- e) April 17, 2013, Adopted. "Triennial Plan Revision 2009 – 2011." Final.
- f) February 2013. Letter from Mike Gilroy, Deputy Air Pollution Control Officer to District Board of Directors regarding "Receive an Informational Report on the Status of Developing Greenhouse Gas Emissions Thresholds for Evaluating Projects Under the California Environmental Quality Act (CEQA) and Provide Direction to Staff on Next Steps."
- g) August 2008. *Air Quality Management Plan*.
- h) February 2008. "CEQA Air Quality Guidelines."
- i) March 21, 2007. "2007 Federal Maintenance Plan for Maintaining the National Ozone Standard in the Monterey Bay Region." Approved by AMBAG on May 9, 2007.
- j) December 1, 2005. "2005 Report on Attainment of the California particulate Matter Standards in the Monterey Bay Region."

Monterey Bay Air Resources District. Adopted March 15, 2017. "2012-2015 Air Quality Management Plan."

Pacific Gas and Electric Company. 2017. "Company Information." Online at: https://www.pge.com/en_US/about-pge/company-information/profile/profile.page (Accessed July 17, 2017).

Santa Cruz City Schools. "District Profile." Website: http://sccs.net/administration/district_profile/ (Accessed May 2, 2017).

Santa Cruz Metropolitan Transit District. May 2014. "Santa Cruz Metro Short Range Transit Plan."

Santa Cruz Regional Transportation Commission. June 2014. "2014 Santa Cruz County Regional Transportation Plan." Available online at: <https://sccrtc.org/funding-planning/long-range-plans/rtp/2014-plan/>.

San Francisco Planning Department. Adopted July 14, 2011. “Standards for Bird-Safe Buildings.” Available online at: <http://sf-planning.org/standards-bird-safe-buildings>.

Swanson Hydrology & Geomorphology, Native Vegetation Network, Hagar Environmental Science. January 2002. “Lower San Lorenzo River & Lagoon Management Plan.” Prepared for San Lorenzo Urban River Task Force, City of Santa Cruz, State Coastal Conservancy. (Included as an appendix in the San Lorenzo Urban River Plan)

United States Census Bureau.

- a) American FactFinder. “S1101: Households and Families.” 2011-2015 American Community Survey. <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml> (Accessed May 2, 2017).
- b) American FactFinder. “S1401: School Enrollment.” 2011-2015 American Community Survey. <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml> (Accessed May 2, 2017).

U.S. Energy Information Administration. 2017. “California State Energy Profile.” Available online at: <https://www.eia.gov/state/print.php?sid=CA>.

United States Fish and Wildlife Service. January 2002. “Migratory Bird Mortality: Many Human-Caused Threats Afflict Our Bird Populations.”

U.S. Environmental Protection Agency (EPA)

- a) 2017. “EPA Region 9 Air Quality Maps and Geographic Information.” Last updated March 7, 2017. Accessed May 25, 2017. <http://www.epa.gov/region9/air/maps/>.
- b) 2016. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2014 EPA 430-R-16-002. Washington, D.C.: EPA. April 15, Online at: <https://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2016-Main-Text.pdf>.
- c) October 2008. *Reducing Urban Heat Islands: Compendium of Strategies*,. Available online at: <https://www.epa.gov/sites/production/files/2014-08/documents/basiccompendium.pdf>

U.S. Fish and Wildlife Service. September 25, 2015. “Birds of Conservation Concern” web page; accessed April 26, 2017. Available online at: <https://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>

6.3 EIR TEAM

Dudek

Stephanie Strelow, Project Manager

Dave Compton, Biological Resources

Matthew Morales, Technical Resource Specialist, Air Quality

Anais Schenk, Environmental Specialist / Planner

Tyler Friesen, Graphics

Consultants

Gary Kittleson, Kittleson Environmental Consulting, Biological Resources

Kimley Horn, Transportation and Traffic Engineering

APPENDIX A

Notice of Preparation and Initial Study

ZONING / PERMIT PROCESSING
831/420-5100 • FAX 831/420-5434
COMPREHENSIVE PLANNING
831/420-5180 • FAX 831/420-5101



INSPECTION SERVICES
831/420-5120 • FAX 831/420-5434
PLANNING ADMINISTRATION
831/420-5110 • FAX 831/420-5101

PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT

809 Center Street • Room 206 • Santa Cruz, CA 95060 • www.cityofsantacruz.com

Alex Khoury, Acting Director

February 15, 2017

NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT

RE: Downtown Recovery Plan, General Plan and Local Coastal Plan Amendments

To Interested Agencies and Persons:

The City of Santa Cruz, as the lead agency, is preparing an Environmental Impact Report on the project described herein. Please respond with written comments regarding the scope and the content of the EIR as it may relate to your agency's area of statutory responsibility or your areas of concern or expertise. Your agency may need to use the EIR prepared by our agency when considering your permit or other approval for the project, if any is required. **Responses are due within 30 days of the receipt of this Notice, as provided by State law.** The contact person's name and address are listed below. Please include the name and phone number of a contact person at your agency in your response.

- 1. Project Location.** The project area consists of an approximate 12-acre portion of the downtown area of the city of Santa Cruz in the area generally bounded by Laurel Street on the south, the San Lorenzo River on the east, Cathcart Street and Soquel Avenue on the north, and Cedar Street on the west. See the attached Location Map and Figure 1 in the attached Initial Study for project area boundaries.
- 2. Project Description.** The proposed project consists of a series of amendments to the City's Downtown Recovery Plan (DRP), General Plan 2030 (GP), and Local Coastal Plan (LCP). The DRP amendments include revisions to Plan text and modifications to development guidelines and standards. The focus of the DRP amendment is to expand the location in which the "Additional Height Zones" are applied and revisions to the Chapter 4 Development Standards of the DRP. The primary proposed modification under consideration is an increase in allowable building heights in the lower Pacific Avenue area to Laurel Street and along the San Lorenzo Riverfront. The proposed General Plan amendment would the floor area ratio (FAR) for the Regional Visitor Commercial land use designation in areas where expanded height would be permitted as the building height increases would also result in an increased FAR. The proposed LCP amendments include changes to policies for the San Lorenzo Urban River Plan (SLURP) component of the LCP.

The proposed amendments and potential increased building heights could result in additional development. City staff estimates that the proposed amendment to height zones could result in a net increase of approximately 711 residential units and approximately 2,200 square feet of office space with a net decrease of approximately 14,700 square feet of commercial building space over existing conditions within the study area. In comparison to potential redevelopment that could occur under the adopted *General Plan 2030*, City staff estimates that potential additional development resulting from the proposed DRP amendments could result in an increase of approximately 274 residential units and approximately 16,600 square feet of commercial and office space over what could be developed under the General Plan without the proposed DRP amendments.

3. Project Applicant. The City of Santa Cruz is the project proponent.

4. Probable Environmental Effects of the Project. After completing a preliminary review of the project, as described in Section 15060 of the CEQA Guidelines, and preparing an Initial Study for the project, which is attached or is available for review on the City's website at: <http://www.cityofsantacruz.com/departments/planning-and-community-development/environmental-documents>, the City has determined that an EIR should be prepared to assess the potentially significant environmental impacts of this project. The City has identified the following possible effects of the project as topics for analysis in the EIR. The City will consider the written comments received in response to this Notice of Preparation in determining whether any additional topics should be studied in the Draft EIR.

- *Aesthetics* – Potential aesthetic impacts related to increased building heights will be reviewed based in part on results of a building massing study prepared for the City's Planning and Community Development Department.
- *Air Quality and Greenhouse Gas Emissions (GHG)* – Potential impacts resulting from emissions related to potential future development will be reviewed.
- *Biological Resources* – Potential impacts to San Lorenzo River habitat and species due to potential development resulting from increased building heights will be reviewed.
- *Cultural Resources* – Potential impacts to historical resources with redevelopment under the proposed plan amendments will be reviewed.
- *Hydrology and Water Quality* – Exposure to flood hazards.
- *Public Services and Utilities* – Fire and police protection services, schools, parks and recreation, wastewater treatment, municipal water service and solid waste disposal will be reviewed based on potential future development that could occur as a result of the proposed amendments.
- *Traffic and Transportation* – Findings of a traffic impact analysis, which is being prepared for the City's Planning and Community Development Department, will be provided and supplemented as needed in the EIR. Updated traffic counts and level of service analyses

will be provided at area intersections. The review will address other modes of transportation in the area, including transit, pedestrian and bicycle circulation.

- *Land Use* - Review of potential project conflicts with plans, policies or regulations adopted for the purpose of avoiding or mitigating an environmental effect will be provided in the EIR.

4. Contact Person Name and Phone Number:

Ron Powers, Principal Planner
City of Santa Cruz Planning and Community Development Department
809 Center Street, Rm. 206
Santa Cruz, CA 95060
Phone: 831 420-5216
Email: RPowers@cityofsantacruz.com

Responses to this Notice of Preparation are due by **March 17, 2017**.

Sincerely,



Ron Powers
Principal Planer

Attachments:

Location Map

Initial Study (Online at: <http://www.cityofsantacruz.com/departments/planning-and-community-development/environmental-documents>)

City of Santa Cruz
INITIAL STUDY / ENVIRONMENTAL CHECKLIST

I. BACKGROUND & PROJECT DESCRIPTION

1. **Application No:** Not Applicable
2. **Project Title:** Downtown Recovery Plan Amendments
3. **Lead Agency Name and Address:**
 City of Santa Cruz
 809 Center Street, Room 107
 Santa Cruz, CA 95060
4. **Contact Person and Phone Number:** Ron Powers, (831) 420-5216
RPowers@cityofsantacruz.com
5. **Project Location:** A portion of the downtown area of the city of Santa Cruz in the area generally bounded by Laurel Street on the south; the San Lorenzo River on the east; Cathcart Street and Soquel Avenue on the north; and Cedar Street on the west. Figure 1 shows the boundary of the project area.
6. **Project Applicant's/Sponsor's Name and Address:**
 City of Santa Cruz
7. **General Plan Designation:** Regional Visitor Commercial, except for the Metro Station property that is designated Community Facilities.
8. **Zoning:** CBD-Central Business District, except for the Metro Station property that is zoned PF-Public Facilities. The southern portion of the study area is zoned CZ-O Coastal Zone Overlay Boundary,
9. **Project Description:**

Background. The Downtown Recovery Plan (DRP) was adopted in 1991 to guide post-Loma Prieta earthquake reconstruction as the earthquake destroyed significant portions of downtown Santa Cruz. The intent was to establish policies, standards and guidelines to direct the recovery process toward the rebuilding after the earthquake. The DRP was adopted as a specific plan (pursuant to California Government Code requirements) to implement policies in the downtown area, and implementation also included amendments to the Zoning Ordinance. Specifically, DRP Chapter 4, the Development Standards and Design Guidelines, are incorporated by reference in Part 24 of the Zoning Ordinance, the Central Business District (CBD). The DRP has been modified several times over the past 25 years with the most recent change in 2016 to relocate the downtown sign regulations from the DRP to Chapter 24 of the Zoning Code.

The City Planning and Community Development Department and the Planning Commission began working on development standards for the Pacific Avenue Retail District and the Front Street/Riverfront Corridor at the request of the City Council in October 2014. The Planning Commission established two subcommittees to review and develop recommendations. The recommended amendments were forwarded to the City Council and in October 2016, the City Council directed staff to initiate environmental review on the proposed amendments.

Project Overview. The proposed project consists of a series of amendments to the City’s DRP, the GP 2030, and the LCP. The DRP amendments include revisions to Plan text and modifications to development guidelines and standards. The focus of the proposed DRP amendment is to expand the location in which the “Additional Height Zones” are applied and revisions to the Chapter 4 Development Standards of the DRP. The primary proposed modification would increase allowable building heights in the lower Pacific Avenue and lower Front Street areas and along the San Lorenzo River, between Cathcart and Laurel Streets. According to the City, these changes were initiated to provide more opportunities for housing in the core of the downtown. Increasing densities in the downtown is consistent with the overarching objectives of the City to maintain a compact downtown with a dense urban core in exchange for retaining a strong greenbelt. This amendment includes modifications to the format of the original DRP with the creation of a more formal Use Chart for ground level and upper level uses, as well as consolidating language relating to design guidelines and development standards. This amendment also includes the renaming of the plan to eliminate the “Recovery” from the title that was formerly associated with the post-earthquake reconstruction that is now mostly complete.

The proposed General Plan amendment would increase the upper limit of the floor area ratio (FAR) for the Regional Visitor Commercial land use designation in areas where expanded height would be permitted. As the building height increases would also result in an increased FAR. The proposed LCP amendments include changes to policies for the San Lorenzo Urban River Plan (SLURP) component of the LCP as further described below.

Summary of Proposed DRP Changes. The proposed amendments include minor revisions to text, reorganization of text, elimination of outdated text, and addition of new text and exhibits, including modifications to development standards regarding building height. Key proposed changes are summarized below and in Table 1.

- ☐ Remove references to the High Density Overlay (HDO) District, which was repealed in 2016 due to redundancy with the adopted *General Plan 2030* and Housing Element.
- ☐ Reorganize and combine Guideline language with Development Standard language into the same section with new standards for public passageways along Cathcart, Elm and Maple Streets.
- ☐ Introduce a percentage footprint with varying height limits for the Pacific Avenue Retail District and west of Front Street for projects taller than 55 feet. This volumetric approach is intended to ensure both vertical and horizontal variation to avoid monolithic structures.

- ❑ Increases allowable maximum building heights in three locations as shown on Figure 2 and summarized below:
 - Additional Height to 75 Feet: Extends the existing zone for additional height to the area along the west side of Pacific Avenue between Cathcart Street and Laurel Street under specified conditions. Current allowable heights are 50 to 60 feet.
 - Additional Height to 85 Feet: Extends the existing zone for additional height to 75 feet between Pacific Avenue and Front Street (between Cathcart and Laurel) under certain conditions and up to 85 feet for a smaller portion of large sites. Current allowable heights are primarily feet except for parcels south of Cathcart that are within 60 to 75 height zones.
 - Additional Height to 70 Feet: Creates a new zone that would change the maximum height from 50 feet to 70 feet under specific conditions along the east side of Front Street between Soquel Avenue and Laurel Street.

The Draft Plan requires the top floor of Front Street properties to not exceed 60% of the floor below and 60% of the building length, thereby ensuring that the skyline views will avoid a linear wall of building mass.
- ❑ Change the upper level stepback 42 degree or 52 degree standard to a numeric stepback approach above a specific height. A stepback is generally an upper floor building setback.
- ❑ The Draft Plan includes language to require the sloped side of the river levee between the levee and the private property to be filled with earth to achieve a similar elevation between the Riverwalk and the adjacent private development for the purposes of encouraging more connections to the Riverwalk. The original DRP did encourage filling along the levee, but the proposed language makes this public objective a mandatory design feature for new development.
- ❑ Include a Use Chart in a table format for both ground level and upper level uses for each of the four CBD subdistricts. This modification allows for easier reference with notes to details about particular uses. Very few changes are proposed to the allowable uses, but the proposed revisions include prohibition of cannabis dispensary facilities as a result of the passage of state Proposition 64, the ballot measure to allow personal recreational use of marijuana.

Neither the existing DRP nor the proposed amendments provide an exhaustive list of all potential and foreseen uses for the CBD subdistricts. The proposed DP does include more uses not mentioned in the original DRP, including required Community Care, Family Day Care and Supportive and Transitional Housing uses that are required by State Law. The proposed DP also includes a provision that allows the Zoning Administrator to determine whether a proposed unlisted use would be considered similar in nature to other listed uses that support the objectives of the DP and the CBD.

Potential Downtown Plan Area Buildout with Amendments. The proposed amendments will allow increased building heights in specified locations and under specified conditions. City Planning Department staff developed an estimate of potential buildout without and with the

proposed amendments for the purpose of evaluating potential environmental impacts as part of the CEQA review. It is estimated that the proposed amendment to expand the Additional Height Zones” could result in a net increase of approximately 711 residential units and approximately 2,200 square feet of office space with a net decrease of approximately 14,700 square feet of commercial building space over existing conditions within the study area. In comparison to potential redevelopment under the adopted *General Plan 2030*, City staff estimates that potential additional development resulting from the proposed DRP amendments could result in an increase of approximately 274 residential units and approximately 16,600 square feet of commercial and office space over what could be developed under the existing General Plan without the proposed DRP amendments.

Summary of Proposed LCP Amendment. A portion of the downtown lies within the coastal zone. Chapter 4 of the Downtown Recovery Plan is incorporated by reference in the CBD zone district, and the district is part of the implementation section of the LCP. Thus, revisions to the DRP Chapter 4 require review and approval by the California Coastal Commission.

In addition to the development standards of Chapter 4, there are also several LCP land use policies that are proposed to be modified. Since the original certification of the City’s LCP in 1985, additional plans have been prepared and policies incorporated into the LCP as amendments. The City adopted the San Lorenzo Urban River Plan (SLURP) in 2003 as a resource management protection plan for the river. Subsequent to the City Council approval, several resource-related and land use policies were included in the LCP by the Coastal Commission as an amendment to the City’s LCP. There are 11 SLURP policies that pertain to Front Street development, several of which are directed to areas outside of the coastal zone. The proposed amendment would remove these policies, nine of which are certified LCP policies, and add two new LCP policies.

10. Public Agencies Whose Approval or Review Is Required:

- California Coastal Commission: Approval of LCP amendment

II. ENVIRONMENTAL SETTING

The city of Santa Cruz is located at the northern edge of Monterey Bay. The project area encompasses approximately 12 acres in the lower downtown area of the City of Santa Cruz within the boundaries of the existing adopted DRP. Boundaries of the DRP plan area are: Laurel Street on the south, Cedar and Center Streets on the west, River and Water Streets on the north, and the top of the west levee of the San Lorenzo River on the east. The project area is the portion of the DRP area that is generally bounded by Laurel Street on the south; the San Lorenzo River on the east; Cathcart Street and Soquel Avenue on the north; and Cedar Street on the west. The project area is developed primarily with a mix of commercial uses with some upper floor office and residential uses. The area also includes the approximately 2-acre Metro Station, owned and operated by the Santa Cruz Metropolitan Transit District that serves as the bus plaza for the downtown area.

Table 1: Summary of Key Proposed DRP Amendments

Chapter	Existing	Proposed
Introduction, Executive Summary, Chapters 1, 2 and 3	Downtown Recovery Plan	All references to the updated plan refer to the plan as Downtown Plan (DP), except where specifically referring to the original document.
	The existing DRP uses the 1989 Loma Prieta earthquake as a baseline for describing character of the CBD zone. Language indicating historic character or historic fabric of the CBD meant pre-1989 earthquake character.	Some language has been modified to note that the City has had 25 years of post-earthquake development and recognizes that the CBD character has changed.
	Summary of the Plan Recommendations	Text clarifies that language represents recommendations in 1991.
	References to flood improvements.	Updated to reflect improvements to the San Lorenzo River levee made since the Loma Prieta earthquake.
	Descriptions and boundaries of the four CBD subdistricts - Pacific Avenue Retail, Front Street / Riverfront Corridor, Cedar Street Village Corridor, and North Pacific.	The general descriptions of the purposes and character of these four areas remain the same. The height map is moved to Chapter 4 with the other Development Standards.
	Reference and description of the High Density Overlay (HDO) District.	Text eliminated as the HDO was repealed in 2016.
Chapter 4 Prohibited Uses	The DRP was formatted to describe allowable uses by each of the four CBD subdistricts and further defined by ground floor and upper floor uses. The allowable uses were written in paragraph form and repeated for each subdistrict.	Reorganizes the allowable uses for all the CBD districts into a table format, similar to the Citywide code update format that will be more consistent with all zoning districts in the future. Adds two tables: one for ground level uses and one for upper floor uses.
	Prohibited uses are listed within Chapter 4 of the Plan. The Plan also includes a list of amortized uses that are to be phased out by October 2020.	Adds Medical and Recreational cannabis service providers to the list of prohibited uses within the Central Business District. No change is proposed for the types of uses that are listed to be phased out of the CBD by October 2020.
	Existing "Additional Height Zones" are located generally north of Cathcart and west of Front Street.	Expands zones of additional height to areas along lower Pacific Avenue and lower Front Street.
Chapters 5, 6 and 7	Circulation and Parking Plan, Streetscape and Open Space Plan, and Implementation and Management Strategy chapters remain intact.	The language of Chapters 5, 6 and 7 were not re-addressed with this update.
Appendices	Appendix 3 – Sign Regulations 5 – Floor Area Ratio (ordinance) 6 – Additional Height Zone C (specific to upper Pacific Avenue) 7 – Live Entertainment (ordinance)	Appendix 3 – Downtown Sign regulations previously were moved to the Zoning Ordinance, Chapter 24.12. Appendix 5 – Floor Area Ratio ordinance appendix deleted as being obsolete in the CBD. Appendix 6 – The Additional Height Zone C and the High Density Overlay Zone have been eliminated. Height Zone C is integrated with Additional Height Zone A; HDO Zone was repealed in 2016. Appendix 7 – Live Entertainment ordinance are in the Zoning Code Chapter 24.
Exhibits	Downtown Landscape Program	No change.
List of Maps and Diagrams	Land Use Concept Height Housing Zone A – Additional Height Standards Zone B – Additional Height Standards Many other diagrams listed.	Land Use Concept remains the same Height Map relocated to Chapter 4. Housing Map deleted as it represented the High Density Overlay Zone, which is now obsolete with the General Plan 2030. Additional Height Zones A and B are in Chapter 4.

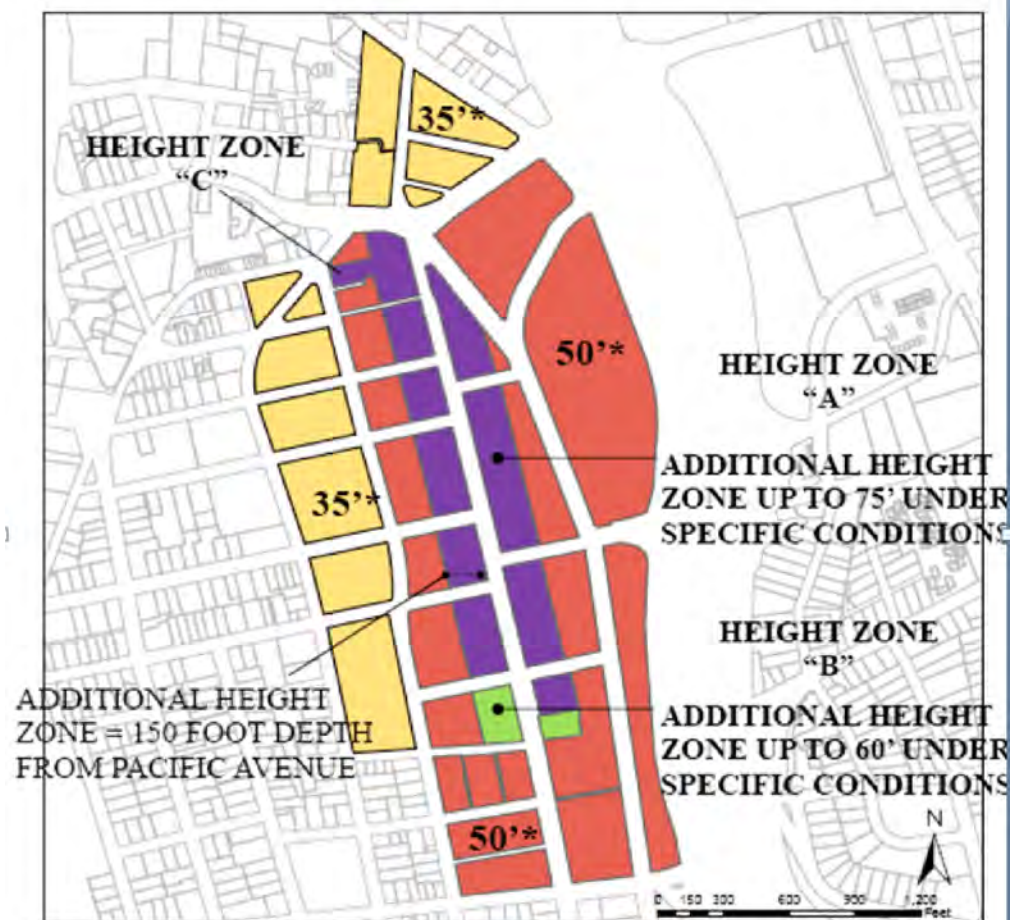
This page intentionally left blank.



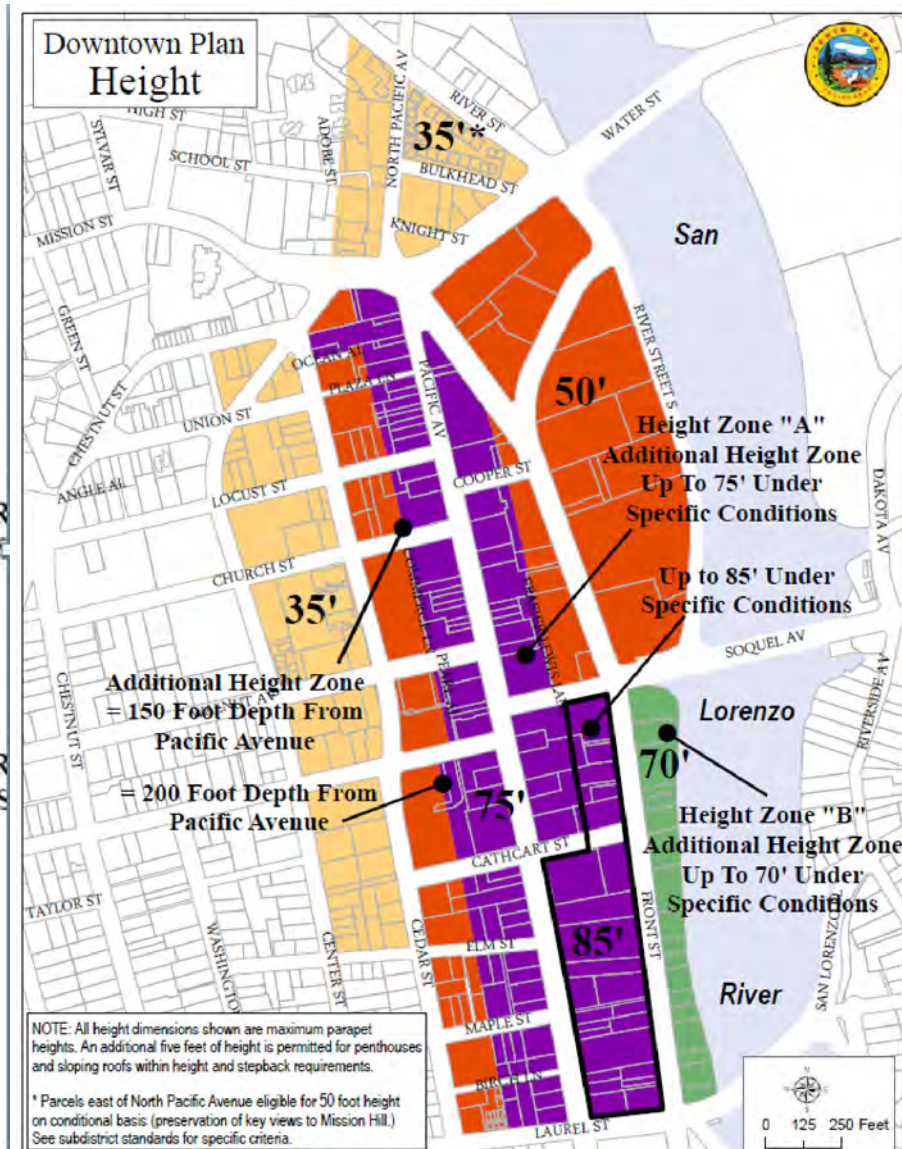
Plan Area

FIGURE 1
Plan Area Location Map

Existing Additional Height Zones



Proposed Additional Height Zones



SOURCE: City of Santa Cruz Planning and Community Development Department

FIGURE 2
Existing and Proposed Additional Height Zones

III. ENVIRONMENTAL CHECKLIST

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

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

Instructions to Environmental Checklist

1. A brief explanation is required (see VI. "Explanation of Environmental Checklist Responses") for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question (see V. Source List, attached). A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).
2. All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.
3. Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that any effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.
4. "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level.

5. Earlier Analysis may be used where, pursuant to the tiering, program EIR, or other CEQA process, one or more effects have been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case a discussion should identify the following on attached sheets:
 - a) *Earlier Analysis used.* Identify earlier analyses and state where they are available for review.
 - b) *Impacts adequately addressed.* Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
 - c) *Mitigation measures.* For effects that are "Less than Significant with Mitigation Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.
6. Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.
7. Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.
8. The explanation of each issue should identify:
 - a) The significance criteria or threshold, if any, used to evaluation each question; and
 - b) The mitigation measure identified, if any, to reduce the impact to less than significance.

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
1. AESTHETICS. Would the project:				
a) Have a substantial adverse effect on a scenic vista?			✓	
b) Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?			✓	
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	✓			
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?			✓	
2. AGRICULTURE AND FOREST RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement Methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use? (V.1b-Figure 4.15-1 in DEIR)				✓
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				✓
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?				✓
d) Result in the loss of forest land or conversion of forest land to non-forest use?				✓
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?				✓

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

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				✓
5. CULTURAL RESOURCES. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?	✓			
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?			✓	
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?			✓	
d) Disturb any human remains, including those interred outside of formal cemeteries?			✓	
e) Cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code 21074?				✓
6. GEOLOGY AND SOILS. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving: i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42. (V.1a) ii. Strong seismic ground shaking? iii. Seismic-related ground failure, including liquefaction? iv. Landslides? (V.1b-DEIR Figure 4.10-3)			✓ ✓ ✓	✓ ✓
b) Result in substantial soil erosion or the loss of topsoil?			✓	
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?			✓	

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property? (V.8b)				✓
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				✓
7. GREENHOUSE GAS EMISSIONS. Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			✓	
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?				✓
8. HAZARDS AND HAZARDOUS MATERIALS. Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?				✓
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?				✓
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ miles of an existing or proposed school?				✓
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				✓
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				✓
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				✓
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				✓
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires,				✓

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				
9. HYDROLOGY AND WATER QUALITY. Would the project:				
a) Violate any water quality standards or waste discharge requirements?				✓
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local ground water table level (for example, the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				✓
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?				✓
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?				✓
e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?			✓	
f) Otherwise substantially degrade water quality?			✓	
g) Place housing within a 100-year flood-hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map? (V.1b-Figure 4.7-1 in DEIR)	✓			
h) Place within a 100-year flood-hazard area structures which would impede or redirect flood flows? (V.1b-Figure 4.7-1 in DEIR)	✓			
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?				✓
j) Inundation by seiche, tsunami, or mudflow? (V.1b-Figure 4.7-2 in DEIR)	✓			

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
10. LAND USE AND PLANNING. Would the project:				
a) Physically divide an established community?				✓
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				✓
c) Conflict with any applicable Habitat Conservation Plan or Natural Community Conservation Plan?				✓
11. MINERAL RESOURCES. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state? (V.1a)				✓
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?				✓
12. NOISE: Would the project:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies?		✓		
b) Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels?				✓
c) Substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?			✓	
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			✓	
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				✓
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				✓

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
13. POPULATION AND HOUSING. Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	✓			
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				✓
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				✓
14. PUBLIC SERVICES. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or need for new or physical altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
a) Fire protection?			✓	
b) Police protection?			✓	
c) Schools?			✓	
d) Parks?			✓	
e) Other public facilities?				✓
15. RECREATION. Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?			✓	
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				✓
16. TRANSPORTATION/TRAFFIC. Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	✓			
b) Conflict with an applicable congestion management program, including, but not limited to level of				✓

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
service standard and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?				
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				✓
d) Substantially increase hazards due to a design feature (for example, sharp curves or dangerous intersections) or incompatible uses (for example, farm equipment)?				✓
e) Result in inadequate emergency access?				✓
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?				✓
17. UTILITIES AND SERVICE SYSTEMS. Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				✓
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?			✓	
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				✓
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	✓			
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?			✓	
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?			✓	
g) Comply with federal, state, and local statutes and regulations related to solid waste?				✓

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
18. MANDATORY FINDINGS OF SIGNIFICANCE. Would the project:				
a) Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?				✓
b) Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of the past projects, the effects of other current projects, and the effects of probable future projects.)		✓		
c) Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?				✓

DISCUSSION OF ENVIRONMENTAL CHECKLIST

See Section **VI--ENVIRONMENTAL EVALUATION** for discussion.

IV. DETERMINATION

On the basis of this initial evaluation:

I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.	
I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.	
I find that the proposed project MAY have a significant effect on the environment and an ENVIRONMENTAL IMPACT REPORT is required.	✓*
I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.	
I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.	



Ron Powers, Principal Planner

2/14/2017

Date

* Topics to be addressed in EIR as identified and discussed in this Initial Study include:

- Aesthetics
- Air Quality and Greenhouse Gas Emissions
- Biological Resources – Riparian Habitat
- Cultural Resources – Historic Resources
- Hydrology – Exposure to Flood Hazards
- Public Services and Utilities
- Transportation and Traffic
- Land Use Review of Project Conflicts with Adopted Plans and Regulations

V. REFERENCES AND DATA SOURCE LIST

1. City of Santa Cruz General Plan and EIR
 - a) Adopted June 26, 2012. *General Plan 2030*. Available online at: <http://www.cityofsantacruz.com/departments/planning-and-community-development/general-plan-2030>
 - b) April 2012. "City of Santa Cruz *General Plan 2030* Final EIR." [SCH#2009032007] Certified June 26, 2012. Includes Draft EIR document, dated September 2011. Available online at: <http://www.cityofsantacruz.com/departments/planning-and-community-development/general-plan-2030>
2. City of Santa Cruz Adopted Plans.
 - a) Adopted August 2016. *2015 Urban Water Management Plan*. Prepared by City of Santa Cruz Water Department.
 - b) Adopted 2013. *City of Santa Cruz Local Hazard Mitigation Plan 2012-2017*.
 - c) Adopted by City Council on February 28, 2006 and certified by the California Coastal Commission on May 9, 2008. *City-wide Creeks and Wetlands Management Plan*.
3. City of Santa Cruz Redevelopment Agency. July 1991. *Final Environmental Impact Report for the City of Santa Cruz Downtown Recovery Plan*. Includes Draft Environmental Impact Report, dated May 1991, prepared by EIP Associates.
4. Monterey Bay Unified Air Pollution Control District.
 - a) April 17, 2013, Adopted. "Triennial Plan Revision 2009 – 2011." Final.
 - b) August 2008. *2008 Air Quality Management Plan for the Monterey Bay Region*.
 - c) February 2008. "CEQA Air Quality Guidelines."
 - d) Adopted April 1996-Revised February 2016. *Guidelines for Implementing the California Environmental Quality Act*.

Initial Study Preparation: Dudek (Stephanie Strelow and Anais Schenk) in association with the City of Santa Cruz Planning and Community Development Department

VI. EXPLANATION OF ENVIRONMENTAL CHECKLIST RESPONSES

Introduction

As defined in the State CEQA Guidelines (section 15382 [pursuant to Public Resources Code sections 21083 and 21068]), a "significant effect on the environment" is:

...a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a

significant effect on the environment. A social or economic change related to a physical change may be considered in determining whether a physical change is significant.

Section 15064(d) of the State CEQA Guidelines indicates that an evaluation of significant effects “shall consider direct physical changes in the environment which may be caused by the project and reasonably foreseeable indirect physical changes in the environment which may be caused by the project.” This section further specifies that an indirect physical change in the environment is a physical change in the environment which is not immediately related to the project, but which is caused indirectly by the project. An indirect physical change is to be considered only if that change is a reasonably foreseeable impact which may be caused by the project.

The proposed project consists of amendments to the adopted DRP, GP and LCP. Adoption of the plan amendments would not directly result in development, and the proposed amendments do not include site-specific development. However, the proposed amendments would expand the geographical areas in which increased building heights may be allowed under specified conditions, which could result in additional building floors as part of future redevelopment in the area. Therefore, the amendments could lead to reasonably foreseeable indirect physical changes in the environment as discussed below. For the purposes of the CEQA analysis, City staff has estimated a potential net increase in future development of approximately 711 residential units and approximately 2,200 square feet of office space with a net decrease of approximately 14,700 square feet of commercial building space within the study area.

1. Aesthetics.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Have a substantial adverse effect on a scenic vista;*
- *Substantially damage scenic resources, including visually prominent trees, rock outcrops, or historic buildings along a state scenic highway;*
- *Substantially degrade the existing visual character or quality of the site and surroundings, i.e., be incompatible with the scale or visual character of the surrounding area; or*
- *Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.*

The project area is located along lower Pacific Avenue and lower Front Street, extending to the San Lorenzo River on the east and almost to Cedar Street on the west. According to maps developed for the City’s *General Plan 2030* and included in the General Plan EIR, the project site is not within a mapped panoramic view. Urban views, including those of the project site, are identified along the San Lorenzo levee (SOURCE V.1c-Figure 4.3-1).

The existing DRP allows for building height increases to up to 75 feet in specified situations along Pacific Avenue north of Cathcart Street and for an already developed parcel on the southeast

corner of Cathcart and Pacific. The proposed amendments would permit Increases in allowable heights in three locations as shown on Figure 2. The EIR for the DRP concluded that the additional height areas would not significantly impact the visual character of the area with implementation of the development standards and design guidelines included in the DRP, including upper floor setbacks.

Although, the proposed project does not include site-specific development proposal, the proposed amendments would expand the geographical areas in which increased building heights may be allowed under specified conditions. The Plan also includes design guidelines and development standards that would remain largely unchanged and would serve to guide structural siting and design. However, analysis of potential increases in building height and effects of future development on the visual character of the project area and surroundings require further review in an EIR. The analysis will review potential future building mass and scale based on a building mass study being prepared for the City Planning and Community Development Department. The EIR analysis will address impacts to scenic views, scenic resources, and light and glare, although no significant impacts are anticipated.

2. Agriculture and Forest Resources.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Convert prime farmland, unique farmland or farmland of state importance to non-agricultural uses;*
- *Conflict with existing zoning for agricultural use or a Williamson Act contract;*
- *Conflict with existing zoning for, or cause rezoning of, forest land;*
- *Result in the loss of forest land or conversion of forest land to non-forest use; or*
- *Involve other changes to the existing environment which, due to their location or nature, could result in conversion of farmland to non-agricultural use or conversion of forest land to non-forest use.*

The project area does not contain prime or other agricultural lands as mapped on the State Farmland Mapping and Monitoring Program, but is designated as “Urban and Built-up Land” (SOURCE V.1b-DEIR Figure 4.3-1). The area is not designated for agricultural uses in the City’s General Plan and is not located adjacent to lands that are in agricultural production. Therefore, the project would not interfere or conflict with agricultural operations. There are planted street trees within the project area, but these trees are not considered timber resources. The project area is not zoned Timberland Preserve. Thus, the proposed project would not result in or lead to the conversion of agricultural or forest lands to other uses.

3. Air Quality.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Conflict with or obstruct implementation of the applicable air quality plan;*

- *Violate any air quality standards or contribute substantially to an existing or projected air quality violation, i.e. result in generation of emissions of or in excess of 137 pounds per day for VOC or No_x, 550 pounds per day of carbon monoxide, 150 pounds per day of sulfur oxides (SO_x), and/or 82 pounds per day of PM₁₀ (due to construction with minimal earthmoving on 8.1 or more acres per day or grading/excavation site on 2.2 or more acres per day for PM₁₀) pursuant to impact criteria for significance developed by the MBUAPCD (MBUAPCD, "CEQA Air Quality Guidelines," February 2008);*
- *Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);*
- *Expose sensitive receptors to substantial pollution concentrations; or*
- *Create objectionable odors affecting a substantial number of people.*

(a) Conflict with Air Quality Management Plan. In 1991, the Monterey Bay Unified Air Pollution Control District (MBUAPCD), now named to the Monterey Bay Air Resources District (MBARD), adopted the *Air Quality Management Plan* (AQMP) for the Monterey Bay region in response to the California Clean Air Act of 1988, which established specific planning requirements to meet the ozone standards. The MBUAPCD has updated the AQMP five times. The most recent update, the Triennial Plan Revision 2009-2011, adopted in 2013, builds on and updates information developed in past AQMPs. The primary elements from the 2008 AQMP that were updated in the 2012 revision include the air quality trends analysis, emission inventory, and mobile source programs (SOURCE V.4a). The proposed project could indirectly lead to increased development intensity as properties in the project area redevelop due to proposed expansion of "Additional Height Zones" and potential increased building heights. Potential conflicts with the AQMP will be reviewed in the EIR based on MBARD methodologies.

(b-c) Project Emissions. To protect public health, both the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) have established ambient air quality standards (AAQS) that are the maximum levels of ambient (background) air pollutants considered safe, with an adequate margin of safety to protect public health and welfare. The national standards address six criteria pollutants, including ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, fine particulate matter (both PM₁₀ and PM_{2.5}, which refer to particles less than 10 microns and 2.5 microns, respectively), and lead. The state standards, which are generally more stringent than the federal standards, apply to the same pollutants as the federal standards do, but also include sulfate, hydrogen sulfide, and vinyl chloride.

The North Central Coast Air Basin (NCCAB), in which the project site is located, is under the jurisdiction of the MBARD and includes Santa Cruz, Monterey and San Benito Counties. The NCCAB is currently in attainment for the federal PM₁₀, ozone, nitrogen dioxide, sulfur dioxide, and carbon monoxide standards and is unclassified or attainment for the federal PM₂₅ and lead standards. The basin is designated non-attainment for the state ozone and PM₁₀ standards, and is in attainment for all other state standards, except for carbon monoxide for which it is unclassified. The MBARD's 2013 AQMP identifies a continued trend of declining ozone emissions in the Air Basin primarily related to lower vehicle miles traveled (SOURCE V.4a).

The project could indirectly result in generation of air emissions through new regional vehicle trips associated with potential future development accommodated by the proposed plan amendments. The timing, rate and amount of future development are not known. Future development projects are required to conduct air emissions calculations for projects whose size exceeds significant screening sizes presented in the AQMP to determine whether emissions exceed MBARD's adopted significance thresholds or potentially violate air quality standards. However, potential indirect impacts related to air emissions resulting from future development will be evaluated in an EIR. The MBARD's "CEQA Air Quality Guidelines," indicate that 8.1 acres could be graded per day with minimal earthmoving or 2.2 acres per day with grading and excavation without exceeding the PM₁₀ threshold of 82 lbs/day. The project area is approximately 12 acres in size, comprised of multiple properties. It is unlikely that any single future development project would exceed these guidelines.

(d) Sensitive Receptors. The project area is located within the developed downtown area of the city of Santa Cruz. Some existing buildings support upper level residential uses, and the DRP supports additional upper floor residential uses. Given the City's existing General Plan designations and zone districts, future development would consist of a mix of commercial and residential uses, but would not be expected to result in industrial development or uses that typically could expose sensitive receptors to substantial pollutant concentrations from a stationary emissions source. For CEQA purposes, a sensitive receptor is defined as any residence, including private homes, condominiums, apartments, and living quarters; education resources such as preschools and kindergarten through grade twelve (k-12) schools; daycare centers; and health care facilities such as hospitals or retirement and nursing homes (SOURCE V.4c).

Diesel particulate matter was identified as a toxic air contaminant (TAC) by the State of California in 1998. Following the identification of diesel as a TAC, the California Air Resources Board (CARB) developed a comprehensive strategy to control diesel PM emissions. The "Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles"—a document approved by ARB in September 2000—set goals to reduce diesel PM emissions in California by 75% by 2010 and 85% by 2020. This objective would be achieved by a combination of approaches (including emission regulations for new diesel engines and low sulfur fuel program). An important part of the Diesel Risk Reduction Plan is a series of measures for various categories of in-use on- and off-road diesel engines, which are generally based on the following types of controls:

- Retrofitting engines with emission control systems, such as diesel particulate filters or oxidation catalysts,
- Replacement of existing engines with new technology diesel engines or natural gas engines, and
- Restrictions placed on the operation of existing equipment.

Once the Diesel Risk Reduction Plan was adopted, the CARB started developing emission regulations for a number of categories of in-use diesel vehicles and equipment. In July 2007, the CARB adopted regulations for in-use, off-road diesel vehicles that will significantly reduce

particulate matter emissions by requiring fleet owners to accelerate turnover to cleaner engines and install exhaust retrofits.

Future development in the project area as a result of the proposed amendments would result in construction that may involve use of trucks and equipment that will emit diesel exhaust, including diesel particulate matter, a designated toxic air contaminant. There are some existing sensitive receptors (residential uses) within the project area that could be exposed to diesel exhaust emissions associated with future construction in the area. It is noted that future redevelopment of the study area could occur without the proposed plan amendments, but the proposed DRP amendment could result in additional building height and floors. Construction-related diesel emissions would be of limited duration (i.e., primarily during grading) and temporary. Furthermore, the State is implementing emission standards for different classes of on- and off-road diesel vehicles and equipment. Additionally, Title 13 of the California Code of Regulations (section 2485(c)(1)) prohibits idling of a diesel engine for more than five minutes in any location. Thus, it is not expected that the proposed project would indirectly expose sensitive receptors to diesel emissions and associated risks, but this will be further reviewed in the EIR.

(e) Odors. The proposed DRP, GP and LCP amendments would not result in changes to the type of permitted commercial and residential uses for the area. These existing permitted uses within the City's developed downtown setting typically would not be the type to create objectionable odors.

4. Biological Resources.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Have a substantial adverse effect, either directly or through habitat modifications on; or substantially reduce the number or restrict the range of any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;*
- *Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or US Fish and Wildlife Service;*
- *Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;*
- *Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;*
- *Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;*
- *Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or state habitat conservation plan;*
- *Substantially reduce the habitat of a fish or wildlife species;*

- Cause a fish or wildlife population to drop below self-sustaining levels; or
- Threaten to eliminate a plant or animal community.

(a-c) Special Status Species and Sensitive Habitat Areas. The project area is currently developed and does not support special status species. According to maps developed for the City's *General Plan 2030* and included in the General Plan EIR, the project area is not within a mapped sensitive habitat area (SOURCE V.1c-Figure 4.8-3). However, the San Lorenzo River is located along the eastern edge of the study area. The City's *City-wide Creeks and Wetlands Management Plan* establishes requirements for structural setbacks and development standards and guidelines that would be applicable to future development. The proposed plan amendments would expand areas where additional building heights may be permitted. Although, taller buildings would not be expected to adversely affect the adjacent river habitat, potential effects on aquatic habitat and species due to potential increased building heights and increased shadows and/or lighting will be further assessed in an EIR.

(d) Wildlife Movement/Nesting. Wildlife corridors are segments of land that provide a link between these different habitats while also providing cover. Wildlife dispersal corridors, also called dispersal movement corridors, wildlife corridors or landscape linkages, are features whose primary wildlife function is to connect at least two significant or core habitat areas and which facilitate movement of animals and plants between two or more otherwise disjunct habitats (SOURCE V.1b-DEIR). Three main corridors have been identified within the City that could provide connectivity between core habitats within or adjacent to the city: western corridor (Moore Creek), central corridor (San Lorenzo River and major tributaries), and eastern corridor (Arana Gulch) (Ibid.).

The project area is within an existing developed area, and future redevelopment would not affect wildlife movement along the river corridor as future development would be within the existing development footprint in the downtown area. Furthermore, future development with or without the proposed plan amendments would be required to comply the City's *City-wide Creeks and Wetlands Management Plan*, which establishes requirements for structural setbacks that would protect wildlife movement in the corridor. Therefore, adoption and implementation of the proposed plan amendments would not directly or indirectly substantially interfere with wildlife movement or with established wildlife corridors.

There are areas along the San Lorenzo River of known bird nesting sites. Further review of adjacent habitat and resources will be provided in an EIR. While the project will not directly result in new construction that would affect nesting birds, future development accommodated by the proposed amendments could result in impacts to nesting birds at the time of construction. However, measures in the *City-wide Creeks and Wetlands Management Plan* include pre-construction surveys where construction may affect nesting birds in order to prevent disturbance if nesting is occurring when construction is initiated. Tree removal during the breeding season (generally March 1 to August 1) also could result in direct mortality to nesting avian species protected under the Migratory Bird Treaty Act due to destruction if active nest sites are present. Construction activity for a prolonged period could affect nesting adults and result in nest

abandonment or failure. This is considered a *potentially significant impact*. Implementation of the pre-construction nesting surveys as set forth in the adopted Creeks Plan would reduce impacts to a less-than-significant level.

(e) Conflicts with Local Ordinances - Tree Removal. There are planted street trees throughout the downtown area. Future development under the DRP could result in tree removal, which could also occur under existing conditions without the proposed plan amendments.

Chapter 9.56 of the City Municipal Code defines heritage trees, establishes permit requirements for the removal of a heritage tree, and sets forth mitigation requirements as adopted by resolution by the City Council. Resolution NS-23,710 adopted by the City Council in April 1998 establishes the criteria for permitting removal of a heritage tree and indicates that one or more of the following findings must be made by the Director of Parks and Recreation:

- 1) The heritage tree or heritage shrub has, or is likely to have, an adverse effect upon the structural integrity of a building, utility, or public or private right of way;
- 2) The physical condition or health of the tree or shrub, such as disease or infestation, warrants alteration or removal; or
- 3) A construction project design cannot be altered to accommodate existing heritage trees or heritage shrubs.

City regulations require tree replacement for approved to include replanting three 15-gallon or one 24-inch size specimen or the current retail value which shall be determined by the Director of Parks and Recreation. Removal would be permitted if found in accordance with the above criteria and requirements. Approval of a tree removal permit automatically requires replacement trees as set forth above. Removal of a heritage tree that is consistent with the criteria, provisions, and requirements set forth in City ordinances is not considered a significant impact. Since future development would be subject to City regulations, any future removal of trees would be required to comply with City requirements, and therefore, any removed heritage trees would be replaced in the ratio required by the City and no significant impacts related to conflicts with local ordinances would occur.

(f) Habitat Conservation Plans. There are no adopted Habitat Conservation or Natural Community Conservation Plans in the project vicinity.

5. Cultural Resources.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5 of the State CEQA Guidelines*;*
- *Cause a substantial adverse change in the significance of an archaeological resource;*
- *Disturb any human remains, including those interred outside of formal cemeteries;*

- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; or
- Cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code 21074.

**Pursuant to CEQA Guidelines, "historical resources include a resource listed in, or determined to be eligible for listing in the California Register of Historical Resources; a resource included in a local register of historical resources; and any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California.*

A "substantial adverse change in the significance of an historical resource" means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired. The significance of an historical resource is materially impaired when a project demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register of Historical Resources or local register of historical places.

(a) Historical Resources. According to maps developed for the City's *General Plan 2030* and included in the General Plan EIR, the southwestern corner of the project area may be within a designated national historic district (SOURCE V.1c-DEIR Figure 4.9-4). Additionally, there are some structures within the study area that included in the City's Historic Building Survey. The proposed DRP, GP and LCP amendments do not change the area of future development, and the overall potential building footprints would remain unchanged. The proposed DRP amendments would allow for increased height in specific locations and under specified conditions, but would not change the area in which development and/or redevelopment could occur under existing adopted plans. However, potential indirect impacts to historical resources as a result of the project's proposed increased heights will be assessed in an EIR.

(b, d) Archaeological Resources. According to maps developed for the City's *General Plan 2030* and included in the General Plan EIR, the project site is within a mapped "sensitive" archaeological area (SOURCE V.1b-DEIR Figure 4.9-1) and within a "sensitive" historical archaeological area (SOURCE V.1b-DEIR Figure 4.9-3). The DRP EIR reported that archaeological sensitive areas are within several blocks of the downtown area, and excavations for large buildings and other construction could uncover buried unknown resources, although deep subsurface prehistoric sites were not expected (SOURCE V.3).

The City's General Plan (Action HA1.2.2) requires preparation of archaeological investigations on sites proposed for development within designated sensitive archaeological and/or historical archaeological areas, except for exempt uses within "sensitive" areas as described below.

HA1.2.2. Require preparation of archaeological investigations on sites proposed for development within areas identified as "Highly Sensitive" or "Sensitive" on the "Areas of Historical Archaeological Sensitivity" map, except for exempt uses within "Sensitive" areas as described below, prior to approval of development

permits. The investigation shall include archival research, site surveys and necessary supplemental testing as may be required, conducted by a qualified archaeologist. The significance of identified resources shall be ascertained in accordance with CEQA definitions, and impacts and mitigation measures outlined if significant impacts are identified, including, but not limited to recovery options and onsite monitoring by an archaeologist during excavation activities. A written report describing the archeological findings of the research or survey shall be provided to the City. Minor projects with little excavation may be exempt from this requirement. Minor projects generally involve spot excavation to a depth of 12 inches or less below existing grade, or uses that have virtually no potential of resulting in significant impacts to archaeological deposits. Exempt projects may include: building additions, outdoor decks, or excavation in soil that can be documented as previously disturbed.

The General Plan EIR included Mitigation Measure 4.9-1 that requires archaeological investigations for any designated site within areas of archaeological sensitivity as well as sensitive historical archaeological areas. Therefore, future site-specific development projects in designated sensitive areas would be required to comply with this provision and conduct archaeological investigations and incorporate measures if needed to mitigation impacts to archaeological resources. Additionally, all development is subject to provisions of the City's Municipal Code section 24.12.430 that requires construction to stop if archaeological resources or human remains are accidentally discovered during construction and sets forth a procedure for notification, evaluation and mitigation, if the find is determined to be a significant resource. The DRP EIR includes Mitigation 4.3-1 that requires stopping of construction if cultural resources are identified, which is similar to the provisions of the City's Municipal Code described above.

The proposed DRP, GP and LCP amendments do not change the area of future development, and the overall potential building footprints would remain unchanged. The proposed DRP amendments would allow for increased height in specific locations and under specified conditions, but would not change the area in which development and/or redevelopment is currently permitted. Therefore, with implementation of required archaeological investigations required by the General Plan, future development indirectly accommodated under the existing DRP or with the proposed DRP and LCP amendments would not result in a significant impact.

(c) Paleontological Resources. According to maps developed for the City's *General Plan 2030* and included in the General Plan EIR, the project area is located within an area mapped as Holocene Alluvium formation (SOURCE V.1b-DEIR Figure 4.9-5). Four geologic units within the City are known to contain fossils: Late Pleistocene alluvium; the Purisima Formation; the Santa Cruz Mudstone; and the Santa Margarita Sandstone (SOURCE V.1b-DEIR). Although Holocene alluvium is generally considered too young to contain paleontological resources, this geologic unit is moderately sensitive for paleontological resources because it is underlain by sedimentary geologic units that have a high paleontological sensitivity (Ibid.). General Plan Action HA1.2.3 requires the City to notify applicants within paleontologically sensitive areas of the potential for encountering such resources during construction and condition approvals that work would be halted and resources

examined in the event of encountering paleontological resources during construction. If the find is significant, the City would require treatment of the find in accordance with the recommendations of the evaluating paleontologist. Treatment may include, but is not limited to, specimen recovery and curation or thorough documentation.

The proposed DRP, GP and LCP amendments do not change the area of future development, and overall building footprints would remain unchanged. Future construction within the project area could result in discovery of unknown paleontological resources with or without the proposed project. With application of the notification process required by the General Plan, future development would not result in significant impacts in the event that paleontological resources are discovered during construction.

(e) Tribal Cultural Resources. State Assembly Bill 52, effective July 1, 2015, recognizes that California Native American prehistoric, historic, archaeological, cultural, and sacred places are essential elements in tribal cultural traditions, heritages, and identities. The law establishes a new category of resources in the California Environmental Quality Act called “tribal cultural resources” that considers the tribal cultural values in addition to the scientific and archaeological values when determining impacts and mitigation. Public Resources Code section 21074 defines a “tribal cultural resource” as either:

- (1) Sites, features, places, cultural landscapes, sacred places and objects with cultural value to a California Native American tribe that is either listed, or determined to be eligible for listing, on the national, state, or local register of historic resources, or
- (2) A resource determined by the lead agency chooses, in its discretion and supported by substantial evidence, to treat as a tribal cultural resource.

The California Public Resources Code section 21084.2 now establishes that “[a] project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment.” The Public Resources Code requires a lead agency to consult with any California Native American tribe that requests consultation and is traditionally and culturally affiliated with the geographic area of a proposed project. No Native American tribe has contacted the City of Santa Cruz and requested consultation.

6. Geology and Soils.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Expose people or structures to potential substantial adverse effects resulting from the rupture of a known earthquake fault, seismic ground shaking, landslides, or seismic-related ground-failure, including liquefaction, and that cannot be mitigated through the use of standard engineering design techniques;*

- *Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project and potentially result in an onsite or offsite landslide or slope failure;*
- *Result in substantial soil erosion or the loss of topsoil and subsequent sedimentation into local drainage facilities and water bodies;*
- *Be located on an expansive soil, as defined by the Uniform Building Code (1997) or subject or other soil constraints that might result in deformation of foundations or damage to structures, creating substantial risks to life or property; or*
- *Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available.*

(a-ii-iv,c) Seismic and Geologic Hazards. The project site is located in a seismically active region of California and the region is considered to be subject to very intense shaking during a seismic event. The City of Santa Cruz is situated between two major active faults: the San Andreas, approximately 11.5 miles to the northeast and the San Gregorio, approximately nine miles to the southwest. There are no active fault zones or risk of fault rupture within the City (SOURCE V.1b-DEIR).

According to maps developed as part of the City's recently adopted *General Plan 2030* and included in the General Plan and General Plan EIR, the project area is located in an area identified as being subject to liquefaction hazards (SOURCE V.1a and V.1b-DEIR Figure 4.10-4). According to maps developed as part of the City's recently adopted *General Plan 2030* and included in the General Plan EIR, the project site is not located in a mapped landslide area (SOURCE V.1b-DEIR Figure 4.10-3).

The proposed DRP, GP and LCP amendments do not change the area of future development, and overall building footprints would remain unchanged. The DRP EIR reported that the age and construction of buildings was a determining factor related to damages sustained during the 1989 Loma Prieta earthquake rather than the property location, especially unreinforced masonry buildings. However, all new construction must conform to the requirements of the California Building Code (CBC). Adherence to existing regulations and standards, including the CBC would minimize harm to people and structures from adverse geologic events and conditions. Buildings will be required to be designed in accordance with the latest edition of the California Building Code, which sets forth structural design parameters for buildings to withstand seismic shaking without substantial structural damage. Conformance to the CBC as required by state law and the City would ensure the maximum practicable protection available for structures and their associated trenches, excavations and foundations. Project designs are required to include the application of CBC Seismic Zone 4 standards (SOURCE V.1b-DEIR volume). The continuation of design review and code enforcement to meet current seismic standards is the primary mitigation strategy to avoid or reduce damage from an earthquake, and seismic safety standards are a requirement for all building permits (SOURCE V.2b). It is also noted that since the 1989 Loma Prieta Earthquake, all commercial and public buildings have been seismically retrofitted, and as infrastructure is repaired or replaced, updated seismic safety standards are incorporated (Ibid.).

Typically, standard geotechnical engineering procedures, soil testing, and proper design can identify and mitigate liquefiable soils. By using the most up-to-date standards, potential damage

related to liquefaction, including subsidence and settlement, can be reduced to levels that are generally considered acceptable (SOURCE V.1b-DEIR volume). Section 24.14.070 of the City's Municipal Code requires preparation of a site-specific geotechnical investigation for all development, except less than four units, in areas identified in the General Plan as having a high liquefaction potential to assess the degree of potential liquefaction and recommend appropriate design/mitigation measures.

Therefore, future development in the project area with or without the proposed plan amendments would be required to be designed in accordance with CBC requirements and recommendations of project-level geotechnical reports, which would avoid potentially significant impacts due to exposure to seismic hazards, including liquefaction.

(b, d) Soils and Erosion. The project area is currently developed. According to the City's General Plan EIR, the project site is not located within an area subject to high erosion (SOURCE V.1b-DEIR volume). The proposed DRP and LCP amendments do not change the area of future development, and overall building footprints would remain unchanged. Therefore, no impacts would directly or indirectly occur with adoption and implementation of the proposed plan amendments.

(e) Use of Septic Systems. The project will be connected to City sanitary sewers, and would not use septic systems.

7. Greenhouse Gas Emissions.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or*
- *Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.*

(a-b) Greenhouse Gas Emissions. Climate change refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns over a period of time. Climate change may result from natural factors, natural processes, and human activities that change the composition of the atmosphere and alter the surface and features of the land. Significant changes in global climate patterns have recently been associated with global warming, an average increase in the temperature of the atmosphere near the Earth's surface, attributed to accumulation of greenhouse house gas (GHG) emissions in the atmosphere. Greenhouse gases trap heat in the atmosphere, which in turn heats the surface of the Earth. Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities (SOURCE V.1b-DEIR volume). Climate change models predict changes in temperature, precipitation patterns, water availability, and rising sea levels, and these altered conditions can have impacts on natural and human systems in California that

can affect California's public health, habitats, ocean and coastal resources, water supplies, agriculture, forestry, and energy use (Ibid.).

The most common GHG that results from human activity is carbon dioxide, followed by methane and nitrous oxide (SOURCE V.1b-DEIR volume). The primary contributors to GHG emissions in California are transportation, electric power production, industry, agriculture and forestry, and other sources, including commercial and residential uses. Approximately 81% of California's emissions are carbon dioxide produced from fossil fuel combustion (Ibid.).

The State of California passed the Global Warming Solutions Act of 2006 (AB 32), which requires reductions of GHG emissions generated within California. The Governor's Executive Order S-3-05 and AB 32 (Health & Safety Code, § 38501 et seq.) both seek to achieve 1990 emissions levels by the year 2020. Executive Order S-3-05 further requires that California's GHG emissions be 80 percent below 1990 levels by the year 2050. AB 32 defines GHGs to include carbon dioxide, methane, nitrous oxide, hydrocarbons, perfluorocarbons and sulfur hexafluoride.

The CARB is the lead agency for implementing AB32. In accordance with provisions of AB 32, CARB has completed a statewide Greenhouse Gas Inventory that provides estimates of the amount of GHGs emitted to, and removed from, the atmosphere by human activities within California. In accordance with requirements of AB32, a Scoping Plan was adopted by CARB in December 2008 and updated in 2014. The Scoping Plan and 2014 Update identify emissions reduction measures and actions related to energy, transportation, agriculture, water conservation and management, waste management, natural resources, green building, and cap-and-trade actions.

The City's *General Plan 2030* includes goals, policies and actions on climate change, including reducing community-wide greenhouse gas emissions 30 percent by 2020, reducing 80 percent by 2050 (compared to 1990 levels), and for all new buildings to be emissions neutral by 2030. In October 2012, the City also adopted a "Climate Action Plan" that outlines the actions the City will take over the next ten years to reduce greenhouse gasses by 30%. The CAP addresses citywide greenhouse emissions and reduction strategies. The CAP outlines the actions the City and its partners may take pertaining to reduction of greenhouse gas emissions to meet the goals and implement the policies and actions identified in the *General Plan 2030*. The CAP provides City emissions inventories, identifies an emissions reduction target for the year 2020, and includes measures to reduce energy use, reduce vehicle trips, implement water conservation programs, reduce emissions from waste collection, increase solar systems, and develop public partnerships to aide sustainable practices. Measures are outlined for the following sectors: municipal, residential, commercial, and community programs.

The project could indirectly result in generation of air emissions through new regional vehicle trips associated with potential future development accommodated by the proposed plan amendments. The timing, rate and amount of future development are not known. Future development projects are required to conduct air emissions calculations for projects whose size exceeds significant screening sizes presented in the AQMP to determine whether emissions exceed MBARD's adopted significance thresholds or potentially violate air quality standards, and emissions

calculations include GHG emissions. However, indirect GHG emissions resulting from future development accommodated by the proposed project will be evaluated in the EIR as part of the air quality analysis. Potential project conflicts with the City's adopted CAP will be addressed in the EIR.

8. Hazards.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;*
- *Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;*
- *Emit hazardous emissions or handle hazardous materials or waste within ¼ miles of an existing or proposed school;*
- *Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment;*
- *Impair the implementation of or physically interfere with an adopted emergency response or evacuation plan; or*
- *Expose people or structures to a significant risk of loss, injury or death involving wildland fires.*

(a-d) Hazardous Materials. The project consists of adoption of amendments to the adopted DRP, GP and LCP. The proposed DRP and LCP amendments do not change the area of future development or uses permitted in the area. The range of commercial and residential uses allowed in the downtown area typically would not result in creation of risks associated with hazardous material transport, use, or disposal and would not result in exposure to health hazards or creation of a health hazard. The project area is not included on a list of hazardous materials compiled pursuant to Government Code section 65962.5 (known as the Cortese List).

(e-f) Location Near Airports. The site is not located near an airport or airstrip. The site is not included in a state hazardous materials site list.

(g) Emergency Response. The City of Santa Cruz has an Emergency Operations Plan (EOP) that details the City's concept of operations in response to disasters. The EOP outlines how information and resources are coordinated for disasters or threat of disasters. The City of Santa Cruz Emergency Operations Center Manager endeavors to conduct annual trainings, tabletop exercises and other drills that support the preparedness and response capabilities of city staff and the readiness of the Emergency Operations Center. Information updates and tabletop discussions are conducted to clarify staff roles and responsibilities in the EOC, in the Department Operations Centers (DOCs) and in the field to help protect people and property (SOURCE V.2b). The proposed plan amendments and potential future development accommodated by the DRP proposed

expansion of additional height zones would not impair or physically interfere with the implementation of this emergency operations plan.

(h) Wildland Fire Hazard. According to maps developed as part of the City's recently adopted *General Plan 2030* and included in the General Plan EIR and General Plan, the project area is not located within a high fire hazard area (SOURCE V.1b-DEIR Figure 4.6-1). The project area is within the developed downtown of the city of Santa Cruz.

9. Hydrology.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Violate any water quality standards or waste discharge requirements;*
- *Substantially deplete groundwater supplies or interfere substantially with groundwater recharge;*
- *Substantially alter the existing drainage pattern of the site or area or alteration of a stream in a manner that would result in substantial offsite erosion or siltation or flooding;*
- *Substantially increase the rate or amount of surface runoff which would exceed capacity of existing or planned storm drain facilities, cause downstream or offsite drainage problems, or increase the risk or severity of flooding in downstream areas;*
- *Substantially degrade surface water quality;*
- *Result in construction of habitable structures within a 100-year floodplain as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, which would expose people or structures to a significant risk of loss, injury or death due to flooding;*
- *Locate structures within a 100-year flood hazard area that would impede or redirect flood flows;*
- *Expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of the failure of a levee or dam; or*
- *Expose people or structures to a significant risk of loss, injury or death as a result in inundation by seiche, tsunami, or mudflow.*

(a) Violation of Water Quality Standards. The proposed project does not include discharges that would result in violation of water quality standards.

(b) Groundwater. The project site is located within a developed area and would not affect groundwater supplies.

(c-e, f) Drainage and Water Quality. The project area is served by a public storm drainage system. The area is developed with nearly, if not all of the area, covered with impervious surfaces. Future redevelopment would not substantially increase impervious surfaces and would not alter existing drainage patterns. Future development would be subject to the City's stormwater management requirements in which both volume and quality of stormwater runoff would be assessed.

Construction activity on projects that disturb one or more acres of soil must obtain coverage under the State's General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 99-08-DWQ). Construction activity subject to this permit includes clearing, grading, and disturbances to the ground such as stockpiling or excavation. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must list best management practices (BMPs) that the discharger would use to protect storm water runoff and the placement of those BMPs.

The proposed DRP, GP and LCP amendments do not change the area of future development, and the overall potential building footprints would remain unchanged. The proposed DRP amendments would allow for increased height in specific locations and under specified conditions, but would not change the area in which development and/or redevelopment is currently permitted. Therefore, with implementation of required stormwater management plans, future development indirectly accommodated under the existing DRP or with the proposed DRP and LCP amendments would not result in a significant impact related to drainage. The City's regulatory requirements and BMPs, as detailed in the "Stormwater Best Management Practices Manual" published by the City's Public Works Department, must be implemented, and projects over one acre in size would be required to prepare a SWPPP to protect water quality during construction.

(g-i) Flood Hazards. According to maps developed as part of the City's recently adopted *General Plan 2030* and included in the General Plan and General Plan EIR, the project area, as is all of the Downtown area, is located in an area identified as being subject to flood hazards along the San Lorenzo River (SOURCE V1.a and V.1b-DEIR Figure 4.7-1). According to maps developed as part of the City's recently adopted *General Plan 2030* and included in the General Plan and General Plan EIR, the project site is located in a mapped tsunami inundation zone (SOURCE V1.a and V.1b-DEIR Figure 4.10-3). As indicated above, the proposed DRP, GP and LCP amendments do not change the area of future development, and the overall potential building footprints would remain unchanged. The proposed DRP amendments would allow for increased height in specific locations and under specified conditions, but would not change the area in which development and/or redevelopment is currently permitted. However, review of hazards due to potential San Lorenzo River flooding, tsunami inundation and sea level rise in the project area will be examined in the EIR.

10. Land Use and Planning.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Physically divide an established community;*
- *Conflict with any applicable City land use plan, policy or regulation adopted for the purpose of avoiding or mitigating an environmental effect; or*
- *Conflict with any applicable Habitat Conservation Plan or Natural Community Conservation Plan.*

The project site is located at the edge of a developed area of the City. Construction of the project would not physically divide an established community.

(b-c) Consistency with Local Policies/ Plans. Review of potential project conflicts with plans, policies or regulations adopted for the purpose of avoiding or mitigating an environmental effect will be assessed in the EIR. The project site is not subject to any Habitat Conservation or Natural Community Conservation Plans.

12. Noise.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Expose persons to or generate noise levels in excess of standards established in the County's "Land Use Compatibility for Community Noise" chart;*
- *Expose persons to or generate excessive groundborne vibration or groundborne noise levels;*
- *Result in a substantial permanent increase in ambient noise levels above existing levels if it will expose outdoor activity areas of noise-sensitive land uses to a 5 dB increase in noise where existing noise levels are below 60 dBA L_{dn} , a 3 dB increase in noise where existing noise levels are between 60 and 65 dBA L_{dn} , or a 1.2 dB increase in noise where existing noise levels are above 65 dBA L_{dn} . An outdoor noise standard of 65 dBA (CNEL) at the property line shall be used in the assessment of operational noise impacts; or*
- *Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above existing levels.*

The project site is not located near an airport or private airstrip.

(a-b) Exposure to Noise. The project area is located in the downtown area of the city of Santa Cruz. Ambient noise levels are characterized by vehicular traffic, activities along Pacific and adjoining streets, and in limited cases music venues. Existing and future noise contours for selected roadways were updated as part of the City's *General Plan 2030*. An existing sound level of 65-66 decibels (dBA), measured in L_{dn} (Day/Night Average Sound Level), was identified within approximately 70 to 90 feet of the centerline of Front Street south of Soquel Avenue with an estimated future sound level of 66-67 dBA with General Plan buildout. An existing sound level of 60 dBA was identified within approximately 80 feet of the centerline of Pacific Avenue between Mission Street and Laurel Street with an estimated future sound level of 62 dBA (SOURCE V.1b-DEIR volume).

For commercial uses, normally acceptable exterior noise levels are 70 decibels and conditionally acceptable levels are identified as 60-70 dBA (SOURCE V.1b-DEIR volume). For multi-family residential uses, normally acceptable exterior noise levels are 65 decibels and conditionally acceptable levels are identified as 60-70 decibels (Ibid.). An interior CNEL of 45 dBA is mandated by the State of California Noise Insulation Standards (California Code of Regulations, Title 24, Part 6, Section T25 28) for multiple-family dwellings and hotel and motel rooms. Since normal noise attenuation

within residential structures with closed windows is about 20 dBA, an exterior noise exposure of 65 dBA Ldn allows the interior standard to be met without any specialized structural attenuation (e.g., dual paned windows) (Ibid.). For typical residential construction (i.e., light frame construction with ordinary sash windows), the minimum amount of exterior to interior noise reduction is at least 20 dBA with exterior doors and windows closed and approximately 15 dBA with windows partially open for ventilation. Buildings constructed of stucco or masonry with dual-glazed windows and solid core exterior doors can be expected to achieve an exterior to interior noise reduction of approximately 25-30 dBA (Ibid.).

Impact Analysis. Future development in the project area would be exposed to exterior and / or interior noise levels that exceed local and state requirements. However, the project area is not within locations that would expose people to noise in excess of established standards. This is considered a *less-than-significant impact*.

The proposed DRP, GP and LCP amendments do not change the area of future development, and overall building footprints would remain unchanged. However, proposed amendments to expand areas of increased height could result in additional residential development in upper floors of future buildings, which could expose additional residents to noise from traffic and activities in the downtown area. City staff has estimated a potential increase of approximately 711 residential units, which represents approximately 274 more units than potentially could be potentially developed under the existing General Plan. However, existing and future ambient noise levels would be within acceptable or conditionally acceptable ranges. Furthermore, Mitigation Measures 4.6-2(a) and 4.6-2(b) in the DRP EIR call for preparation and implementation of noise studies for projects that could be exposed to noise levels in excess of those defined as “normally acceptable” (SOURCE V.3), and as indicated above, window, insulation and other building material selection can reduce interior sound levels.

Implementation of the following mitigation would reduce the impact to a less-than-significant level.

MITIGATION MEASURE NOISE-1: Require preparation and implementation of acoustical studies for future residential development along Front Street to specific building design features that meet state interior sound levels.

(c) Permanent Noise Increases. The proposed DRP, GP and LCP amendments do not change the type of future uses that could occur in the area. Future redevelopment of ground floor commercial uses and upper floor residential or office uses would not be types of land uses that would result in new substantial sources of noise and no impact is anticipated.

(d) Temporary Noise. There would be a temporary increase in existing noise levels during construction of development projects accommodated by the existing DRP and with proposed amendments. The proposed project would not directly result in temporary increases in noise due to construction as no development projects are proposed as part of the proposed project. Noise impacts resulting from construction depend on the noise generated by various pieces of

construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive receptors, as well as existing ambient noise levels. Noise generated during construction would vary throughout the construction period and on any given day, depending on the construction phase and the type and amount of equipment used at the construction site. The highest noise levels would be generated during grading of the site, with lower noise levels occurring during building construction and finishing. Overall, construction noise levels would be temporary, short-term and fluctuate throughout the construction period. Because construction noise impacts would be temporary, the impact of construction noise would be less than significant.

The General Plan EIR concluded that future development would result in construction of varying sound level and duration, which could be an annoyance to adjacent residents. However, with implementation of the General Plan policies to minimize exposure to construction noise levels, the increase in temporary noise levels from construction-related activities would be considered a less-than-significant impact. The General Plan seeks to ensure that construction activities are managed to minimize overall noise impacts on surrounding land uses (HZ3.1.3). Development projects are reviewed on a case-by-case basis, and typical conditions of approval include limiting the day and times of day during which construction and/or heavy construction can be conducted, provision of notification to neighbors regarding construction schedules, and implementation of a process to receive and respond to noise complaints. These are some of the types of measures that would be implemented by the City to manage and minimize construction noise impacts. Therefore, temporary increased noise levels during construction of future development projects is considered a *less-than-significant* impact.

13. **Population and Housing.**

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure;*
- *Displace substantial numbers of existing housing units, necessitating the construction of replacement housing elsewhere; or*
- *Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.*

(a) Population Growth. The proposed project could lead to increased development intensity as properties in the project area redevelop due to proposed expansion of “Additional Height Zones” and future development of additional upper floor residential units. Population growth would be dependent on the type and size of residential units, which is not known. As previously indicated, City staff has estimated a potential increase of approximately 711 residential units as a result of the proposed DRP amendments, which represents approximately 274 more units than potentially could be potentially developed under the existing General Plan. It is expected that this potential

residential development and associated population would be within regional population and housing projections over the next 20 years. However, population growth resulting from the project will be addressed in the Growth Inducement section of the EIR.

(b) Housing. Future redevelopment in the project area will be on sites that do not currently support residential units, and thus, the proposed project is not expected to indirectly result in displacement of existing housing or people.

14. Public Services.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Result in substantial adverse physical impacts associated with provision of new or physically altered facilities, the construction of which could cause significant impacts, in order to maintain acceptable service for fire protection, police protection, schools and parks.*

The proposed project could lead to increased development intensity as properties in the project area redevelop due to proposed expansion of “Additional Height Zones”. Future development would be served by existing public services. Potential impacts on fire protection, police protection, parks and recreational services and schools will be evaluated in an EIR.

15. Recreation.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Increase the use of existing parks or recreational facilities such that substantial physical deterioration would occur or be accelerated; or*
- *Include recreational facilities or require construction or expansion of recreational facilities which might have an adverse physical effect on the environment.*

Santa Cruz offers residents and visitors a wide range of parks, open space, beaches, trails, and recreational opportunities. The City has responsibility for management, maintenance and operation of over 1,700 acres of parks and open space lands, and various community/recreational facilities, and oversees development of new parks and improvements within City-owned parks, open space, and community facilities. In the project area, the San Lorenzo River Walk provides pedestrian and bicycle access to the multi-use path on the river levee.

The proposed project could lead to increased development intensity as properties in the project area redevelop due to proposed expansion of “Additional Height Zones”. Future development would be served by existing public services. Potential impacts on parks will be evaluated in an EIR.

16. Transportation/Traffic.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;*
- *Change the level of service of a State Highway roadway segment from acceptable operation (LOS A, B, or C) to deficient operation (LOS D, E or F);*
- *Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;*
- *Substantially increase hazards due to a design feature (for example, sharp curves or dangerous intersections) or incompatible uses (for example, farm equipment);*
- *Result in inadequate emergency access; or*
- *Conflict with adopted policies, plans, programs that support supporting alternative transportation (for example, bus turnouts, bicycle racks).*

There are no adopted congestion management programs (CMP) within the City or region nor is the project area located near an airport. Therefore, there are no impacts related to conflicts with an applicable CMP or air traffic patterns.

a, d-f) Traffic and Transportation System Performance. The project area is located in the lower downtown area along Pacific Avenue and Front Street. The proposed project could lead to increased development intensity as properties in the project area redevelop due to proposed expansion of “Additional Height Zones” and future development of additional upper floor residential units. Thus, the project could indirectly result in a net increase of residential units and office space with a net decrease in commercial space, which would result in a change in trip generation and traffic in the area. Impacts on the transportation system will be evaluated in the EIR based on a traffic analysis prepared for the City Planning Department. The analysis will include signalized intersections where 25 or more net new trips are added per the City’s Traffic Impact Study Guidelines (City of Santa Cruz, *Traffic Impact Study Guidelines* 2009). Changes to level of service on the State Highway system will also be analyzed.

The project area also supports the Santa Cruz Metropolitan Transit District’s downtown bus station, and transit, pedestrian and bicycle trips are prevalent in the area. The DRP includes standards and guidelines to design for and promote pedestrian circulation in the downtown area. Alternate travel modes will be considered in the traffic impact evaluation. Review of other potential impacts including design hazards, emergency access, and conflicts with alternative transportation plans will also be provided in the EIR.

17. Utilities and Service Systems.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Exceed wastewater treatment requirements of the Regional Water Quality Control Board;*
- *Result in a water demand that exceeds water supplies available from existing entitlements and resources, and new or expanded supplies or entitlements may be needed;*
- *Require or result in construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;*
- *Require or result in construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;*
- *Result in wastewater flows exceed treatment plant capacity; or*
- *Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste demands.*

The proposed project could lead to increased development intensity as properties in the project area redevelop due to proposed expansion of "Additional Height Zones". Future development would be served by existing public utilities, including wastewater/collection and treatment, municipal water service and solid waste disposal. Potential impacts on these utilities will be evaluated in an EIR. See subsection 9(c-d) above regarding storm drainage.

18. Mandatory Findings of Significance.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines, City of Santa Cruz plans and policies, and agency and professional standards, a project impact would be considered significant if the project would:

- *Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory;*
- *Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of the past projects, the effects of other current projects, and the effects of probable future projects.); or*
- *Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly.*

(a) Quality of the Environment. The proposed project could result in indirect impacts to biological and cultural (historical) resources as discussed above in sections 4a-d and 5a, respectively, which will be further evaluated in an EIR.

(b) Cumulative Impacts. Cumulative impacts will be reviewed in the EIR.

(c) Substantial Adverse Effects on Human Beings. No environmental effects have been identified that would have direct or indirect adverse effects on human beings.

APPENDIX B

Notice of Preparation Comments

CALIFORNIA COASTAL COMMISSION

CENTRAL COAST DISTRICT OFFICE
725 FRONT STREET, SUITE 300
SANTA CRUZ, CA 95060
PHONE: (831) 427-4863
FAX: (831) 427-4877
WEB: WWW.COASTAL.CA.GOV



March 2, 2017

Ron Powers
City of Santa Cruz Planning and Community Development Department
809 Center Street, Room 206
Santa Cruz, CA 95060

Subject: Notice of Preparation of EIR: Downtown Recovery Plan, General Plan and Local Coastal Plan Amendments

Dear Ron:

Thank you for the opportunity to provide written comments on the Notice of Preparation (NOP) for the Downtown Recovery Plan (DRP), General Plan and Local Coastal Program (LCP) amendments project. As a preliminary matter, we would like to acknowledge our shared goal with the City to provide better pedestrian access connections between the City's downtown area and the San Lorenzo Riverwalk, and to improve the Riverwalk as a public access and recreation focal point for the City's downtown area. We believe that the Riverwalk is an extremely under-utilized public access and recreation feature of the City, and strongly support improved user experience for this area. The purpose of this letter is to help the City realize these goals by facilitating the Commission's review of the proposed changes to the certified LCP.

Local Coastal Program Amendment

The NOP correctly notes that several of the proposed amendments include changes to the City's certified LCP, and will therefore require Commission approval of an LCP amendment. In fact, the proposed amendments include both Land Use Plan (LUP) Policy changes, including to the San Lorenzo Urban River Plan (SLURP), as well as Implementation Plan (IP) standards, including the Central Business District Zone standards. The standard of review for LUP amendments is that they must be consistent with and adequate to carry out the Chapter 3 policies of the Coastal Act; and the standard of review for IP amendments is that they must be consistent with and adequate to carry out the policies of the certified LUP.

Project Description/Goals

The September 15, 2016 Staff Report to the Planning Commission stated that the project was intended to be consistent with the following Coastal Act policies related to access and recreation, protection of sensitive biologic resources, and protection of visual resources:

- Encourage and incentivize maximum public access to the San Lorenzo River in accordance with Section 30210 of the Coastal Act.

Ron Powers

Downtown Recovery Plan Amendments

March 2, 2017

Page 2

- Achieve superior connections to the San Lorenzo River above the existing DRP and existing SLURP policies, consistent with Section 30211 of the Coastal Act.
- Ensure that development adjacent to the Riverwalk will be designed to prevent impacts to the adjacent sensitive San Lorenzo River and will incentivize clean-up of degraded areas along the levee, consistent with Section 30240 of the Coastal Act. The DRP will continue to be sensitive to the pedestrian experience along the Riverwalk with design guidelines and upper floor step backs and open river pedestrian connections that will provide light, air and open space between buildings.
- Enhance opportunities to view and interact with the San Lorenzo River as a coastal resource consistent with Section 30251 of the Coastal Act. The DRP standards ensure that development will be sited and designed to be visually compatible with the surrounding downtown, while promoting new open space pedestrian plazas and passageways to the Riverwalk.

We would recommend that the CEQA document include these project goals as key objectives of the project.

Impact Analysis - *Aesthetics*

We have some concerns regarding the proposed new height standards along Front Street, which have the potential to impact public views along the Riverwalk and adjacent public recreational facilities. We would therefore request that the CEQA analysis include a visual resource analysis that includes extensive visual simulations from all appropriate public vantage points, including from along both sides of the Riverwalk, from the Soquel Avenue and Laurel Street bridges, from San Lorenzo Park, etc. The simulations should include a comparison between existing development and as proposed under the new height standards so that potential impacts to public views can be evaluated. The City should also consider installing story poles to show the limits of the proposed new height standards. In addition, the CEQA document should evaluate alternatives to the proposed new height standards that meet most of the project objectives but also reduce potential aesthetic impacts.

Biological Resources

The Coastal Act and LCP require that new development avoid impacts to environmentally sensitive habitat. The CEQA document should include an analysis of how the project may impact the San Lorenzo River, including: 1) establishing the appropriate setback of new development, and 2) potential impacts from shading resulting from the proposed building heights.

Hazards

The Coastal Act and LCP require that new development be sited and designed to avoid hazards. The CEQA document should analyze the project's location with respect to potential impacts from flooding. This analysis should account for the effects of sea level rise.

Ron Powers
Downtown Recovery Plan Amendments
March 2, 2017
Page 3

Land Use

The Coastal Act and LCP prioritize visitor serving and coastal recreational uses over residential uses. The CEQA document should evaluate appropriate land use and zoning designations for the locations adjacent to and near the Riverwalk along Front Street. Specifically, the CEQA document should evaluate requiring a mixed use zoning for this area, especially along the Riverwalk, with visitor serving and coastal recreational uses (e.g. restaurants with outdoor seating, bike/kayak rental, etc.) on the ground floor, and residential uses on higher floors.

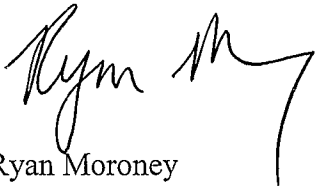
Recreation

We understand that some initial conceptual renderings of the project suggested transferring public right-of-way along the Riverwalk (and associated fill area) to the project developer. However, for the portion of the property located in the Coastal Zone, we believe that the entire public space between the Riverwalk and the proposed buildings along Front Street should be fully utilized for public purposes, including maximization of public access and recreation. Moreover, any such transfer of property would require a Coastal Development Permit that would be appealable to the Commission.

Water Quality

Finally, the Coastal Act and LCP require that erosion control measures be implemented to prevent siltation of streams and coastal lagoons, that discharge of polluted runoff be minimized, and that on-site detention and other appropriate storm water best management practices be used to reduce pollution from urban runoff. The CEQA document should evaluate implementation of Low Impact Development Best Management Practice standards such as bioretention/bioswales, permeable pavers/concrete, roof runoff catchment system and parking lot runoff catchment system for storage; and reuse on site and underground retention/detention units that include additional pre-filtration to remove hydrocarbons, metals, and other potential pollutants generated in the automobile use areas, including for new development along Front Street as well as proposed improvements to the levy system (i.e. the filling of the sloped levy) with the goal of reducing or eliminating runoff and pollution discharges into the River.

Thank you for your consideration of these comments. We look forward to working with the City through the local process.

A handwritten signature in black ink, appearing to read 'Ryan Moroney', with a stylized flourish at the end.

Ryan Moroney
District Supervisor
Central Coast District Office

DEPARTMENT OF TRANSPORTATION

50 HIGUERA STREET
SAN LUIS OBISPO, CA 93401-5415
PHONE (805) 549-3101
FAX (805) 549-3329
TTY 711
<http://www.dot.ca.gov/dist05/>



Serious drought
Help save water!

March 22, 2017

SCr: 1-18.73
SCH#: 2017022050

Mr. Ron Powers
Principal Planner
City of Santa Cruz
809 Center Street, Rm 206
Santa Cruz, CA 95060

COMMENTS TO THE DOWNTOWN RECOVERY PLAN ADMENDMENTS (DRP)

The California Department of Transportation (Caltrans), District 5, Development Review, has reviewed the Downtown Recovery Plan Amendments. As noted, this project will require amendments to the City's General Plan 2030, and the Local Coastal Plan that include revisions to the Plan text, modifications to guidelines and standards, and changes to coastal policies. As stated, the proposed Downtown Recovery Plan (DRP) amendment would expand the location in which the "Additional Height Zones" are applied and revisions to the Chapter 4 Development Standards of the DRP. The primary focus of the DRP would be to increase allowable building heights in the lower Pacific Avenue and lower Front Street areas and along the San Lorenzo River, between Cathcart and Laurel Streets that could lead to increased upper floor residential development.

Caltrans supports local planning efforts that are consistent with State planning priorities intended to support smart growth, promote equity, strengthen the economy, protect the environment, promote public health and safety, and makes the connection to climate change goals. We accomplish this by working with local jurisdictions to achieve a shared vision of how the transportation system should and can accommodate interregional and local travel.

1. To ensure the traffic study in the Draft Environmental Impact Report (EIR) includes the information needed to analyze the impacts (both cumulative and project specific) of this effort, it is recommended that the analysis be prepared in accordance with the Department's "Guide for the Preparation of Traffic Impact Studies," which can be found at: http://www.dot.ca.gov/hq/tpp/offices/ocp/igr_ceqa_files/tisguide.pdf.
2. The traffic study should include information on existing volumes within the study area, including the State transportation system, and should be based on recent traffic volumes less than two years old. Counts older than two years cannot be used as a baseline. Feel free to contact us for assistance in acquiring the most recent data available.

Mr. Ron Powers
March 22, 2017
Page 2

3. Please be aware that comments to this and any subsequent EIR for the project, will stress the importance of using the Association of Monterey Bay Area Governments Model for completing the traffic analysis.
4. The Draft EIR should also include an analysis of the multimodal travel demand expected from the proposed project. This analysis should also identify potentially significant adverse impacts from such demands and the subsequent mitigation measure to address them. Early collaboration, such as sharing the analysis and findings with Caltrans prior to official circulation, can lead to better outcomes for all stakeholders.
5. Projects that support smart growth principles which include improvements to pedestrian, bicycle, and transit infrastructure (or other key Transportation Demand Strategies) are supported by Caltrans and are consistent with our mission, vision, and goals.
6. At any time during the environmental review and approval process, Caltrans retains the statutory right to request a formal scoping meeting to resolve any issues of concern. Such formal scoping meeting requests are allowed per the provisions of the California Public Resources Code Section 21083.9 [a] [1].
7. In addition, any work within the State right-of-way will require an encroachment permit issued from Caltrans. Detailed information such as complete drawings, biological and cultural resource findings, hydraulic calculations, environmental reports, traffic study, etc., may need to be submitted as part of the encroachment permit process.

Should you have any questions, or need further clarification on any of the items discussed above, please contact me at (805) 549-3099 or by email at: jennifer.calate@dot.ca.gov.

Sincerely,



JENNIFER CALATE
Associate Transportation Planner
District 5 Development Review Coordinator
jennifer.calate@dot.ca.gov

cc: Kelly McClendon (D5)



U.S. Department of Homeland Security
 FEMA Region IX
 1111 Broadway, Suite 1200
 Oakland, CA. 94607-4052



FEMA

February 23, 2017

Ron Powers, Principal Planner
 City of Santa Cruz
 Planning and Community Development Department
 809 Center Street, Room 206
 Santa Cruz, California 95060

Dear Mr. Powers:

This is in response to your request for comments regarding the Notice of Preparation of Environmental Impact Report re: Downtown Recovery Plan, General Plan and Local Coastal Plan Amendments in the City of Santa Cruz.

Please review the current effective countywide Flood Insurance Rate Maps (FIRMs) for the County of Santa Cruz (Community Number 060353) and City of Santa Cruz (Community Number 060355), Maps revised May 16, 2012. Please note that the City of Santa Cruz, Santa Cruz County, California is a participant in the National Flood Insurance Program (NFIP). The minimum, basic NFIP floodplain management building requirements are described in Vol. 44 Code of Federal Regulations (44 CFR), Sections 59 through 65.

A summary of these NFIP floodplain management building requirements are as follows:

- All buildings constructed within a riverine floodplain, (i.e., Flood Zones A, AO, AH, AE, and A1 through A30 as delineated on the FIRM), must be elevated so that the lowest floor is at or above the Base Flood Elevation level in accordance with the effective Flood Insurance Rate Map.
- If the area of construction is located within a Regulatory Floodway as delineated on the FIRM, any *development* must not increase base flood elevation levels. **The term *development* means any man-made change to improved or unimproved real estate, including but not limited to buildings, other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, and storage of equipment or materials.** A hydrologic and hydraulic analysis must be performed *prior* to the start of development, and must demonstrate that the development would not cause any rise in base flood levels. No rise is permitted within regulatory floodways.

Ron Powers, Principal Planner

Page 2

February 23, 2017

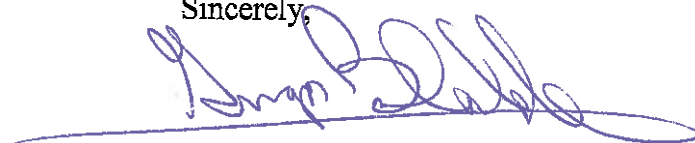
- All buildings constructed within a coastal high hazard area, (any of the "V" Flood Zones as delineated on the FIRM), must be elevated on pilings and columns, so that the lowest horizontal structural member, (excluding the pilings and columns), is elevated to or above the base flood elevation level. In addition, the posts and pilings foundation and the structure attached thereto, is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components.
- Upon completion of any development that changes existing Special Flood Hazard Areas, the NFIP directs all participating communities to submit the appropriate hydrologic and hydraulic data to FEMA for a FIRM revision. In accordance with 44 CFR, Section 65.3, as soon as practicable, but not later than six months after such data becomes available, a community shall notify FEMA of the changes by submitting technical data for a flood map revision. To obtain copies of FEMA's Flood Map Revision Application Packages, please refer to the FEMA website at <http://www.fema.gov/business/nfip/forms.shtm>.

Please Note:

Many NFIP participating communities have adopted floodplain management building requirements which are more restrictive than the minimum federal standards described in 44 CFR. Please contact the local community's floodplain manager for more information on local floodplain management building requirements. The City of Santa Cruz floodplain manager can be reached by calling Eric Marlatt, Zoning Administrator, at (831) 420-5115. The Santa Cruz County floodplain manager can be reached by calling Antonella Gentile, Planner, at (831) 454-3164.

If you have any questions or concerns, please do not hesitate to call Michael Hornick of the Mitigation staff at (510) 627-7260.

Sincerely,

A handwritten signature in blue ink, appearing to read "Gregor Blackburn", is written over a horizontal line.

Gregor Blackburn, CFM, Branch Chief
Floodplain Management and Insurance Branch

Ron Powers, Principal Planner

Page 3

February 23, 2017

cc:

Eric Marlatt, Zoning Administrator, City of Santa Cruz

Antonella Gentile, Planner, Santa Cruz County

Maggie Dutton, State of California, Department of Water Resources, South Central Region
Office

Michael Hornick, NFIP Compliance Officer, DHS/FEMA Region IX

Alessandro Amaglio, Environmental Officer, DHS/FEMA Region IX

From: Jean Brocklebank [<mailto:jeanbean@baymoon.com>]

Sent: Wednesday, March 15, 2017 8:24 PM

To: Ron Powers

Subject: Downtown Recovery Plan, General Plan and Local Coastal Plan Amendments

Dear Mr. Powers ~

Please accept these comments for consideration.

[Friends of San Lorenzo River Wildlife](#) (FoCLB) is concerned about all potential environmental impacts to wildlife and wildlife habitat, as a result of proposed amendments to the Downtown Recovery Plan.

Any development along the river corridor will impact avian species. East-facing windows will reflect the rising sun and cause confusion for birds. More birds are killed by flying into building windows than by any other means. FoCLB expects the City to address this impact and research ways to prevent bird deaths due to new buildings, regardless of height.

There is precedence for our request. Close to home, on Tuesday March 7, 2017 the San Jose City Council voted to prioritize working on ***bird-safe design guidelines for buildings near creeks***. City staff will begin work on studying this issue over the coming year, and will bring their recommendations to the City Council when this work is finished.

The documents of the San Jose City Council, which explain their wise action, can be found here for your review:

March 7, 2017 City Council Meeting (see Consent Agenda item 3.3 Memorandum):
http://sanjose.granicus.com/GeneratedAgendaViewer.php?event_id=ab6006f9-5128-44f5-b750-e2f3c2e336fe

Memorandum with bird buildings (see #7 Riparian Corridor & Bird-Safe Buildings):
http://sanjose.granicus.com/MetaViewer.php?view_id=&event_id=2674&meta_id=619420

In general, FoCLB wants development farther away from the river and the Riverwalk. This will allow people to enjoy the river without buildings being built almost on top of it. FoCLB opposes any amendment that will provide development adjacent to the river that allows increased building heights.

Sincerely,
Jean Brocklebank
Michael Lewis
on behalf of Friends of San Lorenzo River Wildlife



SANTA CRUZ COUNTY GROUP

Of The Ventana Chapter

P.O. Box 604, Santa Cruz, CA 95061

<https://ventana2.sierraclub.org/santacruz/>

e-mail: sierraclubsantacruz@gmail.com

March 15, 2017

To:

Ron Powers, Principal Planner

City of Santa Cruz Planning and Community Development

809 Center Street, Rm. 206

Santa Cruz, CA 95060

Subject: Comments on EIR for Downtown Recovery Plan

Dear Ron Powers,

The Sierra Club appreciates the opportunity to respond to the Notice of Preparation of an Environmental Impact Report for the Downtown Recovery Plan (DRP), General Plan and Coastal Plan Amendments.

Issues of environmental concern that will have a potentially significant impact are listed in the Initial Study/Environmental checklist and we anticipate responding to those depending on the findings in the draft EIR. The specific issues listed below are those we feel need careful, in-depth review via the EIR or are those we see as not included in the Initial Study.

- The amendment to eliminate 9 of the 11 policies in the 2003 San Lorenzo Urban River Plan (SLURP) needs its own section and full explanation for such action with alternatives. These 9 policies are certified under the Local Coastal Plan. SLURP was intended to protect, restore and enhance this important riparian natural resource. It has never been fully implemented nor replaced with a Plan to reflect the environmental goals and recommendations in the 2030 General Plan.
- Any analysis of the impacts on wildlife species can be determined only by a thorough, current baseline study of the San Lorenzo River (SLR) riparian fish, wildlife and fauna by qualified biologists specializing in such species. We request that such study be undertaken.
- The EIR should include study of the Urban Heat Island effect on riparian habitat from this scale of urban development as well as the impacts on birds and other wildlife generated from the additional lighting, glass windows and people.

- The Aesthetics section appears to be limited in its inclusion of the various view-sheds that will be impacted by building heights up to 85 feet along the SLR. For example, the view from the eastern side of the river is not but should be included. The EIR should include renditions that are realistic, not distorted via aerial views or placing people in the foreground, which minimizes the background scale of the proposed structures.

We look forward to seeing the above issues addressed in the draft EIR.

Sincerely,

Greg McPheeters
Chair, Santa Cruz Group, Sierra Club

From: Ron Powers [<mailto:RPowers@cityofsantacruz.com>]
Sent: Tuesday, June 20, 2017 1:34 PM
To: Stephanie Strelow
Subject: FW: Downtown Update Plan - Zoning and Climate Change

On Jun 16, 2017, at 1:43 AM, Candace Brown <clbrown23@gmail.com> wrote:

Dear Ron and Alex and Maggie,

Maggie, Please pass this email to the Planning Commission members regarding new building heights.

Ron, You mentioned that Climate Change issues are in the June 15th Staff Report to the Planning Commission and I have not found it in the document yet. Do you have a page reference? I assume the worst case scenario impacts of Climate Change on the Downtown Update Program EIR will be considered.

Can you also please pass along your presentation of tonight, June 15th, at the Planning Commission too. Thanks.

Alex and Ron, Note in Miami, now new buildings and wastewater infrastructure are five feet higher due to Climate Change. This is an extensive article on the impacts.
<http://www.bbc.com/future/story/20170403-miamis-fight-against-sea-level-rise>

Canada is waking up to the issue of Climate Change and changes now being considered in the National Building Code of Canada.
<https://www.desmog.ca/2017/03/07/canada-s-buildings-will-finally-be-built-climate-change-mind>

Is Flood Management built into the future Santa Cruz code? Impacts are in sufficient base floor heights, drainage systems, backwater valves in sewer systems so they don't back-up into basements, storm drains and where to divert water that overrun the system during flooding. Electrical systems need to be adequately protected and back-up systems should not be in basements. These issues could be dealt with in the Zoning or Building Codes.
<http://www.intactcentreclimateadaptation.ca/wp-content/uploads/2016/10/Intact-Centre-Climate-Change-and-the-Preparedness-of-Canadian-Provinces-and-Yukon-Oct-2016.pdf#page=14>

Thanks, Candace Brown
Cell: 1-818-203-4965

-----Original Message-----

From: Gillian Greensite [mailto:gumtree@pacbell.net]

Sent: Friday, June 23, 2017 10:07 AM

To: Ron Powers

Subject: Downtown Recovery Plan

Hi Ron,

As part of the EIR, I and others request that story poles be erected along the river levee for the entire comment period in order for the public to assess the visual impact of the heights of new buildings. Even if exact heights in exact locations are not yet determined, the massing studies gave sufficient detail to erect such poles in the sites proposed for development.

Thank you,

Gillian

-----Original Message-----

From: Gillian Greensite [mailto:gumtree@pacbell.net]

Sent: Saturday, June 24, 2017 6:36 AM

To: Ron Powers

Subject: Re: Downtown Recovery Plan

Hi Ron,

Thanks for your reply. The poles could be located on the levee since the yards of the housing would be level with the levee according to renditions shown at the various meetings. However I do note that you say you cannot accommodate the request.

Regarding photo simulations, this is to request that they avoid birds eye views and avoid placing people etc. in the foreground which distorts the scale of the building in the background. Besides views from the east side of the river and from Front St. it would be helpful to have a view from the perspective of a person walking the levee, showing the building heights on the same plane as the person.

Thank you,

Gillian

From: Debbie Hencke [<mailto:dhencke@gmail.com>]

Sent: Friday, March 17, 2017 12:06 PM

To: Ron Powers

Cc: Cynthia Chase; David Terrazas; Sandy Brown; Chris Krohn; Cynthia Mathews; Richelle Noroyan; Martine Watkins

Subject: Response to planned EIR

RE: Downtown Recovery Plan, General Plan and Local Coastal Plan Amendments

Concerning the 85 feet height and other tall buildings in a 12 square mile area:

The plan as presented is a disaster. It degrades the beautiful historic district that we have all come to care about. It will obliterate the River views and the uniqueness of being able to walk and lunch along it. What you're proposing as far as height of 85 feet will just keep going up with the planning departments' unabashed granting of variances. Santa Cruz does not want to become another San Francisco or Los Angeles.

We are the smallest county (except for SF) in the state. Do NOT destroy the future with what you think is ok or are told "is the future." If you want a Facebook or Google campus look try San Jose. If you feel you must build because the State tells you to, then confront the reality of this small county and limited resources and change the State. We have the most parks of any county in the state and we can't have both - unabashed development and a huge percentage of land tied up in parks. The State needs to rethink where to build, not Santa Cruz.

Remember that for every apartment you build at the current cost of rent, you need 4-5 low income wage earners to do their laundry, shopping/retail, shoe repair, food outlets, bakeries, restaurants, parking monitoring, etc. - all low income wages and where are those workers going to live? If you think the homeless population is a problem now, it will only continue to worsen and in the experience of other large cities who have built tall buildings, make the area a slum.

There seems to be no consideration of traffic. Assuming people will get out of their cars is not a model that has been proven effective nor viable. While the current health emphasis is on being healthy, people get old and bodies break down. Not everyone can ride a bike or walk miles. It is unrealistic to think in Utopian terms that an area will be "self contained." People want to explore their surroundings, travel and connect in ways that this project does not take into consideration. Traffic is already at a standstill on beautiful days and weekends. Where is the realistic traffic issues in this EIR presentation?

There is no consideration of sewage and water issues that plague this county. Drawing water from the River is the same as injecting treated sewage into the aquifers. There is no way to remove the multitude of chemicals from the septic systems of thousands upstream. There are hormones, antibiotics, chemotherapy agents, and so on to say nothing of the cleaning and auto chemicals people use that find their way into septic systems and the river. What you should be focusing on is the storage of water for drought years and sewage treatment upstream as well as locally. The water issue needs to be solved first.

Lastly, people come to Santa Cruz because of its small town uniqueness. They don't come here to look at 85 foot buildings surrounding the river or even other higher density buildings. They come because it is unique. Turning this area into some utopian concept is not going to draw people or solve the housing situation. It is not a draw for tourism and economic viability.

This plan is not the answer to the housing shortage if one considers the true consequences of such development including water and traffic issues.

Thank you for your attention.

Debbie Hencke
831-359-9391 cell
160 Pine Flat Rd.
Santa Cruz, Ca. 95060
alternate:
419 Morrissey Blvd.
Santa Cruz, Ca. 95062

Ron Powers, Principal Planner
City of Santa Cruz Planning and Community Development
809 Center Street, Rm. 206
Santa Cruz, CA 95060

3/16/17

Dear Ron Powers,

Thank you for the opportunity to comment on the Notice of Preparation of an Environmental Impact Report for the Downtown Recovery Plan.

Here are some items I like to address:

1. AESTHETICS. Would the project:

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

The development is close to the riparian corridor. The additional lights will have impact on the wildlife, birds. There is no mention of consideration to this impact, which deserves to be addressed

Environmental impacts: Potentially Significant Issues

3. AIR QUALITY.

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

The intended height, the additional traffic, increase of building mass have the potential to create “Urban Heat Island” effect. This is contrary to Santa Cruz Climate Change Policy.

4. BIOLOGICAL RESOURCES.

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

The San Lorenzo River(SLR) Steelhead, Coho are on the endangered species list. The SLR is also an important water & land migratory bird corridor. The impact of the Front St development on the wildlife has to be addressed due to height, building mass & additional lightening.

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

This impact can only be determined on hand of a thorough, current data baseline study of the SLR riparian fish, wildlife & fauna inventory.

Environmental impacts:Potentially Significant Issues

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

The Front St Development requires that 9 out of 11 SLURP policies get eliminated, because they are in conflict w/the Development. The development is not in compliance w/The 2030 General Master Plan Environment Goals & Recommendations. Thus it is in conflict w/local policies of protecting biological resources.

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

As of this date City of Santa Cruz doesn't a Habitat Conservation Plan in place. This fact makes it hard to determine if a conflict exists.

Environmental impacts:Potentially Significant Issues

18. MANDATORY FINDINGS OF SIGNIFICANCE.

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

This potential can only be evaluated by a data baseline study of existing fish, wildlife, fauna inventory, which doesn't exist @ this time. It's impossible to know the impacts w/out a current inventory.

Environmental impacts:Potentially Significant Issues

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

response to a) applies

Environmental impacts:Potentially Significant Issues

Respectful thank you.

jane mio

Dear Planning Commissioners & City Council Members,

The Front St. development guidelines lack sufficient attention to the fact that the intended development is right next to a Riparian Corridor, an important watershed, which require specific considerations.

The potential light impact & bird-safe building guidelines are not adequately addressed.

It is worth noting that other Bay-area Cities have integrated the safe-bird building issue in their planning process:

<http://www.greenfoothills.org/speak-up-for-birds-in-san-jose/>

San Francisco & Sunnyvale have bird-safe ordinances as well.

<http://sunnyvale.ca.gov/Portals/0/Sunnyvale/CDD/Planning/Planning%20Library/BirdSafeGuidelines.pdf>

<http://sf-planning.org/standards-bird-safe-buildings>

Here are my comments for [Attachment 4](#) pertaining to Local Coastal Program SLURP policies, which are conceptual ideas/recommendations in [Chapter 6 Significant Riverfront Areas](#).

SRFA-1

Eliminating the entire section w/out including language that addresses the San Lorenzo River identity as an important consideration in the planning process is not in line with the General 2030 Master Plan, Park & Rec. 2030 Master Plan nor the San Lorenzo Urban River Plan.

The height & setback need to be evaluated in regard to their impact on the river environment.

The San Lorenzo Urban River Plan states in “1.4 Relationship to Existing City Plans” page 13:

[Future updates of the General Plan and Local Coastal Program will incorporate recommendations from the San Lorenzo Urban River Plan for “significant riverfront areas” including Front Street, Salz Tannery, and Beach Flats, ..etc. Additionally, the recommendations of the Urban River Plan should be referenced in regional plans referring to the San Lorenzo River and watershed.](#)

SRFA 3:

This section deserves to be reviewed & evaluated with regard towards responsible environment policies/guidelines.

The stated building materials absorb/reflect less heat, which benefit the health of the watershed & the Climate Change condition.

The language of SRFA 3 might not be appropriate for LCP. On the other hand these are worthwhile concepts for a City, which views itself as environment conscious.

Revising SRFA 3 will incorporate the 1.4 San Lorenzo Urban River Plan section, which states:

The (Downtown Recovery) Plan identifies the River as a major downtown open space, and recognizes its potential “as a naturalistic open space, wildlife habitat, and recreational amenity: a garden promenade that can provide a more contemplative and reflective experience to the hustle and bustle of Pacific Avenue.”

SRFA 10

Eliminating this section is essential allowing for a development “wall” along the watershed & is channelizing the river view & diminishes the **2030 Park& Rec.Master Plan** goal, which states:

... is a prime opportunity to revisit for revitalization of the **San Lorenzo Riverwalk** and show case one of Santa Cruz’s natural assets.

Furthermore this SFRA 10 San Lorenzo Urban River Plan concept echoes the General Plan 2030 statement:

The San Lorenzo Urban River Plan—a 20-year comprehensive plan for the areas of the San Lorenzo River, Branciforte Creek, and Jessie Street Marsh within city limits promotes conserving the river as a wildlife area and enhancing it with complementary river oriented development.

Thank you very much for reading my concerns

jane mio

From: Jack Nelson [<mailto:nelsontrio@cruzio.com>]
Sent: Friday, March 17, 2017 11:51 PM
To: Ron Powers
Subject: Downtown Plan, NOP for EIR

March 17, 2017

Subject: Comments on Notice of Preparation for EIR, Downtown Plan update

Friendly greetings Ron:

That's a lot of good work in that Initial Study which I've viewed from online.

My comments regard item 9. i) in the I.S. checklist, which has "No Impact" checked for this question:

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

This initial "no impact" finding suggests the City could be working from obsolete findings and science on the level of risk to downtown from flooding.

Risk is the word, because there is no certainty about when or how much downtown Santa Cruz may be flooded by the effects of climate change and sea level rise.

I wonder, will the EIR be examining...

— Cyclical, extreme atmospheric river storm events of the severity that flooded the Central Valley in 1861, with new research on California storm sediments finding these events have been cyclical and may be more likely in a warming world. What is the level of risk to downtown S.C.?

— Regional climate modeling finding more midwinter extreme precipitation events likely in our region, as climate change proceeds.

— Concern regarding point of no return on collapse of West Antarctic ice sheet, producing sea level rise in tens of feet. New Federal direction toward "no action" on climate action suggests this concern is a higher risk scenario, potentially unfolding in this century.

— Paleoclimate findings: in Earth's past when atmospheric CO₂ is at 400 ppm, sea level response is sea level at tens of feet higher than present sea level, with a hotter world and minimal global cryosphere.

I understand the I.S. discussion (p.37) about not increasing the allowed footprint of future structures, however all these higher structures will be at risk—how much?—even if they do not decrease floodplain capacity. Is it appropriate for the City to grant further development entitlements in a high risk / inevitable risk location?

Thanks for your consideration. Scientific and literature references available on request.

best,

Jack Nelson
land use & environmental planner, retired
127 Rathburn Way, Santa Cruz CA 95062
(831) 429-6149

APPENDIX C

Proposed Plan and Ordinance Text Amendments

APPENDIX C – PLAN AND ORDINANCE TEXT CHANGES

Revisions to Plans and Municipal Code are shown with underlined text for additions and ~~strikeout text~~ for deletions.

Downtown Recovery Plan

See: <http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development/downtown-recovery-plan-amendments>

General Plan Amendment

Chapter 4 - Land Use, page 41, Revise as shown:

Regional Visitor Commercial (RVC), 0.25 to 3.5 FAR.

Applies to areas that emphasize a variety of commercial uses that serve Santa Cruz residents as well as visitors. Mixed-use development is strongly encouraged in RVC districts.

Downtown Santa Cruz. (0.25 to 5.0 FAR) Emphasizes a mix of regional office and retail uses, residential and mixed-use developments, restaurants, and visitor attractions such as entertainment venues. The Downtown Recovery Plan provides detailed requirements for this area.

Reason for General Plan Amendment: The Central Business District (CBD) zone is the primary zone district that implements the broader RVC General Plan land use designation. The modifications proposed for the CBD additional height Zone A between Pacific Avenue and Front Street would potentially allow for upper level floor area that could exceed the existing 3.5 FAR. The FAR limit is one of three development standards that work together to address bulk and mass of new construction: 1) FAR, 2) Height, and 3) establishing a percentage limitation of varying heights in direct relationship to the size of the property (a volumetric standard).

Local Coastal Plan Amendment – San Lorenzo Urban River Plan Policies

Significant Riverfront Areas

Front Street

NEW POLICY

- ☛ SRFA – 1 Require new development projects to incorporate design features that encourage active engagement with the Riverwalk such as: filling adjacent to the Riverwalk with landscaping, providing direct physical access to the Riverwalk, including appropriate active commercial and/or residential uses adjacent to the Riverwalk, or a combination of these and/or other design features that support the resource enhancement and river engagement policies of the San Lorenzo Urban River Plan.

NEW POLICY

- ☛ SRFA – 2 Require new development projects to incorporate pedestrian and/or bicycle connections between Front Street and the Riverwalk at appropriate locations such as the extensions from Maple Street and Elm Street.

- ☛ ~~SRFA – 1 Maintain existing development standards in the Downtown Recovery Plan (DRP) for the Front Street Riverfront Area including principal permitted uses for ground level and upper floors, conditional uses, and height and step back requirements. Maintain maximum height restriction to 50 feet with development above 35 feet in height stepping back at least 10 feet at an angle not to exceed 42 degrees. (DRP, p. 47-50)~~

Reason For Deletion: The amendments to the Downtown Recovery Plan (DRP) make this policy obsolete. This policy language was a reference to the DRP from the SLURP. The SLURP was intended as a resource protection programmatic guide and not a land use planning document. The SLURP process did not have the benefit of any land use planning guidance for architecture or urban design. Since the adoption of the SLURP, the City has undertaken a comprehensive effort to update the principal land use document for the area – the Downtown Recovery Plan. Development standards for this area are appropriately located in the DRP and not within the Local Coastal Plan.

- ☛ ~~SRFA – 32 Maintain the ten-foot setback area between residential and commercial uses adjacent to the levee trail from the western edge of the trail. The setback area between the property line and the Riverwalk shall should be filled to raise the adjacent ground-level use to the same a similar or higher elevation as the Riverwalk elevation as the levee trail. This area The public lands between the Riverwalk and the private property may should also incorporate publicly accessible commercial or residential amenities, such as outdoor public seating or visually accessible garden space for residential development. Trees planted as part of the San Lorenzo Flood Control Improvement Project should be maintained and incorporated into new development where feasible and not in conflict with the required fill or publicly accessible amenities. (DRP, p. 51)~~

- ~~☛ SRFA —3 Maintain design guidelines for residential and commercial development with the exception of limiting building materials to more natural wood, brick and stone; avoid overuse of concrete and stucco. (DRP, p. 51)~~

Reason for Deletion: This language is not appropriate for the LCP. It is too detailed and most of the downtown is outside of the Coastal Zone.

- ~~☛ SRFA —4 The “river promenade” proposed in the original San Lorenzo Design Concept Plan between Soquel Drive and Laurel Street should be re-conceptualized as a more natural, less formal looking “trail” with adjacent garden space and native trees to be accommodated in the ten foot setback area.~~

Reason for Deletion: Levee Trail complete; referenced area mostly outside the Coastal Zone.

- ~~☛ SRFA —5 Establish a river plaza or park within the Front Street Riverfront Area between Soquel Drive and Laurel Street on the west bank (upstream orientation). Redevelopment of the Metro Station affords an opportunity for connecting a plaza or park with a public area on the east side of Front Street. Other favorable sites are the terminus with Cathcart Street and the terminus with Maple Street (Figures 49 & 50).~~

Reason for Deletion: The Downtown Plan language continues to promote the accessible links to the Riverwalk as indicated in the new policies 1 and 2. .

- ~~☛ SRFA —6 Maintain the wooden roof truss buildings along Front Street as architectural artifacts to demonstrate the “working waterfront” character of the area.~~

Reason for Deletion: It is unclear where this policy came from. The ‘historic’ buildings were constructed in the 1920s to 1940s and relate to the auto-service industry and automobile culture, not a “working waterfront”.

- ~~☛ SRFA —7 Ensure that any parcel consolidation strategy provides for public access from the Front Street sidewalk to the levee. Maintain the ten-foot step back requirement between buildings included in the Downtown Recovery Plan for any development. Encourage pedestrian traffic through creative inviting design and incorporate water features, gardens, paving, and stairways up the levee as design features.~~

Reason for Deletion: The proposed policies better reflect the combined intentions and direction for land use in this area.

- ~~☛ SRFA —10 Maintain views from both taller downtown buildings to the River and from the River trail to distant mountains and ridges, avoiding creation of a development “wall” between the downtown and the River.~~

Reason for Deletion: The City does not protect views of the river from private buildings. Front Street and the Riverwalk are perpendicular to the mountain views, therefore, the

policy is not needed to preserve any distant views. The development will be required to have accessible connections to the Riverwalk, which will prevent a development wall between the downtown and the river.

-  ~~SRFA — 11 Preserve views along the Front Street area to and from Beach Hill, a significant historic feature in this area.~~

Reason for Deletion: This policy is too vague and is not a resource-related policy that follows the other parts of the SLURP.

Municipal Code – Zoning Ordinance Amendments

Section 1. Part 24 of the Santa Cruz Municipal Code is hereby amended to read as follows:

Part 24: CENTRAL BUSINESS DISTRICT (CBD)* ~~Editor's Note: Former Part 24: GM-O Garden Mall Overlay District, previously codified herein and containing portions of Ord. 91-23 was repealed and replaced in its entirety by Ord. 91-29.~~

Section 24.10.2300 of the Santa Cruz Municipal Code is hereby amended to read as follows:

24.10.2300 PURPOSE.

This part implements the Land Use Plan, Development Standards and Design Guidelines of the Downtown ~~Recovery~~ Plan (Plan), a specific plan. It is intended to refine the Plan in the area of land use and regulations. It supports the purpose of the Plan, in the context of the General Plan, which aims to ~~make~~ maintain downtown the urban center of the city, with the many functions a city center serves. ~~This s~~ Section 24.10 of the Zoning Ordinance is also part of the Local Coastal Implementation Plan.

The Central Business District Zone of the Downtown ~~Recovery~~ Plan is divided into four subareas, in order to enhance the character of each by special consideration of the character of each. A fifth area, CBD Subdistrict E, The Lower Pacific Avenue, subdistrict has been added and consists of the CBD District South of Laurel Street. The Lower Pacific Avenue subdistrict is intended to implements the policies of the Beach and South of Laurel Plan and is separate from the Downtown ~~Recovery~~ Plan.

Section 24.10.2301 of the Santa Cruz Municipal Code is hereby amended to read as follows:

24.10.2301 USES, DEVELOPMENT STANDARDS AND DESIGN GUIDELINES* ~~Editor's Note: As amended by Ord. 2000-03, the effective date of this section is July 31, 2000~~

Chapter 4 of the Downtown ~~Recovery~~ Plan, as amended, is hereby adopted by reference, and the Planning and Community Development Department shall maintain copies of the Downtown Plan is both hard copy and electronic form ~~three copies of Chapter 4 of the Downtown Recovery Plan are and shall be maintained on file in the office of the city clerk, for use and examination by the public.~~ The policies and regulations set forth in Chapter 4 of the Downtown Recovery Plan shall control all uses in the CBD, Central Business District, and its four subdistricts: Pacific Avenue Retail District; Front Street Riverfront Corridor; Cedar Street Village Corridor; and North Pacific Area.

Section 24.10.2330 of the Santa Cruz Municipal Code is hereby amended to read as follows:

24.10.2330 DEMOLITION CONTROL.

The purpose of demolition control is to provide for orderly change and development of the area in accordance with the General Plan and the Downtown ~~Recovery~~ Plan. It is intended to provide a means whereby existing buildings and structures are evaluated for their reuse potential before demolition is allowed.

1. No demolition permit as authorized by the Uniform Building Code shall be issued unless the replacement use and any use, design or other permits, as applicable, have been approved by the city, except as provided below.
 - a. Where the replacement use of the site requires no building permit, a demolition permit may be issued as approved by the decision-making body in connection with its action in approving the replacement use of the site.
 - b. Where the replacement use requires a building permit, but there is a practical hardship in delaying the demolition permit until a valid building permit is issued, the approving body may authorize demolition before issuance of a building permit if it finds that there is a practical hardship and prior demolition is consistent with the General Plan and the Downtown ~~Recovery~~ Plan. The approving body may require such security as it deems necessary to assure the construction of the replacement project, and may establish time requirements for performance.
2. The decision-making body shall consider any demolition application at the time it considers any necessary permits or actions for the replacement project after demolition. It shall approve demolition after evaluating it for consistency with the General Plan and Downtown ~~Recovery~~ Plan, and taking into account reasonable alternatives for reuse and cost benefits to the community.

Section 24.10.2340 of the Santa Cruz Municipal Code is hereby amended to read as follows:

24.10.2340 EXTENSION AREAS.

The purpose of extension areas is to enhance the pedestrian ambiance of ~~Pacific Avenue~~ the Central Business District and the San Lorenzo Riverwalk, by introducing uses attractive to pedestrians into the pedestrian environment, configured and arranged in ways which activate and enliven the public streets and the San Lorenzo Riverwalk.

1. Revocable License Required. No person shall use an extension area unless a valid revocable license to operate a business has been obtained pursuant to this part.
2. Revocable License Application. Application for a revocable license shall be made jointly by the property owner and the business operator of the business located on the property adjacent to the extension area, and shall be filed with the planning department on the appropriate application form, accompanied with the following information:
 - a. Name and address of the property owner and business operator. Both parties or their authorized representatives shall sign the application.
 - b. The expiration date of the business license of the business intending to operate the extension area.

- c. For extension areas adjacent to public streets and pedestrian lanes within the Central Business District, a drawing showing the extension area in its relationship to the building, sidewalk and street, for the extension area and thirty feet along the sidewalk in either direction. The drawing shall show dimensions of the extension area, locating doorways and access points, show width of sidewalk (distance from curb to building face and property line), existing and projected pedestrian traffic movements, location of utilities that might affect or be affected by the application proposal, parking meters, bus stops, benches, trees, landscaping, trash receptacles and other street furniture, or any other potential sidewalk obstruction.
The drawing of the extension area shall show its intended use, any furniture or display stands, fixtures, signs, canopies and other overhead appurtenances, landscaping and planters, trash receptacles, and any other matter to be placed in the area.
 - d. For extension areas adjacent to the San Lorenzo Riverwalk, a drawing showing the extension area in its relationship to the building, the Riverwalk, for the extension area and thirty feet along the Riverwalk in either direction. The drawing shall show dimensions of the extension area, locating doorways and access points, show proposed hardscape and landscape improvements between the existing Riverwalk and the development project relating to the extension area, location of utilities that might affect or be affected by the application proposal, benches, trees, landscaping, planters, trash receptacles and other furniture, or any other potential pedestrian obstruction.
The drawing of the extension area shall show its intended use, any furniture or display stands, fixtures, signs, canopies and other overhead appurtenances, landscaping and planters, trash receptacles, and any other items to be placed in the area.
 - ed. Other information which may be required to act on the revocable license.
3. Location and Design Requirements. Chapter 4 of the Downtown ~~Recovery~~ Plan describes the use, location and design requirements for extension areas.

The remainder of the section remains unchanged except for deletion of the word Recovery from Downtown ~~Recovery~~ Plan in subsections 6b4 and 6c1.

Section 24.10.2341 of the Santa Cruz Municipal Code is hereby added to read as follows:

24.10.2341 PARKLETS

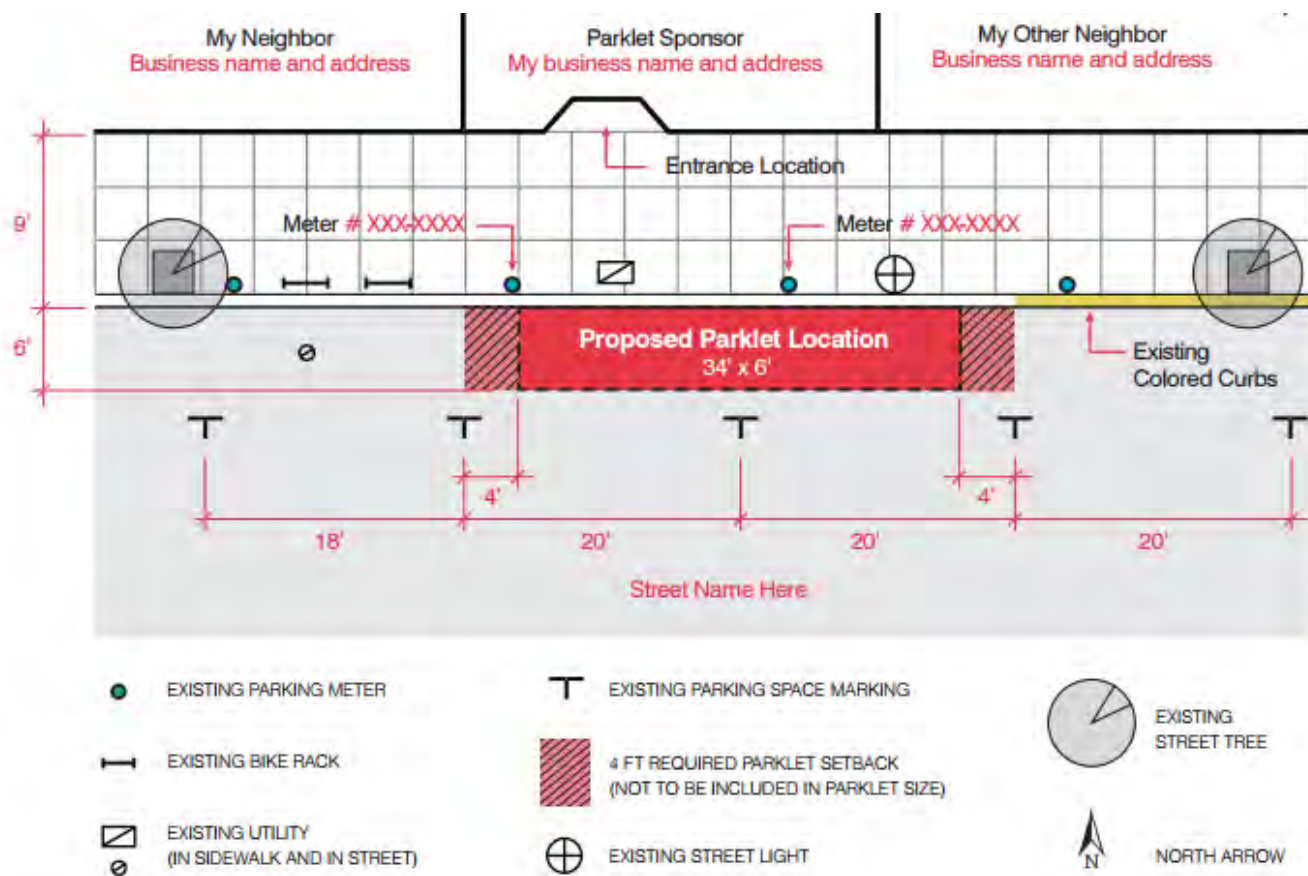
The purpose of parklets is to enhance the pedestrian ambiance of the CBD zone district by creating useable outdoor spaces that encourage a sense of community and that provide a tool for economic development.

1. No person shall construct or use a parklet unless a Design Permit has been obtained pursuant to Part 5 of Chapter 24.08 and a valid revocable license to operate a business has been obtained pursuant to Section 24.10.2340 of this Chapter.
2. No person shall begin construction of a parklet without first obtaining a Temporary Encroachment Permit to allow for construction to take place within the public right of way.
3. All parklets shall be maintained as private spaces and the business licensed to operate the parklet shall be responsible to maintain the parklet in good condition.
4. Parklets may only be constructed on streets with speed limits of 25 mph or lower.
5. Construction Standards.
 - a. The parklet must be located at least one parking space or 20' from any corner.
 - b. A minimum of two parking spaces shall be maintained between each parklet.
 - c. The structure shall not be located in front of a fire hydrant, above a fire hydrant shut-off valve or over utility or manhole covers.
 - d. The parklet shall not replace blue zones designated for disabled parking.
 - e. The parklet shall not be more than six feet wide and shall provide four foot setbacks from each parking tee.
 - f. The parklet length may consist of two parking spaces maximum per business and the parking spaces shall be located adjacent to the front of the business.
 - g. Reflective elements are required at the outside corners of the structure.
 - h. Soft hit posts shall be installed at the outside edges of the structure.
 - i. The parklet shall provide all features necessary to comply with current ADA requirements.
 - j. Bolting or penetrating the surface of the roadway in any way shall not be permitted.
 - k. The platform surface shall be flush with the grade of the adjacent sidewalk with a maximum gap of one-half inch.
 - l. The structure shall not impede the flow of curbside drainage and shall not be constructed over a storm drain.
 - m. Overhead elements shall provide a minimum vertical clearance of 84" above grade.
 - n. The edges/railings shall be spaced appropriately to allow for the ability to see inside the parklet during all hours.
 - o. The edges/railings shall be designed to discourage sitting on railings.
 - p. The top edge of the parklet edges/railings shall be round to prevent the resting of food and drinks.
 - q. The exterior edge/railing shall be a minimum of 30 inches tall. If alcohol will be consumed in the parklet, the edge/railing shall be a minimum of 42 inches tall.
 - r. There shall be no electrical fixtures or features within the parklet. All lighting must originate from the associated business and may not shine into the street or otherwise

- interfere with vehicular travel. Battery or solar powered lighting elements are permitted within the parklet.
- s. All moveable barriers and furniture used in the parklet shall be bolted down or shall be removed from the public right of way during non-operating hours.
6. Design Criteria.
- a. The parklet shall be an open design that allows for pedestrians on either side of the street to see into the parklet. Continuous opaque walls are not permitted.
 - b. The parklet should be designed as an extension of the sidewalk and should have multiple points of entry.
 - c. Parklets should include permanent or movable seating.
 - d. The design should include planting areas that utilize native, drought-tolerant plants. Plantings can be used to discourage seating in areas such as the tops of walls.
 - e. The parklet design should utilize sustainable, locally-sourced materials that are easy to maintain.
 - f. Signage or other advertising matter is not permitted to be installed on or within the parklet with the exception of a notice of private property/right to refuse service no greater than 11" x 5" in size. Sandwich board signs are prohibited at all times.
7. Operational Conditions
- a. If a business changes ownership, the new business owner must obtain a new Extension License per Section 24.10.2340. A Design Permit may be required to recognize changes to the parklet.
 - b. The parklet shall operate consistent with the restaurant hours of operation and shall not operate past 11:00 p.m. Parklets shall be closed or gated when not in use.
 - c. Outdoor entertainment is prohibited within the parklet.
 - d. The business associated with a parklet shall obtain a trespass letter with the Santa Cruz Police Department prior to operation of the parklet.
 - e. Prior to the commencement of use, security cameras shall be installed outside to cover the entire parklet and front sidewalk areas. Cameras shall be placed in positions where the exterior lighting does not bleed into the coverage.
 - f. Parklets and plantings shall be maintained in good condition, free of graffiti and litter. Elements that are visually or structurally degraded shall be replaced expeditiously.
 - g. Patrons of the parklet shall not be permitted to sit on the edges/railings.
 - h. Smoking is not permitted within parklets.
 - i. The parklet shall be reviewed annually by the Planning Department for compliance with conditions of approval and to ensure that the parklet is maintained in good condition and does not create a nuisance to pedestrians or adjacent businesses.

8. Removal

- a. The sponsor, at their own expense, shall be required to remove the parklet and restore the public right of way to the standards of the Public Works Department if desired by the sponsor or if requested by the City of Santa Cruz for utility repair and maintenance, streetscape improvements, or other improvements that interfere with the location of the parklet.
- b. If the parklet is removed temporarily for streetscape or utility improvements, the sponsor shall be responsible for the costs of removing, storing, and re-installing the parklet.
- c. In the case of an emergency, the city may remove the parklet without prior notice to the applicant. The sponsor is responsible for restoring any damage to the parklet.



APPENDIX D

Buildout Assumptions

Assumptions for Downtown Recovery Plan Amendment
Study Area - See Map (West side of Pacific Avenue from Cathcart to Laurel, East Side of Pacific, and all the parcels fronting the west side of Front Street between Soquel Avenue and Laurel Street)
Downtown Parcel and Footprint Spreadsheet dated 6-9-2015
January 6, 2017

	Area X Riverfront	Area Y E. Pacific/W. Front Pacific Station	Area Z W. Pacific	Totals	Change from Existing Conditions (Includes demolition and reconstruction)
Baseline/Existing Conditions					
Property Area	146,000 sf (3.35 acres)	222,200 sf (5.10 acres)	148,800 sf (3.42 acres)	517,000 sf (11.87 acres)	N/A
Commercial	62,000 sf	74,864 sf	182,836 sf	319,700 sf	N/A
Office	N/A	56,105 sf	65,761 sf	121,866 sf	N/A
Residential	N/A	113 units	56 units	169 units	N /A
Parking	164 spaces	186 spaces	97 spaces	447 spaces	N /A
2030 General Plan – No Amendments (Units are totals, reflecting both demolition and reconstruction)					
Commercial	65,875 sf	47,000 sf	182,836 sf	295,711 sf	-23,989
Office	11,000 sf	40,000 sf	65,761 sf	116,761 sf	-5,105
Residential	190 units	360 units	56 units	606 units	437
Parking	265 spaces	1,610 spaces	97 spaces	1,972 spaces	+1,525
Buildout Assumptions with Proposed Downtown Plan Amendments (Units are totals, reflecting both demolition and reconstruction)					
Commercial	73,171 sf	47,000 sf	184,836 sf	305,007 sf	-14,693 sf
Office	18,296 sf	40,000 sf	65,761 sf	124,057 sf	+2,191 sf
Residential	321 units	483 units	76 units	880 units	+711 units
Parking	397 spaces	1,924 spaces	117 spaces	2,438 spaces	+1,991 spaces

GENERAL ASSUMPTIONS FOR AREA X

Ground Level (Same in GP Buildout or with Downtown Plan Amendments)

Requires removal of structures to accommodate parking.

169 spaces exist now and area could accommodate up to 265 spaces and 33,000 sf retail/non-residential uses and remaining area in open space connections to the river.

Second (Riverwalk) Level (Same in GP Buildout or with Downtown Plan Amendments)

25% commercial to connect to Riverwalk and at north and south ends of Area X = 21,875 square feet

75% residential or 66 units

Combined Third and Fourth Levels (Same in GP Buildout or with Downtown Plan Amendments)

15% Office and hotel use split between the uses

11,000 square feet of Office

11,000 square feet of hotel use

85% residential = 124 units

Combined Fifth and Sixth Levels (not feasible under existing General Plan Buildout, only applies to Downtown Plan Amendments)

10% Office and Commercial (could include restaurant) split between uses

7,296 square feet of Office

7,296 square feet of Commercial (restaurant)

90% Residential = 131 units

TOTAL AREA X ASSUMPTIONS UNDER GENERAL PLAN 2030 WITHOUT DOWNTOWN PLAN AMENDMENTS

190 total housing units (66 units 2nd flr + 62 units 3rd flr + 62 units 4th flr)

65,875 sf Commercial (retail, restaurant or hotel) (33,000 sf 1st flr + 21,875 sf 2nd level (Riverwalk), 5,500 sf 3rd flr + 5,500 sf 4th flr)

11,000 sf Commercial (office) (5,500 sf 3rd + 5,500 sf 4th level)

265 total ground level parking spaces accommodated at the Front Street ground level (no structured parking with this scenario)

TOTAL AREA X ASSUMPTIONS UNDER BUILDOUT WITH PROPOSED DOWNTOWN PLAN AMENDMENTS

321 total housing units (66 units 2nd flr + 62 units 3rd flr + 62 units 4th flr + 131 units 5th and 6th flrs)

73,171 sf Commercial (retail, restaurant or hotel) (33,000 sf 1st flr + 21,875 sf 2nd Riverwalk level flr, 5,500 sf 3rd flr + 5,500 4th flr + 7,296 sf 5th and 6th flrs)

18,296 sf Commercial (office) (5,500 sf 3rd + 5,500 sf 4th level + 7,296 sf 5th and 6th flrs)

397 total parking spaces (265 ground level parking spaces + 132 structured)

GENERAL ASSUMPTIONS FOR AREA Y

AREA Y GENERAL PLAN 2030 BUILDOUT WITHOUT THE PROPOSED DOWNTOWN PLAN AMENDMENTS:

Metro Site:

90 units

720 parking spaces (180 spaces per level X 4 levels)

25,000 sf Commercial at ground level

15,000 sf Office

Devcon Properties LLC and adjacent Parcels by proposed Maple Street:

157 units (55 2BR and 102 1BR/Studio)

250 parking spaces

15,000 sf Commercial

City Parking Garage on Lot 7:

640 parking spaces (160 spaces per level X 4 levels)

7,000 sf Commercial

Total parking for this area would be about 1,610 spaces (720 + 250 + 640). 186 parking spaces would be removed and replaced for a net increase of 1,424, resulting in a total of **1,610 spaces for Area Y**

AREA Y BUILDOUT WITH THE DOWNTOWN PLAN AMENDMENTS. The assumptions for the Commercial and Office stay the same, but housing and parking would increase for the respective projects. Devcon Properties LLC project would be able to construct an additional **76 units above the 50' level** and the City's housing by Metro could build **30 additional units with the allowable floors above 50 feet**.

The Metro and City parking garages would be able to construct a combined **340 more spaces** with the additional height proposed for the DRP.

Metro Site:

120 units

900 parking spaces (180 spaces per level X 5 levels)

25,000 sf Commercial

15,000 sf Office

Devcon Properties LLC and adjacent Parcels by proposed Maple Street:

250 units (87 2BR and 163 1BR/Studio)

329 parking spaces

15,000 sf Commercial

City Parking Garage:
800 parking spaces (160 spaces per level X 5 levels)
7,000 sf Commercial

Total new parking for Area Y would be about 1,964 spaces ($900 = 329 = 800$). 186 parking spaces would be removed and replaced for a net increase of 1,830, resulting in a total of **1,964 spaces for Area Y**. Various scenarios could be assumed for parking modifications and on and off-site programs, mechanical stacking, payment of deficiency and in-lieu fees, reduction in parking ratio standards and other factors. Parking code changes are not part of the Downtown Recovery Plan changes and for the purposes of the buildout scenarios, the number of units and the square footages are assumed *reasonable worst-case scenarios* for under the proposed development standard modifications. This area assumes potentially 2 large public parking garages, which is unlikely in a short-term scenario, but both have been included for the purposes of the CEQA analysis.

TOTAL AREA Y ASSUMPTIONS UNDER GENERAL PLAN 2030 WITHOUT DOWNTOWN PLAN AMENDMENTS

247 total housing units (90 units + 157 units)
47,000 sf Commercial (retail, restaurant) (25,000 sf + 15,000 sf + 7,000 sf)
40,000 sf Commercial (office) (15,000 sf + 25,000 sf)
1,610 total parking spaces (720 spaces + 250 spaces + 640 spaces)

TOTAL AREA Y ASSUMPTIONS WITH PROPOSED DOWNTOWN PLAN AMENDMENTS

370 total housing units (120 units + 250 units)
47,000 sf Commercial (retail, restaurant) (25,000 sf + 25,000 sf + 7,000 sf)
15,000 sf Commercial (office) (15,000 sf)
1,964 total parking spaces (900 spaces + 264 spaces + 800 spaces)

GENERAL ASSUMPTIONS FOR AREA Z: West Side of Pacific Avenue between Cathcart Street and Laurel Street

Area Z has well-established businesses on all properties. There is little to no space available for adding parking, therefore the opportunity for redevelopment is limited. Under existing DRP regulations, the height limit would allow most properties to add a floor or even two. But for the purposes of estimating the buildout under the existing GP 2030, the GP EIR assumed this area was already built-out. In order to have the traffic analysis include additional reasonable worst-case assumptions, it is assumed that the NW corner property at Pacific and Laurel could be redeveloped to add a floor and accommodate some housing in a mixed use project.

Under the proposed DRP modifications, the NW corner property at Pacific and Laurel would assume adding two floors of residential for a total of 20 new housing units and another 2,000 square feet of ground level retail. These units would be small units and both the buildout and proposed DRP plan amendment scenarios assume the same number of parking spaces would be constructed in either scenario. Assumptions are made that the size of the units would require 1 space per unit.

TOTAL AREA Z ASSUMPTIONS UNDER GENERAL PLAN 2030 WITHOUT DOWNTOWN PLAN AMENDMENTS

56 total housing units
182,836 sf Commercial
97 total parking spaces

TOTAL AREA Y ASSUMPTIONS WITH PROPOSED DOWNTOWN PLAN AMENDMENTS

76 total housing units
184,836 sf Commercial
117 total parking spaces

APPENDIX E

Air Quality and GHG Emissions Calculations

Available on CD & City Website at:

<http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development-2/environmental-documents>

Santa Cruz Downtown Recovery Plan

CalEEMod Version 2016.3.1 Outputs

Annual, Summer, Winter, Mitigation Report

Santa Cruz Downtown Recovery Plan - Santa Cruz County, Annual

Santa Cruz Downtown Recovery Plan

Santa Cruz County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	2.19	1000sqft	0.05	2,191.00	0
Enclosed Parking with Elevator	1,991.00	Space	0.00	796,400.00	0
Apartments Mid Rise	390.00	Dwelling Unit	6.00	390,000.00	944
Condo/Townhouse	321.00	Dwelling Unit	5.00	321,000.00	777

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	1.8	Precipitation Freq (Days)	61
Climate Zone	5			Operational Year	2040
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	372.88	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity adjusted based on 50% RPS by year 2030

Land Use - Adjusted population based on average City household size of 2.42 persons per du

Construction Phase - Modeling operations only

Vehicle Trips - Trip rates from TIA adjusted based on City-recommended 40% reduction based on mixed-use in Downtown Santa Cruz

Water And Wastewater - Water demand based on City Water Department

Energy Mitigation - Residences and commercial uses that comply with 2016 Title 24 are 28% and 5% more efficient than 2013 Title 24, respectively.

Weighted average for project = 28%

Waste Mitigation - 75% waste diversion consistent with AB 341

APPENDIX E

Table Name	Column Name	Default Value	New Value
tblLandUse	BuildingSpaceSquareFeet	2,190.00	2,191.00
tblLandUse	LandUseSquareFeet	2,190.00	2,191.00
tblLandUse	LotAcreage	17.92	0.00
tblLandUse	LotAcreage	10.26	6.00
tblLandUse	LotAcreage	20.06	5.00
tblLandUse	Population	1,115.00	944.00
tblLandUse	Population	918.00	777.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	372.88
tblProjectCharacteristics	OperationalYear	2018	2040
tblTripsAndVMT	WorkerTripNumber	169.00	0.00
tblVehicleTrips	ST_TR	6.39	3.83
tblVehicleTrips	ST_TR	5.67	4.39
tblVehicleTrips	ST_TR	2.46	1.47
tblVehicleTrips	SU_TR	5.86	3.52
tblVehicleTrips	SU_TR	4.84	3.75
tblVehicleTrips	SU_TR	1.05	0.63
tblVehicleTrips	WD_TR	6.65	3.99
tblVehicleTrips	WD_TR	5.81	4.50
tblVehicleTrips	WD_TR	11.03	6.57
tblWater	IndoorWaterUseRate	25,410,069.99	16,370,250.00
tblWater	IndoorWaterUseRate	20,914,442.22	13,473,975.00
tblWater	IndoorWaterUseRate	389,236.91	39,438.00
tblWater	OutdoorWaterUseRate	16,019,391.95	543,037.50
tblWater	OutdoorWaterUseRate	13,185,191.84	543,037.50
tblWater	OutdoorWaterUseRate	238,564.56	0.00

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	3.5205	0.0845	7.3254	3.9000e-004		0.0408	0.0408		0.0408	0.0408	0.0000	12.0267	12.0267	0.0115	0.0000	12.3148
Energy	0.0729	0.6228	0.2659	3.9700e-003		0.0503	0.0503		0.0503	0.0503	0.0000	2,221.9672	2,221.9672	0.1306	0.0374	2,236.3673
Mobile	0.3995	1.8629	5.2304	0.0250	3.1397	0.0124	3.1521	0.8410	0.0115	0.8526	0.0000	2,297.2355	2,297.2355	0.0616	0.0000	2,298.7764
Waste						0.0000	0.0000		0.0000	0.0000	66.8043	0.0000	66.8043	3.9480	0.0000	165.5049
Water						0.0000	0.0000		0.0000	0.0000	9.4807	27.9922	37.4729	0.9759	0.0234	68.8574
Total	3.9929	2.5702	12.8217	0.0293	3.1397	0.1035	3.2432	0.8410	0.1026	0.9437	76.2850	4,559.2215	4,635.5066	5.1277	0.0608	4,781.8208

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	3.5205	0.0845	7.3254	3.9000e-004		0.0408	0.0408		0.0408	0.0408	0.0000	12.0267	12.0267	0.0115	0.0000	12.3148
Energy	0.0553	0.4724	0.2017	3.0100e-003		0.0382	0.0382		0.0382	0.0382	0.0000	1,813.3595	1,813.3595	0.1090	0.0304	1,825.1446
Mobile	0.3995	1.8629	5.2304	0.0250	3.1397	0.0124	3.1521	0.8410	0.0115	0.8526	0.0000	2,297.2355	2,297.2355	0.0616	0.0000	2,298.7764
Waste						0.0000	0.0000		0.0000	0.0000	16.7011	0.0000	16.7011	0.9870	0.0000	41.3762
Water						0.0000	0.0000		0.0000	0.0000	9.4807	27.9922	37.4729	0.9759	0.0234	68.8574
Total	3.9753	2.4198	12.7575	0.0284	3.1397	0.0914	3.2311	0.8410	0.0905	0.9315	26.1818	4,150.6139	4,176.7957	2.1451	0.0539	4,246.4694

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	0.44	5.85	0.50	3.27	0.00	11.74	0.37	0.00	11.84	1.29	65.68	8.96	9.90	58.17	11.45	11.20

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.3995	1.8629	5.2304	0.0250	3.1397	0.0124	3.1521	0.8410	0.0115	0.8526	0.0000	2,297.2355	2,297.2355	0.0616	0.0000	2,298.7764
Unmitigated	0.3995	1.8629	5.2304	0.0250	3.1397	0.0124	3.1521	0.8410	0.0115	0.8526	0.0000	2,297.2355	2,297.2355	0.0616	0.0000	2,298.7764

4.2 Trip Summary Information

Land Use	Average Daily Trip Rate			Unmitigated	Mitigated
	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	1,556.10	1,493.70	1372.80	4,381,832	4,381,832
Condo/Townhouse	1,444.50	1,409.19	1203.75	4,047,830	4,047,830
Enclosed Parking with Elevator	0.00	0.00	0.00		
General Office Building	14.39	3.22	1.38	26,130	26,130
Total	3,014.99	2,906.11	2,577.93	8,455,792	8,455,792

4.3 Trip Type Information

Land Use	Miles			Trip %			Trip Purpose %		
	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3
Condo/Townhouse	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3
Enclosed Parking with Elevator	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515
Enclosed Parking with Elevator	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515

Apartments Mid Rise	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515
Condo/Townhouse	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

Install High Efficiency Lighting

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	1,266.3759	1,266.3759	0.0985	0.0204	1,274.9106
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	1,500.8983	1,500.8983	0.1167	0.0242	1,511.0135
NaturalGas Mitigated	0.0553	0.4724	0.2017	3.0100e-003		0.0382	0.0382		0.0382	0.0382	0.0000	546.9836	546.9836	0.0105	0.0100	550.2340
NaturalGas Unmitigated	0.0729	0.6228	0.2659	3.9700e-003		0.0503	0.0503		0.0503	0.0503	0.0000	721.0689	721.0689	0.0138	0.0132	725.3539

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	4.46144e+006	0.0241	0.2056	0.0875	1.3100e-003		0.0166	0.0166		0.0166	0.0166	0.0000	238.0792	238.0792	4.5600e-003	4.3600e-003	239.4940
Condo/Townhouse	9.00834e+006	0.0486	0.4151	0.1766	2.6500e-003		0.0336	0.0336		0.0336	0.0336	0.0000	480.7191	480.7191	9.2100e-003	8.8100e-003	483.5758
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
General Office Building	42549.2	2.3000e-004	2.0900e-003	1.7500e-003	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	2.2706	2.2706	4.0000e-005	4.0000e-005	2.2841

APPENDIX E

Total		0.0729	0.6228	0.2659	3.9700e-003		0.0503	0.0503		0.0503	0.0503	0.0000	721.0689	721.0689	0.0138	0.0132	725.3538

Mitigated

	Natural Gas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	3.49779e+006	0.0189	0.1612	0.0686	1.0300e-003		0.0130	0.0130		0.0130	0.0130	0.0000	186.6555	186.6555	3.5800e-003	3.4200e-003	187.7647
Condo/Townhouse	6.72104e+006	0.0362	0.3097	0.1318	1.9800e-003		0.0250	0.0250		0.0250	0.0250	0.0000	358.6602	358.6602	6.8700e-003	6.5800e-003	360.7915
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
General Office Building	31255.1	1.7000e-004	1.5300e-003	1.2900e-003	1.0000e-005		1.2000e-004	1.2000e-004		1.2000e-004	1.2000e-004	0.0000	1.6679	1.6679	3.0000e-005	3.0000e-005	1.6778
Total		0.0553	0.4724	0.2017	3.0200e-003		0.0382	0.0382		0.0382	0.0382	0.0000	546.9836	546.9836	0.0105	0.0100	550.2340

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	1.76334e+006	298.2438	0.0232	4.8000e-003	300.2538
Condo/Townhouse	1.71488e+006	290.0474	0.0226	4.6700e-003	292.0021
Enclosed Parking with Elevator	5.36774e+006	907.8748	0.0706	0.0146	913.9934
General Office Building	27979.1	4.7323	3.7000e-004	8.0000e-005	4.7642
Total		1,500.8983	0.1167	0.0242	1,511.0135

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	1.66216e+006	281.1304	0.0219	4.5200e-003	283.0251
Condo/Townhouse	1.64265e+006	277.8300	0.0216	4.4700e-003	279.7024
Enclosed Parking with Elevator	4.15848e+006	703.3471	0.0547	0.0113	708.0872
General Office Building	24054.6	4.0685	3.2000e-004	7.0000e-005	4.0959
Total		1,266.3759	0.0985	0.0204	1,274.9106

6.0 Area Detail**6.1 Mitigation Measures Area**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	3.5205	0.0845	7.3254	3.9000e-004		0.0408	0.0408		0.0408	0.0408	0.0000	12.0267	12.0267	0.0115	0.0000	12.3148
Unmitigated	3.5205	0.0845	7.3254	3.9000e-004		0.0408	0.0408		0.0408	0.0408	0.0000	12.0267	12.0267	0.0115	0.0000	12.3148

6.2 Area by SubCategory**Unmitigated**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.4630					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.8369					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.2207	0.0845	7.3254	3.9000e-004		0.0408	0.0408		0.0408	0.0408	0.0000	12.0267	12.0267	0.0115	0.0000	12.3148
Total	3.5205	0.0845	7.3254	3.9000e-004		0.0408	0.0408		0.0408	0.0408	0.0000	12.0267	12.0267	0.0115	0.0000	12.3148

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.4630					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.8369					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.2207	0.0845	7.3254	3.9000e-004		0.0408	0.0408		0.0408	0.0408	0.0000	12.0267	12.0267	0.0115	0.0000	12.3148
Total	3.5205	0.0845	7.3254	3.9000e-004		0.0408	0.0408		0.0408	0.0408	0.0000	12.0267	12.0267	0.0115	0.0000	12.3148

7.0 Water Detail**7.1 Mitigation Measures Water**

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	37.4729	0.9759	0.0234	68.8574
Unmitigated	37.4729	0.9759	0.0234	68.8574

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	16.3702 / 0.543037	20.4969	0.5346	0.0128	37.6891
Condo/Townhouse	13.474 / 0.543037	16.9274	0.4400	0.0106	31.0783
Enclosed Parking with Elevator	0 / 0	0.0000	0.0000	0.0000	0.0000
General Office Building	0.039438 / 0	0.0486	1.2900e-003	3.0000e-005	0.0900
Total		37.4729	0.9759	0.0234	68.8574

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e

Land Use	Mgal	MT/yr			
Apartments Mid Rise	16.3702 / 0.543037	20.4969	0.5346	0.0128	37.6891
Condo/Townhouse	13.474 / 0.543037	16.9274	0.4400	0.0106	31.0783
Enclosed Parking with Elevator	0 / 0	0.0000	0.0000	0.0000	0.0000
General Office Building	0.039438 / 0	0.0486	1.2900e-003	3.0000e-005	0.0900
Total		37.4729	0.9759	0.0234	68.8574

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	16.7011	0.9870	0.0000	41.3762
Unmitigated	66.8043	3.9480	0.0000	165.5049

8.2 Waste by Land Use

Unmitigated

Waste Disposed	Total CO2	CH4	N2O	CO2e

Land Use	tons	MT/yr			
Apartments Mid Rise	179.4	36.4166	2.1522	0.0000	90.2205
Condo/Townhouse	147.66	29.9737	1.7714	0.0000	74.2584
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000
General Office Building	2.04	0.4141	0.0245	0.0000	1.0259
Total		66.8043	3.9480	0.0000	165.5049

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	44.85	9.1041	0.5380	0.0000	22.5551
Condo/Townhouse	36.915	7.4934	0.4429	0.0000	18.5646
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000
General Office Building	0.51	0.1035	6.1200e-003	0.0000	0.2565
Total		16.7011	0.9870	0.0000	41.3762

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Santa Cruz Downtown Recovery Plan - Santa Cruz County, Summer

Santa Cruz Downtown Recovery Plan

Santa Cruz County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	2.19	1000sqft	0.05	2,191.00	0
Enclosed Parking with Elevator	1,991.00	Space	0.00	796,400.00	0
Apartments Mid Rise	390.00	Dwelling Unit	6.00	390,000.00	944
Condo/Townhouse	321.00	Dwelling Unit	5.00	321,000.00	777

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	1.8	Precipitation Freq (Days)	61
Climate Zone	5			Operational Year	2040
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	372.88	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity adjusted based on 50% RPS by year 2030

Land Use - Adjusted population based on average City household size of 2.42 persons per du

Construction Phase - Modeling operations only

Vehicle Trips - Trip rates from TIA adjusted based on City-recommended 40% reduction based on mixed-use in Downtown Santa Cruz

Water And Wastewater - Water demand based on City Water Department

Energy Mitigation - Residences and commercial uses that comply with 2016 Title 24 are 28% and 5% more efficient than 2013 Title 24, respectively.

Weighted average for project = 28%

Waste Mitigation - 75% waste diversion consistent with AB 341

APPENDIX E

Table Name	Column Name	Default Value	New Value
tblLandUse	BuildingSpaceSquareFeet	2,190.00	2,191.00
tblLandUse	LandUseSquareFeet	2,190.00	2,191.00
tblLandUse	LotAcreage	17.92	0.00
tblLandUse	LotAcreage	10.26	6.00
tblLandUse	LotAcreage	20.06	5.00
tblLandUse	Population	1,115.00	944.00
tblLandUse	Population	918.00	777.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	372.88
tblProjectCharacteristics	OperationalYear	2018	2040
tblTripsAndVMT	WorkerTripNumber	169.00	0.00
tblVehicleTrips	ST_TR	6.39	3.83
tblVehicleTrips	ST_TR	5.67	4.39
tblVehicleTrips	ST_TR	2.46	1.47
tblVehicleTrips	SU_TR	5.86	3.52
tblVehicleTrips	SU_TR	4.84	3.75
tblVehicleTrips	SU_TR	1.05	0.63
tblVehicleTrips	WD_TR	6.65	3.99
tblVehicleTrips	WD_TR	5.81	4.50
tblVehicleTrips	WD_TR	11.03	6.57
tblWater	IndoorWaterUseRate	25,410,069.99	16,370,250.00
tblWater	IndoorWaterUseRate	20,914,442.22	13,473,975.00
tblWater	IndoorWaterUseRate	389,236.91	39,438.00
tblWater	OutdoorWaterUseRate	16,019,391.95	543,037.50
tblWater	OutdoorWaterUseRate	13,185,191.84	543,037.50
tblWater	OutdoorWaterUseRate	238,564.56	0.00

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	19.8467	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260	0.0000	106.0569	106.0569	0.1017	0.0000	108.5983
Energy	0.3992	3.4123	1.4568	0.0218		0.2758	0.2758		0.2758	0.2758		4,355.3008	4,355.3008	0.0835	0.0799	4,381.1822
Mobile	2.4401	10.1922	30.1498	0.1463	18.3647	0.0701	18.4348	4.9046	0.0651	4.9697		14,831.5765	14,831.5765	0.3827		14,841.1427
Total	22.6861	14.2805	90.2095	0.1712	18.3647	0.6719	19.0366	4.9046	0.6669	5.5715	0.0000	19,292.9342	19,292.9342	0.5678	0.0799	19,330.9233

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	19.8467	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260	0.0000	106.0569	106.0569	0.1017	0.0000	108.5983
Energy	0.3029	2.5885	1.1050	0.0165		0.2092	0.2092		0.2092	0.2092		3,303.8146	3,303.8146	0.0633	0.0606	3,323.4475
Mobile	2.4401	10.1922	30.1498	0.1463	18.3647	0.0701	18.4348	4.9046	0.0651	4.9697		14,831.5765	14,831.5765	0.3827		14,841.1427
Total	22.5897	13.4566	89.8576	0.1660	18.3647	0.6053	18.9700	4.9046	0.6003	5.5049	0.0000	18,241.4480	18,241.4480	0.5476	0.0606	18,273.1886

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	0.42	5.77	0.39	3.07	0.00	9.91	0.35	0.00	9.99	1.20	0.00	5.45	5.45	3.55	24.15	5.47

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.4401	10.1922	30.1498	0.1463	18.3647	0.0701	18.4348	4.9046	0.0651	4.9697		14,831.5765	14,831.5765	0.3827		14,841.1427
Unmitigated	2.4401	10.1922	30.1498	0.1463	18.3647	0.0701	18.4348	4.9046	0.0651	4.9697		14,831.5765	14,831.5765	0.3827		14,841.1427

4.2 Trip Summary Information

Land Use	Average Daily Trip Rate			Unmitigated	Mitigated
	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	1,556.10	1,493.70	1372.80	4,381,832	4,381,832
Condo/Townhouse	1,444.50	1,409.19	1203.75	4,047,830	4,047,830
Enclosed Parking with Elevator	0.00	0.00	0.00		
General Office Building	14.39	3.22	1.38	26,130	26,130
Total	3,014.99	2,906.11	2,577.93	8,455,792	8,455,792

4.3 Trip Type Information

Land Use	Miles			Trip %			Trip Purpose %		
	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3
Condo/Townhouse	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3
Enclosed Parking with Elevator	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515
Enclosed Parking with Elevator	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515
Apartments Mid Rise	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515
Condo/Townhouse	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

Install High Efficiency Lighting

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.3029	2.5885	1.1050	0.0165		0.2092	0.2092		0.2092	0.2092		3,303.8146	3,303.8146	0.0633	0.0606	3,323.4475
NaturalGas Unmitigated	0.3992	3.4123	1.4568	0.0218		0.2758	0.2758		0.2758	0.2758		4,355.3008	4,355.3008	0.0835	0.0799	4,381.1822

5.2 Energy by Land Use - NaturalGas Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	12223.1	0.1318	1.1264	0.4793	7.1900e-003		0.0911	0.0911		0.0911	0.0911		1,438.0133	1,438.0133	0.0276	0.0264	1,446.5587
Condo/Townhouse	24680.4	0.2662	2.2745	0.9679	0.0145		0.1839	0.1839		0.1839	0.1839		2,903.5730	2,903.5730	0.0557	0.0532	2,920.8275
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
General Office Building	116.573	1.2600e-003	0.0114	9.6000e-003	7.0000e-005		8.7000e-004	8.7000e-004		8.7000e-004	8.7000e-004		13.7145	13.7145	2.6000e-004	2.5000e-004	13.7960
Total		0.3992	3.4123	1.4568	0.0218		0.2758	0.2758		0.2758	0.2758		4,355.3008	4,355.3008	0.0835	0.0798	4,381.1822

Mitigated

	Natural Gas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	9.58299	0.1034	0.8831	0.3758	5.6400e-003		0.0714	0.0714		0.0714	0.0714		1,127.4108	1,127.4108	0.0216	0.0207	1,134.1105
Condo/Townhouse	18.4138	0.1986	1.6970	0.7221	0.0108		0.1372	0.1372		0.1372	0.1372		2,166.3296	2,166.3296	0.0415	0.0397	2,179.2030
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
General Office Building	0.0856303	9.2000e-004	8.4000e-003	7.0500e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.0742	10.0742	1.9000e-004	1.8000e-004	10.1340
Total		0.3029	2.5885	1.1050	0.0165		0.2092	0.2092		0.2092	0.2092		3,303.8146	3,303.8146	0.0633	0.0606	3,323.4475

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	19.8467	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260	0.0000	106.0569	106.0569	0.1017	0.0000	108.5983
Unmitigated	19.8467	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260	0.0000	106.0569	106.0569	0.1017	0.0000	108.5983

6.2 Area by SubCategory

Unmitigated

APPENDIX E

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	2.5371					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	15.5444					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.7652	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260		106.0569	106.0569	0.1017		108.5983
Total	19.8467	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260	0.0000	106.0569	106.0569	0.1017	0.0000	108.5983

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	2.5371					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	15.5444					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.7652	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260		106.0569	106.0569	0.1017		108.5983
Total	19.8467	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260	0.0000	106.0569	106.0569	0.1017	0.0000	108.5983

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Santa Cruz Downtown Recovery Plan - Santa Cruz County, Winter

Santa Cruz Downtown Recovery Plan

Santa Cruz County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	2.19	1000sqft	0.05	2,191.00	0
Enclosed Parking with Elevator	1,991.00	Space	0.00	796,400.00	0
Apartments Mid Rise	390.00	Dwelling Unit	6.00	390,000.00	944
Condo/Townhouse	321.00	Dwelling Unit	5.00	321,000.00	777

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	1.8	Precipitation Freq (Days)	61
Climate Zone	5			Operational Year	2040
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	372.88	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity adjusted based on 50% RPS by year 2030

Land Use - Adjusted population based on average City household size of 2.42 persons per du

Construction Phase - Modeling operations only

Vehicle Trips - Trip rates from TIA adjusted based on City-recommended 40% reduction based on mixed-use in Downtown Santa Cruz

Water And Wastewater - Water demand based on City Water Department

Energy Mitigation - Residences and commercial uses that comply with 2016 Title 24 are 28% and 5% more efficient than 2013 Title 24, respectively.

Weighted average for project = 28%

Waste Mitigation - 75% waste diversion consistent with AB 341

APPENDIX E

Table Name	Column Name	Default Value	New Value
tblLandUse	BuildingSpaceSquareFeet	2,190.00	2,191.00
tblLandUse	LandUseSquareFeet	2,190.00	2,191.00
tblLandUse	LotAcreage	17.92	0.00
tblLandUse	LotAcreage	10.26	6.00
tblLandUse	LotAcreage	20.06	5.00
tblLandUse	Population	1,115.00	944.00
tblLandUse	Population	918.00	777.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	372.88
tblProjectCharacteristics	OperationalYear	2018	2040
tblTripsAndVMT	WorkerTripNumber	169.00	0.00
tblVehicleTrips	ST_TR	6.39	3.83
tblVehicleTrips	ST_TR	5.67	4.39
tblVehicleTrips	ST_TR	2.46	1.47
tblVehicleTrips	SU_TR	5.86	3.52
tblVehicleTrips	SU_TR	4.84	3.75
tblVehicleTrips	SU_TR	1.05	0.63
tblVehicleTrips	WD_TR	6.65	3.99
tblVehicleTrips	WD_TR	5.81	4.50
tblVehicleTrips	WD_TR	11.03	6.57
tblWater	IndoorWaterUseRate	25,410,069.99	16,370,250.00
tblWater	IndoorWaterUseRate	20,914,442.22	13,473,975.00
tblWater	IndoorWaterUseRate	389,236.91	39,438.00
tblWater	OutdoorWaterUseRate	16,019,391.95	543,037.50
tblWater	OutdoorWaterUseRate	13,185,191.84	543,037.50
tblWater	OutdoorWaterUseRate	238,564.56	0.00

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	19.8467	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260	0.0000	106.0569	106.0569	0.1017	0.0000	108.5983
Energy	0.3992	3.4123	1.4568	0.0218		0.2758	0.2758		0.2758	0.2758		4,355.3008	4,355.3008	0.0835	0.0799	4,381.1822
Mobile	2.2278	10.6877	30.8462	0.1407	18.3647	0.0702	18.4349	4.9046	0.0652	4.9698		14,256.9926	14,256.9926	0.3909		14,266.7649
Total	22.4737	14.7760	90.9059	0.1655	18.3647	0.6720	19.0367	4.9046	0.6670	5.5716	0.0000	18,718.3503	18,718.3503	0.5760	0.0799	18,756.5454

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	19.8467	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260	0.0000	106.0569	106.0569	0.1017	0.0000	108.5983
Energy	0.3029	2.5885	1.1050	0.0165		0.2092	0.2092		0.2092	0.2092		3,303.8146	3,303.8146	0.0633	0.0606	3,323.4475
Mobile	2.2278	10.6877	30.8462	0.1407	18.3647	0.0702	18.4349	4.9046	0.0652	4.9698		14,256.9926	14,256.9926	0.3909		14,266.7649
Total	22.3773	13.9521	90.5541	0.1603	18.3647	0.6054	18.9701	4.9046	0.6004	5.5050	0.0000	17,666.8641	17,666.8641	0.5559	0.0606	17,698.8107

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	0.43	5.58	0.39	3.18	0.00	9.91	0.35	0.00	9.98	1.20	0.00	5.62	5.62	3.50	24.15	5.64

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.2278	10.6877	30.8462	0.1407	18.3647	0.0702	18.4349	4.9046	0.0652	4.9698		14,256.99 26	14,256.99 26	0.3909		14,266.76 49
Unmitigated	2.2278	10.6877	30.8462	0.1407	18.3647	0.0702	18.4349	4.9046	0.0652	4.9698		14,256.99 26	14,256.99 26	0.3909		14,266.76 49

4.2 Trip Summary Information

Land Use	Average Daily Trip Rate			Unmitigated	Mitigated
	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	1,556.10	1,493.70	1372.80	4,381,832	4,381,832
Condo/Townhouse	1,444.50	1,409.19	1203.75	4,047,830	4,047,830
Enclosed Parking with Elevator	0.00	0.00	0.00		
General Office Building	14.39	3.22	1.38	26,130	26,130
Total	3,014.99	2,906.11	2,577.93	8,455,792	8,455,792

4.3 Trip Type Information

Land Use	Miles			Trip %			Trip Purpose %		
	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3
Condo/Townhouse	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3
Enclosed Parking with Elevator	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515
Enclosed Parking with Elevator	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515
Apartments Mid Rise	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515
Condo/Townhouse	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

Install High Efficiency Lighting

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.3029	2.5885	1.1050	0.0165		0.2092	0.2092		0.2092	0.2092		3,303.8146	3,303.8146	0.0633	0.0606	3,323.4475
NaturalGas Unmitigated	0.3992	3.4123	1.4568	0.0218		0.2758	0.2758		0.2758	0.2758		4,355.3008	4,355.3008	0.0835	0.0799	4,381.1822

5.2 Energy by Land Use - NaturalGas Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	12223.1	0.1318	1.1264	0.4793	7.1900e-003		0.0911	0.0911		0.0911	0.0911		1,438.0133	1,438.0133	0.0276	0.0264	1,446.5587
Condo/Townhouse	24680.4	0.2662	2.2745	0.9679	0.0145		0.1839	0.1839		0.1839	0.1839		2,903.5730	2,903.5730	0.0557	0.0532	2,920.8275
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
General Office Building	116.573	1.2600e-003	0.0114	9.6000e-003	7.0000e-005		8.7000e-004	8.7000e-004		8.7000e-004	8.7000e-004		13.7145	13.7145	2.6000e-004	2.5000e-004	13.7960
Total		0.3992	3.4123	1.4568	0.0218		0.2758	0.2758		0.2758	0.2758		4,355.3008	4,355.3008	0.0835	0.0798	4,381.1822

Mitigated

	Natural Gas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	9.58299	0.1034	0.8831	0.3758	5.6400e-003		0.0714	0.0714		0.0714	0.0714		1,127.4108	1,127.4108	0.0216	0.0207	1,134.1105
Condo/Townhouse	18.4138	0.1986	1.6970	0.7221	0.0108		0.1372	0.1372		0.1372	0.1372		2,166.3296	2,166.3296	0.0415	0.0397	2,179.2030
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
General Office Building	0.0856303	9.2000e-004	8.4000e-003	7.0500e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.0742	10.0742	1.9000e-004	1.8000e-004	10.1340
Total		0.3029	2.5885	1.1050	0.0165		0.2092	0.2092		0.2092	0.2092		3,303.8146	3,303.8146	0.0633	0.0606	3,323.4475

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	19.8467	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260	0.0000	106.0569	106.0569	0.1017	0.0000	108.5983
Unmitigated	19.8467	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260	0.0000	106.0569	106.0569	0.1017	0.0000	108.5983

6.2 Area by SubCategory

Unmitigated

APPENDIX E

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	2.5371					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	15.5444					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.7652	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260		106.0569	106.0569	0.1017		108.5983
Total	19.8467	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260	0.0000	106.0569	106.0569	0.1017	0.0000	108.5983

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	2.5371					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	15.5444					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.7652	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260		106.0569	106.0569	0.1017		108.5983
Total	19.8467	0.6759	58.6029	3.1100e-003		0.3260	0.3260		0.3260	0.3260	0.0000	106.0569	106.0569	0.1017	0.0000	108.5983

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

CalEEMod Version: CalEEMod.2016.3.1

Date: 5/24/2017 11:34 AM

Santa Cruz Downtown Recovery Plan
Santa Cruz County, Mitigation Report

Operational Percent Reduction Summary

Category	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												
Architectural Coating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.63	15.63	15.63	15.65	15.63
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscaping	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas	24.14	24.15	24.15	23.93	24.14	24.14	0.00	24.14	24.14	24.11	24.07	24.14
Water Indoor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Outdoor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Operational Mobile Mitigation

Project Setting:

Mitigation	Category	Measure	% Reduction	Input Value 1	Input Value 2	Input Value 3
No	Land Use	Increase Density	0.00			
No	Land Use	Increase Diversity	0.09	0.31		
No	Land Use	Improve Walkability Design	0.00			

APPENDIX E

No	Land Use	Improve Destination Accessibility	0.00		
No	Land Use	Increase Transit Accessibility	0.25		
No	Land Use	Integrate Below Market Rate Housing	0.00		
	Land Use	Land Use SubTotal	0.00		
No	Neighborhood Enhancements	Improve Pedestrian Network			
No	Neighborhood Enhancements	Provide Traffic Calming Measures			
No	Neighborhood Enhancements	Implement NEV Network	0.00		
	Neighborhood Enhancements	Neighborhood Enhancements Subtotal	0.00		
No	Parking Policy Pricing	Limit Parking Supply	0.00		
No	Parking Policy Pricing	Unbundle Parking Costs	0.00		
No	Parking Policy Pricing	On-street Market Pricing	0.00		
	Parking Policy Pricing	Parking Policy Pricing Subtotal	0.00		
No	Transit Improvements	Provide BRT System	0.00		
No	Transit Improvements	Expand Transit Network	0.00		
No	Transit Improvements	Increase Transit Frequency	0.00		
	Transit Improvements	Transit Improvements Subtotal	0.00		
		Land Use and Site Enhancement Subtotal	0.00		
No	Commute	Implement Trip Reduction Program			
No	Commute	Transit Subsidy			
No	Commute	Implement Employee Parking "Cash Out"			
No	Commute	Workplace Parking Charge			
No	Commute	Encourage Telecommuting and Alternative Work Schedules	0.00		
No	Commute	Market Commute Trip Reduction Option	0.00		
No	Commute	Employee Vanpool/Shuttle	0.00		2.00
No	Commute	Provide Ride Sharing Program			

APPENDIX E

	Commute	Commute Subtotal	0.00		
No	School Trip	Implement School Bus Program	0.00		
		Total VMT Reduction	0.00		

Area Mitigation

Measure Implemented	Mitigation Measure	Input Value
No	Only Natural Gas Hearth	
No	No Hearth	
No	Use Low VOC Cleaning Supplies	
No	Use Low VOC Paint (Residential Interior)	100.00
No	Use Low VOC Paint (Residential Exterior)	100.00
No	Use Low VOC Paint (Non-residential Interior)	150.00
No	Use Low VOC Paint (Non-residential Exterior)	150.00
No	Use Low VOC Paint (Parking)	150.00
No	% Electric Lawnmower	
No	% Electric Leafblower	
No	% Electric Chainsaw	

Energy Mitigation Measures

Measure Implemented	Mitigation Measure	Input Value 1	Input Value 2
Yes	Exceed Title 24	28.00	
Yes	Install High Efficiency Lighting	16.00	
No	On-site Renewable		

Appliance Type	Land Use Subtype	% Improvement
ClothWasher		30.00
DishWasher		15.00

Fan	50.00
Refrigerator	15.00

Water Mitigation Measures

Measure Implemented	Mitigation Measure	Input Value 1	Input Value 2
No	Apply Water Conservation on Strategy		
No	Use Reclaimed Water		
No	Use Grey Water		
No	Install low-flow bathroom faucet	32.00	
No	Install low-flow Kitchen faucet	18.00	
No	Install low-flow Toilet	20.00	
No	Install low-flow Shower	20.00	
No	Turf Reduction		
No	Use Water Efficient Irrigation Systems	6.10	
No	Water Efficient Landscape		

Solid Waste Mitigation

Mitigation Measures	Input Value
Institute Recycling and Composting Services	75.00
Percent Reduction in Waste Disposed	

**Santa Cruz Downtown Recovery Plan –
Reduced Commercial Uses**

CalEEMod Version 2016.3.1 Outputs

Annual, Summer, Winter, Mitigation Report

Santa Cruz DRP - Reduced Commercial - Santa Cruz County, Annual

Santa Cruz DRP - Reduced Commercial
Santa Cruz County, Annual

1.0 Project Characteristics**1.1 Land Usage**

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Strip Mall	14.69	1000sqft	0.34	14,693.00	0

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	1.8	Precipitation Freq (Days)	61
Climate Zone	5			Operational Year	2040
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	372.88	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity adjusted based on 50% RPS by year 2030

Land Use - Amount of commercial uses reduced

Construction Phase - Modeling operations only

Vehicle Trips - Trip rates from TIA adjusted based on City-recommended 40% reduction based on mixed-use in Downtown Santa Cruz

Energy Use - Historical energy use factors assumed for commercial uses to be removed

Water And Wastewater - Water use based on City Water Department

Waste Mitigation - 75% waste diversion consistent with AB 341

Table Name	Column Name	Default Value	New Value
tblLandUse	BuildingSpaceSquareFeet	14,690.00	14,693.00
tblLandUse	LandUseSquareFeet	14,690.00	14,693.00

APPENDIX E

tblOffRoadEquipment	UsageHours	6.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	372.88
tblProjectCharacteristics	OperationalYear	2018	2040
tblTripsAndVMT	WorkerTripNumber	1.00	0.00
tblVehicleTrips	ST_TR	42.04	25.10
tblVehicleTrips	SU_TR	20.43	12.20
tblVehicleTrips	WD_TR	44.32	26.46
tblWater	IndoorWaterUseRate	1,088,125.34	969,738.00
tblWater	OutdoorWaterUseRate	666,915.53	0.00

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0676	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004
Energy	4.3000e-004	3.8700e-003	3.2500e-003	2.0000e-005		2.9000e-004	2.9000e-004		2.9000e-004	2.9000e-004	0.0000	34.3875	34.3875	2.4300e-003	5.6000e-004	34.6159
Mobile	0.0378	0.1777	0.3923	1.6900e-003	0.2035	8.9000e-004	0.2044	0.0545	8.2000e-004	0.0553	0.0000	155.0775	155.0775	4.5300e-003	0.0000	155.1907
Waste						0.0000	0.0000		0.0000	0.0000	3.1301	0.0000	3.1301	0.1850	0.0000	7.7547
Water						0.0000	0.0000		0.0000	0.0000	0.3077	0.8875	1.1952	0.0317	7.6000e-004	2.2135
Total	0.1059	0.1815	0.3957	1.7100e-003	0.2035	1.1800e-003	0.2047	0.0545	1.1100e-003	0.0556	3.4378	190.3529	193.7906	0.2236	1.3200e-003	199.7752

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0676	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004
Energy	4.3000e-004	3.8700e-003	3.2500e-003	2.0000e-005		2.9000e-004	2.9000e-004		2.9000e-004	2.9000e-004	0.0000	34.3875	34.3875	2.4300e-003	5.6000e-004	34.6159
Mobile	0.0378	0.1777	0.3923	1.6900e-003	0.2035	8.9000e-004	0.2044	0.0545	8.2000e-004	0.0553	0.0000	155.0775	155.0775	4.5300e-003	0.0000	155.1907
Waste						0.0000	0.0000		0.0000	0.0000	0.7825	0.0000	0.7825	0.0463	0.0000	1.9387
Water						0.0000	0.0000		0.0000	0.0000	0.3077	0.8875	1.1952	0.0317	7.6000e-004	2.2135
Total	0.1059	0.1815	0.3957	1.7100e-003	0.2035	1.1800e-003	0.2047	0.0545	1.1100e-003	0.0556	1.0902	190.3529	191.4430	0.0849	1.3200e-003	193.9591

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	68.29	0.00	1.21	62.04	0.00	2.91

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0378	0.1777	0.3923	1.6900e-003	0.2035	8.9000e-004	0.2044	0.0545	8.2000e-004	0.0553	0.0000	155.0775	155.0775	4.5300e-003	0.0000	155.1907
Unmitigated	0.0378	0.1777	0.3923	1.6900e-003	0.2035	8.9000e-004	0.2044	0.0545	8.2000e-004	0.0553	0.0000	155.0775	155.0775	4.5300e-003	0.0000	155.1907

4.2 Trip Summary Information

Land Use	Average Daily Trip Rate			Unmitigated	Mitigated
	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Strip Mall	388.70	368.72	179.22	548,125	548,125
Total	388.70	368.72	179.22	548,125	548,125

4.3 Trip Type Information

Land Use	Miles			Trip %			Trip Purpose %		
	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Strip Mall	9.50	7.30	7.30	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Strip Mall	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515

5.0 Energy Detail

Historical Energy Use: Y

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	30.1692	30.1692	2.3500e-003	4.9000e-004	30.3725
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	30.1692	30.1692	2.3500e-003	4.9000e-004	30.3725
NaturalGas Mitigated	4.3000e-004	3.8700e-003	3.2500e-003	2.0000e-005		2.9000e-004	2.9000e-004		2.9000e-004	2.9000e-004	0.0000	4.2183	4.2183	8.0000e-005	8.0000e-005	4.2434
NaturalGas Unmitigated	4.3000e-004	3.8700e-003	3.2500e-003	2.0000e-005		2.9000e-004	2.9000e-004		2.9000e-004	2.9000e-004	0.0000	4.2183	4.2183	8.0000e-005	8.0000e-005	4.2434

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Strip Mall	79048.3	4.3000e-004	3.8700e-003	3.2500e-003	2.0000e-005		2.9000e-004	2.9000e-004		2.9000e-004	2.9000e-004	0.0000	4.2183	4.2183	8.0000e-005	8.0000e-005	4.2434
Total		4.3000e-004	3.8700e-003	3.2500e-003	2.0000e-005		2.9000e-004	2.9000e-004		2.9000e-004	2.9000e-004	0.0000	4.2183	4.2183	8.0000e-005	8.0000e-005	4.2434

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Strip Mall	79048.3	4.3000e-004	3.8700e-003	3.2500e-003	2.0000e-005		2.9000e-004	2.9000e-004		2.9000e-004	2.9000e-004	0.0000	4.2183	4.2183	8.0000e-005	8.0000e-005	4.2434

Total		4.3000e-004	3.8700e-003	3.2500e-003	2.0000e-005		2.9000e-004	2.9000e-004		2.9000e-004	2.9000e-004	0.0000	4.2183	4.2183	8.0000e-005	8.0000e-005	4.2434

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Strip Mall	178373	30.1692	2.3500e-003	4.9000e-004	30.3725
Total		30.1692	2.3500e-003	4.9000e-004	30.3725

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Strip Mall	178373	30.1692	2.3500e-003	4.9000e-004	30.3725
Total		30.1692	2.3500e-003	4.9000e-004	30.3725

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0676	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004
Unmitigated	0.0676	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0102					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0574					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-005	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004
Total	0.0676	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					

Architectural Coating	0.0102					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0574					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-005	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004
Total	0.0676	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	1.1952	0.0317	7.6000e-004	2.2135
Unmitigated	1.1952	0.0317	7.6000e-004	2.2135

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Strip Mall	0.969738 / 0	1.1952	0.0317	7.6000e-004	2.2135
Total		1.1952	0.0317	7.6000e-004	2.2135

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Strip Mall	0.96973870	1.1952	0.0317	7.6000e-004	2.2135
Total		1.1952	0.0317	7.6000e-004	2.2135

8.0 Waste Detail**8.1 Mitigation Measures Waste**

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.7825	0.0463	0.0000	1.9387
Unmitigated	3.1301	0.1850	0.0000	7.7547

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Strip Mall	15.42	3.1301	0.1850	0.0000	7.7547
Total		3.1301	0.1850	0.0000	7.7547

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Strip Mall	3.855	0.7825	0.0463	0.0000	1.9387
Total		0.7825	0.0463	0.0000	1.9387

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment**Fire Pumps and Emergency Generators**

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Santa Cruz DRP - Reduced Commercial - Santa Cruz County, Summer

Santa Cruz DRP - Reduced Commercial
Santa Cruz County, Summer

1.0 Project Characteristics**1.1 Land Usage**

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Strip Mall	14.69	1000sqft	0.34	14,693.00	0

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	1.8	Precipitation Freq (Days)	61
Climate Zone	5	Operational Year	2040		
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	372.88	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity adjusted based on 50% RPS by year 2030

Land Use - Amount of commercial uses reduced

Construction Phase - Modeling operations only

Vehicle Trips - Trip rates from TIA adjusted based on City-recommended 40% reduction based on mixed-use in Downtown Santa Cruz

Energy Use - Historical energy use factors assumed for commercial uses to be removed

Water And Wastewater - Water use based on City Water Department

Waste Mitigation - 75% waste diversion consistent with AB 341

Table Name	Column Name	Default Value	New Value
tblLandUse	BuildingSpaceSquareFeet	14,690.00	14,693.00
tblLandUse	LandUseSquareFeet	14,690.00	14,693.00
tblOffRoadEquipment	UsageHours	6.00	0.00

APPENDIX E

tblProjectCharacteristics	CO2IntensityFactor	641.35	372.88
tblProjectCharacteristics	OperationalYear	2018	2040
tblTripsAndVMT	WorkerTripNumber	1.00	0.00
tblVehicleTrips	ST_TR	42.04	25.10
tblVehicleTrips	SU_TR	20.43	12.20
tblVehicleTrips	WD_TR	44.32	26.46
tblWater	IndoorWaterUseRate	1,088,125.34	969,738.00
tblWater	OutdoorWaterUseRate	666,915.53	0.00

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3705	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003
Energy	2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303
Mobile	0.2513	1.0449	2.3423	0.0105	1.2667	5.3200e-003	1.2720	0.3383	4.9300e-003	0.3432		1,065.1892	1,065.1892	0.0296		1,065.9295
Total	0.6242	1.0661	2.3616	0.0106	1.2667	6.9400e-003	1.2736	0.3383	6.5500e-003	0.3448		1,090.6713	1,090.6713	0.0301	4.7000e-004	1,091.5632

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3705	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003
Energy	2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303
Mobile	0.2513	1.0449	2.3423	0.0105	1.2667	5.3200e-003	1.2720	0.3383	4.9300e-003	0.3432		1,065.1892	1,065.1892	0.0296		1,065.9295
Total	0.6242	1.0661	2.3616	0.0106	1.2667	6.9400e-003	1.2736	0.3383	6.5500e-003	0.3448		1,090.6713	1,090.6713	0.0301	4.7000e-004	1,091.5632

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.2513	1.0449	2.3423	0.0105	1.2667	5.3200e-003	1.2720	0.3383	4.9300e-003	0.3432		1,065.1892	1,065.1892	0.0296		1,065.9295
Unmitigated	0.2513	1.0449	2.3423	0.0105	1.2667	5.3200e-003	1.2720	0.3383	4.9300e-003	0.3432		1,065.1892	1,065.1892	0.0296		1,065.9295

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Strip Mall	388.70	368.72	179.22	548,125	548,125
Total	388.70	368.72	179.22	548,125	548,125

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Strip Mall	9.50	7.30	7.30	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Strip Mall	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515

5.0 Energy Detail

Historical Energy Use: Y

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

NaturalGas Mitigated	2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303
NaturalGas Unmitigated	2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Strip Mall	216.571	2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303
Total		2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Strip Mall	0.216571	2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303
Total		2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.3705	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003
Unmitigated	0.3705	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0560					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.3144					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.4000e-004	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003
Total	0.3706	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e

SubCategory	lb/day										lb/day					
Architectural Coating	0.0560					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.3144					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.4000e-004	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003
Total	0.3706	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Santa Cruz DRP - Reduced Commercial - Santa Cruz County, Winter

Santa Cruz DRP - Reduced Commercial

Santa Cruz County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Strip Mall	14.69	1000sqft	0.34	14,693.00	0

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	1.8	Precipitation Freq (Days)	61
Climate Zone	5	Operational Year	2040		
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	372.88	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity adjusted based on 50% RPS by year 2030

Land Use - Amount of commercial uses reduced

Construction Phase - Modeling operations only

Vehicle Trips - Trip rates from TIA adjusted based on City-recommended 40% reduction based on mixed-use in Downtown Santa Cruz

Energy Use - Historical energy use factors assumed for commercial uses to be removed

Water And Wastewater - Water use based on City Water Department

Waste Mitigation - 75% waste diversion consistent with AB 341

Table Name	Column Name	Default Value	New Value
tblLandUse	BuildingSpaceSquareFeet	14,690.00	14,693.00
tblLandUse	LandUseSquareFeet	14,690.00	14,693.00
tblOffRoadEquipment	UsageHours	6.00	0.00

APPENDIX E

tblProjectCharacteristics	CO2IntensityFactor	641.35	372.88
tblProjectCharacteristics	OperationalYear	2018	2040
tblTripsAndVMT	WorkerTripNumber	1.00	0.00
tblVehicleTrips	ST_TR	42.04	25.10
tblVehicleTrips	SU_TR	20.43	12.20
tblVehicleTrips	WD_TR	44.32	26.46
tblWater	IndoorWaterUseRate	1,088,125.34	969,738.00
tblWater	OutdoorWaterUseRate	666,915.53	0.00

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3705	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003
Energy	2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303
Mobile	0.2229	1.0772	2.4956	0.0101	1.2667	5.3300e-003	1.2720	0.3383	4.9500e-003	0.3432		1,022.2697	1,022.2697	0.0308		1,023.0394
Total	0.5958	1.0985	2.5149	0.0102	1.2667	6.9500e-003	1.2736	0.3383	6.5700e-003	0.3449		1,047.7519	1,047.7519	0.0313	4.7000e-004	1,048.6731

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3705	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003
Energy	2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303
Mobile	0.2229	1.0772	2.4956	0.0101	1.2667	5.3300e-003	1.2720	0.3383	4.9500e-003	0.3432		1,022.2697	1,022.2697	0.0308		1,023.0394
Total	0.5958	1.0985	2.5149	0.0102	1.2667	6.9500e-003	1.2736	0.3383	6.5700e-003	0.3449		1,047.7519	1,047.7519	0.0313	4.7000e-004	1,048.6731

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.2229	1.0772	2.4956	0.0101	1.2667	5.3300e-003	1.2720	0.3383	4.9500e-003	0.3432		1,022.2697	1,022.2697	0.0308		1,023.0394
Unmitigated	0.2229	1.0772	2.4956	0.0101	1.2667	5.3300e-003	1.2720	0.3383	4.9500e-003	0.3432		1,022.2697	1,022.2697	0.0308		1,023.0394

4.2 Trip Summary Information

Land Use	Average Daily Trip Rate			Unmitigated	Mitigated
	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Strip Mall	388.70	368.72	179.22	548,125	548,125
Total	388.70	368.72	179.22	548,125	548,125

4.3 Trip Type Information

Land Use	Miles			Trip %			Trip Purpose %		
	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Strip Mall	9.50	7.30	7.30	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Strip Mall	0.607849	0.022927	0.205901	0.103922	0.009867	0.003828	0.022612	0.014637	0.001269	0.001293	0.004540	0.000840	0.000515

5.0 Energy Detail

Historical Energy Use: Y

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303
NaturalGas Unmitigated	2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303

5.2 Energy by Land Use - Natural Gas

Unmitigated

	Natural Gas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Strip Mall	216.571	2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303
Total		2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303

Mitigated

	Natural Gas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Strip Mall	0.216571	2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303
Total		2.3400e-003	0.0212	0.0178	1.3000e-004		1.6100e-003	1.6100e-003		1.6100e-003	1.6100e-003		25.4789	25.4789	4.9000e-004	4.7000e-004	25.6303

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.3705	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003
Unmitigated	0.3705	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0560					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.3144					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.4000e-004	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003
Total	0.3706	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					

Architectural Coating	0.0560					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.3144					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.4000e-004	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003
Total	0.3706	1.0000e-005	1.4900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2100e-003	3.2100e-003	1.0000e-005		3.4200e-003

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

CalEEMod Version: CalEEMod.2016.3.1

Date: 5/24/2017 11:43 AM

Santa Cruz DRP - Reduced Commercial
Santa Cruz County, Mitigation Report

Operational Percent Reduction Summary

Category	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												
Architectural Coating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscaping	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Indoor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Outdoor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Operational Mobile Mitigation

Project Setting:

Mitigation	Category	Measure	% Reduction	Input Value 1	Input Value 2	Input Value 3
No	Land Use	Increase Density	0.00			
No	Land Use	Increase Diversity	-0.01	0.13		
No	Land Use	Improve Walkability Design	0.00			

APPENDIX E

No	Land Use	Improve Destination Accessibility	0.00		
No	Land Use	Increase Transit Accessibility	0.25		
No	Land Use	Integrate Below Market Rate Housing	0.00		
	Land Use	Land Use SubTotal	0.00		
No	Neighborhood Enhancements	Improve Pedestrian Network			
No	Neighborhood Enhancements	Provide Traffic Calming Measures			
No	Neighborhood Enhancements	Implement NEV Network	0.00		
	Neighborhood Enhancements	Neighborhood Enhancements Subtotal	0.00		
No	Parking Policy Pricing	Limit Parking Supply	0.00		
No	Parking Policy Pricing	Unbundle Parking Costs	0.00		
No	Parking Policy Pricing	On-street Market Pricing	0.00		
	Parking Policy Pricing	Parking Policy Pricing Subtotal	0.00		
No	Transit Improvements	Provide BRT System	0.00		
No	Transit Improvements	Expand Transit Network	0.00		
No	Transit Improvements	Increase Transit Frequency	0.00		
	Transit Improvements	Transit Improvements Subtotal	0.00		
		Land Use and Site Enhancement Subtotal	0.00		
No	Commute	Implement Trip Reduction Program			
No	Commute	Transit Subsidy			
No	Commute	Implement Employee Parking "Cash Out"			
No	Commute	Workplace Parking Charge			
No	Commute	Encourage Telecommuting and Alternative Work Schedules	0.00		
No	Commute	Market Commute Trip Reduction Option	0.00		
No	Commute	Employee Vanpool/Shuttle	0.00		2.00
No	Commute	Provide Ride Sharing Program			

APPENDIX E

	Commute	Commute Subtotal	0.00		
No	School Trip	Implement School Bus Program	0.00		
		Total VMT Reduction	0.00		

Area Mitigation

Measure Implemented	Mitigation Measure	Input Value
No	Only Natural Gas Hearth	
No	No Hearth	
No	Use Low VOC Cleaning Supplies	
No	Use Low VOC Paint (Residential Interior)	100.00
No	Use Low VOC Paint (Residential Exterior)	100.00
No	Use Low VOC Paint (Non-residential Interior)	150.00
No	Use Low VOC Paint (Non-residential Exterior)	150.00
No	Use Low VOC Paint (Parking)	150.00
No	% Electric Lawnmower	
No	% Electric Leafblower	
No	% Electric Chainsaw	

Energy Mitigation Measures

Measure Implemented	Mitigation Measure	Input Value 1	Input Value 2
No	Exceed Title 24		
No	Install High Efficiency Lighting		
No	On-site Renewable		

Appliance Type	Land Use Subtype	% Improvement
ClothWasher		30.00
DishWasher		15.00

Fan	50.00
Refrigerator	15.00

Water Mitigation Measures

Measure Implemented	Mitigation Measure	Input Value 1	Input Value 2
No	Apply Water Conservation on Strategy		
No	Use Reclaimed Water		
No	Use Grey Water		
No	Install low-flow bathroom faucet	32.00	
No	Install low-flow Kitchen faucet	18.00	
No	Install low-flow Toilet	20.00	
No	Install low-flow Shower	20.00	
No	Turf Reduction		
No	Use Water Efficient Irrigation Systems	6.10	
No	Water Efficient Landscape		

Solid Waste Mitigation

Mitigation Measures	Input Value
Institute Recycling and Composting Services	75.00
Percent Reduction in Waste Disposed	

APPENDIX F

Traffic Memo

Level of Service Calculations are available on CD & City Website at:

<http://www.cityofsantacruz.com/government/city-departments/planning-and-community-development-2/environmental-documents>

MEMORANDUM

To: Ron Powers, City of Santa Cruz
From: Frederik Venter, Reaa Ali, Kimley-Horn
Date: May 10, 2017
Subject: **Santa Cruz Downtown Recovery Plan Amendment – Traffic Study**

This memorandum contains the traffic analysis for the Downtown Recovery Plan Project (Project), located in the City of Santa Cruz Downtown area. The objective of this project is to evaluate the traffic and circulation impacts of increasing the building densities and land use changes in Downtown Santa Cruz. The study area bounded by the San Lorenzo River, Soquel Avenue in the north, Laurel Street in the south, and the first block immediately west of Pacific Avenue. The Pacific Avenue portion of the study area is bounded by Cathcart Street on the north and Laurel Street on the south. The Front Street portion of the study area is bounded by Soquel Avenue on the north and Laurel Street on the south. The study area is divided into three areas defined as Areas X, Y, and Z for traffic assignment and analysis purposes. **Figure 1** shows the Study Area.

The traffic analysis contained in this memorandum evaluates the addition of the Downtown Recovery Plan Specific Plan to the existing conditions and cumulative conditions. This memorandum discusses the results of the traffic volumes and LOS developed for the following development scenarios and peak periods:

1. Existing (AM and PM)
2. Existing plus Project (AM and PM)
3. Cumulative plus Project (PM only) – The City General Plan was only developed for the PM peak hour, which represents the worst-case analysis. The PM peak hour volumes are typically higher in the PM compared to the AM peak hour.

The following intersections are included in the study:

1. Front Street and Laurel Street
2. Pacific Avenue and Laurel Street
3. Front Street and Cathcart Street
4. Front Street and Metro Station Access
5. Pacific Avenue and Metro Station Access
6. Pacific Avenue and Maple Street
7. Pacific Avenue and Front Street/Mission-Water Street
8. Front Street and Soquel Avenue
9. Pacific Avenue and Cathcart Street
10. Soquel Avenue and Pacific Avenue
11. Ocean Street and Water Street
12. Highway 1 and Highway 9
13. Chestnut Street and Mission Street



TRAFFIC VOLUMES/DATA COLLECTION

Intersection turning movement counts were collected for the AM (7:00 am – 9:00 am) and PM (4:00 pm – 6:00 pm) peak periods during the weekday when local schools were in session. Some data previously available was also used in the technical analysis. Previously available data was utilized for Intersections 1, 2, 3, 4, 8, and 11. The traffic counts for these intersections were collected on Thursday, May 22, 2014. For intersections 5, 6, 7, 9, 10, 12, and 13, data collection was conducted on Tuesday, November 17, 2015.

Cumulative conditions volumes were obtained from the City of Santa Cruz 2030 General Plan (GP) (PM peak hour only). This development scenario accounts for growth per the General Plan including growth for the University of Santa Cruz and also newer approved projects in and around the downtown area which were not reflected in the GP. The latter resulted in an approximate 5% increase in GP volumes at the study intersections.

TRIP GENERATION

The number of trips anticipated to be generated by the proposed project were derived using trip generation rates obtained from Appendix C of the City's General Plan for the Downtown area. The proposed project is understood to consist of commercial, office, and residential (townhomes and apartments) land uses. Since the General Plan only specifies the daily and PM peak hour trip rates, the AM peak hour trip rates were calculated by applying the proportion of the AM peak hour trip rate to the daily rate for these land uses as found in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 9th Edition*. The following land use codes (LU) from the ITE *Trip Generation Manual* were used: Shopping Center (LU 820) for commercial; General Office Building (LU 710) for office; Residential Condominium/Townhouse (LU 230) for townhomes; and Apartment (LU 220) for apartments.

Trip generation calculations were performed by study area – Area X, Y, and Z of the project, and include a 40% trip reduction for mixed use development in the Downtown Area. The reductions are generated by proximity to the Transit center, mixed use development and, bicycle use and walking trips. The area also proposes added parking in downtown. Additional trips were assumed to be generated by the parking structure as indicated in the trip generation table. The added trips were based on the anticipated parking spaces that would not be utilized by the new land uses in the DRP and accounted for approximately 20% of the spaces at 85% parking occupancy, which is conservative. The anticipated trip generation characteristics for the proposed project are depicted in **Table 1**.

The proposed project trips were distributed on the transportation network based on distribution percentages provided by the City of Santa Cruz. **Figure 2** shows the in and out percent distribution near the project. The resulting AM and PM peak-hour traffic volumes attributed to the proposed project are illustrated in **Figure 3**.

Table 1. Project Trip Generation

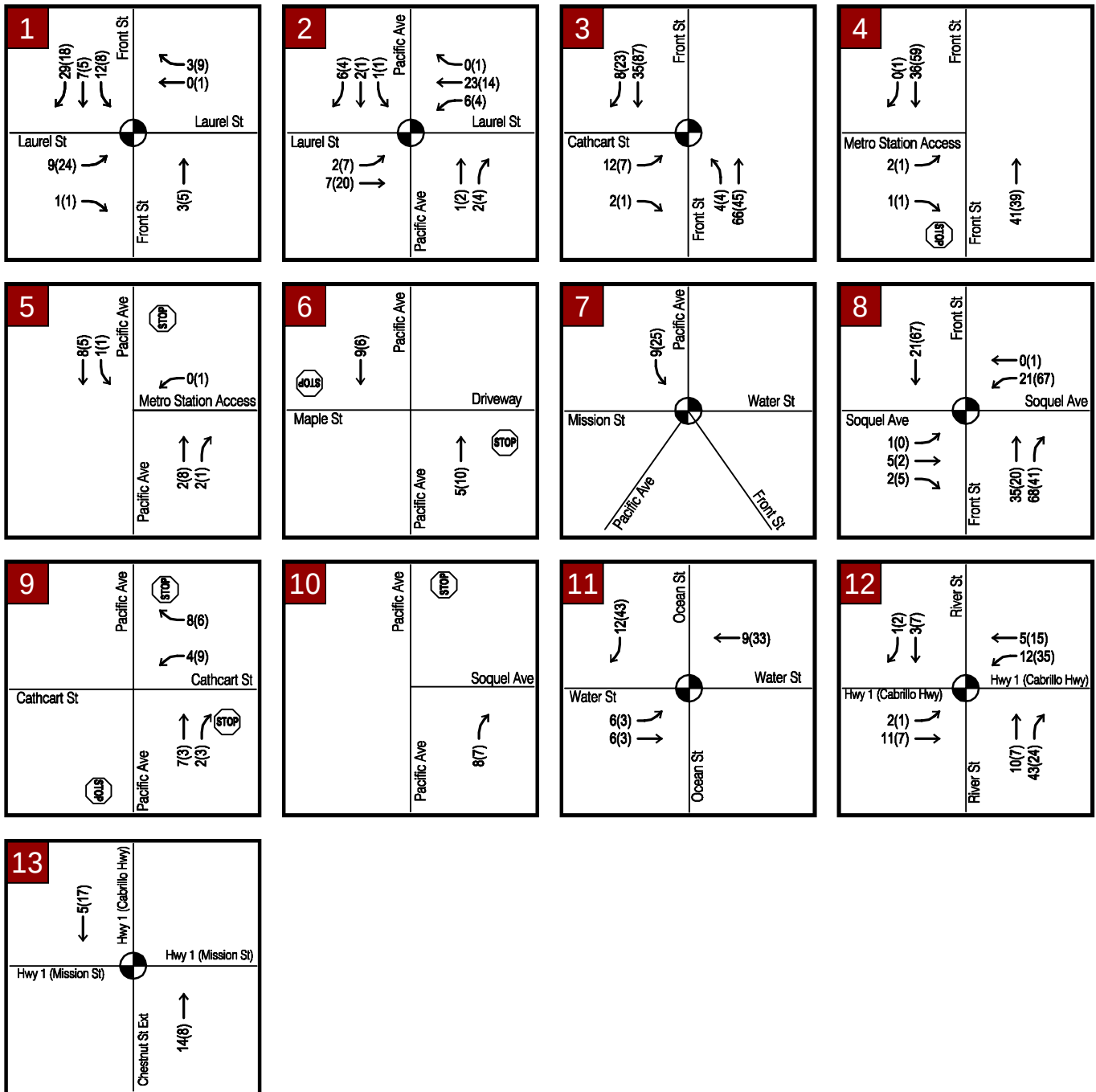
Land Uses	Project Size ⁶		WEEKDAY	AM PEAK HOUR ²				PM PEAK HOUR					
			Daily Trips	Total Peak Hour	% Of ADT	IN	/	OUT	Total Peak Hour	% Of ADT	IN	/	OUT
City of Santa Cruz General Plan 2030 Future City Buildout Trip Generation Rates ¹													
Commercial		1,000 Sq Ft	44.32	1.00	2%	62%	/	38%	2.71	6%	44%	/	56%
Office		1,000 Sq Ft	11.01	1.56	14%	88%	/	12%	1.49	14%	17%	/	83%
Townhomes ³		Dwelling Unit(s)	7.50	0.51	7%	22%	/	78%	0.62	8%	65%	/	35%
Apartments		Dwelling Unit(s)	6.65	0.51	8%	20%	/	80%	0.62	9%	65%	/	35%
Trips Generated													
Area X - Riverfront													
Commercial	11.171	1,000 Sq Ft	496	11		7	/	4	30		13	/	17
Office	18.296	1,000 Sq Ft	202	29		26	/	3	27		5	/	22
Townhomes	321	Dwelling Unit(s)	2,408	164		36	/	128	199		129	/	70
Apartments	0	Dwelling Unit(s)	0	0		0	/	0	0		0	/	0
Total Area X Trips			3,106	204		69	/	135	256		147	/	109
40% Reduction for Downtown Area ⁴			(1,242)	(82)		(28)	/	(54)	(102)		(59)	/	(44)
Net Area X Trips			1,864	122		41	/	81	154		88	/	65
Area Y - E. Pacific/W. Front Pacific Station													
Commercial	(27.864)	1,000 Sq Ft	(1,236)	(28)		(17)	/	(11)	(76)		(33)	/	(43)
Office	(16.105)	1,000 Sq Ft	(178)	(25)		(22)	/	(3)	(24)		(4)	/	(20)
Townhomes	0	Dwelling Unit(s)	0	0		0	/	0	0		0	/	0
Apartments	370	Dwelling Unit(s)	2,462	189		38	/	151	229		149	/	80
Total Area Y Trips			1,048	136		(1)	/	137	129		112	/	17
40% Reduction for Downtown Area ⁴			(419)	(54)		0	/	(55)	(52)		(45)	/	(7)
Parking Garage Added Trips ⁵				26		20	/	6	52		26	/	26
Net Area Y Trips			629	108		19	/	88	129		93	/	36
Area Z - W. Pacific													
Commercial	2	1,000 Sq Ft	90	2		1	/	1	5		2	/	3
Office	0	1,000 Sq Ft	0	0		0	/	0	0		0	/	0
Townhomes	0	Dwelling Unit(s)	0	0		0	/	0	0		0	/	0
Apartments	20	Dwelling Unit(s)	134	10		2	/	8	12		8	/	4
Total Area Z Trips			224	12		3	/	9	17		10	/	7
40% Reduction for Downtown Area ⁴			(90)	(5)		(1)	/	(4)	(7)		(4)	/	(3)
Net Area Z Trips			134	7		2	/	5	10		6	/	4
Total New Downtown Recovery Plan Buildout Trips			2,627	237		63	/	174	293		188	/	106

Notes:

1. Trip generation rates obtained from Appendix C of the City of Santa Cruz General Plan 2030 Draft EIR, September 2011.
2. The AM Peak Hour rates for Commercial, Office, Townhomes, and Apartment uses was calculated by applying the proportion of the AM peak hour rate to the daily rate for Shopping Center (LUC 820), General Office Building (LUC 710), Residential Condominium/Townhouse (LU 230), and Apartment (LUC 220), respectively. The in/out percentages for the uses were obtained from these same ITE LUCs.
3. ITE Land Use 270 Rates used for Townhomes per City direction (email correspondence with Ron Marquez dated 04/22/16).
4. 40% Reduction for mixed use development in Downtown Santa Cruz per City direction (email correspondence with Ron Marquez dated 04/22/16).
5. Required parking per City Code= 414+880+871=2,165 spaces. With 20% reduction=1,732, so 259 additional spaces (1,991-1,732) that will generate traffic. 10% in the AM peak = 26 trips, 20% in the PM peak = 52 trips.
6. Total project size can be obtained by calculating the sum of each land use for Area X, Area Y, and Area Z.
 Commercial land use = 11,171 sf + (-27,864 sf) + 2,000 sf = -14,693 sf
 Office land use = 18,296 sf + (-16,105 sf) + 0 sf = +2,191 sf
 Residential land use = 321 units + 370 units + 20 units = +711 units



APPENDIX F



LEGEND	
X	INTERSECTION #
	TRAFFIC SIGNAL
	STOP SIGN
XX(X)	AM(PM) PEAK HOUR VOLUMES

TRAFFIC IMPACT ANALYSIS METHODOLOGY

Consistent with the City of Santa Cruz TIA Guidelines, the concept of Level of Service (LOS) is utilized to analyze both the signalized and unsignalized study intersections. The LOS of a transportation facility is a qualitative measure used to describe operational conditions. LOS ranges from A (best), which represents minimal delay, to F (worst), which represents heavy delay and a facility that is operating at or near its functional capacity. As defined in Section 4.4 of the City of Santa Cruz 2030 General Plan Draft EIR, the City of Santa Cruz has established LOS D as the minimum acceptable LOS for overall intersection operations during weekday AM and PM peak hours. However, due to environmental, economic, and/or feasibility constraints with implementing improvements at certain major regional intersections, the City accepts a lower LOS at these locations under the current General Plan per existing Circulation Policy 5.1.2. The threshold for each study intersection is specified in the LOS analysis tables below.

Intersection Levels of Service for this study were determined using methods defined in the *Highway Capacity Manual, 2010 and 2000 (HCM)*, and appropriate traffic analysis software. The *HCM* includes procedures for analyzing side-street stop controlled (SASS), all-way stop controlled (AWSC), and signalized intersections and *HCM 2010* uses multimodal analysis principles (bicycle and pedestrians). The SASS procedure defines LOS as a function of average control delay for each minor street approach movement. Conversely, the AWSC and signalized intersection procedures define LOS as a function of average control delay for the intersection. *HCM 2010* was used for all intersections except for Intersection 7 due to the presence of a fifth approach at this location, which *HCM 2010* cannot analyze correctly and *HCM 2000* was used to analyze this study intersection.

EXISTING AND EXISTING PLUS PROJECT CONDITIONS

Traffic volumes for Existing conditions were obtained from traffic counts. Peak-hour traffic associated with the proposed Downtown Recovery Plan amendments was added to the Existing traffic volumes to generate traffic volumes for Existing plus Project conditions.

Figures 4 and 5 show the volumes at the study intersections under Existing and Existing plus Project conditions.

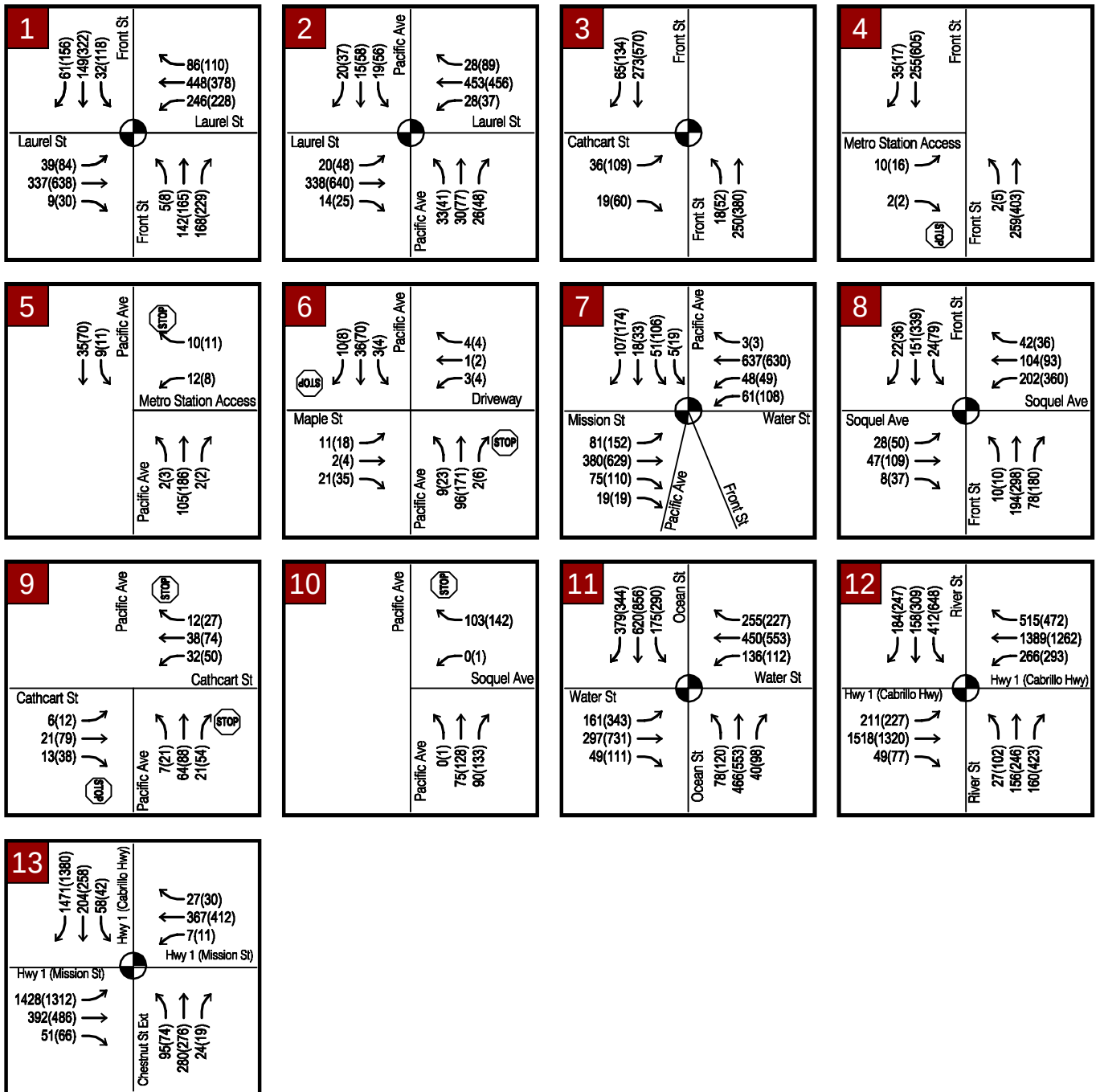
Table 2 below presents the peak-hour intersection operating conditions for the Existing and Existing plus Project development scenarios.

As indicated in **Table 2**, the study intersections operate at LOS A through LOS F under Existing conditions and with the addition of project traffic during the AM and PM peak hours. The addition of project trips does not worsen the LOS at the study intersections lower than the minimum acceptable LOS except at the following intersection.

Intersection #12, Highway 1/Highway 9, is currently operating at LOS E and would continue to operate at LOS E with the addition of the project.

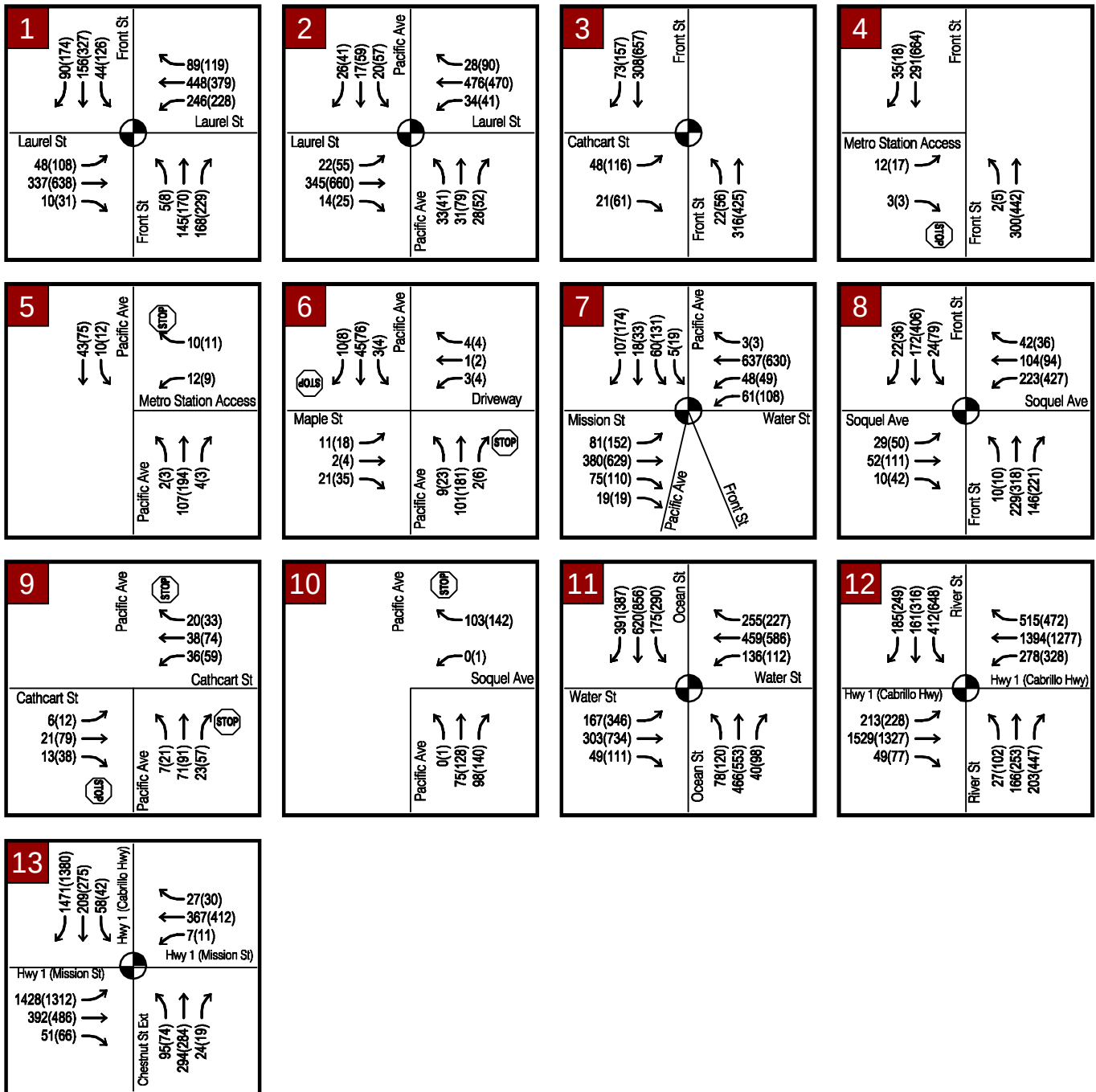
Intersection #13, Chestnut Street/Mission Street, is currently operating at LOS F in the AM peak hour and LOS E in the PM peak hour, and would continue to operate at these conditions with the addition of the project.

APPENDIX F



LEGEND	
	INTERSECTION #
	TRAFFIC SIGNAL
	STOP SIGN
XX(X)	AM(PM) PEAK HOUR VOLUMES

APPENDIX F



LEGEND	
	INTERSECTION #
	TRAFFIC SIGNAL
	STOP SIGN
XX(X)	AM(PM) PEAK HOUR VOLUMES

Table 2. Existing and Existing plus Project Conditions Levels of Service

#	Intersection	Control Type	City of Santa Cruz Threshold ²	Existing Conditions ¹						Existing Plus Project Conditions ¹					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
				Movement	Delay ³	LOS	Movement	Delay ³	LOS	Movement	Delay ³	LOS	Movement	Delay ³	LOS
1	Front Street / Laurel Street	Signal	D	Overall	26.4	C	Overall	30.8	C	Overall	27.2	C	Overall	31.2	C
2	Pacific Avenue / Laurel Street	Signal	D	Overall	14.5	B	Overall	17.9	B	Overall	15.0	B	Overall	18.5	B
3	Front Street / Cathcart Street	Signal	D	Overall	16.2	B	Overall	19.0	B	Overall	16.2	B	Overall	18.9	B
4	Front Street / Metro Station Access	Signal	D	Overall	5.3	A	Overall	4.9	A	Overall	6.0	A	Overall	5.1	A
5	Pacific Avenue / Metro Station Access	SSSC	D	Overall	1.7	A	Overall	1.1	A	Overall	1.6	A	Overall	1.1	A
		Worst Approach	D	WB	9.5	A	WB	11.4	B	WB	9.6	A	WB	11.6	B
6	Pacific Avenue / Maple Street	AWSC	D	Overall	7.6	A	Overall	8.1	A	Overall	7.7	A	Overall	8.2	A
7	Pacific Avenue / Front Street / Mission-Water Street	Signal	D	Overall	17.7	B	Overall	20.2	C	Overall	17.7	B	Overall	21.1	C
8	Front Street / Soquel Avenue	Signal	D	Overall	18.6	B	Overall	21.9	C	Overall	19.2	B	Overall	23.1	C
9	Pacific Avenue / Cathcart Street	AWSC	D	Overall	8.0	A	Overall	8.8	A	Overall	8.1	A	Overall	8.9	A
10	Soquel Avenue / Pacific Avenue	SSSC	D	Overall	3.7	A	Overall	3.6	A	Overall	3.6	A	Overall	3.6	A
		Worst Approach	D	WB	9.6	A	WB	10.3	B	WB	9.7	A	WB	10.3	B
11	Ocean Street / Water Street	Signal	F	Overall	22.6	C	Overall	35.3	D	Overall	22.8	C	Overall	35.6	D
12	Highway 1 / Highway 9	Signal	F	Overall	58.0	E	Overall	71.7	E	Overall	59.5	E	Overall	74.1	E
13	Chestnut Street / Mission Street	Signal	F	Overall	140.9	F	Overall	74.1	E	Overall	140.4	F	Overall	73.8	E

Notes:

- Analysis performed using HCM 2010 methodologies, except for Intersection 7 where HCM 2000 methodology was applied.
- The City of Santa Cruz has established LOS D as the minimum acceptable LOS for overall intersection operations during the AM and PM peak hours. However, under the existing General Plan, the City accepts a lower LOS (F) at some major regional intersections per existing Circulation Policy 5.1.2.
- Delay indicated in seconds/vehicle.
- Intersections that fall below City standard are shown in **bold**.

CUMULATIVE PLUS PROJECT CONDITIONS

Peak-hour traffic volumes for Cumulative conditions were obtained from the City of Santa Cruz 2030 General Plan and include the growth anticipated by the University of Santa Cruz. These volumes were increased by an additional 5% at all approaches except at the bus driveways to account for other currently planned projects not envisioned in the General Plan Environmental Impact Report.

Figure 6 shows the traffic volumes at the study intersections under this development scenario. Planned improvements, included in the City Traffic Impact Fee Program, was assumed to be constructed for GP scenario analysis.

Peak-hour traffic associated with the proposed Downtown Recovery Plan amendments was added to the Cumulative traffic volumes and Levels of Service were determined at the study intersections.

Table 3 presents the peak-hour intersection operating conditions for this analysis scenario.

As indicated in **Table 3**, the study intersections operate at LOS A through LOS F during the PM peak hour.

- Intersection #1, Front Street and Laurel Street, would fail in the PM peak hour
- Intersection #2, Pacific Avenue and Laurel Street, would fail in the PM peak hour
- Intersection #8, Front Street and Soquel Avenue, would fail in the PM peak hour
- Intersection #11, Ocean Street and Water Street, would fail in the PM peak hour
- Intersection #12, Highway 1/Highway 9, would fail in the PM peak hour
- Intersection #13, Chestnut Street/Mission Street, would fail in the PM peak hour.

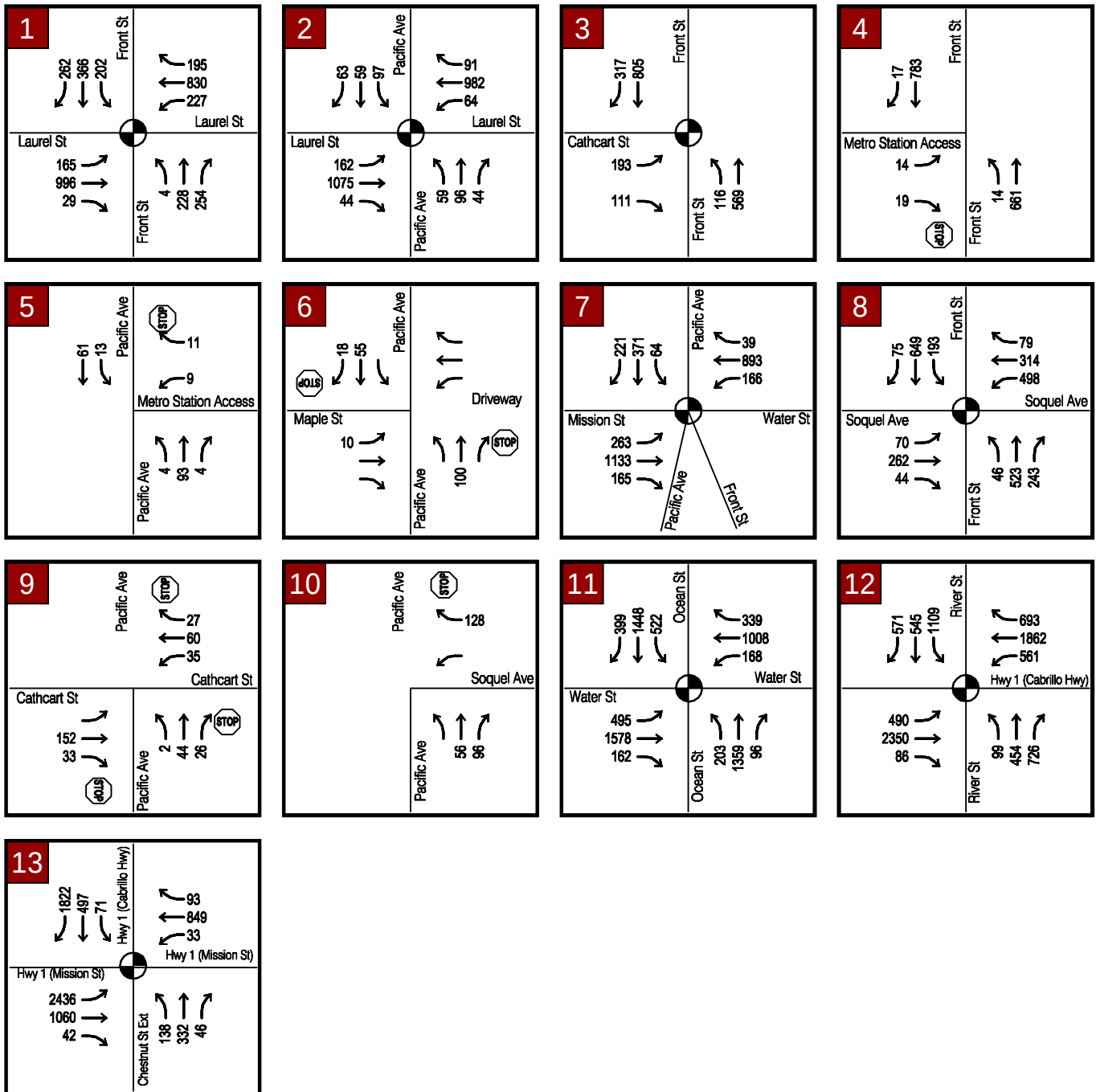
Table 3. Cumulative plus Project Conditions Levels of Service

#	Intersection	Control Type	City of Santa Cruz Threshold ²	Cumulative Plus Project Conditions ¹		
				PM Peak Hour		
				Movement	Delay ³	LOS
1	Front Street / Laurel Street	Signal	D	Overall	100.2	F
2	Pacific Avenue / Laurel Street	Signal	D	Overall	105.9	F
3	Front Street / Cathcart Street	Signal	D	Overall	23.5	C
4	Front Street / Metro Station Access	Signal	D	Overall	6.4	A
5	Pacific Avenue / Metro Station Access	SSSC	D	Overall	1.7	A
		<i>Worst Approach</i>	D	WB	10.5	B
6	Pacific Avenue / Maple Street	AWSC	D	Overall	7.7	A
7	Pacific Avenue / Front Street / Mission-Water Street	Signal	D	Overall	32.3	C
8	Front Street / Soquel Avenue	Signal	D	Overall	59.9	E
9	Pacific Avenue / Cathcart Street	AWSC	D	Overall	8.3	A
10	Soquel Avenue / Pacific Avenue	SSSC	D	Overall	4.3	A
		<i>Worst Approach</i>	D	WB	9.5	A
11	Ocean Street / Water Street	Signal	F	Overall	228.1	F
12	Highway 1 / Highway 9	Signal	F	Overall	269.2	F
13	Chestnut Street / Mission Street	Signal	F	Overall	344.0	F

Notes:

1. Analysis performed using HCM 2010 methodologies, except for Intersection 7 where HCM 2000 methodology was applied.
2. The City of Santa Cruz has established LOS D as the minimum acceptable LOS for overall intersection operations during the AM and PM peak hours. However, under the existing General Plan, the City accepts a lower LOS (F) at some major regional intersections per existing Circulation Policy 5.1.2.
3. Delay indicated in seconds/vehicle.
4. Intersection geometry under cumulative plus project conditions was improved at the following intersections per modifications noted under the City's Capital Improvement Projects list: Highway 1 & Highway 9; Ocean Street & Water Street; and Chestnut Street and Mission Street.
5. Intersections that fall below City standard are shown in **bold**.

APPENDIX F



LEGEND	
	INTERSECTION #
	TRAFFIC SIGNAL
	STOP SIGN
XX	PM PEAK HOUR VOLUMES



APPENDICES

Appendix A. Synchro Analysis Reports

Appendix B. Synchro Timing Reports



Appendix A
Synchro Analysis Reports

APPENDIX F

Existing

AM Peak

Santa Cruz DRP Study 1: Front Street & Laurel Street

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	337	9	246	448	86	5	142	168	32	149	61
Future Volume (veh/h)	39	337	9	246	448	86	5	142	168	32	149	61
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1853	1900	1845	1863	1845	1583	1827	1881	1743	1827	1792
Adj Flow Rate, veh/h	42	366	10	267	487	93	5	154	183	35	162	66
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	2	2	3	2	3	20	4	1	9	4	6
Cap, veh/h	375	1466	40	317	710	597	8	285	249	46	326	272
Arrive On Green	0.22	0.42	0.42	0.18	0.38	0.38	0.01	0.16	0.16	0.03	0.18	0.18
Sat Flow, veh/h	1723	3501	95	1757	1863	1568	1508	1827	1599	1660	1827	1524
Grp Volume(v), veh/h	42	184	192	267	487	93	5	154	183	35	162	66
Grp Sat Flow(s),veh/h/ln	1723	1760	1836	1757	1863	1568	1508	1827	1599	1660	1827	1524
Q Serve(g_s), s	1.4	5.0	5.0	10.8	16.1	2.9	0.2	5.7	8.0	1.5	5.9	2.7
Cycle Q Clear(g_c), s	1.4	5.0	5.0	10.8	16.1	2.9	0.2	5.7	8.0	1.5	5.9	2.7
Prop In Lane	1.00		0.05	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	375	737	769	317	710	597	8	285	249	46	326	272
V/C Ratio(X)	0.11	0.25	0.25	0.84	0.69	0.16	0.63	0.54	0.73	0.76	0.50	0.24
Avail Cap(c_a), veh/h	375	737	769	502	710	597	82	398	348	90	398	332
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.0	13.9	13.9	29.1	19.1	15.0	36.5	28.6	29.6	35.5	27.2	25.9
Incr Delay (d2), s/veh	0.6	0.8	0.8	7.4	5.3	0.6	60.5	1.6	4.9	22.0	1.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	2.6	2.7	5.8	9.3	1.3	0.2	3.0	3.9	1.0	3.1	1.2
LnGrp Delay(d),s/veh	23.7	14.7	14.7	36.5	24.4	15.5	97.0	30.2	34.5	57.5	28.4	26.4
LnGrp LOS	C	B	B	D	C	B	F	C	C	E	C	C
Approach Vol, veh/h		418			847			342			263	
Approach Delay, s/veh		15.6			27.2			33.5			31.8	
Approach LOS		B			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.2	34.8	4.4	17.1	20.0	32.0	6.0	15.4				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	21.0	23.0	4.0	16.0	16.0	28.0	4.0	16.0				
Max Q Clear Time (g_c+I1), s	12.8	7.0	2.2	7.9	3.4	18.1	3.5	10.0				
Green Ext Time (p_c), s	0.5	5.2	0.0	1.7	0.0	4.0	0.0	1.4				
Intersection Summary												
HCM 2010 Ctrl Delay				26.4								
HCM 2010 LOS				C								

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	338	14	28	453	28	33	30	26	19	15	20
Future Volume (veh/h)	20	338	14	28	453	28	33	30	26	19	15	20
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1520	1872	1900	1845	1862	1900	1900	1549	1900	1900	1630	1900
Adj Flow Rate, veh/h	23	393	16	33	527	33	38	35	30	22	17	23
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	25	1	1	3	2	2	0	13	13	13	13	13
Cap, veh/h	85	946	38	103	918	57	446	181	156	160	118	121
Arrive On Green	0.06	0.53	0.53	0.06	0.53	0.53	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	1448	1786	73	1757	1734	109	1389	771	661	374	501	516
Grp Volume(v), veh/h	23	0	409	33	0	560	38	0	65	62	0	0
Grp Sat Flow(s),veh/h/ln	1448	0	1859	1757	0	1843	1389	0	1432	1390	0	0
Q Serve(g_s), s	1.0	0.0	9.0	1.2	0.0	14.0	0.0	0.0	2.5	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.0	0.0	9.0	1.2	0.0	14.0	1.1	0.0	2.5	2.2	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.06	1.00		0.46	0.35		0.37
Lane Grp Cap(c), veh/h	85	0	984	103	0	975	446	0	337	399	0	0
V/C Ratio(X)	0.27	0.00	0.42	0.32	0.00	0.57	0.09	0.00	0.19	0.16	0.00	0.00
Avail Cap(c_a), veh/h	341	0	984	413	0	975	446	0	337	399	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	30.6	0.0	9.7	30.7	0.0	10.8	20.3	0.0	20.8	20.7	0.0	0.0
Incr Delay (d2), s/veh	1.7	0.0	1.3	1.8	0.0	2.5	0.4	0.0	1.3	0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	4.9	0.6	0.0	7.7	0.6	0.0	1.1	1.0	0.0	0.0
LnGrp Delay(d),s/veh	32.3	0.0	10.9	32.4	0.0	13.3	20.7	0.0	22.1	21.6	0.0	0.0
LnGrp LOS	C		B	C		B	C		C	C		
Approach Vol, veh/h	432			593			103			62		
Approach Delay, s/veh	12.1			14.3			21.6			21.6		
Approach LOS	B			B			C			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.0	40.0		20.0	8.0	40.0		20.0				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (G_max), s	10.0	36.0		16.0	16.0	36.0		16.0				
Max Q Clear Time (g_c+I), s	13.2	11.0		4.2	3.0	16.0		4.5				
Green Ext Time (p_c), s	0.0	7.0		0.6	0.0	6.5		0.5				
Intersection Summary												
HCM 2010 Ctrl Delay	14.5											
HCM 2010 LOS	B											

Santa Cruz DRP Study
3: Front Street & Cathcart Street

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	36	19	18	250	273	65		
Future Volume (veh/h)	36	19	18	250	273	65		
Number	5	12	3	8	4	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1638	1810	1712	1743	1706	1900		
Adj Flow Rate, veh/h	41	22	21	287	314	75		
Adj No. of Lanes	1	1	1	1	2	0		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	16	5	11	9	11	11		
Cap, veh/h	440	434	345	1087	950	224		
Arrive On Green	0.28	0.28	0.21	0.62	0.36	0.36		
Sat Flow, veh/h	1560	1538	1630	1743	2690	613		
Grp Volume(v), veh/h	41	22	21	287	194	195		
Grp Sat Flow(s),veh/h/ln	1560	1538	1630	1743	1620	1598		
Q Serve(g_s), s	1.6	0.9	0.9	6.3	7.3	7.5		
Cycle Q Clear(g_c), s	1.6	0.9	0.9	6.3	7.3	7.5		
Prop In Lane	1.00	1.00	1.00			0.38		
Lane Grp Cap(c), veh/h	440	434	345	1087	591	583		
V/C Ratio(X)	0.09	0.05	0.06	0.26	0.33	0.34		
Avail Cap(c_a), veh/h	440	434	345	1087	591	583		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	22.5	22.2	26.8	7.2	19.5	19.5		
Incr Delay (d2), s/veh	0.4	0.2	0.3	0.1	1.5	1.6		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.8	0.4	0.4	3.1	3.5	3.6		
LnGrp Delay(d),s/veh	22.9	22.4	27.1	7.3	21.0	21.1		
LnGrp LOS	C	C	C	A	C	C		
Approach Vol, veh/h	63			308	389			
Approach Delay, s/veh	22.7			8.7	21.0			
Approach LOS	C			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		28.0	22.0	35.0				57.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		24.0	18.0	31.0				53.0
Max Q Clear Time (g_c+I1), s		3.6	2.9	9.5				8.3
Green Ext Time (p_c), s		0.1	0.0	4.2				4.7
Intersection Summary								
HCM 2010 Ctrl Delay			16.2					
HCM 2010 LOS			B					

Santa Cruz DRP Study

4: Front Street & Metro Station Access North

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	10	2	2	259	255	35		
Future Volume (veh/h)	10	2	2	259	255	35		
Number	5	12	3	8	4	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	950	1900	950	1810	1632	1900		
Adj Flow Rate, veh/h	12	2	2	305	300	41		
Adj No. of Lanes	0	0	1	1	1	0		
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85		
Percent Heavy Veh, %	0	0	100	5	5	5		
Cap, veh/h	11	2	563	1425	1108	151		
Arrive On Green	0.02	0.02	0.79	0.79	0.79	0.79		
Sat Flow, veh/h	715	119	528	1810	1406	192		
Grp Volume(v), veh/h	15	0	2	305	0	341		
Grp Sat Flow(s),veh/h/ln	893	0	528	1810	0	1598		
Q Serve(g_s), s	0.6	0.0	0.0	1.7	0.0	2.3		
Cycle Q Clear(g_c), s	0.6	0.0	2.4	1.7	0.0	2.3		
Prop In Lane	0.80	0.13	1.00			0.12		
Lane Grp Cap(c), veh/h	14	0	563	1425	0	1259		
V/C Ratio(X)	1.10	0.00	0.00	0.21	0.00	0.27		
Avail Cap(c_a), veh/h	440	0	563	1425	0	1259		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00		
Uniform Delay (d), s/veh	20.0	0.0	1.5	1.1	0.0	1.2		
Incr Delay (d2), s/veh	141.6	0.0	0.0	0.3	0.0	0.5		
Initial Q Delay(d3),s/veh	4.2	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.7	0.0	0.0	1.0	0.0	1.1		
LnGrp Delay(d),s/veh	165.8	0.0	1.5	1.4	0.0	1.7		
LnGrp LOS	F		A	A		A		
Approach Vol, veh/h	15			307	341			
Approach Delay, s/veh	165.8			1.4	1.7			
Approach LOS	F			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		4.6		36.0				36.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		20.0		32.0				32.0
Max Q Clear Time (g_c+I1), s		2.6		4.3				4.4
Green Ext Time (p_c), s		0.0		4.3				4.3
Intersection Summary								
HCM 2010 Ctrl Delay			5.3					
HCM 2010 LOS			A					
Notes								
User approved volume balancing among the lanes for turning movement.								

Santa Cruz DRP Study
5: Pacific Avenue & Metro Station Access

Intersection						
Int Delay, s/veh	1.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	12	10	105	2	9	35
Future Vol, veh/h	12	10	105	2	9	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	12	10	13	100	100	8
Mvmt Flow	15	12	130	2	11	43
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	196	131	0	0	132	0
Stage 1	131	-	-	-	-	-
Stage 2	65	-	-	-	-	-
Critical Hdwy	6.52	6.3	-	-	5.1	-
Critical Hdwy Stg 1	5.52	-	-	-	-	-
Critical Hdwy Stg 2	5.52	-	-	-	-	-
Follow-up Hdwy	3.608	3.39	-	-	3.1	-
Pot Cap-1 Maneuver	771	898	-	-	1019	-
Stage 1	871	-	-	-	-	-
Stage 2	933	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	763	898	-	-	1019	-
Mov Cap-2 Maneuver	763	-	-	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	923	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	9.5		0		1.8	
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	- 819	1019	-		
HCM Lane V/C Ratio	-	- 0.033	0.011	-		
HCM Control Delay (s)	-	- 9.5	8.6	0		
HCM Lane LOS	-	- A	A	A		
HCM 95th %tile Q(veh)	-	- 0.1	0	-		

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations			↔				↔				↔	
Traffic Vol, veh/h	0	11	2	21	0	3	1	4	0	9	96	2
Future Vol, veh/h	0	11	2	21	0	3	1	4	0	9	96	2
Peak Hour Factor	0.92	0.80	0.80	0.80	0.92	0.80	0.80	0.80	0.92	0.80	0.80	0.80
Heavy Vehicles, %	2	9	50	14	2	33	0	0	2	0	16	0
Mvmt Flow	0	14	3	26	0	4	1	5	0	11	120	3
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7.4	7.8	7.8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	32%	38%	6%
Vol Thru, %	90%	6%	12%	73%
Vol Right, %	2%	62%	50%	20%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	107	34	8	49
LT Vol	9	11	3	3
Through Vol	96	2	1	36
RT Vol	2	21	4	10
Lane Flow Rate	134	42	10	61
Geometry Grp	1	1	1	1
Degree of Util (X)	0.15	0.048	0.013	0.068
Departure Headway (Hd)	4.044	4.09	4.606	3.983
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	884	862	766	892
Service Time	2.083	2.179	2.703	2.038
HCM Lane V/C Ratio	0.152	0.049	0.013	0.068
HCM Control Delay	7.8	7.4	7.8	7.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.5	0.2	0	0.2

Intersection

Intersection Delay, s/veh

Intersection LOS

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	3	36	10
Future Vol, veh/h	0	3	36	10
Peak Hour Factor	0.92	0.80	0.80	0.80
Heavy Vehicles, %	2	0	41	10
Mvmt Flow	0	4	45	13
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.3
HCM LOS	A

APPENDIX F

Santa Cruz DRP Study

7: Pacific Street & Front Street & Mission Street/Water Street

Existing

AM Peak

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	SBL2	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	380	75	19	61	48	637	3	5	51	18	107
Future Volume (vph)	81	380	75	19	61	48	637	3	5	51	18	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0				4.0	4.0
Lane Util. Factor	1.00	0.95	1.00		1.00	1.00	0.95				1.00	1.00
Frt	1.00	1.00	0.85		1.00	1.00	1.00				1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	0.95	1.00				0.96	1.00
Satd. Flow (prot)	1736	3471	1524		1597	1770	3537				1619	1599
Flt Permitted	0.95	1.00	1.00		0.95	0.95	1.00				0.96	1.00
Satd. Flow (perm)	1736	3471	1524		1597	1770	3537				1619	1599
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	91	427	84	21	69	54	716	3	6	57	20	120
RTOR Reduction (vph)	0	0	31	0	0	0	1	0	0	0	0	88
Lane Group Flow (vph)	91	427	74	0	69	54	718	0	0	0	83	32
Heavy Vehicles (%)	4%	4%	5%	10%	13%	2%	2%	0%	0%	19%	0%	1%
Turn Type	Prot	NA	Perm		Prot	Prot	NA		Perm	Perm	NA	Perm
Protected Phases	5	2			1	1	6				8	
Permitted Phases			2						8	8		8
Actuated Green, G (s)	8.2	40.9	40.9		7.6	7.6	40.3				22.1	22.1
Effective Green, g (s)	8.2	40.9	40.9		7.6	7.6	40.3				22.1	22.1
Actuated g/C Ratio	0.10	0.50	0.50		0.09	0.09	0.49				0.27	0.27
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0	4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0				3.0	3.0
Lane Grp Cap (vph)	172	1718	754		146	162	1725				433	427
v/s Ratio Prot	c0.05	0.12			0.04	0.03	c0.20					
v/s Ratio Perm			0.05								0.05	0.02
v/c Ratio	0.53	0.25	0.10		0.47	0.33	0.42				0.19	0.08
Uniform Delay, d1	35.4	12.0	11.1		35.6	35.1	13.6				23.4	22.6
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00				1.00	1.00
Incremental Delay, d2	2.9	0.1	0.1		2.4	1.2	0.7				1.0	0.3
Delay (s)	38.3	12.1	11.1		38.0	36.3	14.3				24.3	23.0
Level of Service	D	B	B		D	D	B				C	C
Approach Delay (s)		15.7					17.7				23.5	
Approach LOS		B					B				C	
Intersection Summary												
HCM 2000 Control Delay			17.7				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.36									
Actuated Cycle Length (s)			82.6				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			36.2%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

Santa Cruz DRP Study
8: Front Street & Soquel Avenue

APPENDIX F

Existing
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	47	8	202	104	42	10	194	78	24	151	22
Future Volume (veh/h)	28	47	8	202	104	42	10	194	78	24	151	22
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1837	1900	1792	1827	1827	1900	1729	1900	1638	1607	1900
Adj Flow Rate, veh/h	33	55	9	178	201	0	12	226	91	28	176	26
Adj No. of Lanes	0	2	0	1	1	1	0	2	0	1	1	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	6	3	4	8	8	8	16	19	19
Cap, veh/h	62	109	18	929	994	845	71	469	180	223	288	43
Arrive On Green	0.05	0.05	0.05	0.54	0.54	0.00	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1156	2054	346	1707	1827	1553	45	2227	853	931	1369	202
Grp Volume(v), veh/h	51	0	46	178	201	0	177	0	152	28	0	202
Grp Sat Flow(s),veh/h/ln	1780	0	1776	1707	1827	1553	1702	0	1422	931	0	1571
Q Serve(g_s), s	1.7	0.0	1.6	3.3	3.5	0.0	0.0	0.0	5.9	1.7	0.0	7.3
Cycle Q Clear(g_c), s	1.7	0.0	1.6	3.3	3.5	0.0	5.6	0.0	5.9	7.6	0.0	7.3
Prop In Lane	0.65		0.19	1.00		1.00	0.07		0.60	1.00		0.13
Lane Grp Cap(c), veh/h	95	0	95	929	994	845	420	0	300	223	0	331
V/C Ratio(X)	0.54	0.00	0.49	0.19	0.20	0.00	0.42	0.00	0.51	0.13	0.00	0.61
Avail Cap(c_a), veh/h	541	0	540	929	994	845	1001	0	797	549	0	880
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.8	0.0	28.8	7.2	7.3	0.0	21.7	0.0	21.8	25.2	0.0	22.3
Incr Delay (d2), s/veh	4.6	0.0	3.9	0.5	0.5	0.0	0.7	0.0	1.3	0.2	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.9	1.7	1.9	0.0	2.7	0.0	2.4	0.5	0.0	3.3
LnGrp Delay(d),s/veh	33.5	0.0	32.6	7.7	7.8	0.0	22.4	0.0	23.1	25.4	0.0	24.2
LnGrp LOS	C		C	A	A		C		C	C		C
Approach Vol, veh/h	97			379			329			230		
Approach Delay, s/veh	33.0			7.7			22.7			24.3		
Approach LOS	C			A			C			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	7.3			17.2			38.0			17.2		
Change Period (Y+Rc), s	4.0			4.0			4.0			4.0		
Max Green Setting (Gmax), s	19.0			35.0			34.0			35.0		
Max Q Clear Time (g_c+l1), s	3.7			9.6			5.5			7.9		
Green Ext Time (p_c), s	0.4			3.6			1.7			3.6		
Intersection Summary												
HCM 2010 Ctrl Delay	18.6											
HCM 2010 LOS	B											
Notes												
User approved volume balancing among the lanes for turning movement.												

Intersection																
Intersection Delay, s/veh	8															
Intersection LOS	A															

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↔				↔				↔					
Traffic Vol, veh/h	0	6	21	13	0	32	38	12	0	7	64	21	0	0	0	0
Future Vol, veh/h	0	6	21	13	0	32	38	12	0	7	64	21	0	0	0	0
Peak Hour Factor	0.92	0.81	0.81	0.81	0.92	0.81	0.81	0.81	0.92	0.81	0.81	0.81	0.92	0.81	0.81	0.81
Heavy Vehicles, %	2	16	9	15	2	28	2	25	2	0	4	28	2	0	0	0
Mvmt Flow	0	7	26	16	0	40	47	15	0	9	79	26	0	0	0	0
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.7	8.4	7.8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	8%	15%	39%
Vol Thru, %	70%	53%	46%
Vol Right, %	23%	33%	15%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	92	40	82
LT Vol	7	6	32
Through Vol	64	21	38
RT Vol	21	13	12
Lane Flow Rate	114	49	101
Geometry Grp	1	1	1
Degree of Util (X)	0.131	0.059	0.129
Departure Headway (Hd)	4.14	4.285	4.605
Convergence, Y/N	Yes	Yes	Yes
Cap	871	823	771
Service Time	2.14	2.38	2.678
HCM Lane V/C Ratio	0.131	0.06	0.131
HCM Control Delay	7.8	7.7	8.4
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.5	0.2	0.4

Intersection

Int Delay, s/veh 3.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	103	75	90	0	0
Future Vol, veh/h	0	103	75	90	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	-
Grade, %	0	-	0	-	-	0
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	0	4	6	5	0	0
Mvmt Flow	0	123	89	107	0	0

Major/Minor	Minor1	Major1
Conflicting Flow All	- 143	0 0
Stage 1	- -	- -
Stage 2	- -	- -
Critical Hdwy	- 6.24	- -
Critical Hdwy Stg 1	- -	- -
Critical Hdwy Stg 2	- -	- -
Follow-up Hdwy	- 3.336	- -
Pot Cap-1 Maneuver	0 899	- -
Stage 1	0 -	- -
Stage 2	0 -	- -
Platoon blocked, %		- -
Mov Cap-1 Maneuver	- 899	- -
Mov Cap-2 Maneuver	- -	- -
Stage 1	- -	- -
Stage 2	- -	- -

Approach	WB	NB
HCM Control Delay, s	9.6	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBT	NBRWBLn1
Capacity (veh/h)	- -	899
HCM Lane V/C Ratio	- -	0.136
HCM Control Delay (s)	- -	9.6
HCM Lane LOS	- -	A
HCM 95th %tile Q(veh)	- -	0.5

APPENDIX F

Existing

AM Peak

Santa Cruz DRP Study 11: Ocean Street & Water Street

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	161	297	49	136	450	255	78	466	40	175	620	379
Future Volume (veh/h)	161	297	49	136	450	255	78	466	40	175	620	379
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1822	1900	1881	1827	1863	1845	1845	1900	1863	1845	1845
Adj Flow Rate, veh/h	173	319	53	146	484	0	84	501	43	188	667	0
Adj No. of Lanes	2	2	0	1	2	1	1	2	1	1	2	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	4	4	4	1	4	2	3	3	0	2	3	3
Cap, veh/h	276	664	109	191	861	393	109	991	457	241	1250	559
Arrive On Green	0.08	0.22	0.22	0.11	0.25	0.00	0.06	0.28	0.28	0.14	0.36	0.00
Sat Flow, veh/h	3375	2977	489	1792	3471	1583	1757	3505	1615	1774	3505	1568
Grp Volume(v), veh/h	173	184	188	146	484	0	84	501	43	188	667	0
Grp Sat Flow(s),veh/h/ln	1688	1731	1736	1792	1736	1583	1757	1752	1615	1774	1752	1568
Q Serve(g_s), s	3.2	5.9	6.0	5.0	7.8	0.0	3.0	7.6	1.2	6.5	9.6	0.0
Cycle Q Clear(g_c), s	3.2	5.9	6.0	5.0	7.8	0.0	3.0	7.6	1.2	6.5	9.6	0.0
Prop In Lane	1.00		0.28	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	276	386	387	191	861	393	109	991	457	241	1250	559
V/C Ratio(X)	0.63	0.48	0.49	0.76	0.56	0.00	0.77	0.51	0.09	0.78	0.53	0.00
Avail Cap(c_a), veh/h	689	734	736	619	1963	895	386	1652	761	697	2257	1010
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	28.3	21.5	21.5	27.6	20.9	0.0	29.4	19.1	16.8	26.6	16.3	0.0
Incr Delay (d2), s/veh	2.3	0.9	0.9	6.2	0.6	0.0	10.9	0.4	0.1	5.4	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	2.9	3.0	2.8	3.8	0.0	1.8	3.7	0.6	3.5	4.7	0.0
LnGrp Delay(d),s/veh	30.6	22.4	22.5	33.8	21.5	0.0	40.3	19.5	16.9	32.0	16.6	0.0
LnGrp LOS	C	C	C	C	C		D	B	B	C	B	
Approach Vol, veh/h		545			630			628			855	
Approach Delay, s/veh		25.0			24.4			22.1			20.0	
Approach LOS		C			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.8	18.2	7.9	26.7	9.2	19.8	12.6	22.0				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	22.0	27.0	14.0	41.0	13.0	36.0	25.0	30.0				
Max Q Clear Time (g_c+I1), s	7.0	8.0	5.0	11.6	5.2	9.8	8.5	9.6				
Green Ext Time (p_c), s	0.3	5.4	0.1	9.7	0.3	6.0	0.5	8.4				
Intersection Summary												
HCM 2010 Ctrl Delay				22.6								
HCM 2010 LOS				C								

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  		 	  				 	 		
Traffic Volume (veh/h)	211	1518	49	266	1389	515	27	156	160	412	158	184
Future Volume (veh/h)	211	1518	49	266	1389	515	27	156	160	412	158	184
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1900	1827	1827	1792	1712	1810	1810	1610	1727	1743
Adj Flow Rate, veh/h	218	1565	0	274	1432	0	28	161	165	425	163	190
Adj No. of Lanes	1	3	0	2	3	1	1	1	2	2	1	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	3	3	4	4	6	11	5	5	18	10	9
Cap, veh/h	238	2388	0	314	2154	658	235	261	391	613	356	305
Arrive On Green	0.14	0.47	0.00	0.09	0.43	0.00	0.14	0.14	0.14	0.21	0.21	0.21
Sat Flow, veh/h	1757	5204	0	3375	4988	1524	1630	1810	2707	2975	1727	1482
Grp Volume(v), veh/h	218	1565	0	274	1432	0	28	161	165	425	163	190
Grp Sat Flow(s),veh/h/ln	1757	1679	0	1688	1663	1524	1630	1810	1354	1487	1727	1482
Q Serve(g_s), s	23.8	46.0	0.0	15.5	44.4	0.0	2.9	16.2	10.8	25.7	16.1	22.7
Cycle Q Clear(g_c), s	23.8	46.0	0.0	15.5	44.4	0.0	2.9	16.2	10.8	25.7	16.1	22.7
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	238	2388	0	314	2154	658	235	261	391	613	356	305
V/C Ratio(X)	0.92	0.66	0.00	0.87	0.66	0.00	0.12	0.62	0.42	0.69	0.46	0.62
Avail Cap(c_a), veh/h	344	2388	0	417	2154	658	235	261	391	613	356	305
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	82.8	38.9	0.0	86.9	43.9	0.0	72.3	78.0	75.7	71.3	67.5	70.1
Incr Delay (d2), s/veh	22.4	1.4	0.0	14.4	1.6	0.0	1.0	10.5	3.3	6.3	4.2	9.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.0	21.6	0.0	7.9	20.7	0.0	1.4	8.9	4.2	11.1	8.1	10.1
LnGrp Delay(d),s/veh	105.2	40.4	0.0	101.3	45.6	0.0	73.3	88.4	79.0	77.7	71.7	79.4
LnGrp LOS	F	D		F	D		E	F	E	E	E	E
Approach Vol, veh/h	1783				1706		354				778	
Approach Delay, s/veh	48.3				54.5		82.8				76.8	
Approach LOS	D				D		F				E	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2			4	5	6	8				
Phs Duration (G+Y+Rc), s	32.1	96.0			32.0	30.2	87.8	44.0				
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	27.0	92.0			28.0	38.0	78.0	40.0				
Max Q Clear Time (g_c+1.0), s	17.5	48.0			18.2	25.8	46.4	27.7				
Green Ext Time (p_c), s	0.5	35.9			1.1	0.5	27.2	2.7				
Intersection Summary												
HCM 2010 Ctrl Delay			58.0									
HCM 2010 LOS			E									

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1428	392	51	7	367	27	95	280	24	58	204	1471
Future Volume (veh/h)	1428	392	51	7	367	27	95	280	24	58	204	1471
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1839	1900	1900	1849	1900	1881	1883	1900	1881	1845	1827
Adj Flow Rate, veh/h	1587	436	57	8	408	0	106	311	27	64	227	1634
Adj No. of Lanes	2	1	0	0	2	0	1	2	0	1	2	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	4	4	3	3	3	1	1	1	1	3	4
Cap, veh/h	1222	554	72	10	520	0	139	1052	91	84	1000	1182
Arrive On Green	0.35	0.35	0.35	0.15	0.15	0.00	0.08	0.32	0.32	0.05	0.29	0.29
Sat Flow, veh/h	3514	1594	208	66	3629	0	1792	3333	288	1792	3505	2733
Grp Volume(v), veh/h	1587	0	493	223	193	0	106	166	172	64	227	1634
Grp Sat Flow(s),veh/h/ln	1757	0	1803	1846	1757	0	1792	1789	1832	1792	1752	1367
Q Serve(g_s), s	39.0	0.0	27.5	13.1	11.8	0.0	6.5	7.9	8.0	4.0	5.6	32.0
Cycle Q Clear(g_c), s	39.0	0.0	27.5	13.1	11.8	0.0	6.5	7.9	8.0	4.0	5.6	32.0
Prop In Lane	1.00		0.12	0.04		0.00	1.00		0.16	1.00		1.00
Lane Grp Cap(c), veh/h	1222	0	627	271	258	0	139	564	578	84	1000	1182
V/C Ratio(X)	1.30	0.00	0.79	0.82	0.75	0.00	0.77	0.29	0.30	0.76	0.23	1.38
Avail Cap(c_a), veh/h	1222	0	627	362	345	0	655	564	578	639	1000	1182
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.6	0.0	32.8	46.4	45.8	0.0	50.7	29.0	29.0	52.8	30.6	27.2
Incr Delay (d2), s/veh	140.6	0.0	6.6	10.7	6.1	0.0	8.5	0.3	0.3	13.0	0.1	177.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	42.7	0.0	14.8	7.5	6.2	0.0	3.5	3.9	4.1	2.3	2.7	47.4
LnGrp Delay(d),s/veh	177.2	0.0	39.4	57.1	51.9	0.0	59.2	29.2	29.3	65.8	30.7	204.8
LnGrp LOS	F		D	E	D		E	C	C	E	C	F
Approach Vol, veh/h	2080			416			444			1925		
Approach Delay, s/veh	144.6			54.7			36.4			179.7		
Approach LOS	F			D			D			F		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		20.5	12.7	36.0		43.0	9.3	39.4				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Green Setting (Gmax), s		22.0	41.0	32.0		39.0	40.0	33.0				
Max Q Clear Time (g_c+l1), s		15.1	8.5	34.0		41.0	6.0	10.0				
Green Ext Time (p_c), s		1.3	0.6	0.0		0.0	0.2	2.3				
Intersection Summary												
HCM 2010 Ctrl Delay	140.9											
HCM 2010 LOS	F											
Notes												
User approved volume balancing among the lanes for turning movement.												

Santa Cruz DRP Study
1: Front Street & Laurel Street

APPENDIX F

Existing
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	638	30	228	378	110	8	165	229	118	322	156
Future Volume (veh/h)	84	638	30	228	378	110	8	165	229	118	322	156
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1897	1900	1900	1881	1900	1900	1881	1900	1827	1900	1900
Adj Flow Rate, veh/h	89	679	32	243	402	117	9	176	244	126	343	166
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	0	0	0	1	0	0	1	0	4	0	0
Cap, veh/h	372	1237	58	286	567	486	16	355	305	158	514	437
Arrive On Green	0.21	0.35	0.35	0.16	0.30	0.30	0.01	0.19	0.19	0.09	0.27	0.27
Sat Flow, veh/h	1774	3506	165	1810	1881	1615	1810	1881	1615	1740	1900	1615
Grp Volume(v), veh/h	89	349	362	243	402	117	9	176	244	126	343	166
Grp Sat Flow(s),veh/h/ln	1774	1803	1868	1810	1881	1615	1810	1881	1615	1740	1900	1615
Q Serve(g_s), s	3.2	11.9	11.9	10.0	14.5	4.2	0.4	6.4	11.0	5.4	12.3	6.4
Cycle Q Clear(g_c), s	3.2	11.9	11.9	10.0	14.5	4.2	0.4	6.4	11.0	5.4	12.3	6.4
Prop In Lane	1.00		0.09	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	372	636	659	286	567	486	16	355	305	158	514	437
V/C Ratio(X)	0.24	0.55	0.55	0.85	0.71	0.24	0.55	0.50	0.80	0.80	0.67	0.38
Avail Cap(c_a), veh/h	372	636	659	332	567	486	95	394	338	205	523	444
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.1	19.8	19.8	31.3	23.7	20.1	37.7	27.7	29.6	34.0	24.8	22.6
Incr Delay (d2), s/veh	1.5	3.4	3.3	16.7	7.3	1.2	25.3	1.1	11.8	15.1	3.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	6.5	6.7	6.3	8.6	2.0	0.3	3.4	5.9	3.3	6.8	2.9
LnGrp Delay(d),s/veh	26.6	23.2	23.1	48.0	31.1	21.3	63.0	28.8	41.4	49.1	28.0	23.2
LnGrp LOS	C	C	C	D	C	C	E	C	D	D	C	C
Approach Vol, veh/h	800				762				429			
Approach Delay, s/veh	23.5				35.0				36.7			
Approach LOS	C				C				D			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.1	30.9	4.7	24.7	20.0	27.0	10.9	18.4				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	14.0	25.0	4.0	21.0	16.0	23.0	9.0	16.0				
Max Q Clear Time (g_c+I1), s	12.0	13.9	2.4	14.3	5.2	16.5	7.4	13.0				
Green Ext Time (p_c), s	0.1	5.5	0.0	2.6	0.1	3.7	0.0	1.4				
Intersection Summary												
HCM 2010 Ctrl Delay	30.8											
HCM 2010 LOS	C											

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	640	25	37	456	89	41	77	48	56	58	37
Future Volume (veh/h)	48	640	25	37	456	89	41	77	48	56	58	37
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1900	1900	1900	1894	1900	1900	1843	1900	1900	1808	1900
Adj Flow Rate, veh/h	51	681	27	39	485	95	44	82	51	60	62	39
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	10	0	0	0	0	0	0	5	5	5	5	5
Cap, veh/h	99	962	38	106	814	159	402	250	156	167	161	81
Arrive On Green	0.06	0.53	0.53	0.06	0.53	0.53	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1645	1815	72	1810	1539	301	1314	1064	662	401	684	347
Grp Volume(v), veh/h	51	0	708	39	0	580	44	0	133	161	0	0
Grp Sat Flow(s),veh/h/ln	1645	0	1887	1810	0	1841	1314	0	1726	1431	0	0
Q Serve(g_s), s	2.0	0.0	19.2	1.4	0.0	14.8	0.0	0.0	4.3	2.6	0.0	0.0
Cycle Q Clear(g_c), s	2.0	0.0	19.2	1.4	0.0	14.8	2.0	0.0	4.3	6.9	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.16	1.00		0.38	0.37		0.24
Lane Grp Cap(c), veh/h	99	0	1001	106	0	973	402	0	406	409	0	0
V/C Ratio(X)	0.51	0.00	0.71	0.37	0.00	0.60	0.11	0.00	0.33	0.39	0.00	0.00
Avail Cap(c_a), veh/h	386	0	1001	425	0	973	402	0	406	409	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	31.0	0.0	12.0	30.8	0.0	11.1	20.7	0.0	21.6	22.4	0.0	0.0
Incr Delay (d2), s/veh	4.1	0.0	4.2	2.1	0.0	2.7	0.5	0.0	2.2	2.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	11.0	0.8	0.0	8.1	0.7	0.0	2.3	3.0	0.0	0.0
LnGrp Delay(d),s/veh	35.1	0.0	16.2	32.9	0.0	13.7	21.2	0.0	23.7	25.2	0.0	0.0
LnGrp LOS	D		B	C		B	C		C	C		
Approach Vol, veh/h	759			619			177			161		
Approach Delay, s/veh	17.5			15.0			23.1			25.2		
Approach LOS	B			B			C			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	40.1			20.0	8.1	40.0		20.0				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (G_max)	10.0	36.0		16.0	16.0	36.0		16.0				
Max Q Clear Time (g_c+I)	13.4	21.2		8.9	4.0	16.8		6.3				
Green Ext Time (p_c), s	0.0	7.7		1.1	0.1	9.0		1.3				
Intersection Summary												
HCM 2010 Ctrl Delay				17.9								
HCM 2010 LOS				B								

Santa Cruz DRP Study
3: Front Street & Cathcart Street

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	109	60	52	380	570	134		
Future Volume (veh/h)	109	60	52	380	570	134		
Number	5	12	3	8	4	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1881	1845	1810	1827	1860	1900		
Adj Flow Rate, veh/h	114	62	54	396	594	140		
Adj No. of Lanes	1	1	1	1	2	0		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96		
Percent Heavy Veh, %	1	3	5	4	1	1		
Cap, veh/h	464	406	365	1182	1103	259		
Arrive On Green	0.26	0.26	0.21	0.65	0.39	0.39		
Sat Flow, veh/h	1792	1568	1723	1827	2934	668		
Grp Volume(v), veh/h	114	62	54	396	369	365		
Grp Sat Flow(s),veh/h/ln	1792	1568	1723	1827	1767	1742		
Q Serve(g_s), s	4.3	2.6	2.2	8.3	13.7	13.8		
Cycle Q Clear(g_c), s	4.3	2.6	2.2	8.3	13.7	13.8		
Prop In Lane	1.00	1.00	1.00			0.38		
Lane Grp Cap(c), veh/h	464	406	365	1182	686	676		
V/C Ratio(X)	0.25	0.15	0.15	0.33	0.54	0.54		
Avail Cap(c_a), veh/h	464	406	365	1182	686	676		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	24.9	24.3	27.3	6.8	20.1	20.1		
Incr Delay (d2), s/veh	1.3	0.8	0.9	0.2	3.0	3.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.3	1.2	1.1	4.2	7.2	7.2		
LnGrp Delay(d),s/veh	26.2	25.1	28.1	6.9	23.1	23.2		
LnGrp LOS	C	C	C	A	C	C		
Approach Vol, veh/h	176			450	734			
Approach Delay, s/veh	25.8			9.5	23.2			
Approach LOS	C			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		26.0	22.0	37.0				59.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		22.0	18.0	33.0				55.0
Max Q Clear Time (g_c+I1), s		6.3	4.2	15.8				10.3
Green Ext Time (p_c), s		0.4	0.1	6.8				9.2
Intersection Summary								
HCM 2010 Ctrl Delay			19.0					
HCM 2010 LOS			B					

Santa Cruz DRP Study

4: Front Street & Metro Station Access North

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	16	2	5	403	605	17		
Future Volume (veh/h)	16	2	5	403	605	17		
Number	5	12	3	8	4	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	976	1900	1056	1900	1839	1900		
Adj Flow Rate, veh/h	17	2	5	420	630	18		
Adj No. of Lanes	0	0	1	1	1	0		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96		
Percent Heavy Veh, %	0	0	80	0	1	1		
Cap, veh/h	15	2	469	1508	1412	40		
Arrive On Green	0.02	0.02	0.79	0.79	0.79	0.79		
Sat Flow, veh/h	782	92	442	1900	1779	51		
Grp Volume(v), veh/h	20	0	5	420	0	648		
Grp Sat Flow(s),veh/h/ln	920	0	442	1900	0	1830		
Q Serve(g_s), s	0.8	0.0	0.2	2.5	0.0	4.8		
Cycle Q Clear(g_c), s	0.8	0.0	5.0	2.5	0.0	4.8		
Prop In Lane	0.85	0.10	1.00			0.03		
Lane Grp Cap(c), veh/h	18	0	469	1508	0	1452		
V/C Ratio(X)	1.10	0.00	0.01	0.28	0.00	0.45		
Avail Cap(c_a), veh/h	387	0	469	1508	0	1452		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00		
Uniform Delay (d), s/veh	21.0	0.0	2.2	1.2	0.0	1.4		
Incr Delay (d2), s/veh	127.4	0.0	0.0	0.5	0.0	1.0		
Initial Q Delay(d3),s/veh	4.7	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.0	1.5	0.0	2.7		
LnGrp Delay(d),s/veh	153.1	0.0	2.3	1.6	0.0	2.4		
LnGrp LOS	F		A	A		A		
Approach Vol, veh/h	20			425	648			
Approach Delay, s/veh	153.1			1.6	2.4			
Approach LOS	F			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		4.8		38.0				38.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		18.0		34.0				34.0
Max Q Clear Time (g_c+I1), s		2.8		6.8				7.0
Green Ext Time (p_c), s		0.0		8.3				8.3
Intersection Summary								
HCM 2010 Ctrl Delay			4.9					
HCM 2010 LOS			A					
Notes								
User approved volume balancing among the lanes for turning movement.								

Santa Cruz DRP Study
5: Pacific Avenue & Metro Station Access

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	11	186	2	11	70
Future Vol, veh/h	8	11	186	2	11	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	100	90	4	100	90	1
Mvmt Flow	9	12	207	2	12	78
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	310	208	0	0	209	0
Stage 1	208	-	-	-	-	-
Stage 2	102	-	-	-	-	-
Critical Hdwy	7.4	7.1	-	-	5	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	4.11	-	-	3.01	-
Pot Cap-1 Maneuver	520	653	-	-	975	-
Stage 1	640	-	-	-	-	-
Stage 2	726	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	513	653	-	-	975	-
Mov Cap-2 Maneuver	513	-	-	-	-	-
Stage 1	640	-	-	-	-	-
Stage 2	717	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	11.4		0		1.2	
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	- 586	975	-		
HCM Lane V/C Ratio	-	- 0.036	0.013	-		
HCM Control Delay (s)	-	- 11.4	8.7	0		
HCM Lane LOS	-	- B	A	A		
HCM 95th %tile Q(veh)	-	- 0.1	0	-		

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations			↕				↕				↕	
Traffic Vol, veh/h	0	18	4	35	0	4	2	4	0	23	171	6
Future Vol, veh/h	0	18	4	35	0	4	2	4	0	23	171	6
Peak Hour Factor	0.92	0.93	0.93	0.93	0.92	0.93	0.93	0.93	0.92	0.93	0.93	0.93
Heavy Vehicles, %	2	0	0	0	2	0	0	0	2	0	7	0
Mvmt Flow	0	19	4	38	0	4	2	4	0	25	184	6
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7.6	7.5	8.5
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	12%	32%	40%	5%
Vol Thru, %	85%	7%	20%	85%
Vol Right, %	3%	61%	40%	10%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	200	57	10	82
LT Vol	23	18	4	4
Through Vol	171	4	2	70
RT Vol	6	35	4	8
Lane Flow Rate	215	61	11	88
Geometry Grp	1	1	1	1
Degree of Util (X)	0.245	0.073	0.013	0.101
Departure Headway (Hd)	4.097	4.267	4.47	4.141
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	869	845	805	852
Service Time	2.161	2.267	2.474	2.232
HCM Lane V/C Ratio	0.247	0.072	0.014	0.103
HCM Control Delay	8.5	7.6	7.5	7.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1	0.2	0	0.3

Intersection

Intersection Delay, s/veh

Intersection LOS

Movement	SBU	SBL	SBT	SBR
Lane Configurations			↔	
Traffic Vol, veh/h	0	4	70	8
Future Vol, veh/h	0	4	70	8
Peak Hour Factor	0.92	0.93	0.93	0.93
Heavy Vehicles, %	2	0	17	0
Mvmt Flow	0	4	75	9
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.7
HCM LOS	A

APPENDIX F

Santa Cruz DRP Study

7: Pacific Street & Front Street & Mission Street/Water Street

Existing

PM Peak

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	SBL2	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	152	629	110	19	108	49	630	3	19	106	33	174
Future Volume (vph)	152	629	110	19	108	49	630	3	19	106	33	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0				4.0	4.0
Lane Util. Factor	1.00	0.95	1.00		1.00	1.00	0.95				1.00	1.00
Frt	1.00	1.00	0.85		1.00	1.00	1.00				1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	0.95	1.00				0.96	1.00
Satd. Flow (prot)	1787	3574	1590		1787	1770	3572				1747	1599
Flt Permitted	0.95	1.00	1.00		0.95	0.95	1.00				0.96	1.00
Satd. Flow (perm)	1787	3574	1590		1787	1770	3572				1747	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	163	676	118	20	116	53	677	3	20	114	35	187
RTOR Reduction (vph)	0	0	32	0	0	0	1	0	0	0	0	129
Lane Group Flow (vph)	163	676	106	0	116	53	679	0	0	0	169	58
Heavy Vehicles (%)	1%	1%	1%	5%	1%	2%	1%	0%	5%	5%	3%	1%
Turn Type	Prot	NA	Perm		Prot	Prot	NA		Perm	Perm	NA	Perm
Protected Phases	5	2			1	1	6				8	
Permitted Phases			2						8	8		8
Actuated Green, G (s)	12.6	39.4	39.4		9.2	9.2	36.0				22.0	22.0
Effective Green, g (s)	12.6	39.4	39.4		9.2	9.2	36.0				22.0	22.0
Actuated g/C Ratio	0.15	0.48	0.48		0.11	0.11	0.44				0.27	0.27
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0	4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0				3.0	3.0
Lane Grp Cap (vph)	272	1704	758		199	197	1556				465	425
v/s Ratio Prot	c0.09	c0.19			0.06	0.03	c0.19					
v/s Ratio Perm			0.07								0.10	0.04
v/c Ratio	0.60	0.40	0.14		0.58	0.27	0.44				0.36	0.14
Uniform Delay, d1	32.6	13.9	12.1		34.9	33.6	16.2				24.6	23.1
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00				1.00	1.00
Incremental Delay, d2	3.5	0.2	0.1		4.3	0.7	0.9				2.2	0.7
Delay (s)	36.2	14.1	12.2		39.2	34.4	17.1				26.8	23.7
Level of Service	D	B	B		D	C	B				C	C
Approach Delay (s)		17.5					21.2				25.2	
Approach LOS		B					C				C	
Intersection Summary												
HCM 2000 Control Delay			20.2	HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			82.6	Sum of lost time (s)					12.0			
Intersection Capacity Utilization			44.6%	ICU Level of Service					A			
Analysis Period (min)			15									
c Critical Lane Group												

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	109	37	360	93	36	10	298	180	79	339	36
Future Volume (veh/h)	50	109	37	360	93	36	10	298	180	79	339	36
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1859	1900	1900	1877	1900	1900	1831	1900	1881	1818	1900
Adj Flow Rate, veh/h	53	115	39	238	295	0	11	314	189	83	357	38
Adj No. of Lanes	0	2	0	1	1	1	0	2	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	4	4	0	3	0	5	5	5	1	5	5
Cap, veh/h	83	187	66	757	786	676	58	668	385	274	525	56
Arrive On Green	0.09	0.09	0.09	0.42	0.42	0.00	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	880	1978	693	1810	1877	1615	24	2056	1186	901	1616	172
Grp Volume(v), veh/h	109	0	98	238	295	0	282	0	232	83	0	395
Grp Sat Flow(s),veh/h/ln	1815	0	1736	1810	1877	1615	1809	0	1457	901	0	1788
Q Serve(g_s), s	4.3	0.0	4.0	6.5	8.0	0.0	0.0	0.0	9.5	6.0	0.0	14.2
Cycle Q Clear(g_c), s	4.3	0.0	4.0	6.5	8.0	0.0	9.1	0.0	9.5	15.5	0.0	14.2
Prop In Lane	0.49		0.40	1.00		1.00	0.04		0.81	1.00		0.10
Lane Grp Cap(c), veh/h	172	0	165	757	786	676	638	0	473	274	0	581
V/C Ratio(X)	0.64	0.00	0.59	0.31	0.38	0.00	0.44	0.00	0.49	0.30	0.00	0.68
Avail Cap(c_a), veh/h	441	0	422	757	786	676	995	0	767	456	0	941
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.3	0.0	32.2	14.4	14.9	0.0	20.0	0.0	20.1	26.3	0.0	21.7
Incr Delay (d2), s/veh	3.9	0.0	3.4	1.1	1.4	0.0	0.5	0.0	0.8	0.6	0.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	2.1	3.5	4.4	0.0	4.7	0.0	3.9	1.5	0.0	7.2
LnGrp Delay(d),s/veh	36.2	0.0	35.6	15.5	16.2	0.0	20.4	0.0	20.9	26.9	0.0	23.1
LnGrp LOS	D		D	B	B		C		C	C		C
Approach Vol, veh/h	207			533			514			478		
Approach Delay, s/veh	35.9			15.9			20.6			23.8		
Approach LOS	D			B			C			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	11.0			28.1			35.0			28.1		
Change Period (Y+Rc), s	4.0			4.0			4.0			4.0		
Max Green Setting (Gmax), s	18.0			39.0			31.0			39.0		
Max Q Clear Time (g_c+l1), s	6.3			17.5			10.0			11.5		
Green Ext Time (p_c), s	0.8			6.5			2.4			7.1		
Intersection Summary												
HCM 2010 Ctrl Delay				21.9								
HCM 2010 LOS				C								
Notes												
User approved volume balancing among the lanes for turning movement.												

Santa Cruz DRP Study
9: Pacific Avenue & Cathcart Street

Existing
PM Peak

Intersection

Intersection Delay, s/veh 8.8

Intersection LOS A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↔				↔				↔					
Traffic Vol, veh/h	0	12	79	38	0	50	74	27	0	21	88	54	0	0	0	0
Future Vol, veh/h	0	12	79	38	0	50	74	27	0	21	88	54	0	0	0	0
Peak Hour Factor	0.92	0.91	0.91	0.91	0.92	0.91	0.91	0.91	0.92	0.91	0.91	0.91	0.92	0.91	0.91	0.91
Heavy Vehicles, %	2	0	0	2	2	22	2	14	2	0	1	9	2	0	0	0
Mvmt Flow	0	13	87	42	0	55	81	30	0	23	97	59	0	0	0	0
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.3	9.2	8.7
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	13%	9%	33%
Vol Thru, %	54%	61%	49%
Vol Right, %	33%	29%	18%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	163	129	151
LT Vol	21	12	50
Through Vol	88	79	74
RT Vol	54	38	27
Lane Flow Rate	179	142	166
Geometry Grp	1	1	1
Degree of Util (X)	0.221	0.171	0.221
Departure Headway (Hd)	4.444	4.355	4.803
Convergence, Y/N	Yes	Yes	Yes
Cap	810	824	748
Service Time	2.466	2.382	2.829
HCM Lane V/C Ratio	0.221	0.172	0.222
HCM Control Delay	8.7	8.3	9.2
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.8	0.6	0.8

Intersection

Int Delay, s/veh 3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	142	128	133	0	0
Future Vol, veh/h	1	142	128	133	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	-
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	1	0	0
Mvmt Flow	1	154	139	145	0	0

Major/Minor	Minor1	Major1
Conflicting Flow All	211	211
Stage 1	211	-
Stage 2	0	-
Critical Hdwy	6.4	6.2
Critical Hdwy Stg 1	5.4	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	3.5	3.3
Pot Cap-1 Maneuver	782	834
Stage 1	829	-
Stage 2	-	-
Platoon blocked, %		-
Mov Cap-1 Maneuver	782	834
Mov Cap-2 Maneuver	782	-
Stage 1	829	-
Stage 2	-	-

Approach	WB	NB
HCM Control Delay, s	10.3	0
HCM LOS	B	

Minor Lane/Major Mvmt	NBT	NBRWBLn1
Capacity (veh/h)	-	- 834
HCM Lane V/C Ratio	-	- 0.185
HCM Control Delay (s)	-	- 10.3
HCM Lane LOS	-	- B
HCM 95th %tile Q(veh)	-	- 0.7

APPENDIX F

Santa Cruz DRP Study 11: Ocean Street & Water Street

Existing
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	343	731	111	112	553	227	120	553	98	290	856	344
Future Volume (veh/h)	343	731	111	112	553	227	120	553	98	290	856	344
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1881	1900	1900	1881	1900	1900	1881	1881	1881	1900	1863
Adj Flow Rate, veh/h	357	761	116	117	576	0	125	576	102	302	892	0
Adj No. of Lanes	2	2	0	1	2	1	1	2	1	1	2	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	1	1	0	1	0	0	1	1	1	0	2
Cap, veh/h	447	1016	155	148	996	450	157	832	372	343	1219	535
Arrive On Green	0.13	0.33	0.33	0.08	0.28	0.00	0.09	0.23	0.23	0.19	0.34	0.00
Sat Flow, veh/h	3442	3111	474	1810	3574	1615	1810	3574	1599	1792	3610	1583
Grp Volume(v), veh/h	357	437	440	117	576	0	125	576	102	302	892	0
Grp Sat Flow(s),veh/h/ln	1721	1787	1798	1810	1787	1615	1810	1787	1599	1792	1805	1583
Q Serve(g_s), s	9.6	20.8	20.9	6.1	13.3	0.0	6.5	14.1	5.0	15.7	20.8	0.0
Cycle Q Clear(g_c), s	9.6	20.8	20.9	6.1	13.3	0.0	6.5	14.1	5.0	15.7	20.8	0.0
Prop In Lane	1.00		0.26	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	447	584	587	148	996	450	157	832	372	343	1219	535
V/C Ratio(X)	0.80	0.75	0.75	0.79	0.58	0.00	0.80	0.69	0.27	0.88	0.73	0.00
Avail Cap(c_a), veh/h	684	710	714	246	1196	541	265	935	418	525	1472	646
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	40.4	28.7	28.7	43.1	29.7	0.0	42.8	33.6	30.1	37.6	27.9	0.0
Incr Delay (d2), s/veh	3.9	3.5	3.5	9.1	0.5	0.0	8.8	1.9	0.4	10.7	1.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	10.8	10.8	3.4	6.6	0.0	3.6	7.2	2.2	8.7	10.5	0.0
LnGrp Delay(d),s/veh	44.3	32.2	32.2	52.2	30.2	0.0	51.7	35.5	30.5	48.2	29.4	0.0
LnGrp LOS	D	C	C	D	C		D	D	C	D	C	
Approach Vol, veh/h	1234				693				803			
Approach Delay, s/veh	35.7				33.9				37.4			
Approach LOS	D				C				D			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.8	35.2	12.3	36.3	16.4	30.6	22.3	26.2				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	13.0	38.0	14.0	39.0	19.0	32.0	28.0	25.0				
Max Q Clear Time (g_c+I1), s	8.1	22.9	8.5	22.8	11.6	15.3	17.7	16.1				
Green Ext Time (p_c), s	0.1	8.4	0.1	9.5	0.8	8.9	0.7	6.1				
Intersection Summary												
HCM 2010 Ctrl Delay	35.3											
HCM 2010 LOS	D											

Santa Cruz DRP Study
12: Highway 9 & Highway 1

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	227	1320	77	293	1262	472	102	246	423	648	309	247
Future Volume (veh/h)	227	1320	77	293	1262	472	102	246	423	648	309	247
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1847	1900	1845	1863	1810	1881	1845	1881	1863	1845	1863
Adj Flow Rate, veh/h	241	1404	0	312	1343	0	109	262	450	689	329	263
Adj No. of Lanes	1	3	0	2	3	1	1	1	2	2	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	3	3	3	2	5	1	3	1	2	3	2
Cap, veh/h	260	1922	0	353	1727	522	341	352	536	833	447	383
Arrive On Green	0.15	0.38	0.00	0.10	0.34	0.00	0.19	0.19	0.19	0.24	0.24	0.24
Sat Flow, veh/h	1792	5208	0	3408	5085	1538	1792	1845	2814	3442	1845	1583
Grp Volume(v), veh/h	241	1404	0	312	1343	0	109	262	450	689	329	263
Grp Sat Flow(s),veh/h/ln	1792	1680	0	1704	1695	1538	1792	1845	1407	1721	1845	1583
Q Serve(g_s), s	25.8	46.4	0.0	17.5	46.0	0.0	10.2	26.0	29.9	36.8	31.9	29.3
Cycle Q Clear(g_c), s	25.8	46.4	0.0	17.5	46.0	0.0	10.2	26.0	29.9	36.8	31.9	29.3
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	260	1922	0	353	1727	522	341	352	536	833	447	383
V/C Ratio(X)	0.93	0.73	0.00	0.88	0.78	0.00	0.32	0.75	0.84	0.83	0.74	0.69
Avail Cap(c_a), veh/h	323	1922	0	456	1727	522	341	352	536	833	447	383
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	81.9	51.5	0.0	85.8	57.5	0.0	67.7	74.1	75.7	69.7	67.9	66.9
Incr Delay (d2), s/veh	28.3	2.5	0.0	15.0	3.5	0.0	2.5	13.4	14.6	9.2	10.4	9.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.8	22.0	0.0	9.0	22.1	0.0	5.3	14.6	12.7	18.6	17.6	13.9
LnGrp Delay(d),s/veh	110.2	54.0	0.0	100.9	61.0	0.0	70.2	87.5	90.3	78.9	78.2	76.5
LnGrp LOS	F	D		F	E		E	F	F	E	E	E
Approach Vol, veh/h	1645			1655			821			1281		
Approach Delay, s/veh	62.2			68.5			86.7			78.3		
Approach LOS	E			E			F			E		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	34.1	78.0		41.0	32.2	69.9		51.0				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	20.0	74.0		37.0	35.0	65.0		47.0				
Max Q Clear Time (g_c+1.0), s	19.5	48.4		31.9	27.8	48.0		38.8				
Green Ext Time (p_c), s	0.6	21.5		1.8	0.4	15.0		3.7				
Intersection Summary												
HCM 2010 Ctrl Delay				71.7								
HCM 2010 LOS				E								

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1312	486	66	11	412	30	74	276	19	42	258	1380
Future Volume (veh/h)	1312	486	66	11	412	30	74	276	19	42	258	1380
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1882	1900	1900	1850	1900	1881	1900	1900	1900	1900	1863
Adj Flow Rate, veh/h	1353	501	68	11	425	0	76	285	20	43	266	1423
Adj No. of Lanes	2	1	0	0	2	0	1	2	0	1	2	2
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	1	1	3	3	3	1	0	0	0	0	2
Cap, veh/h	1237	561	76	13	539	0	100	1112	78	56	1083	1263
Arrive On Green	0.35	0.35	0.35	0.15	0.15	0.00	0.06	0.32	0.32	0.03	0.30	0.30
Sat Flow, veh/h	3583	1623	220	87	3608	0	1792	3424	239	1810	3610	2787
Grp Volume(v), veh/h	1353	0	569	234	202	0	76	149	156	43	266	1423
Grp Sat Flow(s),veh/h/ln	1792	0	1843	1845	1757	0	1792	1805	1858	1810	1805	1393
Q Serve(g_s), s	38.0	0.0	32.2	13.5	12.1	0.0	4.6	6.7	6.8	2.6	6.1	33.0
Cycle Q Clear(g_c), s	38.0	0.0	32.2	13.5	12.1	0.0	4.6	6.7	6.8	2.6	6.1	33.0
Prop In Lane	1.00		0.12	0.05		0.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	1237	0	637	283	269	0	100	586	603	56	1083	1263
V/C Ratio(X)	1.09	0.00	0.89	0.83	0.75	0.00	0.76	0.26	0.26	0.76	0.25	1.13
Avail Cap(c_a), veh/h	1237	0	637	369	351	0	668	586	603	756	1083	1263
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.0	0.0	34.1	45.2	44.6	0.0	51.2	27.4	27.4	52.9	29.1	25.5
Incr Delay (d2), s/veh	55.0	0.0	15.1	11.2	6.4	0.0	11.0	0.2	0.2	18.7	0.1	67.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	28.2	0.0	18.9	7.8	6.4	0.0	2.6	3.4	3.5	1.6	3.1	31.0
LnGrp Delay(d),s/veh	91.0	0.0	49.2	56.4	51.0	0.0	62.2	27.6	27.6	71.6	29.2	93.1
LnGrp LOS	F		D	E	D		E	C	C	E	C	F
Approach Vol, veh/h	1922			436			381			1732		
Approach Delay, s/veh	78.6			53.9			34.5			82.8		
Approach LOS	E			D			C			F		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		20.9	10.2	37.0		42.0	7.4	39.7				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Green Setting (Gmax), s		22.0	41.0	33.0		38.0	46.0	28.0				
Max Q Clear Time (g_c+I1), s		15.5	6.6	35.0		40.0	4.6	8.8				
Green Ext Time (p_c), s		1.4	0.4	0.0		0.0	0.1	1.8				
Intersection Summary												
HCM 2010 Ctrl Delay	74.1											
HCM 2010 LOS	E											
Notes												
User approved volume balancing among the lanes for turning movement.												

Santa Cruz DRP Study
1: Front Street & Laurel Street

APPENDIX F
Existing + Project
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	337	10	246	448	89	5	145	168	44	156	90
Future Volume (veh/h)	48	337	10	246	448	89	5	145	168	44	156	90
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1852	1900	1845	1863	1845	1583	1827	1881	1743	1827	1792
Adj Flow Rate, veh/h	52	366	11	267	487	97	5	158	183	48	170	98
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	2	2	3	2	3	20	4	1	9	4	6
Cap, veh/h	372	1441	43	316	703	592	8	286	250	58	340	284
Arrive On Green	0.22	0.41	0.41	0.18	0.38	0.38	0.01	0.16	0.16	0.03	0.19	0.19
Sat Flow, veh/h	1723	3489	105	1757	1863	1568	1508	1827	1599	1660	1827	1524
Grp Volume(v), veh/h	52	184	193	267	487	97	5	158	183	48	170	98
Grp Sat Flow(s),veh/h/ln	1723	1760	1834	1757	1863	1568	1508	1827	1599	1660	1827	1524
Q Serve(g_s), s	1.8	5.1	5.1	10.9	16.4	3.0	0.2	5.9	8.1	2.1	6.2	4.2
Cycle Q Clear(g_c), s	1.8	5.1	5.1	10.9	16.4	3.0	0.2	5.9	8.1	2.1	6.2	4.2
Prop In Lane	1.00		0.06	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	372	727	757	316	703	592	8	286	250	58	340	284
V/C Ratio(X)	0.14	0.25	0.25	0.84	0.69	0.16	0.63	0.55	0.73	0.83	0.50	0.35
Avail Cap(c_a), veh/h	372	727	757	497	703	592	81	394	345	89	394	328
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.5	14.3	14.3	29.4	19.5	15.3	36.8	28.9	29.8	35.6	27.1	26.3
Incr Delay (d2), s/veh	0.8	0.8	0.8	7.7	5.6	0.6	60.6	1.7	5.0	29.3	1.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	2.6	2.7	5.9	9.5	1.4	0.2	3.1	3.9	1.4	3.2	1.8
LnGrp Delay(d),s/veh	24.3	15.1	15.1	37.1	25.0	15.9	97.4	30.6	34.8	64.9	28.2	27.0
LnGrp LOS	C	B	B	D	C	B	F	C	C	E	C	C
Approach Vol, veh/h	429				851				346			
Approach Delay, s/veh	16.2				27.8				33.8			
Approach LOS	B				C				C			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.3	34.7	4.4	17.8	20.0	32.0	6.6	15.6				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	21.0	23.0	4.0	16.0	16.0	28.0	4.0	16.0				
Max Q Clear Time (g_c+I1), s	12.9	7.1	2.2	8.2	3.8	18.4	4.1	10.1				
Green Ext Time (p_c), s	0.5	5.3	0.0	1.8	0.1	4.0	0.0	1.5				
Intersection Summary												
HCM 2010 Ctrl Delay			27.2									
HCM 2010 LOS			C									

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

APPENDIX F
Existing + Project
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	345	14	34	476	28	33	31	28	20	17	26
Future Volume (veh/h)	22	345	14	34	476	28	33	31	28	20	17	26
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1520	1872	1900	1845	1862	1900	1900	1544	1900	1900	1611	1900
Adj Flow Rate, veh/h	26	401	16	40	553	33	38	36	33	23	20	30
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	25	1	1	3	2	2	0	13	13	13	13	13
Cap, veh/h	85	947	38	103	921	55	447	175	160	143	118	134
Arrive On Green	0.06	0.53	0.53	0.06	0.53	0.53	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	1448	1788	71	1757	1740	104	1376	743	681	314	501	569
Grp Volume(v), veh/h	26	0	417	40	0	586	38	0	69	73	0	0
Grp Sat Flow(s),veh/h/ln	1448	0	1859	1757	0	1843	1376	0	1424	1384	0	0
Q Serve(g_s), s	1.2	0.0	9.3	1.5	0.0	14.9	0.0	0.0	2.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.2	0.0	9.3	1.5	0.0	14.9	1.1	0.0	2.6	2.7	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.06	1.00		0.48	0.32		0.41
Lane Grp Cap(c), veh/h	85	0	984	103	0	976	447	0	335	395	0	0
V/C Ratio(X)	0.31	0.00	0.42	0.39	0.00	0.60	0.09	0.00	0.21	0.18	0.00	0.00
Avail Cap(c_a), veh/h	341	0	984	413	0	976	447	0	335	395	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	30.7	0.0	9.7	30.8	0.0	11.0	20.3	0.0	20.9	20.9	0.0	0.0
Incr Delay (d2), s/veh	2.0	0.0	1.3	2.4	0.0	2.7	0.4	0.0	1.4	1.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	5.0	0.8	0.0	8.2	0.6	0.0	1.2	1.2	0.0	0.0
LnGrp Delay(d),s/veh	32.7	0.0	11.0	33.2	0.0	13.8	20.7	0.0	22.3	21.9	0.0	0.0
LnGrp LOS	C		B	C		B	C		C	C		
Approach Vol, veh/h	443			626			107			73		
Approach Delay, s/veh	12.3			15.0			21.7			21.9		
Approach LOS	B			B			C			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.0	40.0		20.0	8.0	40.0		20.0				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	10.0	36.0		16.0	16.0	36.0		16.0				
Max Q Clear Time (g_c+I), s	13.5	11.3		4.7	3.2	16.9		4.6				
Green Ext Time (p_c), s	0.0	7.3		0.6	0.0	6.6		0.6				
Intersection Summary												
HCM 2010 Ctrl Delay				15.0								
HCM 2010 LOS				B								

Santa Cruz DRP Study
3: Front Street & Cathcart Street

APPENDIX F
Existing + Project
AM Peak

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	48	21	22	316	308	73		
Future Volume (veh/h)	48	21	22	316	308	73		
Number	5	12	3	8	4	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1638	1810	1712	1743	1706	1900		
Adj Flow Rate, veh/h	55	24	25	363	354	84		
Adj No. of Lanes	1	1	1	1	2	0		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	16	5	11	9	11	11		
Cap, veh/h	422	416	364	1107	951	223		
Arrive On Green	0.27	0.27	0.22	0.64	0.36	0.36		
Sat Flow, veh/h	1560	1538	1630	1743	2692	611		
Grp Volume(v), veh/h	55	24	25	363	218	220		
Grp Sat Flow(s),veh/h/ln	1560	1538	1630	1743	1621	1598		
Q Serve(g_s), s	2.3	1.0	1.0	8.2	8.4	8.6		
Cycle Q Clear(g_c), s	2.3	1.0	1.0	8.2	8.4	8.6		
Prop In Lane	1.00	1.00	1.00			0.38		
Lane Grp Cap(c), veh/h	422	416	364	1107	591	583		
V/C Ratio(X)	0.13	0.06	0.07	0.33	0.37	0.38		
Avail Cap(c_a), veh/h	422	416	364	1107	591	583		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	23.4	23.0	26.0	7.1	19.8	19.9		
Incr Delay (d2), s/veh	0.6	0.3	0.4	0.2	1.8	1.9		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.1	0.4	0.5	3.9	4.1	4.1		
LnGrp Delay(d),s/veh	24.1	23.2	26.4	7.3	21.6	21.7		
LnGrp LOS	C	C	C	A	C	C		
Approach Vol, veh/h	79			388	438			
Approach Delay, s/veh	23.8			8.5	21.7			
Approach LOS	C			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		27.0	23.0	35.0				58.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		23.0	19.0	31.0				54.0
Max Q Clear Time (g_c+I1), s		4.3	3.0	10.6				10.2
Green Ext Time (p_c), s		0.2	0.0	5.0				5.8
Intersection Summary								
HCM 2010 Ctrl Delay			16.2					
HCM 2010 LOS			B					

Santa Cruz DRP Study
4: Front Street & Metro Station Access North

APPENDIX F
Existing + Project
AM Peak

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	12	3	2	300	291	35		
Future Volume (veh/h)	12	3	2	300	291	35		
Number	5	12	3	8	4	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	950	1900	950	1810	1650	1900		
Adj Flow Rate, veh/h	14	4	2	353	342	41		
Adj No. of Lanes	0	0	1	1	1	0		
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85		
Percent Heavy Veh, %	0	0	100	5	5	5		
Cap, veh/h	12	4	540	1429	1142	137		
Arrive On Green	0.02	0.02	0.79	0.79	0.79	0.79		
Sat Flow, veh/h	652	186	508	1810	1446	173		
Grp Volume(v), veh/h	19	0	2	353	0	383		
Grp Sat Flow(s),veh/h/ln	885	0	508	1810	0	1619		
Q Serve(g_s), s	0.8	0.0	0.0	2.1	0.0	2.7		
Cycle Q Clear(g_c), s	0.8	0.0	2.8	2.1	0.0	2.7		
Prop In Lane	0.74	0.21	1.00			0.11		
Lane Grp Cap(c), veh/h	17	0	540	1429	0	1279		
V/C Ratio(X)	1.13	0.00	0.00	0.25	0.00	0.30		
Avail Cap(c_a), veh/h	402	0	540	1429	0	1279		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00		
Uniform Delay (d), s/veh	20.5	0.0	1.6	1.1	0.0	1.2		
Incr Delay (d2), s/veh	143.0	0.0	0.0	0.4	0.0	0.6		
Initial Q Delay(d3),s/veh	8.5	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.0	1.1	0.0	1.4		
LnGrp Delay(d),s/veh	172.0	0.0	1.6	1.6	0.0	1.8		
LnGrp LOS	F		A	A		A		
Approach Vol, veh/h	19			355	383			
Approach Delay, s/veh	172.0			1.6	1.8			
Approach LOS	F			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		4.8		37.0				37.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		19.0		33.0				33.0
Max Q Clear Time (g_c+I1), s		2.8		4.7				4.8
Green Ext Time (p_c), s		0.0		5.1				5.1
Intersection Summary								
HCM 2010 Ctrl Delay			6.0					
HCM 2010 LOS			A					
Notes								
User approved volume balancing among the lanes for turning movement.								

Santa Cruz DRP Study
5: Pacific Avenue & Metro Station Access

APPENDIX F
Existing + Project
AM Peak

Intersection						
Int Delay, s/veh	1.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	12	10	107	4	10	43
Future Vol, veh/h	12	10	107	4	10	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	12	10	13	100	100	8
Mvmt Flow	15	12	132	5	12	53
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	213	135	0	0	137	0
Stage 1	135	-	-	-	-	-
Stage 2	78	-	-	-	-	-
Critical Hdwy	6.52	6.3	-	-	5.1	-
Critical Hdwy Stg 1	5.52	-	-	-	-	-
Critical Hdwy Stg 2	5.52	-	-	-	-	-
Follow-up Hdwy	3.608	3.39	-	-	3.1	-
Pot Cap-1 Maneuver	753	893	-	-	1014	-
Stage 1	867	-	-	-	-	-
Stage 2	920	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	744	893	-	-	1014	-
Mov Cap-2 Maneuver	744	-	-	-	-	-
Stage 1	867	-	-	-	-	-
Stage 2	909	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	9.6		0		1.6	
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	- 805	1014	-		
HCM Lane V/C Ratio	-	- 0.034	0.012	-		
HCM Control Delay (s)	-	- 9.6	8.6	0		
HCM Lane LOS	-	- A	A	A		
HCM 95th %tile Q(veh)	-	- 0.1	0	-		

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations			↔				↔				↔	
Traffic Vol, veh/h	0	11	2	21	0	3	1	4	0	9	101	2
Future Vol, veh/h	0	11	2	21	0	3	1	4	0	9	101	2
Peak Hour Factor	0.92	0.80	0.80	0.80	0.92	0.80	0.80	0.80	0.92	0.80	0.80	0.80
Heavy Vehicles, %	2	9	50	14	2	33	0	0	2	0	16	0
Mvmt Flow	0	14	3	26	0	4	1	5	0	11	126	3
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7.4	7.8	7.9
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	32%	38%	5%
Vol Thru, %	90%	6%	12%	78%
Vol Right, %	2%	62%	50%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	112	34	8	58
LT Vol	9	11	3	3
Through Vol	101	2	1	45
RT Vol	2	21	4	10
Lane Flow Rate	140	42	10	72
Geometry Grp	1	1	1	1
Degree of Util (X)	0.158	0.049	0.013	0.081
Departure Headway (Hd)	4.052	4.118	4.744	4.004
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	881	854	759	887
Service Time	2.096	2.218	2.744	2.064
HCM Lane V/C Ratio	0.159	0.049	0.013	0.081
HCM Control Delay	7.9	7.4	7.8	7.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.2	0	0.3

Intersection

Intersection Delay, s/veh

Intersection LOS

Movement	SBU	SBL	SBT	SBR
Lane Configurations			↔	
Traffic Vol, veh/h	0	3	45	10
Future Vol, veh/h	0	3	45	10
Peak Hour Factor	0.92	0.80	0.80	0.80
Heavy Vehicles, %	2	0	41	10
Mvmt Flow	0	4	56	13
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.4
HCM LOS	A

APPENDIX F

Santa Cruz DRP Study

Existing + Project

7: Pacific Street & Front Street & Mission Street/Water Street

AM Peak

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	SBL2	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	380	75	19	61	48	637	3	5	60	18	107
Future Volume (vph)	81	380	75	19	61	48	637	3	5	60	18	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0				4.0	4.0
Lane Util. Factor	1.00	0.95	1.00		1.00	1.00	0.95				1.00	1.00
Frt	1.00	1.00	0.85		1.00	1.00	1.00				1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	0.95	1.00				0.96	1.00
Satd. Flow (prot)	1736	3471	1524		1597	1770	3537				1608	1599
Flt Permitted	0.95	1.00	1.00		0.95	0.95	1.00				0.96	1.00
Satd. Flow (perm)	1736	3471	1524		1597	1770	3537				1608	1599
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	91	427	84	21	69	54	716	3	6	67	20	120
RTOR Reduction (vph)	0	0	31	0	0	0	1	0	0	0	0	88
Lane Group Flow (vph)	91	427	74	0	69	54	718	0	0	0	93	32
Heavy Vehicles (%)	4%	4%	5%	10%	13%	2%	2%	0%	0%	19%	0%	1%
Turn Type	Prot	NA	Perm		Prot	Prot	NA		Perm	Perm	NA	Perm
Protected Phases	5	2			1	1	6				8	
Permitted Phases			2						8	8		8
Actuated Green, G (s)	8.2	40.9	40.9		7.6	7.6	40.3				22.1	22.1
Effective Green, g (s)	8.2	40.9	40.9		7.6	7.6	40.3				22.1	22.1
Actuated g/C Ratio	0.10	0.50	0.50		0.09	0.09	0.49				0.27	0.27
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0	4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0				3.0	3.0
Lane Grp Cap (vph)	172	1718	754		146	162	1725				430	427
v/s Ratio Prot	c0.05	0.12			0.04	0.03	c0.20					
v/s Ratio Perm			0.05								0.06	0.02
v/c Ratio	0.53	0.25	0.10		0.47	0.33	0.42				0.22	0.08
Uniform Delay, d1	35.4	12.0	11.1		35.6	35.1	13.6				23.5	22.6
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00				1.00	1.00
Incremental Delay, d2	2.9	0.1	0.1		2.4	1.2	0.7				1.2	0.3
Delay (s)	38.3	12.1	11.1		38.0	36.3	14.3				24.7	23.0
Level of Service	D	B	B		D	D	B				C	C
Approach Delay (s)		15.7					17.7				23.7	
Approach LOS		B					B				C	
Intersection Summary												
HCM 2000 Control Delay			17.7				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.37									
Actuated Cycle Length (s)			82.6				Sum of lost time (s)		12.0			
Intersection Capacity Utilization			36.7%				ICU Level of Service		A			
Analysis Period (min)			15									
c Critical Lane Group												

Santa Cruz DRP Study
8: Front Street & Soquel Avenue

APPENDIX F
Existing + Project
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	52	10	223	104	42	10	229	146	24	172	22
Future Volume (veh/h)	29	52	10	223	104	42	10	229	146	24	172	22
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1841	1900	1792	1825	1827	1900	1714	1900	1638	1606	1900
Adj Flow Rate, veh/h	34	60	12	190	218	0	12	266	170	28	200	26
Adj No. of Lanes	0	2	0	1	1	1	0	2	0	1	1	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	6	3	4	8	8	8	16	19	19
Cap, veh/h	62	116	24	855	914	778	65	489	296	218	362	47
Arrive On Green	0.06	0.06	0.06	0.50	0.50	0.00	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	1093	2040	420	1707	1825	1553	30	1883	1141	834	1393	181
Grp Volume(v), veh/h	56	0	50	190	218	0	246	0	202	28	0	226
Grp Sat Flow(s),veh/h/ln	1786	0	1767	1707	1825	1553	1696	0	1359	834	0	1574
Q Serve(g_s), s	2.0	0.0	1.8	4.1	4.5	0.0	0.0	0.0	8.5	2.0	0.0	8.2
Cycle Q Clear(g_c), s	2.0	0.0	1.8	4.1	4.5	0.0	8.1	0.0	8.5	10.5	0.0	8.2
Prop In Lane	0.61		0.24	1.00		1.00	0.05		0.84	1.00		0.12
Lane Grp Cap(c), veh/h	102	0	101	855	914	778	498	0	353	218	0	409
V/C Ratio(X)	0.55	0.00	0.50	0.22	0.24	0.00	0.49	0.00	0.57	0.13	0.00	0.55
Avail Cap(c_a), veh/h	515	0	510	855	914	778	975	0	743	457	0	860
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.2	0.0	30.2	9.2	9.3	0.0	21.1	0.0	21.2	25.8	0.0	21.1
Incr Delay (d2), s/veh	4.5	0.0	3.8	0.6	0.6	0.0	0.8	0.0	1.5	0.3	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	1.0	2.0	2.4	0.0	3.9	0.0	3.4	0.5	0.0	3.6
LnGrp Delay(d),s/veh	34.7	0.0	34.0	9.8	9.9	0.0	21.8	0.0	22.7	26.0	0.0	22.2
LnGrp LOS	C		C	A	A		C		C	C		C
Approach Vol, veh/h	106					408				448	254	
Approach Delay, s/veh	34.4					9.9				22.2	22.7	
Approach LOS	C					A				C	C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4			6		8				
Phs Duration (G+Y+Rc), s	7.8		21.1			37.0		21.1				
Change Period (Y+Rc), s	4.0		4.0			4.0		4.0				
Max Green Setting (Gmax), s	19.0		36.0			33.0		36.0				
Max Q Clear Time (g_c+l1), s	4.0		12.5			6.5		10.5				
Green Ext Time (p_c), s	0.4		4.6			1.8		4.7				
Intersection Summary												
HCM 2010 Ctrl Delay			19.2									
HCM 2010 LOS			B									
Notes												
User approved volume balancing among the lanes for turning movement.												

Intersection

Intersection Delay, s/veh 8.1

Intersection LOS A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↔				↔				↔					
Traffic Vol, veh/h	0	6	21	13	0	36	38	20	0	7	71	23	0	0	0	0
Future Vol, veh/h	0	6	21	13	0	36	38	20	0	7	71	23	0	0	0	0
Peak Hour Factor	0.92	0.81	0.81	0.81	0.92	0.81	0.81	0.81	0.92	0.81	0.81	0.81	0.92	0.81	0.81	0.81
Heavy Vehicles, %	2	16	9	15	2	28	2	25	2	0	4	28	2	0	0	0
Mvmt Flow	0	7	26	16	0	44	47	25	0	9	88	28	0	0	0	0
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.7	8.5	7.9
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	7%	15%	38%
Vol Thru, %	70%	53%	40%
Vol Right, %	23%	33%	21%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	101	40	94
LT Vol	7	6	36
Through Vol	71	21	38
RT Vol	23	13	20
Lane Flow Rate	125	49	116
Geometry Grp	1	1	1
Degree of Util (X)	0.145	0.061	0.148
Departure Headway (Hd)	4.175	4.418	4.584
Convergence, Y/N	Yes	Yes	Yes
Cap	863	814	773
Service Time	2.179	2.426	2.667
HCM Lane V/C Ratio	0.145	0.06	0.15
HCM Control Delay	7.9	7.7	8.5
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.5	0.2	0.5

Intersection						
Int Delay, s/veh	3.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	103	75	98	0	0
Future Vol, veh/h	0	103	75	98	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	-
Grade, %	0	-	0	-	-	0
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	0	4	6	5	0	0
Mvmt Flow	0	123	89	117	0	0
Major/Minor	Minor1	Major1				
Conflicting Flow All	-	148	0	0		
Stage 1	-	-	-	-		
Stage 2	-	-	-	-		
Critical Hdwy	-	6.24	-	-		
Critical Hdwy Stg 1	-	-	-	-		
Critical Hdwy Stg 2	-	-	-	-		
Follow-up Hdwy	-	3.336	-	-		
Pot Cap-1 Maneuver	0	894	-	-		
Stage 1	0	-	-	-		
Stage 2	0	-	-	-		
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	-	894	-	-		
Mov Cap-2 Maneuver	-	-	-	-		
Stage 1	-	-	-	-		
Stage 2	-	-	-	-		
Approach	WB	NB				
HCM Control Delay, s	9.7	0				
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1				
Capacity (veh/h)	-	- 894				
HCM Lane V/C Ratio	-	- 0.137				
HCM Control Delay (s)	-	- 9.7				
HCM Lane LOS	-	- A				
HCM 95th %tile Q(veh)	-	- 0.5				

Santa Cruz DRP Study
11: Ocean Street & Water Street

APPENDIX F
Existing + Project
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	167	303	49	136	459	255	78	466	40	175	620	391
Future Volume (veh/h)	167	303	49	136	459	255	78	466	40	175	620	391
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1822	1900	1881	1827	1863	1845	1845	1900	1863	1845	1845
Adj Flow Rate, veh/h	180	326	53	146	494	0	84	501	43	188	667	0
Adj No. of Lanes	2	2	0	1	2	1	1	2	1	1	2	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	4	4	4	1	4	2	3	3	0	2	3	3
Cap, veh/h	284	682	110	191	871	397	109	984	454	241	1242	556
Arrive On Green	0.08	0.23	0.23	0.11	0.25	0.00	0.06	0.28	0.28	0.14	0.35	0.00
Sat Flow, veh/h	3375	2987	481	1792	3471	1583	1757	3505	1615	1774	3505	1568
Grp Volume(v), veh/h	180	187	192	146	494	0	84	501	43	188	667	0
Grp Sat Flow(s),veh/h/ln	1688	1731	1737	1792	1736	1583	1757	1752	1615	1774	1752	1568
Q Serve(g_s), s	3.3	6.0	6.2	5.1	8.0	0.0	3.0	7.7	1.3	6.6	9.8	0.0
Cycle Q Clear(g_c), s	3.3	6.0	6.2	5.1	8.0	0.0	3.0	7.7	1.3	6.6	9.8	0.0
Prop In Lane	1.00		0.28	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	284	395	397	191	871	397	109	984	454	241	1242	556
V/C Ratio(X)	0.63	0.47	0.48	0.76	0.57	0.00	0.77	0.51	0.09	0.78	0.54	0.00
Avail Cap(c_a), veh/h	681	725	728	612	1940	885	382	1632	752	688	2230	998
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	28.5	21.5	21.6	28.0	21.1	0.0	29.8	19.4	17.1	26.9	16.6	0.0
Incr Delay (d2), s/veh	2.3	0.9	0.9	6.2	0.6	0.0	10.9	0.4	0.1	5.5	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	3.0	3.0	2.8	3.9	0.0	1.8	3.7	0.6	3.6	4.8	0.0
LnGrp Delay(d),s/veh	30.9	22.4	22.5	34.2	21.7	0.0	40.6	19.8	17.2	32.4	16.9	0.0
LnGrp LOS	C	C	C	C	C		D	B	B	C	B	
Approach Vol, veh/h		559			640			628			855	
Approach Delay, s/veh		25.1			24.5			22.4			20.3	
Approach LOS		C			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.9	18.7	8.0	26.8	9.4	20.2	12.7	22.1				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	22.0	27.0	14.0	41.0	13.0	36.0	25.0	30.0				
Max Q Clear Time (g_c+I1), s	7.1	8.2	5.0	11.8	5.3	10.0	8.6	9.7				
Green Ext Time (p_c), s	0.3	5.5	0.1	9.7	0.3	6.2	0.4	8.4				
Intersection Summary												
HCM 2010 Ctrl Delay				22.8								
HCM 2010 LOS				C								

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰		↰↰	↰↰↰	↰	↰	↰	↰↰	↰↰	↰	↰
Traffic Volume (veh/h)	213	1529	49	278	1394	515	27	166	203	412	161	185
Future Volume (veh/h)	213	1529	49	278	1394	515	27	166	203	412	161	185
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1900	1827	1827	1792	1712	1810	1810	1610	1727	1743
Adj Flow Rate, veh/h	220	1576	0	287	1437	0	28	171	209	425	166	191
Adj No. of Lanes	1	3	0	2	3	1	1	1	2	2	1	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	3	3	4	4	6	11	5	5	18	10	9
Cap, veh/h	239	2339	0	328	2120	648	252	280	419	599	348	298
Arrive On Green	0.14	0.46	0.00	0.10	0.43	0.00	0.15	0.15	0.15	0.20	0.20	0.20
Sat Flow, veh/h	1757	5204	0	3375	4988	1524	1630	1810	2707	2975	1727	1482
Grp Volume(v), veh/h	220	1576	0	287	1437	0	28	171	209	425	166	191
Grp Sat Flow(s),veh/h/ln	1757	1679	0	1688	1663	1524	1630	1810	1354	1487	1727	1482
Q Serve(g_s), s	24.0	47.3	0.0	16.3	45.1	0.0	2.9	17.1	13.7	25.8	16.5	22.9
Cycle Q Clear(g_c), s	24.0	47.3	0.0	16.3	45.1	0.0	2.9	17.1	13.7	25.8	16.5	22.9
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	239	2339	0	328	2120	648	252	280	419	599	348	298
V/C Ratio(X)	0.92	0.67	0.00	0.88	0.68	0.00	0.11	0.61	0.50	0.71	0.48	0.64
Avail Cap(c_a), veh/h	335	2339	0	435	2120	648	252	280	419	599	348	298
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	82.6	40.5	0.0	86.3	45.0	0.0	70.4	76.5	75.0	72.1	68.4	71.0
Incr Delay (d2), s/veh	23.7	1.6	0.0	14.3	1.8	0.0	0.9	9.6	4.2	7.0	4.6	10.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.3	22.2	0.0	8.3	21.1	0.0	1.4	9.3	5.4	11.2	8.3	10.2
LnGrp Delay(d),s/veh	106.4	42.0	0.0	100.7	46.8	0.0	71.3	86.0	79.2	79.1	73.1	81.1
LnGrp LOS	F	D		F	D		E	F	E	E	E	F
Approach Vol, veh/h	1796			1724			408			782		
Approach Delay, s/veh	49.9			55.7			81.5			78.3		
Approach LOS	D			E			F			E		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	32.8	94.0		34.0	30.4	86.4		43.0				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	25.0	90.0		30.0	37.0	78.0		39.0				
Max Q Clear Time (g_c+1.0), s	19.3	49.3		19.1	26.0	47.1		27.8				
Green Ext Time (p_c), s	0.6	33.8		1.4	0.5	26.7		2.6				
Intersection Summary												
HCM 2010 Ctrl Delay				59.5								
HCM 2010 LOS				E								

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

APPENDIX F
Existing + Project
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1428	392	51	7	367	27	95	294	24	58	209	1471
Future Volume (veh/h)	1428	392	51	7	367	27	95	294	24	58	209	1471
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1839	1900	1900	1849	1900	1881	1883	1900	1881	1845	1827
Adj Flow Rate, veh/h	1587	436	57	8	408	0	106	327	27	64	232	1634
Adj No. of Lanes	2	1	0	0	2	0	1	2	0	1	2	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	4	4	3	3	3	1	1	1	1	3	4
Cap, veh/h	1209	548	72	10	518	0	138	1075	88	84	1020	1196
Arrive On Green	0.34	0.34	0.34	0.15	0.15	0.00	0.08	0.32	0.32	0.05	0.29	0.29
Sat Flow, veh/h	3514	1594	208	66	3629	0	1792	3348	275	1792	3505	2733
Grp Volume(v), veh/h	1587	0	493	223	193	0	106	174	180	64	232	1634
Grp Sat Flow(s),veh/h/ln	1757	0	1803	1846	1757	0	1792	1788	1834	1792	1752	1367
Q Serve(g_s), s	39.0	0.0	28.0	13.3	11.9	0.0	6.6	8.3	8.4	4.0	5.7	33.0
Cycle Q Clear(g_c), s	39.0	0.0	28.0	13.3	11.9	0.0	6.6	8.3	8.4	4.0	5.7	33.0
Prop In Lane	1.00		0.12	0.04		0.00	1.00		0.15	1.00		1.00
Lane Grp Cap(c), veh/h	1209	0	620	271	257	0	138	574	589	84	1020	1196
V/C Ratio(X)	1.31	0.00	0.79	0.82	0.75	0.00	0.77	0.30	0.31	0.76	0.23	1.37
Avail Cap(c_a), veh/h	1209	0	620	358	341	0	632	574	589	711	1020	1196
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.2	0.0	33.6	47.0	46.4	0.0	51.3	28.9	29.0	53.4	30.5	27.2
Incr Delay (d2), s/veh	146.8	0.0	7.1	11.2	6.3	0.0	8.5	0.3	0.3	12.9	0.1	170.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	43.4	0.0	15.2	7.6	6.2	0.0	3.6	4.2	4.3	2.3	2.8	46.9
LnGrp Delay(d),s/veh	184.0	0.0	40.7	58.1	52.7	0.0	59.8	29.2	29.3	66.3	30.6	197.4
LnGrp LOS	F		D	E	D		E	C	C	E	C	F
Approach Vol, veh/h	2080			416			460			1930		
Approach Delay, s/veh	150.0			55.6			36.3			173.0		
Approach LOS	F			E			D			F		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		3	4	6		7	8				
Phs Duration (G+Y+Rc), s	20.6		12.8	37.0	43.0		9.3	40.4				
Change Period (Y+Rc), s	4.0		4.0	4.0	4.0		4.0	4.0				
Max Green Setting (Gmax), s	22.0		40.0	33.0	39.0		45.0	28.0				
Max Q Clear Time (g_c+l1), s	15.3		8.6	35.0	41.0		6.0	10.4				
Green Ext Time (p_c), s	1.3		0.6	0.0	0.0		0.2	2.2				
Intersection Summary												
HCM 2010 Ctrl Delay	140.4											
HCM 2010 LOS	F											
Notes												
User approved volume balancing among the lanes for turning movement.												

Santa Cruz DRP Study
1: Front Street & Laurel Street

APPENDIX F
Existing + Project
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	108	638	31	228	379	119	8	170	229	126	327	174
Future Volume (veh/h)	108	638	31	228	379	119	8	170	229	126	327	174
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1897	1900	1900	1881	1900	1900	1881	1900	1827	1900	1900
Adj Flow Rate, veh/h	115	679	33	243	403	127	9	181	244	134	348	185
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	0	0	0	1	0	0	1	0	4	0	0
Cap, veh/h	370	1226	60	285	564	484	16	353	303	167	522	443
Arrive On Green	0.21	0.35	0.35	0.16	0.30	0.30	0.01	0.19	0.19	0.10	0.27	0.27
Sat Flow, veh/h	1774	3500	170	1810	1881	1615	1810	1881	1615	1740	1900	1615
Grp Volume(v), veh/h	115	350	362	243	403	127	9	181	244	134	348	185
Grp Sat Flow(s),veh/h/ln	1774	1802	1867	1810	1881	1615	1810	1881	1615	1740	1900	1615
Q Serve(g_s), s	4.2	12.0	12.0	10.0	14.7	4.6	0.4	6.6	11.1	5.8	12.5	7.2
Cycle Q Clear(g_c), s	4.2	12.0	12.0	10.0	14.7	4.6	0.4	6.6	11.1	5.8	12.5	7.2
Prop In Lane	1.00		0.09	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	370	631	654	285	564	484	16	353	303	167	522	443
V/C Ratio(X)	0.31	0.55	0.55	0.85	0.72	0.26	0.55	0.51	0.81	0.80	0.67	0.42
Avail Cap(c_a), veh/h	370	631	654	330	564	484	94	392	337	204	522	443
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.7	20.1	20.1	31.5	24.0	20.4	37.9	28.0	29.9	34.0	24.7	22.8
Incr Delay (d2), s/veh	2.2	3.5	3.4	16.9	7.6	1.3	25.3	1.2	12.3	16.9	3.2	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	6.5	6.8	6.3	8.8	2.2	0.3	3.5	5.9	3.6	6.9	3.3
LnGrp Delay(d),s/veh	27.9	23.6	23.5	48.4	31.5	21.8	63.2	29.2	42.1	50.9	28.0	23.4
LnGrp LOS	C	C	C	D	C	C	E	C	D	D	C	C
Approach Vol, veh/h	827		773				434		667			
Approach Delay, s/veh	24.1		35.2				37.2		31.3			
Approach LOS	C		D				D		C			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.1	30.9	4.7	25.1	20.0	27.0	11.4	18.4				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	14.0	25.0	4.0	21.0	16.0	23.0	9.0	16.0				
Max Q Clear Time (g_c+I1), s	12.0	14.0	2.4	14.5	6.2	16.7	7.8	13.1				
Green Ext Time (p_c), s	0.1	5.5	0.0	2.6	0.2	3.7	0.0	1.3				
Intersection Summary												
HCM 2010 Ctrl Delay			31.2									
HCM 2010 LOS			C									

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

APPENDIX F
Existing + Project
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	660	25	41	470	90	41	79	52	57	59	41
Future Volume (veh/h)	55	660	25	41	470	90	41	79	52	57	59	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1900	1900	1900	1894	1900	1900	1844	1900	1900	1805	1900
Adj Flow Rate, veh/h	59	702	27	44	500	96	44	84	55	61	63	44
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	10	0	0	0	0	0	0	5	5	5	5	5
Cap, veh/h	107	968	37	106	812	156	392	243	159	161	155	87
Arrive On Green	0.07	0.53	0.53	0.06	0.53	0.53	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1645	1818	70	1810	1545	297	1307	1042	682	381	665	371
Grp Volume(v), veh/h	59	0	729	44	0	596	44	0	139	168	0	0
Grp Sat Flow(s),veh/h/ln	1645	0	1888	1810	0	1842	1307	0	1724	1416	0	0
Q Serve(g_s), s	2.4	0.0	20.1	1.6	0.0	15.5	0.0	0.0	4.6	2.8	0.0	0.0
Cycle Q Clear(g_c), s	2.4	0.0	20.1	1.6	0.0	15.5	2.1	0.0	4.6	7.4	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.16	1.00		0.40	0.36		0.26
Lane Grp Cap(c), veh/h	107	0	1005	106	0	968	392	0	403	403	0	0
V/C Ratio(X)	0.55	0.00	0.73	0.42	0.00	0.62	0.11	0.00	0.34	0.42	0.00	0.00
Avail Cap(c_a), veh/h	384	0	1005	423	0	968	392	0	403	403	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	31.0	0.0	12.2	31.1	0.0	11.4	20.9	0.0	21.9	22.8	0.0	0.0
Incr Delay (d2), s/veh	4.4	0.0	4.6	2.6	0.0	2.9	0.6	0.0	2.3	3.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	11.6	0.9	0.0	8.6	0.7	0.0	2.5	3.1	0.0	0.0
LnGrp Delay(d),s/veh	35.4	0.0	16.7	33.7	0.0	14.3	21.5	0.0	24.2	25.9	0.0	0.0
LnGrp LOS	D		B	C		B	C		C	C		
Approach Vol, veh/h	788		640			183			168			
Approach Delay, s/veh	18.1		15.6			23.5			25.9			
Approach LOS	B		B			C			C			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	4		5	6	8					
Phs Duration (G+Y+Rc), s	8.0	40.5	20.0		8.5	40.0	20.0					
Change Period (Y+Rc), s	4.0	4.0	4.0		4.0	4.0	4.0					
Max Green Setting (Gmax), s	10.0	36.0	16.0		16.0	36.0	16.0					
Max Q Clear Time (g_c+I), s	13.6	22.1	9.4		4.4	17.5	6.6					
Green Ext Time (p_c), s	0.0	7.7	1.1		0.1	9.1	1.3					
Intersection Summary												
HCM 2010 Ctrl Delay			18.5									
HCM 2010 LOS			B									

Santa Cruz DRP Study
3: Front Street & Cathcart Street

APPENDIX F
Existing + Project
PM Peak

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	116	61	56	425	657	157		
Future Volume (veh/h)	116	61	56	425	657	157		
Number	5	12	3	8	4	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1881	1845	1810	1827	1860	1900		
Adj Flow Rate, veh/h	121	64	58	443	684	164		
Adj No. of Lanes	1	1	1	1	2	0		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96		
Percent Heavy Veh, %	1	3	5	4	1	1		
Cap, veh/h	443	387	345	1204	1165	279		
Arrive On Green	0.25	0.25	0.20	0.66	0.41	0.41		
Sat Flow, veh/h	1792	1568	1723	1827	2922	678		
Grp Volume(v), veh/h	121	64	58	443	427	421		
Grp Sat Flow(s),veh/h/ln	1792	1568	1723	1827	1767	1740		
Q Serve(g_s), s	4.6	2.7	2.4	9.3	15.9	16.0		
Cycle Q Clear(g_c), s	4.6	2.7	2.4	9.3	15.9	16.0		
Prop In Lane	1.00	1.00	1.00			0.39		
Lane Grp Cap(c), veh/h	443	387	345	1204	728	717		
V/C Ratio(X)	0.27	0.17	0.17	0.37	0.59	0.59		
Avail Cap(c_a), veh/h	443	387	345	1204	728	717		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	25.8	25.1	28.1	6.5	19.4	19.4		
Incr Delay (d2), s/veh	1.5	0.9	1.1	0.2	3.5	3.5		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.5	1.3	1.2	4.6	8.4	8.3		
LnGrp Delay(d),s/veh	27.4	26.0	29.2	6.7	22.8	22.9		
LnGrp LOS	C	C	C	A	C	C		
Approach Vol, veh/h	185			501	848			
Approach Delay, s/veh	26.9			9.3	22.9			
Approach LOS	C			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		25.0	21.0	39.0				60.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		21.0	17.0	35.0				56.0
Max Q Clear Time (g_c+I1), s		6.6	4.4	18.0				11.3
Green Ext Time (p_c), s		0.4	0.1	7.9				11.2
Intersection Summary								
HCM 2010 Ctrl Delay		18.9						
HCM 2010 LOS		B						

Santa Cruz DRP Study
4: Front Street & Metro Station Access North

APPENDIX F
Existing + Project
PM Peak

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	17	3	5	442	664	18		
Future Volume (veh/h)	17	3	5	442	664	18		
Number	5	12	3	8	4	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	985	1900	1056	1900	1841	1900		
Adj Flow Rate, veh/h	18	3	5	460	692	19		
Adj No. of Lanes	0	0	1	1	1	0		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96		
Percent Heavy Veh, %	0	0	80	0	1	1		
Cap, veh/h	16	3	443	1505	1412	39		
Arrive On Green	0.02	0.02	0.79	0.79	0.79	0.79		
Sat Flow, veh/h	757	126	417	1900	1783	49		
Grp Volume(v), veh/h	22	0	5	460	0	711		
Grp Sat Flow(s),veh/h/ln	925	0	417	1900	0	1832		
Q Serve(g_s), s	0.9	0.0	0.2	2.9	0.0	5.7		
Cycle Q Clear(g_c), s	0.9	0.0	5.8	2.9	0.0	5.7		
Prop In Lane	0.82	0.14	1.00			0.03		
Lane Grp Cap(c), veh/h	20	0	443	1505	0	1451		
V/C Ratio(X)	1.11	0.00	0.01	0.31	0.00	0.49		
Avail Cap(c_a), veh/h	388	0	443	1505	0	1451		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00		
Uniform Delay (d), s/veh	21.0	0.0	2.5	1.2	0.0	1.5		
Incr Delay (d2), s/veh	125.4	0.0	0.0	0.5	0.0	1.2		
Initial Q Delay(d3),s/veh	5.5	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.0	1.6	0.0	3.2		
LnGrp Delay(d),s/veh	151.8	0.0	2.6	1.7	0.0	2.7		
LnGrp LOS	F		A	A		A		
Approach Vol, veh/h	22			465	711			
Approach Delay, s/veh	151.8			1.8	2.7			
Approach LOS	F			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		4.9		38.0				38.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		18.0		34.0				34.0
Max Q Clear Time (g_c+I1), s		2.9		7.7				7.8
Green Ext Time (p_c), s		0.0		9.3				9.3
Intersection Summary								
HCM 2010 Ctrl Delay			5.1					
HCM 2010 LOS			A					
Notes								
User approved volume balancing among the lanes for turning movement.								

Santa Cruz DRP Study
5: Pacific Avenue & Metro Station Access

APPENDIX F
Existing + Project
PM Peak

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	11	194	3	12	75
Future Vol, veh/h	9	11	194	3	12	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	100	90	4	100	90	1
Mvmt Flow	10	12	216	3	13	83
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	327	217	0	0	219	0
Stage 1	217	-	-	-	-	-
Stage 2	110	-	-	-	-	-
Critical Hdwy	7.4	7.1	-	-	5	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	4.11	-	-	3.01	-
Pot Cap-1 Maneuver	507	645	-	-	966	-
Stage 1	633	-	-	-	-	-
Stage 2	719	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	500	645	-	-	966	-
Mov Cap-2 Maneuver	500	-	-	-	-	-
Stage 1	633	-	-	-	-	-
Stage 2	709	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	11.6		0		1.2	
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	- 571	966	-		
HCM Lane V/C Ratio	-	- 0.039	0.014	-		
HCM Control Delay (s)	-	- 11.6	8.8	0		
HCM Lane LOS	-	- B	A	A		
HCM 95th %tile Q(veh)	-	- 0.1	0	-		

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations			↔				↔				↔	
Traffic Vol, veh/h	0	18	4	35	0	4	2	4	0	23	181	6
Future Vol, veh/h	0	18	4	35	0	4	2	4	0	23	181	6
Peak Hour Factor	0.92	0.93	0.93	0.93	0.92	0.93	0.93	0.93	0.92	0.93	0.93	0.93
Heavy Vehicles, %	2	0	0	0	2	0	0	0	2	0	7	0
Mvmt Flow	0	19	4	38	0	4	2	4	0	25	195	6
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7.6	7.6	8.6
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	11%	32%	40%	5%
Vol Thru, %	86%	7%	20%	86%
Vol Right, %	3%	61%	40%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	210	57	10	88
LT Vol	23	18	4	4
Through Vol	181	4	2	76
RT Vol	6	35	4	8
Lane Flow Rate	226	61	11	95
Geometry Grp	1	1	1	1
Degree of Util (X)	0.257	0.073	0.013	0.109
Departure Headway (Hd)	4.102	4.304	4.509	4.152
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	867	837	798	850
Service Time	2.168	2.304	2.511	2.246
HCM Lane V/C Ratio	0.261	0.073	0.014	0.112
HCM Control Delay	8.6	7.6	7.6	7.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1	0.2	0	0.4

Intersection

Intersection Delay, s/veh

Intersection LOS

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	4	76	8
Future Vol, veh/h	0	4	76	8
Peak Hour Factor	0.92	0.93	0.93	0.93
Heavy Vehicles, %	2	0	17	0
Mvmt Flow	0	4	82	9
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.8
HCM LOS	A

APPENDIX F

Santa Cruz DRP Study

Existing + Project

7: Pacific Street & Front Street & Mission Street/Water Street

PM Peak

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	SBL2	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	152	629	110	19	108	49	630	3	19	131	33	174
Future Volume (vph)	152	629	110	19	108	49	630	3	19	131	33	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0				4.0	4.0
Lane Util. Factor	1.00	0.95	1.00		1.00	1.00	0.95				1.00	1.00
Frt	1.00	1.00	0.85		1.00	1.00	1.00				1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	0.95	1.00				0.96	1.00
Satd. Flow (prot)	1787	3574	1590		1787	1770	3572				1744	1599
Flt Permitted	0.95	1.00	1.00		0.95	0.95	1.00				0.96	1.00
Satd. Flow (perm)	1787	3574	1590		1787	1770	3572				1744	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	163	676	118	20	116	53	677	3	20	141	35	187
RTOR Reduction (vph)	0	0	33	0	0	0	1	0	0	0	0	111
Lane Group Flow (vph)	163	676	105	0	116	53	679	0	0	0	196	76
Heavy Vehicles (%)	1%	1%	1%	5%	1%	2%	1%	0%	5%	5%	3%	1%
Turn Type	Prot	NA	Perm		Prot	Prot	NA		Perm	Perm	NA	Perm
Protected Phases	5	2			1	1	6				8	
Permitted Phases			2						8	8		8
Actuated Green, G (s)	12.6	37.4	37.4		9.2	9.2	34.0				24.0	24.0
Effective Green, g (s)	12.6	37.4	37.4		9.2	9.2	34.0				24.0	24.0
Actuated g/C Ratio	0.15	0.45	0.45		0.11	0.11	0.41				0.29	0.29
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0	4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0				3.0	3.0
Lane Grp Cap (vph)	272	1618	719		199	197	1470				506	464
v/s Ratio Prot	c0.09	c0.19			0.06	0.03	c0.19					
v/s Ratio Perm			0.07								0.11	0.05
v/c Ratio	0.60	0.42	0.15		0.58	0.27	0.46				0.39	0.16
Uniform Delay, d1	32.6	15.3	13.2		34.9	33.6	17.7				23.4	21.8
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00				1.00	1.00
Incremental Delay, d2	3.5	0.2	0.1		4.3	0.7	1.0				2.2	0.8
Delay (s)	36.2	15.4	13.3		39.2	34.4	18.7				25.7	22.6
Level of Service	D	B	B		D	C	B				C	C
Approach Delay (s)		18.6					22.5				24.2	
Approach LOS		B					C				C	
Intersection Summary												
HCM 2000 Control Delay			21.1		HCM 2000 Level of Service						C	
HCM 2000 Volume to Capacity ratio			0.45									
Actuated Cycle Length (s)			82.6		Sum of lost time (s)					12.0		
Intersection Capacity Utilization			46.0%		ICU Level of Service					A		
Analysis Period (min)			15									
c Critical Lane Group												

Santa Cruz DRP Study
8: Front Street & Soquel Avenue

APPENDIX F
Existing + Project
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	111	42	427	94	36	10	318	221	79	406	36
Future Volume (veh/h)	50	111	42	427	94	36	10	318	221	79	406	36
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1859	1900	1900	1880	1900	1900	1832	1900	1881	1817	1900
Adj Flow Rate, veh/h	53	117	44	520	0	0	11	335	233	83	427	38
Adj No. of Lanes	0	2	0	2	0	1	0	2	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	4	4	0	3	0	5	5	5	1	5	5
Cap, veh/h	80	182	71	1467	0	655	54	674	451	266	573	51
Arrive On Green	0.09	0.09	0.09	0.41	0.00	0.00	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	851	1939	753	3619	0	1615	21	1934	1295	848	1644	146
Grp Volume(v), veh/h	113	0	101	520	0	0	320	0	259	83	0	465
Grp Sat Flow(s),veh/h/ln	1817	0	1726	1810	0	1615	1811	0	1439	848	0	1791
Q Serve(g_s), s	4.8	0.0	4.4	7.9	0.0	0.0	0.0	0.0	11.3	6.8	0.0	18.0
Cycle Q Clear(g_c), s	4.8	0.0	4.4	7.9	0.0	0.0	18.0	0.0	11.3	18.1	0.0	18.0
Prop In Lane	0.47		0.44	1.00		1.00	0.03		0.90	1.00		0.08
Lane Grp Cap(c), veh/h	171	0	162	1467	0	655	679	0	502	266	0	625
V/C Ratio(X)	0.66	0.00	0.62	0.35	0.00	0.00	0.47	0.00	0.52	0.31	0.00	0.74
Avail Cap(c_a), veh/h	368	0	350	1467	0	655	958	0	729	400	0	907
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.6	0.0	34.4	16.3	0.0	0.0	20.3	0.0	20.4	27.6	0.0	22.6
Incr Delay (d2), s/veh	4.3	0.0	3.8	0.7	0.0	0.0	0.5	0.0	0.8	0.7	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.0	2.3	4.0	0.0	0.0	5.6	0.0	4.6	1.6	0.0	9.3
LnGrp Delay(d),s/veh	38.9	0.0	38.3	17.0	0.0	0.0	20.8	0.0	21.2	28.3	0.0	24.6
LnGrp LOS	D		D	B			C		C	C		C
Approach Vol, veh/h	214			520			579			548		
Approach Delay, s/veh	38.6			17.0			21.0			25.1		
Approach LOS	D			B			C			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	11.4		31.5		36.0		31.5					
Change Period (Y+Rc), s	4.0		4.0		4.0		4.0					
Max Green Setting (Gmax), s	16.0		40.0		32.0		40.0					
Max Q Clear Time (g_c+I1), s	6.8		20.1		9.9		20.0					
Green Ext Time (p_c), s	0.7		7.4		1.9		7.5					
Intersection Summary												
HCM 2010 Ctrl Delay				23.1								
HCM 2010 LOS				C								
Notes												
User approved volume balancing among the lanes for turning movement.												

Intersection

Intersection Delay, s/veh 8.9

Intersection LOS A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↔				↔				↔					
Traffic Vol, veh/h	0	12	79	38	0	59	74	33	0	21	91	57	0	0	0	0
Future Vol, veh/h	0	12	79	38	0	59	74	33	0	21	91	57	0	0	0	0
Peak Hour Factor	0.92	0.91	0.91	0.91	0.92	0.91	0.91	0.91	0.92	0.91	0.91	0.91	0.92	0.91	0.91	0.91
Heavy Vehicles, %	2	0	0	2	2	22	2	14	2	0	1	9	2	0	0	0
Mvmt Flow	0	13	87	42	0	65	81	36	0	23	100	63	0	0	0	0
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.3	9.4	8.9
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	12%	9%	36%
Vol Thru, %	54%	61%	45%
Vol Right, %	34%	29%	20%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	169	129	166
LT Vol	21	12	59
Through Vol	91	79	74
RT Vol	57	38	33
Lane Flow Rate	186	142	182
Geometry Grp	1	1	1
Degree of Util (X)	0.231	0.173	0.244
Departure Headway (Hd)	4.48	4.393	4.815
Convergence, Y/N	Yes	Yes	Yes
Cap	802	817	746
Service Time	2.507	2.424	2.844
HCM Lane V/C Ratio	0.232	0.174	0.244
HCM Control Delay	8.9	8.3	9.4
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.9	0.6	1

Intersection						
Int Delay, s/veh	3.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	142	128	140	0	0
Future Vol, veh/h	1	142	128	140	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	-
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	1	0	0
Mvmt Flow	1	154	139	152	0	0
Major/Minor	Minor1	Major1				
Conflicting Flow All	215	215	0	0		
Stage 1	215	-	-	-		
Stage 2	0	-	-	-		
Critical Hdwy	6.4	6.2	-	-		
Critical Hdwy Stg 1	5.4	-	-	-		
Critical Hdwy Stg 2	-	-	-	-		
Follow-up Hdwy	3.5	3.3	-	-		
Pot Cap-1 Maneuver	778	830	-	-		
Stage 1	826	-	-	-		
Stage 2	-	-	-	-		
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	778	830	-	-		
Mov Cap-2 Maneuver	778	-	-	-		
Stage 1	826	-	-	-		
Stage 2	-	-	-	-		
Approach	WB	NB				
HCM Control Delay, s	10.3	0				
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1			
Capacity (veh/h)	-	-	830			
HCM Lane V/C Ratio	-	-	0.186			
HCM Control Delay (s)	-	-	10.3			
HCM Lane LOS	-	-	B			
HCM 95th %tile Q(veh)	-	-	0.7			

Santa Cruz DRP Study
11: Ocean Street & Water Street

APPENDIX F
Existing + Project
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	346	734	111	112	586	227	120	553	98	290	856	387
Future Volume (veh/h)	346	734	111	112	586	227	120	553	98	290	856	387
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1881	1900	1900	1881	1900	1900	1881	1881	1881	1900	1863
Adj Flow Rate, veh/h	360	765	116	117	610	0	125	576	102	302	892	0
Adj No. of Lanes	2	2	0	1	2	1	1	2	1	1	2	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	1	1	0	1	0	0	1	1	1	0	2
Cap, veh/h	447	1022	155	148	1002	453	157	829	371	343	1216	533
Arrive On Green	0.13	0.33	0.33	0.08	0.28	0.00	0.09	0.23	0.23	0.19	0.34	0.00
Sat Flow, veh/h	3442	3113	472	1810	3574	1615	1810	3574	1599	1792	3610	1583
Grp Volume(v), veh/h	360	439	442	117	610	0	125	576	102	302	892	0
Grp Sat Flow(s),veh/h/ln	1721	1787	1798	1810	1787	1615	1810	1787	1599	1792	1805	1583
Q Serve(g_s), s	9.8	21.0	21.0	6.1	14.2	0.0	6.5	14.2	5.0	15.7	20.9	0.0
Cycle Q Clear(g_c), s	9.8	21.0	21.0	6.1	14.2	0.0	6.5	14.2	5.0	15.7	20.9	0.0
Prop In Lane	1.00		0.26	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	447	587	590	148	1002	453	157	829	371	343	1216	533
V/C Ratio(X)	0.81	0.75	0.75	0.79	0.61	0.00	0.80	0.69	0.28	0.88	0.73	0.00
Avail Cap(c_a), veh/h	645	707	711	245	1228	555	264	930	416	522	1465	643
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	40.6	28.7	28.7	43.3	30.0	0.0	43.0	33.8	30.3	37.8	28.1	0.0
Incr Delay (d2), s/veh	4.9	3.6	3.6	9.1	0.6	0.0	8.9	2.0	0.4	10.9	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	11.0	11.0	3.4	7.1	0.0	3.6	7.2	2.2	8.8	10.7	0.0
LnGrp Delay(d),s/veh	45.5	32.3	32.3	52.5	30.6	0.0	51.9	35.8	30.7	48.6	29.6	0.0
LnGrp LOS	D	C	C	D	C		D	D	C	D	C	
Approach Vol, veh/h	1241				727				803			
Approach Delay, s/veh	36.1				34.1				37.6			
Approach LOS	D				C				D			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.8	35.5	12.3	36.4	16.5	30.9	22.4	26.3				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	13.0	38.0	14.0	39.0	18.0	33.0	28.0	25.0				
Max Q Clear Time (g_c+I1), s	8.1	23.0	8.5	22.9	11.8	16.2	17.7	16.2				
Green Ext Time (p_c), s	0.1	8.5	0.1	9.4	0.7	9.2	0.7	6.1				
Intersection Summary												
HCM 2010 Ctrl Delay	35.6											
HCM 2010 LOS	D											

Santa Cruz DRP Study
12: Highway 9 & Highway 1

APPENDIX F
Existing + Project
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  		 	  				 	 		
Traffic Volume (veh/h)	228	1327	77	328	1277	472	102	253	447	648	316	249
Future Volume (veh/h)	228	1327	77	328	1277	472	102	253	447	648	316	249
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1847	1900	1845	1863	1810	1881	1845	1881	1863	1845	1863
Adj Flow Rate, veh/h	243	1412	0	349	1359	0	109	269	476	689	336	265
Adj No. of Lanes	1	3	0	2	3	1	1	1	2	2	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	3	3	3	2	5	1	3	1	2	3	2
Cap, veh/h	262	1874	0	388	1726	522	347	357	545	824	442	379
Arrive On Green	0.15	0.37	0.00	0.11	0.34	0.00	0.19	0.19	0.19	0.24	0.24	0.24
Sat Flow, veh/h	1792	5207	0	3408	5085	1538	1792	1845	2814	3442	1845	1583
Grp Volume(v), veh/h	243	1412	0	349	1359	0	109	269	476	689	336	265
Grp Sat Flow(s),veh/h/ln	1792	1680	0	1704	1695	1538	1792	1845	1407	1721	1845	1583
Q Serve(g_s), s	26.3	48.0	0.0	19.9	47.3	0.0	10.3	27.0	32.2	37.4	33.3	30.0
Cycle Q Clear(g_c), s	26.3	48.0	0.0	19.9	47.3	0.0	10.3	27.0	32.2	37.4	33.3	30.0
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	262	1874	0	388	1726	522	347	357	545	824	442	379
V/C Ratio(X)	0.93	0.75	0.00	0.90	0.79	0.00	0.31	0.75	0.87	0.84	0.76	0.70
Avail Cap(c_a), veh/h	328	1874	0	451	1726	522	347	357	545	824	442	379
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	82.8	53.8	0.0	85.9	58.5	0.0	68.0	74.8	76.9	71.0	69.5	68.2
Incr Delay (d2), s/veh	27.9	2.9	0.0	18.9	3.7	0.0	2.4	13.7	17.5	9.8	11.7	10.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.1	22.9	0.0	10.4	22.7	0.0	5.3	15.2	13.9	18.9	18.4	14.2
LnGrp Delay(d),s/veh	110.7	56.7	0.0	104.8	62.2	0.0	70.4	88.5	94.4	80.9	81.2	78.5
LnGrp LOS	F	E		F	E		E	F	F	F	F	E
Approach Vol, veh/h	1655			1708			854			1290		
Approach Delay, s/veh	64.6			70.9			89.4			80.5		
Approach LOS	E			E			F			F		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	26.4	77.0		42.0	32.7	70.6		51.0				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	26.3	73.0		38.0	36.0	63.0		47.0				
Max Q Clear Time (g_c+T1), s	21.9	50.0		34.2	28.3	49.3		39.4				
Green Ext Time (p_c), s	0.5	19.7		1.5	0.4	12.3		3.6				
Intersection Summary												
HCM 2010 Ctrl Delay				74.1								
HCM 2010 LOS				E								

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

APPENDIX F
Existing + Project
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1312	486	66	11	412	30	74	284	19	42	275	1380
Future Volume (veh/h)	1312	486	66	11	412	30	74	284	19	42	275	1380
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1882	1900	1900	1850	1900	1881	1900	1900	1900	1900	1863
Adj Flow Rate, veh/h	1353	501	68	11	425	0	76	293	20	43	284	1423
Adj No. of Lanes	2	1	0	0	2	0	1	2	0	1	2	2
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	1	1	3	3	3	1	0	0	0	0	2
Cap, veh/h	1238	561	76	13	539	0	100	1114	76	56	1083	1263
Arrive On Green	0.35	0.35	0.35	0.15	0.15	0.00	0.06	0.32	0.32	0.03	0.30	0.30
Sat Flow, veh/h	3583	1623	220	87	3608	0	1792	3431	233	1810	3610	2787
Grp Volume(v), veh/h	1353	0	569	234	202	0	76	153	160	43	284	1423
Grp Sat Flow(s),veh/h/ln	1792	0	1843	1845	1757	0	1792	1805	1859	1810	1805	1393
Q Serve(g_s), s	38.0	0.0	32.2	13.5	12.1	0.0	4.6	6.9	7.0	2.6	6.6	33.0
Cycle Q Clear(g_c), s	38.0	0.0	32.2	13.5	12.1	0.0	4.6	6.9	7.0	2.6	6.6	33.0
Prop In Lane	1.00		0.12	0.05		0.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	1238	0	637	283	269	0	100	586	604	56	1083	1263
V/C Ratio(X)	1.09	0.00	0.89	0.83	0.75	0.00	0.76	0.26	0.26	0.76	0.26	1.13
Avail Cap(c_a), veh/h	1238	0	637	369	351	0	668	586	604	757	1083	1263
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.0	0.0	34.1	45.2	44.6	0.0	51.2	27.4	27.4	52.9	29.3	25.5
Incr Delay (d2), s/veh	55.0	0.0	15.1	11.2	6.4	0.0	11.0	0.2	0.2	18.7	0.1	67.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	28.2	0.0	18.9	7.8	6.4	0.0	2.6	3.5	3.6	1.6	3.3	31.0
LnGrp Delay(d),s/veh	91.0	0.0	49.2	56.4	51.0	0.0	62.2	27.7	27.7	71.6	29.4	93.1
LnGrp LOS	F		D	E	D		E	C	C	E	C	F
Approach Vol, veh/h	1922			436			389			1750		
Approach Delay, s/veh	78.6			53.9			34.4			82.2		
Approach LOS	E			D			C			F		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		20.9	10.2	37.0		42.0	7.4	39.7				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Green Setting (Gmax), s		22.0	41.0	33.0		38.0	46.0	28.0				
Max Q Clear Time (g_c+I1), s		15.5	6.6	35.0		40.0	4.6	9.0				
Green Ext Time (p_c), s		1.4	0.4	0.0		0.0	0.1	1.9				
Intersection Summary												
HCM 2010 Ctrl Delay	73.8											
HCM 2010 LOS	E											
Notes												
User approved volume balancing among the lanes for turning movement.												

Santa Cruz DRP Study
1: Front Street & Laurel Street

APPENDIX F
Cumulative + Project PM
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	996	29	227	830	195	4	228	254	202	366	262
Future Volume (veh/h)	165	996	29	227	830	195	4	228	254	202	366	262
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1898	1900	1900	1881	1900	1900	1881	1900	1827	1900	1900
Adj Flow Rate, veh/h	179	1083	32	247	902	212	4	248	276	220	398	285
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	0	0	0	1	0	0	1	0	4	0	0
Cap, veh/h	357	1327	39	286	616	529	8	365	313	131	504	429
Arrive On Green	0.20	0.37	0.37	0.16	0.33	0.33	0.00	0.19	0.19	0.08	0.27	0.27
Sat Flow, veh/h	1774	3577	106	1810	1881	1615	1810	1881	1615	1740	1900	1615
Grp Volume(v), veh/h	179	546	569	247	902	212	4	248	276	220	398	285
Grp Sat Flow(s),veh/h/ln	1774	1803	1880	1810	1881	1615	1810	1881	1615	1740	1900	1615
Q Serve(g_s), s	7.1	21.7	21.7	10.6	26.0	8.1	0.2	9.7	13.2	6.0	15.5	12.5
Cycle Q Clear(g_c), s	7.1	21.7	21.7	10.6	26.0	8.1	0.2	9.7	13.2	6.0	15.5	12.5
Prop In Lane	1.00		0.06	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	357	669	697	286	616	529	8	365	313	131	504	429
V/C Ratio(X)	0.50	0.82	0.82	0.86	1.46	0.40	0.52	0.68	0.88	1.67	0.79	0.66
Avail Cap(c_a), veh/h	357	669	697	296	616	529	91	379	325	131	504	429
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.2	22.5	22.5	32.6	26.7	20.7	39.5	29.7	31.1	36.7	27.1	26.0
Incr Delay (d2), s/veh	4.9	10.6	10.2	21.8	217.9	2.3	45.2	4.6	22.7	334.0	8.2	3.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	12.7	13.2	7.0	50.6	3.9	0.2	5.5	7.8	15.0	9.2	6.0
LnGrp Delay(d),s/veh	33.1	33.1	32.8	54.4	244.6	22.9	84.7	34.3	53.8	370.7	35.3	29.9
LnGrp LOS	C	C	C	D	F	C	F	C	D	F	D	C
Approach Vol, veh/h	1294		1361				528				903	
Approach Delay, s/veh	33.0		175.5				44.9				115.3	
Approach LOS	C		F				D				F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.6	33.4	4.3	25.1	20.0	30.0	10.0	19.4				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	13.0	29.0	4.0	18.0	16.0	26.0	6.0	16.0				
Max Q Clear Time (g_c+I1), s	12.6	23.7	2.2	17.5	9.1	28.0	8.0	15.2				
Green Ext Time (p_c), s	0.0	4.7	0.0	0.4	0.3	0.0	0.0	0.2				
Intersection Summary												
HCM 2010 Ctrl Delay	100.2											
HCM 2010 LOS	F											

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

APPENDIX F
Cumulative + Project PM
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	162	1075	44	64	982	91	59	96	44	97	59	63
Future Volume (veh/h)	162	1075	44	64	982	91	59	96	44	97	59	63
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1900	1900	1900	1897	1900	1900	1837	1900	1900	1808	1900
Adj Flow Rate, veh/h	176	1168	48	70	1067	99	64	104	48	105	64	68
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	0	0	0	0	0	0	5	5	5	5	5
Cap, veh/h	221	1006	41	119	833	77	299	258	119	159	87	71
Arrive On Green	0.13	0.56	0.56	0.07	0.49	0.49	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	1645	1812	74	1810	1710	159	1278	1191	550	410	401	326
Grp Volume(v), veh/h	176	0	1216	70	0	1166	64	0	152	237	0	0
Grp Sat Flow(s),veh/h/ln	1645	0	1887	1810	0	1869	1278	0	1740	1136	0	0
Q Serve(g_s), s	7.7	0.0	41.0	2.8	0.0	36.0	0.0	0.0	5.5	9.9	0.0	0.0
Cycle Q Clear(g_c), s	7.7	0.0	41.0	2.8	0.0	36.0	4.3	0.0	5.5	15.4	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.08	1.00		0.32	0.44		0.29
Lane Grp Cap(c), veh/h	221	0	1048	119	0	910	299	0	377	316	0	0
V/C Ratio(X)	0.80	0.00	1.16	0.59	0.00	1.28	0.21	0.00	0.40	0.75	0.00	0.00
Avail Cap(c_a), veh/h	356	0	1048	392	0	910	299	0	377	316	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	31.0	0.0	16.4	33.5	0.0	19.0	24.4	0.0	24.9	29.6	0.0	0.0
Incr Delay (d2), s/veh	6.5	0.0	83.1	4.5	0.0	134.9	1.6	0.0	3.2	15.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.9	0.0	45.1	1.5	0.0	52.6	1.2	0.0	3.0	6.1	0.0	0.0
LnGrp Delay(d),s/veh	37.5	0.0	99.5	38.1	0.0	153.8	26.0	0.0	28.1	44.7	0.0	0.0
LnGrp LOS	D		F	D		F	C		C	D		
Approach Vol, veh/h	1392			1236			216			237		
Approach Delay, s/veh	91.7			147.3			27.5			44.7		
Approach LOS	F			F			C			D		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.9	45.0		20.0	13.9	40.0		20.0				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	10.0	36.0		16.0	16.0	36.0		16.0				
Max Q Clear Time (g_c+I), s	14.8	43.0		17.4	9.7	38.0		7.5				
Green Ext Time (p_c), s	0.1	0.0		0.0	0.2	0.0		1.7				
Intersection Summary												
HCM 2010 Ctrl Delay	105.9											
HCM 2010 LOS	F											

Santa Cruz DRP Study
3: Front Street & Cathcart Street

APPENDIX F
Cumulative + Project PM
PM Peak

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	193	111	116	569	805	317		
Future Volume (veh/h)	193	111	116	569	805	317		
Number	5	12	3	8	4	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1881	1845	1810	1827	1850	1900		
Adj Flow Rate, veh/h	210	121	126	618	875	345		
Adj No. of Lanes	1	1	1	1	2	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	1	3	5	4	1	1		
Cap, veh/h	400	350	324	1247	1103	433		
Arrive On Green	0.22	0.22	0.19	0.68	0.45	0.45		
Sat Flow, veh/h	1792	1568	1723	1827	2560	969		
Grp Volume(v), veh/h	210	121	126	618	622	598		
Grp Sat Flow(s),veh/h/ln	1792	1568	1723	1827	1758	1679		
Q Serve(g_s), s	8.8	5.5	5.4	13.8	25.8	26.0		
Cycle Q Clear(g_c), s	8.8	5.5	5.4	13.8	25.8	26.0		
Prop In Lane	1.00	1.00	1.00			0.58		
Lane Grp Cap(c), veh/h	400	350	324	1247	786	751		
V/C Ratio(X)	0.52	0.35	0.39	0.50	0.79	0.80		
Avail Cap(c_a), veh/h	400	350	324	1247	786	751		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	29.0	27.8	30.2	6.5	20.1	20.2		
Incr Delay (d2), s/veh	4.8	2.7	3.5	0.3	8.0	8.6		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.9	2.6	2.9	7.0	14.2	13.7		
LnGrp Delay(d),s/veh	33.9	30.4	33.7	6.8	28.1	28.8		
LnGrp LOS	C	C	C	A	C	C		
Approach Vol, veh/h	331			744	1220			
Approach Delay, s/veh	32.6			11.3	28.4			
Approach LOS	C			B	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		23.0	20.0	42.0				62.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		19.0	16.0	38.0				58.0
Max Q Clear Time (g_c+I1), s		10.8	7.4	28.0				15.8
Green Ext Time (p_c), s		0.7	0.2	7.6				19.6
Intersection Summary								
HCM 2010 Ctrl Delay			23.5					
HCM 2010 LOS			C					

Santa Cruz DRP Study
4: Front Street & Metro Station Access North

APPENDIX F
Cumulative + Project PM
PM Peak

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	14	19	14	661	783	17		
Future Volume (veh/h)	14	19	14	661	783	17		
Number	5	12	3	8	4	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1112	1900	1056	1900	1850	1900		
Adj Flow Rate, veh/h	15	21	15	718	851	18		
Adj No. of Lanes	0	0	1	1	1	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	0	0	80	0	1	1		
Cap, veh/h	13	19	376	1503	1428	30		
Arrive On Green	0.03	0.03	0.79	0.79	0.79	0.79		
Sat Flow, veh/h	402	563	360	1900	1805	38		
Grp Volume(v), veh/h	37	0	15	718	0	869		
Grp Sat Flow(s),veh/h/ln	993	0	360	1900	0	1843		
Q Serve(g_s), s	1.5	0.0	0.8	5.8	0.0	8.5		
Cycle Q Clear(g_c), s	1.5	0.0	9.3	5.8	0.0	8.5		
Prop In Lane	0.41	0.57	1.00			0.02		
Lane Grp Cap(c), veh/h	33	0	376	1503	0	1458		
V/C Ratio(X)	1.14	0.00	0.04	0.48	0.00	0.60		
Avail Cap(c_a), veh/h	349	0	376	1503	0	1458		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00		
Uniform Delay (d), s/veh	22.0	0.0	3.7	1.6	0.0	1.9		
Incr Delay (d2), s/veh	114.2	0.0	0.2	1.1	0.0	1.8		
Initial Q Delay(d3),s/veh	6.4	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.4	0.0	0.1	3.2	0.0	4.8		
LnGrp Delay(d),s/veh	142.6	0.0	3.9	2.7	0.0	3.7		
LnGrp LOS	F		A	A		A		
Approach Vol, veh/h	37			733	869			
Approach Delay, s/veh	142.6			2.7	3.7			
Approach LOS	F			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		5.5		40.0				40.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		16.0		36.0				36.0
Max Q Clear Time (g_c+I1), s		3.5		10.5				11.3
Green Ext Time (p_c), s		0.0		14.1				13.9
Intersection Summary								
HCM 2010 Ctrl Delay			6.4					
HCM 2010 LOS			A					
Notes								
User approved volume balancing among the lanes for turning movement.								

Santa Cruz DRP Study
5: Pacific Avenue & Metro Station Access

APPENDIX F
Cumulative + Project PM
PM Peak

Intersection						
Int Delay, s/veh	1.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	11	93	4	13	61
Future Vol, veh/h	9	11	93	4	13	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	100	90	4	100	90	1
Mvmt Flow	10	12	101	4	14	66
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	198	103	0	0	105	0
Stage 1	103	-	-	-	-	-
Stage 2	95	-	-	-	-	-
Critical Hdwy	7.4	7.1	-	-	5	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	4.11	-	-	3.01	-
Pot Cap-1 Maneuver	613	758	-	-	1080	-
Stage 1	725	-	-	-	-	-
Stage 2	732	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	605	758	-	-	1080	-
Mov Cap-2 Maneuver	605	-	-	-	-	-
Stage 1	725	-	-	-	-	-
Stage 2	722	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	10.5		0		1.5	
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	- 681	1080	-		
HCM Lane V/C Ratio	-	- 0.032	0.013	-		
HCM Control Delay (s)	-	- 10.5	8.4	0		
HCM Lane LOS	-	- B	A	A		
HCM 95th %tile Q(veh)	-	- 0.1	0	-		

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations			↔				↔				↔	
Traffic Vol, veh/h	0	10	0	0	0	0	0	0	0	0	100	0
Future Vol, veh/h	0	10	0	0	0	0	0	0	0	0	100	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	0	2	0	0	0	2	0	7	0
Mvmt Flow	0	11	0	0	0	0	0	0	0	0	109	0
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7.6	0	7.7
HCM LOS	A	-	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	100%	0%	0%
Vol Thru, %	100%	0%	100%	75%
Vol Right, %	0%	0%	0%	25%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	100	10	0	73
LT Vol	0	10	0	0
Through Vol	100	0	0	55
RT Vol	0	0	0	18
Lane Flow Rate	109	11	0	79
Geometry Grp	1	1	1	1
Degree of Util (X)	0.124	0.013	0	0.091
Departure Headway (Hd)	4.098	4.424	4.234	4.142
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	875	798	0	864
Service Time	2.121	2.513	2.326	2.171
HCM Lane V/C Ratio	0.125	0.014	0	0.091
HCM Control Delay	7.7	7.6	7.3	7.6
HCM Lane LOS	A	A	N	A
HCM 95th-tile Q	0.4	0	0	0.3

Intersection

Intersection Delay, s/veh

Intersection LOS

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	0	55	18
Future Vol, veh/h	0	0	55	18
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	17	0
Mvmt Flow	0	0	60	20
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.6
HCM LOS	A

APPENDIX F

Santa Cruz DRP Study

Cumulative + Project PM

7: Pacific Street & Front Street & Mission Street/Water Street

PM Peak

										
Movement	EBL	EBT	EBR	WBL2	WBL	WBT	WBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	263	1133	165	0	166	893	39	64	371	221
Future Volume (vph)	263	1133	165	0	166	893	39	64	371	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	0.95	1.00		1.00	0.95			1.00	1.00
Frt	1.00	1.00	0.85		1.00	0.99			1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00			0.99	1.00
Satd. Flow (prot)	1787	3574	1599		1770	3553			1826	1599
Flt Permitted	0.95	1.00	1.00		0.95	1.00			0.99	1.00
Satd. Flow (perm)	1787	3574	1599		1770	3553			1826	1599
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	286	1232	179	0	180	971	42	70	403	240
RTOR Reduction (vph)	0	0	0	0	0	3	0	0	0	75
Lane Group Flow (vph)	286	1232	179	0	180	1010	0	0	473	165
Heavy Vehicles (%)	1%	1%	1%	1%	2%	1%	0%	5%	3%	1%
Turn Type	Prot	NA	Perm	Prot	Prot	NA		Perm	NA	Perm
Protected Phases	5	2		1	1	6			8	
Permitted Phases			2					8		8
Actuated Green, G (s)	16.9	37.5	37.5		11.5	32.1			28.0	28.0
Effective Green, g (s)	16.9	37.5	37.5		11.5	32.1			28.0	28.0
Actuated g/C Ratio	0.19	0.42	0.42		0.13	0.36			0.31	0.31
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	339	1505	673		228	1281			574	503
v/s Ratio Prot	c0.16	c0.34			0.10	0.28				
v/s Ratio Perm			0.11						0.26	0.10
v/c Ratio	0.84	0.82	0.27		0.79	0.79			0.82	0.33
Uniform Delay, d1	34.8	22.7	16.8		37.6	25.4			28.2	23.3
Progression Factor	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	17.1	3.6	0.2		16.4	5.0			12.7	1.7
Delay (s)	51.9	26.3	17.0		54.0	30.4			40.9	25.1
Level of Service	D	C	B		D	C			D	C
Approach Delay (s)		29.7				34.0			35.6	
Approach LOS		C				C			D	
Intersection Summary										
HCM 2000 Control Delay			32.3		HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.85							
Actuated Cycle Length (s)			89.0		Sum of lost time (s)				12.0	
Intersection Capacity Utilization			73.6%		ICU Level of Service				D	
Analysis Period (min)			15							
c Critical Lane Group										

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	262	44	498	314	79	46	523	243	193	649	75
Future Volume (veh/h)	70	262	44	498	314	79	46	523	243	193	649	75
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1848	1900	1900	1858	1900	1900	1830	1900	1881	1819	1900
Adj Flow Rate, veh/h	76	285	48	441	481	0	50	568	264	210	705	82
Adj No. of Lanes	0	2	0	1	1	1	0	2	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	0	3	0	5	5	5	1	5	5
Cap, veh/h	91	357	63	462	474	412	52	622	449	256	768	89
Arrive On Green	0.14	0.14	0.14	0.26	0.26	0.00	0.48	0.48	0.48	0.48	0.48	0.48
Sat Flow, veh/h	640	2508	440	1810	1858	1615	24	1296	936	663	1600	186
Grp Volume(v), veh/h	216	0	193	441	481	0	459	0	423	210	0	787
Grp Sat Flow(s),veh/h/ln	1817	0	1771	1810	1858	1615	756	0	1500	663	0	1786
Q Serve(g_s), s	11.3	0.0	10.3	23.5	25.0	0.0	6.8	0.0	20.0	27.0	0.0	40.2
Cycle Q Clear(g_c), s	11.3	0.0	10.3	23.5	25.0	0.0	47.0	0.0	20.0	47.0	0.0	40.2
Prop In Lane	0.35		0.25	1.00		1.00	0.11		0.62	1.00		0.10
Lane Grp Cap(c), veh/h	259	0	252	462	474	412	403	0	720	256	0	857
V/C Ratio(X)	0.83	0.00	0.77	0.95	1.01	0.00	1.14	0.00	0.59	0.82	0.00	0.92
Avail Cap(c_a), veh/h	297	0	289	462	474	412	403	0	720	256	0	857
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.9	0.0	40.4	35.9	36.5	0.0	22.7	0.0	18.5	37.2	0.0	23.7
Incr Delay (d2), s/veh	16.4	0.0	10.2	32.0	45.0	0.0	87.9	0.0	1.3	18.6	0.0	14.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	0.0	5.8	15.9	18.7	0.0	20.7	0.0	8.5	7.0	0.0	23.2
LnGrp Delay(d),s/veh	57.3	0.0	50.6	67.9	81.5	0.0	110.5	0.0	19.7	55.8	0.0	38.4
LnGrp LOS	E		D	E	F		F		B	E		D
Approach Vol, veh/h	409			922			882			997		
Approach Delay, s/veh	54.1			75.0			67.0			42.1		
Approach LOS	D			E			E			D		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	18.0			51.0			29.0			51.0		
Change Period (Y+Rc), s	4.0			4.0			4.0			4.0		
Max Green Setting (Gmax), s	16.0			47.0			25.0			47.0		
Max Q Clear Time (g_c+l1), s	13.3			49.0			27.0			49.0		
Green Ext Time (p_c), s	0.6			0.0			0.0			0.0		
Intersection Summary												
HCM 2010 Ctrl Delay	59.9											
HCM 2010 LOS	E											
Notes												
User approved volume balancing among the lanes for turning movement.												

Intersection

Intersection Delay, s/veh 8.3

Intersection LOS A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↔				↔				↔					
Traffic Vol, veh/h	0	0	152	33	0	35	60	27	0	2	44	26	0	0	0	0
Future Vol, veh/h	0	0	152	33	0	35	60	27	0	2	44	26	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	2	2	22	2	14	2	0	1	9	2	0	0	0
Mvmt Flow	0	0	165	36	0	38	65	29	0	2	48	28	0	0	0	0
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.3	8.5	7.9
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	3%	0%	29%
Vol Thru, %	61%	82%	49%
Vol Right, %	36%	18%	22%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	72	185	122
LT Vol	2	0	35
Through Vol	44	152	60
RT Vol	26	33	27
Lane Flow Rate	78	201	133
Geometry Grp	1	1	1
Degree of Util (X)	0.096	0.225	0.165
Departure Headway (Hd)	4.424	4.033	4.492
Convergence, Y/N	Yes	Yes	Yes
Cap	815	875	786
Service Time	2.424	2.126	2.586
HCM Lane V/C Ratio	0.096	0.23	0.169
HCM Control Delay	7.9	8.3	8.5
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.3	0.9	0.6

Intersection						
Int Delay, s/veh	4.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	128	56	96	0	0
Future Vol, veh/h	0	128	56	96	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	-
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	1	0	0
Mvmt Flow	0	139	61	104	0	0
Major/Minor	Minor1	Major1				
Conflicting Flow All	-	113	0	0		
Stage 1	-	-	-	-		
Stage 2	-	-	-	-		
Critical Hdwy	-	6.2	-	-		
Critical Hdwy Stg 1	-	-	-	-		
Critical Hdwy Stg 2	-	-	-	-		
Follow-up Hdwy	-	3.3	-	-		
Pot Cap-1 Maneuver	0	945	-	-		
Stage 1	0	-	-	-		
Stage 2	0	-	-	-		
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	-	945	-	-		
Mov Cap-2 Maneuver	-	-	-	-		
Stage 1	-	-	-	-		
Stage 2	-	-	-	-		
Approach	WB	NB				
HCM Control Delay, s	9.5	0				
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1				
Capacity (veh/h)	-	- 945				
HCM Lane V/C Ratio	-	- 0.147				
HCM Control Delay (s)	-	- 9.5				
HCM Lane LOS	-	- A				
HCM 95th %tile Q(veh)	-	- 0.5				

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	495	1578	162	168	1008	339	203	1359	96	522	1448	399
Future Volume (veh/h)	495	1578	162	168	1008	339	203	1359	96	522	1448	399
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1881	1900	1900	1881	1900	1900	1881	1881	1881	1900	1863
Adj Flow Rate, veh/h	538	1715	176	183	1096	0	221	1477	104	567	1574	0
Adj No. of Lanes	2	2	0	1	2	1	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	1	1	0	1	0	0	1	1	1	0	2
Cap, veh/h	344	1175	119	121	1162	525	136	953	426	314	1324	581
Arrive On Green	0.10	0.36	0.36	0.07	0.32	0.00	0.08	0.27	0.27	0.17	0.37	0.00
Sat Flow, veh/h	3442	3278	331	1810	3574	1615	1810	3574	1599	1792	3610	1583
Grp Volume(v), veh/h	538	923	968	183	1096	0	221	1477	104	567	1574	0
Grp Sat Flow(s),veh/h/ln	1721	1787	1823	1810	1787	1615	1810	1787	1599	1792	1805	1583
Q Serve(g_s), s	12.0	43.0	43.0	8.0	35.8	0.0	9.0	32.0	6.1	21.0	44.0	0.0
Cycle Q Clear(g_c), s	12.0	43.0	43.0	8.0	35.8	0.0	9.0	32.0	6.1	21.0	44.0	0.0
Prop In Lane	1.00		0.18	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	344	640	653	121	1162	525	136	953	426	314	1324	581
V/C Ratio(X)	1.56	1.44	1.48	1.52	0.94	0.00	1.63	1.55	0.24	1.81	1.19	0.00
Avail Cap(c_a), veh/h	344	640	653	121	1162	525	136	953	426	314	1324	581
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	54.0	38.5	38.5	56.0	39.4	0.0	55.5	44.0	34.5	49.5	38.0	0.0
Incr Delay (d2), s/veh	267.2	207.3	225.2	270.3	14.9	0.0	313.8	252.5	0.3	376.2	92.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.5	58.0	62.4	13.0	20.1	0.0	16.3	49.2	2.8	43.1	39.0	0.0
LnGrp Delay(d),s/veh	321.2	245.8	263.7	326.3	54.3	0.0	369.3	296.5	34.8	425.7	130.9	0.0
LnGrp LOS	F	F	F	F	D		F	F	C	F	F	
Approach Vol, veh/h	2429				1279				1802			
Approach Delay, s/veh	269.6				93.2				290.4			
Approach LOS	F				F				F			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.0	47.0	13.0	48.0	16.0	43.0	25.0	36.0				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	8.0	43.0	9.0	44.0	12.0	39.0	21.0	32.0				
Max Q Clear Time (g_c+I1), s	10.0	45.0	11.0	46.0	14.0	37.8	23.0	34.0				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay	228.1											
HCM 2010 LOS	F											

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	490	2350	86	561	1862	693	99	454	726	1109	545	571
Future Volume (veh/h)	490	2350	86	561	1862	693	99	454	726	1109	545	571
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1846	1900	1845	1863	1810	1881	1845	1881	1863	1845	1863
Adj Flow Rate, veh/h	533	2554	0	610	2024	0	108	493	789	1205	592	621
Adj No. of Lanes	1	3	0	2	3	1	1	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	3	3	3	2	5	1	3	1	2	3	2
Cap, veh/h	340	1839	0	392	1475	446	349	360	549	843	452	388
Arrive On Green	0.19	0.37	0.00	0.12	0.29	0.00	0.19	0.19	0.19	0.25	0.25	0.25
Sat Flow, veh/h	1792	5205	0	3408	5085	1538	1792	1845	2814	3442	1845	1583
Grp Volume(v), veh/h	533	2554	0	610	2024	0	108	493	789	1205	592	621
Grp Sat Flow(s),veh/h/ln	1792	1680	0	1704	1695	1538	1792	1845	1407	1721	1845	1583
Q Serve(g_s), s	38.0	73.0	0.0	23.0	58.0	0.0	10.3	39.0	39.0	49.0	49.0	49.0
Cycle Q Clear(g_c), s	38.0	73.0	0.0	23.0	58.0	0.0	10.3	39.0	39.0	49.0	49.0	49.0
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	340	1839	0	392	1475	446	349	360	549	843	452	388
V/C Ratio(X)	1.57	1.39	0.00	1.56	1.37	0.00	0.31	1.37	1.44	1.43	1.31	1.60
Avail Cap(c_a), veh/h	340	1839	0	392	1475	446	349	360	549	843	452	388
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	81.0	63.5	0.0	88.5	71.0	0.0	69.0	80.5	80.5	75.5	75.5	75.5
Incr Delay (d2), s/veh	268.5	178.3	0.0	262.6	172.0	0.0	2.3	183.6	207.2	199.9	154.6	282.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	44.2	64.3	0.0	25.1	50.7	0.0	5.4	38.2	31.0	46.7	44.4	51.9
LnGrp Delay(d),s/veh	349.5	241.8	0.0	351.1	243.0	0.0	71.2	264.1	287.7	275.4	230.1	357.7
LnGrp LOS	F	F		F	F		E	F	F	F	F	F
Approach Vol, veh/h	3087			2634			1390			2418		
Approach Delay, s/veh	260.4			268.0			262.5			285.5		
Approach LOS	F			F			F			F		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	37.0	77.0		43.0	42.0	62.0		53.0				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	23.0	73.0		39.0	38.0	58.0		49.0				
Max Q Clear Time (g_c+25.0), s	25.0	75.0		41.0	40.0	60.0		51.0				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	0.0		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay	269.2											
HCM 2010 LOS	F											

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

APPENDIX F
Cumulative + Project PM
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2436	1060	42	33	849	93	138	332	46	71	497	1822
Future Volume (veh/h)	2436	1060	42	33	849	93	138	332	46	71	497	1822
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1882	1900	1900	1852	1900	1881	1900	1900	1900	1900	1863
Adj Flow Rate, veh/h	2648	1152	46	36	923	0	150	361	50	77	540	1980
Adj No. of Lanes	2	1	0	0	2	0	1	2	0	1	2	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	3	3	3	1	0	0	0	0	2
Cap, veh/h	1430	717	29	23	623	0	186	752	103	100	676	1022
Arrive On Green	0.40	0.40	0.40	0.18	0.18	0.00	0.10	0.24	0.24	0.06	0.19	0.19
Sat Flow, veh/h	3583	1797	72	129	3567	0	1792	3189	438	1810	3610	2787
Grp Volume(v), veh/h	2648	0	1198	514	445	0	150	203	208	77	540	1980
Grp Sat Flow(s),veh/h/ln	1792	0	1869	1845	1759	0	1792	1805	1823	1810	1805	1393
Q Serve(g_s), s	49.0	0.0	49.0	22.0	22.0	0.0	10.1	11.9	12.1	5.2	17.5	23.0
Cycle Q Clear(g_c), s	49.0	0.0	49.0	22.0	22.0	0.0	10.1	11.9	12.1	5.2	17.5	23.0
Prop In Lane	1.00		0.04	0.07		0.00	1.00		0.24	1.00		1.00
Lane Grp Cap(c), veh/h	1430	0	746	331	315	0	186	426	430	100	676	1022
V/C Ratio(X)	1.85	0.00	1.61	1.55	1.41	0.00	0.81	0.48	0.48	0.77	0.80	1.94
Avail Cap(c_a), veh/h	1430	0	746	331	315	0	584	426	430	516	676	1022
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.9	0.0	36.9	50.4	50.4	0.0	53.8	40.4	40.5	57.2	47.7	31.9
Incr Delay (d2), s/veh	385.8	0.0	278.9	263.2	203.7	0.0	7.9	0.8	0.8	11.6	6.7	425.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	100.7	0.0	82.9	35.3	28.4	0.0	5.4	6.0	6.2	2.9	9.4	77.6
LnGrp Delay(d),s/veh	422.7	0.0	315.8	313.6	254.1	0.0	61.7	41.2	41.3	68.8	54.4	457.7
LnGrp LOS	F		F	F	F		E	D	D	E	D	F
Approach Vol, veh/h	3846		959				561			2597		
Approach Delay, s/veh	389.4		286.0				46.7			362.3		
Approach LOS	F		F				D			F		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		26.0	16.8	27.0		53.0	10.8	33.0				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Green Setting (Gmax), s		22.0	40.0	23.0		49.0	35.0	28.0				
Max Q Clear Time (g_c+l1), s		24.0	12.1	25.0		51.0	7.2	14.1				
Green Ext Time (p_c), s		0.0	0.8	0.0		0.0	0.2	2.5				
Intersection Summary												
HCM 2010 Ctrl Delay	344.0											
HCM 2010 LOS	F											
Notes												
User approved volume balancing among the lanes for turning movement.												



Appendix B
Synchro Timing Reports

APPENDIX F

Existing

AM Peak

Santa Cruz DRP Study 1: Front Street & Laurel Street

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	39	337	246	448	86	5	142	168	32	149	61
Future Volume (vph)	39	337	246	448	86	5	142	168	32	149	61
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Detector Phase	5	2	1	6	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	27.0	25.0	32.0	32.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (%)	25.0%	33.8%	31.3%	40.0%	40.0%	10.0%	25.0%	25.0%	10.0%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	16.2	28.8	15.6	28.3	28.3	4.0	11.4	11.4	4.0	14.4	14.4
Actuated g/C Ratio	0.22	0.40	0.22	0.39	0.39	0.06	0.16	0.16	0.06	0.20	0.20
v/c Ratio	0.11	0.27	0.71	0.67	0.14	0.06	0.54	0.45	0.38	0.45	0.15
Control Delay	26.0	18.1	37.3	25.6	2.6	37.2	35.9	8.7	48.3	29.7	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	18.1	37.3	25.6	2.6	37.2	35.9	8.7	48.3	29.7	0.7
LOS	C	B	D	C	A	D	D	A	D	C	A
Approach Delay		18.9		26.7			21.4			24.9	
Approach LOS		B		C			C			C	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 72.4

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 23.7

Intersection LOS: C

Intersection Capacity Utilization 51.4%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Front Street & Laurel Street

			
25 s	27 s	8 s	20 s
			
20 s	32 s	8 s	20 s

APPENDIX F

Santa Cruz DRP Study 1: Front Street & Laurel Street

Existing
AM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	27.0	25.0	32.0	32.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (%)	25.0%	33.8%	31.3%	40.0%	40.0%	10.0%	25.0%	25.0%	10.0%	25.0%	25.0%
Maximum Green (s)	16.0	23.0	21.0	28.0	28.0	4.0	16.0	16.0	4.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	Max	Max	None	Max	Max	None	None	None	None	None	None
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0
90th %ile Green (s)	16.0	23.0	21.0	28.0	28.0	4.0	16.0	16.0	4.0	16.0	16.0
90th %ile Term Code	MaxR	MaxR	Max	MaxR	MaxR	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	16.0	24.8	19.2	28.0	28.0	0.0	13.5	13.5	4.0	21.5	21.5
70th %ile Term Code	MaxR	Hold	Gap	MaxR	MaxR	Skip	Gap	Gap	Max	Hold	Hold
50th %ile Green (s)	16.0	27.5	16.5	28.0	28.0	0.0	11.6	11.6	4.0	19.6	19.6
50th %ile Term Code	MaxR	Hold	Gap	MaxR	MaxR	Skip	Gap	Gap	Max	Hold	Hold
30th %ile Green (s)	16.0	31.1	12.9	28.0	28.0	0.0	9.5	9.5	0.0	9.5	9.5
30th %ile Term Code	MaxR	Hold	Gap	MaxR	MaxR	Skip	Hold	Hold	Skip	Gap	Gap
10th %ile Green (s)	16.0	34.2	9.8	28.0	28.0	0.0	7.2	7.2	0.0	7.2	7.2
10th %ile Term Code	MaxR	Hold	Gap	MaxR	MaxR	Skip	Hold	Hold	Skip	Gap	Gap

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 72.4

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 80

70th %ile Actuated Cycle: 77.5

50th %ile Actuated Cycle: 75.6

30th %ile Actuated Cycle: 65.5

10th %ile Actuated Cycle: 63.2

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	20	338	28	453	33	30	19	15
Future Volume (vph)	20	338	28	453	33	30	19	15
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases					8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	40.0	20.0	40.0	20.0	20.0	20.0	20.0
Total Split (%)	25.0%	50.0%	25.0%	50.0%	25.0%	25.0%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	Max	Max	Max	Max
Act Effct Green (s)	6.7	36.3	6.8	36.3	16.1	16.1		16.1
Actuated g/C Ratio	0.10	0.56	0.10	0.56	0.25	0.25		0.25
v/c Ratio	0.16	0.39	0.18	0.54	0.10	0.17		0.17
Control Delay	30.8	10.6	30.5	12.6	21.9	15.1		16.6
Queue Delay	0.0	0.0	0.0	4.5	0.0	0.0		0.0
Total Delay	30.8	10.6	30.5	17.1	21.9	15.1		16.6
LOS	C	B	C	B	C	B		B
Approach Delay		11.7		17.9		17.6		16.6
Approach LOS		B		B		B		B

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 64.8

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 15.5

Intersection LOS: B

Intersection Capacity Utilization 41.9%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 2: Pacific Avenue & Laurel Street

 Ø1	 Ø2	 Ø4
20 s	40 s	20 s
 Ø5	 Ø6	 Ø8
20 s	40 s	20 s

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Protected Phases	5	2	1	6		8		4
Permitted Phases					8		4	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	40.0	20.0	40.0	20.0	20.0	20.0	20.0
Total Split (%)	25.0%	50.0%	25.0%	50.0%	25.0%	25.0%	25.0%	25.0%
Maximum Green (s)	16.0	36.0	16.0	36.0	16.0	16.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	None	Max	Max	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
90th %ile Green (s)	8.5	36.0	8.7	36.2	16.0	16.0	16.0	16.0
90th %ile Term Code	Gap	MaxR	Gap	Hold	MaxR	MaxR	MaxR	MaxR
70th %ile Green (s)	7.4	36.0	7.5	36.1	16.0	16.0	16.0	16.0
70th %ile Term Code	Gap	MaxR	Gap	Hold	MaxR	MaxR	MaxR	MaxR
50th %ile Green (s)	0.0	36.0	0.0	36.0	16.0	16.0	16.0	16.0
50th %ile Term Code	Skip	MaxR	Skip	MaxR	MaxR	MaxR	MaxR	MaxR
30th %ile Green (s)	0.0	36.0	0.0	36.0	16.0	16.0	16.0	16.0
30th %ile Term Code	Skip	MaxR	Skip	MaxR	MaxR	MaxR	MaxR	MaxR
10th %ile Green (s)	0.0	36.0	0.0	36.0	16.0	16.0	16.0	16.0
10th %ile Term Code	Skip	MaxR	Skip	MaxR	MaxR	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 64.8

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 72.7

70th %ile Actuated Cycle: 71.5

50th %ile Actuated Cycle: 60

30th %ile Actuated Cycle: 60

10th %ile Actuated Cycle: 60

Santa Cruz DRP Study
3: Front Street & Cathcart Street

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	36	19	18	250	273
Future Volume (vph)	36	19	18	250	273
Turn Type	Prot	Perm	Prot	NA	NA
Protected Phases	5		3	8	4
Permitted Phases		5			
Detector Phase	5	5	3	8	4
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0
Total Split (s)	28.0	28.0	22.0	57.0	35.0
Total Split (%)	32.9%	32.9%	25.9%	67.1%	41.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Recall Mode	Max	Max	Max	None	Max
Act Effect Green (s)	24.0	24.0	18.0	53.0	31.0
Actuated g/C Ratio	0.28	0.28	0.21	0.62	0.36
v/c Ratio	0.09	0.05	0.06	0.26	0.33
Control Delay	23.3	9.9	27.4	8.0	18.5
Queue Delay	0.0	0.0	0.0	1.5	0.0
Total Delay	23.3	9.9	27.4	9.5	18.5
LOS	C	A	C	A	B
Approach Delay	18.6			10.7	18.5
Approach LOS	B			B	B

Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 85

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.33

Intersection Signal Delay: 15.3

Intersection LOS: B

Intersection Capacity Utilization 25.0%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Front Street & Cathcart Street



Santa Cruz DRP Study
3: Front Street & Cathcart Street

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Protected Phases	5		3	8	4
Permitted Phases		5			
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0
Total Split (s)	28.0	28.0	22.0	57.0	35.0
Total Split (%)	32.9%	32.9%	25.9%	67.1%	41.2%
Maximum Green (s)	24.0	24.0	18.0	53.0	31.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lead/Lag			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	Max	Max	Max	None	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0
90th %ile Green (s)	24.0	24.0	18.0	53.0	31.0
90th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
70th %ile Green (s)	24.0	24.0	18.0	53.0	31.0
70th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
50th %ile Green (s)	24.0	24.0	18.0	53.0	31.0
50th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
30th %ile Green (s)	24.0	24.0	18.0	53.0	31.0
30th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
10th %ile Green (s)	24.0	24.0	18.0	53.0	31.0
10th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR

Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 85

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 85

70th %ile Actuated Cycle: 85

50th %ile Actuated Cycle: 85

30th %ile Actuated Cycle: 85

10th %ile Actuated Cycle: 85

Santa Cruz DRP Study

4: Front Street & Metro Station Access North

				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Traffic Volume (vph)	10	2	259	255
Future Volume (vph)	10	2	259	255
Turn Type	Prot	Perm	NA	NA
Protected Phases	5		8	4
Permitted Phases		8		
Detector Phase	5	8	8	4
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	24.0	36.0	36.0	36.0
Total Split (%)	40.0%	60.0%	60.0%	60.0%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Max	Max	Max
Act Effect Green (s)	6.5	50.8	50.8	50.8
Actuated g/C Ratio	0.12	0.95	0.95	0.95
v/c Ratio	0.13	0.00	0.18	0.22
Control Delay	23.6	1.5	1.2	1.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	23.6	1.5	1.2	1.3
LOS	C	A	A	A
Approach Delay	23.6		1.2	1.3
Approach LOS	C		A	A

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 53.6

Natural Cycle: 40

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.22

Intersection Signal Delay: 1.7

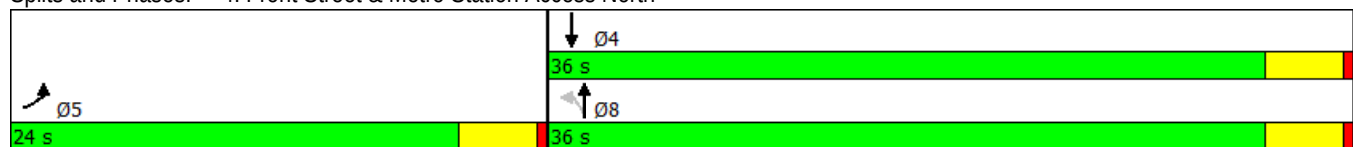
Intersection LOS: A

Intersection Capacity Utilization 25.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: Front Street & Metro Station Access North



Santa Cruz DRP Study

4: Front Street & Metro Station Access North

				
Lane Group	EBL	NBL	NBT	SBT
Protected Phases	5		8	4
Permitted Phases		8		
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	24.0	36.0	36.0	36.0
Total Split (%)	40.0%	60.0%	60.0%	60.0%
Maximum Green (s)	20.0	32.0	32.0	32.0
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lead/Lag				
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0
Recall Mode	None	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0
90th %ile Green (s)	8.8	47.0	47.0	47.0
90th %ile Term Code	Gap	Dwell	Dwell	Dwell
70th %ile Green (s)	0.0	47.0	47.0	47.0
70th %ile Term Code	Skip	Dwell	Dwell	Dwell
50th %ile Green (s)	0.0	47.0	47.0	47.0
50th %ile Term Code	Skip	Dwell	Dwell	Dwell
30th %ile Green (s)	0.0	47.0	47.0	47.0
30th %ile Term Code	Skip	Dwell	Dwell	Dwell
10th %ile Green (s)	0.0	47.0	47.0	47.0
10th %ile Term Code	Skip	Dwell	Dwell	Dwell

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 53.6

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 63.8

70th %ile Actuated Cycle: 51

50th %ile Actuated Cycle: 51

30th %ile Actuated Cycle: 51

10th %ile Actuated Cycle: 51

Santa Cruz DRP Study

7: Pacific Street & Front Street & Mission Street/Water Street

								
Lane Group	EBL	EBT	EBR	WBL2	WBL	WBT	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	81	380	75	61	48	637	18	107
Future Volume (vph)	81	380	75	61	48	637	18	107
Turn Type	Prot	NA	Perm	Prot	Prot	NA	NA	Perm
Protected Phases	5	2		1	1	6	8	
Permitted Phases			2					8
Detector Phase	5	2	2	1	1	6	8	8
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	8.0	20.0	20.0	20.0
Total Split (s)	20.0	44.0	44.0	20.0	20.0	44.0	26.0	26.0
Total Split (%)	22.2%	48.9%	48.9%	22.2%	22.2%	48.9%	28.9%	28.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	None	Max	Max	Max
Act Effct Green (s)	9.6	40.8	40.8	8.9	8.9	40.2	22.1	22.1
Actuated g/C Ratio	0.12	0.50	0.50	0.11	0.11	0.49	0.27	0.27
v/c Ratio	0.45	0.25	0.13	0.40	0.28	0.41	0.19	0.23
Control Delay	41.5	13.0	6.8	41.6	37.9	15.0	26.4	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.5	13.0	6.8	41.6	37.9	15.0	26.4	6.6
LOS	D	B	A	D	D	B	C	A
Approach Delay		16.1				18.7	14.7	
Approach LOS		B				B	B	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 81.7

Natural Cycle: 50

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.45

Intersection Signal Delay: 17.2

Intersection LOS: B

Intersection Capacity Utilization 36.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 7: Pacific Street & Front Street & Mission Street/Water Street

 Ø1	 Ø2	
20 s	44 s	
 Ø5	 Ø6	 Ø8
20 s	44 s	26 s

Santa Cruz DRP Study

7: Pacific Street & Front Street & Mission Street/Water Street

								
Lane Group	EBL	EBT	EBR	WBL2	WBL	WBT	SBT	SBR
Protected Phases	5	2		1	1	6	8	
Permitted Phases			2					8
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	8.0	20.0	20.0	20.0
Total Split (s)	20.0	44.0	44.0	20.0	20.0	44.0	26.0	26.0
Total Split (%)	22.2%	48.9%	48.9%	22.2%	22.2%	48.9%	28.9%	28.9%
Maximum Green (s)	16.0	40.0	40.0	16.0	16.0	40.0	22.0	22.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	Max	Max	Max
Walk Time (s)		5.0	5.0			5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0			11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0			0	0	0
90th %ile Green (s)	13.6	40.9	40.9	12.7	12.7	40.0	22.0	22.0
90th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
70th %ile Green (s)	11.3	40.8	40.8	10.5	10.5	40.0	22.0	22.0
70th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
50th %ile Green (s)	9.7	40.8	40.8	8.9	8.9	40.0	22.0	22.0
50th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
30th %ile Green (s)	8.1	40.6	40.6	7.5	7.5	40.0	22.0	22.0
30th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
10th %ile Green (s)	0.0	40.0	40.0	0.0	0.0	40.0	22.0	22.0
10th %ile Term Code	Skip	Hold	Hold	Skip	Skip	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 81.7

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 87.6

70th %ile Actuated Cycle: 85.3

50th %ile Actuated Cycle: 83.7

30th %ile Actuated Cycle: 82.1

10th %ile Actuated Cycle: 70

Santa Cruz DRP Study
8: Front Street & Soquel Avenue

	→	↖	←	↗	↘	↑	↙	↓
Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↕↕	↖	↗	↗		↕↕	↖	↗
Traffic Volume (vph)	47	202	104	42	10	194	24	151
Future Volume (vph)	47	202	104	42	10	194	24	151
Turn Type	NA	Split	NA	Perm	Perm	NA	Perm	NA
Protected Phases	2	6	6			8		4
Permitted Phases				6	8		4	
Detector Phase	2	6	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	23.0	38.0	38.0	38.0	39.0	39.0	39.0	39.0
Total Split (%)	23.0%	38.0%	38.0%	38.0%	39.0%	39.0%	39.0%	39.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lag	Lead	Lead	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	Max	None	None	None	None
Act Effct Green (s)	7.2	34.6	34.6	34.6		13.3	13.3	13.3
Actuated g/C Ratio	0.11	0.53	0.53	0.53		0.20	0.20	0.20
v/c Ratio	0.25	0.20	0.20	0.06		0.50	0.17	0.61
Control Delay	28.0	11.0	10.9	3.3		21.6	24.5	31.8
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	28.0	11.0	10.9	3.3		21.6	24.5	31.8
LOS	C	B	B	A		C	C	C
Approach Delay	28.0		10.0			21.6		30.9
Approach LOS	C		B			C		C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 64.9

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 19.8

Intersection LOS: B

Intersection Capacity Utilization 41.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 8: Front Street & Soquel Avenue

↖ Ø6	↗ Ø2	↓ Ø4
38 s	23 s	39 s
		↖ Ø8
		39 s

Santa Cruz DRP Study
8: Front Street & Soquel Avenue

APPENDIX F

Existing
AM Peak

								
Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Protected Phases	2	6	6			8		4
Permitted Phases				6	8		4	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	23.0	38.0	38.0	38.0	39.0	39.0	39.0	39.0
Total Split (%)	23.0%	38.0%	38.0%	38.0%	39.0%	39.0%	39.0%	39.0%
Maximum Green (s)	19.0	34.0	34.0	34.0	35.0	35.0	35.0	35.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lag	Lead	Lead	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	Max	Max	None	None	None	None
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
90th %ile Green (s)	9.0	34.0	34.0	34.0	19.4	19.4	19.4	19.4
90th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
70th %ile Green (s)	7.9	34.0	34.0	34.0	15.7	15.7	15.7	15.7
70th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
50th %ile Green (s)	7.2	34.0	34.0	34.0	13.4	13.4	13.4	13.4
50th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
30th %ile Green (s)	6.5	34.0	34.0	34.0	11.3	11.3	11.3	11.3
30th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
10th %ile Green (s)	0.0	34.0	34.0	34.0	8.0	8.0	8.0	8.0
10th %ile Term Code	Skip	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 64.9

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 74.4

70th %ile Actuated Cycle: 69.6

50th %ile Actuated Cycle: 66.6

30th %ile Actuated Cycle: 63.8

10th %ile Actuated Cycle: 50

APPENDIX F

Existing

AM Peak

Santa Cruz DRP Study 11: Ocean Street & Water Street

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	161	297	136	450	255	78	466	40	175	620	379
Future Volume (vph)	161	297	136	450	255	78	466	40	175	620	379
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Detector Phase	5	2	1	6	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	17.0	31.0	26.0	40.0	40.0	18.0	34.0	34.0	29.0	45.0	45.0
Total Split (%)	14.2%	25.8%	21.7%	33.3%	33.3%	15.0%	28.3%	28.3%	24.2%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	None	Min	Min	None	Min	Min	None	Min	Min
Act Effct Green (s)	10.0	17.0	12.7	19.7	19.7	9.8	20.3	20.3	14.8	28.4	28.4
Actuated g/C Ratio	0.12	0.21	0.16	0.24	0.24	0.12	0.25	0.25	0.18	0.35	0.35
v/c Ratio	0.42	0.52	0.53	0.58	0.47	0.40	0.58	0.08	0.59	0.55	0.50
Control Delay	40.9	33.1	42.9	32.0	6.8	44.8	31.2	0.3	41.9	25.6	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	33.1	42.9	32.0	6.8	44.8	31.2	0.3	41.9	25.6	5.0
LOS	D	C	D	C	A	D	C	A	D	C	A
Approach Delay		35.5		26.2			30.9			21.4	
Approach LOS		D		C			C			C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 81.8

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 26.8

Intersection LOS: C

Intersection Capacity Utilization 53.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 11: Ocean Street & Water Street

 Ø1	 Ø2	 Ø3	 Ø4
26 s	31 s	18 s	45 s
 Ø5	 Ø6	 Ø7	 Ø8
17 s	40 s	29 s	34 s

APPENDIX F

Santa Cruz DRP Study 11: Ocean Street & Water Street

Existing
AM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	17.0	31.0	26.0	40.0	40.0	18.0	34.0	34.0	29.0	45.0	45.0
Total Split (%)	14.2%	25.8%	21.7%	33.3%	33.3%	15.0%	28.3%	28.3%	24.2%	37.5%	37.5%
Maximum Green (s)	13.0	27.0	22.0	36.0	36.0	14.0	30.0	30.0	25.0	41.0	41.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Min	None	Min	Min	None	Min	Min	None	Min	Min
Walk Time (s)		5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0
90th %ile Green (s)	13.0	23.2	19.7	29.9	29.9	14.0	30.5	30.5	23.1	39.6	39.6
90th %ile Term Code	Max	Hold	Gap	Gap	Gap	Max	Hold	Hold	Gap	Gap	Gap
70th %ile Green (s)	11.5	19.4	15.2	23.1	23.1	11.5	24.6	24.6	17.7	30.8	30.8
70th %ile Term Code	Gap	Hold	Gap	Gap	Gap	Gap	Hold	Hold	Gap	Gap	Gap
50th %ile Green (s)	9.8	16.4	12.3	18.9	18.9	9.5	20.2	20.2	14.4	25.1	25.1
50th %ile Term Code	Gap	Hold	Gap	Gap	Gap	Gap	Hold	Hold	Gap	Gap	Gap
30th %ile Green (s)	8.5	14.5	10.2	16.2	16.2	8.0	17.3	17.3	11.8	21.1	21.1
30th %ile Term Code	Gap	Hold	Gap	Gap	Gap	Gap	Hold	Hold	Gap	Gap	Gap
10th %ile Green (s)	6.9	11.4	7.5	12.0	12.0	0.0	11.2	11.2	8.6	23.8	23.8
10th %ile Term Code	Gap	Hold	Gap	Gap	Gap	Skip	Gap	Gap	Gap	Hold	Hold

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 81.8

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 112.5

70th %ile Actuated Cycle: 92.9

50th %ile Actuated Cycle: 79.3

30th %ile Actuated Cycle: 69.8

10th %ile Actuated Cycle: 54.7

APPENDIX F

Existing

AM Peak

Santa Cruz DRP Study 12: Highway 9 & Highway 1

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	211	1518	266	1389	515	27	156	160	412	158	184
Future Volume (vph)	211	1518	266	1389	515	27	156	160	412	158	184
Turn Type	Prot	NA	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6		4	4		8	8	
Permitted Phases					6			4			8
Detector Phase	5	2	1	6	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	42.0	96.0	28.0	82.0	82.0	32.0	32.0	32.0	44.0	44.0	44.0
Total Split (%)	21.0%	48.0%	14.0%	41.0%	41.0%	16.0%	16.0%	16.0%	22.0%	22.0%	22.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	29.4	92.0	20.7	83.2	83.2	28.0	28.0	28.0	40.0	40.0	40.0
Actuated g/C Ratio	0.15	0.47	0.11	0.42	0.42	0.14	0.14	0.14	0.20	0.20	0.20
v/c Ratio	0.83	0.69	0.77	0.68	0.66	0.12	0.63	0.35	0.70	0.46	0.42
Control Delay	106.5	43.2	101.0	48.6	26.3	76.4	91.7	29.9	80.5	74.5	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	106.5	43.2	101.0	48.6	26.3	76.4	91.7	29.9	80.5	74.5	10.4
LOS	F	D	F	D	C	E	F	C	F	E	B
Approach Delay		50.7		49.7			61.7			62.1	
Approach LOS		D		D			E			E	

Intersection Summary

Cycle Length: 200

Actuated Cycle Length: 196.7

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 52.7

Intersection LOS: D

Intersection Capacity Utilization 71.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 12: Highway 9 & Highway 1

			
28 s	96 s	32 s	44 s
			
42 s	82 s		

APPENDIX F

Santa Cruz DRP Study 12: Highway 9 & Highway 1

Existing
AM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		4	4		8	8	
Permitted Phases					6			4			8
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	42.0	96.0	28.0	82.0	82.0	32.0	32.0	32.0	44.0	44.0	44.0
Total Split (%)	21.0%	48.0%	14.0%	41.0%	41.0%	16.0%	16.0%	16.0%	22.0%	22.0%	22.0%
Maximum Green (s)	38.0	92.0	24.0	78.0	78.0	28.0	28.0	28.0	40.0	40.0	40.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	None	Max	Max	Max	Max	Max	Max	Max	Max
Walk Time (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0
90th %ile Green (s)	38.0	92.0	24.0	78.0	78.0	28.0	28.0	28.0	40.0	40.0	40.0
90th %ile Term Code	Max	MaxR	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
70th %ile Green (s)	33.7	92.0	23.6	81.9	81.9	28.0	28.0	28.0	40.0	40.0	40.0
70th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
50th %ile Green (s)	29.8	92.0	21.3	83.5	83.5	28.0	28.0	28.0	40.0	40.0	40.0
50th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
30th %ile Green (s)	25.8	92.0	19.0	85.2	85.2	28.0	28.0	28.0	40.0	40.0	40.0
30th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
10th %ile Green (s)	20.4	92.0	15.8	87.4	87.4	28.0	28.0	28.0	40.0	40.0	40.0
10th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 200

Actuated Cycle Length: 196.7

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 200

70th %ile Actuated Cycle: 199.6

50th %ile Actuated Cycle: 197.3

30th %ile Actuated Cycle: 195

10th %ile Actuated Cycle: 191.8

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

								
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	1428	392	367	95	280	58	204	1471
Future Volume (vph)	1428	392	367	95	280	58	204	1471
Turn Type	Split	NA	NA	Prot	NA	Prot	NA	pm+ov
Protected Phases	6	6	2	3	8	7	4	6
Permitted Phases								4
Detector Phase	6	6	2	3	8	7	4	4 6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	43.0	43.0	26.0	45.0	37.0	44.0	36.0	43.0
Total Split (%)	28.7%	28.7%	17.3%	30.0%	24.7%	29.3%	24.0%	28.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	39.2	39.2	19.7	12.3	35.3	9.6	30.3	73.5
Actuated g/C Ratio	0.33	0.33	0.17	0.10	0.30	0.08	0.26	0.62
v/c Ratio	1.49	1.43dl	0.76	0.57	0.32	0.44	0.25	0.82
Control Delay	262.4	132.8	56.2	63.1	33.6	62.5	36.3	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	262.4	132.8	56.2	63.1	33.6	62.5	36.3	13.3
LOS	F	F	E	E	C	E	D	B
Approach Delay		182.2	56.2		40.6		17.7	
Approach LOS		F	E		D		B	

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 117.6

Natural Cycle: 120

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.49

Intersection Signal Delay: 93.2

Intersection LOS: F

Intersection Capacity Utilization 77.9%

ICU Level of Service D

Analysis Period (min) 15

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 13: Chestnut Street & Mission Street

 Ø2	 Ø6	 Ø4	 Ø3
26 s	43 s	36 s	45 s
		 Ø7	 Ø8
		44 s	37 s

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

APPENDIX F

Existing
AM Peak

								
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Protected Phases	6	6	2	3	8	7	4	6
Permitted Phases								4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	43.0	43.0	26.0	45.0	37.0	44.0	36.0	43.0
Total Split (%)	28.7%	28.7%	17.3%	30.0%	24.7%	29.3%	24.0%	28.7%
Maximum Green (s)	39.0	39.0	22.0	41.0	33.0	40.0	32.0	39.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag				Lag	Lag	Lead	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	None	None	None
Walk Time (s)	5.0	5.0			5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0
90th %ile Green (s)	39.0	39.0	22.0	17.2	35.9	13.3	32.0	39.0
90th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Max	Max
70th %ile Green (s)	39.0	39.0	22.0	14.3	35.1	11.2	32.0	39.0
70th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Max	Max
50th %ile Green (s)	39.0	39.0	21.2	12.5	34.8	9.7	32.0	39.0
50th %ile Term Code	Max	Max	Gap	Gap	Hold	Gap	Max	Max
30th %ile Green (s)	39.0	39.0	18.9	10.7	33.4	8.3	31.0	39.0
30th %ile Term Code	Max	Max	Gap	Gap	Hold	Gap	Gap	Max
10th %ile Green (s)	39.0	39.0	15.0	7.8	36.4	0.0	24.6	39.0
10th %ile Term Code	Max	Max	Gap	Gap	Hold	Skip	Gap	Max

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 117.6

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 126.2

70th %ile Actuated Cycle: 123.3

50th %ile Actuated Cycle: 120.7

30th %ile Actuated Cycle: 115.6

10th %ile Actuated Cycle: 102.4

APPENDIX F

Existing

PM Peak

Santa Cruz DRP Study 1: Front Street & Laurel Street

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	84	638	228	378	110	8	165	229	118	322	156
Future Volume (vph)	84	638	228	378	110	8	165	229	118	322	156
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Detector Phase	5	2	1	6	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	29.0	18.0	27.0	27.0	8.0	20.0	20.0	13.0	25.0	25.0
Total Split (%)	25.0%	36.3%	22.5%	33.8%	33.8%	10.0%	25.0%	25.0%	16.3%	31.3%	31.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	16.1	26.2	13.1	23.2	23.2	4.0	13.0	13.0	8.6	21.5	21.5
Actuated g/C Ratio	0.22	0.35	0.18	0.31	0.31	0.05	0.17	0.17	0.12	0.29	0.29
v/c Ratio	0.23	0.56	0.77	0.69	0.19	0.09	0.54	0.51	0.63	0.62	0.28
Control Delay	28.1	23.0	48.1	31.4	1.9	38.1	35.4	8.1	48.8	28.9	5.4
Queue Delay	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.1	24.1	48.1	31.4	1.9	38.1	35.4	8.1	48.8	28.9	5.4
LOS	C	C	D	C	A	D	D	A	D	C	A
Approach Delay		24.6		32.2			20.0			26.7	
Approach LOS		C		C			B			C	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 74.4

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 26.5

Intersection LOS: C

Intersection Capacity Utilization 64.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Front Street & Laurel Street

			
18 s	29 s	8 s	25 s
			
20 s	27 s	13 s	20 s

APPENDIX F

Santa Cruz DRP Study 1: Front Street & Laurel Street

Existing
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	29.0	18.0	27.0	27.0	8.0	20.0	20.0	13.0	25.0	25.0
Total Split (%)	25.0%	36.3%	22.5%	33.8%	33.8%	10.0%	25.0%	25.0%	16.3%	31.3%	31.3%
Maximum Green (s)	16.0	25.0	14.0	23.0	23.0	4.0	16.0	16.0	9.0	21.0	21.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	Max	Max	None	Max	Max	None	None	None	None	None	None
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0
90th %ile Green (s)	16.0	25.0	14.0	23.0	23.0	4.0	16.0	16.0	9.0	21.0	21.0
90th %ile Term Code	MaxR	MaxR	Max	MaxR	MaxR	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	16.0	25.0	14.0	23.0	23.0	0.0	15.4	15.4	9.0	28.4	28.4
70th %ile Term Code	MaxR	MaxR	Max	MaxR	MaxR	Skip	Gap	Gap	Max	Hold	Hold
50th %ile Green (s)	16.0	25.0	14.0	23.0	23.0	0.0	12.3	12.3	9.0	25.3	25.3
50th %ile Term Code	MaxR	MaxR	Max	MaxR	MaxR	Skip	Gap	Gap	Max	Hold	Hold
30th %ile Green (s)	16.0	25.5	13.5	23.0	23.0	0.0	10.3	10.3	9.0	23.3	23.3
30th %ile Term Code	MaxR	Hold	Gap	MaxR	MaxR	Skip	Gap	Gap	Max	Hold	Hold
10th %ile Green (s)	16.0	28.9	10.1	23.0	23.0	0.0	11.2	11.2	0.0	11.2	11.2
10th %ile Term Code	MaxR	Hold	Gap	MaxR	MaxR	Skip	Hold	Hold	Skip	Gap	Gap

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 74.4

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 80

70th %ile Actuated Cycle: 79.4

50th %ile Actuated Cycle: 76.3

30th %ile Actuated Cycle: 74.3

10th %ile Actuated Cycle: 62.2

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	48	640	37	456	41	77	56	58
Future Volume (vph)	48	640	37	456	41	77	56	58
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases					8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	40.0	20.0	40.0	20.0	20.0	20.0	20.0
Total Split (%)	25.0%	50.0%	25.0%	50.0%	25.0%	25.0%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	Max	Max	Max	Max
Act Effct Green (s)	7.6	36.8	7.0	36.3	16.1	16.1		16.1
Actuated g/C Ratio	0.11	0.54	0.10	0.54	0.24	0.24		0.24
v/c Ratio	0.28	0.69	0.21	0.58	0.16	0.30		0.44
Control Delay	32.8	17.0	32.2	14.6	24.6	19.8		25.6
Queue Delay	0.0	0.0	0.0	4.5	0.0	0.0		0.0
Total Delay	32.8	17.0	32.2	19.2	24.6	19.8		25.6
LOS	C	B	C	B	C	B		C
Approach Delay		18.0		20.0		21.0		25.6
Approach LOS		B		B		C		C

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 67.7

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 19.8

Intersection LOS: B

Intersection Capacity Utilization 65.3%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: Pacific Avenue & Laurel Street

 Ø1	 Ø2	 Ø4
20 s	40 s	20 s
 Ø5	 Ø6	 Ø8
20 s	40 s	20 s

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Protected Phases	5	2	1	6		8		4
Permitted Phases					8		4	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	40.0	20.0	40.0	20.0	20.0	20.0	20.0
Total Split (%)	25.0%	50.0%	25.0%	50.0%	25.0%	25.0%	25.0%	25.0%
Maximum Green (s)	16.0	36.0	16.0	36.0	16.0	16.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	None	Max	Max	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
90th %ile Green (s)	10.3	37.2	9.1	36.0	16.0	16.0	16.0	16.0
90th %ile Term Code	Gap	Hold	Gap	MaxR	MaxR	MaxR	MaxR	MaxR
70th %ile Green (s)	8.7	36.9	7.8	36.0	16.0	16.0	16.0	16.0
70th %ile Term Code	Gap	Hold	Gap	MaxR	MaxR	MaxR	MaxR	MaxR
50th %ile Green (s)	7.6	36.7	6.9	36.0	16.0	16.0	16.0	16.0
50th %ile Term Code	Gap	Hold	Gap	MaxR	MaxR	MaxR	MaxR	MaxR
30th %ile Green (s)	0.0	36.0	0.0	36.0	16.0	16.0	16.0	16.0
30th %ile Term Code	Skip	MaxR	Skip	MaxR	MaxR	MaxR	MaxR	MaxR
10th %ile Green (s)	0.0	36.0	0.0	36.0	16.0	16.0	16.0	16.0
10th %ile Term Code	Skip	MaxR	Skip	MaxR	MaxR	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 67.7

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 74.3

70th %ile Actuated Cycle: 72.7

50th %ile Actuated Cycle: 71.6

30th %ile Actuated Cycle: 60

10th %ile Actuated Cycle: 60

Santa Cruz DRP Study
3: Front Street & Cathcart Street

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	109	60	52	380	570
Future Volume (vph)	109	60	52	380	570
Turn Type	Prot	Perm	Prot	NA	NA
Protected Phases	5		3	8	4
Permitted Phases		5			
Detector Phase	5	5	3	8	4
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0
Total Split (s)	26.0	26.0	22.0	59.0	37.0
Total Split (%)	30.6%	30.6%	25.9%	69.4%	43.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Recall Mode	Max	Max	Max	None	Max
Act Effect Green (s)	22.0	22.0	18.0	55.0	33.0
Actuated g/C Ratio	0.26	0.26	0.21	0.65	0.39
v/c Ratio	0.25	0.14	0.15	0.34	0.54
Control Delay	26.7	7.7	28.6	7.7	20.8
Queue Delay	0.0	0.0	0.0	2.3	0.0
Total Delay	26.7	7.7	28.6	10.0	20.8
LOS	C	A	C	B	C
Approach Delay	19.9			12.2	20.8
Approach LOS	B			B	C

Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 85

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 17.8

Intersection LOS: B

Intersection Capacity Utilization 39.4%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Front Street & Cathcart Street



Santa Cruz DRP Study
3: Front Street & Cathcart Street

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Protected Phases	5		3	8	4
Permitted Phases		5			
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0
Total Split (s)	26.0	26.0	22.0	59.0	37.0
Total Split (%)	30.6%	30.6%	25.9%	69.4%	43.5%
Maximum Green (s)	22.0	22.0	18.0	55.0	33.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lead/Lag			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	Max	Max	Max	None	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0
90th %ile Green (s)	22.0	22.0	18.0	55.0	33.0
90th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
70th %ile Green (s)	22.0	22.0	18.0	55.0	33.0
70th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
50th %ile Green (s)	22.0	22.0	18.0	55.0	33.0
50th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
30th %ile Green (s)	22.0	22.0	18.0	55.0	33.0
30th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
10th %ile Green (s)	22.0	22.0	18.0	55.0	33.0
10th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR

Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 85

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 85

70th %ile Actuated Cycle: 85

50th %ile Actuated Cycle: 85

30th %ile Actuated Cycle: 85

10th %ile Actuated Cycle: 85

Santa Cruz DRP Study

4: Front Street & Metro Station Access North

				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Traffic Volume (vph)	16	5	403	605
Future Volume (vph)	16	5	403	605
Turn Type	Prot	Perm	NA	NA
Protected Phases	5		8	4
Permitted Phases		8		
Detector Phase	5	8	8	4
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	22.0	38.0	38.0	38.0
Total Split (%)	36.7%	63.3%	63.3%	63.3%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Max	Max	Max
Act Effect Green (s)	6.8	52.8	52.8	52.8
Actuated g/C Ratio	0.12	0.95	0.95	0.95
v/c Ratio	0.17	0.01	0.23	0.37
Control Delay	25.3	1.4	1.3	1.9
Queue Delay	0.0	0.0	0.0	0.1
Total Delay	25.3	1.4	1.3	1.9
LOS	C	A	A	A
Approach Delay	25.3		1.3	1.9
Approach LOS	C		A	A

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 55.7

Natural Cycle: 50

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.37

Intersection Signal Delay: 2.1

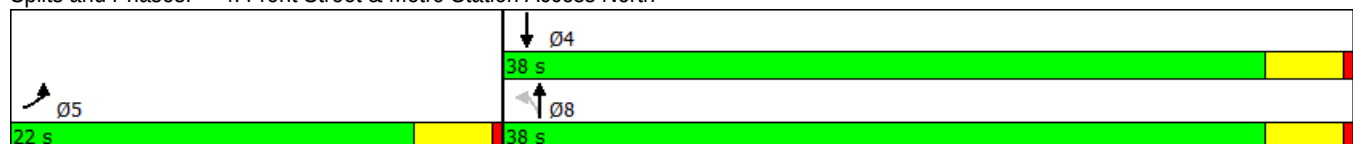
Intersection LOS: A

Intersection Capacity Utilization 42.9%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: Front Street & Metro Station Access North



Santa Cruz DRP Study

4: Front Street & Metro Station Access North

				
Lane Group	EBL	NBL	NBT	SBT
Protected Phases	5		8	4
Permitted Phases		8		
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	22.0	38.0	38.0	38.0
Total Split (%)	36.7%	63.3%	63.3%	63.3%
Maximum Green (s)	18.0	34.0	34.0	34.0
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lead/Lag				
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0
Recall Mode	None	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0
90th %ile Green (s)	9.6	49.0	49.0	49.0
90th %ile Term Code	Gap	Dwell	Dwell	Dwell
70th %ile Green (s)	0.0	49.0	49.0	49.0
70th %ile Term Code	Skip	Dwell	Dwell	Dwell
50th %ile Green (s)	0.0	49.0	49.0	49.0
50th %ile Term Code	Skip	Dwell	Dwell	Dwell
30th %ile Green (s)	0.0	49.0	49.0	49.0
30th %ile Term Code	Skip	Dwell	Dwell	Dwell
10th %ile Green (s)	0.0	49.0	49.0	49.0
10th %ile Term Code	Skip	Dwell	Dwell	Dwell

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 55.7

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 66.6

70th %ile Actuated Cycle: 53

50th %ile Actuated Cycle: 53

30th %ile Actuated Cycle: 53

10th %ile Actuated Cycle: 53

Santa Cruz DRP Study

7: Pacific Street & Front Street & Mission Street/Water Street

								
Lane Group	EBL	EBT	EBR	WBL2	WBL	WBT	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	152	629	110	108	49	630	33	174
Future Volume (vph)	152	629	110	108	49	630	33	174
Turn Type	Prot	NA	Perm	Prot	Prot	NA	NA	Perm
Protected Phases	5	2		1	1	6	8	
Permitted Phases			2					8
Detector Phase	5	2	2	1	1	6	8	8
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	8.0	20.0	20.0	20.0
Total Split (s)	25.0	44.0	44.0	20.0	20.0	39.0	26.0	26.0
Total Split (%)	27.8%	48.9%	48.9%	22.2%	22.2%	43.3%	28.9%	28.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	None	Max	Max	Max
Act Effct Green (s)	12.6	39.4	39.4	10.6	10.6	35.1	22.0	22.0
Actuated g/C Ratio	0.15	0.48	0.48	0.13	0.13	0.43	0.27	0.27
v/c Ratio	0.59	0.39	0.17	0.50	0.23	0.44	0.36	0.33
Control Delay	41.1	15.5	8.9	41.0	34.2	18.1	27.7	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.1	15.5	8.9	41.0	34.2	18.1	27.7	6.9
LOS	D	B	A	D	C	B	C	A
Approach Delay		18.9				22.2	16.8	
Approach LOS		B				C	B	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 81.8

Natural Cycle: 50

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 19.8

Intersection LOS: B

Intersection Capacity Utilization 44.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 7: Pacific Street & Front Street & Mission Street/Water Street

 Ø1	 Ø2	
20 s	44 s	
 Ø5	 Ø6	 Ø8
25 s	39 s	26 s

Santa Cruz DRP Study

7: Pacific Street & Front Street & Mission Street/Water Street

								
Lane Group	EBL	EBT	EBR	WBL2	WBL	WBT	SBT	SBR
Protected Phases	5	2		1	1	6	8	
Permitted Phases			2					8
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	8.0	20.0	20.0	20.0
Total Split (s)	25.0	44.0	44.0	20.0	20.0	39.0	26.0	26.0
Total Split (%)	27.8%	48.9%	48.9%	22.2%	22.2%	43.3%	28.9%	28.9%
Maximum Green (s)	21.0	40.0	40.0	16.0	16.0	35.0	22.0	22.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	Max	Max	Max
Walk Time (s)		5.0	5.0			5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0			11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0			0	0	0
90th %ile Green (s)	18.0	38.0	38.0	15.0	15.0	35.0	22.0	22.0
90th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
70th %ile Green (s)	14.7	37.4	37.4	12.3	12.3	35.0	22.0	22.0
70th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
50th %ile Green (s)	12.6	37.1	37.1	10.5	10.5	35.0	22.0	22.0
50th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
30th %ile Green (s)	10.6	36.7	36.7	8.9	8.9	35.0	22.0	22.0
30th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
10th %ile Green (s)	7.9	46.9	46.9	0.0	0.0	35.0	22.0	22.0
10th %ile Term Code	Gap	Hold	Hold	Skip	Skip	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 81.8

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 87

70th %ile Actuated Cycle: 83.7

50th %ile Actuated Cycle: 81.6

30th %ile Actuated Cycle: 79.6

10th %ile Actuated Cycle: 76.9

Santa Cruz DRP Study
8: Front Street & Soquel Avenue

Existing
PM Peak

	→	↖	←	↗	↘	↑	↙	↓
Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↔↔	↖	↖	↗		↔↔	↖	↖
Traffic Volume (vph)	109	360	93	36	10	298	79	339
Future Volume (vph)	109	360	93	36	10	298	79	339
Turn Type	NA	Split	NA	Perm	Perm	NA	Perm	NA
Protected Phases	2	6	6			8		4
Permitted Phases				6	8		4	
Detector Phase	2	6	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	22.0	35.0	35.0	35.0	43.0	43.0	43.0	43.0
Total Split (%)	22.0%	35.0%	35.0%	35.0%	43.0%	43.0%	43.0%	43.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lag	Lead	Lead	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	Max	None	None	None	None
Act Effct Green (s)	9.6	31.4	31.4	31.4		21.9	21.9	21.9
Actuated g/C Ratio	0.13	0.42	0.42	0.42		0.29	0.29	0.29
v/c Ratio	0.46	0.33	0.33	0.05		0.51	0.43	0.75
Control Delay	31.4	18.7	18.8	3.7		17.5	29.1	33.2
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	31.4	18.7	18.8	3.7		17.5	29.1	33.2
LOS	C	B	B	A		B	C	C
Approach Delay	31.4		17.6			17.5		32.5
Approach LOS	C		B			B		C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 75.1

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 23.4

Intersection LOS: C

Intersection Capacity Utilization 65.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 8: Front Street & Soquel Avenue

↖ Ø6	↗ Ø2	↓ Ø4
35 s	22 s	43 s
		↑ Ø8
		43 s

Santa Cruz DRP Study
8: Front Street & Soquel Avenue

APPENDIX F

Existing
PM Peak

								
Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Protected Phases	2	6	6			8		4
Permitted Phases				6	8		4	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	22.0	35.0	35.0	35.0	43.0	43.0	43.0	43.0
Total Split (%)	22.0%	35.0%	35.0%	35.0%	43.0%	43.0%	43.0%	43.0%
Maximum Green (s)	18.0	31.0	31.0	31.0	39.0	39.0	39.0	39.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lag	Lead	Lead	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	Max	Max	None	None	None	None
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
90th %ile Green (s)	13.2	31.0	31.0	31.0	33.2	33.2	33.2	33.2
90th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
70th %ile Green (s)	10.8	31.0	31.0	31.0	25.8	25.8	25.8	25.8
70th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
50th %ile Green (s)	9.5	31.0	31.0	31.0	22.0	22.0	22.0	22.0
50th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
30th %ile Green (s)	8.2	31.0	31.0	31.0	17.6	17.6	17.6	17.6
30th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
10th %ile Green (s)	6.8	31.0	31.0	31.0	13.5	13.5	13.5	13.5
10th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 75.1

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 89.4

70th %ile Actuated Cycle: 79.6

50th %ile Actuated Cycle: 74.5

30th %ile Actuated Cycle: 68.8

10th %ile Actuated Cycle: 63.3

APPENDIX F

Existing

PM Peak

Santa Cruz DRP Study 11: Ocean Street & Water Street

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	343	731	112	553	227	120	553	98	290	856	344
Future Volume (vph)	343	731	112	553	227	120	553	98	290	856	344
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Detector Phase	5	2	1	6	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	23.0	42.0	17.0	36.0	36.0	18.0	29.0	29.0	32.0	43.0	43.0
Total Split (%)	19.2%	35.0%	14.2%	30.0%	30.0%	15.0%	24.2%	24.2%	26.7%	35.8%	35.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	None	Min	Min	None	Min	Min	None	Min	Min
Act Effct Green (s)	16.1	32.7	11.3	27.9	27.9	11.9	23.7	23.7	22.7	34.6	34.6
Actuated g/C Ratio	0.15	0.31	0.11	0.26	0.26	0.11	0.22	0.22	0.21	0.32	0.32
v/c Ratio	0.69	0.81	0.62	0.62	0.40	0.62	0.73	0.21	0.80	0.76	0.50
Control Delay	52.5	41.3	63.9	39.1	6.5	63.1	46.4	2.4	57.8	38.5	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.5	41.3	63.9	39.1	6.5	63.1	46.4	2.4	57.8	38.5	8.5
LOS	D	D	E	D	A	E	D	A	E	D	A
Approach Delay		44.5		33.9			43.4			35.3	
Approach LOS		D		C			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 106.9

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 39.0

Intersection LOS: D

Intersection Capacity Utilization 74.6%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 11: Ocean Street & Water Street

			
17 s	42 s	18 s	43 s
			
23 s	36 s	32 s	29 s

Santa Cruz DRP Study
11: Ocean Street & Water Street

Existing
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	23.0	42.0	17.0	36.0	36.0	18.0	29.0	29.0	32.0	43.0	43.0
Total Split (%)	19.2%	35.0%	14.2%	30.0%	30.0%	15.0%	24.2%	24.2%	26.7%	35.8%	35.8%
Maximum Green (s)	19.0	38.0	13.0	32.0	32.0	14.0	25.0	25.0	28.0	39.0	39.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Min	None	Min	Min	None	Min	Min	None	Min	Min
Walk Time (s)		5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0
90th %ile Green (s)	19.0	38.0	13.0	32.0	32.0	14.0	25.0	25.0	28.0	39.0	39.0
90th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	19.0	38.0	13.0	32.0	32.0	14.0	25.0	25.0	28.0	39.0	39.0
70th %ile Term Code	Max	Max	Max	Hold	Hold	Max	Max	Max	Max	Max	Max
50th %ile Green (s)	17.4	36.0	12.9	31.5	31.5	13.4	27.4	27.4	25.0	39.0	39.0
50th %ile Term Code	Gap	Gap	Gap	Hold	Hold	Gap	Hold	Hold	Gap	Max	Max
30th %ile Green (s)	14.5	30.3	10.4	26.2	26.2	10.8	23.3	23.3	20.0	32.5	32.5
30th %ile Term Code	Gap	Gap	Gap	Hold	Hold	Gap	Hold	Hold	Gap	Gap	Gap
10th %ile Green (s)	10.9	22.2	7.4	18.7	18.7	7.6	17.5	17.5	13.9	23.8	23.8
10th %ile Term Code	Gap	Gap	Gap	Hold	Hold	Gap	Hold	Hold	Gap	Gap	Gap

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 106.9

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 120

70th %ile Actuated Cycle: 120

50th %ile Actuated Cycle: 117.3

30th %ile Actuated Cycle: 100

10th %ile Actuated Cycle: 77

APPENDIX F

Existing

PM Peak

Santa Cruz DRP Study 12: Highway 9 & Highway 1

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	227	1320	293	1262	472	102	246	423	648	309	247
Future Volume (vph)	227	1320	293	1262	472	102	246	423	648	309	247
Turn Type	Prot	NA	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6		4	4		8	8	
Permitted Phases					6			4			8
Detector Phase	5	2	1	6	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	39.0	78.0	30.0	69.0	69.0	41.0	41.0	41.0	51.0	51.0	51.0
Total Split (%)	19.5%	39.0%	15.0%	34.5%	34.5%	20.5%	20.5%	20.5%	25.5%	25.5%	25.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	30.4	74.1	22.6	66.3	66.3	37.0	37.0	37.0	47.0	47.0	47.0
Actuated g/C Ratio	0.15	0.38	0.11	0.34	0.34	0.19	0.19	0.19	0.24	0.24	0.24
v/c Ratio	0.87	0.79	0.80	0.78	0.74	0.32	0.76	0.66	0.84	0.75	0.50
Control Delay	110.7	58.2	100.4	63.2	36.2	72.8	90.7	47.2	81.9	81.5	19.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	110.7	58.2	100.4	63.2	36.2	72.8	90.7	47.2	81.9	81.5	19.8
LOS	F	E	F	E	D	E	F	D	F	F	B
Approach Delay		65.5		62.3			64.5			69.0	
Approach LOS		E		E			E			E	

Intersection Summary

Cycle Length: 200

Actuated Cycle Length: 196.7

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 65.0

Intersection LOS: E

Intersection Capacity Utilization 81.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 12: Highway 9 & Highway 1

 Ø1	 Ø2	 Ø4	 Ø8
30 s	78 s	41 s	51 s
 Ø5	 Ø6		
39 s	69 s		

APPENDIX F

Santa Cruz DRP Study 12: Highway 9 & Highway 1

Existing
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		4	4		8	8	
Permitted Phases					6			4			8
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	39.0	78.0	30.0	69.0	69.0	41.0	41.0	41.0	51.0	51.0	51.0
Total Split (%)	19.5%	39.0%	15.0%	34.5%	34.5%	20.5%	20.5%	20.5%	25.5%	25.5%	25.5%
Maximum Green (s)	35.0	74.0	26.0	65.0	65.0	37.0	37.0	37.0	47.0	47.0	47.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	None	Max	Max	Max	Max	Max	Max	Max	Max
Walk Time (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0
90th %ile Green (s)	35.0	74.0	26.0	65.0	65.0	37.0	37.0	37.0	47.0	47.0	47.0
90th %ile Term Code	Max	MaxR	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
70th %ile Green (s)	35.0	74.2	25.8	65.0	65.0	37.0	37.0	37.0	47.0	47.0	47.0
70th %ile Term Code	Max	Hold	Gap	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
50th %ile Green (s)	32.0	74.0	23.3	65.3	65.3	37.0	37.0	37.0	47.0	47.0	47.0
50th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
30th %ile Green (s)	28.0	74.0	20.9	66.9	66.9	37.0	37.0	37.0	47.0	47.0	47.0
30th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
10th %ile Green (s)	22.4	74.0	17.4	69.0	69.0	37.0	37.0	37.0	47.0	47.0	47.0
10th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 200

Actuated Cycle Length: 196.7

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 200

70th %ile Actuated Cycle: 200

50th %ile Actuated Cycle: 197.3

30th %ile Actuated Cycle: 194.9

10th %ile Actuated Cycle: 191.4

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

								
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	1312	486	412	74	276	42	258	1380
Future Volume (vph)	1312	486	412	74	276	42	258	1380
Turn Type	Split	NA	NA	Prot	NA	Prot	NA	pm+ov
Protected Phases	6	6	2	3	8	7	4	6
Permitted Phases								4
Detector Phase	6	6	2	3	8	7	4	4 6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	42.0	42.0	26.0	45.0	32.0	50.0	37.0	42.0
Total Split (%)	28.0%	28.0%	17.3%	30.0%	21.3%	33.3%	24.7%	28.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	38.8	38.8	20.0	10.2	29.0	8.1	27.2	70.2
Actuated g/C Ratio	0.35	0.35	0.18	0.09	0.26	0.07	0.25	0.64
v/c Ratio	1.18	1.12dl	0.74	0.46	0.32	0.32	0.30	0.68
Control Delay	131.0	80.9	51.3	59.7	33.4	58.6	35.3	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	131.0	80.9	51.3	59.7	33.4	58.6	35.3	6.7
LOS	F	F	D	E	C	E	D	A
Approach Delay		98.5	51.3		38.7		12.4	
Approach LOS		F	D		D		B	

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 109.8

Natural Cycle: 100

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.18

Intersection Signal Delay: 55.4

Intersection LOS: E

Intersection Capacity Utilization 75.0%

ICU Level of Service D

Analysis Period (min) 15

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 13: Chestnut Street & Mission Street

 Ø2	 Ø6	 Ø4	 Ø3
26 s	42 s	37 s	45 s
		 Ø7	 Ø8
		50 s	32 s

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

								
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Protected Phases	6	6	2	3	8	7	4	6
Permitted Phases								4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	42.0	42.0	26.0	45.0	32.0	50.0	37.0	42.0
Total Split (%)	28.0%	28.0%	17.3%	30.0%	21.3%	33.3%	24.7%	28.0%
Maximum Green (s)	38.0	38.0	22.0	41.0	28.0	46.0	33.0	38.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag				Lag	Lag	Lead	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	None	None	None
Walk Time (s)	5.0	5.0			5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0
90th %ile Green (s)	38.0	38.0	22.0	14.3	36.2	11.1	33.0	38.0
90th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Max	Max
70th %ile Green (s)	38.0	38.0	22.0	11.9	35.5	9.4	33.0	38.0
70th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Max	Max
50th %ile Green (s)	38.0	38.0	22.0	10.4	31.7	8.2	29.5	38.0
50th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Gap	Max
30th %ile Green (s)	38.0	38.0	19.3	8.7	25.9	7.0	24.2	38.0
30th %ile Term Code	Max	Max	Gap	Gap	Hold	Gap	Gap	Max
10th %ile Green (s)	38.0	38.0	14.6	0.0	17.9	0.0	17.9	38.0
10th %ile Term Code	Max	Max	Gap	Skip	Hold	Skip	Gap	Max

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 109.8

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 123.3

70th %ile Actuated Cycle: 120.9

50th %ile Actuated Cycle: 115.9

30th %ile Actuated Cycle: 106.2

10th %ile Actuated Cycle: 82.5

Santa Cruz DRP Study
1: Front Street & Laurel Street

APPENDIX F
Existing + Project
AM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	48	337	246	448	89	5	145	168	44	156	90
Future Volume (vph)	48	337	246	448	89	5	145	168	44	156	90
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Detector Phase	5	2	1	6	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	27.0	25.0	32.0	32.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (%)	25.0%	33.8%	31.3%	40.0%	40.0%	10.0%	25.0%	25.0%	10.0%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	16.1	28.7	15.7	28.2	28.2	4.0	11.5	11.5	4.0	14.6	14.6
Actuated g/C Ratio	0.22	0.40	0.22	0.39	0.39	0.06	0.16	0.16	0.06	0.20	0.20
v/c Ratio	0.14	0.27	0.71	0.67	0.14	0.06	0.54	0.45	0.52	0.46	0.22
Control Delay	26.3	18.1	37.4	25.7	2.9	37.2	36.1	8.6	58.3	30.1	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.3	18.1	37.4	25.7	2.9	37.2	36.1	8.6	58.3	30.1	1.5
LOS	C	B	D	C	A	D	D	A	E	C	A
Approach Delay		19.1		26.8			21.6			25.5	
Approach LOS		B		C			C			C	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 72.5

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 23.9

Intersection LOS: C

Intersection Capacity Utilization 51.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Front Street & Laurel Street

 Ø1	 Ø2	 Ø3	 Ø4
25 s	27 s	8 s	20 s
 Ø5	 Ø6	 Ø7	 Ø8
20 s	32 s	8 s	20 s

Santa Cruz DRP Study
1: Front Street & Laurel Street

APPENDIX F
Existing + Project
AM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	27.0	25.0	32.0	32.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (%)	25.0%	33.8%	31.3%	40.0%	40.0%	10.0%	25.0%	25.0%	10.0%	25.0%	25.0%
Maximum Green (s)	16.0	23.0	21.0	28.0	28.0	4.0	16.0	16.0	4.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	Max	Max	None	Max	Max	None	None	None	None	None	None
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0
90th %ile Green (s)	16.0	23.0	21.0	28.0	28.0	4.0	16.0	16.0	4.0	16.0	16.0
90th %ile Term Code	MaxR	MaxR	Max	MaxR	MaxR	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	16.0	24.7	19.3	28.0	28.0	0.0	13.7	13.7	4.0	21.7	21.7
70th %ile Term Code	MaxR	Hold	Gap	MaxR	MaxR	Skip	Gap	Gap	Max	Hold	Hold
50th %ile Green (s)	16.0	27.5	16.5	28.0	28.0	0.0	11.7	11.7	4.0	19.7	19.7
50th %ile Term Code	MaxR	Hold	Gap	MaxR	MaxR	Skip	Gap	Gap	Max	Hold	Hold
30th %ile Green (s)	16.0	31.1	12.9	28.0	28.0	0.0	9.7	9.7	0.0	9.7	9.7
30th %ile Term Code	MaxR	Hold	Gap	MaxR	MaxR	Skip	Hold	Hold	Skip	Gap	Gap
10th %ile Green (s)	16.0	34.2	9.8	28.0	28.0	0.0	7.4	7.4	0.0	7.4	7.4
10th %ile Term Code	MaxR	Hold	Gap	MaxR	MaxR	Skip	Hold	Hold	Skip	Gap	Gap

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 72.5

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 80

70th %ile Actuated Cycle: 77.7

50th %ile Actuated Cycle: 75.7

30th %ile Actuated Cycle: 65.7

10th %ile Actuated Cycle: 63.4

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

APPENDIX F
Existing + Project
AM Peak

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	22	345	34	476	33	31	20	17
Future Volume (vph)	22	345	34	476	33	31	20	17
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases					8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	40.0	20.0	40.0	20.0	20.0	20.0	20.0
Total Split (%)	25.0%	50.0%	25.0%	50.0%	25.0%	25.0%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	Max	Max	Max	Max
Act Effct Green (s)	6.9	36.3	7.1	38.5	16.1	16.1		16.1
Actuated g/C Ratio	0.10	0.54	0.11	0.57	0.24	0.24		0.24
v/c Ratio	0.18	0.41	0.22	0.55	0.11	0.19		0.21
Control Delay	32.1	11.9	31.9	12.8	23.2	15.6		17.0
Queue Delay	0.0	0.0	0.0	18.5	0.0	0.0		0.0
Total Delay	32.1	11.9	31.9	31.3	23.2	15.6		17.0
LOS	C	B	C	C	C	B		B
Approach Delay		13.1		31.3		18.3		17.0
Approach LOS		B		C		B		B

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 67.2

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 22.9

Intersection LOS: C

Intersection Capacity Utilization 45.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 2: Pacific Avenue & Laurel Street

 Ø1	 Ø2	 Ø4
20 s	40 s	20 s
 Ø5	 Ø6	 Ø8
20 s	40 s	20 s

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

APPENDIX F
Existing + Project
AM Peak

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Protected Phases	5	2	1	6		8		4
Permitted Phases					8		4	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	40.0	20.0	40.0	20.0	20.0	20.0	20.0
Total Split (%)	25.0%	50.0%	25.0%	50.0%	25.0%	25.0%	25.0%	25.0%
Maximum Green (s)	16.0	36.0	16.0	36.0	16.0	16.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	None	Max	Max	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
90th %ile Green (s)	8.9	36.0	9.2	36.3	16.0	16.0	16.0	16.0
90th %ile Term Code	Gap	MaxR	Gap	Hold	MaxR	MaxR	MaxR	MaxR
70th %ile Green (s)	7.6	36.0	7.9	36.3	16.0	16.0	16.0	16.0
70th %ile Term Code	Gap	MaxR	Gap	Hold	MaxR	MaxR	MaxR	MaxR
50th %ile Green (s)	0.0	36.0	7.0	47.0	16.0	16.0	16.0	16.0
50th %ile Term Code	Skip	MaxR	Gap	Hold	MaxR	MaxR	MaxR	MaxR
30th %ile Green (s)	0.0	36.0	0.0	36.0	16.0	16.0	16.0	16.0
30th %ile Term Code	Skip	MaxR	Skip	MaxR	MaxR	MaxR	MaxR	MaxR
10th %ile Green (s)	0.0	36.0	0.0	36.0	16.0	16.0	16.0	16.0
10th %ile Term Code	Skip	MaxR	Skip	MaxR	MaxR	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 67.2

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 73.2

70th %ile Actuated Cycle: 71.9

50th %ile Actuated Cycle: 71

30th %ile Actuated Cycle: 60

10th %ile Actuated Cycle: 60

Santa Cruz DRP Study
3: Front Street & Cathcart Street

APPENDIX F
Existing + Project
AM Peak

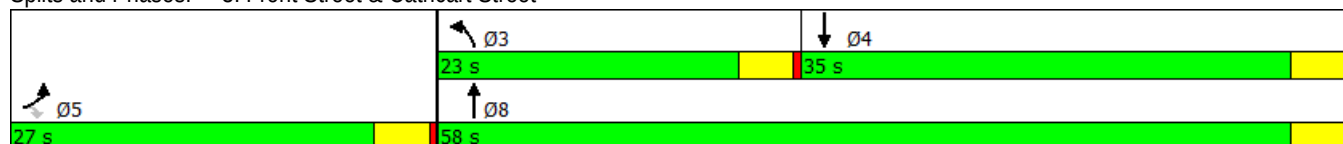
					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	48	21	22	316	308
Future Volume (vph)	48	21	22	316	308
Turn Type	Prot	Perm	Prot	NA	NA
Protected Phases	5		3	8	4
Permitted Phases		5			
Detector Phase	5	5	3	8	4
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0
Total Split (s)	27.0	27.0	23.0	58.0	35.0
Total Split (%)	31.8%	31.8%	27.1%	68.2%	41.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Recall Mode	Max	Max	Max	None	Max
Act Effct Green (s)	23.0	23.0	19.0	54.0	31.0
Actuated g/C Ratio	0.27	0.27	0.22	0.64	0.36
v/c Ratio	0.13	0.06	0.07	0.33	0.37
Control Delay	24.6	10.0	26.8	8.1	19.1
Queue Delay	0.0	0.0	0.0	2.1	0.0
Total Delay	24.6	10.0	26.8	10.2	19.1
LOS	C	B	C	B	B
Approach Delay	20.2			11.3	19.1
Approach LOS	C			B	B

Intersection Summary

Cycle Length: 85
 Actuated Cycle Length: 85
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.37
 Intersection Signal Delay: 15.9
 Intersection Capacity Utilization 27.5%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 3: Front Street & Cathcart Street



Santa Cruz DRP Study
3: Front Street & Cathcart Street

APPENDIX F
Existing + Project
AM Peak

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Protected Phases	5		3	8	4
Permitted Phases		5			
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0
Total Split (s)	27.0	27.0	23.0	58.0	35.0
Total Split (%)	31.8%	31.8%	27.1%	68.2%	41.2%
Maximum Green (s)	23.0	23.0	19.0	54.0	31.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lead/Lag			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	Max	Max	Max	None	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0
90th %ile Green (s)	23.0	23.0	19.0	54.0	31.0
90th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
70th %ile Green (s)	23.0	23.0	19.0	54.0	31.0
70th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
50th %ile Green (s)	23.0	23.0	19.0	54.0	31.0
50th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
30th %ile Green (s)	23.0	23.0	19.0	54.0	31.0
30th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
10th %ile Green (s)	23.0	23.0	19.0	54.0	31.0
10th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR

Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 85

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 85

70th %ile Actuated Cycle: 85

50th %ile Actuated Cycle: 85

30th %ile Actuated Cycle: 85

10th %ile Actuated Cycle: 85

Santa Cruz DRP Study
4: Front Street & Metro Station Access North

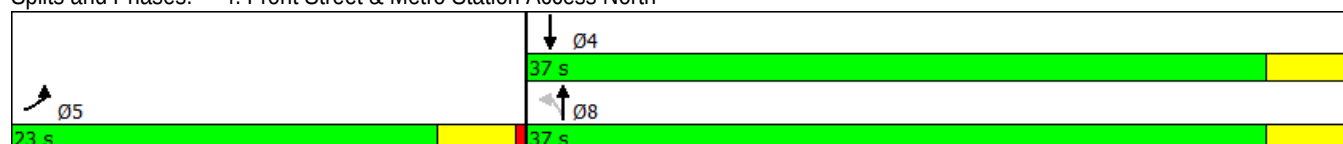
				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Traffic Volume (vph)	12	2	300	291
Future Volume (vph)	12	2	300	291
Turn Type	Prot	Perm	NA	NA
Protected Phases	5		8	4
Permitted Phases		8		
Detector Phase	5	8	8	4
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	23.0	37.0	37.0	37.0
Total Split (%)	38.3%	61.7%	61.7%	61.7%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Max	Max	Max
Act Effect Green (s)	6.7	51.8	51.8	51.8
Actuated g/C Ratio	0.12	0.95	0.95	0.95
v/c Ratio	0.16	0.00	0.21	0.25
Control Delay	23.7	1.5	1.3	1.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	23.7	1.5	1.3	1.4
LOS	C	A	A	A
Approach Delay	23.7		1.3	1.4
Approach LOS	C		A	A

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 54.7
 Natural Cycle: 40
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.25
 Intersection Signal Delay: 1.9
 Intersection Capacity Utilization 27.4%
 Analysis Period (min) 15

Intersection LOS: A
ICU Level of Service A

Splits and Phases: 4: Front Street & Metro Station Access North



Santa Cruz DRP Study
4: Front Street & Metro Station Access North

APPENDIX F
Existing + Project
AM Peak

				
Lane Group	EBL	NBL	NBT	SBT
Protected Phases	5		8	4
Permitted Phases		8		
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	23.0	37.0	37.0	37.0
Total Split (%)	38.3%	61.7%	61.7%	61.7%
Maximum Green (s)	19.0	33.0	33.0	33.0
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lead/Lag				
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0
Recall Mode	None	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0
90th %ile Green (s)	9.4	48.0	48.0	48.0
90th %ile Term Code	Gap	Dwell	Dwell	Dwell
70th %ile Green (s)	0.0	48.0	48.0	48.0
70th %ile Term Code	Skip	Dwell	Dwell	Dwell
50th %ile Green (s)	0.0	48.0	48.0	48.0
50th %ile Term Code	Skip	Dwell	Dwell	Dwell
30th %ile Green (s)	0.0	48.0	48.0	48.0
30th %ile Term Code	Skip	Dwell	Dwell	Dwell
10th %ile Green (s)	0.0	48.0	48.0	48.0
10th %ile Term Code	Skip	Dwell	Dwell	Dwell

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 54.7
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 65.4
 70th %ile Actuated Cycle: 52
 50th %ile Actuated Cycle: 52
 30th %ile Actuated Cycle: 52
 10th %ile Actuated Cycle: 52

Santa Cruz DRP Study
7: Pacific Street & Front Street & Mission Street/Water Street

								
Lane Group	EBL	EBT	EBR	WBL2	WBL	WBT	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	81	380	75	61	48	637	18	107
Future Volume (vph)	81	380	75	61	48	637	18	107
Turn Type	Prot	NA	Perm	Prot	Prot	NA	NA	Perm
Protected Phases	5	2		1	1	6	8	
Permitted Phases			2					8
Detector Phase	5	2	2	1	1	6	8	8
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	8.0	20.0	20.0	20.0
Total Split (s)	20.0	44.0	44.0	20.0	20.0	44.0	26.0	26.0
Total Split (%)	22.2%	48.9%	48.9%	22.2%	22.2%	48.9%	28.9%	28.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	None	Max	Max	Max
Act Effct Green (s)	9.6	40.8	40.8	8.9	8.9	40.2	22.1	22.1
Actuated g/C Ratio	0.12	0.50	0.50	0.11	0.11	0.49	0.27	0.27
v/c Ratio	0.45	0.25	0.13	0.40	0.28	0.41	0.21	0.23
Control Delay	41.5	13.0	6.8	41.6	37.9	15.0	26.7	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.5	13.0	6.8	41.6	37.9	15.0	26.7	6.6
LOS	D	B	A	D	D	B	C	A
Approach Delay		16.1				18.7	15.3	
Approach LOS		B				B	B	

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 81.7
 Natural Cycle: 50
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.45
 Intersection Signal Delay: 17.3
 Intersection Capacity Utilization 36.7%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 7: Pacific Street & Front Street & Mission Street/Water Street

 Ø1	 Ø2	
20 s	44 s	
 Ø5	 Ø6	 Ø8
20 s	44 s	26 s

Santa Cruz DRP Study
7: Pacific Street & Front Street & Mission Street/Water Street

								
Lane Group	EBL	EBT	EBR	WBL2	WBL	WBT	SBT	SBR
Protected Phases	5	2		1	1	6	8	
Permitted Phases			2					8
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	8.0	20.0	20.0	20.0
Total Split (s)	20.0	44.0	44.0	20.0	20.0	44.0	26.0	26.0
Total Split (%)	22.2%	48.9%	48.9%	22.2%	22.2%	48.9%	28.9%	28.9%
Maximum Green (s)	16.0	40.0	40.0	16.0	16.0	40.0	22.0	22.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	Max	Max	Max
Walk Time (s)		5.0	5.0			5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0			11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0			0	0	0
90th %ile Green (s)	13.6	40.9	40.9	12.7	12.7	40.0	22.0	22.0
90th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
70th %ile Green (s)	11.3	40.8	40.8	10.5	10.5	40.0	22.0	22.0
70th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
50th %ile Green (s)	9.7	40.8	40.8	8.9	8.9	40.0	22.0	22.0
50th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
30th %ile Green (s)	8.1	40.6	40.6	7.5	7.5	40.0	22.0	22.0
30th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
10th %ile Green (s)	0.0	40.0	40.0	0.0	0.0	40.0	22.0	22.0
10th %ile Term Code	Skip	Hold	Hold	Skip	Skip	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 81.7

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 87.6

70th %ile Actuated Cycle: 85.3

50th %ile Actuated Cycle: 83.7

30th %ile Actuated Cycle: 82.1

10th %ile Actuated Cycle: 70

Santa Cruz DRP Study
8: Front Street & Soquel Avenue

APPENDIX F
Existing + Project
AM Peak

	→	↖	←	↗	↘	↑	↙	↓
Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↕↕	↖	↗	↗		↕↕	↖	↗
Traffic Volume (vph)	52	223	104	42	10	229	24	172
Future Volume (vph)	52	223	104	42	10	229	24	172
Turn Type	NA	Split	NA	Perm	Perm	NA	Perm	NA
Protected Phases	2	6	6			8		4
Permitted Phases				6	8		4	
Detector Phase	2	6	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	23.0	37.0	37.0	37.0	40.0	40.0	40.0	40.0
Total Split (%)	23.0%	37.0%	37.0%	37.0%	40.0%	40.0%	40.0%	40.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lag	Lead	Lead	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	Max	None	None	None	None
Act Effct Green (s)	7.4	33.7	33.7	33.7		14.3	14.3	14.3
Actuated g/C Ratio	0.11	0.52	0.52	0.52		0.22	0.22	0.22
v/c Ratio	0.27	0.22	0.22	0.06		0.60	0.22	0.64
Control Delay	27.8	11.9	11.8	3.6		18.9	25.8	32.0
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	27.8	11.9	11.8	3.6		18.9	25.8	32.0
LOS	C	B	B	A		B	C	C
Approach Delay	27.8		10.9			18.9		31.3
Approach LOS	C		B			B		C

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 65
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 19.4
 Intersection Capacity Utilization 42.2%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 8: Front Street & Soquel Avenue

↖ Ø6	↗ Ø2	↓ Ø4
37 s	23 s	40 s
		↖ Ø8
		40 s

Santa Cruz DRP Study
8: Front Street & Soquel Avenue

APPENDIX F
Existing + Project
AM Peak

								
Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Protected Phases	2	6	6			8		4
Permitted Phases				6	8		4	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	23.0	37.0	37.0	37.0	40.0	40.0	40.0	40.0
Total Split (%)	23.0%	37.0%	37.0%	37.0%	40.0%	40.0%	40.0%	40.0%
Maximum Green (s)	19.0	33.0	33.0	33.0	36.0	36.0	36.0	36.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lag	Lead	Lead	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	Max	Max	None	None	None	None
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
90th %ile Green (s)	9.3	33.0	33.0	33.0	21.0	21.0	21.0	21.0
90th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
70th %ile Green (s)	8.0	33.0	33.0	33.0	16.9	16.9	16.9	16.9
70th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
50th %ile Green (s)	7.3	33.0	33.0	33.0	14.4	14.4	14.4	14.4
50th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
30th %ile Green (s)	6.6	33.0	33.0	33.0	12.1	12.1	12.1	12.1
30th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
10th %ile Green (s)	0.0	33.0	33.0	33.0	8.5	8.5	8.5	8.5
10th %ile Term Code	Skip	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 65
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 75.3
 70th %ile Actuated Cycle: 69.9
 50th %ile Actuated Cycle: 66.7
 30th %ile Actuated Cycle: 63.7
 10th %ile Actuated Cycle: 49.5

Santa Cruz DRP Study
11: Ocean Street & Water Street

APPENDIX F
Existing + Project
AM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	167	303	136	459	255	78	466	40	175	620	391
Future Volume (vph)	167	303	136	459	255	78	466	40	175	620	391
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Detector Phase	5	2	1	6	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	17.0	31.0	26.0	40.0	40.0	18.0	34.0	34.0	29.0	45.0	45.0
Total Split (%)	14.2%	25.8%	21.7%	33.3%	33.3%	15.0%	28.3%	28.3%	24.2%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	None	Min	Min	None	Min	Min	None	Min	Min
Act Effct Green (s)	10.2	17.4	12.8	20.1	20.1	9.8	20.5	20.5	14.8	28.6	28.6
Actuated g/C Ratio	0.12	0.21	0.16	0.24	0.24	0.12	0.25	0.25	0.18	0.35	0.35
v/c Ratio	0.43	0.52	0.53	0.59	0.46	0.41	0.58	0.08	0.59	0.55	0.52
Control Delay	41.2	33.0	43.2	32.2	6.8	45.1	31.5	0.3	42.3	25.9	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	33.0	43.2	32.2	6.8	45.1	31.5	0.3	42.3	25.9	5.5
LOS	D	C	D	C	A	D	C	A	D	C	A
Approach Delay		35.7		26.3			31.2			21.6	
Approach LOS		D		C			C			C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 82.5

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 27.0

Intersection LOS: C

Intersection Capacity Utilization 53.4%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 11: Ocean Street & Water Street

 Ø1	 Ø2	 Ø3	 Ø4
26 s	31 s	18 s	45 s
 Ø5	 Ø6	 Ø7	 Ø8
17 s	40 s	29 s	34 s

Santa Cruz DRP Study
11: Ocean Street & Water Street

APPENDIX F
Existing + Project
AM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	17.0	31.0	26.0	40.0	40.0	18.0	34.0	34.0	29.0	45.0	45.0
Total Split (%)	14.2%	25.8%	21.7%	33.3%	33.3%	15.0%	28.3%	28.3%	24.2%	37.5%	37.5%
Maximum Green (s)	13.0	27.0	22.0	36.0	36.0	14.0	30.0	30.0	25.0	41.0	41.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Min	None	Min	Min	None	Min	Min	None	Min	Min
Walk Time (s)		5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0
90th %ile Green (s)	13.0	23.6	19.8	30.4	30.4	14.0	30.5	30.5	23.2	39.7	39.7
90th %ile Term Code	Max	Hold	Gap	Gap	Gap	Max	Hold	Hold	Gap	Gap	Gap
70th %ile Green (s)	11.7	20.0	15.2	23.5	23.5	11.5	24.7	24.7	17.8	31.0	31.0
70th %ile Term Code	Gap	Hold	Gap	Gap	Gap	Gap	Hold	Hold	Gap	Gap	Gap
50th %ile Green (s)	10.0	16.8	12.4	19.2	19.2	9.6	20.4	20.4	14.4	25.2	25.2
50th %ile Term Code	Gap	Hold	Gap	Gap	Gap	Gap	Hold	Hold	Gap	Gap	Gap
30th %ile Green (s)	8.7	15.0	10.2	16.5	16.5	8.0	17.4	17.4	11.8	21.2	21.2
30th %ile Term Code	Gap	Hold	Gap	Gap	Gap	Gap	Hold	Hold	Gap	Gap	Gap
10th %ile Green (s)	7.0	11.6	7.6	12.2	12.2	0.0	11.3	11.3	8.6	23.9	23.9
10th %ile Term Code	Gap	Hold	Gap	Gap	Gap	Skip	Gap	Gap	Gap	Hold	Hold

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 82.5
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 113.1
 70th %ile Actuated Cycle: 93.7
 50th %ile Actuated Cycle: 80
 30th %ile Actuated Cycle: 70.4
 10th %ile Actuated Cycle: 55.1

Santa Cruz DRP Study
12: Highway 9 & Highway 1

APPENDIX F
Existing + Project
AM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	213	1529	278	1394	515	27	166	203	412	161	185
Future Volume (vph)	213	1529	278	1394	515	27	166	203	412	161	185
Turn Type	Prot	NA	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6		4	4		8	8	
Permitted Phases					6			4			8
Detector Phase	5	2	1	6	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	41.0	94.0	29.0	82.0	82.0	34.0	34.0	34.0	43.0	43.0	43.0
Total Split (%)	20.5%	47.0%	14.5%	41.0%	41.0%	17.0%	17.0%	17.0%	21.5%	21.5%	21.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	29.4	90.0	21.4	82.1	82.1	30.0	30.0	30.0	39.0	39.0	39.0
Actuated g/C Ratio	0.15	0.46	0.11	0.42	0.42	0.15	0.15	0.15	0.20	0.20	0.20
v/c Ratio	0.84	0.71	0.78	0.69	0.67	0.11	0.62	0.40	0.72	0.49	0.43
Control Delay	107.6	45.0	100.5	49.6	26.9	74.4	89.2	30.9	82.0	75.9	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	107.6	45.0	100.5	49.6	26.9	74.4	89.2	30.9	82.0	75.9	10.5
LOS	F	D	F	D	C	E	F	C	F	E	B
Approach Delay		52.4		50.7			58.3			63.2	
Approach LOS		D		D			E			E	

Intersection Summary

Cycle Length: 200	
Actuated Cycle Length: 196.5	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 53.7	Intersection LOS: D
Intersection Capacity Utilization 72.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 12: Highway 9 & Highway 1

 Ø1	 Ø2	 Ø4	 Ø8
29 s	94 s	34 s	43 s
 Ø5	 Ø6		
41 s	82 s		

Santa Cruz DRP Study
12: Highway 9 & Highway 1

APPENDIX F
Existing + Project
AM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		4	4		8	8	
Permitted Phases					6			4			8
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	41.0	94.0	29.0	82.0	82.0	34.0	34.0	34.0	43.0	43.0	43.0
Total Split (%)	20.5%	47.0%	14.5%	41.0%	41.0%	17.0%	17.0%	17.0%	21.5%	21.5%	21.5%
Maximum Green (s)	37.0	90.0	25.0	78.0	78.0	30.0	30.0	30.0	39.0	39.0	39.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	None	Max	Max	Max	Max	Max	Max	Max	Max
Walk Time (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0
90th %ile Green (s)	37.0	90.0	25.0	78.0	78.0	30.0	30.0	30.0	39.0	39.0	39.0
90th %ile Term Code	Max	MaxR	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
70th %ile Green (s)	33.9	90.0	24.4	80.5	80.5	30.0	30.0	30.0	39.0	39.0	39.0
70th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
50th %ile Green (s)	29.9	90.0	22.0	82.1	82.1	30.0	30.0	30.0	39.0	39.0	39.0
50th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
30th %ile Green (s)	26.0	90.0	19.6	83.6	83.6	30.0	30.0	30.0	39.0	39.0	39.0
30th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
10th %ile Green (s)	20.5	90.0	16.4	85.9	85.9	30.0	30.0	30.0	39.0	39.0	39.0
10th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 200
 Actuated Cycle Length: 196.5
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 200
 70th %ile Actuated Cycle: 199.4
 50th %ile Actuated Cycle: 197
 30th %ile Actuated Cycle: 194.6
 10th %ile Actuated Cycle: 191.4

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

APPENDIX F
Existing + Project
AM Peak

								
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	1428	392	367	95	294	58	209	1471
Future Volume (vph)	1428	392	367	95	294	58	209	1471
Turn Type	Split	NA	NA	Prot	NA	Prot	NA	pm+ov
Protected Phases	6	6	2	3	8	7	4	6
Permitted Phases								4
Detector Phase	6	6	2	3	8	7	4	4 6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	43.0	43.0	26.0	44.0	32.0	49.0	37.0	43.0
Total Split (%)	28.7%	28.7%	17.3%	29.3%	21.3%	32.7%	24.7%	28.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	39.2	39.2	19.8	12.4	36.0	9.6	30.9	74.2
Actuated g/C Ratio	0.33	0.33	0.17	0.10	0.30	0.08	0.26	0.63
v/c Ratio	1.50	1.44dl	0.77	0.57	0.33	0.44	0.25	0.82
Control Delay	266.2	136.1	56.8	63.7	33.7	63.2	36.2	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	266.2	136.1	56.8	63.7	33.7	63.2	36.2	13.6
LOS	F	F	E	E	C	E	D	B
Approach Delay		185.7	56.8		40.6		17.9	
Approach LOS		F	E		D		B	

Intersection Summary

Cycle Length: 150
 Actuated Cycle Length: 118.4
 Natural Cycle: 120
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.50
 Intersection Signal Delay: 94.6
 Intersection Capacity Utilization 77.9%
 Analysis Period (min) 15
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 13: Chestnut Street & Mission Street

 Ø2	 Ø6	 Ø4	 Ø3
26 s	43 s	37 s	44 s
		 Ø7	 Ø8
		49 s	32 s

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

APPENDIX F
Existing + Project
AM Peak

								
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Protected Phases	6	6	2	3	8	7	4	6
Permitted Phases								4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	43.0	43.0	26.0	44.0	32.0	49.0	37.0	43.0
Total Split (%)	28.7%	28.7%	17.3%	29.3%	21.3%	32.7%	24.7%	28.7%
Maximum Green (s)	39.0	39.0	22.0	40.0	28.0	45.0	33.0	39.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag				Lag	Lag	Lead	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	None	None	None
Walk Time (s)	5.0	5.0			5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0
90th %ile Green (s)	39.0	39.0	22.0	17.4	37.0	13.4	33.0	39.0
90th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Max	Max
70th %ile Green (s)	39.0	39.0	22.0	14.4	36.2	11.2	33.0	39.0
70th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Max	Max
50th %ile Green (s)	39.0	39.0	21.4	12.5	35.8	9.7	33.0	39.0
50th %ile Term Code	Max	Max	Gap	Gap	Hold	Gap	Max	Max
30th %ile Green (s)	39.0	39.0	19.0	10.7	34.1	8.3	31.7	39.0
30th %ile Term Code	Max	Max	Gap	Gap	Hold	Gap	Gap	Max
10th %ile Green (s)	39.0	39.0	14.9	7.8	36.1	0.0	24.3	39.0
10th %ile Term Code	Max	Max	Gap	Gap	Hold	Skip	Gap	Max

Intersection Summary

Cycle Length: 150
 Actuated Cycle Length: 118.4
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 127.4
 70th %ile Actuated Cycle: 124.4
 50th %ile Actuated Cycle: 121.9
 30th %ile Actuated Cycle: 116.4
 10th %ile Actuated Cycle: 102

APPENDIX F

Santa Cruz DRP Study 1: Front Street & Laurel Street

Existing + Project
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	108	638	228	379	119	8	170	229	126	327	174
Future Volume (vph)	108	638	228	379	119	8	170	229	126	327	174
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Detector Phase	5	2	1	6	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	29.0	18.0	27.0	27.0	8.0	20.0	20.0	13.0	25.0	25.0
Total Split (%)	25.0%	36.3%	22.5%	33.8%	33.8%	10.0%	25.0%	25.0%	16.3%	31.3%	31.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	16.0	26.0	13.1	23.0	23.0	4.0	12.4	12.4	8.6	23.5	23.5
Actuated g/C Ratio	0.21	0.34	0.17	0.30	0.30	0.05	0.16	0.16	0.11	0.31	0.31
v/c Ratio	0.31	0.58	0.78	0.71	0.21	0.09	0.59	0.52	0.68	0.59	0.30
Control Delay	29.2	23.7	49.8	32.7	2.3	38.2	37.9	8.5	52.6	27.8	5.1
Queue Delay	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.2	25.3	49.8	32.7	2.3	38.2	37.9	8.5	52.6	27.8	5.1
LOS	C	C	D	C	A	D	D	A	D	C	A
Approach Delay		25.8		33.1			21.4			26.5	
Approach LOS		C		C			C			C	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 76.1

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 27.4

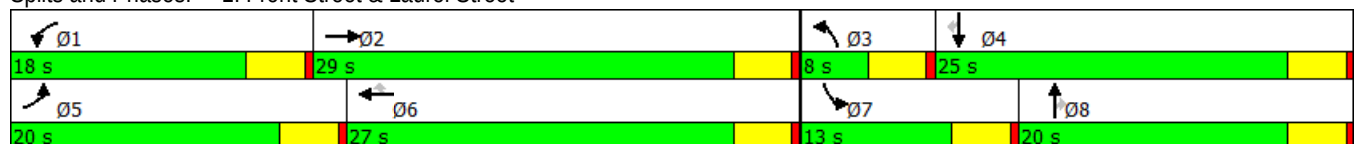
Intersection LOS: C

Intersection Capacity Utilization 65.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Front Street & Laurel Street



APPENDIX F

Existing + Project

PM Peak

Santa Cruz DRP Study 1: Front Street & Laurel Street

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	29.0	18.0	27.0	27.0	8.0	20.0	20.0	13.0	25.0	25.0
Total Split (%)	25.0%	36.3%	22.5%	33.8%	33.8%	10.0%	25.0%	25.0%	16.3%	31.3%	31.3%
Maximum Green (s)	16.0	25.0	14.0	23.0	23.0	4.0	16.0	16.0	9.0	21.0	21.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	Max	Max	None	Max	Max	None	None	None	None	None	None
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0
90th %ile Green (s)	16.0	25.0	14.0	23.0	23.0	4.0	16.0	16.0	9.0	21.0	21.0
90th %ile Term Code	MaxR	MaxR	Max	MaxR	MaxR	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	16.0	25.0	14.0	23.0	23.0	0.0	15.6	15.6	9.0	28.6	28.6
70th %ile Term Code	MaxR	MaxR	Max	MaxR	MaxR	Skip	Gap	Gap	Max	Hold	Hold
50th %ile Green (s)	16.0	25.0	14.0	23.0	23.0	0.0	12.5	12.5	9.0	25.5	25.5
50th %ile Term Code	MaxR	MaxR	Max	MaxR	MaxR	Skip	Gap	Gap	Max	Hold	Hold
30th %ile Green (s)	16.0	25.4	13.6	23.0	23.0	0.0	10.6	10.6	9.0	23.6	23.6
30th %ile Term Code	MaxR	Hold	Gap	MaxR	MaxR	Skip	Gap	Gap	Max	Hold	Hold
10th %ile Green (s)	16.0	28.8	10.2	23.0	23.0	0.0	7.8	7.8	7.2	19.0	19.0
10th %ile Term Code	MaxR	Hold	Gap	MaxR	MaxR	Skip	Gap	Gap	Gap	Hold	Hold

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 76.1

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 80

70th %ile Actuated Cycle: 79.6

50th %ile Actuated Cycle: 76.5

30th %ile Actuated Cycle: 74.6

10th %ile Actuated Cycle: 70

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

APPENDIX F
Existing + Project
PM Peak

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	55	660	41	470	41	79	57	59
Future Volume (vph)	55	660	41	470	41	79	57	59
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases					8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	40.0	20.0	40.0	20.0	20.0	20.0	20.0
Total Split (%)	25.0%	50.0%	25.0%	50.0%	25.0%	25.0%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	Max	Max	Max	Max
Act Effct Green (s)	7.9	37.0	7.2	36.4	16.2	16.2		16.2
Actuated g/C Ratio	0.12	0.54	0.11	0.54	0.24	0.24		0.24
v/c Ratio	0.31	0.71	0.23	0.60	0.16	0.32		0.46
Control Delay	33.3	17.9	32.5	15.2	24.9	19.9		26.0
Queue Delay	0.0	0.0	0.0	5.4	0.0	0.0		0.0
Total Delay	33.3	17.9	32.5	20.6	24.9	19.9		26.0
LOS	C	B	C	C	C	B		C
Approach Delay		19.0		21.4		21.1		26.0
Approach LOS		B		C		C		C

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 68

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 20.8

Intersection LOS: C

Intersection Capacity Utilization 69.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: Pacific Avenue & Laurel Street

 Ø1	 Ø2	 Ø4
20 s	40 s	20 s
 Ø5	 Ø6	 Ø8
20 s	40 s	20 s

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

APPENDIX F
Existing + Project
PM Peak

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Protected Phases	5	2	1	6		8		4
Permitted Phases					8		4	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	40.0	20.0	40.0	20.0	20.0	20.0	20.0
Total Split (%)	25.0%	50.0%	25.0%	50.0%	25.0%	25.0%	25.0%	25.0%
Maximum Green (s)	16.0	36.0	16.0	36.0	16.0	16.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	None	Max	Max	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
90th %ile Green (s)	10.9	37.4	9.5	36.0	16.0	16.0	16.0	16.0
90th %ile Term Code	Gap	Hold	Gap	MaxR	MaxR	MaxR	MaxR	MaxR
70th %ile Green (s)	9.1	37.0	8.1	36.0	16.0	16.0	16.0	16.0
70th %ile Term Code	Gap	Hold	Gap	MaxR	MaxR	MaxR	MaxR	MaxR
50th %ile Green (s)	7.9	36.8	7.1	36.0	16.0	16.0	16.0	16.0
50th %ile Term Code	Gap	Hold	Gap	MaxR	MaxR	MaxR	MaxR	MaxR
30th %ile Green (s)	0.0	36.0	0.0	36.0	16.0	16.0	16.0	16.0
30th %ile Term Code	Skip	MaxR	Skip	MaxR	MaxR	MaxR	MaxR	MaxR
10th %ile Green (s)	0.0	36.0	0.0	36.0	16.0	16.0	16.0	16.0
10th %ile Term Code	Skip	MaxR	Skip	MaxR	MaxR	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 68

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 74.9

70th %ile Actuated Cycle: 73.1

50th %ile Actuated Cycle: 71.9

30th %ile Actuated Cycle: 60

10th %ile Actuated Cycle: 60

Santa Cruz DRP Study
3: Front Street & Cathcart Street

APPENDIX F
Existing + Project
PM Peak

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	116	61	56	425	657
Future Volume (vph)	116	61	56	425	657
Turn Type	Prot	Perm	Prot	NA	NA
Protected Phases	5		3	8	4
Permitted Phases		5			
Detector Phase	5	5	3	8	4
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0
Total Split (s)	25.0	25.0	21.0	60.0	39.0
Total Split (%)	29.4%	29.4%	24.7%	70.6%	45.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Recall Mode	Max	Max	Max	None	Max
Act Effect Green (s)	21.0	21.0	17.0	56.0	35.0
Actuated g/C Ratio	0.25	0.25	0.20	0.66	0.41
v/c Ratio	0.27	0.15	0.17	0.37	0.59
Control Delay	27.9	8.0	29.7	7.6	20.4
Queue Delay	0.0	0.0	0.0	2.8	0.0
Total Delay	27.9	8.0	29.7	10.4	20.4
LOS	C	A	C	B	C
Approach Delay	21.0			12.6	20.4
Approach LOS	C			B	C

Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 85

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 18.0

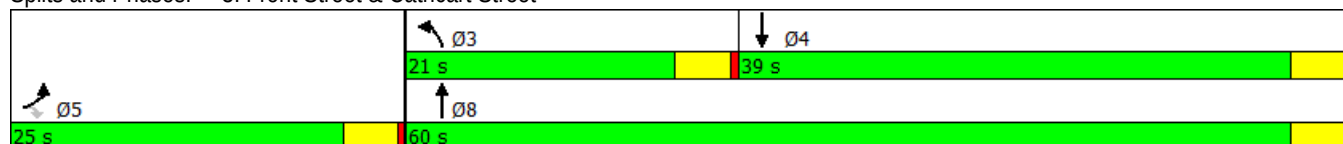
Intersection LOS: B

Intersection Capacity Utilization 42.9%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Front Street & Cathcart Street



Santa Cruz DRP Study
3: Front Street & Cathcart Street

APPENDIX F
Existing + Project
PM Peak

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Protected Phases	5		3	8	4
Permitted Phases		5			
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0
Total Split (s)	25.0	25.0	21.0	60.0	39.0
Total Split (%)	29.4%	29.4%	24.7%	70.6%	45.9%
Maximum Green (s)	21.0	21.0	17.0	56.0	35.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lead/Lag			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	Max	Max	Max	None	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0
90th %ile Green (s)	21.0	21.0	17.0	56.0	35.0
90th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
70th %ile Green (s)	21.0	21.0	17.0	56.0	35.0
70th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
50th %ile Green (s)	21.0	21.0	17.0	56.0	35.0
50th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
30th %ile Green (s)	21.0	21.0	17.0	56.0	35.0
30th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
10th %ile Green (s)	21.0	21.0	17.0	56.0	35.0
10th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR

Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 85

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 85

70th %ile Actuated Cycle: 85

50th %ile Actuated Cycle: 85

30th %ile Actuated Cycle: 85

10th %ile Actuated Cycle: 85

Santa Cruz DRP Study
4: Front Street & Metro Station Access North

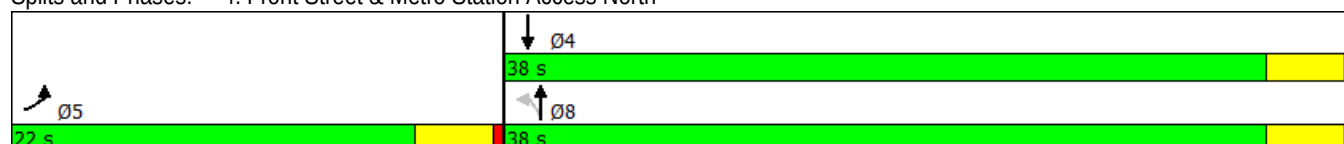
				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Traffic Volume (vph)	17	5	442	664
Future Volume (vph)	17	5	442	664
Turn Type	Prot	Perm	NA	NA
Protected Phases	5		8	4
Permitted Phases		8		
Detector Phase	5	8	8	4
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	22.0	38.0	38.0	38.0
Total Split (%)	36.7%	63.3%	63.3%	63.3%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Max	Max	Max
Act Effect Green (s)	6.9	52.8	52.8	52.8
Actuated g/C Ratio	0.12	0.95	0.95	0.95
v/c Ratio	0.18	0.01	0.26	0.41
Control Delay	24.9	1.4	1.4	2.1
Queue Delay	0.0	0.0	0.0	0.1
Total Delay	24.9	1.4	1.4	2.1
LOS	C	A	A	A
Approach Delay	24.9		1.4	2.1
Approach LOS	C		A	A

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 55.8
 Natural Cycle: 50
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.41
 Intersection Signal Delay: 2.3
 Intersection Capacity Utilization 46.0%
 Analysis Period (min) 15

Intersection LOS: A
ICU Level of Service A

Splits and Phases: 4: Front Street & Metro Station Access North



Santa Cruz DRP Study
4: Front Street & Metro Station Access North

APPENDIX F
Existing + Project
PM Peak

				
Lane Group	EBL	NBL	NBT	SBT
Protected Phases	5		8	4
Permitted Phases		8		
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	22.0	38.0	38.0	38.0
Total Split (%)	36.7%	63.3%	63.3%	63.3%
Maximum Green (s)	18.0	34.0	34.0	34.0
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lead/Lag				
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0
Recall Mode	None	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0
90th %ile Green (s)	9.9	49.0	49.0	49.0
90th %ile Term Code	Gap	Dwell	Dwell	Dwell
70th %ile Green (s)	0.0	49.0	49.0	49.0
70th %ile Term Code	Skip	Dwell	Dwell	Dwell
50th %ile Green (s)	0.0	49.0	49.0	49.0
50th %ile Term Code	Skip	Dwell	Dwell	Dwell
30th %ile Green (s)	0.0	49.0	49.0	49.0
30th %ile Term Code	Skip	Dwell	Dwell	Dwell
10th %ile Green (s)	0.0	49.0	49.0	49.0
10th %ile Term Code	Skip	Dwell	Dwell	Dwell

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 55.8
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 66.9
 70th %ile Actuated Cycle: 53
 50th %ile Actuated Cycle: 53
 30th %ile Actuated Cycle: 53
 10th %ile Actuated Cycle: 53

Santa Cruz DRP Study
7: Pacific Street & Front Street & Mission Street/Water Street

								
Lane Group	EBL	EBT	EBR	WBL2	WBL	WBT	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	152	629	110	108	49	630	33	174
Future Volume (vph)	152	629	110	108	49	630	33	174
Turn Type	Prot	NA	Perm	Prot	Prot	NA	NA	Perm
Protected Phases	5	2		1	1	6	8	
Permitted Phases			2					8
Detector Phase	5	2	2	1	1	6	8	8
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	8.0	20.0	20.0	20.0
Total Split (s)	25.0	42.0	42.0	20.0	20.0	37.0	28.0	28.0
Total Split (%)	27.8%	46.7%	46.7%	22.2%	22.2%	41.1%	31.1%	31.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	None	Max	Max	Max
Act Effct Green (s)	12.6	37.4	37.4	10.6	10.6	33.1	24.1	24.1
Actuated g/C Ratio	0.15	0.46	0.46	0.13	0.13	0.40	0.29	0.29
v/c Ratio	0.59	0.41	0.18	0.50	0.23	0.47	0.38	0.32
Control Delay	41.1	17.0	9.7	41.0	34.2	19.8	26.5	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.1	17.0	9.7	41.0	34.2	19.8	26.5	8.0
LOS	D	B	A	D	C	B	C	A
Approach Delay		20.0				23.6	17.5	
Approach LOS		B				C	B	

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 81.8
 Natural Cycle: 50
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.59
 Intersection Signal Delay: 20.9
 Intersection Capacity Utilization 46.0%
 Analysis Period (min) 15

Intersection LOS: C
ICU Level of Service A

Splits and Phases: 7: Pacific Street & Front Street & Mission Street/Water Street

 Ø1	 Ø2	
20 s	42 s	
 Ø5	 Ø6	 Ø8
25 s	37 s	28 s

Santa Cruz DRP Study
7: Pacific Street & Front Street & Mission Street/Water Street

								
Lane Group	EBL	EBT	EBR	WBL2	WBL	WBT	SBT	SBR
Protected Phases	5	2		1	1	6	8	
Permitted Phases			2					8
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	8.0	20.0	20.0	20.0
Total Split (s)	25.0	42.0	42.0	20.0	20.0	37.0	28.0	28.0
Total Split (%)	27.8%	46.7%	46.7%	22.2%	22.2%	41.1%	31.1%	31.1%
Maximum Green (s)	21.0	38.0	38.0	16.0	16.0	33.0	24.0	24.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	Max	Max	Max
Walk Time (s)		5.0	5.0			5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0			11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0			0	0	0
90th %ile Green (s)	18.0	36.0	36.0	15.0	15.0	33.0	24.0	24.0
90th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
70th %ile Green (s)	14.7	35.4	35.4	12.3	12.3	33.0	24.0	24.0
70th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
50th %ile Green (s)	12.6	35.1	35.1	10.5	10.5	33.0	24.0	24.0
50th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
30th %ile Green (s)	10.6	34.7	34.7	8.9	8.9	33.0	24.0	24.0
30th %ile Term Code	Gap	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR
10th %ile Green (s)	7.9	44.9	44.9	0.0	0.0	33.0	24.0	24.0
10th %ile Term Code	Gap	Hold	Hold	Skip	Skip	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 81.8
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 87
 70th %ile Actuated Cycle: 83.7
 50th %ile Actuated Cycle: 81.6
 30th %ile Actuated Cycle: 79.6
 10th %ile Actuated Cycle: 76.9

Santa Cruz DRP Study
8: Front Street & Soquel Avenue

APPENDIX F
Existing + Project
PM Peak

	→	↗	←	↖	↘	↑	↙	↓
Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↔↔	↖	↖	↖		↔↔	↖	↖
Traffic Volume (vph)	111	427	94	36	10	318	79	406
Future Volume (vph)	111	427	94	36	10	318	79	406
Turn Type	NA	Split	NA	Perm	Perm	NA	Perm	NA
Protected Phases	2	6	6			8		4
Permitted Phases				6	8		4	
Detector Phase	2	6	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	36.0	36.0	36.0	44.0	44.0	44.0	44.0
Total Split (%)	20.0%	36.0%	36.0%	36.0%	44.0%	44.0%	44.0%	44.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lag	Lead	Lead	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	Max	None	None	None	None
Act Effct Green (s)	10.0	32.6	32.6	32.6		26.4	26.4	26.4
Actuated g/C Ratio	0.12	0.40	0.40	0.40		0.33	0.33	0.33
v/c Ratio	0.49	0.39	0.40	0.06		0.51	0.43	0.79
Control Delay	34.3	22.2	22.3	4.1		15.5	28.8	35.0
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	34.3	22.2	22.3	4.1		15.5	28.8	35.0
LOS	C	C	C	A		B	C	C
Approach Delay	34.3		21.1			15.5		34.0
Approach LOS	C		C			B		C

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 81.2
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 24.5
 Intersection Capacity Utilization 73.2%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 8: Front Street & Soquel Avenue

↖ Ø6	↖ Ø2	↓ Ø4
36 s	20 s	44 s
		↑ Ø8
		44 s

Santa Cruz DRP Study
8: Front Street & Soquel Avenue

APPENDIX F
Existing + Project
PM Peak

								
Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Protected Phases	2	6	6			8		4
Permitted Phases				6	8		4	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	36.0	36.0	36.0	44.0	44.0	44.0	44.0
Total Split (%)	20.0%	36.0%	36.0%	36.0%	44.0%	44.0%	44.0%	44.0%
Maximum Green (s)	16.0	32.0	32.0	32.0	40.0	40.0	40.0	40.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lag	Lead	Lead	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	Max	Max	None	None	None	None
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
90th %ile Green (s)	13.9	32.0	32.0	32.0	40.0	40.0	40.0	40.0
90th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Max	Max
70th %ile Green (s)	11.4	32.0	32.0	32.0	31.9	31.9	31.9	31.9
70th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
50th %ile Green (s)	9.9	32.0	32.0	32.0	26.2	26.2	26.2	26.2
50th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
30th %ile Green (s)	8.5	32.0	32.0	32.0	21.1	21.1	21.1	21.1
30th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap
10th %ile Green (s)	6.9	32.0	32.0	32.0	16.0	16.0	16.0	16.0
10th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Gap	Gap

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 81.2
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 97.9
 70th %ile Actuated Cycle: 87.3
 50th %ile Actuated Cycle: 80.1
 30th %ile Actuated Cycle: 73.6
 10th %ile Actuated Cycle: 66.9

Santa Cruz DRP Study
11: Ocean Street & Water Street

APPENDIX F
Existing + Project
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	346	734	112	586	227	120	553	98	290	856	387
Future Volume (vph)	346	734	112	586	227	120	553	98	290	856	387
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Detector Phase	5	2	1	6	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	22.0	42.0	17.0	37.0	37.0	18.0	29.0	29.0	32.0	43.0	43.0
Total Split (%)	18.3%	35.0%	14.2%	30.8%	30.8%	15.0%	24.2%	24.2%	26.7%	35.8%	35.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	None	Min	Min	None	Min	Min	None	Min	Min
Act Effct Green (s)	15.8	32.8	11.3	28.3	28.3	11.8	23.7	23.7	22.7	34.6	34.6
Actuated g/C Ratio	0.15	0.31	0.11	0.26	0.26	0.11	0.22	0.22	0.21	0.32	0.32
v/c Ratio	0.71	0.81	0.62	0.65	0.39	0.63	0.73	0.21	0.80	0.76	0.54
Control Delay	53.9	41.4	63.9	39.4	6.4	63.2	46.5	2.4	57.8	38.5	8.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.9	41.4	63.9	39.4	6.4	63.2	46.5	2.4	57.8	38.5	8.8
LOS	D	D	E	D	A	E	D	A	E	D	A
Approach Delay		45.0		34.3			43.5			34.7	
Approach LOS		D		C			D			C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 107

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 38.9

Intersection LOS: D

Intersection Capacity Utilization 74.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 11: Ocean Street & Water Street

 Ø1	 Ø2	 Ø3	 Ø4
17 s	42 s	18 s	43 s
 Ø5	 Ø6	 Ø7	 Ø8
22 s	37 s	32 s	29 s

Santa Cruz DRP Study
11: Ocean Street & Water Street

APPENDIX F
Existing + Project
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	22.0	42.0	17.0	37.0	37.0	18.0	29.0	29.0	32.0	43.0	43.0
Total Split (%)	18.3%	35.0%	14.2%	30.8%	30.8%	15.0%	24.2%	24.2%	26.7%	35.8%	35.8%
Maximum Green (s)	18.0	38.0	13.0	33.0	33.0	14.0	25.0	25.0	28.0	39.0	39.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Min	None	Min	Min	None	Min	Min	None	Min	Min
Walk Time (s)		5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0
90th %ile Green (s)	18.0	38.0	13.0	33.0	33.0	14.0	25.0	25.0	28.0	39.0	39.0
90th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	18.0	38.0	13.0	33.0	33.0	14.0	25.0	25.0	28.0	39.0	39.0
70th %ile Term Code	Max	Max	Max	Hold	Hold	Max	Max	Max	Max	Max	Max
50th %ile Green (s)	17.5	36.2	12.9	31.6	31.6	13.4	27.3	27.3	25.1	39.0	39.0
50th %ile Term Code	Gap	Gap	Gap	Hold	Hold	Gap	Hold	Hold	Gap	Max	Max
30th %ile Green (s)	14.6	30.4	10.4	26.2	26.2	10.8	23.4	23.4	20.0	32.6	32.6
30th %ile Term Code	Gap	Gap	Gap	Hold	Hold	Gap	Hold	Hold	Gap	Gap	Gap
10th %ile Green (s)	11.0	22.3	7.4	18.7	18.7	7.6	17.5	17.5	14.0	23.9	23.9
10th %ile Term Code	Gap	Gap	Gap	Hold	Hold	Gap	Hold	Hold	Gap	Gap	Gap

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 107
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 120
 70th %ile Actuated Cycle: 120
 50th %ile Actuated Cycle: 117.5
 30th %ile Actuated Cycle: 100.2
 10th %ile Actuated Cycle: 77.2

Santa Cruz DRP Study
12: Highway 9 & Highway 1

APPENDIX F
Existing + Project
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	228	1327	328	1277	472	102	253	447	648	316	249
Future Volume (vph)	228	1327	328	1277	472	102	253	447	648	316	249
Turn Type	Prot	NA	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6		4	4		8	8	
Permitted Phases					6			4			8
Detector Phase	5	2	1	6	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	40.0	77.0	30.0	67.0	67.0	42.0	42.0	42.0	51.0	51.0	51.0
Total Split (%)	20.0%	38.5%	15.0%	33.5%	33.5%	21.0%	21.0%	21.0%	25.5%	25.5%	25.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	31.0	73.0	24.0	66.0	66.0	38.0	38.0	38.0	47.0	47.0	47.0
Actuated g/C Ratio	0.16	0.37	0.12	0.33	0.33	0.19	0.19	0.19	0.24	0.24	0.24
v/c Ratio	0.87	0.81	0.85	0.80	0.75	0.32	0.76	0.68	0.85	0.77	0.50
Control Delay	110.1	60.5	104.1	65.0	38.2	72.3	90.9	48.4	83.0	83.7	20.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	110.1	60.5	104.1	65.0	38.2	72.3	90.9	48.4	83.0	83.7	20.8
LOS	F	E	F	E	D	E	F	D	F	F	C
Approach Delay		67.4		65.1			64.9			70.4	
Approach LOS		E		E			E			E	

Intersection Summary

Cycle Length: 200
 Actuated Cycle Length: 198.1
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 66.9
 Intersection Capacity Utilization 82.4%
 Analysis Period (min) 15

Intersection LOS: E
 ICU Level of Service E

Splits and Phases: 12: Highway 9 & Highway 1

 Ø1	 Ø2	 Ø4	 Ø8
30 s	77 s	42 s	51 s
 Ø5	 Ø6		
40 s	67 s		

Santa Cruz DRP Study
12: Highway 9 & Highway 1

APPENDIX F
Existing + Project
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		4	4		8	8	
Permitted Phases					6			4			8
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	40.0	77.0	30.0	67.0	67.0	42.0	42.0	42.0	51.0	51.0	51.0
Total Split (%)	20.0%	38.5%	15.0%	33.5%	33.5%	21.0%	21.0%	21.0%	25.5%	25.5%	25.5%
Maximum Green (s)	36.0	73.0	26.0	63.0	63.0	38.0	38.0	38.0	47.0	47.0	47.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	None	Max	Max	Max	Max	Max	Max	Max	Max
Walk Time (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0
90th %ile Green (s)	36.0	73.0	26.0	63.0	63.0	38.0	38.0	38.0	47.0	47.0	47.0
90th %ile Term Code	Max	MaxR	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
70th %ile Green (s)	36.0	73.0	26.0	63.0	63.0	38.0	38.0	38.0	47.0	47.0	47.0
70th %ile Term Code	Max	MaxR	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
50th %ile Green (s)	32.5	73.0	25.8	66.3	66.3	38.0	38.0	38.0	47.0	47.0	47.0
50th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
30th %ile Green (s)	28.3	73.0	23.1	67.8	67.8	38.0	38.0	38.0	47.0	47.0	47.0
30th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
10th %ile Green (s)	22.6	73.0	19.4	69.8	69.8	38.0	38.0	38.0	47.0	47.0	47.0
10th %ile Term Code	Gap	MaxR	Gap	Hold	Hold	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 200
 Actuated Cycle Length: 198.1
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 200
 70th %ile Actuated Cycle: 200
 50th %ile Actuated Cycle: 199.8
 30th %ile Actuated Cycle: 197.1
 10th %ile Actuated Cycle: 193.4

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

APPENDIX F
Existing + Project
PM Peak

								
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	1312	486	412	74	284	42	275	1380
Future Volume (vph)	1312	486	412	74	284	42	275	1380
Turn Type	Split	NA	NA	Prot	NA	Prot	NA	pm+ov
Protected Phases	6	6	2	3	8	7	4	6
Permitted Phases								4
Detector Phase	6	6	2	3	8	7	4	4 6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	42.0	42.0	26.0	45.0	32.0	50.0	37.0	42.0
Total Split (%)	28.0%	28.0%	17.3%	30.0%	21.3%	33.3%	24.7%	28.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	38.8	38.8	20.0	10.2	29.3	8.1	27.5	70.4
Actuated g/C Ratio	0.35	0.35	0.18	0.09	0.27	0.07	0.25	0.64
v/c Ratio	1.18	1.13dl	0.74	0.46	0.33	0.32	0.31	0.68
Control Delay	132.4	81.9	51.4	59.8	33.5	58.7	35.4	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	132.4	81.9	51.4	59.8	33.5	58.7	35.4	6.7
LOS	F	F	D	E	C	E	D	A
Approach Delay		99.7	51.4		38.6		12.7	
Approach LOS		F	D		D		B	

Intersection Summary

Cycle Length: 150
 Actuated Cycle Length: 110
 Natural Cycle: 100
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.18
 Intersection Signal Delay: 55.8
 Intersection Capacity Utilization 75.0%
 Analysis Period (min) 15
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 13: Chestnut Street & Mission Street

 Ø2	 Ø6	 Ø4	 Ø3
26 s	42 s	37 s	45 s
		 Ø7	 Ø8
		50 s	32 s

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

APPENDIX F
Existing + Project
PM Peak

								
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Protected Phases	6	6	2	3	8	7	4	6
Permitted Phases								4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	42.0	42.0	26.0	45.0	32.0	50.0	37.0	42.0
Total Split (%)	28.0%	28.0%	17.3%	30.0%	21.3%	33.3%	24.7%	28.0%
Maximum Green (s)	38.0	38.0	22.0	41.0	28.0	46.0	33.0	38.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag				Lag	Lag	Lead	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	None	None	None
Walk Time (s)	5.0	5.0			5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0
90th %ile Green (s)	38.0	38.0	22.0	14.3	36.2	11.1	33.0	38.0
90th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Max	Max
70th %ile Green (s)	38.0	38.0	22.0	11.9	35.5	9.4	33.0	38.0
70th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Max	Max
50th %ile Green (s)	38.0	38.0	22.0	10.4	32.2	8.2	30.0	38.0
50th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Gap	Max
30th %ile Green (s)	38.0	38.0	19.4	8.7	26.4	7.0	24.7	38.0
30th %ile Term Code	Max	Max	Gap	Gap	Hold	Gap	Gap	Max
10th %ile Green (s)	38.0	38.0	14.6	0.0	18.2	0.0	18.2	38.0
10th %ile Term Code	Max	Max	Gap	Skip	Hold	Skip	Gap	Max

Intersection Summary

Cycle Length: 150
 Actuated Cycle Length: 110
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 123.3
 70th %ile Actuated Cycle: 120.9
 50th %ile Actuated Cycle: 116.4
 30th %ile Actuated Cycle: 106.8
 10th %ile Actuated Cycle: 82.8

Santa Cruz DRP Study
1: Front Street & Laurel Street

APPENDIX F
Cumulative + Project PM
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	165	996	227	830	195	4	228	254	202	366	262
Future Volume (vph)	165	996	227	830	195	4	228	254	202	366	262
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Detector Phase	5	2	1	6	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	33.0	17.0	30.0	30.0	8.0	20.0	20.0	10.0	22.0	22.0
Total Split (%)	25.0%	41.3%	21.3%	37.5%	37.5%	10.0%	25.0%	25.0%	12.5%	27.5%	27.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	16.0	29.4	12.7	26.0	26.0	4.0	14.1	14.1	6.0	22.6	22.6
Actuated g/C Ratio	0.20	0.38	0.16	0.33	0.33	0.05	0.18	0.18	0.08	0.29	0.29
v/c Ratio	0.49	0.82	0.85	1.44	0.33	0.04	0.73	0.56	1.65	0.73	0.44
Control Delay	33.5	29.1	59.3	232.9	6.9	37.2	43.7	10.2	352.4	35.7	6.6
Queue Delay	0.0	48.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.5	77.7	59.3	232.9	6.9	37.2	43.7	10.2	352.4	35.7	6.6
LOS	C	E	E	F	A	D	D	B	F	D	A
Approach Delay		71.6		166.2			26.1			103.7	
Approach LOS		E		F			C			F	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 78.2

Natural Cycle: 110

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.65

Intersection Signal Delay: 104.3

Intersection LOS: F

Intersection Capacity Utilization 89.3%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Front Street & Laurel Street

 Ø1	 Ø2	 Ø3	 Ø4
17 s	33 s	8 s	22 s
 Ø5	 Ø6	 Ø7	 Ø8
20 s	30 s	10 s	20 s

Santa Cruz DRP Study
1: Front Street & Laurel Street

APPENDIX F
Cumulative + Project PM
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	33.0	17.0	30.0	30.0	8.0	20.0	20.0	10.0	22.0	22.0
Total Split (%)	25.0%	41.3%	21.3%	37.5%	37.5%	10.0%	25.0%	25.0%	12.5%	27.5%	27.5%
Maximum Green (s)	16.0	29.0	13.0	26.0	26.0	4.0	16.0	16.0	6.0	18.0	18.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	Max	Max	None	Max	Max	None	None	None	None	None	None
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0
90th %ile Green (s)	16.0	29.0	13.0	26.0	26.0	4.0	16.0	16.0	6.0	18.0	18.0
90th %ile Term Code	MaxR	MaxR	Max	MaxR	MaxR	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	16.0	29.0	13.0	26.0	26.0	0.0	16.0	16.0	6.0	26.0	26.0
70th %ile Term Code	MaxR	MaxR	Max	MaxR	MaxR	Skip	Max	Max	Max	Hold	Hold
50th %ile Green (s)	16.0	29.0	13.0	26.0	26.0	0.0	16.0	16.0	6.0	26.0	26.0
50th %ile Term Code	MaxR	MaxR	Max	MaxR	MaxR	Skip	Max	Max	Max	Hold	Hold
30th %ile Green (s)	16.0	29.0	13.0	26.0	26.0	0.0	13.1	13.1	6.0	23.1	23.1
30th %ile Term Code	MaxR	MaxR	Max	MaxR	MaxR	Skip	Gap	Gap	Max	Hold	Hold
10th %ile Green (s)	16.0	30.7	11.3	26.0	26.0	0.0	9.8	9.8	6.0	19.8	19.8
10th %ile Term Code	MaxR	Hold	Gap	MaxR	MaxR	Skip	Gap	Gap	Max	Hold	Hold

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 78.2

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 80

70th %ile Actuated Cycle: 80

50th %ile Actuated Cycle: 80

30th %ile Actuated Cycle: 77.1

10th %ile Actuated Cycle: 73.8

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

APPENDIX F
Cumulative + Project PM
PM Peak

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	162	1075	64	982	59	96	97	59
Future Volume (vph)	162	1075	64	982	59	96	97	59
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases					8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	40.0	20.0	40.0	20.0	20.0	20.0	20.0
Total Split (%)	25.0%	50.0%	25.0%	50.0%	25.0%	25.0%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	Max	Max	Max	Max
Act Effct Green (s)	12.8	42.5	8.4	36.1	16.0	16.0		16.0
Actuated g/C Ratio	0.17	0.55	0.11	0.47	0.21	0.21		0.21
v/c Ratio	0.64	1.16	0.36	1.32	0.31	0.39		0.87
Control Delay	41.3	105.6	37.1	176.2	31.6	25.9		59.8
Queue Delay	0.0	0.0	0.0	1.2	0.0	0.0		0.0
Total Delay	41.3	105.6	37.1	177.3	31.6	25.9		59.8
LOS	D	F	D	F	C	C		E
Approach Delay		97.5		169.4		27.6		59.8
Approach LOS		F		F		C		E

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 76.9

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.32

Intersection Signal Delay: 118.5

Intersection LOS: F

Intersection Capacity Utilization 99.6%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Pacific Avenue & Laurel Street

 Ø1	 Ø2	 Ø4
20 s	40 s	20 s
 Ø5	 Ø6	 Ø8
20 s	40 s	20 s

Santa Cruz DRP Study
2: Pacific Avenue & Laurel Street

APPENDIX F
Cumulative + Project PM
PM Peak

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Protected Phases	5	2	1	6		8		4
Permitted Phases					8		4	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	40.0	20.0	40.0	20.0	20.0	20.0	20.0
Total Split (%)	25.0%	50.0%	25.0%	50.0%	25.0%	25.0%	25.0%	25.0%
Maximum Green (s)	16.0	36.0	16.0	36.0	16.0	16.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	None	Max	Max	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
90th %ile Green (s)	16.0	40.5	11.5	36.0	16.0	16.0	16.0	16.0
90th %ile Term Code	Max	Hold	Gap	MaxR	MaxR	MaxR	MaxR	MaxR
70th %ile Green (s)	15.9	42.2	9.7	36.0	16.0	16.0	16.0	16.0
70th %ile Term Code	Gap	Hold	Gap	MaxR	MaxR	MaxR	MaxR	MaxR
50th %ile Green (s)	13.4	41.1	8.3	36.0	16.0	16.0	16.0	16.0
50th %ile Term Code	Gap	Hold	Gap	MaxR	MaxR	MaxR	MaxR	MaxR
30th %ile Green (s)	11.1	40.0	7.1	36.0	16.0	16.0	16.0	16.0
30th %ile Term Code	Gap	Hold	Gap	MaxR	MaxR	MaxR	MaxR	MaxR
10th %ile Green (s)	8.1	48.1	0.0	36.0	16.0	16.0	16.0	16.0
10th %ile Term Code	Gap	Hold	Skip	MaxR	MaxR	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 76.9

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 80

70th %ile Actuated Cycle: 79.9

50th %ile Actuated Cycle: 77.4

30th %ile Actuated Cycle: 75.1

10th %ile Actuated Cycle: 72.1

Santa Cruz DRP Study
3: Front Street & Cathcart Street

APPENDIX F
Cumulative + Project PM
PM Peak

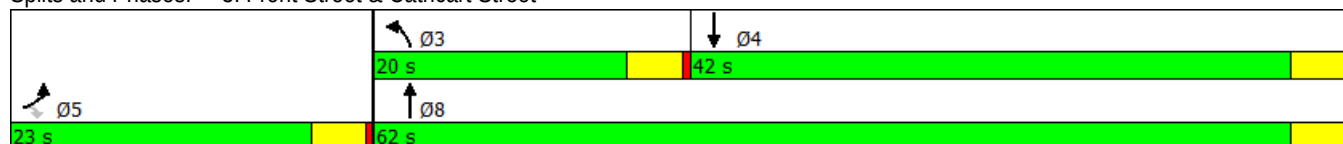
					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	193	111	116	569	805
Future Volume (vph)	193	111	116	569	805
Turn Type	Prot	Perm	Prot	NA	NA
Protected Phases	5		3	8	4
Permitted Phases		5			
Detector Phase	5	5	3	8	4
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0
Total Split (s)	23.0	23.0	20.0	62.0	42.0
Total Split (%)	27.1%	27.1%	23.5%	72.9%	49.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Recall Mode	Max	Max	Max	None	Max
Act Effect Green (s)	19.0	19.0	16.0	58.0	38.0
Actuated g/C Ratio	0.22	0.22	0.19	0.68	0.45
v/c Ratio	0.53	0.29	0.39	0.50	0.79
Control Delay	34.6	11.2	34.4	8.2	22.9
Queue Delay	0.0	0.0	0.0	6.4	0.2
Total Delay	34.6	11.2	34.4	14.5	23.1
LOS	C	B	C	B	C
Approach Delay	26.1			17.9	23.1
Approach LOS	C			B	C

Intersection Summary

Cycle Length: 85
 Actuated Cycle Length: 85
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 21.8
 Intersection Capacity Utilization 59.5%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service B

Splits and Phases: 3: Front Street & Cathcart Street



					
Lane Group	EBL	EBR	NBL	NBT	SBT
Protected Phases	5		3	8	4
Permitted Phases		5			
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0
Total Split (s)	23.0	23.0	20.0	62.0	42.0
Total Split (%)	27.1%	27.1%	23.5%	72.9%	49.4%
Maximum Green (s)	19.0	19.0	16.0	58.0	38.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lead/Lag			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	Max	Max	Max	None	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0
90th %ile Green (s)	19.0	19.0	16.0	58.0	38.0
90th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
70th %ile Green (s)	19.0	19.0	16.0	58.0	38.0
70th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
50th %ile Green (s)	19.0	19.0	16.0	58.0	38.0
50th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
30th %ile Green (s)	19.0	19.0	16.0	58.0	38.0
30th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR
10th %ile Green (s)	19.0	19.0	16.0	58.0	38.0
10th %ile Term Code	MaxR	MaxR	MaxR	Hold	MaxR

Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 85

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 85

70th %ile Actuated Cycle: 85

50th %ile Actuated Cycle: 85

30th %ile Actuated Cycle: 85

10th %ile Actuated Cycle: 85

Santa Cruz DRP Study
4: Front Street & Metro Station Access North

APPENDIX F
Cumulative + Project PM
PM Peak

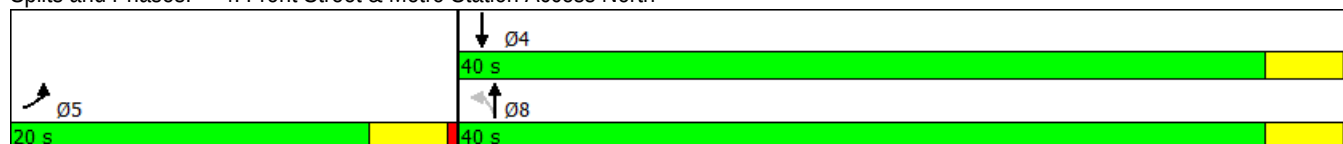
				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Traffic Volume (vph)	14	14	661	783
Future Volume (vph)	14	14	661	783
Turn Type	Prot	Perm	NA	NA
Protected Phases	5		8	4
Permitted Phases		8		
Detector Phase	5	8	8	4
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	20.0	40.0	40.0	40.0
Total Split (%)	33.3%	66.7%	66.7%	66.7%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Max	Max	Max
Act Effect Green (s)	7.0	54.2	54.2	54.2
Actuated g/C Ratio	0.12	0.90	0.90	0.90
v/c Ratio	0.27	0.05	0.42	0.52
Control Delay	21.2	2.6	2.9	3.8
Queue Delay	0.0	0.0	0.0	0.1
Total Delay	21.2	2.6	2.9	3.9
LOS	C	A	A	A
Approach Delay	21.2		2.9	3.9
Approach LOS	C		A	A

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60.3
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.52
 Intersection Signal Delay: 3.8
 Intersection Capacity Utilization 52.2%
 Analysis Period (min) 15

Intersection LOS: A
ICU Level of Service A

Splits and Phases: 4: Front Street & Metro Station Access North



Santa Cruz DRP Study
4: Front Street & Metro Station Access North

APPENDIX F
Cumulative + Project PM
PM Peak

				
Lane Group	EBL	NBL	NBT	SBT
Protected Phases	5		8	4
Permitted Phases		8		
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	20.0	40.0	40.0	40.0
Total Split (%)	33.3%	66.7%	66.7%	66.7%
Maximum Green (s)	16.0	36.0	36.0	36.0
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lead/Lag				
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0
Recall Mode	None	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0
90th %ile Green (s)	10.5	51.0	51.0	51.0
90th %ile Term Code	Gap	Dwell	Dwell	Dwell
70th %ile Green (s)	8.0	51.0	51.0	51.0
70th %ile Term Code	Gap	Dwell	Dwell	Dwell
50th %ile Green (s)	0.0	51.0	51.0	51.0
50th %ile Term Code	Skip	Dwell	Dwell	Dwell
30th %ile Green (s)	0.0	51.0	51.0	51.0
30th %ile Term Code	Skip	Dwell	Dwell	Dwell
10th %ile Green (s)	0.0	51.0	51.0	51.0
10th %ile Term Code	Skip	Dwell	Dwell	Dwell

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60.3
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 69.5
 70th %ile Actuated Cycle: 67
 50th %ile Actuated Cycle: 55
 30th %ile Actuated Cycle: 55
 10th %ile Actuated Cycle: 55

Santa Cruz DRP Study
7: Pacific Street & Front Street & Mission Street/Water Street

APPENDIX F
Cumulative + Project PM
PM Peak

							
Lane Group	EBL	EBT	EBR	WBL	WBT	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	263	1133	165	166	893	371	221
Future Volume (vph)	263	1133	165	166	893	371	221
Turn Type	Prot	NA	Perm	Prot	NA	NA	Perm
Protected Phases	5	2		1	6	8	
Permitted Phases			2				8
Detector Phase	5	2	2	1	6	8	8
Switch Phase							
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	20.0	20.0	20.0
Total Split (s)	22.0	42.0	42.0	16.0	36.0	32.0	32.0
Total Split (%)	24.4%	46.7%	46.7%	17.8%	40.0%	35.6%	35.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	Max	Max	Max
Act Effct Green (s)	16.9	37.5	37.5	11.5	32.1	28.0	28.0
Actuated g/C Ratio	0.19	0.42	0.42	0.13	0.36	0.31	0.31
v/c Ratio	0.84	0.82	0.27	0.79	0.79	0.82	0.42
Control Delay	57.9	28.3	18.2	62.8	30.9	42.4	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.9	28.3	18.2	62.8	30.9	42.4	15.5
LOS	E	C	B	E	C	D	B
Approach Delay		32.2			35.7	33.4	
Approach LOS		C			D	C	

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 89
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 33.6
 Intersection Capacity Utilization 73.6%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 7: Pacific Street & Front Street & Mission Street/Water Street

 Ø1	 Ø2	
16 s	42 s	
 Ø5	 Ø6	 Ø8
22 s	36 s	32 s

Santa Cruz DRP Study
7: Pacific Street & Front Street & Mission Street/Water Street

APPENDIX F
Cumulative + Project PM
PM Peak

							
Lane Group	EBL	EBT	EBR	WBL	WBT	SBT	SBR
Protected Phases	5	2		1	6	8	
Permitted Phases			2				8
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	20.0	20.0	20.0
Total Split (s)	22.0	42.0	42.0	16.0	36.0	32.0	32.0
Total Split (%)	24.4%	46.7%	46.7%	17.8%	40.0%	35.6%	35.6%
Maximum Green (s)	18.0	38.0	38.0	12.0	32.0	28.0	28.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Max	Max	Max
Walk Time (s)		5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0	0
90th %ile Green (s)	18.0	38.0	38.0	12.0	32.0	28.0	28.0
90th %ile Term Code	Max	Max	Max	Max	MaxR	MaxR	MaxR
70th %ile Green (s)	18.0	38.0	38.0	12.0	32.0	28.0	28.0
70th %ile Term Code	Max	Max	Max	Max	MaxR	MaxR	MaxR
50th %ile Green (s)	18.0	38.0	38.0	12.0	32.0	28.0	28.0
50th %ile Term Code	Max	Max	Max	Max	MaxR	MaxR	MaxR
30th %ile Green (s)	17.5	38.0	38.0	12.0	32.5	28.0	28.0
30th %ile Term Code	Gap	Max	Max	Max	Hold	MaxR	MaxR
10th %ile Green (s)	13.2	35.7	35.7	9.5	32.0	28.0	28.0
10th %ile Term Code	Gap	Hold	Hold	Gap	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 89

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 90

70th %ile Actuated Cycle: 90

50th %ile Actuated Cycle: 90

30th %ile Actuated Cycle: 90

10th %ile Actuated Cycle: 85.2

Santa Cruz DRP Study
8: Front Street & Soquel Avenue

APPENDIX F
Cumulative + Project PM
PM Peak

	→	↖	←	↗	↘	↑	↙	↓
Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↔↔	↖	↗	↗		↔↔	↖	↗
Traffic Volume (vph)	262	498	314	79	46	523	193	649
Future Volume (vph)	262	498	314	79	46	523	193	649
Turn Type	NA	Split	NA	Perm	Perm	NA	Perm	NA
Protected Phases	2	6	6			8		4
Permitted Phases				6	8		4	
Detector Phase	2	6	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	29.0	29.0	29.0	51.0	51.0	51.0	51.0
Total Split (%)	20.0%	29.0%	29.0%	29.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lag	Lead	Lead	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	Max	None	None	None	None
Act Effct Green (s)	15.0	25.0	25.0	25.0		47.0	47.0	47.0
Actuated g/C Ratio	0.15	0.25	0.25	0.25		0.47	0.47	0.47
v/c Ratio	0.78	1.00	1.02	0.19		0.81	1.04	0.92
Control Delay	50.2	82.3	86.3	12.3		27.5	105.3	42.4
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	50.2	82.3	86.3	12.3		27.5	105.3	42.4
LOS	D	F	F	B		C	F	D
Approach Delay	50.2		77.9			27.5		55.7
Approach LOS	D		E			C		E

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 99
 Natural Cycle: 100
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 54.0
 Intersection Capacity Utilization 108.3%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service G

Splits and Phases: 8: Front Street & Soquel Avenue

↖ Ø6	↗ Ø2	↓ Ø4
29 s	20 s	51 s
		↖ Ø8
		51 s

								
Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Protected Phases	2	6	6			8		4
Permitted Phases				6	8		4	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	29.0	29.0	29.0	51.0	51.0	51.0	51.0
Total Split (%)	20.0%	29.0%	29.0%	29.0%	51.0%	51.0%	51.0%	51.0%
Maximum Green (s)	16.0	25.0	25.0	25.0	47.0	47.0	47.0	47.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lag	Lead	Lead	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	Max	Max	None	None	None	None
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
90th %ile Green (s)	16.0	25.0	25.0	25.0	47.0	47.0	47.0	47.0
90th %ile Term Code	Max	MaxR	MaxR	MaxR	Max	Max	Max	Max
70th %ile Green (s)	16.0	25.0	25.0	25.0	47.0	47.0	47.0	47.0
70th %ile Term Code	Max	MaxR	MaxR	MaxR	Max	Max	Max	Max
50th %ile Green (s)	16.0	25.0	25.0	25.0	47.0	47.0	47.0	47.0
50th %ile Term Code	Max	MaxR	MaxR	MaxR	Hold	Hold	Max	Max
30th %ile Green (s)	14.9	25.0	25.0	25.0	47.0	47.0	47.0	47.0
30th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Max	Max
10th %ile Green (s)	12.1	25.0	25.0	25.0	47.0	47.0	47.0	47.0
10th %ile Term Code	Gap	MaxR	MaxR	MaxR	Hold	Hold	Max	Max

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 99
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 100
 70th %ile Actuated Cycle: 100
 50th %ile Actuated Cycle: 100
 30th %ile Actuated Cycle: 98.9
 10th %ile Actuated Cycle: 96.1

Santa Cruz DRP Study
11: Ocean Street & Water Street

APPENDIX F
Cumulative + Project PM
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	495	1578	168	1008	339	203	1359	96	522	1448	399
Future Volume (vph)	495	1578	168	1008	339	203	1359	96	522	1448	399
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Detector Phase	5	2	1	6	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	16.0	47.0	12.0	43.0	43.0	13.0	36.0	36.0	25.0	48.0	48.0
Total Split (%)	13.3%	39.2%	10.0%	35.8%	35.8%	10.8%	30.0%	30.0%	20.8%	40.0%	40.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	None	Min	Min	None	Min	Min	None	Min	Min
Act Effct Green (s)	12.0	43.0	8.0	39.0	39.0	9.0	32.0	32.0	21.0	44.0	44.0
Actuated g/C Ratio	0.10	0.36	0.07	0.32	0.32	0.08	0.27	0.27	0.18	0.37	0.37
v/c Ratio	1.57	1.49	1.52	0.94	0.53	1.64	1.55	0.20	1.82	1.19	0.63
Control Delay	305.4	255.2	311.5	55.8	12.9	352.6	284.7	5.6	410.0	128.1	23.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	305.4	255.2	311.5	55.8	12.9	352.6	284.7	5.6	410.0	128.1	23.5
LOS	F	F	F	E	B	F	F	A	F	F	C
Approach Delay		266.3		74.6			276.9			172.5	
Approach LOS		F		E			F			F	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.82

Intersection Signal Delay: 202.7

Intersection LOS: F

Intersection Capacity Utilization 137.9%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 11: Ocean Street & Water Street

 Ø1	 Ø2	 Ø3	 Ø4
12 s	47 s	13 s	48 s
 Ø5	 Ø6	 Ø7	 Ø8
16 s	43 s	25 s	36 s

Santa Cruz DRP Study
11: Ocean Street & Water Street

APPENDIX F
Cumulative + Project PM
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		3	8		7	4	
Permitted Phases					6			8			4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	16.0	47.0	12.0	43.0	43.0	13.0	36.0	36.0	25.0	48.0	48.0
Total Split (%)	13.3%	39.2%	10.0%	35.8%	35.8%	10.8%	30.0%	30.0%	20.8%	40.0%	40.0%
Maximum Green (s)	12.0	43.0	8.0	39.0	39.0	9.0	32.0	32.0	21.0	44.0	44.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Min	None	Min	Min	None	Min	Min	None	Min	Min
Walk Time (s)		5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0
90th %ile Green (s)	12.0	43.0	8.0	39.0	39.0	9.0	32.0	32.0	21.0	44.0	44.0
90th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	12.0	43.0	8.0	39.0	39.0	9.0	32.0	32.0	21.0	44.0	44.0
70th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
50th %ile Green (s)	12.0	43.0	8.0	39.0	39.0	9.0	32.0	32.0	21.0	44.0	44.0
50th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
30th %ile Green (s)	12.0	43.0	8.0	39.0	39.0	9.0	32.0	32.0	21.0	44.0	44.0
30th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
10th %ile Green (s)	12.0	43.0	8.0	39.0	39.0	9.0	32.0	32.0	21.0	44.0	44.0
10th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 120

70th %ile Actuated Cycle: 120

50th %ile Actuated Cycle: 120

30th %ile Actuated Cycle: 120

10th %ile Actuated Cycle: 120

Santa Cruz DRP Study
12: Highway 9 & Highway 1

APPENDIX F
Cumulative + Project PM
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	490	2350	561	1862	693	99	454	726	1109	545	571
Future Volume (vph)	490	2350	561	1862	693	99	454	726	1109	545	571
Turn Type	Prot	NA	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6		4	4		8	8	
Permitted Phases					6			4			8
Detector Phase	5	2	1	6	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	42.0	77.0	27.0	62.0	62.0	43.0	43.0	43.0	53.0	53.0	53.0
Total Split (%)	21.0%	38.5%	13.5%	31.0%	31.0%	21.5%	21.5%	21.5%	26.5%	26.5%	26.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	38.0	73.0	23.0	58.0	58.0	39.0	39.0	39.0	49.0	49.0	49.0
Actuated g/C Ratio	0.19	0.36	0.12	0.29	0.29	0.20	0.20	0.20	0.24	0.24	0.24
v/c Ratio	1.57	1.44	1.56	1.37	1.23	0.31	1.37	1.14	1.43	1.31	1.06
Control Delay	318.0	246.5	314.4	221.8	157.3	71.9	239.3	131.7	251.0	209.4	92.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	318.0	246.5	314.4	221.8	157.3	71.9	239.3	131.7	251.0	209.4	92.3
LOS	F	F	F	F	F	E	F	F	F	F	F
Approach Delay		258.5		224.1			165.2			200.1	
Approach LOS		F		F			F			F	

Intersection Summary

Cycle Length: 200
 Actuated Cycle Length: 200
 Natural Cycle: 140
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.57
 Intersection Signal Delay: 221.1
 Intersection Capacity Utilization 132.2%
 Analysis Period (min) 15

Intersection LOS: F
 ICU Level of Service H

Splits and Phases: 12: Highway 9 & Highway 1

 Ø1	 Ø2	 Ø4	 Ø8
27 s	77 s	43 s	53 s
 Ø5	 Ø6		
42 s	62 s		

Santa Cruz DRP Study
12: Highway 9 & Highway 1

APPENDIX F
Cumulative + Project PM
PM Peak

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2	1	6		4	4		8	8	
Permitted Phases					6			4			8
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	42.0	77.0	27.0	62.0	62.0	43.0	43.0	43.0	53.0	53.0	53.0
Total Split (%)	21.0%	38.5%	13.5%	31.0%	31.0%	21.5%	21.5%	21.5%	26.5%	26.5%	26.5%
Maximum Green (s)	38.0	73.0	23.0	58.0	58.0	39.0	39.0	39.0	49.0	49.0	49.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max	None	Max	Max	Max	Max	Max	Max	Max	Max
Walk Time (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0
90th %ile Green (s)	38.0	73.0	23.0	58.0	58.0	39.0	39.0	39.0	49.0	49.0	49.0
90th %ile Term Code	Max	MaxR	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
70th %ile Green (s)	38.0	73.0	23.0	58.0	58.0	39.0	39.0	39.0	49.0	49.0	49.0
70th %ile Term Code	Max	MaxR	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
50th %ile Green (s)	38.0	73.0	23.0	58.0	58.0	39.0	39.0	39.0	49.0	49.0	49.0
50th %ile Term Code	Max	MaxR	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
30th %ile Green (s)	38.0	73.0	23.0	58.0	58.0	39.0	39.0	39.0	49.0	49.0	49.0
30th %ile Term Code	Max	MaxR	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
10th %ile Green (s)	38.0	73.0	23.0	58.0	58.0	39.0	39.0	39.0	49.0	49.0	49.0
10th %ile Term Code	Max	MaxR	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR

Intersection Summary

Cycle Length: 200

Actuated Cycle Length: 200

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 200

70th %ile Actuated Cycle: 200

50th %ile Actuated Cycle: 200

30th %ile Actuated Cycle: 200

10th %ile Actuated Cycle: 200

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

APPENDIX F
Cumulative + Project PM
PM Peak

								
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	2436	1060	849	138	332	71	497	1822
Future Volume (vph)	2436	1060	849	138	332	71	497	1822
Turn Type	Split	NA	NA	Prot	NA	Prot	NA	pm+ov
Protected Phases	6	6	2	3	8	7	4	6
Permitted Phases								4
Detector Phase	6	6	2	3	8	7	4	4 6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	53.0	53.0	26.0	44.0	32.0	39.0	27.0	53.0
Total Split (%)	35.3%	35.3%	17.3%	29.3%	21.3%	26.0%	18.0%	35.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag	Lag	Lead	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	49.1	49.1	22.0	15.8	28.1	10.7	23.0	76.1
Actuated g/C Ratio	0.39	0.39	0.17	0.13	0.22	0.08	0.18	0.60
v/c Ratio	2.09	2.00dl	1.74	0.67	0.52	0.50	0.82	1.04
Control Delay	520.3	453.9	370.4	67.5	44.9	66.6	61.0	48.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	520.3	453.9	370.4	67.5	44.9	66.6	61.0	48.9
LOS	F	F	F	E	D	E	E	D
Approach Delay		476.8	370.4		50.9		51.9	
Approach LOS		F	F		D		D	

Intersection Summary

Cycle Length: 150
 Actuated Cycle Length: 125.9
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 2.09
 Intersection Signal Delay: 296.3
 Intersection Capacity Utilization 129.8%
 Analysis Period (min) 15
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Intersection LOS: F
ICU Level of Service H

Splits and Phases: 13: Chestnut Street & Mission Street

 Ø2	 Ø6	 Ø4	 Ø3
26 s	53 s	27 s	44 s
		 Ø7	 Ø8
		39 s	32 s

Santa Cruz DRP Study
13: Chestnut Street & Mission Street

APPENDIX F
Cumulative + Project PM
PM Peak

								
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Protected Phases	6	6	2	3	8	7	4	6
Permitted Phases								4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	53.0	53.0	26.0	44.0	32.0	39.0	27.0	53.0
Total Split (%)	35.3%	35.3%	17.3%	29.3%	21.3%	26.0%	18.0%	35.3%
Maximum Green (s)	49.0	49.0	22.0	40.0	28.0	35.0	23.0	49.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag				Lag	Lag	Lead	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	None	None	None
Walk Time (s)	5.0	5.0			5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0
90th %ile Green (s)	49.0	49.0	22.0	21.8	29.9	14.9	23.0	49.0
90th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Max	Max
70th %ile Green (s)	49.0	49.0	22.0	18.1	28.7	12.4	23.0	49.0
70th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Max	Max
50th %ile Green (s)	49.0	49.0	22.0	15.8	28.1	10.7	23.0	49.0
50th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Max	Max
30th %ile Green (s)	49.0	49.0	22.0	13.5	27.4	9.1	23.0	49.0
30th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Max	Max
10th %ile Green (s)	49.0	49.0	22.0	10.2	26.3	6.9	23.0	49.0
10th %ile Term Code	Max	Max	Max	Gap	Hold	Gap	Max	Max

Intersection Summary

Cycle Length: 150
 Actuated Cycle Length: 125.9
 Control Type: Actuated-Uncoordinated
 90th %ile Actuated Cycle: 131.8
 70th %ile Actuated Cycle: 128.1
 50th %ile Actuated Cycle: 125.8
 30th %ile Actuated Cycle: 123.5
 10th %ile Actuated Cycle: 120.2