San Luis Obispo County
Flood Control and
Water Conservation District

Cambria Drainage and Flood Control Study

FINAL REPORT

FEBRUARY 2004

RMC
Raines, Melton & Carella, Inc.
Consulting Engineers/Project Managers
In Association with:
Essex Environmental & Questa Engineering Corp

EXECUTIVE SUMMARY

This report is a summary of findings, conclusions and recommendations of the Drainage and Flood Control Study conducted for the Community of Cambria. This report was prepared under the direction of the County of San Luis Obispo Public Works Department.

In response to questions raised by several citizens who experienced flood damage to their homes and businesses during the unusually heavy rainfall period of March 2001, the County Board of Supervisors approved funding for Drainage and Flood Control Studies for the communities of Cambria, Cayucos, Nipomo, Oceano, San Miguel, and Santa Margarita. The goals of the studies were intended to quantify the extent of drainage and flooding problems of each of these communities, to generate recommendations for solutions for the drainage problems, to identify environmental permitting requirements, to provide planning level cost estimates, and to outline a plan for funding and implementation of the proposed solutions. This study was funded through the General Flood Control District Budget.

Overview of Responsibility

The responsibilities for drainage are administered through the San Luis Obispo County Flood Control and Water Conservation District (District). **The District is the designated County agency responsible for managing, planning, and maintaining drainage and flood control facilities in unincorporated public areas where no other agency has assumed an active role in such activities**. The District has a regional role in the County and can work with individual cities or communities when requested. **The District uses its general funding to identify water related issues, to determine solutions to those problems and to help those local areas implement recommended solutions. The District is not, however, responsible for paying for community-specific mitigation improvements. The specific property owners that benefit from these solutions must agree to pay for the construction and future maintenance of them**. This policy (Resolution 68-223) was formally established by the Board of Supervisors in 1968. The policy was adopted because there is not sufficient funding available for the District to fund construction and operation of facilities. This approach provides the best leveraging of the funds that are available.

The District is restricted in the way it can fund needed projects or increase revenues for existing operations. It is generally limited to an assessment district procedure for obtaining financing for the construction of new projects. Due to the changes enacted with the passage of Proposition 218, the District must now have all new benefit assessments and increases to existing benefit assessments for maintenance and operations approved through an election of affected property owners.

Existing Drainage Problems

The combination of the area's steep topography, lack of underground drainage facilities, and location of residential parcels below the street grade has resulted in localized poor drainage and/or flooding around some residences, buildings, and roadways. The magnitude of flooding varies by the districts in Cambria and by location in each district. Drainage from a number of uphill lots flows along the edge of street pavement and drains onto lower lots, creating flooding and erosion problems. Drainage problems also exist where curbs are present, but the topography creates conditions where lots adjacent to the roadway are much lower than the roadway surface. This allows street drainage flowing at the curbside to enter the residential lots at the lowered curb section along the driveway entrance. Many unpaved roads are also subject to sheet and rill erosion during storm events.

Proposed Projects

The major constraint identified in local flooding issues was the lack of suitable conveyance facilities for storm water runoff. In most areas, storm water flows as surface flow in streets, ditches, and backyard areas. Stormwater conveyance is widely varied, due to changes in roadway slope and cross section, the presence or lack of curb and gutters, and the presence or lack of existing culverts and drainage channels. Most drainage issues were the result of upstream concentrated flows entering downstream lots due to a lack of storm drain facilities to convey flow.

The proposed solution is the construction of a number of small projects to resolve the flooding problems. Several potential projects have been developed to address drainage and flooding issues, and are shown by district in Figures 3 through 13 in Appendix A. A combination of the projects will be required to eliminate all of the drainage problems for the community. However, the intent is that each alternative will work independently to solve localized problems. The proposed projects primarily include the installation of paved roadways with rolled asphalt berms to keep storm runoff within the public right-of-way and off residential property. Storm runoff would then be collected in drop inlets or catch basins and be conveyed in an underground pipe to its terminal discharge point. In some locations, roadside ditches and drainage channels are proposed in place of storm drains. The goal of each project was to divert runoff away from topographic low points (generally a residential property) into a storm drain to effectively convey the flow to a creek or the ocean.

Flooding problems along Santa Rosa Creek in the West Village are being addressed by the construction of a by-pass channel for Santa Rosa Creek, as part of the Cambria Flood Control Project. Therefore, drainage and flooding problems are not discussed in this report. The by-pass channel will allow overflows to move slowly through the by-pass channel and then rejoin the Santa Rosa Creek downstream without overtopping Cambria Drive or Santa Rosa Creek. The project restores controlled flooding to the historic floodplain of Santa Rosa Creek while protecting the West Village from overflows of Santa Rosa Creek.

Table ES-1 summarizes the proposed alternatives by zone and also provides estimated costs and implementation timeframe. The total cost of all the projects is approximately $6.7 million. This total includes street and berm improvements totaling approximately $2.5 million that would be paid by the benefiting home owners through the Cooperative Roads Improvement Program. The storm drain, culvert, and road side ditch improvements and related appurtenances have an estimated cost of approximately $4.2 million

Table ES-1: Summary of Alternatives

DISTRICT [1]	PROJECT	PROBLEM AREA	PROPOSED MITIGATION	COST [2]	APPROXIMATE IMPLEMENTATION TIME FRAME [3]
Marine Terrace	1	Saint Thomas Ave. and Emmons Dr.	Replace culverts, install storm drain	$107,000	3.5 years
Marine Terrace	2	Marlborough Lane and Drake St.	Pave street, install storm drain, berms and drop inlets	$643,000	4 years
Marine Terrace	3	Newhall Ave. and Randall Dr.	Berm street, install drop inlet and storm drain	$127,000	3.5 years
Lodge Hill South	5	Burton Dr., Orville Ave., and Ardath Dr.	Install storm drain, berms, drop inlets, and outfall	$657,000	4 years
Lodge Hill South	6	Bradford Rd. and Orville Pl.	Pave and berm street	$273,000	3.5 years

DISTRICT [1]	PROJECT	PROBLEM AREA	PROPOSED MITIGATION	COST [2]	APPROXIMATE IMPLEMENTATION TIME FRAME [3]
Lodge Hill South	7	McCabe Dr.	Install berms	$18,000	3 years
Lodge Hill South	8	Cowper, Radcliff Ave., Langton St. and Kenneth	Pave and berm streets, install storm drain, drop inlets and culverts	$1,850,000	3.5 years
Lodge Hill South	9	Various Locations	Berms streets and install culverts	$768,000	3 years
Lodge Hill North	10	Wilton Dr.	Install roadside ditches, culverts, and storm drain	$238,000	3.5 years
Lodge Hill North	11	Ramsey St.	Pave and berm street, install drop inlets, storm drains and energy dissipator	$347,000	3.5 years
Lodge Hill North	12	Various Locations	Berm streets	$90,000	3 years
Pine View	13	Eton Rd. and Wood St.	Drop inlet, storm drain, outfall, and erosion protection	$263,000	5 years
Pine View	14	Martindale	Berm street	$40,000	3 years
Park Hill	15	Dorset St. and Cambridge St.	Berm multiple streets, install storm drain, drop inlets	$482,000	3.5 to 4 years
Park Hill	16	Pembrook	Berm street, install drop inlet and storm drain	$103,000	3 years
Happy Hill	18	Canterbury Lane	Install berm, drop inlet and storm drain	$168,000	3 years
Happy Hill	19	Various Locations	Install berms	$242,000	3 years
Happy Hill	20	Suffolk St.	Install berm, cross drain	$273,000	3 years

Notes:
1: See Figure 2 for delineation of the districts in Cambria and Figures 3 through 13 for the proposed projects.
2: ENR CCI for Los Angeles (February 2003) = 7,566. Includes 20% for Engineering and Design, 60% for Administrative and Environmental, and a 20% Contingency. Typical estimates used for County Overhead & Support Costs for Construction Project Planning. Use 100% cumulative markup on construction costs for Coastal Zone Projects. Percentages provided by County (Typical to all estimates in this report).
3: See Table 6-1 for detailed milestone durations. If a lead agency is in place, then decrease the duration by approximately 9 to 12 months.

ADDITIONAL RECOMMENDATIONS

Elevation Requirements and Mountable Berms

Existing homes located below street grade and whose driveways slope down away from the road may experience flooding in the garage or home. This is because without an adequate curb/berm, the driveway may act to convey runoff from the street above to lower elevations and sometimes into the garage or home. It is recommended that Cambria mandate the installation of a County standard mountable berm for all existing driveways/accesses to structures which are below the edge of pavement. It is also recommended that Cambria and the County Planning Department develop a design guideline that recommends the floor and garage elevation

for all new home construction be greater than the adjoining street grade. Driveways should slope down away from the home, towards the road.

It is recognized that the unique topographic nature of Cambria and the configuration of some infill lots will render this suggestion impractical or extremely difficult to implement at some locations. If some of Cambria's down sloping lots cannot be built above street level, then an alternative to protecting a structure's contents would be to build the access points (e.g. doors and garage openings) a minimum of one foot above adjacent grade so that flooding on the property will not encroach into the doorways. This design guideline will prevent flooding from entering into doorways and protect a structure's contents.

Minimize Storm Runoff from Homes

By diverting stormwater from impervious areas such as roofs, walkways and driveways, and reusing whenever possible, runoff that flows to streets can be greatly reduced. This can be achieved by directing rain gutter downspouts to landscaped areas, swales or infiltration basins on private property where water can percolate into the ground.

Development on Steep Terrain

For properties that contain drainage courses that convey runoff from uphill streets and lots, it is encouraged that a drainage easement be retained on the lower properties so that appropriate drainage facilities can be installed to convey runoff to the street below. The County's Department of Public Works should develop a design guideline standard for a catch basin and down drain to convey water from an uphill lot, through the downhill lot and eventually discharging to the street below. The County's Planning and Building Department should also provide the leadership and encouragement to property owners to dedicate drainage easements or to develop an appropriate reimbursement mechanism for uphill owners to compensate downhill owners for the easement.

Improve Drainage Systems as the Community Develops

New development is expected to substantially increase storm water flows in the community. The drainage impacts associated with increased development will be most pronounced in the Lodge Hill area where many of the roads are unpaved. Drainage improvements should be planned with any proposed development. Regardless of whether drainage problems exist prior to development, mitigation should be planned as not to increase the severity or frequency of problems. Such mitigation could include on-site detention of runoff, thereby preventing the increase of runoff onto lower lying properties.

It is recommended that development fees collected for Cambria be used to fund drainage improvements for areas that will be most impacted by future development. These areas are typically the topographic low points within a drainage sub-basin or district. The development fees collected to date should also be used to fund projects that mitigate for existing problems created by recent development (e.g. flooding at Eton Road and Wood Drive). If new development can not retain runoff on site, then it should be responsible for funding the necessary improvements to convey increased runoff.

In conjunction with planning drainage improvements with future development, critical lots that are at risk to flood damages due to their location should be identified. These lots should dedicate drainage easements on their property or design sufficient conveyance facilities as not to impede the flow of storm water.

Maintenance on Existing Facilities

Existing natural or fabricated drainage channels should be kept free of obstructions such as fallen trees, debris, and sedimentation to maintain capacity in the drainage system. Primary responsibility for this maintenance should rest with the owners of the property through which the drainage channels pass since the County is not

responsible for maintaining facilities on private property. If the drainage channels pass through public property, such as County roads, then the County's maintenance department is responsible for removing impediments. The District should continue to provide leadership, advice and encouragement to property owners and local agencies to assume these responsibilities.

Rolled Asphalt Berms

The community should consider incorporating the Caltrans Type E 4 mountable berm into the road section for all new and substantially rehabilitated roads as the standard for all new roadway work where roadway drainage containment is considered necessary in the residential area. Appendix I contains a typical cross section detail of the mountable berm.

Formation of a Drainage Facility Maintenance Department

It is recommended that a facility maintenance district be formed to better maintain the drainage infrastructure in Cambria. Responsibilities of the new maintenance district would include: (1) being the contact point for all resident complaints regarding drainage infrastructure in the community; (2) keeping an organized database of all new drainage infrastructure in the community including the size and capacity of culverts and storm drains, even if this infrastructure is installed by private property owners; (3) keeping a regular maintenance schedule that may involve multiple maintenance visits where needed; and (4) responding to drainage infrastructure repairs as needed. Having a localized facility maintenance district will make it easier to maintain drainage infrastructure as needed throughout the community.

Neighbor Coordination

Many reported problems were caused by residents blocking historical drainage courses or removing drainage lines that conveyed runoff from higher elevations to lower elevations. These drain lines were installed by private residences in order to move water from the street or their property to public right of way. Filling in or removing drain lines causes runoff to pond in the back or side yards of the upstream properties. Neighbors should organize to ensure that storm runoff flows unimpeded to public right of way. Filling in drainage courses or removing drain pipes is discouraged by the District.

Implementation Strategy

The most effective approach for improving drainage and flooding problems in each community is to identify the problems, develop solutions, and then create a local entity to implement the solutions. The role of the District is to assist the community in determining the improvements necessary to reduce flooding, and then to assist them in implementing programs to improve protection.

The District will continue to use its general funds only to provide programming and project initiation services so that communities can better understand the drainage problems they are facing, and determine how those problems should be solved. The proposed projects for Cambria totaled approximately $6.7 million. This total includes street and berm improvements totaling approximately $2.5 million that would be paid by the benefiting home owners through the Cooperative Roads Improvement Program. The storm drain, road side ditch improvements and related appurtenances have an estimated cost of approximately $4.2 million. If the lead agency in Cambria established a funding source to pay for the storm drain, culvert and roadside ditch improvements (excluding the street and berm improvements), approximately $298,000 per year would have to be generated by the community in order to build all the projects and pay off a municipal bond[1].

[1] Assumes a municipal bond rate of 5 percent, paid off over a period of 25 years.

Community Financial Support

If the residents benefiting from these projects calculate that their average annual damages due to flooding are less than the assessment or fee necessary to mitigate the flooding, then the community might conclude that risking flood damages is economically beneficial. In other words, the benefits gained are less than the cost of the project. A discussion of flood protection benefits versus project costs should be conducted with the community in order to measure the interest in implementing a project. The discussion would explore whether the community is willing to financially support a project if the costs exceeded the benefits.

The reader should note that it will be difficult to pass an assessment or fee in any of the districts when vacant properties in Cambria cannot build due to the water service moratorium.

IMPLEMENTATION STEPS

It is recommended that the following implementation steps, in general, be followed for the proposed projects. It is assumed that a community supported agency/zone would serve as the lead agency and assume control of the project at completion. **A lead agency in Cambria has not been designated, but it is recommended that the CCSD serve as the lead agency**. **The CCSD has formally commented that it is not prepared to take the lead agency role on the proposed projects.**

- Fund and complete a Basis of Design Report[2] within 9 to 15 months of start (depends on complexity of project)
- Conduct benefit assessment or property based fee proceedings
- Design project, prepare environmental documents and resource agency permits
- Advertise for construction
- Construct project

The phasing of storm drain projects would depend on the residents' desire to implement projects within their district. Each proposed project works independently to solve localized problems within a specific district. Therefore, neighbors within a district can organize to implement a project that benefits their area. The primary difference in the implementation steps for each project involves the complexity and the level of CEQA documentation required for storm drain projects. The majority of projects qualify for Class 1 CEQA categorical exemption because the alternatives consist of minor alterations to existing public facilities and do not have the potential to affect sensitive resources.

SCHEDULE FOR IMPROVEMENTS

The average duration for a storm drain project is approximately three to four years, depending on the length of pipeline, level of CEQA documentation, permitting requirements and environmental mitigation requirements. Chapter 6, "Implementation Strategy" includes more detail regarding task durations.

[2] The Basis of Design Report would include a description of the existing problem, proposed alternatives, recommended project, preliminary alignments, potential environmental impacts, and cost estimates.

ACKNOWLEDGEMENT

The San Luis Obispo County Flood Control and Water Conservation District, Community of Cambria Drainage and Flood Control Study 2003 represents a collaborative effort between San Luis Obispo County, the Community of Cambria, Raines, Melton & Carella, Inc., Questa Engineering Corporation and Essex Environmental. We would like to acknowledge and thank the following key personnel from the County and the North Coast Advisory Council whose invaluable knowledge, experience, and contributions were instrumental in the preparation of this report.

Paul Skartvedt – North Coast Advisory Council Member
Walter Fitzhugh – North Coast Advisory Council Member
Noel King – Public Works Director
Glen Priddy – Deputy Director Engineering Services
George Gibson – Design Engineer Public Works
Dean Benedix – Project Manager Public Works
Paavo Ogren – Deputy Public Works Director

TABLE OF CONTENTS

Executive Summary i

Overview of Responsibility i

Existing Drainage Problems i

Proposed Projects ii
Additional Recommendations iii

Implementation Strategy v
Implementation Steps vi
Schedule for Improvements vi

CHAPTER 1 INTRODUCTION 1-1

1.1 Project Understanding 1-2

1.2 Objectives and Scope 1-2

1.3 Methodology 1-2

1.4 Existing Information 1-3

1.5 Report Content 1-3

CHAPTER 2 COUNTY POLICIES 2-1

2.1 Overview of Responsibilities 2-1
2.1.1 Flood Control and Water Conservation District 2-1
2.1.1.1 History 2-1
2.1.1.2 Policy Direction: Resolution Number 68-223 2-1
2.1.1.3 Funding Sources 2-1
2.1.1.4 Countywide Activities 2-2
2.1.2 County Standards for Control of Drainage (Coastal Zone) 2-2
2.1.3 The Road Fund 2-2
2.1.4 Other Agencies with Drainage Responsibilities 2-3
2.1.4.1 Community Service Districts 2-3
2.1.4.2 County Service Areas 2-3
2.1.4.3 Cities 2-3
2.1.4.4 U.S. Corps of Engineers 2-3
2.1.4.5 California Department of Water Resources 2-3
2.1.4.6 Caltrans 2-3

2.2 Flood Control Zone 2-3

2.3 Funding Issues 2-4

2.4 Maintenance Responsibilities 2-4

2.5 Private Resident Opportunities 2-4

CHAPTER 3 ENGINEERING ANALYSIS AND ALTERNATIVES DEVELOPMENT 3-1

3.1 Overview of Proposed Projects 3-1

3.2 Engineering Methodology 3-1

3.3 Existing Drainage and Flooding Problems 3-2
3.3.1 Regional Hydrology 3-2
3.3.2 FEMA Flood Hazard Zones 3-2
3.3.3 Topography 3-3
3.3.4 No Drainage Provisions During Early Development 3-3
3.3.5 Land Use Changes 3-3
3.3.6 Existing Drainage Facilities 3-4
3.3.7 Unpaved Roads and Road Shoulders 3-4
3.3.8 Homes Below Road Grade 3-4

3.4 Recently Completed or On-Going Community Drainage Projects 3-4
3.4.1 Cambria Flood Control Project: Santa Rosa Creek Bypass Channel 3-4
3.4.2 Marine Terrace Cooperative Roads Project 3-5
3.4.3 Sheffield Street Pressure Storm Drain and West Village Pump Station Projects 3-5
3.4.4 Village Lane Culvert 3-5

3.5 Engineering Analysis Overview 3-5
3.5.1 Local Drainage and Flooding Problems 3-6
3.5.2 Hillside Runoff and Sedimentation 3-6
3.5.3 Maintenance of Drainage Facilities 3-6
3.5.4 Curbs and Gutters 3-6

3.6 Proposed Capital Improvement Projects 3-7
3.6.1 Marine Terrace 3-7
3.6.1.1 Existing Conditions 3-7
3.6.1.2 Project 1: Eroded Drainage Channel from Saint Thomas Avenue to Emmons Drive 3-8
3.6.1.3 Project 2: Marlborough Lane and Drake Street Flooding 3-9
3.6.1.4 Project 3: Newhall Avenue and Randall Drive Flooding 3-10
3.6.1.5 Marine Terrace Cost Estimates: Projects 1 through 3 3-11
3.6.2 Cambria Pines Estates 3-12
3.6.2.1 Existing Conditions 3-12
3.6.2.2 Project 4: Kenneth Drive Area Swale 3-12
3.6.3 Lodge Hill South 3-12
3.6.3.1 Project 5: Burton Drive between Orville Avenue and Ardath Drive 3-13
3.6.3.2 Project 6: Home and Roadway Flooding at Bradford Road and Orville Place 3-13
3.6.3.3 Project 7: Home Flooding on McCabe Drive near Ardath 3-14
3.6.3.4 Project 8: Flooding of Streets and Homes on Cowper, Radcliff Avenue and Langton Street 3-14
3.6.3.5 Project 9: Minor Projects and Berm Installation at Various Locations 3-15
3.6.3.6 Lodge Hill South Cost Estimates: Projects 4 through 9 3-16
3.6.4 Lodge Hill North 3-17
3.6.4.1 Existing Conditions 3-17
3.6.4.2 Project 10: Wilton Drive Localized Flooding 3-17
3.6.4.3 Project 11: Ramsey Street Flooding 3-18
3.6.4.4 Project 12: Berm Installation at Various Locations 3-18
3.6.4.5 Lodge Hill North Cost Estimates: Projects 10 through 12 3-19
3.6.5 Pine View 3-19
3.6.5.1 Existing Conditions 3-19
3.6.5.2 Project 13: Eton Road Flooding near Wood Street 3-20
3.6.5.3 Project 14: Residential Flooding on Martindale Road 3-20
3.6.5.4 Cambria Pines Lodge and Expansion 3-20
3.6.5.5 Pine View Cost Estimates: Projects 13 and 14 3-22

3.6.6 Pine Knolls Estates 3-22
3.6.7 Park Hill 3-22
3.6.7.1 Existing Conditions 3-22
3.6.7.2 Project 15: Dorset Street and Cambridge Street Gully 3-23
3.6.7.3 Project 16: Pembrook Minor Ponding 3-24
3.6.7.4 Project 17: Windsor Bridge 3-24
3.6.7.5 Park Hill Cost Estimates: Projects 15 and 16 3-25
3.6.8 Happy Hill 3-25
3.6.8.1 Existing Conditions 3-25
3.6.8.2 Project 18: Canterbury Lane Drainage Problem 3-25
3.6.8.3 Project 19: Berm Installation at Various Locations 3-26
3.6.8.4 Project 20: Suffolk Street Flooding 3-26
3.6.8.5 Happy Hill Cost Estimates: Projects 18 through 20 3-27
3.6.9 Leimert Estates 3-27
3.6.10 Summary of Costs 3-28
3.6.11 Recommended Projects 3-28

3.7 Additional Recommendations 3-29
3.7.1 Proposed Residential Design Standards 3-29
3.7.1.1 Elevation Requirements and Mountable Berms 3-29
3.7.1.2 Minimize Storm Runoff from Homes 3-30
3.7.1.3 Development on Steep Terrain 3-30
3.7.2 System Improvements with Increased Development 3-31
3.7.3 Rolled Asphalt Berms 3-31
3.7.4 Pave Roads 3-32
3.7.5 Routine Maintenance of Drainage Channels and Culverts 3-32
3.7.6 Formation of a Drainage Facility Maintenance Department 3-32
3.7.7 Neighbor Coordination 3-33
3.7.8 Hillside Runoff and Sedimentation 3-33
3.7.9 Collect Design Level Surveys 3-33

3.8 Summary of Recommendations 3-34

3.9 Cost Estimates 3-34

CHAPTER 4 ENVIRONMENTAL FEASIBILITY ANALYSIS 4-1

4.1 Environmental Analysis Objective 4-1
4.1.2 Environmental Analysis Methodology 4-1
4.1.3 Biological Resources 4-1
4.1.4 Cultural Resources 4-1
4.1.5 Land Use 4-1

4.2 Environmental Analysis Results 4-2
4.2.2 Environmental Constraints 4-2
4.2.3 Permit Requirements 4-2
4.2.4 Potential Mitigation 4-2
4.2.5 Additional Studies and Surveys 4-3

CHAPTER 5 FUNDING ALTERNATIVES 5-1

5.1 Overview of Funding Responsibilities 5-1

5.2 Funding Sources 5-1
5.2.2 Recommended Funding Strategy 5-1

5.2.3 Local Funding 5-2
5.2.3.1 Special Taxes 5-2
5.2.3.2 Benefit Assessments 5-2
5.2.3.3 County Cooperative Road Improvement Program 5-2
5.2.3.4 Property-Based Fee 5-3
5.2.3.5 Development Impact Fee 5-3
5.2.4 Outside (Leveraged) Funding Sources 5-4
5.2.4.1 U.S. Army Corps of Engineers: Flood Hazard Mitigation and Riverine Ecosystem Restoration Program 5-4
5.2.4.2 U.S. Army Corps of Engineers: Continuing Authorities Program (CAP) 5-5
5.2.4.3 California Department of Water Resources: Urban Streams Restoration Program 5-5
5.2.4.4 State Water Resources Control Board: Proposition 13 Watershed Protection Program 5-6
5.2.4.5 Governor's Office of Emergency Services: Flood Mitigation Assistance Program 5-6

5.3 Recommended Funding Strategy 5-6

CHAPTER 6 IMPLEMENTATION STRATEGY 6-1

6.1 Local Control versus District Control 6-1
6.1.2 Amend CCSD Charter to Include Drainage Services 6-1

6.2 Drainage Improvements in All Districts 6-1
6.2.2 Implementation Steps 6-2
6.2.2.1 Community Designates a Lead Agency 6-2
6.2.2.2 Lead Agency Prepares Basis of Design Report 6-2
6.2.2.3 Conduct Benefit Assessment or Property Based Fee 6-2
6.2.2.4 Design Project, Prepare Environmental Documents and Permits 6-2
6.2.2.5 Construction 6-3
6.2.3 Cost Estimate 6-3
6.2.4 Timeframe for Implementation 6-3

APPENDICES

APPENDIX A – Figures

APPENDIX B – Photographs

APPENDIX C – Community Questionnaire and Responses

APPENDIX D – Resolution Establishing Policy

APPENDIX E – Engineering Analysis Technical Memorandum

APPENDIX F – Environmental Analysis Technical Memorandum

APPENDIX G – Funding Assistance Review Technical Memorandum

APPENDIX H – Comments and Response to Comments

APPENDIX I – Caltrans Type E4 Mountable Berm Typical Section

LIST OF TABLES

TABLE 3-1: MARINE TERRACE PROJECTS 1 THROUGH 3 3-11
TABLE 3-2: LODGE HILL SOUTH PROJECTS 4 THROUGH 9 3-16
TABLE 3-3: LODGE HILL NORTH PROJECTS 10 THROUGH 12 3-19
TABLE 3-4: PINE VIEW PROJECTS 13 AND 14 3-22
TABLE 3-5: PARK HILL PROJECTS 15 AND 16 3-25
TABLE 3-6: HAPPY HILL PROJECTS 18 THROUGH 20 3-27
TABLE 3-7: CAMBRIA DRAINAGE IMPROVEMENTS SUMMARY COST TABLE 3-28
TABLE 4-1: ENVIRONMENTAL CONSTRAINTS 4-5
TABLE 4-2: PERMIT ASSESSMENT 4-6
TABLE 4-3: PERMITTING TIMEFRAME 4-8
TABLE 6-1: FORECAST DURATIONS FOR MAJOR TASKS 63

ABBREVIATIONS

CCSD	Cambria Community Services District
CEQA	California Environmental Policy Act
CDFG	California Department of Fish and Game
Caltrans	California Department of Transportation
CCC	California Coastal Commission
CCI	Construction Cost Index
CCRWQCB	Central Coast Regional Water Quality Control Board
cfs	Cubic Feet per Second
Corps	U.S. Army Corps of Engineers
County	San Luis Obispo County
CSD	Community Services District
CZLUO	San Luis Obispo County Coastal Zone Land Use Ordinance
District	San Luis Obispo County Flood Control and Water Conservation District
EIR	Environmental Impact Report
FEMA	Federal Emergency Management Agency
FH	Flood Hazard
FIRM	Flood Insurance Rate Maps
FMP	Floodplain Management Plan
ft	feet
LAFCo	Local Agency Formation Commission
LF	linear feet
NCAC	North Coast Advisory Council
NEPA	National Environmental Policy Act
ND	Negative Declaration
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
OES	Office of Emergency Services
RWQCB	Regional Water Quality Control Board
SWRCB	State Water Resources Control Board
SLOCAPCD	San Luis Obispo County Air Pollution Control District
TM	Technical Memorandum
USFWS	United States Fish and Wildlife Service

CHAPTER 1 INTRODUCTION

Chapter Synopsis: This chapter presents the purposes, objectives, and scope for the Drainage and Flood Control Study, followed by the methodology used to achieve those purposes and objectives.

The community of Cambria (Cambria) is located on the central coast of California, located approximately 35 miles north of San Luis Obispo and 5 miles south of San Simeon. Cambria is bordered by the Pacific Ocean to the west, and surrounded by rolling foothills of the Coast Ranges to north, east and south. Originally subdivided over 70 years ago, Cambria was developed into a community of vacation homes. Recent trends have expanded Cambria and increased the number of homes and full time residences. Figure 1-1 shows the location of Cambria with respect to surrounding communities.

Cambria is one of a series of small unincorporated communities that line the coast of San Luis Obispo County and are separated from the majority of development in the County by the green buffer of the Coast Ranges. Cambria is composed of five separate commercial districts and nine residential neighborhoods, which are illustrated in Figure 2 of Appendix A. The nine residential districts are situated on the surrounding hills and ocean bluffs. Each of the nine neighborhoods has its own character defined by home styles, topography, microclimate and neighborhood age.

Figure 1-1: Community of Cambria Location[3]

Approximately 6,500 residents live in Cambria[4]. As shown in Figure 2 in Appendix A, Highway 1 is the principal transportation corridor in Cambria. The regional state highway extends on a south-east to north-west alignment from its junction with Highway 101 in the City of San Luis Obispo.

The residential areas of Cambria are all well-defined by previous subdivisions. There are no major land areas within the community that could be used for large subdivision development. The source of future growth will be construction on "in-fill" lots in existing subdivisions. Many homes in Cambria are used on weekends only or on a seasonal basis. It is projected that seasonal use will decline and many of these homes will become permanent residences. The need for infrastructure improvements, such as drainage facilities, will change as this shift occurs.

San Luis Obispo County and the State Coastal Commission govern and oversee building development within the community. Building size and height are regulated and adapted to specific areas within the community. Due to the countywide Growth Management Ordinance, the wait for building in Cambria is approximately 20 years, unless purchasing a lot already on the Cambria Community Service District (CCSD) water/sewer list awaiting permits.

[3] Map is excerpted from Microsoft Streets and Trips
[4] Chamber of Commerce web site.

1.1 Project Understanding

Parts of Cambria have been flooded in the past and West Village is within the FEMA 100-year floodplain. The West Village was under several feet of water during the 1995 storms. The low lying areas of central and west Cambria are vulnerable to flooding because limited channel capacity of Santa Rosa Creek, results in high water surface elevations during peak storm events.

There are two categories of flooding and drainage problems in Cambria, 1) localized drainage problems and 2) major creek flooding problems. Flooding on Santa Rosa Creek is being addressed as part of the Santa Rosa Creek Bypass Structure Project. Therefore, this report will focus on the localized drainage and flooding problems experienced throughout Cambria. The combination of the area's steep topography, the lack of gutters and underground drainage facilities, undersized and under maintained drainage facilities, unpaved roads and location of residential parcels below the street grade has resulted in localized poor drainage and/or flooding around some residences, buildings, and roadways. Lack of storm drain inlets and conveyance facilities has caused drainage and flooding problems at some intersections.

Drainage from uphill lots flows along the edge of street pavement and drains onto lower lots, creating flooding and erosion problems. In locations where homes have been built on historical drainage courses without providing appropriate conveyance systems to reroute flow, storm runoff also runs through private property causing erosion and damage.

1.2 Objectives and Scope

This report has been prepared for the San Luis Obispo County Flood Control and Water Conservation District on behalf of the Community of Cambria. The main objective of the Drainage and Flood Control Study is to identify and present conceptual improvements needed to minimize or eliminate the localized flooding problems, and to convey the collected runoff from the developed areas to a disposal point. It serves as a guide for long range planning for improvements to ensure that the community has reliable drainage infrastructure in the future. This report documents the existing conditions, examines potential improvements, identifies environmental permitting requirements, and recommends a funding strategy to pay for the improvements.

1.3 Methodology

In order to accomplish the goals of the Study, the methodology shown in Figure 1 of Appendix A was used. As shown in the figure, community involvement in the study was imperative to gain a local understanding of the flooding problems. Each community was represented by an Advisory Committee and this Advisory Committee also identified a sub-committee to work directly with the study team throughout the duration of the project. The sub-committee also reviewed technical documents and provided comments to the study team. The North Coast Advisory Council (NCAC) represented the community of Cambria. Members Paul Skartvedt and Walter Fitzhugh worked directly with the study team for the duration of the project. The study team requested input and endorsement from the NCAC at the following milestones:

- Initiation of Study and Community Questionnaire
- Approach to Conducting Engineering Analysis
- Proposed Alternatives for Mitigating Flooding
- Review of Draft Report
- Endorsement of Final Report

In order to gain the local knowledge of existing flooding problems, a questionnaire was mailed to the residents of Cambria. The questionnaire requested information on existing flooding problems, location of flooding, frequency of occurrence, and observed causes. Over 180 responses were received from Cambria residences. A summary of the responses and comments received is included in Appendix C. In order to protect the privacy of

the respondents, personal information (names and phone numbers) is not included in the summary. A sample of the questionnaire is also included in Appendix C.

1.4 Existing Information

When available, existing information was used to assist in the engineering and environmental analysis. A list of references is provided in this report. Previous to this study, limited engineering analysis quantifying the existing drainage and flooding problems had been conducted for the entire community of Cambria, however, a report did exist for the Lodge Hill area. Resident observations and documentation were available and provided valuable information on the location and severity of historic flooding problems.

1.5 Report Content

The structure of the Drainage and Flood Control Study is outlined below.

- CHAPTER 1 – INTRODUCTION (this introduction)
- CHAPTER 2 – COUNTY POLICIES, (presents an overview of the drainage and flood control responsibilities in the County of San Luis Obispo).
- CHAPTER 3 – ENGINEERING ANALYSIS AND ALTERNATIVES DEVELOPMENT, (discusses the existing drainage and flooding problems in Cambria and presents alternatives that will mitigate the problems).
- CHAPTER 4 – ENVIRONMENTAL FEASIBILITY ANALYSIS, (discusses the environmental permitting and regulatory requirements for the proposed alternatives).
- CHAPTER 5 – FUNDING ALTERNATIVES, (provides a summary of funding options, including criteria for qualifying projects, available funds, and cost sharing formulas).
- CHAPTER 6 – IMPLEMENTATION STRATEGY, (This chapter consists of an implementation plan of the recommended improvements developed to reduce nuisance flooding and provide flood protection).

In addition to the six chapters, there are also nine appendices attached to the end of the report. The appendices are:

APPENDIX A – Figures

APPENDIX B – Photographs

APPENDIX C – Community Questionnaire and Responses

APPENDIX D – Resolution Establishing Policy

APPENDIX E – Engineering Analysis Technical Memorandum

APPENDIX F – Environmental Analysis Technical Memorandum

APPENDIX G – Funding Assistance Technical Memorandum

APPENDIX H – Comments and Response to Comments

APPENDIX I – Caltrans Type E4 Mountable Berm Typical Section

CHAPTER 2 COUNTY POLICIES

Chapter Synopsis: This chapter presents an overview of the drainage and flood control responsibilities in the County of San Luis Obispo, as carried out by the San Luis Obispo County Flood Control and Water Conservation District.

2.1 Overview of Responsibilities

The drainage and flood control responsibilities of the County are determined by State and County statutes and by County policy. The responsibilities for drainage are administered through the Road Division of the County Public Works Department and the San Luis Obispo County Flood Control and Water Conservation District (District). The District is the designated County agency responsible for managing, planning, and maintaining drainage and flood control facilities in unincorporated public areas where no other agency has assumed an active role in such activities. The District has a regional role in the County and can work with individual cities or communities when requested. The sections below describe the limits of the jurisdiction of road maintenance and improvement, Road Fund administration, and how the District is administered to best leverage its powers by creating Zones of Benefit to oversee specific projects.

2.1.1 FLOOD CONTROL AND WATER CONSERVATION DISTRICT

2.1.1.1 History

The San Luis Obispo County Flood Control and Water Conservation District was established in 1945. The powers of the District include flood control, water supply, water conservation, water quality protection and the ability to study all aspects of water resources. The District also has power to form zones of benefit within its boundary to implement water resource projects.

The District is a special district that is governed by the County Board of Supervisors. The boundaries of the District are the same as the County boundaries, and the staff of the District is the same as the staff of the County. The District also includes all of the territory within the County's seven incorporated cities. The District budget is separate and distinct from all other County budgets. It has its own funding sources, and its own expenditure plan.

2.1.1.2 Policy Direction: Resolution Number 68-223

The District is available to help communities deal with flood waters and to conserve, study and develop water supplies. The District uses its general fund to identify water related issues, to determine solutions to those problems and to help those local areas implement recommended solutions. The District is not, however, responsible for paying for community-specific mitigation improvements. The specific property owners that benefit from these solutions must agree to pay for the construction and future maintenance of them. This policy (Resolution 68-223) was formally established by the Board of Supervisors in 1968, and was reviewed and reconfirmed in April 2001. The documentation of the policy is included in Appendix D of this report.

The policy was adopted because there is not sufficient funding available for the District to fund construction and operation of facilities. This approach provides the best leveraging of the funds that are available on a county-wide basis.

2.1.1.3 Funding Sources

The primary funding source for the District, which is the entire County, is a pre-Proposition 13 general property tax allocation, which provides approximately $550,000 per year in revenue. In addition, the District receives about $130,000 per year in interest income from current resources. Reserves from the County's General Fund,

which is separate from District fund, are normally not used for the construction of projects protecting private property, unless there is a significant general or roadway benefit.

2.1.1.4 Countywide Activities

The District provides funding for flood control programming and planning of localized drainage issues.

2.1.2 County Standards for Control of Drainage (Coastal Zone)

The County's planning department establishes the land use policies and drainage ordinances for the County (the District has no land use ordinances). Section 23.05.040 et. seq., of the San Luis Obispo County Coastal Zone Land Use Ordinance (CZLUO) contains the County's standards for the control of drainage and drainage facilities. These standards aim to minimize the harmful effects of storm water runoff and to protect neighboring and downstream properties from drainage problems resulting from new development. They include:

- Requirements pertaining to the design and construction of drainage systems
- Requirements pertaining to the maintenance of offsite natural drainage patterns
- Requirements pertaining to the location of development in the coastal area
- Restrictions on development in areas subject to flood hazards

Conditions of development in flood hazard areas must, at a minimum, enforce the current Federal flood plain management regulations as defined in the National Flood Insurance Program. Projects that may be subject to or cause flood hazards are required to prepare a drainage plan, subject to approval by the County Engineer.

In addition, Section 23.07.060 of the County's CZLUO contains development standards for areas with the Flood Hazard (FH) designation. The standards state that drainage plans for development in FH areas must include a normal depth analysis that determines whether the proposed development is in the floodway or the flood fringe. In addition, development in FH areas would be subject to construction practices that would not limit floodway capacity or increase flood heights above an allowable limit.

2.1.3 The Road Fund

The County provides some limited drainage improvements as a function of its road maintenance responsibilities. The Road Fund is a separate, distinct legal account and budget, from the District. It has numerous State statutes (primarily the Streets and Highways Code) that dictate how Road Fund monies may legally be expended. The Road Fund program operates the County Maintained Road System and is funded through a combination of restricted revenue sources that are primarily derived through taxes on gasoline that are apportioned to cities and counties by the State, as well as contributions from the County General Fund. These funding sources can only be spent on solving problems that directly relate to County maintained roads.

As a function of operating the road system, the drainage issues related to the road system are addressed when such drainage work protects the County maintained road system in a cost beneficial way, or is directly related to County road improvement projects and is necessary to prevent property damage. This includes directing the flow of streams across the roads through culverts and bridges.

Specific drainage related projects completed in Cambria through the Road Fund include:

- Paved the ditch on Jean Street and added two 30-inch culverts as the start of Marine Terrace drainage
- Improved drainage in a cooperative effort between Ogden and Emmons. Private property owners placed a 36-inch culvert across their properties at their expense, and the Department of Public Works placed inlet and outlet structures to convey flow from, and back onto, the roadway (see Photograph 1 of Appendix B for inlet structure).
- Removed, replaced and enlarged a culvert on Madison Street to prevent overtopping of the roadway.

- Installed new berms and drainage ditches to better control roadside drainage, erosion and runoff created by new home construction.

In addition to the above Road Fund financed drainage improvements, the following drainage projects are currently planned for the future.

- Enlarge and replace a culvert on Village Lane.
- Construct improvements to tie in with the Co-op Road Improvement Projects on Marine Terrace.

2.1.4 Other Agencies with Drainage Responsibilities

2.1.4.1 Community Service Districts

Community Service Districts (CSD's) are locally controlled special districts that can also provide drainage and flood control services. The Cambria CSD provides water, sewer, and garbage collection services, but does not have authority to provide drainage and flood control services. No special district provides drainage service in Cambria.

2.1.4.2 County Service Areas

County Service Areas (CSA's) can focus the powers of the County to provide specific services to specific areas, including drainage and flood control services. These special districts are governed by the County Board of Supervisors and receive their funding through the collection of voter approved service charges or benefit assessments from the residents or property owners of the specific area served. LAFCo discourages the creation of CSA's within the boundaries of a CSD when the CSD is capable of performing the same services. A new CSA would also create administrative costs to operate. Therefore, no CSA currently provides drainage service in Cambria.

2.1.4.3 Cities

Individual cities within the County exercise control over drainage issues within their city limits.

2.1.4.4 U.S. Corps of Engineers

At the Federal level, the U.S. Army Corps of Engineers (Corps) provides flood protection throughout the nation, however, the Corps has done very little work in San Luis Obispo County and operates no facilities here.

2.1.4.5 California Department of Water Resources

The Sate of California also administers some flood control and drainage programs via the State Department of Water Resources' (DWR) flood control division. DWR has little presence in the County, and mainly gets involved in a consulting role during flood emergencies.

2.1.4.6 Caltrans

The California Department of Transportation (Caltrans) operates drainage facilities that are associated with the State Highway System.

2.2 Flood Control Zone

The District has the power to form Zones of Benefit to implement and operate facilities. Each Zone must have its own funding source.

2.3 Funding Issues

The District is restricted in the way it can fund needed projects or increase revenues for existing operations. It is generally limited to a zone of benefit or an assessment district procedure for obtaining financing for the construction of new projects.

Due to the changes enacted with the passage of Proposition 218, the District must now also have all new benefit assessments, and increases to existing benefit assessments for maintenance and operations, approved through an election of affected property owners.

The District provides a means of funding studies that define problems and recommend technical solutions to those problems. The critical next steps of constructing and maintaining drainage facilities can normally only be completed with local benefiting property owners being willing to vote to assess themselves for these costs.

Chapter 5 discusses in greater detail the alternative methods for potentially funding the construction of community-specific flood control and drainage projects.

2.4 Maintenance Responsibilities

Survey respondents reported that many of the existing storm drain facilities are filled with sediment and vegetation. Field investigations indicate that some of the drainage ditches, roadside swales and underground storm drains were partially filled with excessive sediment and vegetal growth. Under maintained facilities reduce their design capacity and inhibit their ability to convey runoff. However, in Cambria, the District does not possess flood control or drainage easements for any of the creeks. Under these circumstances, the owner whose parcel line extends into the drainage channel is responsible for maintaining the channel's capacity. If a property owner does not maintain the conveyance facilities, then these structures will go unattended because the District is not responsible for maintaining facilities on private property or on property within the jurisdiction of other public agencies (e.g. Caltrans and Highway 1).

2.5 Private Resident Opportunities

In some cases, the residents or groups of residents can accelerate the installation of road or storm drain improvements by paying the County Engineering Department to install an identified improvement. Current County policy requires the benefited party to pay for the necessary improvements. In 2002, the County implemented an improvement plan for the Marine Terrace and Alban Place, via the Cooperative Roads Improvement Program. Seven streets were paved and two storm drains were installed as part of this project.

CHAPTER 3 ENGINEERING ANALYSIS AND ALTERNATIVES DEVELOPMENT

Chapter Synopsis: This chapter discusses the existing drainage and flooding problems in Cambria and presents alternatives that can mitigate the problems. The chapter also presents the estimated cost for planning, designing and constructing the proposed capital projects. An engineering technical memorandum was prepared for this study and is included in Appendix E. The technical memorandum provides greater detail on the engineering methodology, analysis and alternatives. Some items in this chapter were modified since the completion of the technical memorandum. The reader should rely on this chapter for the most updated information.

3.1 Overview of Proposed Projects

The proposed solution to the problems is the construction of a number of small project alternatives, or groups of smaller projects, to resolve the flooding problems. For Cambria, up to 20 individual or groups of projects have been investigated to address the drainage and flooding problems and are shown by district on Figures 3 through 13 in Appendix A. The proposed projects can either be implemented individually to solve isolated problems, or combined to develop a comprehensive solution for improved drainage throughout the entire community. However, the intent is that each alternative will work independently to solve localized problems. The benefit to this approach is that neighborhood groups could organize to implement a project in their section of town and not be impeded by the lack of action of others. Although an extensive curb, gutter and storm drain system could be constructed to provide conveyance of all storm water runoff, the project would be very expensive and would not blend with the rural character of Cambria. If all the projects proposed in this report were implemented, the estimated project costs would be approximately $6.7 million. This total includes street and berm improvements totaling approximately $2.4 million that would be paid by the benefiting home owners through the Cooperative Roads Improvement Program. Table 3-7 breaks down the project costs by district.

The proposed projects and their priority for implementation are dependent upon the needs of the individual residents and their desire to reduce damages and/or nuisance flooding problems caused by inadequate or non-existent drainage facilities. A general summary of projects and recommendations for improving flood protection and stormwater drainage is provided below.

- Develop a selection process for prioritizing storm drain improvements and identifying the sources of funding for the improvements.
- Consider forming a special assessment district to fund drainage system improvements and to provide drainage maintenance responsibilities, or amend the charter of the Cambria Community Services District to include drainage responsibilities.
- Establish maintenance responsibility for flood prone areas on private property.
- Modify land use ordinance standards to mandate:
  - On-site retention of stormwater runoff
  - All new homes be constructed with the street level floor higher than the adjacent road grade elevation, or build all access points to a structure (e.g. doors and garages) one foot higher than the adjacent ground elevation
  - All new driveways slope towards the road
  - All existing homes located below the adjacent street grade install rolled asphalt berms.

3.2 Engineering Methodology

The purpose of the engineering analysis was to examine existing drainage conditions for Cambria, identify problematic areas and issues, prioritize and categorize the problems. This analysis also developed conceptual projects to mitigate identified drainage and flood control problems. This chapter includes a description of

existing drainage conditions, a discussion of the methodology used to evaluate drainage problems, and identification of a series of proposed projects to mitigate the drainage problems. The proposed projects can either be implemented individually to solve isolated problems, or combined to develop a comprehensive solution for improved drainage throughout the entire community.

Cambria was divided into nine residential districts: 1) Marine Terrace, 2) Cambria Pine Estates, 3) Lodge Hill South, 4) Lodge Hill North, 5) Pine View Tract, 6) Pine Knoll Estates, 7) Park Hill, 8) Happy Hill, and 9) Leimert Estates. These districts are shown in Figure 2 of Appendix A. The study team utilized existing topographic maps to delineate watershed sub-basins and to identify storm water runoff flow paths. The known problem areas were assessed using a combination of resident accounts and field investigations.

3.3 Existing Drainage and Flooding Problems

The lack of gutters and underground storm drains, undersized and under maintained drainage facilities, unpaved roads and location of homes below the street grade has resulted in localized poor drainage and/or flooding around some residences, buildings, and roadways. Based on the community responses to the questionnaires, the most serious flooding in the community takes place where natural drainage courses were filled in by roads or housing developments, and no provision for drainage was incorporated into the development. Subsequently, storm runoff that historically flowed unimpeded, now has a structure obstructing its path. These locations will experience flooding if an underground drainage pipe, roadside swale or other drainage facility is not built to reroute the storm runoff.

Drainage problems within the community were identified by:

- Reviewing community responses to questionnaires
- Conducting community outreach discussions with local residents and County staff
- Conducting field mapping of curbs, gutters, and storm drain facilities
- Reviewing Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) for the Cambria Community

3.3.1 Regional Hydrology

Cambria is bound by the Pacific Ocean to the west and surrounded by the Santa Lucia Mountains to the north, east, and south. Much of the community is built in the steep foothills of the Santa Lucia Mountains. With the exception of the coastline which slopes gently to the sea, the surrounding area is characterized by steep mountains and narrow valleys. The downtown area, an area that was historically hit with severe flooding, is located at roughly 20 to 40 feet above mean sea level (MSL).

The majority of Cambria is located within the Santa Rosa Creek watershed. Santa Rosa Creek, running east to west along Main Street, has a drainage area of approximately 45 square miles. The Santa Rosa Creek watershed has significant topographic variability. Elevations in the watershed range from sea level to over 2,000 feet above MSL in some mountain areas. Santa Rosa Creek has a history of flooding. The last significant flood event occurred in March of 1995 and caused extensive flooding in the West Village. Such flooding can be partially attributed to the siting of this portion of the community within the historic floodplain of Santa Rosa Creek. Generally, floods along the creek channel tend to be high magnitude, short-duration events. A bypass channel for Santa Rosa Creek is currently being planned. The bypass channel will protect the West Village from extensive flood damage from Santa Rosa Creek flows similar to those that occurred in 1995.

3.3.2 FEMA Flood Hazard Zones

Portions of Cambria, along Main Street (West Village), have been classified by the Federal Emergency Management Agency (FEMA) as being located within 100-year flood hazard zone of Santa Rosa Creek. The West Village was under several feet of water during 1995 storms. The FEMA floodplain delineations are shown

in Appendix E, Engineering Analysis Technical Memorandum. The Santa Rosa Creek Bypass Structure project is scheduled for completion in 2004/05). It should be noted that the 100-year flooding evaluation and recommendations for solutions to the 100-year flooding problems in the FEMA designated zones were not the purpose of this study.

3.3.3 TOPOGRAPHY

A unique feature of Cambria is the three-dimensional landscape of the surrounding hills, the Santa Rosa Creek Valley and the bluffs along the Pacific Ocean. The residential neighborhoods are built on the surrounding hills and marine terraces. Each of the neighborhood districts has a different slope aspect, topography, and amount of developed and open land. This variation in topography between neighborhoods complicates the approach for developing a drainage plan for the entire community. Each district must be considered independently, precluding the opportunity to develop a traditional storm drain system for the entire community.

3.3.4 NO DRAINAGE PROVISIONS DURING EARLY DEVELOPMENT

When Cambria was first subdivided over 70 years ago, storm water conveyance and flood control infrastructure were not incorporated into the community. There are several reasons for this, including:

- No regulatory requirement to provide drainage improvements, since the development was pre-subdivision Map Act requirements.
- Cambria' topography, proximity to the ocean and existing creeks rendered a perception that a formal storm drain system was unnecessary because the natural physical characteristics of the community were sufficient for conveying storm runoff to the ocean.

During this early period, the curb, gutter, and drainage improvements were not required for development, resulting in no upfront drainage infrastructure cost by the property owners. With an increase in urbanization came an increase in impervious surfaces and runoff, and also a decrease in pervious surfaces available to absorb the urban runoff.

The combination of the area's steep topography, lack of drainage facilities, unpaved roads and location of homes below the street grade has resulted in soil erosion and localized poor drainage and/or flooding around some residences. The lack of a consistent, organized network of drainage facilities within the community causes storm runoff from a number of uphill lots to flow along the edge of street pavement and drain onto lower lots, creating flooding and erosion problems. However, drainage problems also exist where curbs or berms are present, but the topography creates conditions where lots adjacent to the roadway are much lower than the roadway surface. This allows street drainage flowing at the curbside to enter the residential lots at the lowered curb section along the driveway entrance.

3.3.5 LAND USE CHANGES

Major land use changes have occurred in Cambria over the past 50 years. These changes include increased urbanization of Cambria resulting from new home construction and miles of road installation. Continued construction results in an increase of impervious surfaces and an increase in surface runoff.

Most home owners collect and convey storm runoff from their property to the street right of way. If the street is paved but does not have underground drainage facilities or roadside drainage swales, then the runoff will tend to flow downhill and collect in road sags or properties sitting lower than the road grade. The conversion of forest land to developed residential homes will increase the rate and volume of runoff from precipitation. If drainage provisions are not constructed, then the storm runoff path may be altered, potentially damaging areas not historically flooded.

3.3.6 Existing Drainage Facilities

There are a few large storm drain pipelines and drainage ditches scattered throughout the districts in Cambria. The existing storm drain facilities are shown in the figures for each district in Appendix A. These were identified and mapped during the field reconnaissance. It is possible that some private and public storm drains were not located; therefore, the structures identified in the figure are not intended to be a comprehensive inventory of all facilities. With the exception of a few storm drains, berms and drainage ditches in the Marine Terrace, there appears to be little continuity or synergism between the numerous drainage facilities in Cambria. As runoff gathers, concentrates and discharges from one facility (say a storm drain), if no facility is constructed downstream to capture this flow, then roads and homes in the runoff's path could be damaged during large storms. An example of this condition is the discharge of Avon Creek onto Marlborough Lane in the Marine Terrace district. Runoff is not conveyed in a storm drain in Castle Street, but instead flows through private lots and back yards, eventually flooding Drake Street. Photographs 2 and 3 in Appendix B show where storm runoff discharges onto Marlborough Lane and flows through backyards.

3.3.7 Unpaved Roads and Road Shoulders

Existing roads in Cambria include paved roads, with or without curbs, to unpaved roads with culverts or roadside swales. Curbing types include asphalt berms and concrete or asphalt curbs. Unpaved roads are susceptible to erosion. The uncurbed road shoulders erode because the paved road sections and residential homes concentrate and direct storm runoff to the road shoulders. Continued erosion leads to damaged road surfaces, and increased cost for repairing uncurbed sections. Photographs 4 and 5 in Appendix B provide examples of unpaved roads and roads lacking curbs/berms.

Presently, road maintenance operations in Cambria generally rely on complaints and landowner payments to guide road repair activities along residential streets. Main thoroughfares are treated differently in that the cost for repair is not passed on to the landowners who live on these streets. This type of management is common for county road management throughout the State.

It should be noted that several of the roadways recommended for surfacing are of substandard width or grade and do not meet the minimum requirements of the California Fire Code for an approved fire access roadway. **If an unpaved road is improved, then the roadway should be brought into compliance with the California Fire Code.**

3.3.8 Homes Below Road Grade

Homes that are down-slope of a road and whose driveways slope down away from the road experience flooding. Runoff will typically flow through driveways and into garages. Homes subject to concentrated flow erosion often take measures to manage storm runoff from their roof gutters, install drains in the driveway to divert flow, and install rock lined ditches to direct runoff to street right of way. Some people also use sandbags to redirect water around their home. Photograph 6 in Appendix B shows homes on McCabe that were recently constructed below street grade without asphalt berms to protect the homes from street runoff.

3.4 Recently Completed or On-Going Community Drainage Projects

3.4.1 Cambria Flood Control Project: Santa Rosa Creek Bypass Channel

In the 1960's Highway 1 was constructed on fill, dividing the floodplain of Santa Rosa Creek. To the south is the creek channel and to the north is the West Village. Highway 1 now acts as a low levee, separating the creek from its floodplain to the north. A significant flood event occurred in 1995 throughout the West Village. A significant portion of the damage resulted from inadequate capacity in Santa Rosa Creek at the Highway 1 bridge. This resulted in flow leaving the channel, overtopping a low creek bank levee, flooding West Main Street, and inundating the West Village.

Flooding problems along Santa Rosa Creek in the West Village are being addressed by the construction of a by-pass channel for Santa Rosa Creek. The by-pass channel will allow overflows to move slowly through the by-pass channel and then rejoin the Santa Rosa Creek downstream without overtopping Cambria Drive or Santa Rosa Creek. The project restores controlled flooding to the historic floodplain of Santa Rosa Creek while protecting the West Village from overflows of Santa Rosa Creek. Refer to the June 22, 2000 Questa Engineering Corporation Final Feasibility Report for detailed information on the West Village area flooding problem and the Cambria Flood Control Project.

3.4.2 Marine Terrace Cooperative Roads Project

Major improvements plans were completed in fall of 2002 in the Marine Terrace area of Cambria. These plans consisted of major improvements to streets and drainage west of Marlborough Lane and between Emmons Road and Jean Street. As documented in Chapter 2, in a cooperative effort with the community, the County improved drainage between Ogden and Emmons when the street improvements were installed. Among the improvements were mountable roadside berms, the replacement of several storm drain pipes, and the construction of a new 36-inch storm drain pipe down Harvey Street.

3.4.3 Sheffield Street Pressure Storm Drain and West Village Pump Station Projects

Local runoff collects in the West Village during large storms because the existing storm drainage system relies on a series of flap gated culverts draining to Santa Rosa Creek. During large storms, high flows in Santa Rosa creek prevent these culverts from draining. Runoff backs up and ponds in the low lying areas of the West Village. As of the writing of this technical memorandum, schematic designs have been developed to reduce flooding in the West Village from local runoff. The concept involves the combination of two facilities, a pressure storm drain and a pump station.

A pressure storm drain is proposed along Sheffield Street through the West Village. This storm drain will intercept runoff from the main Sheffield drainage and use pressure head to discharge the water directly into Santa Rosa Creek. Because the storm drain must be under pressure to discharge flow during high stages in Santa Rosa Creek, there will be no drop inlets proposed in lower portions of the West Village. Local runoff generated from watersheds above and in the West Village will be directed to a pump station located at the eastern end near Main Street and Kent Avenue. This pump station will collect runoff and pump into Santa Rosa Creek, utilizing either existing storm drainage pipes or new ones installed across Highway 1. These projects have not been funded at this time but the County is actively seeking potential sources of funding for these improvements.

3.4.4 Village Lane Culvert

The 36-inch culvert on Village Lane was replaced by the County in the summer of 2002 to increase the culvert's capacity. This improvement addressed concerns regarding the increase in flow in Burton Drive due to development in the upper watershed.

3.5 Engineering Analysis Overview

There appears to be no coherent system to manage storm runoff in Cambria. Storm water flows in paved and unpaved streets that may or may not contain curbs. Runoff is then discharged to another street, water course or private lot that lacks sufficient capacity to convey the flow. This sequence of steps continues until the water reaches a barrier or low point with no outlet, where flooding occurs. Through discussions with County staff and Cambria residence, it appears that a traditional network of curbs, gutters, drop inlets and underground pipes are not preferred in the community that wishes to maintain its character.

3.5.1 Local Drainage and Flooding Problems

Local flooding problems include storm water runoff from uphill areas entering neighboring residences during peak rainfall periods and ponding of storm water near intersections and in yards. A majority of the community lacks a consistent, organized network of curbs, gutters, and storm drains, resulting in a number of nuisance drainage and flooding problems within the community. Drainage from a number of uphill lots flows along the edge of the street and drains off the edge of the pavement through the lower lots, creating flooding and erosion problems. However, drainage problems also exist where berms are present, but the topography creates conditions where lots adjacent to the roadway are much lower than the roadway surface. This allows street drainage flowing at the curbside to enter the residential lots at the lowered curb section along the driveway entrance. In some cases, a small rolled asphalt section has been place along the driveway entrance, which prevents runoff from entering the driveway. In other cases, residents have constructed trench drains across their driveway to prevent runoff from entering their garages and residences.

3.5.2 Hillside Runoff and Sedimentation

Some survey respondents identified hillside runoff and sedimentation as a major problem in Cambria. During storms, hillside runoff scours the surface and carries sediment to lower lying areas. Homes that back up onto hillsides receive this runoff. If the owner has not constructed a barrier or erosion protection measure, then the sediment concentrated runoff will deposit onto the property and create a nuisance problem. There have been no reports of damage due to hillside runoff.

3.5.3 Maintenance of Drainage Facilities

Survey respondents reported that many of the existing drop inlets and culverts are filled with sediment and debris. Under maintained facilities reduce their design capacity and inhibit their ability to convey runoff. Field investigations indicate that some of the culverts and drainage ditches were partially filled with sediment and excessive vegetal growth. However, in many instances it was difficult to determine whether the culverts were located in public right of way or on private property. The District is not responsible for maintaining facilities on private property.

3.5.4 Curbs and Gutters

San Luis Obispo County Land Use Ordinance 22.54.030 requires the installation of concrete curb, gutters, and sidewalks along the entire street frontage of the site under permit, and also along the street frontage of any adjoining lots in the same ownership as the site, for any projects in the following land use categories:

- New residential subdivisions, pursuant to Title 21 of the SLO County Code
- Residential multifamily land use category, remodeling improvements that are valued at 25 percent or greater than the current property value
- New residential multifamily categories within an urban reserve line
- All commercial, office and professional categories within an urban reserve line
- All industrial categories within an urban reserve line.

Curbs and gutters are not required on new residential single family lot construction (infill lots), residential rural and suburban categories, agricultural, open space and park & recreation land use areas within an Urban Reserve Line. Curb, gutter and/or sidewalk improvement requirements may be waived, modified or delayed as follows:

- Incompatible Grade. In the opinion of the County Engineer, the finish grades of the project site and adjoining street are incompatible for the purpose of accommodating the improvements.
- Incompatible Development. Based upon the land use designations, existing land uses in the site vicinity, and existing and projected needs for drainage and traffic control, that such improvements would be incompatible with the ultimate development of the area.

- Premature Development. 1) The proposed use of a site is an interim use, 2) the project is part of a phased development and upon completion of all phases, the entire extent of improvements will be constructed, and 3) delaying the improvements would better support the orderly development of the area.

The character and level of development of the rural residential community is such that the retrofitted installation of a community supported integrated system of curbs and gutters is extremely unlikely. The community should consider incorporating the Caltrans Type E 4 mountable berm into the road section for all new and substantially rehabilitated roads as the standard for all new roadway work where roadway drainage containment is considered necessary in the residential area. Appendix I contains a typical cross section detail of the mountable berm.

3.6 Proposed Capital Improvement Projects

The major constraint identified in local flooding issues was the lack of suitable conveyance facilities for storm water runoff. In most areas, storm water flows as surface flow in streets, ditches, and backyard areas. Stormwater conveyance is widely varied, due to changes in roadway slope and cross section, the presence or lack of curb and gutters, and the presence or lack of existing culverts and drainage channels. Most drainage issues were the result of upstream concentrated flows entering downstream lots due to a reduction in conveyance capacity or the lack of storm drain facilities to convey flow. Other drainage issues were a result of standing water after a rainfall, which could be resolved by providing drain inlets and underground piping to an outlet area.

The proposed projects and alignments presented in this report for mitigation of drainage and flooding issues in Cambria were established using best engineering judgment and available information. The final projects may vary from what is presented in this report as a project becomes more defined.

The proposed projects include the installation of a number of projects to resolve the flooding problems. Several potential projects have been developed to address drainage and flooding issues, and are shown by district on Figures 3 through 13 in Appendix A. A combination of the projects will be required to eliminate all of the drainage problems for the community. However, the intent is that each alternative will work independently to solve localized problems. The benefit to this approach is that neighborhood groups could organize to implement a project in their section of town and not be impeded by the lack of action of others. Although an extensive storm drain system could be constructed to provide conveyance of all storm water runoff, the project would be very expensive. The project alternatives are described in the following sections based on the district for which they are proposed.

The proposed projects discussed in this section are intended for planning level purposes only. Detailed calculation of pipeline diameter would require a design level topographic survey of the proposed alignments and detailed analysis of the peak flow rates of each subwatershed. It is also recommended that the effects of increased runoff on existing downstream creek channels, culverts and other utilities be conducted during the design phase so that proper improvements or mitigation can be planned. If a proposed project proceeds toward implementation, it is recommended that the lead agency invest the resources to perform the detailed engineering.

3.6.1 Marine Terrace

3.6.1.1 Existing Conditions

Marine Terrace is located in western Cambria. Unlike much of the community that drains to Santa Rosa Creek, Marine Terrace drains directly west to the Pacific Ocean. Runoff from upland areas east of Marlborough Lane flows west through low-lying areas, often causing localized flooding due to drainage courses flowing through private properties and road side depressions (See Photographs 2 and 3 in Appendix B). Non existent or

undersized drainage facilities at road intersections also cause flooding problems. Road and drainage improvements were recently completed in parts of the Marine Terrace area (west of Marlborough Street, between Emmons Road and Jean Street) as part of a Community Cooperative Road Improvement Program. Existing drainage infrastructure in the remaining areas of this neighborhood includes storm drain pipes at various street intersections, gullies, and some roadside berms. Figure 3 in Appendix A shows Marine Terrace's existing drainage facilities and major flooding area(s).

Three significant drainage problems were identified in Marine Terrace:

- Flooding along the eroded drainage channel that meanders from Saint Thomas Avenue to Emmons Drive
- Drake Street flooding from Marlborough Lane to Sherwood Street
- Flooding of homes and roadways along southern bend of Newhall Avenue

3.6.1.2 Project 1: Eroded Drainage Channel from Saint Thomas Avenue to Emmons Drive

Problem Assessment

A large gully originates near the intersection of Saint Thomas Avenue and Benson Avenue. The gully collects runoff from properties along Berwick Drive and Benson Avenue. The gully continues westward, collecting additional runoff as it crosses Ogden Drive and Ardath Street within 18-inch and 24-inch corrugated metal pipes (CMP). Flow continues in an open channel above Emmons Drive until it reaches a 36-inch reinforced concrete pipe (RCP) that carries the flow to Oxford Avenue. The water is then discharged on the east side of Oxford Avenue and is directed south along Oxford Avenue by an impact-type energy dissipater. The 18-inch and 24-inch CMP culverts at Ogden Drive and at the intersection of Madison Street and Ardath Street are undersized or do not have adequate headwater depth to overcome inlet control constraints. These hydraulic constraints cause flooding along the gully and street crossings.

Proposed Project

The proposed project involves the replacement of the 18-inch and 24-inch culverts at Ogden Drive and at the intersection of Madison Drive and Ardath Drive with 48-inch culverts. Although preliminary calculations estimate that a 30-inch pipe culvert would greatly reduce flooding problems at this location, a 48-inch culvert would be capable of handling a larger debris load, thus providing additional capacity in the event of debris clogging. Installing approximately 200 feet of 36-inch storm drain in Marlborough Lane, from Gaine Street to Harvey Street would convey street runoff to the existing 36-inch Storm Drain in Harvey Street. Figure 4 in Appendix A shows the location of the proposed project.

Another option is to explore concepts for increasing the headwater depth at the entrances of the existing 18-inch and 24-inch culverts. Increasing headwater depth would reduce inlet control constraints found under existing conditions. The headwall improvement construction cost is approximately $35,000, however, for the purposes of this analysis, project cost estimates were developed for the 48-inch only. Detailed surveys must be conducted prior to determining whether installing a storm drain or increasing the headwall depth would be the preferred alternative from a hydraulic conveyance perspective.

Optional Facility
An option for increasing the conveyance capacity of this project is replacing the gully and roadside ditch with a storm drain. Extending the 48-inch storm drain from Ogden Drive to Emmons, and replacing the existing roadside drainage ditch in Oxford from the existing 36-inch storm drain to Harvey Street would increase conveyance capacity because a storm drain does not experience the same vegetal growth that obstructs open gullies and roadside ditches. The storm drain would also provide a continuous and unimpeded flow path from

Odgen Drive down to Sherwood Drive. These options are shown in Figure 4 of Appendix A. Cost estimates are provided with and without the optional 48-inch storm drain.

3.6.1.3 Project 2: Marlborough Lane and Drake Street Flooding

Problem Assessment

The area west of Marlborough Lane has shallow topography. Runoff flowing west from the hills tends to pool in this area due to flat road gradients and depressions, as well as inadequate drainage facilities at some intersections. While major street and drainage improvements were completed west of Marlborough Lane between Emmons Road and Jean Street in 2002 (residents paid for the street improvements and the County paid for the 36-inch storm drain in Harvey Street to protect the public right of way from flood damage), these improvements did not address severe reoccurring flood problems on Drake Street between Sherwood Drive and Marlborough Lane.

Flooding problems along Drake Street are largely the result of high flows from Avon Creek discharging onto Marlborough Lane. The historic drainage course for Avon Creek has been filled in by homes and roads west of Marlborough Lane. The creek lacks a defined conveyance channel and the flow is directed to Drake Street where it travels west down to the Pacific Ocean. Castle Street, located north and parallel to Drake Street, is not paved and lacks drainage infrastructure. During larger storm events, water from Castle Street joins with flows from Avon Creek and, as a result, inundates Drake Street with approximately 1 foot of water from curb to curb. The inundation of Drake Street causes water to back up, resulting in drainage problems at nearby intersections, including the intersection of Atwell Street and Windsor Boulevard. Several residents claim the backed up water often results in the flooding of their homes and yards.

Proposed Project

The proposed project to mitigate street flooding along Drake Street from Marlborough Lane to Sherwood Drive is to pave Castle Street and install a 36-inch underground storm drain with drop inlets along Castle Street, from Marlborough Lane west to the existing outfall in Sherwood Drive. The underground storm drain system will convey flows from Avon Creek west to the ocean and prevent these flows from inundating Drake Street. Rolled asphalt berms will also be installed along Castle Street to keep runoff within the street and help to convey the runoff to the proposed drop inlets. After these improvements are completed, Drake Street will only need to convey flows from a small portion of Marlborough Lane and Drake Street itself. Figure 4 in Appendix A shows the location of this project in the Marine Terrace. Consistent with many other Cambria Cooperative Road improvement projects, proposed improvements along Castle Street (base and paving) would be paid for by the benefiting street property owners. This will affect the required project funding amount to be discussed later in this chapter.

It is also proposed that Orlando Drive have pavement and berms installed in conjunction with the Castle Street paving, as part of the Cooperative Roads Improvement Program. It should be noted that three attempts have failed to secure homeowner approval of paving Castle Street. Homeowner approval is required because street improvements are paid by benefiting property owners.

An alternative alignment for the Castle Street storm drain is to route the pipeline in Windsor from Castle Street to Orlando Drive, then west on Orlando to the existing storm drain outfall. Inlets would be installed at Orlando and Windsor to collect upper Orlando Dive stormwater northeast of Windsor. Detailed field surveys would need to be gathered during the design phase to ensure that sufficient slope is available to convey flow in the storm drains. Sufficient slope will determine the preferred alignment. The cost estimate for each alignment is approximately the same.

Optional Facility
In order to control overland runoff from Avon Creek that currently flows through private properties between Madison Street and Marlborough Lane, the proposed 36-inch storm drain in Drake Street could be extended up to Madison Street. This would require the property owners to dedicate a drainage easement on their property prior to installing the storm drain. As discussed with the optional storm drain in Project 1 above, open channels and gullies fill with vegetation and obstruct the conveyance of storm water. This option is shown in Figure 4 of Appendix A and the cost estimate reflects this as an optional item.

3.6.1.4 Project 3: Newhall Avenue and Randall Drive Flooding

Problem Assessment

Resident questionnaires indicate severe home and street flooding frequently occurs at the southern bend of Newhall Avenue and down gradient at Randall Drive. Runoff from uphill areas, including portions of Saint James Road, Wales Road, Saint Thomas Avenue, and Ogden Drive flows down streets and private property, ultimately discharging onto Newhall Avenue. Flooding in this area can be attributed to the combination of topography and lack of infrastructure along the south side of Newhall Avenue to convey runoff. Unrestricted runoff continues down gradient to Randall Drive, eventually flowing to the creek (herein referred to as "Randall Creek") that runs along the south side of Randall Drive.

Proposed Project

The proposed project to mitigate for home and street flooding at the southern bend of Newhall Avenue and at Randall Drive is to construct berms along the south side of Newhall Avenue, install a drop inlet at the bend of Newhall Avenue, and convey flows south to Randall Creek. While the installation of berms would contain runoff in the street and prevent runoff from flowing onto private property, the berms would also increase the volume of runoff in the street (i.e. less water would flow across to private property) and street flooding would increase. For this reason, installation of a drop inlet and underground storm drain would convey this water to Randall Creek. An energy dissipation structure at the discharge point into the creek will help to reduce erosion.

With the completion of the storm drainage improvements proposed in this report, and the installation of paved streets with berms, runoff from lower frequency storms should be successfully controlled.

3.6.1.5 Marine Terrace Cost Estimates: Projects 1 through 3

The cost estimate for each project is broken down by item in Table 3-1. The total cost for all three projects is approximately $877,000. If the optional storm drains are constructed, the cost increases to approximately $1,433,000. The street improvements on Castle Street and Orlando Drive would be funded by the benefiting homeowners as part of the Cooperative Roads Improvement Program. This reduces the total project cost by approximately $193,000. Therefore the proposed drainage improvements (excluding optional projects) in the Marine Terrace total approximately $684,000.

Table 3-1: Marine Terrace Projects 1 through 3

PROJECT	ITEM	QUANTITY	UNIT	UNIT COST ($)	TOTAL ($) [1]
1	48-inch Culverts (Madison Street & Ardath Drive; Ogden Drive)	2	each	$7,500	$15,000
1	36-inch Marlborough Storm Drain from Gaine to Harvey	200	L.F.	$180	$36,000
1	Drop Inlet	1	each	$1,500	$2,000
2	36-inch Castle Street Storm Drain	1,275	L.F.	$180	$230,000
2	Castle Street Roadway Improvement, 4"-thick AC [2]	110	tons	$150	$17,000
2	Castle Street Roadway Improvement, 6"-thick AB [2]	560	tons	$20	$11,000
2	Castle Street Rolled Asphalt Curbs	1200	L.F.	$10	$12,000
2	Orlando Roadway Improvement, 4"-thick AC [2]	110	tons	$150	$17,000
2	Orlando Roadway Improvement, 6"-thick AB [2]	560	tons	$20	$11,000
2	Orlando Rolled Asphalt Curbs	1200	L.F.	$10	$12,000
2	Drop Inlets	8	each	$1,500	$12,000
3	Newhall Street Rolled Asphalt Curb	1700	L.F.	$10	$17,000
3	Drop Inlet	1	each	$1,500	$2,000
3	Culvert – Newhall to “Randall Creek”	325	L.F.	$125	$41,000
3	Energy Dissipater	1	each	$2,500	$3,000
				Subtotal	**$438,000**
	Engineering and Design [3]			20 percent of subtotal	$88,000
	Administrative and Environmental [3]			60 percent of subtotal	$263,000
	Contingency [3]			20 percent of subtotal	$88,000
				Total	**$877,000**
OPTIONAL					
1	48-inch Storm Drain from Ogden to Emmons	500	LF	300	$150,000
1	48-inch Storm Drain from in Oxford to Harvey St.	250	LF	300	$75,000
2	36-inch Storm drain from Marlborough Lane to Madison Street	300	LF	180	$54,000
				Subtotal	**$715,000**
	Engineering and Design [3]			20 percent of subtotal	$143,000
	Administrative and Environmental [3]			60 percent of subtotal	$429,000
	Contingency [3]			20 percent of subtotal	$143,000
				Total	**$1,430,000**

Notes:

1. Rounded to the nearest thousand. Typical to all estimates in this report.
2. Street improvements will be paid for by benefiting property owners (Cooperative Roads Improvement Program).
3. ENR CCI for Los Angeles (February 2003) = 7,566. Includes 20% for Engineering and Design, 60% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 100% cumulative markup on construction costs for Coastal Zone Projects. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).

3.6.2 CAMBRIA PINES ESTATES

3.6.2.1 Existing Conditions

The Cambria Pines Estates is a small district and is located in western Cambria, just northeast of Marine Terrace. Runoff in this district generally drains west to Avon Creek. Existing drainage infrastructure in this district is limited to a section of berm along the northern side of Kenneth Drive, and a 24-inch and 36-inch culvert on Kenneth Drive west of Trenton. All roads in this district are paved.

No major flooding problems were noted or reported in the Cambria Pines District. Drainage problems in this district are small, localized problems that can be found throughout the community. General solutions to common drainage problems are discussed later in this chapter.

3.6.2.2 Project 4: Kenneth Drive Area Swale

Problem Assessment

A natural drainage swale crosses Kenneth Drive, between Tipton and Trenton Streets. This swale continues north across Warren Road, exiting onto an undeveloped natural open space area north of this tract area. A residential questionnaire indicated that this at grade swale crossing causes shallow ponding on Kenneth Drive. Rain runoff from Ardath flows west past Trenton Street and concentrates in the shallow topographic area on the north. The flow continues north between properties, in a natural drainage channel, as it flows towards Kenneth Drive. During heavy storms, the runoff crosses at grade and causes shallow flooding of Kenneth Drive.

Proposed Project

The proposed project would be the installation of a storm drain upstream of the existing culverts crossing under Kenneth Drive. As shown in Figure 6 of Appendix A, this culvert crossing would be replaced and be part of a larger project that mitigates flooding problems on Cowper. The cost estimate for this component is included in Project 8 of the Lodge Hill South section of this chapter.

3.6.3 LODGE HILL SOUTH

The Lodge Hill South district is located in southeastern Cambria. South of Highway 1, the district is located on moderate to steeply sloping hillsides that drain east to Fiscalini Creek (tributary of Santa Rosa Creek), and north to Burton Creek (tributary to Santa Rosa Creek). There appears to be no coherent system to manage storm water in Lodge Hill. Existing infrastructure in this district is limited to some roadside berms of varying height and older storm drain pipes. Many of the roads in this district are unpaved which leads to erosion and hazardous driving conditions during storms. Existing drainage infrastructure and major problem areas in the Lodge Hill South district are illustrated in Figure 5 of Appendix A.

Five significant drainage problems were identified in the Lodge Hill South district:

- Flooding along Burton Drive between Orville Avenue and Ardath Drive
- Flooding of homes and roadways at Bradford Road and Orville Place
- Flooding of basements, garages, and landscaping on McCabe Drive near Ardath Drive
- Flooding/erosion of streets and private property near intersection of Radcliff Avenue and Langton Street
- Flooding/erosion of street on Cowper between Langton and Radcliff

Numerous complaints received via the questionnaires indicate problems which could be resolved if berms would control water down the streets. Berm installation locations that would remedy road water running onto private property are shown in Figure 6 of Appendix A.

3.6.3.1 Project 5: Burton Drive between Orville Avenue and Ardath Drive

Problem Assessment

The most serious flooding problem in the Lodge Hill district exists on Burton Drive between Orville Avenue and Ardath Drive. Resident questionnaires indicate flooding along this portion of Burton Drive is so severe that it causes excessive erosion, makes Burton hazardous to vehicles, and makes it difficult for residents of this area to get into their driveway. Flooding problems along Burton Drive can be attributed to both topography and inadequate drainage infrastructure. Burton Drive was built along the approximate centerline of a creek that originates near the intersection of Burton Drive and Kay Street. Runoff from the surrounding hillsides now flows to Burton Drive, causing flooding problems in the lower areas of the road. Additionally, drainage infrastructure along Burton Drive is limited to storm drain pipes at street intersections. Some of these pipes have now deteriorated and/or become easily clogged during the rainy season (see Photograph 7 for sample of vegetated drainage channel at intersection of Burton and Ardath). There are no existing curbs along Burton Drive.

Proposed Project

The proposed project to mitigate flooding along Burton Drive from Orville Avenue to Ardath Drive is to install an underground storm drain system and drop inlets from Orville Avenue to Ardath Drive. Berms placed along this segment of Burton Drive will keep runoff within the street and help to convey runoff to drop inlets. The underground storm drain pipe will ultimately discharge to "Burton Creek." An energy dissipater placed at the outfall to "Burton Creek" will prevent erosion of the creek channel. Additional armoring of the channel at the outfall may be necessary to protect existing utilities. The utility investigation conducted during the design phase will indicate the location of existing utilities and the possible need for utility relocation or protection from runoff erosion. Figure 6 in Appendix A shows the proposed drainage infrastructure for this project.

Optional Facility
Given the estimated high cost of implementing the proposed Project 5, an interim solution may be needed until funds can be appropriated to complete the project. An optional facility would consist of constructing and improving lined roadside ditches and driveway culverts along both sides of Burton Drive, from Ross Drive to Ardath Drive. The cost estimate reflects this as an optional item. The installation of roadside ditches could mean the loss of some roadside parking. Evaluating the hydraulics during the design phase would determine the magnitude of storm that could be conveyed in an improved ditch.

3.6.3.2 Project 6: Home and Roadway Flooding at Bradford Road and Orville Place

Problem Assessment

Resident questionnaires indicate that during periods of heavy rains, streets and homes are flooded at Bradford Road near Orville Place. This is partially attributed to unrestricted runoff from upgradient roads (Richard and Pierce Avenues) flowing downgradient to Bradford Road. Additionally, Bradford Road is an unpaved road. Drainage infrastructure along Bradford Road is limited to roadside drainage ditches that are undersized and frequently clogged during the rainy season. It is common for eroded dirt and debris from unpaved roads to clog roadside drainage ditches, reducing capacity and increasing flooding.

Proposed Project

The proposed project to mitigate roadway and home flooding along Bradford Road is to pave and berm Bradford Road and Pierce Avenue. This would facilitate the containment of runoff on streets and prevent it from draining onto private property. It will likely be necessary to simultaneously construct rolling berms along Bradford Place and Orville Place as well. However, it should be taken into consideration that paving increases impervious surfaces, increasing runoff volume. These improvements could increase the flooding on Burton

Drive described in Project 5 if the proposed storm drain improvements are not implemented prior to or simultaneously with Project 6 (runoff from this area drains to Burton Drive). Also, the construction of berms may concentrate runoff down gradient to other properties, exacerbating and/or creating new drainage problems elsewhere. Figure 6 of Appendix A shows the location of proposed improvements.

3.6.3.3 Project 7: Home Flooding on McCabe Drive near Ardath

Problem Assessment

During heavy storms and periods of prolonged rain, residents of McCabe Drive near Ardath Drive experience flooding of private property and homes. Reported damages include flooded basements and garages and severe damage to landscaping. While drainage problems in this area have existed for years, the construction of seven homes over the last four years allowed concentrated roadside swale water to run off onto private property, flooding adjacent garages and downhill private property (See Photograph 6).

The fact that new home construction was permitted by the County without adequate drainage to convey runoff from McCabe downhill to Green Street exemplifies poor drainage and design standards that are common with new construction in Cambria. A County standard should have required the developer to construct the homes above the street grade and design the driveways to slope down away from the home, towards the road. If development constraints rendered this option infeasible, then appropriate drainage provisions, such as a drain line should have been installed to divert roadway runoff away from homes, down towards Green Street. These types of drains are common with new construction in Cayucos and should be implemented in Cambria.

Proposed Project

The proposed project to mitigate flooding on McCabe is to construct asphalt berms on the east side of McCabe Drive. This would contain runoff within the street and protect private property. It may be necessary to berm the unnamed road between McCabe Drive and Green Street to prevent the redirection of flow from causing drainage problems downgradient. As stated before, constructing new asphalt berms in selected locations has the potential to move drainage problems to areas without adequate drainage infrastructure.

Optional Facility
If redirecting storm runoff downstream to lower elevation homes on McCabe induces flooding, then an alternative would be to divert runoff from McCabe to Green Street. An easement from home owners would need to be purchased or donated to construct the storm drain. A drop inlet on McCabe would divert runoff to a 24-inch storm drain that would outlet onto Green Street.

3.6.3.4 Project 8: Flooding of Streets and Homes on Cowper, Radcliff Avenue and Langton Street

Problem Assessment

The approximately 30 acre upper watershed from the Dovedale and Radcliff Avenue area contributes to flooding on Cowper near Ardath. This watershed contains several at grade stormwater road crossings where sediment collects. It also contains several private culverts and private property swales that convey a large amount of runoff. Based on analysis of the areas topography and road slopes, runoff from the upper watershed in this area flows down Cowper Street and causes flooding on residential property near Ardath Street.

In addition to the flooding near Ardath Street, erosion of streets and private property occurs near the intersection of Radcliff Avenue and Langton Street. Unrestricted runoff from Dovedale Avenue flows west to Langton Street, down Langton Street, to the intersection of Radcliff Avenue and Langton Street. Here, runoff forms a large puddle before draining north to private properties, ultimately flowing beneath two homes to Cowper

Street. Dovedale Avenue, Radcliff Avenue, and Cowper Street are all unpaved roads without berms. Severe sheet rill erosion and roadside erosion are evident at the corner of Radcliff Avenue and Langton Street.

Cowper Street, north of Ardath Drive, is also unpaved and experiences sheet rill erosion and roadside erosion (see Photograph 8 in Appendix B). Residential flooding was not reported on Cowper north of Ardath.

Proposed Project

In order to collect and convey runoff away from private properties and prevent erosion of roadways, a storm drain should be installed in Cowper, starting at Radcliff and Langton. As shown in Figure 6 of Appendix A, drop inlets would collect runoff that currently ponds at the intersection of Radcliff and Cowper. A 36-inch storm drain and drop inlet system would collect and convey runoff along Cowper Street to Ardath Street. A feasible alignment to continue the storm drain would be west along Ardath to the topographic low point approximately 250 feet west of Trenton Avenue. As shown in the figure, installing the pipeline at the proposed location would require purchasing a drainage easement through private property between Ardath and Kenneth. A culvert under Kenneth would discharge the collected runoff into the open space north of Kenneth. The storm drain will be upsized to a 48-inch pipeline from Ardath to the discharge point.

In order to prevent erosion of streets and private property, it is recommended that Radcliff Avenue and Cowper be paved and bermed. Paving and berming these two streets will help to contain runoff within the streets. North of Ardath Street, Cowper and Kenneth should also be paved and bermed. A 24-inch storm drain in Kenneth would convey runoff collected from Cowper, Alban, Trenton and Kenneth to the discharge point. The alignment and diameter of the storm drains should be verified during the design phase when surveys are collected.

3.6.3.5 Project 9: Minor Projects and Berm Installation at Various Locations

Berm Installation

Rolled asphalt berm structures were found in several areas of Cambria. Berms can often be an effective means of containing runoff within the roadway and preventing it from flowing onto private property. However, the berms observed throughout the community were of varying heights, sometimes only 2-3 inches in height. These shorter berms may do little to prevent localized flooding problems during large magnitude storm events. It is recommended that rolled asphalt berms (Cal Trans Type E4 mountable berm with backsloped choker at a minimum of 6-inches above the gutter flowline-typical section shown in Appendix I) be used where berms are needed to control roadside runoff. Standard installation of berms is discussed in more detail later in this chapter.

Streets where berm installation would remedy road water running onto private property include the following and are shown in Figure 6 of Appendix A:

- Berwick Drive
- Benson Avenue
- Leona Drive
- Wales Road
- Pineridge Drive
- Richard Avenue
- Saint James Road
- Bixby Road

Minor Project

The intersection of Tweed and Norwich is flat and the uphill roadway watershed drains across the intersection at grade. This causes sediment to deposit on the roadway. An easement to construct a storm drain and drop inlet on the south side of Tweed was granted to the County, but drainage facilities were not installed. However, culverts exist on the downhill, west side of the street. A culvert and drop inlet should be installed to collect and convey runoff flowing downhill from Norwich to the existing culverts in Tweed.

3.6.3.6 Lodge Hill South Cost Estimates: Projects 4 through 9

The cost estimate for each project is broken down by item in Table 3-2. The total cost for all six projects is approximately $3.6 million. If an improved drainage ditch is constructed in Burton Drive in place of the storm drain for Project 5, and the optional storm drain is constructed from McCabe to Green Street, the cost remains approximately the same because the savings for the drainage ditch offset the increase for the storm drain. The street improvements on Bradford, Pierce, Cowper, Radcliff, Kenneth, and the berm installation would be funded by the benefiting homeowners as part of the Cooperative Roads Improvement Program. This reduces the total project cost by approximately $1.4 million. Therefore the proposed drainage improvements (excluding optional projects) in Lodge Hill South total approximately $2.2 million.

Table 3-2: Lodge Hill South Projects 4 through 9

PROJECT	ITEM	QUANTITY	UNIT	UNIT COST ($)	TOTAL ($) [1]
5	36-inch Culverts (Burton Drive between Orville and Ardath)	1,600	LF	$180	$288,000
5	Drop Inlet	3	each	$1,500	$5,000
5	Burton Rolled Ashalt Curbs	3,200	LF	$10	$32,000
5	Energy Dissipator	1	each	$2,500	$3,000
6	Bradford Roadway Improvement, 4"-thick AC [2]	200	tons	$150	$30,000
6	Bradford Roadway Improvement, 6"-thick AB [2]	1,030	tons	$20	$21,000
6	Bradford Rolled Asphalt Curbs	2,200	LF	$10	$22,000
6	Pierce Roadway Improvement, 4"-thick AC [2]	180	tons	$150	$27,000
6	Pierce Roadway Improvement, 6"-thick AB [2]	890	tons	$20	$18,000
6	Pierce Rolled Asphalt Curbs	1,900	LF	$10	$19,000
7	McCabe Rolled Asphalt Curbs	900	LF	$10	$9,000
8	36-inch Storm Drain in Cowper and Langton	1,500	LF	$180	$270,000
8	48-inch Storm Drain in Ardath and Private Property	1,050	LF	$300	$315,000
8	Drainage Easement	4,000	SF	$5	$20,000
8	24-inch Storm drain in Kenneth	800	LF	$180	$144,000
8	Drop Inlet	7	each	$1,500	$11,000
8	Cowper/Langton Roadway Improvement, 4"-thick AC [2]	200	tons	$150	$30,000
8	Cowper/Langton Roadway Improvement, 6"-thick AB [2]	1,030	tons	$20	$21,000
8	Cowper/Langton Rolled Asphalt Curbs	4,400	LF	$10	$44,000
8	Kenneth Roadway Improvement, 4"-thick AC [2]	75	tons	$150	$11,000
8	Kenneth Roadway Improvement, 6"-thick AB [2]	380	tons	$20	$8,000
8	Kenneth Rolled Asphalt Curbs	1,600	LF	$10	$16,000
8	Radcliff Roadway Improvement, 4"-thick AC [2]	75	tons	$150	$11,000
8	Radcliff Roadway Improvement, 6"-thick AB [2]	380	tons	$20	$8,000
8	Radcliff Rolled Asphalt Curbs	1,600	LF	$10	$16,000
9	Berm Installation; Various Locations	36,600	LF	$10	$366,000
9	36-inch Culvert in across Tweed	100	LF	$180	$18,000
				Subtotal	**$1,783,000**

PROJECT	ITEM	QUANTITY	UNIT	UNIT COST ($)	TOTAL ($) [1]
	Engineering and Design [3]			20 percent of subtotal	$357,000
	Administrative and Environmental [3]			60 percent of subtotal	$1,070,000
	Contingency [3]			20 percent of subtotal	$357,000
				Total	**$3,567,000**
OPTIONAL					
5	Improve Burton roadside ditch	3,200	LF	$85	$272,000
7	24-inch Storm drain from McCabe to Green Street	250	LF	$180	$45,000
7	Drop Inlet	1	each	$1,500	$2,000
				Subtotal	**$1,809,000**
	Engineering and Design [3]			20 percent of subtotal	$362,000
	Administrative and Environmental [3]			60 percent of subtotal	$1,085,000
	Contingency [3]			20 percent of subtotal	$362,000
				Total	**$3,618,000**

Notes:

1. Rounded to the nearest thousand. Typical to all estimates in this report.
2. Street improvements will be paid for by benefiting property owners (Cooperative Roads Improvement Program).
3. ENR CCI for Los Angeles (February 2003) = 7,566. Includes 20% for Engineering and Design, 60% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 100% cumulative markup on construction costs for Coastal Zone Projects. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).

3.6.4 Lodge Hill North

3.6.4.1 Existing Conditions

The Lodge Hill North district consists of the portion of Lodge Hill located north of Highway 1. Development here rests on low-lying plateaus, the edges of which drop off to steep slopes and canyons. This area drains west and north to "Burton Creek" and Santa Rosa Creek, respectively. Drainage infrastructure in this district is limited to small roadside ditches and small culverts at some street intersections as shown in Figure 7 in Appendix A. Many of these storm drains are undersized and/or become clogged during the rainy season. Burton Circle, Margate Avenue, and Ramsey Street are unpaved.

3.6.4.2 Project 10: Wilton Drive Localized Flooding

Problem Assessment

Several localized flooding problems were identified along Wilton Drive. The northerly section of Wilton Drive has a relatively flat grade. Small depressions, minimal gradients, and lack of drainage infrastructure result in temporary ponding of runoff, in particular at the intersection of Wilton and Andover. Resident questionnaires indicate large storm events often result in serious street flooding as well as the flooding of some homes.

Proposed Project

Localized flooding problems along Wilton Drive are due to poor drainage infrastructure and minimal gradients. The proposed project to mitigate this problem involves the construction of lined roadside ditches with positive drainage. Culverts would be needed beneath driveways and at intersections to prevent obstruction of flow and/or the flooding of homes. Culverts that currently exist will likely need to be replaced to ensure sufficient capacity exists to convey runoff. The segment of Wilton Drive in the northern portion of the district that runs east-west should have positive drainage towards "Burton Creek." The segment of Wilton Drive in the eastern portion of

the district that runs north-south should have positive drainage towards the unnamed drainage that runs parallel to this segment of Wilton Drive and flows north to Santa Rosa Creek.

It is also proposed that a 36-inch storm drain be installed at the intersection of Wilton and Andover to convey runoff collected in the roadside ditches north, towards the existing drop inlet and culvert that cross Wilton and discharges runoff down the canyon. The proposed facilities are shown in Figure 8 of Appendix A.

3.6.4.3 Project 11: Ramsey Street Flooding

Problem Assessment

Ramsey Street is a dirt road positioned on the south-facing slope of a steep canyon that drains to "Burton Creek". During storm events, concentrated runoff travels over Ramsey Street, resulting in severe erosion and flooding. Following a large storm event in 1998, portions of Ramsey Street became so heavily eroded that it was impassable. The road was rebuilt in the summer of 1998 but nothing has been done to address the mechanisms of the old road failure. This street continues to flood and erode each rainy season.

Proposed Project

It is proposed that roadside drainage and erosion problems along Ramsey Street be addressed by the reconstruction and paving of Ramsey Street, coupled with the installation of drop inlets to convey runoff from upland areas, down the canyon towards "Burton Creek," as shown in Figure 8 of Appendix A. Rock energy dissipaters should be placed at outfalls on west side of Ramsey Street to avoid erosion of the steep canyon to the west.

Paving Ramsey Street should be a lower priority project because improving an undeveloped street where there is no significant flooding to property or structures provides less benefit than improving a completely developed street with flooding problems. This project will only benefit immediately adjacent property owners and should be constructed to County standards with the eventual development of this residential block. Improving Ramsey Street should be paid for by the benefiting street property owners, consistent with many other Cambria Cooperative Road improvement projects. Assigning financial responsibility for road improvements to property owners will reduce the total funding amount for drainage projects proposed in this report.

3.6.4.4 Project 12: Berm Installation at Various Locations

It is recommended that rolled asphalt berms (Cal Trans Type E4 mountable berm with backsloped choker at a minimum of 6-inches above the gutter flowline-typical section shown in Appendix I) be used where berms are needed to control roadside runoff. Standard installation of berms is discussed in more detail later in this chapter.

Streets where berm installation would remedy road water running onto private property include the following and are shown in Figure 8 of Appendix A:

- Andover
- Blythe
- Orme
- Latham and
- Newton

3.6.4.5 Lodge Hill North Cost Estimates: Projects 10 through 12

The cost estimate for each project is broken down by item in Table 3-3. The total cost for all three projects is approximately $673,000. The Ramsey Street improvements and the berm installation would be funded by the benefiting homeowners as part of the Cooperative Roads Improvement Program. This reduces the total project cost by approximately $290,000. Therefore the proposed drainage improvements in Lodge Hill North total approximately $383,000.

Table 3-3: Lodge Hill North Projects 10 through 12

PROJECT	ITEM	QUANTITY	UNIT	UNIT COST ($)	TOTAL ($) [1]
10	36-inch Storm Drain in Wilton from Andover to existing culvert	150	LF	$180	$27,000
10	Driveway Culverts	15	each	$1,000	$15,000
10	Intersection Culverts	4	each	$3,500	$14,000
10	Roadside Ditches Along Wilton Drive	2,500	LF	$25	$63,000
11	Ramsey Street Roadway Improvement, 4"-thick AC [2]	215	tons	$150	$32,000
11	Ramsey Street Roadway Improvement, 6"-thick AB [2]	1,080	tons	$20	$22,000
11	Ramsey Street Rolled Asphalt Curbs	4,600	LF	$10	$46,000
11	Drop Inlet	5	each	$1,500	$8,000
11	Drainage Pipes, 18-inch outlet from drop inlet	200	LF	$150	$30,000
11	Energy Dissipator	5	each	$1,500	$8,000
11	Storm Drain from Wilton to drop inlet	150	LF	$180	$27,000
12	Berm Installation; Various Locations	4,500	LF	$10	$45,000
				Subtotal	**$337,000**
	Engineering and Design [3]			20 percent of subtotal	$67,000
	Administrative and Environmental [3]			60 percent of subtotal	$202,000
	Contingency [3]			20 percent of subtotal	$67,000
				Total	**$673,000**

Notes:

1. Rounded to the nearest thousand. Typical to all estimates in this report.
2. Street improvements will be paid for by benefiting property owners (Cooperative Roads Improvement Program).
3. ENR CCI for Los Angeles (February 2003) = 7,566. Includes 20% for Engineering and Design, 60% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 100% cumulative markup on construction costs for Coastal Zone Projects. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).

3.6.5 PINE VIEW

3.6.5.1 Existing Conditions

The Pine View district is located in central Cambria. The district drains north and east to Santa Rosa Creek and an unnamed creek (herein referred to as "Fitzhugh Creek"), respectively. Existing drainage infrastructure in this district consists of berms and storm drain pipes. Most roads in this district are paved. Refer to Figure 9 in Appendix A for a map of the Pine View district.

Possible funding alternatives are discussed in more detail in Chapter 5 of this report, however, the reader should note that developers in this drainage subbasin were assessed a drainage mitigation fee per building unit. Drainage improvements, in particular to mitigate downstream problems caused by uphill development, should be funded by revenue generated from developer fees.

3.6.5.2 Project 13: Eton Road Flooding near Wood Street

Problem Assessment

The problem most often reported by Cambria residents in the Pine View area is located on Eton Road near Wood Drive. Development of Pine View since the early 1980's has changed drainage patterns, resulting in runoff flowing from Wood Drive east, over Eton Road and over the Fitzhugh Ranch agricultural lands on the way to "Fitzhugh Creek". The increase in runoff has created a traffic hazard on Eton Road and amplified the amount of erosion caused on Fitzhugh Ranch as the water flows towards Fitzhugh Creek. The existing 16-inch CMP culvert crossing under Eton Road north of Wood Drive lacks the capacity to convey flow during large storm events.

Proposed Project

In order to mitigate this problem, runoff generated west of the intersection with Eton Road and Wood Drive should be collected and re-routed underground. Review of topographic maps and analysis of the area indicate that there are two possible alignments for routing runoff from the intersection of Eton Road and Wood Drive to Fitzhugh Creek. One alignment involves the purchase of a drainage easement across the Fitzhugh Ranch to install a 42-inch diameter underground storm drain for discharge to the creek. There appears to be sufficient slope between Eton and the creek for positive drainage. The second alignment involves the construction of a 42-inch diameter storm drain in Eton Road to convey runoff south towards the upper reach of Fitzhugh Creek. Based on the level of detail from available topographic maps, this alignment may not have sufficient slope to drain the runoff. Each project will require the construction of an outfall and erosion protection at the creek, potentially increasing the resource agency permit requirements for these projects. The two alignments are shown in Figure 9 of Appendix A.

During the design phase of this project, detailed surveys should be collected to determine the hydraulics and preferred alignment for conveying flow. Extending the pipeline north of Wood Drive should also be considered to capture upper watershed runoff that also flows onto and erodes the ranch.

3.6.5.3 Project 14: Residential Flooding on Martindale Road

Problem Assessment

Letters prepared by community residents living along Martindale Road report that runoff from public right of way flows through low points along the road's gutter onto private property. The gutters lack sufficient height to keep runoff on the roadway.

Proposed Project

It is recommended that rolled asphalt berms (Cal Trans Type E4 mountable berm with backsloped choker at a minimum of 6-inches above the gutter flowline-typical section shown in Appendix I) be used where berms are needed to control roadside runoff. Standard installation of berms is discussed in more detail later in this chapter. The improvements along Martindale Road are shown in Figure 9 of Appendix A.

3.6.5.4 Cambria Pines Lodge and Expansion

The existing lodge and support facilities are located on a 26 acre site on top of the hill north-east of the intersection of Burton Drive and Patterson Place. Runoff from the existing undeveloped property and developed facilities drains in three directions, through County Road right-of-way and through established drainage courses, ultimately to Santa Rosa Creek. Storm runoff from the property has for many years contributed to erosion, sedimentation and flooding of the properties below.

The County Planning Commission, in July 2001, approved an expansion of the existing lodge which authorized an increase of approximately two acres of developed area to the existing six acres of development on the hilltop site. As part of the expansion development review process, County staff, developer consultant, Upper Salinas – Las Tablas Resource Conservation District and Natural Resources Conservation District engineers evaluated existing and proposed site drainage, sedimentation and erosion issues. The development review process included review and discussion of these issues with the North Coast Advisory Council, Cambria Community Services District, and a group of local homeowners formed and designated the "East Lodge Hill Neighbors".

The resulting Cambria Pines Lodge expansion approval included a requirement for drainage improvements for the new facilities and existing facilities. These improvements include specifically designated and described improvements, including the provisions of interlocking pavers in parking lots to increase absorption, cisterns, collection of roof runoff and release to energy dissipaters, storm water/oil residue separators, storm water diversion devises to reduce concentrated flows, and other measures. A drainage plan, a sedimentation and erosion control plan are required to be prepared, approved and implemented. These plans will include additional specific improvement measures to be implemented to reduce the affects of the expansion and existing development on adjacent properties and existing drainage facilities and systems.

These improvements will be constructed at the cost of the developer in conjunction with expansion of the lodge. It is anticipated that the facilities to be constructed in conjunction with the lodge expansion will improve the existing drainage conditions to the best extent possible for this area under regulatory conditions.

3.6.5.5 Pine View Cost Estimates: Projects 13 and 14

The cost estimate for each project is broken down by item in Table 3-4. The total cost for the two projects is approximately $303,000. The Martindale berm installation would be funded by the benefiting homeowners as part of the Cooperative Roads Improvement Program. This reduces the total project cost by approximately $40,000. Therefore the proposed drainage improvements in Pine View total approximately $263,000.

Installing the storm drain along Alignment 2 in Eton Road increases the total project cost by approximately $30,000. Even though a drainage easement would be purchased to install the underground storm drain across the ranch, Alignment 2 is longer and requires the installation of approximately 150 feet of additional 42-inch pipe.

Table 3-4: Pine View Projects 13 and 14

PROJECT	ITEM	QUANTITY	UNIT	UNIT COST ($)	TOTAL ($) [1]
13	42-inch underground Storm Drain thru drainage easement	300	LF	$300	$90,000
13	Drainage easement	3,000	SF	$5	$15,000
13	Outfall	1	each	$20,000	$20,000
13	Erosion protection	1	each	$5,000	$5,000
13	Drop Inlet	1	each	$1,500	$2,000
14	Martindale Berm Installation [2]	2,000	LF	$10	$20,000
				Subtotal	**$152,000**
	Engineering and Design [3]			20 percent of subtotal	$30,000
	Administrative and Environmental [3]			60 percent of subtotal	$91,000
	Contingency [3]			20 percent of subtotal	$30,000
				Total	**$303,000**

Notes:

1. Rounded to the nearest thousand. Typical to all estimates in this report.
2. Street improvements will be paid for by benefiting property owners (Cooperative Roads Improvement Program).
3. ENR CCI for Los Angeles (February 2003) = 7,566. Includes 20% for Engineering and Design, 60% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 100% cumulative markup on construction costs for Coastal Zone Projects. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).

3.6.6 Pine Knolls Estates

The Pine Knolls Estates district is located just north of Mid-Village. The district is found on moderately steep south-facing hillsides that drain through the Mid-Village, ultimately draining to Santa Rosa Creek. No major flooding problems were noted or reported in the Pines Knolls District. Drainage problems in this district are likely typical nuisance problems that can be found throughout the community. No specific projects are proposed for this district, however, if street runoff flowing onto private property is an issue, then installing berms could mitigate this problem.

3.6.7 Park Hill

3.6.7.1 Existing Conditions

The Park Hill district is located in western Cambria. The district is bounded by Santa Rosa Creek to the north and east, and by the Pacific Ocean to the west. The district slopes to the northwest, draining to Santa Rosa Creek and the Pacific Ocean. While areas east of Windsor Boulevard tend to be moderately to steeply sloping, areas to the west of Windsor are relatively flat. Existing drainage infrastructure in this district includes rolling berms and storm drain pipes at major intersections. All roads in this district are paved. Few drainage problems were

identified in the Park Hill district, but the major problem was associated with the drainage channel that runs in between properties from Lancaster to Cambridge.

3.6.7.2 Project 15: Dorset Street and Cambridge Street Gully

Problem Assessment

A primary source of flooding in the Park Hill district is the gully that flows between homes between Dorset Street and Cambridge Street. An aboveground 18-inch corrugated plastic pipe between 426 and 424 Cambridge Street that concentrates flow from the gully to Cambridge Street was identified during the site reconnaissance. The pipe appears to have been placed by residents in attempts to solve the flooding problems. This area collects runoff from a small watershed (12 acres) above it. Flow continues down Cambridge Street to Windsor Boulevard. Runoff pools at the intersection of Cambridge Street and Windsor Boulevard, resulting in severe street and private residence flooding because the runoff is impeded from flowing south down Windsor Boulevard to Dorset, where the existing storm drain discharges runoff to the ocean. Instead, runoff currently sheet flows across Windsor and floods 5285 Windsor. The existing drainage facilities and areas subject to flooding are shown in Figure 10 in Appendix A.

Proposed Project

The proposed project to address flooding on Cambridge Street involves the installation of berms on Lancaster Street, Dorset Street, Hastings Street, Cambridge Street and Windsor Boulevard, as well as extending the existing storm drain in Dorset from Nottingham Street to Windsor Boulevard. In order to divert the runoff that currently sheet flows across Windsor near Cambridge, a 24-inch storm drain and drop inlets should be installed in Windsor between Cambridge and Dorset. The underground storm drain that runs in Dorset Street to Nottingham Drive should be extended to Windsor Boulevard. A drop inlet should also be installed to convey flows from Windsor Boulevard west to the ocean. Figure 11 in Appendix A shows the location of proposed facilities.

Runoff that discharges from an existing culvert at the intersection of Pembrook and Lancaster flows in a westerly direction towards Whitehall Avenue. An increase in the road grade elevation on Lancaster causes the water to change direction and flow through a lower elevation vacant lot on the north side of Lancaster, where the water then enters and flows through the back and side yard of a home on Dorset. The green dotted line in Figure 10 and 11 in Appendix A indicates the flow path of the street runoff. In order to keep street runoff from Lancaster off private property, an 18-inch storm drain should also be installed in Lancaster between Pembrook and Whitehall Avenue to divert the flow. This project has the added benefit of reducing the amount of runoff that flows to the gully between Dorset and Cambridge. The 18-inch storm drain will divert flow discharged from the existing culvert at Pembrook and then outlet the flow to the street near the intersection of Lancaster and Whitehall Avenue. The steep topography and rapid change in road elevation allows for the storm drain to "daylight" near Whitehall Avenue. An alternative to having the storm drain outlet to the bermed road shoulder is to continue the storm drain an additional 400 feet to Windsor Boulevard. This project assumed the storm drain terminated at Whitehall Avenue.

The installation of berms will keep runoff within the streets and reduce runoff on private property, allowing it to move west within the roadways to Windsor Boulevard. The drop inlets and storm drain system will collect and convey runoff from the street to an underground conveyance system, eventually discharging the flow to the ocean. The proposed berms should mitigate the problem reported on Nottingham near Hastings where runoff flows across Nottingham and erodes the bluff.

The drawback to this project is that some existing developed lots may not be able to outlet their rain water onto bermed streets if this project is implemented. These residences will need to manage rain water on-site, perhaps through the installation of an on-site basin in their yard.

3.6.7.3 Project 16: Pembrook Minor Ponding

Problem Assessment

A sag in the street near 434, 444, 445 and 447 Pembrook causes minor ponding of street runoff. Many homes on the north side of Pembrook are also located below street grade, which may allow street runoff to enter the structures if drainage channels are not present to re-route flow away from the homes.

Proposed Project

A cross street culvert already exists at this location. The proposed project to mitigate the ponding is to install a "downdrain" from the outlet of the existing culvert and run the drain line down the hillside towards Windsor Boulevard. An outlet structure that dissipates energy may be necessary to prevent erosion near Windsor Boulevard. A drainage easement will need to be purchased for installation of the storm drain. Berms will also be necessary to keep runoff in the roadway and out of private property. Figure 11 in Appendix A shows the location of the proposed culvert and storm drain.

3.6.7.4 Project 17: Windsor Bridge

Problem Assessment

The Windsor Bridge currently constitutes the only entrance and egress to and from the Park Hill area as well as the Seaclift Estates. The southern approach to the bridge is significantly lower than the bridge itself. During large storm events in 1995, high flows flooded the southern approach, making Park Hill inaccessible to vehicles. While these flooding conditions are rare and last only for a few hours, such conditions could prevent emergency access to and from the Park Hill and Seaclift Estates areas during large storm events.

While proposing improvements for the constriction at Windsor Street Bridge is beyond the scope of this drainage study, a coalition of private and public funds was raised to purchase the East-West Ranch property, located south of Seaclift Estates, and preserve it as open space. The Cambria Community Services District has plans to build a dirt fire road that will extend from Seaclift Estates south to Marine Terrace. The fire road will provide a second emergency access to and from Seaclift Estates and Park Hill during large storm events should the Windsor Bridge become impassable.

3.6.7.5 Park Hill Cost Estimates: Projects 15 and 16

The cost estimate for each project is broken down by item in Table 3-5. The total cost for the two projects is approximately $587,000. The berm installation would be funded by the benefiting homeowners as part of the Cooperative Roads Improvement Program. This reduces the total project cost by approximately $168,000. Therefore the proposed drainage improvements in Park Hill total approximately $419,000.

Table 3-5: Park Hill Projects 15 and 16

PROJECT	ITEM	QUANTITY	UNIT	UNIT COST ($)	TOTAL ($) [1]
15	24-inch Storm Drain in Windsor	300	LF	$180	$54,000
15	Storm Drain Extension in Dorset	200	LF	$180	$36,000
15	18-inch Storm Drain in Lancaster	430	LF	$180	$77,000
15	Rolled Asphalt Curbs [2]	6,850	LF	$10	$69,000
15	Drop Inlets	3	each	$1,500	$5,000
16	12-inch Storm Drain at Pembrook	150	LF	$180	$27,000
16	Drainage Easement	1,500	SF	$5	$8,000
16	Outlet Structure	1	each	$1,500	$2,000
16	Rolled Asphalt Curbs [2]	1,500	LF	$10	$15,000
				Subtotal	**$293,000**
	Engineering and Design [3]			20 percent of subtotal	$59,000
	Administrative and Environmental [3]			60 percent of subtotal	$176,000
	Contingency [3]			20 percent of subtotal	$59,000
				Total	**$587,000**

Notes:

1. Rounded to the nearest thousand. Typical to all estimates in this report.
2. Street improvements will be paid for by benefiting property owners (Cooperative Roads Improvement Program).
3. ENR CCI for Los Angeles (February 2003) = 7,566. Includes 20% for Engineering and Design, 60% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 100% cumulative markup on construction costs for Coastal Zone Projects. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).

3.6.8 HAPPY HILL

3.6.8.1 Existing Conditions

Located in northwestern Cambria, this district drains in a generally southwest direction, towards Santa Rosa Creek and the Pacific Ocean. Existing drainage infrastructure in this district is limited to a few berms and older storm drain pipes. All streets in this district are paved.

3.6.8.2 Project 18: Canterbury Lane Drainage Problem

Problem Assessment

Perhaps the most severe drainage problem in the Happy Hill district occurs on Canterbury Lane. This drainage problem can be attributed to several factors including: 1) natural gradients, 2) lack of berms along Derby Lane and Canterbury Lane, 3) the construction of homes on Canterbury Lane below street grade, and 4) an increase in impervious surface area upgradient during the development of new homes on Derby Lane. The combination of these factors results in the flooding of street and homes during large storm events. See Figure 12 in Appendix A for existing drainage infrastructure in Happy Hill.

Proposed Project

The proposed project to mitigate drainage issues in Happy Hill is to install berms along the south side of Canterbury Lane and install a drop inlet and underground storm drain at the corner of Canterbury Lane, near 539 Canturbury Lane. The proposed berms would keep runoff from flowing down gradient into homes on the southside of Canterbury Lane but they would cause runoff to pool in the vicinity of 539 Canterbury Lane. For this reason, a drop inlet and storm drain pipe is needed to convey these flows to the unnamed drainage below. An energy dissipater will be necessary to prevent excessive erosion at the discharge point to the drainage. Figure 13 in Appendix A show the proposed improvements.

3.6.8.3 Project 19: Berm Installation at Various Locations

It is recommended that rolled asphalt berms (Cal Trans Type E4 mountable berm with backsloped choker at a minimum of 6-inches above the gutter flowline-shown in Appendix I) be used where berms are needed to control roadside runoff. Standard installation of berms is discussed in more detail later in this chapter.

Streets where berm installation would remedy road water running onto private property include the following and are shown in Figure 13 of Appendix A:

- Ashby Lane
- Sunbury Avenue
- Weymouth Street
- Warwick Street
- Croyden Lane
- Wellington Drive
- Suffolk Street
- Hillcrest Drive

3.6.8.4 Project 20: Suffolk Street Flooding

Problem Assessment

A resident response indicated that during very heavy rain storms, flooding on Suffolk Street below the forest occurs. The CT Ranch forest (which borders Northampton Street), Northampton Street runoff and the homes on the north side of Suffolk Street drain onto property located at 912 Suffolk Street and also adjacent properties. Flooding was severe enough in 1997/98 that the runoff eroded a channel down the hillside onto Hillcrest Drive. The County has placed boulders within the channel to prevent further erosion.

Proposed Project

Runoff flowing from the north side of Suffolk and the upper hillside currently flows to the lowest point on Suffolk. This location lacks a storm drain to convey water down to Hillcrest Drive. The proposed project is to install berms on the south side of Suffolk to keep runoff on the roadway and prevent the collection and ponding of water on private property. Installing a drop inlet and storm drain system to collect the runoff and convey it downhill onto Hillcrest Drive will mitigate the current problem. From Hillcrest Drive, the runoff will flow to an existing channel west of “Nitt Witt Ridge” historic site. Berms should also be installed on Hillcrest Drive to keep runoff on the roadway and off of private property.

3.6.8.5 Happy Hill Cost Estimates: Projects 18 through 20

The cost estimate for each project is broken down by item in Table 3-6. The total cost for the two projects is approximately $683,000. The berm installation would be funded by the benefiting homeowners as part of the Cooperative Roads Improvement Program. This reduces the total project cost by approximately $338,000. Therefore the proposed drainage improvements in Happy Hill total approximately $345,000.

Table 3-6: Happy Hill Projects 18 through 20

PROJECT	ITEM	QUANTITY	UNIT	UNIT COST ($)	TOTAL ($) [1]
18	18-inch Storm Drain off Canterbury	300	LF	$180	$54,000
18	Drop Inlet	1	each	$1,500	$2,000
18	Rolled Asphalt Curbs [2]	2,800	LF	$10	$28,000
19	Rolled Asphalt Curbs; Various Locations [2]	12,050	LF	$10	$121,000
20	18-inch Storm Drain off Suffolk Street	500	LF	$180	$90,000
20	Drainage Easement	5,000	SF	$5	$25,000
20	Drop Inlet	1	each	$1,500	$2,000
20	Rolled Asphalt Curbs; Suffolk and Hillcrest [2]	2,000	LF	$10	$20,000
				Subtotal	**$342,000**
	Engineering and Design [3]			20 percent of subtotal	$68,000
	Administrative and Environmental [3]			60 percent of subtotal	$205,000
	Contingency [3]			20 percent of subtotal	$68,000
				Total	**$683,000**

Notes:

1. Rounded to the nearest thousand. Typical to all estimates in this report.
2. Street improvements will be paid for by benefiting property owners (Cooperative Roads Improvement Program).
3. ENR CCI for Los Angeles (February 2003) = 7,566. Includes 20% for Engineering and Design, 60% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 100% cumulative markup on construction costs for Coastal Zone Projects. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).

3.6.9 LEIMERT ESTATES

Leimert Estates is the northernmost district in Cambria. Development in this district is less dense than other districts in Cambria, and generally consists or larger parcels and homes. Two responses were received from residents in this area regarding inadequately functioning facilities. These items should be reviewed by the County's Public Works Department to determine if the installed facilities (circa 1972) were properly sized and constructed according to County standards. One location is at 6211 Somerset Way where the runoff overtops the drop inlet and flows into the adjacent driveway. The second location is at 444 Exeter where the flat grade on Exeter south of Chiswick backs up water at Chiswick and Exeter.

3.6.10 Summary of Costs

Table 3-7 is a summary table of the costs for proposed projects in each of the drainage zones. If all the proposed projects were implemented, the total cost is approximately $6.7 million. The street and rolled asphalt curb/berm projects, which total approximately $2.5 million, would be paid by the benefiting property owners as part of the County's Cooperative Roads Program. Therefore, the storm drain, road side ditch improvements and related appurtenances have an estimated cost of approximately $4.2 million.

Table 3-7: Cambria Drainage Improvements Summary Cost Table

DISTRICT	TOTAL COST [1]	STREET/BERM IMPROVEMENTS [2]	FLOOD/DRAINAGE COST [3]
Marine Terrace	$877,000	$193,000	$684,000
Lodge Hill South	$3,567,000	$1,418,000	$2,149,000
Lodge Hill North	$673,000	$290,000	$383,000
Pine View	$303,000	$40,000	$263,000
Park Hill	$587,000	$168,000	$419,000
Happy Hill	$683,000	$338,000	$345,000
TOTAL	**$6,690,000**	**$2,447,000**	**$4,243,000**

NOTE:

1. **Excludes optional project costs**. Includes contingency, engineering and environmental.
2. Street improvements would be paid for by benefiting property owners (similar to the Cooperative Roads Program).
3. Excludes street improvements and berm installation.

3.6.11 Recommended Projects

A number of nuisance drainage and flooding problems occur within the different districts due to the topography, the construction of roads and homes on historic drainage courses, the lack of an underground storm drain system, and the lack of a consistent, organized network of curbs and gutters within the community. An underground storm drain conveyance system in each district would reduce the amount of overland flow runoff in downstream areas, consequently reducing the flooding problems created with overland flow. However, character and level of development of the rural residential community is such that the retrofitted installation of a community supported integrated system of curbs, gutters and storm drains is extremely unlikely.

The community should consider incorporating the Caltrans Type E 4 mountable berm into the road section for all new and substantially rehabilitated roads as the standard for all new roadway work where roadway drainage containment is considered necessary in the residential area. Rolled asphalt sections may also be required along driveways, where garages and driveways are lower than the roadway.

Each project discussed above will work independently to solve localized drainage problems. Residences within one of proposed project areas could organize to implement a project in their section of town and not be impeded by the lack of action of others. The projects and their priority for implementation are dependent upon the needs of the individual residents and their desire to reduce damages and/or nuisance flooding problems caused by inadequate drainage facilities.

Chapter 6 discusses the implementation strategy for planning, designing, constructing and phasing the recommended project.

3.7 Additional Recommendations

3.7.1 Proposed Residential Design Standards

The County Department of Planning and Building staff prepared and the North Coast Advisory Council reviewed the draft Cambria Residential Design Standards (CRDS) for the North Coast Area Plan. To control erosion, the CRDS recommends that all runoff from impervious surfaces such as roofs, driveways, walks, patios or decks be collected and retained on-site, or released to the public right-of-way through an effective erosion control device or drainage system approved by the County's Department of Public Works. This would achieve the goal of reducing urban runoff and the amount of water that flows to the street, thereby minimizing the threat of flooding to lower elevation properties. Minimizing storm runoff also prevents erosion of streets and road shoulders because less water flows to the street and directing the runoff through a grassy swale slows water's velocity. Based in part on the CRDS recommendations, these proposed recommendations to design guidelines are encouraged to reduce the threat of flooding to residential homes and to improve the drainage of storm runoff in Cambria. In general new development of infill properties should achieve the following:

- Increase vegetative groundcover, to the maximum extent possible, as a means of reducing stormwater runoff
- Install on-site natural drainage channels or detention basins to retain runoff from impervious surfaces prior to reaching the public right-of-way

All natural drainage should be kept free of obstructions such as branches, trash, and sediment to maintain the drainage capacity of the channel. Maintenance responsibility should rest with the owners of the property through which the drainage channels pass. Suggested specifics for improving drainage and protecting homes from flooding are detailed below.

3.7.1.1 Elevation Requirements and Mountable Berms

The location of a home is a key factor in the resulting drainage problems that are likely to be inflicted on it. Homes located below street grade and whose driveways slope down away from the road may experience flooding in the garage or home. This is because without an adequate curb/berm, the driveway may act to convey runoff from the street above to lower elevations and sometimes into the garage or home.

For example, seven homes located on McCabe Drive (near 2110 McCabe Drive) were constructed within the last four years. Many of these homes were built below the road grade. The construction allowed concentrated roadside runoff to flow onto private property, flooding adjacent garages and downhill private property. No drainage facilities or berms were constructed to direct runoff away from homes or to keep runoff on the roadway. The fact that new home construction was permitted by the County without adequate drainage to convey runoff from McCabe downhill to Green Street exemplifies poor drainage and design standards that are common with new construction in Cambria.

For new infill development, the site's topography is typically integrated into a home's design. With Cambria's unique nature and variation in topography, many new homes will be located below street grade. These new developments should be encouraged to grade the site such that their dwellings are located above street grade. **It is recommended that Cambria and the County Planning Department develop a design guideline that encourages the floor and garage elevation for all new home construction be greater than the adjoining street grade. Driveways should slope down away from the home, towards the road. It is also recommended that Cambria mandate the installation of a County standard mountable berm for all existing driveways/accesses to structures which are below the edge of pavement.**

It is recognized that the unique topographic nature of Cambria and the configuration of some infill lots will render this suggestion impractical or extremely difficult to implement at some locations. If some of Cambria's

down sloping lots cannot be built above street level, then an alternative to protecting a structure's contents would be to build the access points (e.g. doors and garage openings) a minimum of one foot above adjacent grade so that flooding on the property will not encroach into the doorways. This design guideline will prevent flooding from entering into doorways and protect a structure's contents.

3.7.1.2 Minimize Storm Runoff from Homes

Divert Runoff to Landscaped Areas

By diverting stormwater from impervious areas such as roofs, walkways and driveways, and reusing whenever possible, runoff that flows to streets can be greatly reduced. This can be achieved by directing rain gutters to landscaped areas, swales or infiltration basins on private property where water can percolate into the ground.

Placing landscaped areas directly below eaves allows roof runoff to percolate into the subsoil. Plants should be sturdy enough and provide a subsurface matrix of roots to tolerate heavy sheet flow runoff and periodic saturation. Landscaped infiltration basins for stormwater retention should have flow directed toward them with curbs, berm, or similar structures, and slightly concave to retain surface water until it infiltrates.

Install Porous Pavers

In place of concrete or asphalt for constructing walkways, patios and driveways, consider installing porous pavers and pavement. Porous pavers reduce runoff because they are semi-permeable and infiltrate runoff. The Cambria Nursery and Florist installed porous pavers in their parking lot to reduce runoff and have been successful and managing runoff on-site. Pavers range in cost from $2 to $4 per square foot (material cost only).

Rain Barrel

If land constraints are an issue, then installing a rain barrel to capture runoff from a home's gutter downspout is a unique, functional and decorative feature that could minimize a home's runoff. A 55-gallon barrel could fill during a storm that produces a half inch of rain. The stored water could then be used for irrigation or could be slowly drained after the storm passes. Some minor retrofitting would be required on the downspout and spigots (drain and overflow) would need to be installed on the barrel, but this small investment would reduce urban runoff during peak storms.

The following are encouraged for existing homes and recommended mandates for new home development:

- **Where possible, direct down-spouts and gutters to drain onto the lawn, plant beds or containment areas where rain will soak into the soil rather than run off the yard.**
- **Decrease soil erosion by planting groundcovers where lawn grass does not thrive, such as under trees or on steep slopes.**
- **Use mulch, bricks, flagstone, gravel, or other porous surfaces for walkways, patios and driveways.**
- **Collect and store rain runoff from your roof in a rain barrel or cistern.**
- **Create swales (low areas) or terracing to catch, hold and filter stormwater.**

3.7.1.3 Development on Steep Terrain

Many homes in Cambria (e.g. McCabe Drive) were built on steep terrain or downhill sites. For properties that contain drainage courses that convey runoff from uphill streets and lots, it is encouraged that a drainage easement be retained on the lower properties so that appropriate drainage facilities can be installed to convey runoff to the street below. Review of available information indicates that a typical design for a catch basin and storm drain to convey water from an uphill lot, through the downhill lot and eventually discharging to the street

below does not exist. Many of these facilities are installed in Cayucos and work effectively in conveying runoff to public streets (See example in Photograph 9 of Appendix B). The County's Department of Public Works should develop a typical design standard for a catch basin and down drain to convey water from an uphill lot, through the downhill lot and eventually discharging to the street below. The County's Planning and Building Department should also provide the leadership and encouragement to property owners to dedicate drainage easements or to develop an appropriate reimbursement mechanism for uphill owners to compensate downhill owners for the easement. Lower property developments should be prepared to provide a drainage easement for up slope properties to convey their runoff.

3.7.2 System Improvements with Increased Development

The increased development that continues to occur in Cambria through build out will continue to change the hydrologic character of the community. The construction of new homes and roads continue to increase the amount of impervious surfaces that will limit the ability of soils to absorb rainfall, thereby increasing the amount of surface runoff. This development will exacerbate the frequency of localized flooding and subject more property to flood damage unless concurrent drainage improvements are made. The continued increase in residential dwelling units and non-residential development will nearly triple the amount of impermeable area[5]. The majority of this new development will be infill of existing developed areas.

The new development will proportionately increase storm water flows in the community. The drainage impacts associated with increased development will be most pronounced in the Lodge Hill area where many of the roads are unpaved. Increased runoff will raise the potential for erosion of unpaved roads. Drainage improvements should be planned with any proposed development. Regardless of whether drainage problems exist prior to development, mitigation should be planned as not to increase the severity or frequency of problems. Such mitigation could include on-site detention of runoff, thereby preventing the increase of runoff onto lower lying properties. If mitigations are deemed infeasible, consideration should be given to the establishment of a drainage fee to off-set future needed drainage improvements.

It is recommended that development fees collected for Cambria be used to fund drainage improvements for areas that will be most impacted by future development. These areas are typically the topographic low points within a drainage sub-basin or district. The development fees collected to date should also be used to fund projects that mitigate for existing problems created by recent development (e.g. flooding at Eton Road and Wood Drive). If new development can not retain runoff on site, then it should be responsible for funding the necessary improvements to convey increased runoff.

In conjunction with planning drainage improvements with future development, critical lots that are at risk to flood damages due to their location should be identified. These lots should dedicate drainage easements on their property or design sufficient conveyance facilities as not to impede the flow of storm water.

3.7.3 Rolled Asphalt Berms

Rolled asphalt berm structures were found in several areas of Cambria. While it would be incorrect to label such structures as curbs and gutters, berms can often be an effective means of containing runoff within the roadway and preventing it from flowing onto private property. However, the berms observed throughout the community were of varying heights, sometimes only 2-3 inches in height. These lower berms may do little to prevent localized flooding problems during large magnitude storm events.

The community should consider incorporating the Caltrans Type E 4 mountable berm into the road section for all new and substantially rehabilitated roads as the standard for all new roadway work where roadway drainage containment is considered necessary in the residential area. Appendix I contains a typical cross section detail of the mountable berm. Installation of rolled asphalt berms would cost a property

[5] Based on 1996 North Coast Area Plan

owner approximately $20 per foot or approximately $1,000[6] for the County to install the berms in front of a 50-foot wide parcel. Numerous complaints indicate many drainage problems within Cambria could be resolved with the construction of berms to control water down the street. However, it is important to note that there is a limit to the extent which berms can be installed without the eventual installation of a catchment and underground storm drain system. This is because berms restrict runoff to streets, reducing the amount of runoff that is infiltrated on private property, thus increasing the total volume of runoff. Berms have a finite capacity and once this capacity is reached, runoff will overtop the berms and flow onto private property. Catchments prevent overtopping of the berms. At the downstream end of a watershed, this volume can be quite substantial. Therefore, an underground storm drain system, an expensive improvement, is often necessary at the end of the drainage path.

Additionally, the piecemeal installation of berms can result in creating or exacerbating drainage problems at nearby properties. While the property owner that installs the berm may benefit, berms cause runoff to concentrate and can kick water off to neighboring and/or downstream properties.

3.7.4 Pave Roads

In general, the most obvious recommendation to reduce erosion and sediment deposition is to pave roads that are currently unpaved, and construct appropriate drainage facilities along with road paving. Many unpaved roads in Lodge Hill and Marine Terrace tend to erode and clog drainage infrastructure during the rainy season. Clogged drainage infrastructure reduces conveyance capacity and often results in flooding/drainage problems. **It is recommended that the community move towards paving all dirt roads in the community in accordance with County standards.** Through the Cooperative Roads Program, the County charges homeowners approximately $75[7] per foot of road width to pave the roads in front of their homes. For a 50 foot wide lot, a home owner would be expected to pay approximately $3,750. Paving costs vary depending on the condition of the road base in front of the home, width of the road, slope, and need for curbing. The design effort for paving the roads should also include storm water management improvements, such as swales or underground pipes, so that new problems are not created with road paving (such as erosion due to concentration of flows).

3.7.5 Routine Maintenance of Drainage Channels and Culverts

All the natural drainage channels that convey flow experience some sediment deposition and vegetal growth. Existing natural or fabricated drainage channels should be kept free of obstructions such as fallen trees, debris, and sedimentation to maintain capacity in the drainage system. Primary responsibility for this maintenance rests with the owners of the property through which the drainage channels pass since the County is not responsible for maintaining facilities on private property. If the drainage channels pass through public property, such as County roads, then the County's maintenance department is responsible for removing impediments. The District should continue to provide leadership, advice and encouragement to property owners and local agencies to assume these responsibilities.

3.7.6 Formation of a Drainage Facility Maintenance Department

Many of the drainage/flooding problems in Cambria are exacerbated by inadequate maintenance of drainage facilities. Currently, the maintenance of drainage infrastructure located within public right of way for unincorporated communities in the County, including Cambria, is the responsibility of the County Public Works Department. The limited availability of County staff and the large area of responsibility make it difficult for District maintenance workers to repeatedly attend to all County drainage facilities prior to all predicted storms and between successive storm events. This means that the maintenance of some culverts and ditches is not performed in a timely manner and, therefore, these culverts and ditches may end up becoming clogged during periodic storm events.

[6] Includes design, administrative, environmental and contingency.
[7] Assumes a 15 foot wide road.

If the community elects not to fund the proposed projects, then at a minimum, the community should finance annual maintenance such as channel clearing, sediment removal and vegetation management. **For this reason, it is recommended that either the existing Cambria Community Services District or a separate facility maintenance district be formed to better maintain the drainage infrastructure in Cambria.** Responsibilities of the new maintenance district would include:

- Being the contact point for all resident complaints regarding drainage infrastructure in the community
- Keeping an organized database of all new drainage infrastructure in the community including the size and capacity of culverts and storm drains, even if this infrastructure is installed by private property owners
- Keeping a regular maintenance schedule that may involve multiple maintenance visits where needed
- Responding to drainage infrastructure repairs as needed
- Conducting an information campaign for creek ownership responsibilities for maintenance and cleaning

Having a local facility maintenance district will make it easier to maintain drainage infrastructure as needed throughout the community.

3.7.7 Neighbor Coordination

Many reported problems were caused by residents blocking historical drainage courses or removing drainage lines that conveyed runoff from higher elevations to lower elevations. These drain lines were installed by private residences in order to move water from the street or their property to public right of way. Filling in or removing drain lines causes runoff to pond in the back or side yards of the upstream properties. If drainage lines convey large amounts of street runoff (e.g. if the property is located at a low point in the street and the drain line is the only outlet), then the County or District would coordinate with the neighbors to reach resolution and restore the drain pipe. If a private drain line functions only to convey runoff from private property, then the County or District would not serve a mediator. The responsibility would fall on the neighbors to resolve the problem. Filling in drainage courses or removing drain pipes is discouraged by the District.

3.7.8 Hillside Runoff and Sedimentation

Reserves from the County's General Fund are normally not used for the construction of projects protecting private property, unless there is a significant general or roadway benefit. In some cases, the reported residential drainage problems in the Cambria area included sedimentation or mud occurring from hillside runoff. Where sediments and runoff leave one private property to enter another, as occurs in residential back yard areas from the adjacent upslope hillside, the District has no jurisdiction. Hillside runoff and sedimentation onto private properties should be addressed by the individual property owner, and not the District. However, District staff is available to consult with the property owners, provide information on common drainage law, and provide basic information on conveying runoff from their property onto public right of way.

3.7.9 Collect Design Level Surveys

It is recommended that during the design phase of the proposed projects, surveys should be collected and detailed hydraulic analyses should be conducted to optimize the capacity of the proposed projects. Detailed surveys will allow the lead agency responsible for implementing the projects to conduct value engineering and determine the most economical and feasible solution to the problems.

3.8 Summary of Recommendations

- Develop a selection process for prioritizing storm drain improvements and identifying the sources of funding for the improvements.
- Consider forming a special assessment district to fund drainage system improvements and to provide drainage maintenance responsibilities, or amend the charter of the Cambria Community Service District to include drainage responsibilities.
- Establish maintenance responsibility for flood prone areas on private property.
- Modify land use ordinance standards to mandate:
  - On-site retention of stormwater runoff
  - All new homes be constructed above the adjacent road grade elevation
  - All new driveways slope towards the road
  - All existing homes located below the adjacent street grade install rolled asphalt berms

3.9 Cost Estimates

Project cost estimates have been provided in this report. More detail on the unit cost and quantity calculations are provided in Appendix E, Engineering Technical Memorandum. These cost estimates are preliminary and subject to revision based on more definition and detail of the recommended project. Construction cost adjustments for inflation will be required if the projects are implemented years from now.

CHAPTER 4 ENVIRONMENTAL FEASIBILITY ANALYSIS

Chapter Synopsis: This chapter discusses the environmental permitting and regulatory requirements for the proposed alternatives. An environmental technical memorandum was prepared for this study and is included in Appendix F. The technical memorandum will provide greater detail on the environmental methodology, analysis and alternatives.

4.1 Environmental Analysis Objective

The study investigated the potential environmental impacts, and also state and federal resource agency permit requirements. The objective was to conduct a "fatal flaw" preliminary environmental feasibility analysis on the proposed drainage and/or flood control mitigation alternatives described in Chapter 3. This analysis assessed the environmental impacts and constraints associated with the proposed alternatives. Each proposed alternative was examined for biological resources, cultural resources, water quality, and land use constraints likely to be present in each given area. Specifically the investigation included:

- Determination of whether project can be permitted
- Outline of the types of probable mitigation measures
- Outline of additional studies required for the next phase implementation
- Determination of the level of California Environmental Quality Act (CEQA) documentation necessary (e.g. EIR, Negative Declaration, Categorical Exemption) for each alternative
- Identification of the applicable environmental regulatory requirements of jurisdictional agencies (e.g. U.S. Army Corps of Engineers, California Department of Fish and Game, Regional Water Quality Control Board)
- Outline of regulatory permitting requirements and approximate schedule for obtaining permits

4.1.2 Environmental Analysis Methodology

Project alternatives were analyzed for environmental constraints that would prevent agency approval, increase costs (particularly for mitigation), or delay the project schedule. Existing documentation relative to each resource topic (e.g., biological resources, cultural resources, water quality, and land use) was examined to help determine the likelihood of constraints.

4.1.3 Biological Resources

A reconnaissance level site assessment was conducted on June 30, 2003 to investigate biological resources in the project area. The assessment area included the proposed project sites and bordering areas. Each site was generally assessed for its potential to support sensitive biological and botanical resources. Information from the California Natural Diversity Database was combined with recent experience on other projects in the area to determine the potential for sensitive species and their habitat in the project areas.

4.1.4 Cultural Resources

Data on file in the San Luis Obispo County Department of Planning and Building was used to determine if cultural resources have been identified in each project area. No standard record searches or site visits were conducted.

4.1.5 Land Use

The *San Luis Obispo General Plan, Estero Area Plan Update,* and *North Coast Planning Area Land Use Element and Local Coastal Plan* were reviewed to determine whether the proposed alternatives were

consistent with local policies. A Geographic Information System was used to examine the presence of prime farmland and farmland of local or state importance in the project area.

4.2 Environmental Analysis Results

4.2.2 Environmental Constraints

Table 4-1 summarizes the environmental constraints that may be encountered for each project alternative. Based on this preliminary analysis, major environmental constraints include the potential presence of cultural resources (Marine Terrace-Castle Street), and potential impacts to threatened species habitat (Lodge Hill and Pine View).

4.2.3 Permit Requirements

An assessment of the state and federal environmental permits that may be necessary for each project alternative is provided in Table 4-2. An estimate of the timeframe typically required to obtain each type of permit is summarized in Table 4-3. Based on the level of research performed for this analysis, all of the project alternatives would be possible to permit if mitigation measures are implemented to avoid environmental constraints. Mitigation measures for work in Lodge Hill and on Castle Street in Marine Terrace would need to be implemented to reduce environmental impacts. The Corps, Coastal Commission, and USFWS may require more stringent mitigation measures for the proposed outfall on Fitzhugh Creek due to potential impacts to jurisdictional waters and sensitive species habitat.

4.2.4 Potential Mitigation

Potential impacts to environmental resources may result from the proposed project alternatives. Those impacts may require implementation of mitigation measures to protect sensitive, threatened or endangered species and cultural resources. Table 4-4 summarizes the potential mitigation measures for each alternative.

Table 4-4: Potential Mitigation Requirements

PROJECT/LOCATION	ALTERNATIVE	POTENTIAL MITIGATION
Marine Terrace Project 1: Eroded Drainage Channel from Saint Thomas Avenue to Emmons Drive Project 2: Marlborough Lane and Drake Street Flooding Project 3: Newhall Avenue and Randall Drive Flooding	Project 1: Replace existing culvert, construct storm drain Project 2: Pave street, construct storm drain, install berms Project 3: Install berms, drop inlet and storm drain	• Erosion and sediment control measures during construction • Record search for cultural resources for Drake Street paving project; surface surveys during ground disturbance depending on results of record search; identify exclusion zones for cultural resources; Recovery and treatment could be required depending on findings.
Cambria Pines Estates Permit requirements combined with Lodge Hill South projects		
Lodge Hill South Project 5: Burton Drive between Orville Avenue and Ardath Drive Project 6: Home and Roadway Flooding at Bradford Road and Orville Place Project 7: Home Flooding on McCabe	Project 5: Install storm drain, berms, drop inlets and energy dissipater Project 6: Pave and berm street Project 7: Install asphalt	• Conducting preconstruction surveys for sensitive species for Project 5. Monitoring during construction in locations where sensitive species habitat is found. • Erosion and sediment control measures during construction • For street paving and work within Burton Creek, record search for

Drive near Ardath Project 8: Flooding of Streets and Homes on Cowper, Radcliff Avenue and Langton Street Project 9: Minor Projects and Berm Installation at Various Locations	berms and downdrain Project 8: Install storm drain, berms, drop inlets and pave streets Project 9: Install berms, drop inlet and road culvert	cultural resources; surface surveys during ground disturbance depending on results of record search; identify exclusion zones for cultural resources; Recovery and treatment could be required depending on findings.
Lodge Hill North Project 10: Wilton Drive Localized Flooding Project 11: Ramsey Street Flooding Project 12: Berm Installation at Various Locations	 Project 10: Install lined roadside ditches, driveway culverts, storm drain and berms Project 11: Pave Ramsey, install drop inlets, storm drain and energy dissipater Project 12: Install berms on various roads	• Erosion and sediment control measures during construction
Pine View Project 13: Eton Road Flooding near Wood Street Project 14: Residential Flooding on Martindale Road	 Project 13: Install storm drain, drop inlet, outfall and erosion protection Project 14: Install berms	• Conducting preconstruction surveys for sensitive species for Project 13. Monitoring during construction in locations where sensitive species habitat is found. • Erosion and sediment control measures during construction
Park Hill Project 15: Dorset Street and Cambridge Street Gully Project 16: Pembrook Minor Ponding	 Project 15: Install berms, extend existing storm drain, drop inlets, install new storm drain Project 16: Install culvert, drop inlet/catch basin, storm drain, and berms	• Erosion and sediment control measures during construction
Happy Hill Project 18: Canterbury Lane Drainage Problem Project 19: Berm Installation at Various Locations Project 20: Suffolk Street Flooding	 Project 18: Install berms, drop inlet and storm drain Project 19: Install berms Project 20: Install berms, storm drain, and drop inlet	• Erosion and sediment control measures during construction

4.2.5 Additional Studies and Surveys

The following studies/surveys will need to be performed in order to begin the permitting phase of the project:

- Habitat assessments in Lodge Hill and Pine View
- Sensitive species surveys in Lodge Hill and Pine View
- Cultural resource record searches

Table 4-1: Environmental Constraints

ALTERNATIVES	BIOLOGICAL	CULTURAL RESOURCES [8]	LAND USE
Marine Terrace			
Project 1: Replace 24-inch culverts at Ogden Drive and at the intersection of Madison Drive and Ardath Drive with 48-inch culverts. Install approximately 200 feet of 36-inch storm drain in Marlborough Lane, from Gaine Street to Harvey Street Project 3: Construct berms along the south side of Newhall Avenue, install a drop inlet at the bend of Newhall Avenue, and convey flows south to Randall Creek.	None	None	None
Project 2: Pave Castle Street and install a 36-inch underground storm drain with drop inlets along Castle Street, from Marlborough Lane west to Sherwood Drive. Rolled asphalt berms will also be installed along Castle Street. Pave and berm Orlando Drive.	None	There are numerous cultural resource sites along Castle Street. This area may have been a village site. Stone tools, chert flakes, and groundstone artifacts have been recovered on previous projects. Higher project costs may result from required surveys, monitoring, and mitigation for cultural resources. The project schedule may be delayed and project costs increased if cultural resources are found on site.	None
Lodge Hill South			
Project 5: Install an underground storm drain system and drop inlets from Orville Avenue to Ardath Drive. Install berms along this segment of Burton Drive. The underground storm drain pipe will ultimately discharge to Burton Creek. Install an energy dissipater at the outfall to Burton Creek.	Improvements to the outfall in the creek bank may affect threatened species habitat, including California red-legged frog (CRLF). Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for CRLF.	None	None
Project 6: Pave and berm Bradford Road and Pierce Avenue. Project 7: Construct asphalt berms on the east side of McCabe Drive. Project 8: Install storm drain in Cowper, starting at Radcliff and Langton. Upsize pipe at Ardath and continue storm drain to Kenneth. Pave and berm Cowper and Radcliff. Project 9: Install berms and culverts in various locations.	None	Potential for cultural resource sites along unpaved roads. Higher project costs may result from required surveys, monitoring, and mitigation for cultural resources. The project schedule may be delayed and project costs increased if cultural resources are found on site.	None

[8] Cultural resource information was obtained solely from the San Luis Obispo County Department of Planning and Building. No standard record searches or site visits were conducted.

ALTERNATIVES	BIOLOGICAL	CULTURAL RESOURCES [8]	LAND USE
Lodge Hill North			
Project 10: Construct lined roadside ditches with positive drainage. Culverts would be needed beneath driveways and at intersections to prevent obstruction of flow and/or the flooding of homes. Install 36-inch storm drain at the intersection of Wilton and Andover to convey runoff collected in the roadside ditches north. Project 11: Reconstruct and pave Ramsey Street, coupled with the installation of drop inlets to convey runoff from upland areas beneath Ramsey Street west, down the canyon towards Burton Creek. Project 12: Install berms at various locations.	None	None	None
Pine View			
Project 13: Purchase drainage easement across the Fitzhugh Ranch to install a 42-inch diameter underground storm drain for discharge to the creek. The second alignment involves the construction of a 42-inch diameter storm drain in Eton Road to convey runoff south towards the upper reach of Fitzhugh Creek. Each project will require the construction of an outfall and erosion protection at the creek.	Construction of a new outfall in the creek bank may affect threatened species habitat, including California red-legged frog (CRLF). Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for CRLF.	None	None
Project 14: Install berms on Martindale	None	None	None
Park Hill			
Project 15: Install berms on Lancaster Street, Dorset Street, Hastings Street, Cambridge Street and Windsor Boulevard. Extend the existing storm drain in Dorset from Nottingham Street to Windsor Boulevard. Install a 24-inch storm drain and drop inlets in Windsor between Cambridge and Dorset. Extend underground storm drain that runs in Dorset Street to Nottingham Drive. Install drop inlet to convey flows from Windsor Boulevard west to the ocean. Install 18-inch storm drain in Lancaster between Pembrook and Whitehall Avenue. Project 16: Install berms, storm drain and drop inlet.	None	None	None
Happy Hill			
Project 18: Install berms on Canterbury, a drop inlet and storm drain. Project 19: Install berms at various locations. Project 20: Install berms, drop inlet and down drain on Suffolk and Hillcrest.	None	None	None

Table 4-2: Permit Assessment

ALTERNATIVE	PROJECT DESCRIPTION	CEQA[9] DOCUMENT	SHPO 106[10]	CDFG 1601[11]	CORPS 404 PERMIT[12]	USFWS SECTION 7[13]	NMFS SECTION 7[14]	RWQCB 401[15]	SWRCB GENERAL PERMIT[16]	SWRCB PHASE II SWMP[17]	CCC CDP[18]	NOTES
Marine Terrace												
Project 1 and 2	Replace culverts, install storm drain and berms.	Exempt (see notes)	No	No	No	No	No	No	No	Yes	Yes	The project qualifies for Class 1 CEQA categorical exemption because it involves minor alterations to existing public facilities and does not have the potential to affect sensitive resources.
Project 3	Pave street, install storm drain, drop inlets and berms	ND [19] (see notes)	No	No	No	No	No	No	No	Yes	Yes	Because there is potential to affect cultural resources while installing the underground storm drain, a ND/MND will be required. However, since there are no federal permits required for the project, Section 106 Consultation is not triggered.
Lodge Hill South												
Project 5	Install berms, storm drain, outfall and energy dissipater.	ND (see notes)	Possibly (see notes)	Yes	Possibly (see notes)	Possibly (see notes)	No	Possibly (see notes)	No	Yes	Yes	Because the project involves the construction of new facilities and has the potential to affect sensitive species or their habitat, a ND/MND will be required. A Corps permit will be required if the improvements to the outfall are constructed below the ordinary high water mark. The Corps will consult with the USFWS if threatened/endangered species could be affected by outfall improvements and/or operation. If a Corps permit is required, a 401 Certification from the RWQCB and a Federal Consistency Determination from the Coastal Commission Consistency Office will also be required. Depending on the result of a cultural records search, Section 106 consultation may be required.
Projects 6, 7, 8 and 9	Pave roads, install berms, storm drains and drop inlets	Exempt (see notes)	No	No	No	No	No	No	No	Yes	Yes	The project qualifies for Class 1 CEQA categorical exemption because it involves minor alterations to existing public facilities and does not have the potential to affect sensitive resources. If the cultural resources survey indicates that there is potential to affect cultural resources while installing the underground storm drain or road pavement, a ND/MND will be required. However, since there are no federal permits required for the project, Section 106 Consultation is not triggered.

[9] California Environmental Quality Act: Required if a state agency has to take action on a project; If the project does not qualify for an exemption, the compliance document is either a Negative Declaration or Mitigated Negative Declaration (ND) or an Environmental Impact Report (EIR)
[10] State Historic Preservation Office – Section 106 (Cultural resource information was obtained solely from the San Luis Obispo County Department of Planning and Building): Required if a project has the potential to impact cultural resources
[11] California Department of Fish and Game – 1601 Streambed Alteration Agreement: Required if a project has the potential to impact sensitive species or their habitat
[12] U.S. Army Corps of Engineers – 404 Permit: Required if a project involves work below the ordinary high water mark
[13] U.S. Fish and Wildlife Service – Section 7 Consultation: Required if a project has the potential to impact sensitive species or their habitat
[14] National Marine Fisheries Service – Section 7 Consultation: Required if a project has the potential to impact sensitive marine and anadromous fish species or their habitat
[15] Regional Water Quality Control Board – 401 Certification: Required if a project has the potential to discharge to surface water, ground water, or other water systems
[16] State Water Resources Control Board – National Pollutant Discharge Elimination System (NPDES) General Construction Permit: Required if a project involves ground disturbance of more than 1 acre
[17] State Water Resources Control Board – Phase II Storm Water Management Plan Revision: Required for potential discharges to surface water, ground water, or other water systems by small municipal separate storm sewer systems not covered by the Phase I program
[18] California Coastal Commission – Coastal Development Permit: Required if a project is located in the Coastal Zone or in streams that feed into the Coastal Zone
[19] Negative Declaration or Mitigated Negative Declaration: Required if projects with impacts that are less than significant or less than significant with mitigation

ALTERNATIVE	PROJECT DESCRIPTION	CEQA[9] DOCUMENT	SHPO 106[10]	CDFG 1601[11]	CORPS 404 PERMIT[12]	USFWS SECTION 7[13]	NMFS SECTION 7[14]	RWQCB 401[15]	SWRCB GENERAL PERMIT[16]	SWRCB PHASE II SWMP[17]	CCC CDP[18]	NOTES
Lodge Hill North												
Projects 10, 11 and 12	Install berms, roadside ditches, storm drain, drop inlets, and pave road	Exempt (see notes)	No	No	No	No	No	No	No	Yes	Yes	The project qualifies for Class 1 CEQA categorical exemption because it involves minor alterations to existing public facilities and does not have the potential to affect sensitive resources.
Pine View												
Project 13	Install storm drain, creek outfall and erosion protection	ND (see notes)	Possibly (see notes)	Yes	Possibly (see notes)	Possibly (see notes)	No	Possibly (see notes)	No	Yes	Yes	Because the project involves the construction of new facilities and has the potential to affect sensitive species or their habitat, a ND/MND will be required. A Corps permit will be required if the improvements to the outfall are constructed below the ordinary high water mark. The Corps will consult with the USFWS if threatened/endangered species could be affected by outfall improvements and/or operation. If a Corps permit is required, a 401 Certification from the RWQCB and a Federal Consistency Determination from the Coastal Commission Consistency Office will also be required. Depending on the result of a cultural records search, Section 106 consultation may be required.
Project 14	Install berms	Exempt (see notes)	No	No	No	No	No	No	No	Yes	Yes	The project qualifies for Class 1 CEQA categorical exemption because it involves minor alterations to existing public facilities and does not have the potential to affect sensitive resources.
Park Hill												
Project 15 and 16	Install berms, storm drains, and drop inlets	Exempt (see notes)	No	No	No	No	No	No	No	Yes	Yes	The project qualifies for Class 1 CEQA categorical exemption because it involves minor alterations to existing public facilities and does not have the potential to affect sensitive resources.
Happy Hill												
Projects 18, 19 and 20	Install berms, storm drains and drop inlets	Exempt (see notes)	No	No	No	No	No	No	No	Yes	Yes	The project qualifies for Class 1 CEQA categorical exemption because it involves minor alterations to existing public facilities and does not have the potential to affect sensitive resources.

Table 4-3: Permitting Timeframe

PERMIT	TYPICAL TIMEFRAME [1] (MONTHS)	NOTES
California Environmental Quality Act (CEQA)		
Exemption	< 1	
Negative Declaration (ND)	6 - 12	
California Department of Fish and Game (CDFG) 1601 Streambed Alteration Agreement	3 - 6	CEQA must be completed before the 1601 Agreement can be issued.
U.S. Army Corps of Engineers (Corps) Section 404		
Nationwide Permit	1 - 3	Section 7 and Section 106 consultations are to be complete.
Individual Permit	12 - 18	National Environmental Policy Act (NEPA) compliance is required, which can take one year or more.
U. S. Fish and Wildlife Service (USFWS)/ National Marine Fisheries Service (NMFS) Section 7 Consultation		
Informal	1 - 3	
Formal	6 - 12	
State Historic Preservation Office (SHPO) Section 106 Consultation	6 - 12	
Regional Water Quality Control Board (RWQCB) 401 Certification	1 - 3	CEQA must be completed before the 401 Certification can be issued.
State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Construction Permit	< 1	A Storm Water Pollution Prevention Plan (SWPPP) must be prepared prior to construction and implemented during construction.
SWRCB NPDES Phase II SWMP Modification	3 - 6	SWMP must be modified and submitted with Notice

PERMIT	TYPICAL TIMEFRAME [1] (MONTHS)	NOTES
		of Intent prior to construction. Due to the fact this program is so new, processing times may vary.
Coastal Commission Coastal Development Permit	4 - 6	Public controversy could delay this approval. Projects within appealable Coastal Commission jurisdiction require review at the state level. A federal consistency determination, which might further delay approval, is required for projects with federal agency involvement.

Notes:
1. Timeframes do not include time required to perform pre-applications studies, to prepare required applications, and to complete prerequisite approvals.

CHAPTER 5 FUNDING ALTERNATIVES

Chapter Synopsis: This chapter provides a summary of funding options, including criteria for qualifying projects, available funds, and cost sharing formulas. This chapter also discusses recommended funding sources that match the types of proposed projects. A funding review technical memorandum was prepared for this study and is presented in Appendix G.

5.1 Overview of Funding Responsibilities

The District is the responsible agency for managing, planning, and maintaining historical drainage and flood control facilities in unincorporated areas of the District. It is the District's policy that funding for these services comes from two sources. Planning costs are typically advanced or funded through the District's general flood control fund, with the intentions that the costs are reimbursed by the Assessment District or benefiting zone. However, design and construction costs of drainage and flood control projects are the responsibility of the community or area that benefits from the capital improvement. If budget constraints prevent the District from providing funds to pay for the planning and design, and the local community is unwilling to pay, then the project will not be advanced until funds become available.

In some communities, local agencies (e.g. community services districts) are legally authorized to provide drainage and flood control services by the Local Agency Formation Commission (LAFCo). In these communities, the local agency is responsible for implementing projects and can implement projects with the District. The Cambria Community Service District (CCSD) is the only special district in Cambria, however, it does not provide drainage services.

Funds to implement drainage or flood control projects can be generated through various federal, state, and local sources through grants, cost sharing agreements, taxes, assessments and fees. This chapter provides a summary of funding options, including criteria for qualifying projects, available funds, and cost sharing formula. This chapter also discusses recommended funding sources that match the types of proposed projects.

5.2 Funding Sources

The various funding sources applicable to Cambria are presented in this section. For more detail on the types of funding programs, reference the technical memorandum included in Appendix G.

5.2.2 Recommended Funding Strategy

The sections in this chapter are organized to outline first, the local funding options that the District and lead agency can establish. The types of projects proposed in Chapter 3 are typical storm drain infrastructure projects that would not normally qualify for outside Federal or State funding. Federally funded projects require a benefit to cost ratio greater than one to gain Federal interest. The projects must also meet guidelines such as river restoration or streambank repair. The Cambria projects either do not qualify based on the funding program's criteria, or the amount of flood damage experienced by home owners does not warrant Federal interest in a flood control project. Therefore, the proposed projects will most likely be funded entirely using local funds.

The recommended local funding mechanisms include 1) taxes, 2) assessments, and 3) fees (property based and development impact). The creation of a local funding source establishes the framework for a comprehensive community funding program. Federal or State grants should not be relied upon to fund the proposed capital projects.

5.2.3 LOCAL FUNDING

As discussed previously, the District is the responsible agency for programming drainage and flood control services. A lead agency would be responsible for the drainage and flood control services and would serve as the applicant and/or responsible agency for administering the funding options discussed in this chapter.

There are several options for providing funds to the communities involved in the Study. The options include grants, taxes, assessments, and fees. Most of the projects proposed in this study will be funded locally. The storm drain projects would most likely be funded by taxes, fees and assessments.

The reader should note that it will be difficult passing an assessment, special tax, or property-based fee in any of the drainage districts when vacant properties in Cambria cannot build due to the water service moratorium.

5.2.3.1 Special Taxes

Taxes are the most common means for a government to raise revenue. An existing tax can be raised, or a new tax can be levied on residents in a district to fund flood control projects. By definition, this is a special tax requiring approval from two thirds of the electorate (residents). If approved, the revenue generated would be allocated specifically for drainage and flood control projects in the district. It would be the responsibility of the district to determine where those funds would be spent.

This form of revenue requires all residents to pay the tax regardless of benefits received and the special tax formula does not need to be related to benefits received from the proposed projects. In order to establish the special tax, the District would need to develop and adopt a formula; the board of supervisors would approve placing the tax on the ballot. A special tax is approved by resident registered voters (except in the case of Mello-Roos CFD tax which can be approved by property owners in uninhabited areas). Figure 1 in Appendix G illustrates the special tax adoption process.

5.2.3.2 Benefit Assessments

A benefit assessment is a charge levied on a property to pay for public improvements or services that benefit the property. The difference between an assessment and a tax is that benefit assessment formula must quantify the relationship between the assessment charged and the benefit received by the property (if a property does not benefit, it cannot be assessed). The application of this funding mechanism would likely limit assessments to those properties within the immediate vicinity of constructed improvements.

All new assessments must conform to the requirements of Proposition 218, which was passed in November 1996. Proposition 218 specifically requires that property owners (not registered voters) be allowed to vote on new benefit assessments. New assessments may be approved by a simple majority approval of the property owners, with votes weighted in proportion to the assessment proposed.

In order to implement a new assessment, the lead agency must define those parcels that receive benefit and define the method of assessment in a Basis of Design Report. Figure 2 in Appendix G illustrates the benefit assessment adoption process.

5.2.3.3 County Cooperative Road Improvement Program

Similar to a benefit assessment, a charge is levied on a property to pay for public improvements or services that benefit the property, but the owners must agree to fund the improvements. This program specifically targets paving or improving roads in the County. Once home owners agree to fund road improvements, the opportunity to install drainage facilities such as asphalt berms becomes available. Streets in Marine Terrace were paved and bermed in the fall of 2002 through this program.

5.2.3.4 Property-Based Fee

A property-based user fee is a charge levied on a property to pay for public improvements or services that are used by that property. The difference between an assessment and a user fee is that assessments rely on a demonstration of special benefit (which can be hard to prove) while user's fees require demonstration of use. In the case of drainage facilities, a user fee allows an agency to collect revenue from properties that contribute runoff into the system but may not flood because of their location.

A user fee can be structured proportionally to the amount each parcel uses the flood control facilities rather than how much each property benefits from the services or improvements provided. This allows program costs to be spread over a larger customer base. For flood control work, user fees are typically related to impervious area on the property, which can be equated to runoff. Like the benefit assessment, a user fee may also be implemented by a 50% vote; however, before the vote may be initiated, a noticed protest hearing must take place and less than 50% written protest must be received.

In order to implement a new user fee, the lead agency must define those parcels that use the various drainage facilities and define its method of calculating a fee proportional to use. Figure 3 in Appendix G illustrates the user fee adoption process.

There is current legislative effort aimed at exempting storm drainage fees from the Proposition 218 balloting test. Should this effort be successful, property based fees could be established with a fee study and protest hearing, as described for the Development Impact Fee below.

5.2.3.5 Development Impact Fee

Government Code Section 66000 et.seq., allows the County to collect development fees to fund the installation of storm drain infrastructure necessary to offset the impacts of development. Development Impact Fees are tied to either General Plans or Capital Improvement Programs approved by the County. As regular updates of the General Plan and/or Capital Improvement Programs, additional storm drain infrastructure is identified to support the new developments and projects. The fees cannot be used to correct existing problems; although they can be used to fund a "fair share" of new projects. The collection of fees in lieu of the installation of curb, gutter and sidewalks in problematic locations must be approved by District Board of Supervisors as a new and separate action.

Development Impact Fees are not subject to vote. They can be approved by a majority of the Board of Supervisors or the Board of Directors after a protest hearing. Figure 4 in Appendix G illustrates the adoption process.

The implementation of a Development Impact Fee in Cambria may not benefit the community since it is nearly built out. However, redevelopment and larger remodels (improvements that exceed a certain percentage of the current property home value) could provide the nexus for collecting impact fees.

Lodge Hill Area

Lodge Hill area drainage improvements should be funded using developer fees which have been collected from residents by the County Planning Department for many years. The funds could be used to mitigate drainage and flooding problems created by recent development and also to construct improvements to serve future development and infill projects.

Pine View Area

Developers in this drainage subbasin were assessed a drainage mitigation fee per building unit. Drainage improvements to mitigate downstream problems caused by uphill development, should be funded by revenue generated from developer fees

5.2.4 OUTSIDE (LEVERAGED) FUNDING SOURCES

Although the types of projects proposed in Chapter 3 of this report are not the types of projects that would qualify for State or Federal funding, descriptions of possible outside funding sources are described below since they could be applied for other purposes in Cambria, such as watershed protection and stream restoration.

Federal and State programs (e.g. cost sharing agreements or grants) provide an opportunity for communities to reduce the total project cost that will be funded through taxes, assessments, and fees. Grant applications often require detailed information regarding the project, the impact on the community and the environment, and project costs. Additionally, grant distributors prefer projects that provide multiple benefits including environmental restoration. Projects compete for existing funds and a majority of applications are not accepted because of this.

Once a grant is appropriated to a project, the recipient is required to complete additional paperwork including invoices, status reports, and project closeout reports. Grant management adds to the overall project costs and not all grant management costs are guaranteed to be recovered (not included as matching funding for project costs).

5.2.4.1 U.S. Army Corps of Engineers: Flood Hazard Mitigation and Riverine Ecosystem Restoration Program

Informally known as "Challenge 21," this watershed-based program focuses on identifying sustainable solutions to flooding problems by examining nonstructural solutions in flood-prone areas, while retaining traditional measures where appropriate. Eligible projects will meet the dual purpose of flood hazard mitigation and riverine ecosystem restoration.

Projects include the relocation of threatened structures, conservation or restoration of wetlands and natural floodwater storage areas, and planning for responses to potential future floods.

The Corps requires that the local sponsor[20] assist in the preparation of the planning, environmental, and design documents to ensure that the communities are involved in the project development and selection process. This requires the local sponsor to have an active role throughout the entire Corps civil works process, which can last up to seven years or more. The local sponsor is also expected to share in the cost of the project planning, design and construction (cost sharing depends on the program, but can be as high as 50 percent of the project). The local sponsor financial contribution can be in the form of in-kind service (e.g. staff time), which would offset the cash contribution requirements, but some of these costs would be in addition to the requirements defined by the Corps process. The local sponsor will incur project costs that are deemed ineligible and cannot be used as part of the local sponsor financial contribution. These costs are typically project management costs incurred for administrative tasks such as management of staff, preparation of invoices, etc. Refer to Appendix G for more detail on local sponsor cost sharing responsibilities for Corps sponsored projects.

The amount of structural and non-structural damage experienced by residences and business in Cambria may not qualify as a Federal project based on the Corps' benefit to cost ratio formula (the damages must be greater than the project costs). The Corps would make this determination following the completion of an Economic Analysis

[20] A local sponsor is typically the local flood control agency or district responsible for providing drainage and flood control. Local sponsors share in the cost for planning, designing and constructing a project with the Corps.

as part of a Feasibility Study. However, based on the delineation of the FEMA 100-year floodplain, Federal involvement would only be recommended for the proposed levee project along Cambria Creek.

5.2.4.2 U.S. Army Corps of Engineers: Continuing Authorities Program (CAP)

Congress has provided the Corps with a number of standing authorities to study and build water resources projects for various purposes, and with specified limits on Federal money spent for a project. The benefit with CAP projects is that specific congressional authorization is not needed. However, the requirements of a local sponsor and the economic benefits described above apply to CAP funded projects. The potential CAP funding available for Cambria or Little Cambria Creek include:

- Flood Control Projects – Section 205 of the 1948 Flood Control Act (FCA), as amended: Local protection from flooding by the construction or improvement of flood control works such as levees, channels, and dams. Non-structural alternatives are also considered.
- Emergency Streambank and Shoreline Restoration – Section 14, 1946 FCA, as amended: Allows emergency streambank and shoreline protection to prevent damage to public facilities, e.g., roads, bridges, hospitals, schools, and water/sewage treatment plants.
- Snagging and Clearing for Flood Control – Section 208, 1954 FCA, as amended: Local protection from flooding by channel clearing and excavation, with limited embankment construction by use of materials from the clearing operations only.
- Aquatic Ecosystem Restoration – Section 206, Water Resources Development Act (WRDA) of 1996: Carries out aquatic ecosystem restoration projects that will improve the quality of the environment, are in the public interest, and are cost effective.

The Federal funding level and the local sponsor (non-Federal) funding requirements are summarized below. Local sponsors are expected to pay for at least 25 percent of the total project costs on Federally sponsored projects.

- Flood Control Projects - Federal share may not exceed $7 million for each project. Required non-Federal match: 50 percent of the cost of the project for structural measures and 35 percent of the cost of the project for nonstructural measures.
- Emergency Streambank and Shoreline Restoration - Federal share may not exceed $1 million for each project. Non-Federal share of total project costs is at least 25 percent.
- Snagging and Clearing for Flood Control – Federal share may not exceed $500,000 for each project. Required 50 percent non-Federal match including all costs in excess of the Federal cost limitation.
- Aquatic Ecosystem Restoration – Federal share is limited to $5 million. The non-Federal share is 35 percent (including studies, plans and specifications, and construction).

5.2.4.3 California Department of Water Resources: Urban Streams Restoration Program

The objectives of this program are to assist communities in reducing damages from streambank, watershed instability and floods while restoring the environmental and aesthetic values of streams, and to encourage stewardship and maintenance of streams by the community. Objectives of the program are met by providing local governments and citizen's groups with small grants and technical assistance for restoration projects, to encourage all segments of local communities to value natural streams as an amenity, and to educate citizens about the value and processes taking place in natural streams.

Grants can fund projects as simple as a volunteer workday to clean up neighborhood steams, or projects as complex as complete restoration of a streams to its original, natural state.

- The Department of Water Resources is in the process of amending the regulations for the program, including raising the grant cap from $200,000 to $1 million

- All potential projects must have two sponsors: a local agency and a community group.

5.2.4.4 State Water Resources Control Board: Proposition 13 Watershed Protection Program

This program provides grants to municipalities, local agencies, or nonprofit organizations to develop local watershed management plans and/or implement projects consistent with watershed plans. Grants may be awarded for projects that implement methods for attaining watershed improvements or for a monitoring program described in a local watershed management plan in an amount not to exceed five million dollars per project. These grants could be used to reduce chronic flooding problems or control water velocity and volume using vegetation management or other nonstructural methods in Cambria.
California

5.2.4.5 Governor's Office of Emergency Services: Flood Mitigation Assistance Program

FEMA provides funds on a yearly basis for each of the states to administer Flood Mitigation Assistance (FMA) grants. In California, the Governor's Office of Emergency Services administers these grants. The purpose of these grants is to provide local communities with funds to alleviate reoccurring flooding problems and to reduce claims on the National Flood Insurance Fund (NFIF). There are three types of grants available:

- FMA Planning Grants
- FMA Project Grants
- FMA Technical Assistance Grants

All projects that address flooding issues for areas within a Special Flood Hazard Area (SFHA)[21] are eligible for both FMA Planning and Project grants. In order to receive a FMA Project grant, a Flood Mitigation Plan (FMP) must be completed. A draft FMP has been submitted to the Office of Emergency Services (OES) for review and comment. The County anticipates an approved FMP by the end of calendar year 2004. The FMA Planning Grant can be used to fund the completion of the FMP. Refer to the Funding Assistance Technical Memorandum in Appendix G for more detail on typical grant eligibility and administrative requirements.

5.3 Recommended Funding Strategy

There are limited funding opportunities available for the alternatives identified in this report. **As stated previously, the local lead agency will need to fund the planning, permitting, environmental compliance, design and construction for all projects. The lead agency should establish local funding mechanisms, which include development impact fees, assessments and property based fees. The lead agency will be supported by the District in their efforts**.

Development Impact Fee

The lead agency should collect development fees on new development, redevelopment and larger remodels to fund the installation of storm drain infrastructure necessary to offset the impacts of development. Drainage mitigation fees collected by the County's Planning and Building Department to date should be used to fund the most serious problems in Lodge Hill, Pine View and Marine Terrace. Future fees collected for development in Cambria should be used to fund necessary drainage projects identified to support new developments.

Property Based Fee

To fund the construction of storm drain pipelines in the different districts, a property-based user fee may be more appropriate than an assessment fee and would also be easier to prove since a user fee allows an agency to

[21] Any area within the 100-year flood plain as defined by FEMA is within a SFHA.

collect revenue from properties that contribute runoff into the system, but may not flood because of their location. The user fee could be structured proportionally to the amount each parcel uses the storm drain facility, rather than how much each property benefits from the services or improvements provided. The user fee could be related to impervious area on the property, which can be equated to runoff. For example, higher elevation properties in Pine View that may not flood would assist in funding the downstream storm drain system.

Benefit Assessments

A benefit assessment is one possible approach for generating funding for the proposed projects. A benefit assessment may not be as appropriate for funding the proposed projects when compared to a property based fee because an assessment requires a demonstration of special benefit, while users' fee require demonstration of use. Based on the responses received from the community questionnaires, most homes that experience flood related damages are located at the low point of a street or within a historic drainage course. A majority of the benefits received from a project would be realized by a few property owners. Subsequently, the owners receiving little or no benefit might not be willing to assess themselves to fund a project. Therefore, if a project will only benefit a limited number of homes, then an assessment should not be pursued.

CHAPTER 6 IMPLEMENTATION STRATEGY

Chapter Synopsis: This chapter consists of the implementation strategy for constructing the drainage and flood control improvements. Recommendations are based on the proposed projects discussed in Chapter 3. The proposed projects were determined by evaluating the different alternatives, ease of construction, easements and right-of-way requirements.

6.1 Local Control versus District Control

The most effective approach to improving drainage and flooding problems in each community is to identify the problems and then create a local entity to implement the solutions to solve those problems. The role of the District is to assist in determining the improvements necessary to reduce flooding, and then to assist the individual communities in implementing programs to improve flood protection.

The District will use its general funds to provide planning and programming assistance, so that local areas of benefit within the County can better understand the significant drainage problems they are facing and determine how those problems should be solved. However, the general property tax allocation provides the District with only about $550,000 per year in revenue. The District does not possess the programs, funds or staffing to address all the on-going flooding and drainage problems in the County.

The proposed projects for Cambria totaled approximately $6.7 million. This total includes street and berm improvements totaling approximately $2.5 million that would be paid by the benefiting home owners through the Cooperative Roads Improvement Program. The storm drain, road side ditch improvements and related appurtenances have an estimated cost of approximately $4.2 million. If the lead agency in Cambria established a funding source to pay for the storm drain, culvert and roadside ditch improvements (excluding the street and berm improvements), approximately $298,000 per year would have to be generated by the community in order to build all the projects and pay off a municipal bond[22].

The success of any project depends on the agreement between the District and the local agency advocating the project. In order for a project to proceed, it must be accomplished in a cooperative manner and must have property owner support.

6.1.2 AMEND CCSD CHARTER TO INCLUDE DRAINAGE SERVICES

It is recommended that the CCSD amend its charter to include drainage services (including maintenance) and serve as the lead agency of the community. The CCSD, with assistance from the County, would be responsible for implementing the proposed projects in this report. If the CCSD chooses not to serve in this capacity, then a special service area should be created to provide drainage services in Cambria. At this point, there is no clear indication of whether a drainage service district would be supported by the community. Home owners must be willing to fund a majority of the required capital costs.

A formal response received from the CCSD indicates that it is not prepared to take the lead agency role on the proposed projects. The response stated that the CCSD neither had the resources nor the capability to undertake such responsibility.

6.2 Drainage Improvements in All Districts

The phasing of storm drain projects would depend on the residents' desire to implement projects within each district. Each proposed project works independently to solve localized problems within a specific district. For example, neighbors within Marine Terrace could organize to implement a project that benefits their area in the

[22] Assumes a municipal bond rate of 5 percent, paid off over a period of 25 years.

community. The implementation steps for the projects discussed in Chapter 3 of this report would generally follow the steps outlined below. The exception is the level of CEQA documentation discussed in Chapter 4 of this report. For example, the project proposed for Lodge Hill South and Pine View Tract includes retrofitting an outfall on Burton Creek and installing a new outfall on Fitzhugh Creek, which increases the level of CEQA documentation and resource permit approval. Paving Drake Street and installing a storm drain could require mitigation for cultural resources, thereby increasing the level of CEQA documentation. Table 4-1 outlines the level of CEQA documentation and permit requirements for each project by district. The majority of projects qualify for Class 1 CEQA categorical exemption because the alternatives consist of minor alterations to existing public facilities and do not have the potential to affect sensitive resources.

6.2.2 Implementation Steps

6.2.2.1 Community Designates a Lead Agency

An existing or newly formed group needs to assume the role of lead agency. The lead agency representing the community would assume control of the project at completion. The lead agency will be responsible for gaining a preliminary level of community support for projects prior to implementing the engineering planning phase.

6.2.2.2 Lead Agency Prepares Basis of Design Report

The lead agency, with support from the residents living within a district, would fund and complete a Basis of Design Report within 9 months of start. The Basis of Design Report would include a description of the existing problem, proposed alternatives, recommended project, preliminary alignments, potential environmental impacts, and cost estimates. A basis of design report for a project that could impact sensitive species habitat would be completed within 15 months of start.

Based on the engineering analysis, project cost estimates would be developed to determine the appropriate funding mechanism to construct and maintain the completed project. The cost estimates will continue to be refined and the level of accuracy will improve during the design phase. The Basis of Design Report should provide cost information in sufficient detail to initiate property based fee or benefit assessment proceedings.

6.2.2.3 Conduct Benefit Assessment or Property Based Fee

A property-based user fee may be more appropriate than an assessment fee and would also be easier to prove since, in the case of drainage facilities, a user fee allows an agency to collect revenue from properties that contribute runoff into the system, but may not flood because of their higher elevation location. The user fee could be structured proportionally to the amount each parcel uses the storm drain and appurtenant facilities, rather than how much each property benefits from the services or improvements provided. The user fee could be related to impervious area on the property, which can be equated to runoff.

If approved, the property-based fee could be used to secure Certificates of Participation ("COPs") that finance a portion of the project construction. COPs are similar to bonds and are typically sold shortly after the project construction bids are received. COPs typically do not provide provisions for principal payoff, hence the property-based fee is set to cover the costs of both principal and interest. Currently rates for COPs are on the order of 5 to 5.5 percent and terms are typically 20 to 25-years.

6.2.2.4 Design Project, Prepare Environmental Documents and Permits

If the community supported the project by approving a property based fee, then the lead agency would proceed with designing the project, preparing the appropriate environmental document and securing resource agency permits to construct the project. The duration for the design and environmental documentation process is approximately 12 months from the approval of a property based fee. If a project involves construction within a

creek bank, then the CEQA and permit process would increase this phase of the project by approximately 6 to 12 months.

6.2.2.5 Construction

The lead agency would advertise the project and oversee construction. It is assumed that the duration would be approximately 6 to 12 months, depending on length of pipeline and environmental mitigation requirements.

6.2.3 Cost Estimate

The total cost for each project is broken down in the appropriate sections of Chapter 3 and the breakdown by district is summarized in Table 3-7. The local cost share to be funded via a property based fee was not calculated because the number of parcels within each district contributing runoff to the proposed facilities was not identified. The entire cost will likely be borne by the property owners because owners that contribute runoff to the proposed drainage facilities must agree to pay for the construction and future maintenance of them. The property owners assume the financial responsibility by approving the property based fee.

6.2.4 Timeframe for Implementation

Instead of approximating completion dates for the implementation steps, an estimated timeframe for each milestone was developed. In order to establish a completion date, add the cumulative durations to the initiation of the project. The timeframe is shown in Table 6-1. If this project was implemented from initiation to completion without delay, then the typical storm drain with road paving project could be completed in approximately 3.5 years. Implementing projects with potential environmental impacts to sensitive species and their habitat could be completed in approximately 5 years.

Table 6-1: Forecast Durations for Major Tasks

MILESTONE	DURATION
Community Designates Lead Agency Role	9 months
Lead Agency Prepares Basis of Design Report	9 to 15 months
Benefit Assessment Election	6 months
Design [1]	6 to 12 months
CEQA/ Resource Agency Permits [1, 2]	6 to 24 months
Approvals and Advertise for Construction	4 months
Construct Drainage Improvements [3]	6 to 12 months
Total	**~ 3 to 5 years**

Notes:
1: Design and CEQA occur concurrently
2: Duration for CEQA and Resource Agency Permits depends on the complexity and presence of sensitive species and their habitat
3: Depends on scope of project, length of pipeline, complexity of construction staging, and environmental mitigation requirements.

REFERENCES

1. San Luis Obispo County Department of Public Works, "San Luis Obispo County Flood Protection and Drainage Policies, Programs, Permitting and Funding," April 17 2001
2. Cambria Design Plan, Public Hearing Draft, County of San Luis Obispo, August 22, 2000
3. Cambria Residential Design Plan, North Coast Area Plan Amendment, Revised Public Hearing Draft, January 8, 2003
4. Cambria Erosion and Sediment Study, Lodge Hill Study Area, USDA Natural Resources Conservation Service, Watershed Planning Services, July 20, 1999
5. Final Environmental Impact Report for Land use Element and Local Coastal Plan, North Coast Area Plan, Volume I-EIR Text, San Luis Obispo County Department of Planning and Building, March 20, 1996
6. Land use Element and Local Coastal Plan, Public Review Draft, San Luis Obispo County Department of Planning and Building, February 15, 1993.
7. Improvement Plans for the 2001 Marine Terrace and Alban Place Cooperative Roads Project.
8. Land Use Ordinance, Title 22 of the County Code, January 1, 2003

Appendix A

FIGURES

APPENDIX A

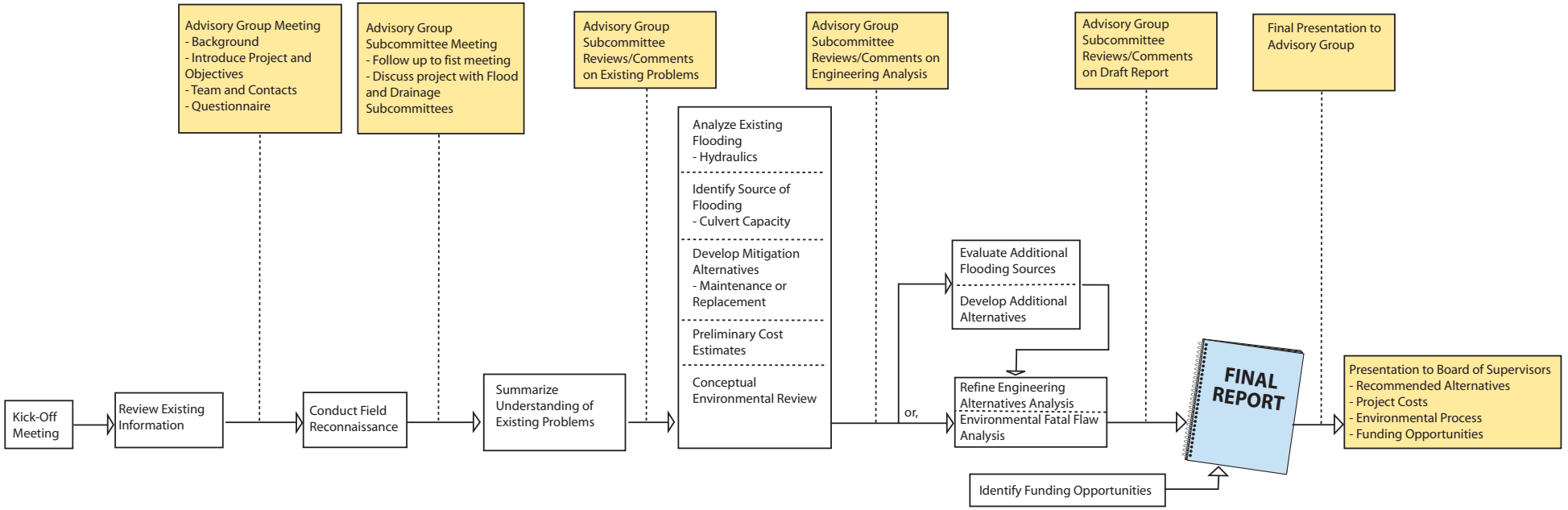
FIGURES

COUNTY OF SAN LUIS OBISPO

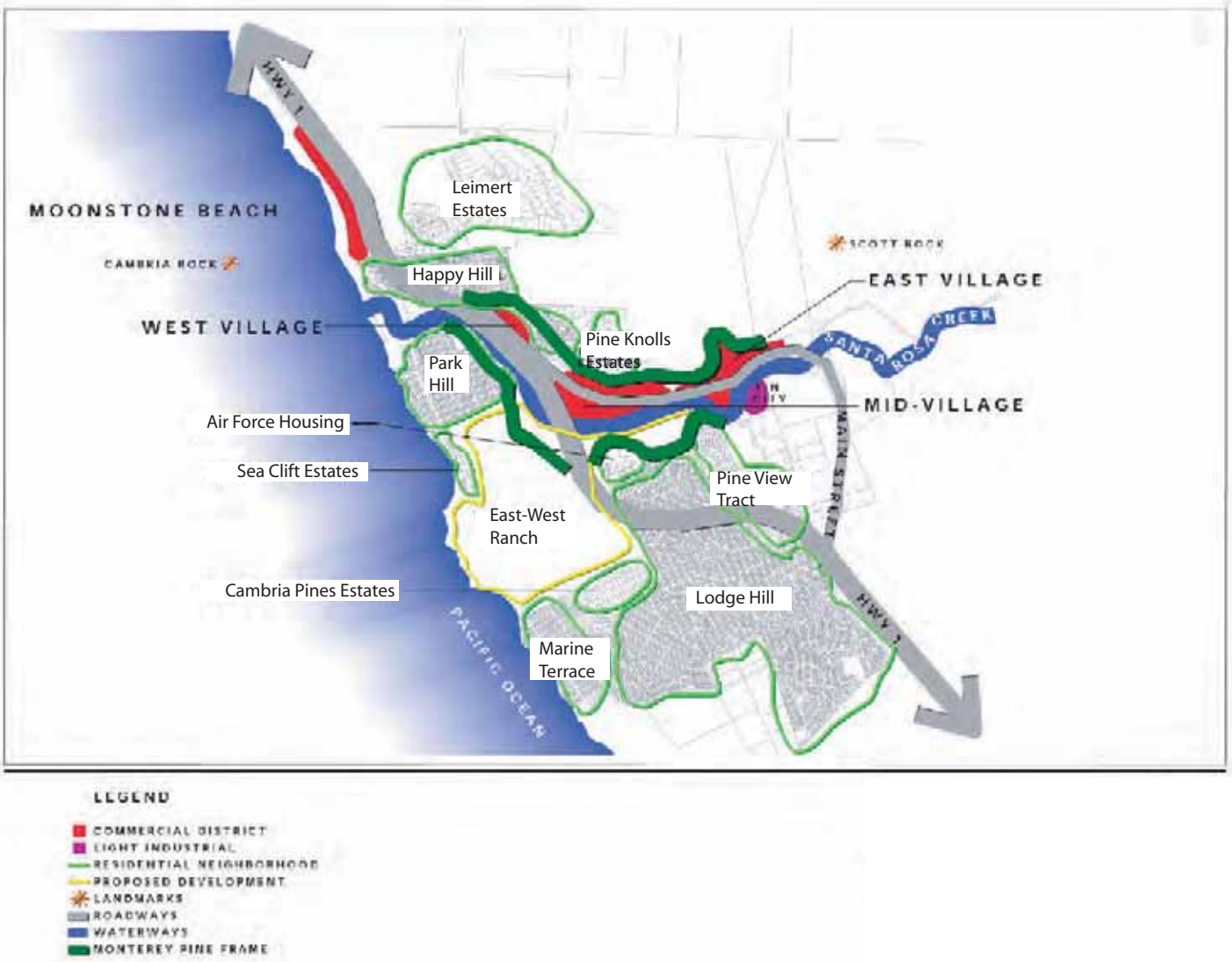
Community Drainage and Flood Control Studies

Cambria, Cayucos, Nipomo, Oceano, San Miguel and Santa Margarita

Study Flow Chart

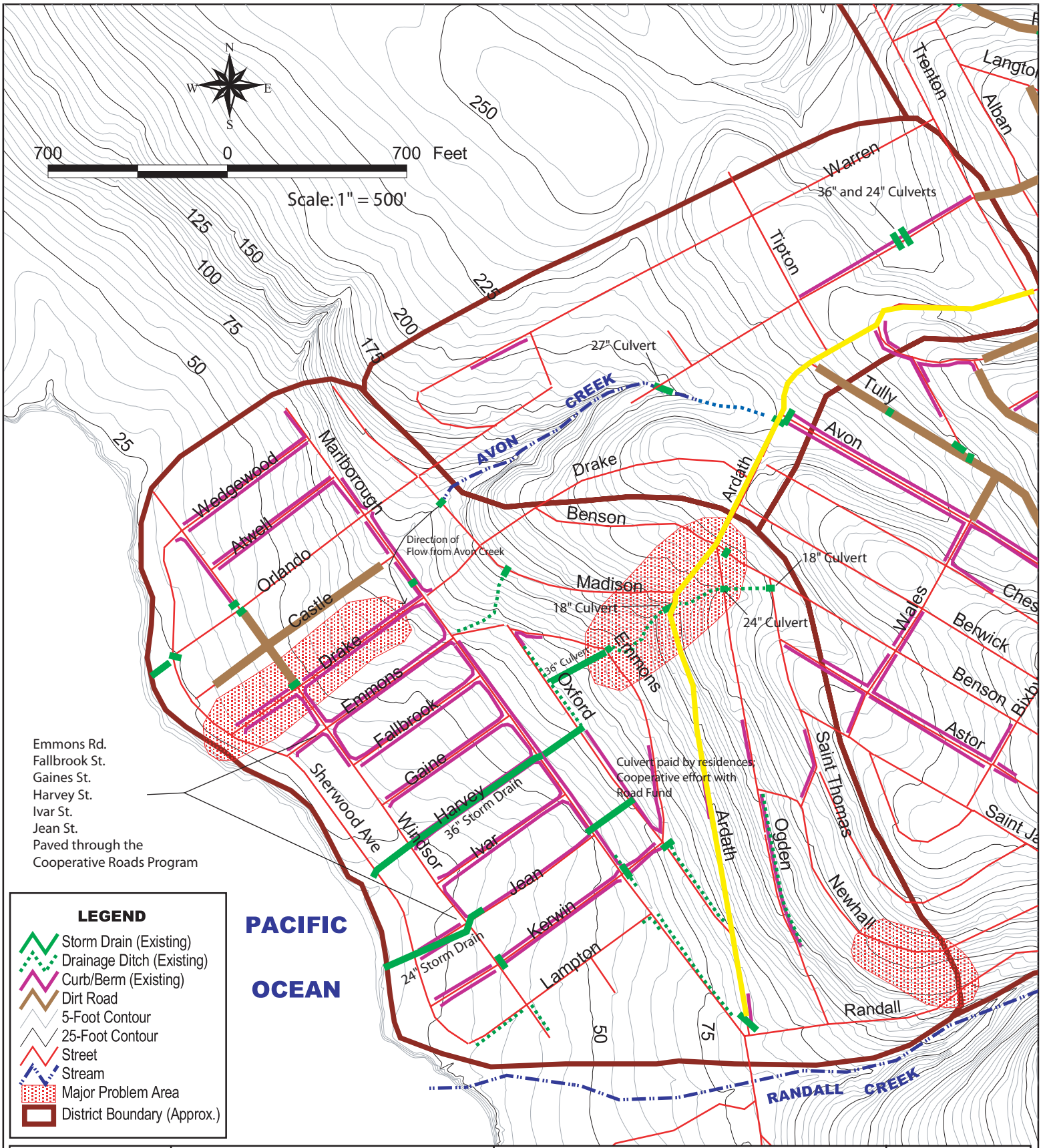


RMC



SOURCE: County of San Luis Obispo, 2001. *Cambria Residential Design Plan.*

Project: SLO County H&H Project No.: 210176 Path: Z:\2001\210176\Cambria Date: 15 Oct 2003 Drawn By: KOW	QUESTA ENGINEERING CORP Civil Environmental & Water Resources P.O. Box 70356 · 1220 Brickyard Cove Road · Point Richmond, CA 94807 Modified by RMC, November 2003	Cambria Drainage and Flood Control Study Districts of Cambria	Appendix A Figure 2



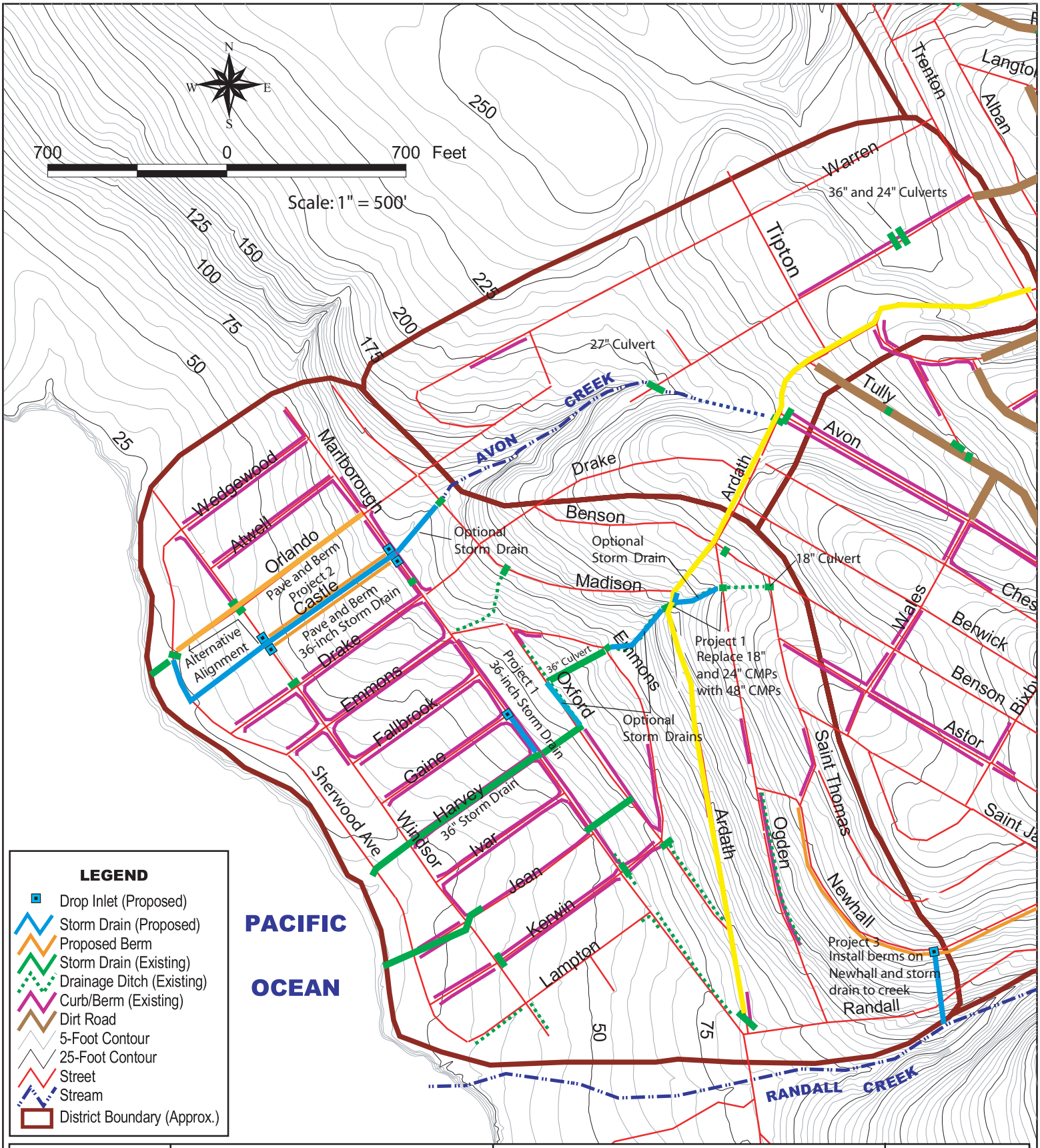
Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
31 May 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356, 1220 Brickyard Cove Road, Point Richmond, CA 94807

Modified by RMC, November 2003

Cambria
Drainage and Flood Control Study
Marine Terrace
Existing Drainage Infrastructure
and Reported Flooding Problems

Appendix A
Figure
3



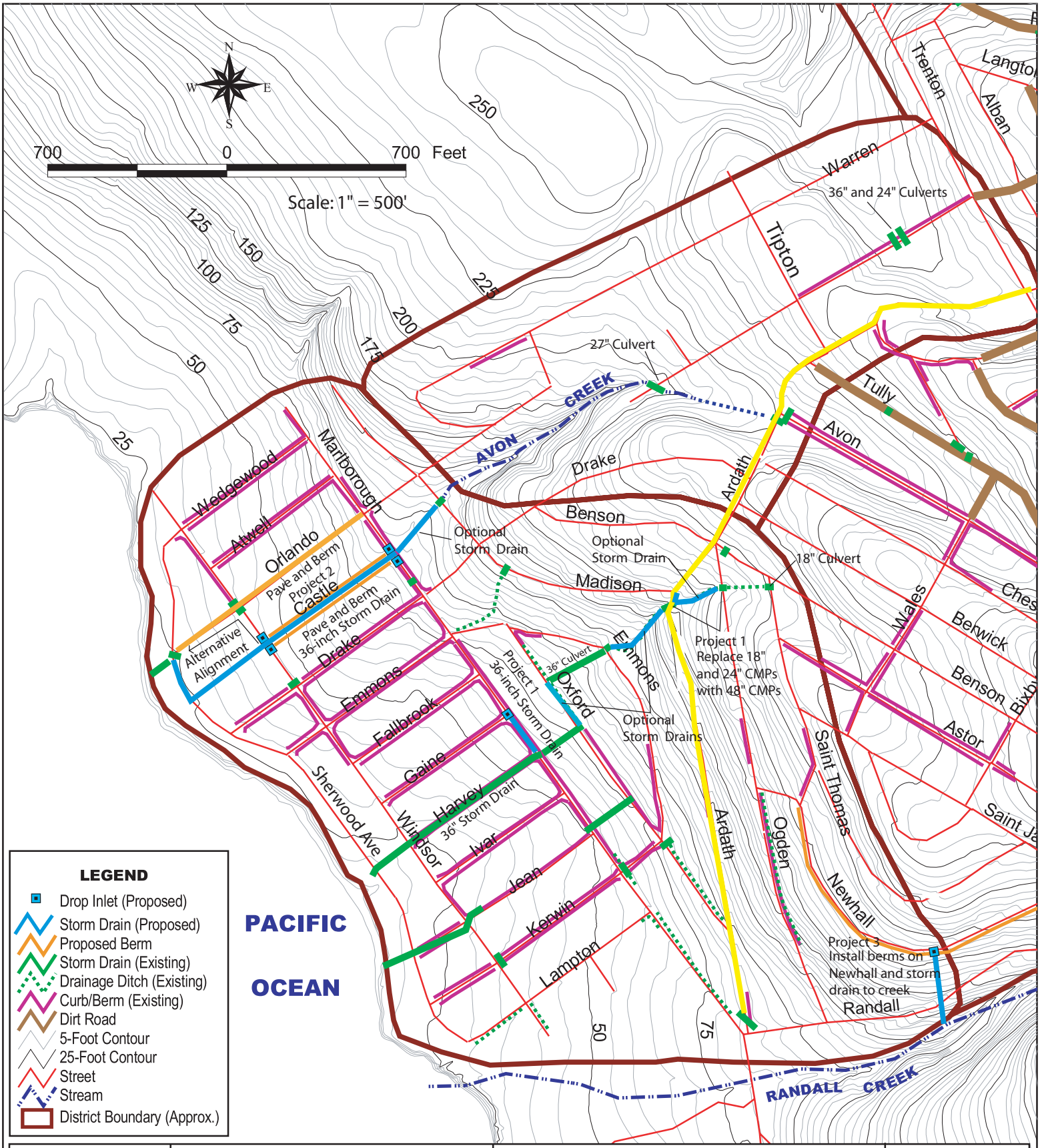
Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
31 May 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 · 1220 Brickyard Cove Road · Point Richmond, CA 94807

Modified by RMC, November 2003

Cambria
Drainage and Flood Control Study
Marine Terrace
Proposed Drainage Improvements

Appendix A
Figure
4



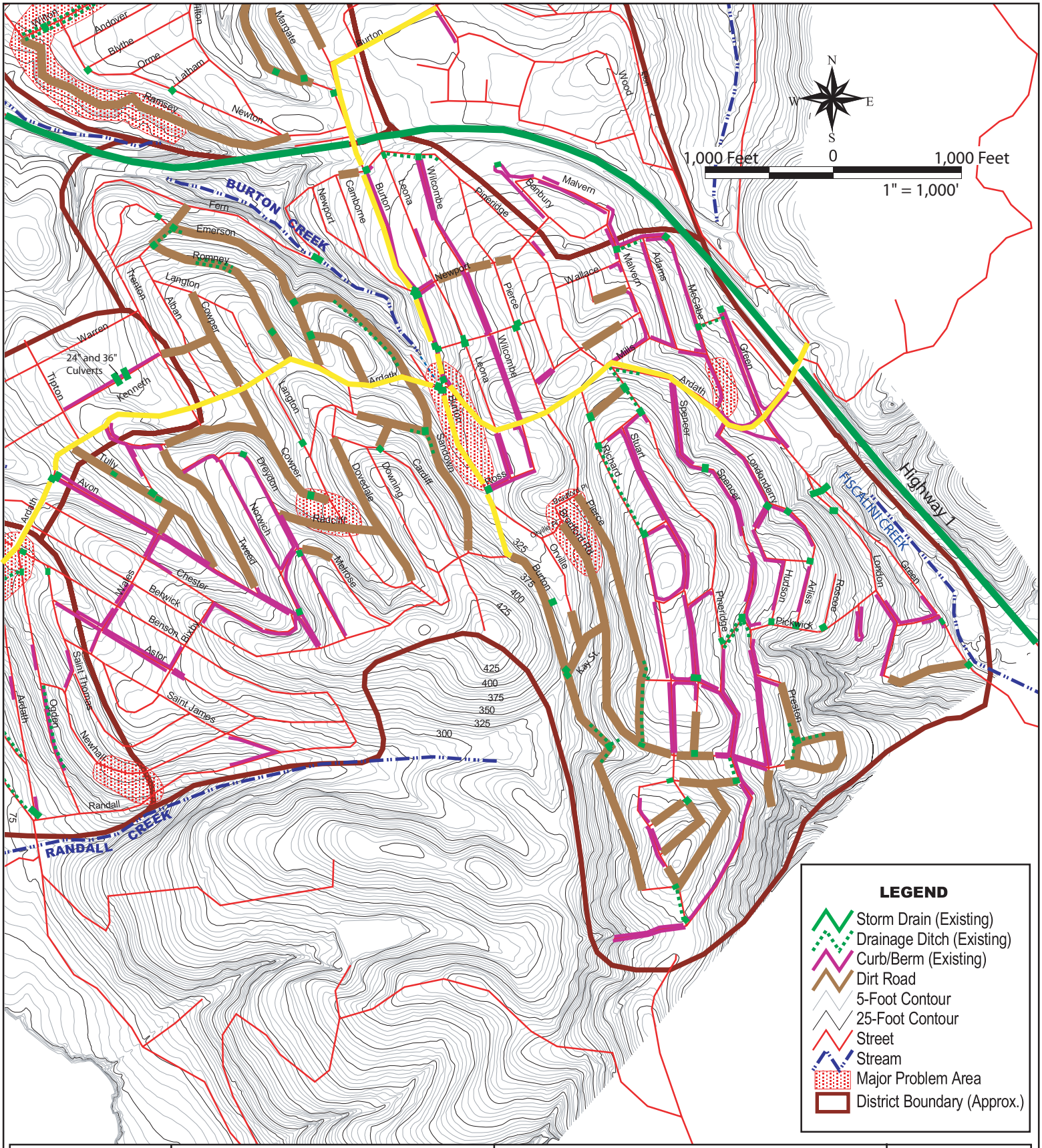
Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
31 May 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 · 1220 Brickyard Cove Road · Point Richmond, CA 94807

Modified by RMC, November 2003

Cambria
Drainage and Flood Control Study
Marine Terrace
Proposed Drainage Improvements

Appendix A
Figure
4



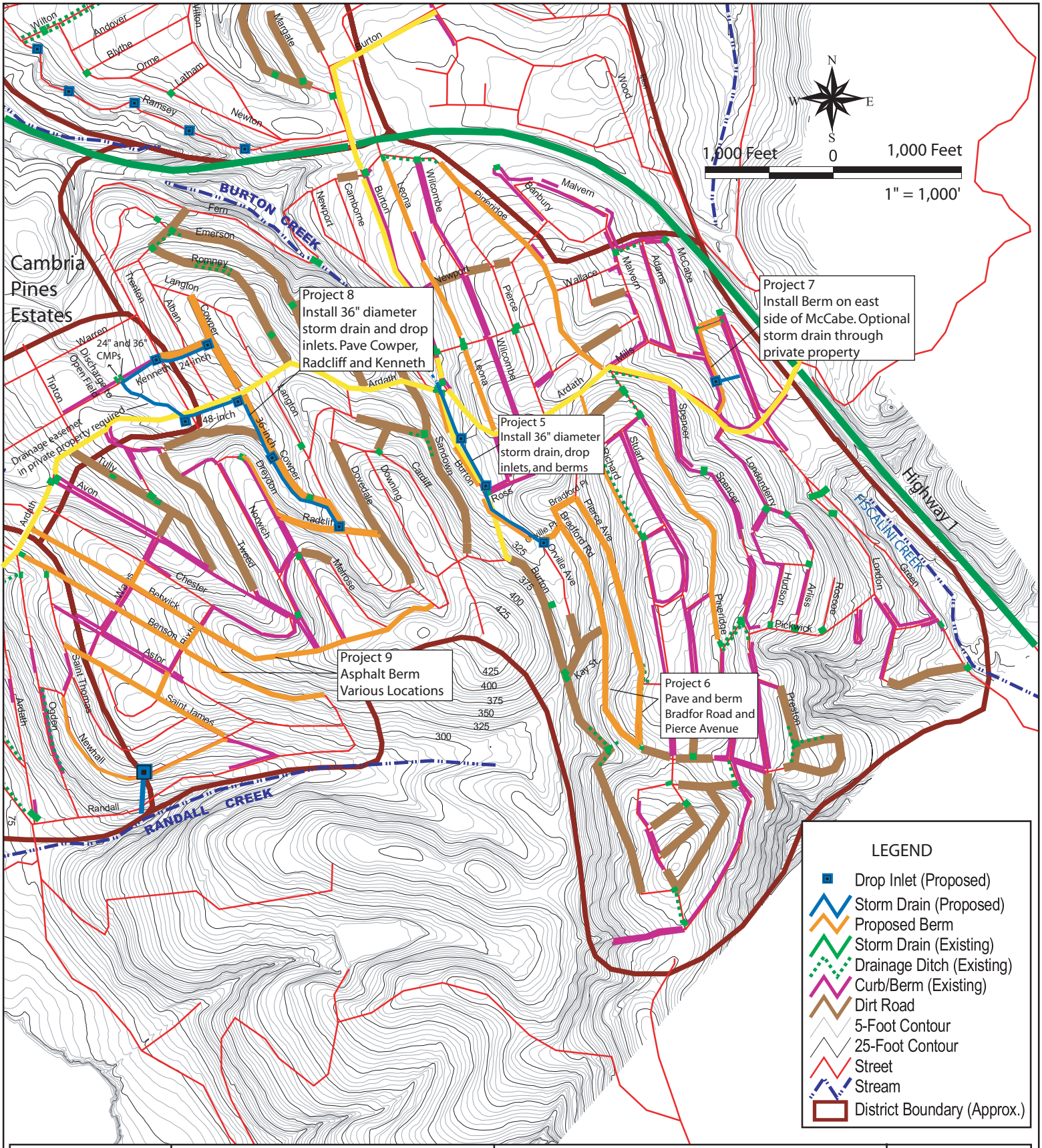
Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil, Environmental & Water Resources
P.O. Box 70356, 1220 Brickyard Cove Road, Point Richmond, CA 94807

Modified by RMC, November 2003

Cambria
Drainage and Flood Control Study
Lodge Hill South and Cambria Pines Estates
Existing Drainage Infrastructure and Areas of Reported Problems

Appendix A
Figure
5



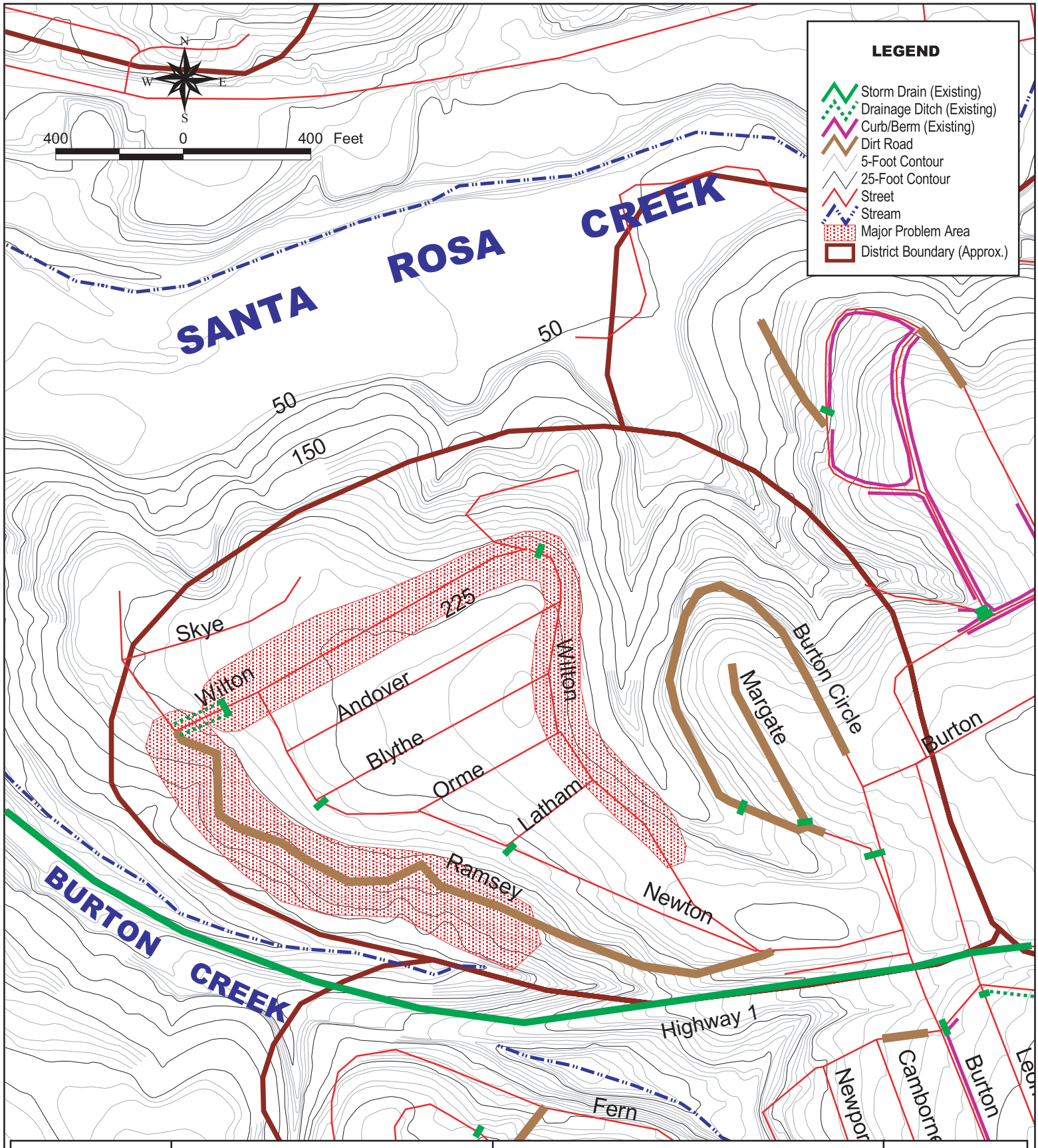
Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 · 1220 Brickyard Cove Road · Point Richmond, CA 94807

Modified by RMC, November 2003

Cambria
Drainage and Flood Control Study
Lodge Hill South
and Cambria Pines Estates
Proposed Drainage Improvements

Appendix A
Figure
6



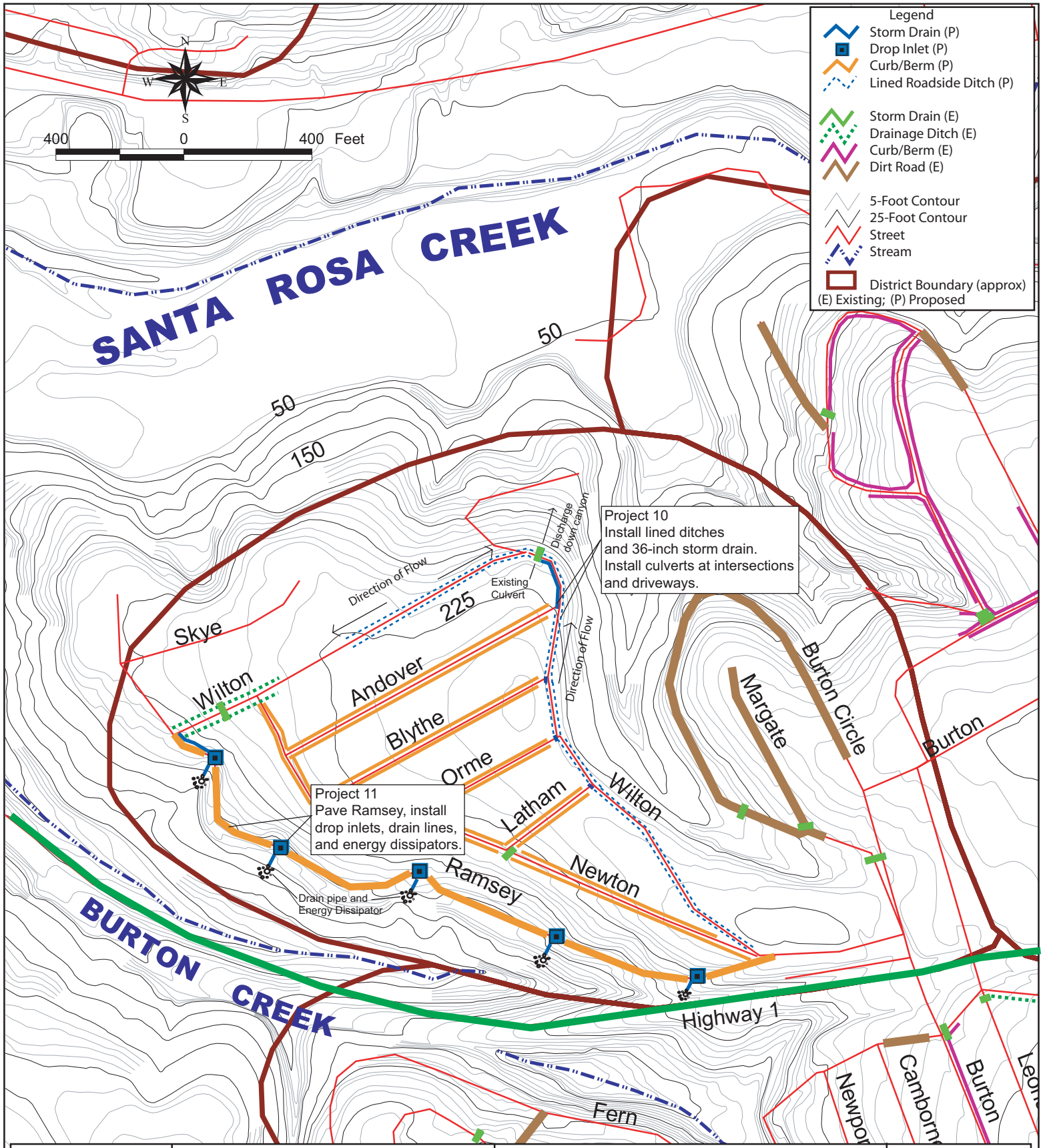
Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 · 1220 Brickyard Cove Road · Point Richmond, CA 94807

Modified by RMC, November 2003

Cambria
Drainage and Flood Control Study
Lodge Hill North
Existing Drainage Infrastructure
and Areas of Reported Problems

Appendix A
Figure
7



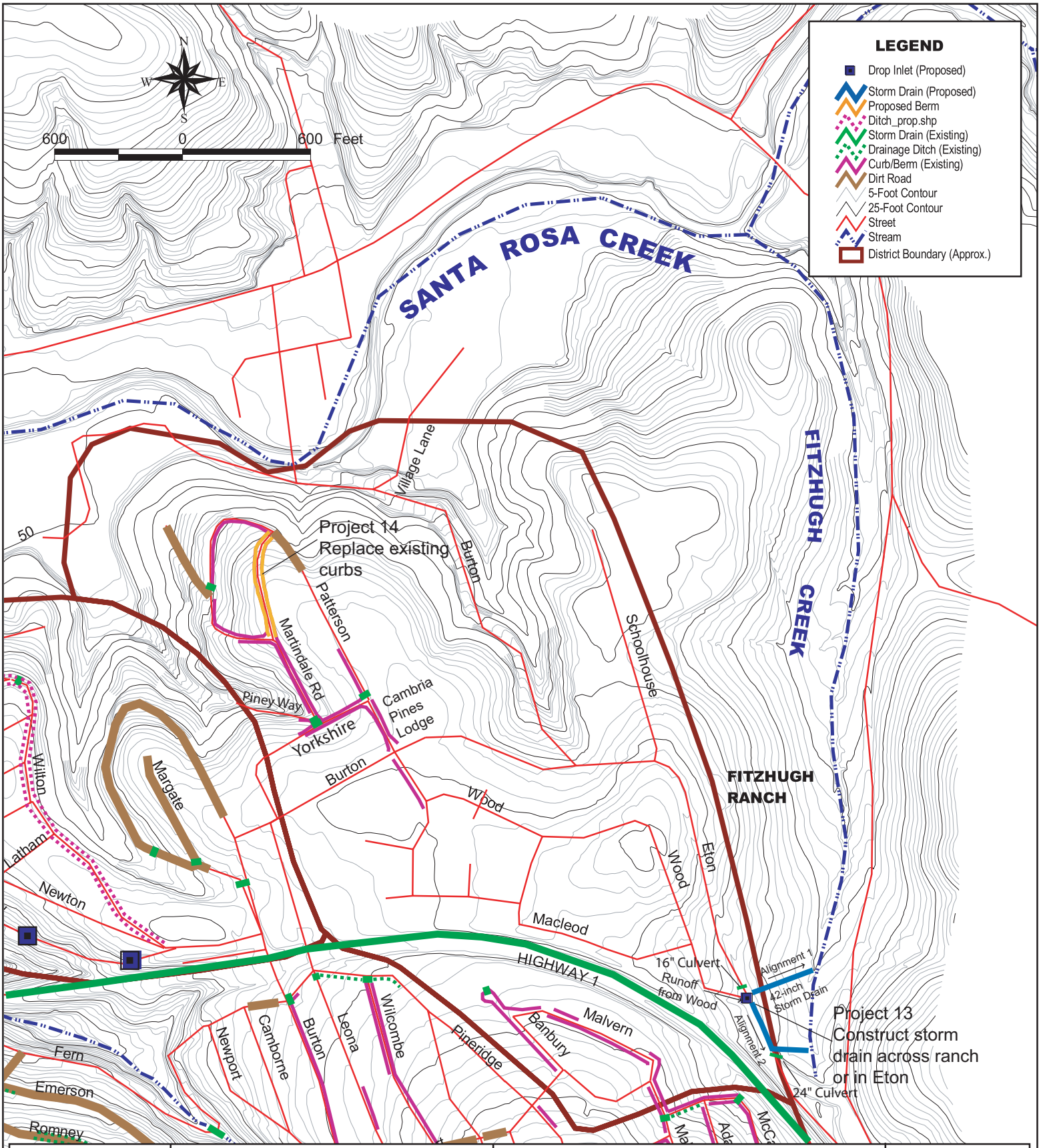
Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 · 1220 Brickyard Cove Road · Point Richmond, CA 94807

Modified by RMC, November 2003

Cambria
Drainage and Flood Control Study
Lodge Hill North
Proposed Drainage Improvements

Appendix A
Figure
8



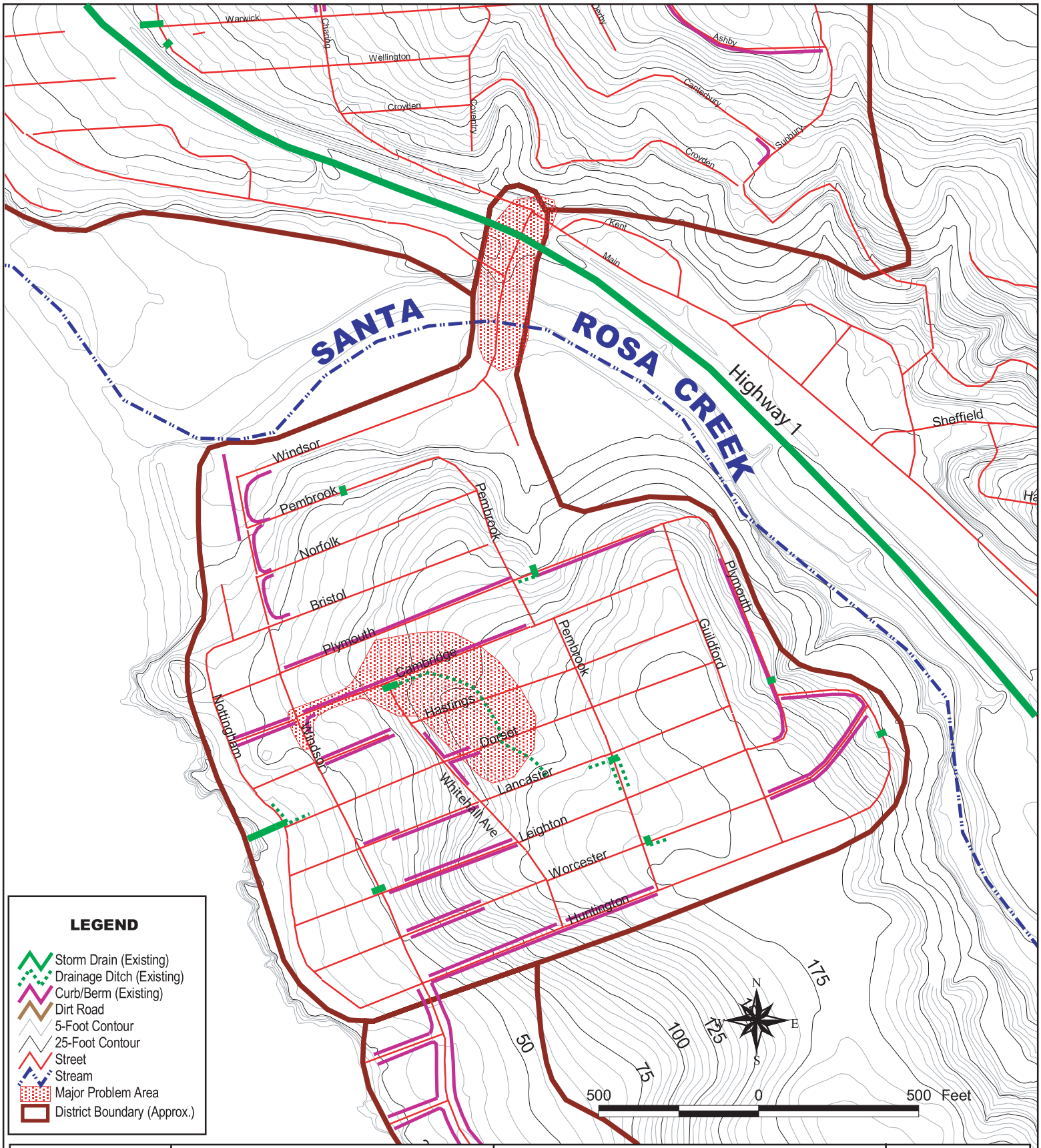
Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 · 1220 Brickyard Cove Road · Point Richmond, CA 94807

Modified by RMC, November 2003

Cambria
Drainage and Flood Control Study
Pine View
Proposed Drainage Improvements

Appendix A
Figure
9



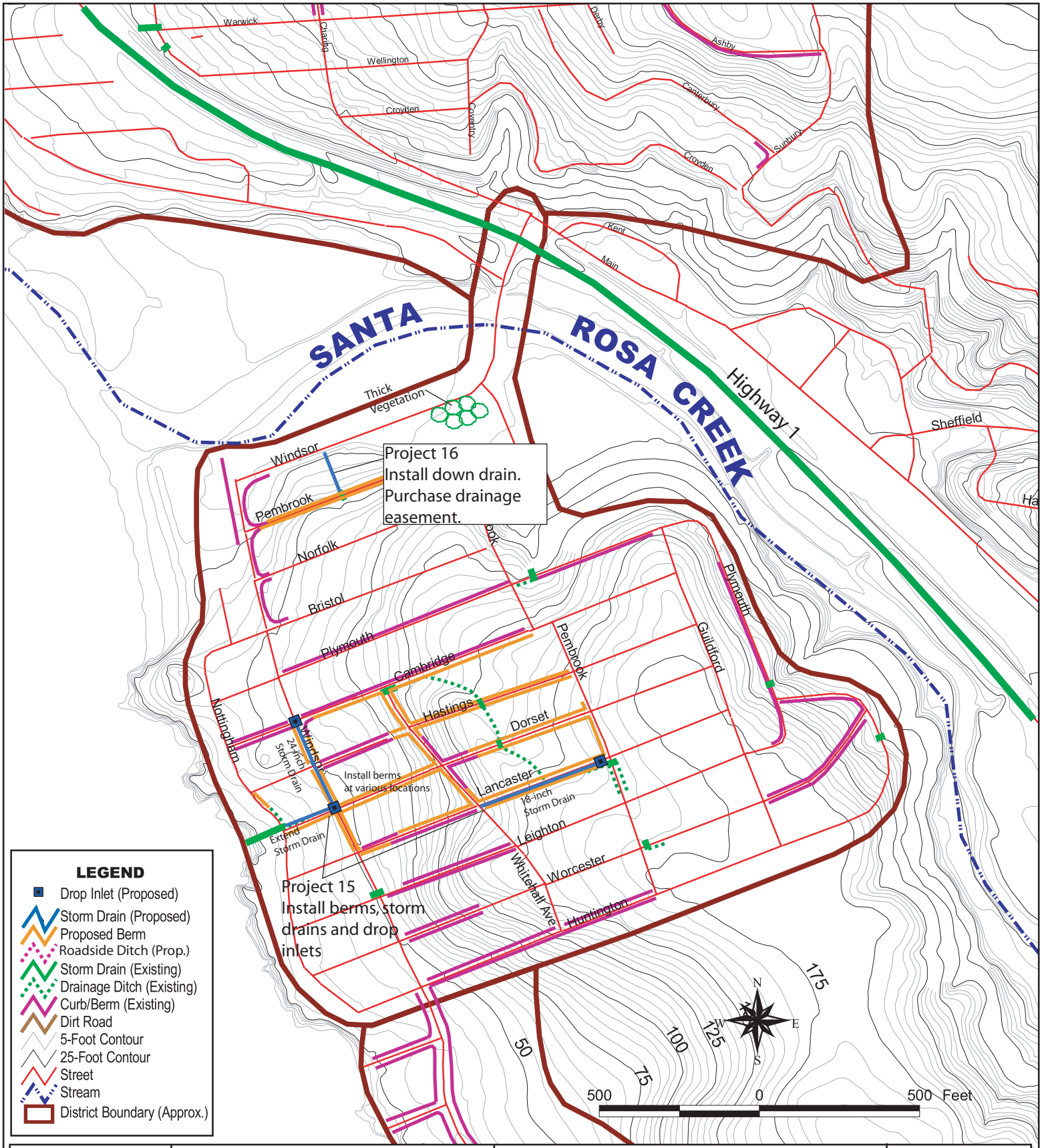
Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

Modified by RMC, November 2003

Cambria
Drainage and Flood Control Study
Park Hill
Existing Drainage Infrastructure
and Areas of Reported Problems

Appendix A
Figure
10



LEGEND

- Drop Inlet (Proposed)
- Storm Drain (Proposed)
- Proposed Berm
- Roadside Ditch (Prop.)
- Storm Drain (Existing)
- Drainage Ditch (Existing)
- Curb/Berm (Existing)
- Dirt Road
- 5-Foot Contour
- 25-Foot Contour
- Street
- Stream
- District Boundary (Approx.)

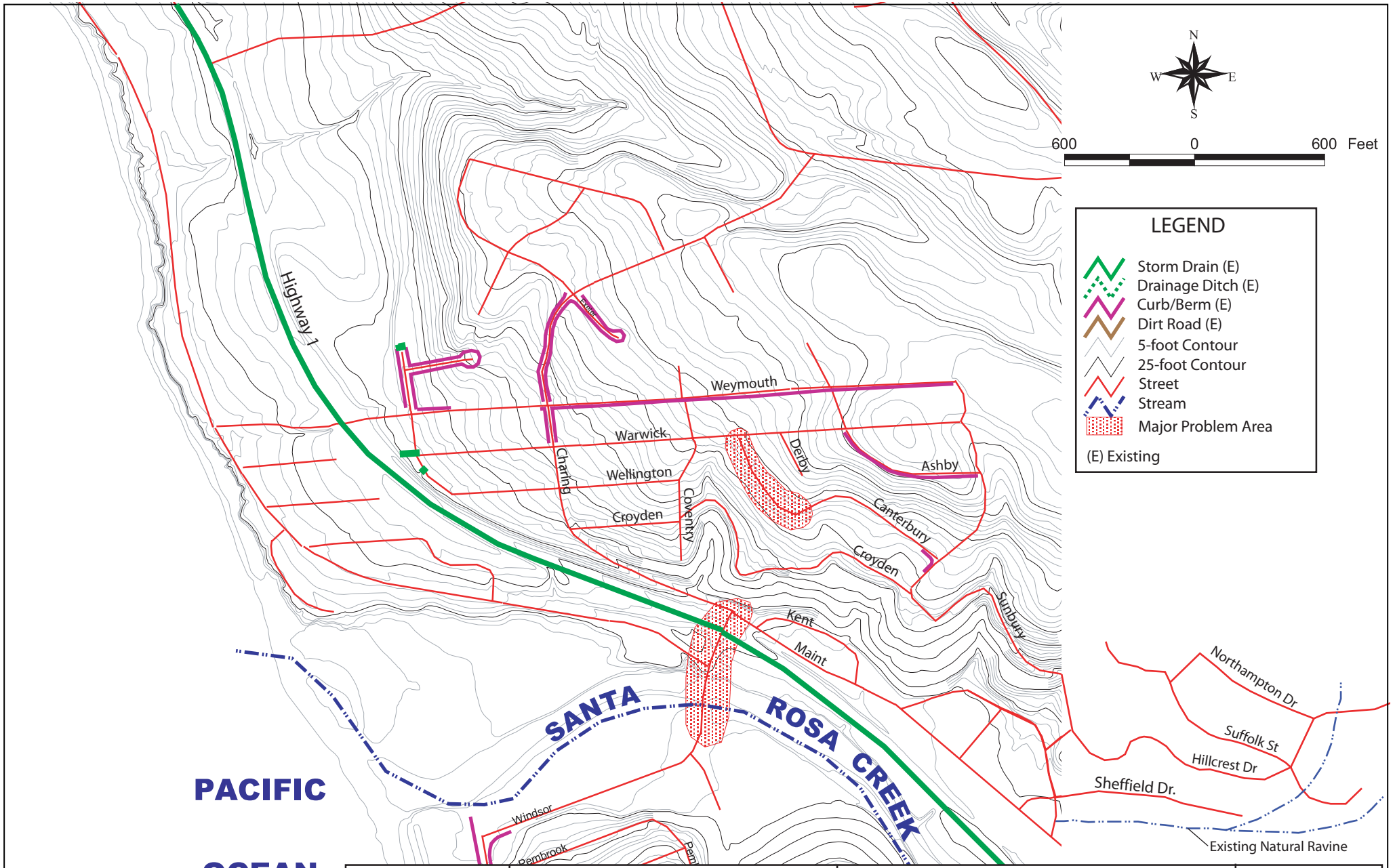
Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

Modified by RMC, November 2003

Cambria
Drainage and Flood Control Study
Park Hill
Proposed Drainage Improvements

Appendix A
Figure
11



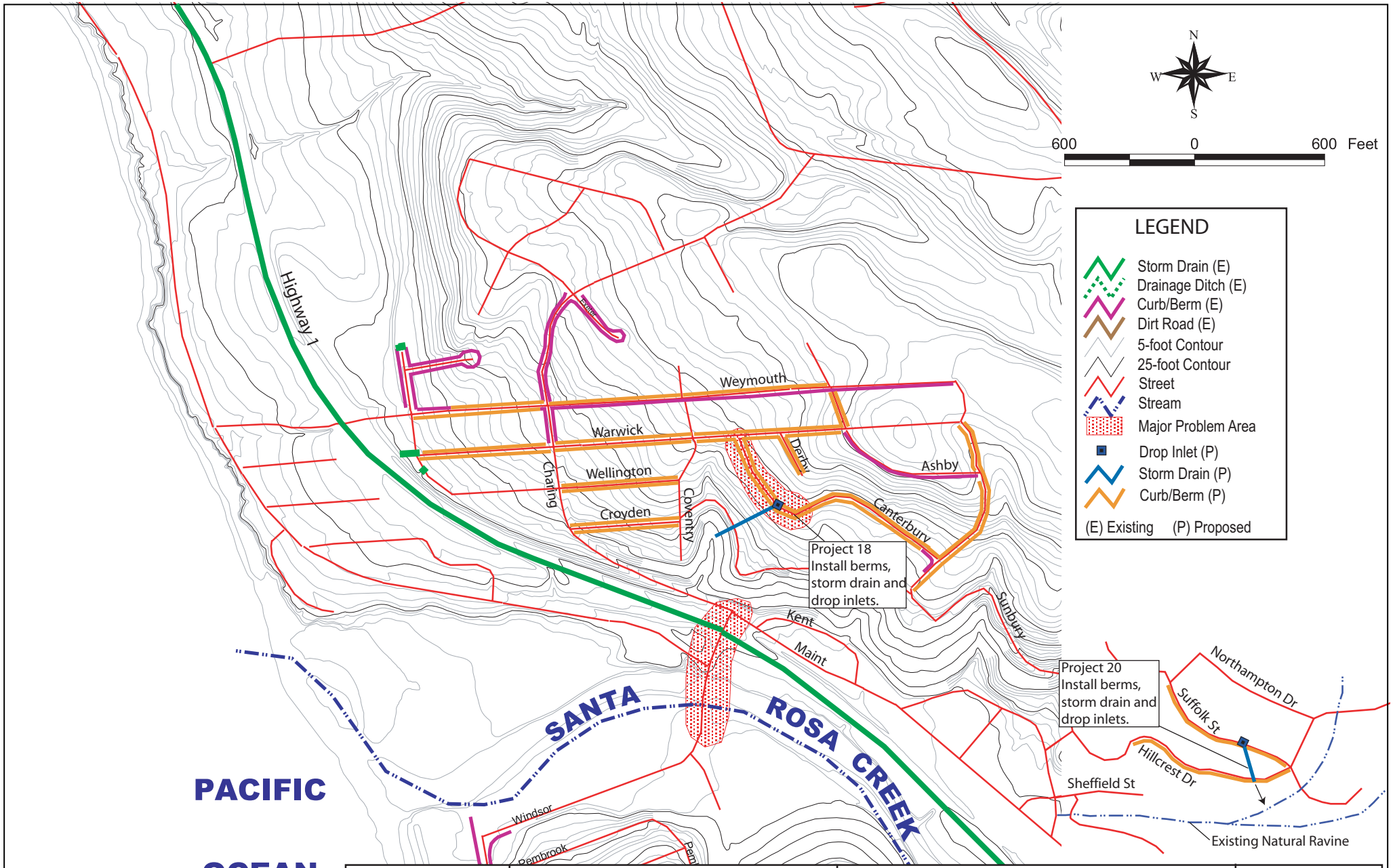
Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KO

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 270356 · 1220 Brickyard Cove Road · Point Richmond, CA 94807

Modified by RMC, November 2003

Cambria
Drainage and Flood Control Study
Happy Hill
Existing Drainage Infrastructure and Areas of Reported Problems

Appendix A
Figure
12



Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KO

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356, 1220 Brickyard Cove Road, Point Richmond, CA 94807

Modified by RMC, November 2003

Cambria
Drainage and Flood Control Study
Happy Hill
Proposed Drainage Improvements

Appendix A
Figure
13

Appendix B

PHOTOGRAPHS

APPENDIX B

PHOTOGRAPHS

Photograph 1: Drop Inlet on Ogden

Cooperative effort between home owners and County improved drainage on Ogden

Photograph 2: Avon Creek Discharging onto Marlborough in the Marine Terrace District

Photograph 3: Runoff from Avon Creek flows through Backyards on Castle Street

Photograph 4: Unpaved Road in Marine Terrace

Photograph 5: Newhall in Lodge Hill. Paved Road with no Berms to keep Runoff on Roadway.

Photograph 6: Homes on McCabe Constructed below Street Grade without Berms or Appropriate Drainage.

Photograph 7: Drainage Channel and Culvert at Intersection of Ardath and Burton

Photograph 8: Unpaved section of Cowper north of Ardath

Photograph 9: Private Drain Line in Cayucos Conveying Runoff to Lower Elevation Properties (drain to the left of the bush)

Appendix C

COMMUNITY QUESTIONNAIRE AND RESPONSES

APPENDIX C

COMMUNITY QUESTIONNAIRE AND RESPONSES

COMMUNITY DRAINAGE AND FLOOD CONTROL STUDY QUESTIONNAIRE

Cambria

Why should I complete this questionnaire? We need your help in identifying existing flooding problems in Cambria. We will use this questionnaire to 1) gather local knowledge of the location and severity of existing drainage and flood problems, and 2) identify likely causes. Your time and effort is appreciated?

Please complete this questionnaire and return it in the enclosed self addressed envelope, so we can address all your community's problems as comprehensively as possible. A map of your community is on the reverse side of this form. Please use it if it will assist you in locating or describing problems to us. *We will not be able to respond to each person individually submitting a questionnaire, but your response will enable us to evaluate your specific concern, assure we are aware of all drainage problems in your community, and possibly develop specific solutions depending on the location and type of drainage problem which exists.*

Contact Information (optional):

Name:	
Address:	
Phone Number:	
Email:	

Where have you experienced or observed flooding? Please provide the amount of flooding (e.g. a few inches, 1 foot, severe), the location, year and observed damage to homes or property. A map is provided for you to indicate the location. Photographs of the flooding would be very helpful to us.

How often does the flooding you observed occur? Every time it rains, once a year, once every five years, once in my lifetime.

Did you observe likely causes of the flooding, such as clogged culverts under roads, catch basins filled with dirt, no place for water to flow?

Are there any other comments regarding drainage and flooding that you would like to make?

Cambria Resident Identified Drainage/Flooding Problems and Locations

	Property Address	Comment
	Marine Terrace/Lodge Hill	
1	1981 Tweed Ave.	Water ponds at intersection of Dreydon and Tweed Ave. following a rain event. Misplaced catch basin and lack of culvert under road cause problem. Owner granted an easement to County to construct drainage infrastructure. County placed facilities in incorrect location.
2	1920 Sherwood	Water runoff flows towards my home. No outlet for water to convey past home.
3	1783 Newhall Ave.	Lack of curbs, catch basins and channels to divert water away from property has created problems. I must use sand bags to divert water and protect property.
4	676 Orlando Drive	Runoff from Warren Rd. to Orlando caused problems. Drainage under front deck and foundation. No drainage course to divert water. Occurred five times in last seven years.
5	1961 Oxford Ave.	Garage flooded during heavy rains. Occurs approximately once a year. Slope to the culvert is inadequate to drain water from our side of the street.
6	2125 Tully Place	Flooding at intersection of Pitt Place and Tully Place. Culvert inadequate to convey flow. Drainage ditch along Tully not deep enough and is overgrown with weeds. If ditch not maintained (I clean every year), then water flows to my property. I currently sand bag property to protect against flooding.
7	650 Randall Drive	During large rains, a large runoff concentrates on the south side of Newhall and cuts through properties. Homes on north side of Newhall send their runoff onto Newhall. A road berm on the south side of Newhall would fix the problem.
8	351 Atwell St.	Ponding at the following locations after a heavy rain: Atwell and Windsor, Sherwood at the following intersections: Drake, Orlando and Wedgewood. No controlled drainage to convey water.
9	293 Drake St.	6 inches of ponding on Drake St. and Windsor in Marine Terrace.
10	395 Drake St.	Yard is flooded by concentration of runoff from adjacent 50 foot lot. Concentration of runoff originates under Marlborough St.
11	810 Warren Rd.	Concentration of runoff on 320 Drake St.
12	292 Orlando	Runoff from hillside above Madison Dr. channels through property, along side homes. Runoff empties onto drake in middle of homes. Lack of road paving causes erosion. Need a channel or storm drain to convey flow.
13	460 Drake St.	1 foot of flooding near Drake and Sherwood every heavy rain.
14	249 Drake St.	Drake St. flood from curb to curb during a heavy rain. Stream diverted directly onto Drake St.
15	2064 Berwick Dr.	Runoff from road enters our property. Lack of roadside drainage prevents collection of runoff. Need a berm or other drainage structure to convey water.
16	370 Lampton	Drain pipe on the east side of Marlborough, between Ardath and Lampton is not large enough to convey runoff. Water floods my property because of this.
17	1791 Newhall Ave.	Upper Hill runoff drains onto Newhall. All upstream runoff drains onto Newhall. A culvert could divert water from the low point to an appropriate discharge.
18	1455 Berwick Dr.	Lack of curb and gutter causes flooding on Berwick. Bridge St. near cemetery has only one lane due to erosion of hillside.
19	1280 Ellb Ave.	Flooding at 525 Drake St. Runoff diverted from Marlborough to Drake causes at least 6 inches of ponding.
20	2107 Sherwood	Drake and Sherwood. Every rain, this intersection ponds with water.
21	461 Kerwin St.	Standing water at two locations: 1) 461 Kerwin and 2) 2001 Sherwood. Clogged culverts and lack of proper drainage facilities to divert water.
22	293 Drake St.	Observed at least 6 inches on Drake St. and Windsor in Marine Terrace.
23	840 Kenneth Dr.	Flooding of half the road near 1000 Kenneth Dr. during very heavy rains. Kenneth Drive is build across a ravine, and heavy rains exceed the capacity of the culvert.

24	2601 Sherwood Dr.	Runoff from Madison and Orlando flow onto Sherwood and Drake, causing flooding problems.
25	2155 Sherwood Dr.	Runoff from Emmons and Fallbrook arrive on Windsor and concentrate onto property at 2140 Sherwood. Water then crosses street and enters our garage.
26	2401 Windsor Boulevard.	Runoff from Lodge Hill near Marlborough at Castle. Flow has eroded a small drainage channel which flows across several lots onto Drake near Windsor.
27	Castle St. near Marlborough	South side of Castle St. floods frequently. Castle is not paved and lacks drainage facilities.
28	2599 Pineridge	Up to 1 foot of runoff from Pineridge. I built a berm to protect my yard.
29	1880 Marlborough Lane	Several inches of ponding on Marlborough between Ardath and Lampton. Drain pipe along Marlborough partially clogged with dirt.
30	2500 Burton Dr.	Along Burton Dr. just before the drain at Newport Ave. & Burton Dr., large pond forms in street. No drainage facility to convey water away from low spot.
31	1765 Cardiff Dr.	Burton near Ardath. Drainage channel adjacent to road floods when it rains.
32	1474 Pineridge Dr.	Rain runoff flows into garage. Clogged culverts prevent rain runoff from flowing.
33	2170 Burton Dr.	Burton Dr. south of Ardath turns into a muddy river when it rains. Possible spring erodes road and driveway.
34	2060 Burton Dr.	Burton Dr. between Ross and Ardath. Depending on rainfall, ponding of a few inches to one foot. Runoff from many streets are conveyed to this point.
35	2580 Emerson Road	Culvert at intersection of Emerson and Amhurst clogs, overflows and erodes the road shoulder.
36	1801 Burton Dr.	Low side of Burton Dr. just across Ardath. Entire low area ponds during a heavy rain.
37	2530 Leona	Flooding occurs each rain. Road improved in August 2001, however, standing water still a problem.
38	2065 Burton Dr.	Severe flooding on Burton Dr. from Ardath to Ross. Most streets drain to Burton and no drainage facilities to convey runoff.
39	1301 Kenneth	Lack of culvert causes ponding on Kenneth Road inform and adjacent to my house.
40	24900 Pineridge Dr.	Since the County paved Pineridge Dr. and raised the road surface elevation, flooding of my yard has occurred. Pineridge Dr. needs a curb to convey runoff.
41	1258 Pineridge Dr.	Water does not drain on street shoulders.
42	1965 Emmons Road	Tin Village from Cambria Nursery. Ardath Road at Trenton. Piney Way onto East Ranch. Eton Road from Woods Drive. Burton Drive from Cambria Pines Lodge. Road side ditches filled with dirt. Dirt is periodically graded onto roadside ditches, clogging their conveyance ability.
43	2490 Burton Dr.	Severe flooding comes from behind our home from above Burton on Leona. There are no berms to direct the water away from home. Problem occurs once every three years. We installed French drains to divert water away from property.
44	1943 Burton Dr.	Deteriorating drainage condition on Burton from Ross St. to Ardath Dr. Existing drainage needs to be improved.
45	2755 Taft Pl.	Intersection of Pineridge and Ardath ponds with a few inches of water. The clogged culvert prevents water from flowing.
46	2098 Leona Dr.	Burton Dr. between Ardath and Ross. Water ponding creates potholes.
47	2120 McCabe Dr.	Flooded basements in 2000 and 2001. No curbs or drainage infrastructure constructed by developer. I installed berm and rocks to divert runoff away from home.
48	2374	No flooding of the house, but runoff between driveway and street.

49 2090 McCabe Drive	Runoff flows down Ardath from above McCabe. Lack of channels in Ardath above McCabe to convey flow. Causes flooding of road.
50 1761 Bradford Rd.	Road flooding on Bradford Road down to Orville, where it collects at bottom of hill. No drainage facility to keep water off road.
51 1776 Bradford Rd.	Bradford Road is unpaved and is eroded during a heavy rain. Runoff also caused erosion in back yard.
52 1870 Bradford Rd./Place	1" to 4" of flooding in April 2001 in yard/road. Rain runoff erodes top soil from yard.
53 3298 Bradford Circle	Water ponding at the lower end of Bradford Circle in front of our house. Lack of culvert causes water to flow across street and down hill.
54 3255 Bradford Circle	Bradford below Richard on Lodge Hill; the road side ditches overflow and the water runs down the dirt road, causing erosion problems. The drainage ditches are filled with debris or vegetation and the drain pipes are in disrepair.
55 1601 Radcliff Ave.	Our home is on corner of Langton and Radcliff. During heavy rains, water flows behind our home, across many lots. Water flows from Dovedale to Langton, as well as from Langton and Radcliff to the intersection of Radcliff and Langton.
56 2150 Cowper St.	Water reaches a depth of 2" to 4" in front of my property, in an area 50' long. Debris is deposited in street after a rain. No drainage facilities to convey water therefore all water flows in street.
57 1501 Radcliff	Radcliff is a dirt road. At the intersection of Radcliff and Langton, water flows from three streets to the intersection. Any rain storm results in flooding at Langton and Radcliff, then down Cowper. Paving the area and installing appropriate drainage facilities would correct the problem.
58 3070 Wilton Drive	Water sheet flows across Wilton and down our driveway. Sandbags protect driveway and property. Only a problem during heavy storms. Improving drainage ditch across street would provide conveyance for stormwater. Water drains down canyon at Wilton and Andover Place.
59 2164 Wilton Drive	Drainage problem on Wilshire Drive. Chronic drainage problem from Andover Place. Runoff from Andover flows across Wilton Drive, causing flooding problems at my home and my neighbors at 2159 Wilton Drive. Lack of culverts under driveways have led to poor drainage conditions.
60 2791 Newton Rd.	Several inches of ponding in our driveway. Occurs during heavy "El Nino" years. Too much water draining from up hill to be conveyed by our own system. We are located in the low spot and on the downside slope of the road. Dirt and grass growth prevent proper drainage.
61 2159 Wilton Dr.	Shoulder on south side of road is not sloped to convey water to existing culvert. Existing speed bump in road conveys runoff to my garage. Need culvert to convey water from one side of Wilton to the other.
62 3145 Ramsey	Clogged catch basin causes water to overflow across street. Water flows under my house.
63 563 Croyden Lane	Drainage problem on Yorkshire near Burton. Corner of Croyden Lane and Charing. Need drainage improvements.
64 2118 Andover Place	Ramsey is flooded in a low spot because the road crew covered the drain pipe that runs under the road. Water no longer drains away. Maintenance needs to clean out culvert.
65 1997 Wilton Dr.	Intersection of Wilton and Ramsey. Debris clogs installed culvert.
66 2104 Andover Place	Drainage problem at intersection of Andover and Wilton. 3" to 4" standing water following a storm. Inadequate drainage facilities.
67 2802 Wilton Place	Runoff from street flows to our property. Home is below street level and subject to flooding problems. Lack of gutters or drainage ditches promotes problem.
68 2108 Emmons Rd.	Culvert pipe gets clogged and sends water down Ardath. Runoff enters house on low side of Ardath. Happened in 1995, 1998 (El Nino years). Maintenance required on culvert to keep flow moving. Pipe should be replaced with larger capacity culvert.
69 771 Ardath Dr.	Many properties affected by storms in 98 and 99. Clogged culvert at south of Ardath and Madison caused problem. A drainage system that conveys runoff in an orderly fashion should be installed.
70 2219 Madison	Problem on Emmons St. Concrete collector on the east side of Emmons was never completed leaving a 7' hole with no protection.

71	2210 Benson Ave.	Intersection of Ardath and Benson; runoff flows down Ardath and crosses intersection and causes hazardous conditions. Happens about 4 times a year.
72	2091 Emmons Rd.	February 1998, experienced flooding in garage. Runoff caused erosion along foundation of home. Runoff from east side of Ardath caused problem. The natural drainage channel is filled with sediment and vegetation. Appropriate drainage would correct the problem. Debris carried by runoff increases the problem. Routine maintenance would improve the problem. Continue the culvert installed by the County years ago.
73	321 Drake St.	Flooding on Drake St. from Marlborough to Windsor. Runoff flows through private property lots, under fences. Causes erosion of plants and yard. Lack of storm drain system to convey water causes problem. Entire street becomes flooded.
74	305 Fallbrook St.	Flooding in front of home along Windsor. Occurred after new street paving installed. No storm drains were included with improvements.
75	2547 Leona Dr.	The street is slightly higher than the uphill side of property, therefore water ponds following a rain. No damage to property.
76	Intersection of Ardath and Randall	Ponding at intersection following heavy rains. Clogged culverts are partly to blame.
77		Curbing on west side of Berwick inadequate from top of hill to bottom. Sheet flow in streets from Berwick to Benson, and finally to Astor. Need to improve curbs.
78		Runoff from Dovedale onto Radcliffe has created wash out conditions on Radcliffe. Many problems on dirt streets in Lodge Hill. Create gullies during storms.
79	1290 Ellis Ave.	No problems.
80		Clogged culverts on Emmons Rd.
81	1770 Orville Ave.	Along Orville Ave. and intersection of Orville Ave. and Orville Place, up to 8 inches of water ponds. Runoff from the top flows down dirt road and collects at intersection. Road should be paved with appropriate storm drain system installed.
82	2021 Richard Ave.	Water flowing into garage due to clogged culvert across the road. I've cleaned weeds and debris to keep water flowing within culvert. Heavy rains cause runoff to flow across Richard, down my driveway. Serious flooding not a problem.
83	1957 Sherwood	Storm runoff erodes under road pavement. Some ponding during heavy rains.
84		Under Marlborough through vacant lot to channel between houses, eventually to Drake. Water floods back yards, driveways and road on Drake.
85		In the 2100 block of Burton Dr., water flows along side of road. This reach of Burton Dr. is full of pot holes.
86		No curb or gutter on west side of Berwick. Water sheet flows across Berwick to Benson, Bixby, Wales area.
87		Marlborough and Ardath. Clogged culverts and catch basins inhibit runoff.
88	2263 Madison St.	No problem
89	1983 Oxford Ave.	No problem
90	2790 Newton Dr.	Slow draining water, but no flooding. No problems.
91		Randall Dr. and Benson floods every time it rains. No culverts to divert water.
92	2850 Ardath	As long as drainage ditches and culverts are clear, water flows nicely.
93		Wales Rd. and Benson Ave. Drainage swale along the east side of Wales Rd. between Berwick Dr. and Benson Ave. has filled with mud and causes runoff to flood the intersection. Runoff also flows across Wales Rd. to its west side at Benson Ave. The runoff floods the homes on the west side of Wales Rd., south of Benson Ave., and also the backyards of the homes along Astor Ave. Routine maintenance is necessary. Drain pipe needs to be installed under Benson Ave. so that the water stays on the east side of Wales Rd.

94 2345 Village Lane	Increased runoff due to Cambria Nursery development. Runoff from Eton Rd. and Burton Dr. Increased runoff flows to Village Lane culvert.
95 2775 Taft Place	Need improved drainage on Pineridge and Richard Ave. All the rain runoff from the "Top of World" Bradford Circle flows to Pineridge.
96 1840 Langton	Water puddles at intersection of Ratcliff and Langton. Runoff does not flow to ditch across street.
97 1710 Pineridge	Hillside runoff ponds at Lyle and Pineridge. Our lot receives most of this runoff. Need culvert to divert water away or berm to protect property.
98 1775 Avon Ave.	Tweed, a dirt street, ponds with water approximately 1 foot deep and 20 feet long. No outlet for water in this street sag.
99 2370 Sherwood Dr.	Flooding every two years.
100 2180 Emmons St.	Water diversion on Madison flows through empty lot, but continues on down the hill. Runoff is causing erosion and created a "slump" that is moving and could collapse during a big storm. This would release large quantities of mud and water onto Emmons.
101 2147 Tully	No problem
102 740 Ardath	Rain washed out parking strip in 1997. Routine maintenance of culverts required.
103 1855 Spencer St.	No problem
104 2226 Burton Dr.	A few inches of ponding on Burton at Ardath.
105 1390 Ellis Ave.	Flooding on Ardath from Richard toward Pineridge. Hillside runoff covers right side of Ardath. No drainage system in Ardath to convey flow.
106 3290 Bradford Circle	Need culvert under Bradford Circle to convey runoff.
107 1718 Richard Ave.	Intersection of Richard Ave. and Ardath floods because of water flowing from the east side of Richard.
108 554 Ardath Dr.	No problem
109 2330 Ludlow	Entrance to Ludlow from Ardath full of potholes due to rain runoff and vehicles.
110 1910 Berwick Dr.	No problem
111 2551 Sherwood Dr.	No problem
112 2845 Newton Dr.	Erosion of neighboring property from culvert discharge.
113 733 Ardath Dr.	Culvert at Ardath and Madison clogged and water ran down Ardath and flooded our garage. This is really not a problem; twice in 25 years is not that bad.
114 2303 Pineridge Dr.	Potential problem because street is higher than the properties near Pineridge and Ernest.
115 2706 Newton Dr.	Flooding along Newton
116 1510 Astor Ave.	Storm drains in Lodge Hill need to be cleaned.
117 1901 Oxford Ave.	A few inches across driveway. Repave Oxford from Ardath to Kerwin.
118 1735 Arliss Dr.	No problem
119 1440 Cedar Place	Flooding on west side of Highway 1 on Ardath Dr.
120 Sherwood and Castle Sherwood and Orlando	Several inches of ponding when it rains.

121 750 Drake St.	Water flows down Burton from the nursery.
122 Pierce Ave.	Clogged culverts on Pierce Ave. have led to drainage problems.
123 1150 Kenneth Dr.	No problem
Park Hill	
124 465 Norfolk St.	Windsor Boulevard. at Shamel Park and Santa Rosa Creek under Windsor Bridge.
125 434 Pembrook Dr.	Poor drainage on the street the entire length of our lot.
126 486 Bristol St.	Windsor Boulevard. at Shamel Park and at the water treatment plant.
127 427 Dorset St.	Approximately 1 foot of flooding in front of house for the past 3 years. Debris in catch basin and culvert prevent flow. Leads to flooding of yard and garden. This problem is primarily a maintenance issue.
128 597 Huntington Road	Problems started after County raised Huntington Rd by repaving. Didn't provide any drainage facilities. Several inches pond for several days. Now water ponds on Guilford. County installed a drainage ditch that was ruined by the next rain season.
129 574 Leighton	At end of driveway and across front of property, neighbor has a PVC pipe draining across my driveway. I've constructed a drainage ditch to convey water down the road. Water backs up and pools on my property.
130 310 Cambridge	Cambridge at Windsor Boulevard; up to 1 foot of water ponds and washes away stones in our yard. Lack of drainage facility forces water to flow along roadside.
131 420 Worcester Dr.	During a heavy rain, garage floods half to five inches. Flooding has isolated me in home. Flooding by park also observed. An emergency response plan would benefit residences.
132 426 Cambridge St.	A 36" storm drain under Hastings St. to the So. East discharges storm runoff along the east fence of 449 Hastings St. The runoff flows in the back yard of 440 Cambridge St. and against the foundation of my home. A new pipe was installed under Hastings about 1 year ago, but did not fix our problem. I installed a drain but runoff from surrounding streets (Lancaster St.). Runoff floods yard and road.
133 4675 Windsor Boulevard.	Severe flooding in February 1998. The total cost of repair was $35,000. No flooding since 1998. Prior to building house, vacant lot had flooded one time since 1995. Poorly designed storm drains that have been rebuilt were cause of problem.
134 5285 Windsor Bl.	The downstairs of our home has been flooded twice since 1986 (in 1995 and 1997). Water runs off the hill on Cambridge St. and cannot make the turn at Windsor Boulevard. This problem appeared after drainage work was completed up the hill on Cambridge.
135 392 Leighton St.	No problems.
136	Problems on Windsor from bridge to corner of park. Approximately 1 foot deep spills over onto both lanes. Clogged drain leads to problems.
137	Several inches of flooding at Windsor bridge. Culverts need to be maintained.
138	Windsor Drive at Shamel Park, flooding caused by lack of capacity in drain.
139	Northeast corner of Cambridge and Windsor, approximately 6" of flooding. County road to cemetery also floods.
140 444 Pembrook Dr.	Water ponds in front of 434, 437, and 445 Pembrook Dr.
141 300 Lancaster St.	Lack of drainage ditches for storm runoff.
142 4992 Windsor Boulevard.	No problem. However, closing of Windsor Bridge effects Park Hill residents.
143 2620 S. Windsor Boulevard.	No problem
144 594 Hastings	No problem
145 690 Huntington Rd.	County drain pipe on our property becomes clogged.

146 446 Hastings St.	A culvert runs through my property and I know there was a problem in the past (pre-ownership). No channel or drainage course for the discharge to flow in.
147 1908 Windsor Boulevard.	No problem
Happy Hill	
148	Water from Darby and Warwick floods into our back yard. Debris is left behind after storm runoff flows in Canterbury. Lack of storm drains caused problem.
149 391 Weymouth St.	Intermittent drainage problem on the north side of Weymouth, originating in the 400 block. Flows across Charing Lane and past the front of our house. Only a few inches of water. Only damage is to asphalt street.
150 516 Canterbury	Water flowing downhill from Warwick sheet flows across Canterbury. Runoff should flow on shoulder of Warwick, but momentum causes it to flow onto our property. Every 2 to 3 years, need to sand bag property. A catch basin and culvert would fix the problem.
151 383 Croyden Lane	Water from Warwick flows down Charing and enters Croyden Lane at the 300 block, and washes a trench in front of the 10 mail boxes.
152 531 Canterbury Lane	Water ponds at the front of our driveway. Hillside runoff is not conveyed past our property. A culvert located on the south of our house does not function because debris in front of our yard prevents water from flowing to the culvert.
153 359 Wellington	Runoff from Warwick flows down Wellington and cross over the crown in the road. Occurs once a year. The gutters are insufficient to contain the flow and the road crown needs to be raised.
154 539 Canterbury	Water surrounded foundation of home. Construction of home behind ours resulted in a collection of water and seepage into our home.
155 580 Weymouth St.	During rainy seasons, a lake develops behind our house and on our vacant lot. Runoff from the hill flows towards our house and nearly tops the front door threshold. Our home is in the path of the uphill runoff.
156 679 Canterbury Lane	Water flows from uphill property onto our property. Uphill owner should drain water to front of his house.
157 445 Warwick St.	Water from hill runs off onto street and yards. A drainage system that re-directs water should be installed.
158 912 Suffolk St.	During El Nino of 1997-98, experienced flooding on Suffolk St., above Hillcrest and below the forest. Many higher elevation homes drain onto my property. No culverts on our side of Suffolk St. cause the problem.
159 655 Ashby Lane	Two locations on Ashby Lane. 1) low spot between 650 and 660 ponds during heavy rains. Runoff erodes portions of Ashby and Warwick. 2) Intersection of Warwick and Coventry ponds for days following a storm.
160 6211 Somerset Way	Runoff flows into driveway, over curb. 22 homes drain to my location. Stormwater from Chiswick Way and Exeter Lane flow down concrete curb and gutter. At my driveway, water flows from gutter into driveway.
161 924 Northampton	Path from forest is a conduit for runoff. Flow to Suffolk causes erosion. Culvert becomes clogged at North dead end corner of Northampton.
161 345 Wellington	Winter 1995. Flooded 1st floor of my home. Water flowed down Warwick and came through lot behind me on Warrick. Only happened once and placed sand bags around property to protect home.
162 345 Warwick	North side of our block is normally under 1" to 2" of water, about two feet wide. This is not a major flooding problem.
163 365 Chelsea Lane	No problem
164 433 Warwick St.	No problem
165 444 Exeter Lane	Curbside gutters on Chiswick and Exeter over fill and sometimes flow into downhill driveways. Lack of slope to drain causes problem. Several downhill driveways silt up from slow moving water.

166 535 Warwick	Neighbors driveway on Weymouth is like a river pouring into my yard. Consequently, there has been damage to the cement floor in the garage and downstairs bedroom.
167 558 Croyden Lane	Small cross drains that flood following every rain. No catch basins or approach structures exist. One drain near Sunbury is always filled with weeds. The other located near my home has a depressed inlet. No drain receives sufficient maintenance.
168 6380 Buckley Dr.	No problem
169 601 Dover Lane	No problem
170 570 Chelsea Lane	No problem
171 612 Exeter Lane	Road shoulder always wet. No exit for water.
172 455 Chiswick Way	No problem
173 6415 Cambria Pines	No problem
174 484 Weymouth St.	No problem
175 401 Chiswick Way	No problem
176 475 Chiswick Way	Very large rains overflow my French drain. No damage caused.
Pine View Tract	
177 2650 Eton Rd.	Water flows from Eton Road and Wood Drive to my agricultural land, creating a traffic hazard. Runoff erodes ag land.
178 3140 Martindale Rd.	County road in front of my house has settled or was never properly constructed. Rain runoff flows from the road, through my property. Road gutters do not contain the runoff.
179 1187 Pinewood Dr.	No problem
180 2345 Village Lane	Runoff from Burton Dr. flows onto property. No street storm system to convey runoff.
Sea Cliff Estates	
181 303 Wallbridge St.	Clogged culverts and poorly maintained drainage ditches cause flooding problems.

Appendix D

RESOLUTION ESTABLISHING POLICY

APPENDIX D

RESOLUTION ESTABLISHING POLICY

BEFORE THE BOARD OF SUPERVISORS

of the

SAN LUIS OBISPO COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

Monday May 20, 1968

PRESENT: Supervisors M. Roland Gates, Elston L. Kidwell, Fred C. Kimball, Lyle F. Carpenter, and Chairman Hans Heilmann

ABSENT: None

Resolution No. 68-223

RESOLUTION ESTABLISHING POLICY OF THE SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT RELATING TO THE APPORTIONMENT OF LOCAL COSTS OF PLANNING, DESIGN, CONSTRUCTION, OPERATION AND MAINTENANCE OF DRAINAGE AND FLOOD CONTROL FACILITIES

The following resolution is now offered and read:

WHEREAS, the San Luis Obispo County Water Resources Advisory Committee has proposed the adoption of a policy relating to the apportionment of local costs of planning, design, construction, operation and maintenance of drainage and flood control facilities by letter dated May 8, 1968.

NOW, THEREFORE, BE IT RESOLVED AND ORDERED by the Board of Supervisors of the San Luis Obispo County Flood Control and Water Conservation District, State of California, that the following shall be the policy of the San Luis Obispo County Flood Control and Water Conservation District relating to the apportionment of local costs of planning, design, construction, operation and maintenance of drainage and flood control facilities until further notice:

1. The San Luis Obispo County Flood Control and Water Conservation District shall maintain surveillance of water problems throughout the County and advise the landowners of present or potential drainage problems in the areas where found. Where remedial action is deemed necessary, the Board of Supervisors shall call an informal hearing for the purpose of informing property owners in the areas causing the problem and in the areas of damage or potential damage.

2. If a program of correction is indicated, the Board of Supervisors shall provide assistance in the formation of a suitable zone of the County Flood Control District. Once a zone has been formed, it shall bear the cost of the planning, design, construction, financing and maintenance of drainage facilities. If the zone is formed, the cost of formation of the zone should be reimbursed from the initial budget of the zone. If the zone formation proposal is rejected, or otherwise abandoned, then the cost of the zone formation proceedings should be absorbed by the County Flood Control District.

3. Applications for the formation of a drainage district or zone should be discussed with the County Hydraulic Engineer so that the applicants will have available to them all current and pertinent information for their guidance.

4. Provision should be made for reimbursement to a developer, or his successors in interest, of his costs of off-site drainage facilities in excess of his pro-rata share, as determined by the County of San Luis Obispo, when adjoining properties develop and require the use of facilities financed by said developer. The period of eligibility for reimbursement should be flexible and based on the size of a project. It is anticipated that the normal period of reimbursement would be from five to ten years and in no event would it exceed 20 years.

5. The Board of Supervisors shall maintain a revised project priority list, giving preference to those projects approved by the people within the areas affected, in the order of approval.

6. Local costs of drainage projects should be spread within the area of benefit in accordance with benefits received, insofar as possible. Where pay-as-you-go financing or general obligation bond financing is contemplated, the total assessed valuation is an equitable basis for spreading project costs under the assumption that benefits are in accordance with assessed valuation. Where assessment bond proceedings are contemplated, and only in such cases, land area, front or abutting footage, number of developable sites, as well as assessed valuation, shall be used as bases of spreading costs among beneficiaries, either separately or in combination. In such instances the proper basis of assessment spread should be determined primarily from engineering considerations.

On motion of Supervisor Kidwell, seconded by Supervisor Carpenter, and on the following roll call vote, to-wit:

AYES: Supervisors Kidwell, Carpenter, Gates, Kimball, Chairman Heil
NOES: None
ABSENT: None

the foregoing resolution is hereby adopted.

Chairman of the Board of Supervisors

ATTEST:

Clerk of said Board of Supervisors

SLO CO FC & WCD
m

STATE OF CALIFORNIA, }
County of San Luis Obispo, } ss.

I, RUTH WARNKEN, County Clerk and ex-officio Clerk of the Board of Supervisors of the San Luis Obispo County Flood Control and Water Conservation District, do hereby certify the foregoing to be a full, true and correct copy of an order made by the Board of Supervisors, as the same appears spread upon their minute book.

WITNESS my hand and the seal of said Board of Supervisors, affixed this 23rd day of May, 1968.

RUTH WARNKEN
County Clerk and Ex-Officio Clerk of the Board of Supervisors

[SEAL]

By _____ Deputy Clerk.

Appendix E

ENGINEERING TECHNICAL MEMORANDUM

APPENDIX E

ENGINEERING TECHNICAL MEMORANDUM

DRAFT TECHNICAL MEMORANDUM

San Luis Obispo County Hydrology and Hydraulics Study

COMMUNITY OF CAMBRIA

Prepared for:

San Luis Obispo County
Flood Control

Prepared by

Questa Engineering Corp.
1220 Brickyard Cove Road
Pt. Richmond, California

October 15, 2003

DRAFT TECHNICAL MEMORANDUM

San Luis Obispo County Hydrology and Hydraulics Study

COMMUNITY OF CAMBRIA

EXECUTIVE SUMMARY

The drainage/flooding problems in Cambria are the result of a combination of factors, including: steep topography; undersized or deteriorating drainage facilities; under maintained facilities; and/or an increase in impervious surfaces due to new development and the paving of roads. The nature and cause of these localized flooding problems vary from location to location, making it difficult to apply a regional solution to flooding problems in the town as a whole. This technical memorandum has divided the community into a series of neighborhoods. In each neighborhood, significant or noteworthy problem areas have been noted. Projects are proposed for these problem areas. Not every problem in the neighborhood has been noted or a solution identified. However, this analysis establishes a path for mitigating the most severe flooding problems and also outlines steps that should be designed into future developments to prevent additional drainage problems.

The Cambria community maintains a rural like character. Numerous roads are unpaved and lack curbs and gutters. It is this rural nature that inherently causes drainage problems stemming from the lack of a centralized and planned drain collection and management scheme typical of most planned suburban communities. Many problems stem from roadway drainage or runoff collected by roadways draining on to the private property at inappropriate places. Many of these problems can be solved in specific locations by the application of street paving and/or rolled asphalt berms along the edge of pavement. It is important to realize that these types of solutions are not as simple as they appear because channeling water in the roadways concentrates runoff. This concentration of water may then cause problems in other locations previously not experiencing them. In some cases concentrating water would mean attaining drainage easements through private property and installing drainage system components. Solving these problems would mean implementing a neighborhood wide storm runoff management system. Each of these types of problems must be dealt with on a case-by-case basis.

The development of comprehensive drainage standards/requirements would reduce the drainage impacts of new development and retrofits in the future. This report investigated each neighborhood district in Cambria and proposed solutions to the most severe drainage problems. As the alternatives to correct the most serious problems are implemented, smaller localized problems can then be corrected. The result of the sequential implementation of improvements could result in a comprehensive drainage system.

Mitigation for drainage problems in the West Village Main Street area were addressed in the Cambria Flood Control Project and are planned for completion in 2004/2005. Please refer to the Cambria Flood Control Project Final Feasibility Report prepared by Questa Engineering June 22, 2000 for more information on this area.

PURPOSE OF THIS TECHNICAL MEMORANDUM

The purpose of this technical memorandum is to characterize drainage conditions and problems in the nine residential districts of Cambria. The study includes four primary tasks: (1) problem assessment; (2) project recommendation; (3) cost estimates; and (4) discussion. The scope of work includes prioritization of problematic areas and issues, coordination with San Luis Obispo County Planning and Public Works Department, community outreach discussions with residents, review of Community Drainage and Flood Control Study Questionnaires that were distributed and completed by Cambria residents, and site reconnaissance and field mapping conducted by Questa Engineering Corporation in April 2003. The scope of work does not include detailed engineering design, extensive drainage calculations, or development of site-specific solutions for every individual drainage problem reported in Cambria. Instead, this technical memorandum is intended as a guidance tool for prioritization of serious problems and development of long-term drainage solutions for the community as a whole.

ENVIRONMENTAL SETTING

Climate and Topography

The Town of Cambria is located in northwestern San Luis Obispo County, within the Coast Range Geomorphic Province of California. The Coast Range Geomorphic Province is characterized by a series of northwest-trending valleys and mountain ridges that run parallel to the coast. The town is bound by the Pacific Ocean to the west and surrounded by the Santa Lucia Mountains to the north, east, and south. While Cambria is well known for its seaside cottages and beach homes, much of the community is built in the steep foothills of the Santa Lucia Mountains. With the exception of the coastline, which slopes gently to the sea, the surrounding area is characterized by steep mountains and narrow valleys. The downtown area, an area that was historically hit with severe flooding, is located at roughly 20 to 40 feet above mean sea level (MSL).

The marine environment heavily influences the coastal climate of Cambria. Temperatures in this area are mild year-round, with minimum average temperatures of about 47 degrees Fahrenheit in winter and 69 degrees Fahrenheit during summer. Average annual precipitation, occurring primarily between November and April, is approximately 17 inches. The warmest months are September and October and are typically characterized by dense morning fog followed by afternoon sunshine.

Surface Geology and Soils

Geology and soil characteristics can have a significant influence on local drainage patterns. The majority of the Community of Cambria is underlain by sandstone that formed in a series of marine terraces. The weathering of this sandstone has produced the underlying sandy soils found throughout most of the community.

According to the Soil Survey for San Luis Obispo County, soils in the community consist primarily of Concepcion loam (coastal areas) and San Simeon sandy loam (upland areas). Concepcion loam, found on the lowest terrace along the coastline, is characterized as having very slow permeability, slow surface runoff, and a slight hazard of water erosion. San Simeon sandy loam is found on the higher terraces on moderately and steeply sloping foothills. San Simeon sandy loam is characterized as having low permeability, medium to rapid surface runoff, and a moderate to high hazard of

erosion. Both soils are underlain by clay subsoils, resulting in very slow infiltration rates when thoroughly wetted, a very slow rate of water transmission, and high runoff potential.

Regional Hydrology

The majority of Cambria is located within the Santa Rosa Creek watershed. Santa Rosa Creek, running east to west along Main Street, has a drainage area of approximately 45 square miles. The Santa Rosa Creek watershed has significant topographic variability. Elevations in the watershed range from sea level to over 2,000 feet above MSL in some mountain areas. Warm air approaching the region from the Pacific Ocean is cooled as it is forced upward over the mountains, causing water vapor to condense and rain out. This phenomenon, known as the rain shadow effect, results in varying rainfall amounts throughout the watershed.

Santa Rosa Creek has a history of flooding. The last significant flood event occurred in March of 1995 and caused extensive flooding in the West Village. Such flooding can be partially attributed to the siting of this portion of the community within the historic floodplain of Santa Rosa Creek. Generally, floods along the creek channel tend to be high magnitude, short-duration events. A bypass channel for Santa Rosa Creek is currently being planned. The bypass channel will protect the West Village from extensive flood damage from Santa Rosa Creek flows similar to those that occurred in 1995.

FEMA Flood Zones

The Federal Emergency Management Agency (FEMA) has classified portions of the Cambria Community, along Main Street, as being located within the 100-year flood hazard zone of Santa Rosa Creek. However, the 100-year flood hazard zone may be considered for revision after completion of the Santa Rosa Creek Bypass Structure. This project is discussed later in this report. The current FEMA flood hazards map for Cambria is depicted in **Figure 1**.

PROBLEM IDENTIFICATION AND RECOMMENDED SOLUTION PROJECTS

This drainage study examines existing drainage conditions and flooding problems in nine residential districts of Cambria: (1) Marine Terrace; (2) Cambria Pine Estates; (3) Lodge Hill South; (4) Lodge Hill North; (5) Pine View Tract; (6) Pine Knoll Estates; (7) Park Hill; (8) Happy Hill; and (9) Leimert Estates. These districts are shown in **Figure 2.** Major site-specific problems are identified for each district. In some cases, the identified site-specific problems are generic problems (i.e. lack of berms, unpaved roads) whose severity makes them worth mentioning in this report. However, generic drainage problems are evident throughout Cambria, and should be addressed as the community improves roadway and drainage infrastructure.

MARINE TERRACE

Marine Terrace - Existing Conditions

Marine Terrace is located in western Cambria. Unlike much of the community that drains to Santa Rosa Creek, Marine Terrace drains directly west to the Pacific Ocean. Runoff from upland areas east of Marlborough Lane flow west through the low-lying areas, often causing localized flooding problems due to low gradients and depressions as well as inadequate infrastructure at some intersections. Major drainage improvements were recently completed in parts of the Marine Terrace

area (west of Marlborough Street and between Emmons Rd and Jean Street) as part of a Community Cooperative Road Improvement Project. Existing drainage infrastructure in the remaining areas of the district includes storm drain pipes at some street intersections and major gullys, and some berms of varying height. Most roads in the Marine Terrace area are paved.

Marine Terrace - Problem Assessment

Three significant drainage problems were identified in Marine Terrace: flooding along the eroded drainage that stretches from Saint Thomas Ave to Emmons Dr (Problem 1); street flooding along Drake St from Marlborough Lane to Sherwood St (Problem 2); and flooding of homes and roadway along southern bend of Newhall Ave (Problem 3). Existing drainage infrastructure and major problem areas in the Marine Terrace district are illustrated in **Figure 3**.

Problem 1-Ogden and Ardath Drive Culverts
A large gully originates near the intersection of Saint Thomas Ave and Benson Ave that collects runoff from properties along Berwick Dr and Benson Ave. The gully continues westward, collecting additional runoff as it crosses Ogden Dr and Ardath St within 24-inch corrugated metal pipes (CMP). Flow continues in an open channel above Emmons Dr until it reaches a 36-inch reinforced concrete pipe that carries the flow to Oxford Ave. The water is then discharged on the east side of Oxford Ave and is directed south along Oxford Ave by an impact-type energy dissipater. The 24-inch storm drain pipes at Ogden Dr and at the intersection of Madison St and Ardath St are undersized or do not have adequate headwater depth to overcome inlet control constraints and cause flooding along the gully. Existing pipe capacities and 10-year flows are shown in **Table 1**.

Table 1: Existing Culvert Capacities

Culvert Location	Culvert Size (inches)	Drainage Area (acres)	Inlet Control Pipe Capacity (cfs)	Flows During 10-yr Storm Event (cfs)
Ogden Drive	24	23	16	27
Madison Drive & Ardath Drive	24	25	16	29

Problem 2-Marlborough Lane and Drake Street Flooding
The area west of Marlborough Lane has shallow topography. Runoff flowing west from the hills above tends to pool in this area due to low gradients and depressions as well as inadequate infrastructure at some intersections. While major street and drainage improvements were completed west of Marlborough Lane between Emmons Road and Jean St in 2002, these improvements did not address severe reoccurring flood problems on Drake St between Sherwood St and Marlborough St. Flooding problems along Drake St are largely the result of high flows in Avon Creek at Marlborough Lane. Here runoff has no defined channel but is directed to Drake St where it travels west down to the Pacific Ocean. Castle St, located north and parallel to Drake St, is not paved and lacks drainage infrastructure. During larger storm events, water from Castle St joins with flows from "Avon Creek" and as a result, Drake St is inundated with approximately 1 foot of water from curb to curb. The inundation of Drake St causes water to back up, resulting in drainage problems at nearby

intersections, including the intersection of Atwell St and Windsor Blvd. Several residents claim the backed up water often results in the flooding of their homes and yards.

Problem 3-Newhall Avenue and Randall Drive Flooding
Resident questionnaires indicate severe home and street flooding frequently occurs at the southern bend of Newhall Ave and down gradient at Randall Dr. Runoff from uphill areas including portions of Saint James Rd, Wales Rd, Saint Thomas Ave, and Ogden Dr flows down streets and private property, and ultimately down Newhall Avenue. Flooding in this area can be attributed to the combination of topography and lack of infrastructure along the south side of Newhall Ave. Unrestricted runoff continues down gradient to Randall Dr on its way to the creek that runs along the south side of Randall Drive (herein referred to as "Randall Creek").

Marine Terrace - Recommended Solution Projects

Project 1 – Alternative A: Ogden and Ardath Drive Culvert Replacement
The recommended solution to flooding along the eroded drainage between Ogden Dr and Ardath Dr (Problem 1) involves the replacement of the 24-inch culverts at Ogden Dr and at the intersection of Madison Dr and Ardath Dr with 48-inch culverts. Although preliminary calculations estimate that a 30-inch pipe culvert would greatly reduce flooding problems at this location, a 48-inch culvert would be capable of handling a larger debris load, thus providing additional capacity in the event of debris clogging.

Project 1 – Alternative B: Increasing Headwater Depth
Another option to addressing Problem 1 would be to explore ways to increase the headwater depth at the entrances of the existing 24-inch culverts at Ogden Drive and at the intersection of Madison Drive and Ardath Drive. Increasing headwater depth would reduce inlet control constraints found under existing conditions.

Project 2- Castle Street Paving and Storm Drain Installation
The recommended solution to severe street flooding along Drake Street from Marlborough Land to Sherwood Street (Problem 2) is to pave Castle Street and install a subterranean storm drain system along Castle Street from Marlborough Lane west to the ocean. The subterranean storm drain system will convey flows from "Avon Creek" west to the ocean and prevent these flows from inundating Drake Street. Rolling berms will also be installed along Castle Street to keep runoff within the street and help to convey the runoff to the proposed drop inlets. After these improvements are completed, Drake Street will only need to convey flows from a small portion of Marlborough Lane and Drake Street itself. **Figure 4** depicts proposed drainage infrastructure in Marine Terrace. Consistent with many other Cambria Cooperative Road improvement projects, proposed improvements along Castle Street (base and paving) would be paid for by the benefiting street property owners. This will affect the required project funding amount to be discussed in later reports.

Project 3-Newhall Avenue Berm and Drop Inlet Installation
The recommended solution to home and street flooding at the southern bend of Newhall Avenue and at Randall Drive (Problem 3) is to construct berms along the south side of Newhall Avenue, install a drop inlet at the bend of Newhall Avenue, and convey flows south to "Randall Creek." While the installation of berms would contain runoff in the street and prevent runoff from flowing onto private property, the berms would also increase the volume of runoff in the street (i.e. less water would flow across to private property) and street flooding would increase. For this reason, installation of a drop

inlet and subterranean storm drain would convey this water to “Randall Creek.” And energy dissipation structure at the discharge point into the creek will help to reduce erosion at this location.

With the completion of the storm drainage improvements recommended in this report, and the installation of paved streets with berms, storm water from lower frequency storms should be successfully controlled.

Table 2: Marine Terrace Projects 1a, 1b, 2, and 3
Cost Estimate for Recommended Drainage Improvements

Item No.	Description	Est. Qty.	Unit	Unit Price	Total
1	Main Drainage Pipes (Castle Street), 36"	1,275	L.F.	$180	$227,700
2	Altrenative 1b –Headwall improvements [1]	1	E.A	35,000	$35,000
3	Culverts (Madison Drive & Ardath Drive; Ogden Drive)	2	E.A.	$3,000	$6,000
4	Roadway Improvement, 4"-thick AC [2]	110	tons	$150	$16,500
5	Roadway Improvement, 6"-thick AB [2]	560	tons	$20	$11,200
6	Rolled Asphalt Curbs	3400	L.F.	$10	$34,000
7	Drop Inlets	5	E.A.	$1,500	$7,500
8	Culvert – Newhall to “Randall Creek”	325		$125	$40,625
9	Energy Dissipator	1	E.A.	$2,500	$2,500
				Subtotal	$381,025
				20% Contingency	$76,205
				20% Design	$76,205
				40% Admin/Environmental	$152,410
				Total	**$685,845**

NOTE:
1. Alternative 1b not included in overall total cost estimate for Marine Terrace because site specific surveys must be completed prior to determining ultimate feasibility of this concept.
2. Street improvements would be paid for by benefiting property owners (similar to the Cooperative Roads Program).

CAMBRIA PINE ESTATES

Cambria Pine Estates - Existing Conditions

The Cambria Pine Estates is a small district is located in western Cambria, just northeast of Marine Terrace. Runoff in this district generally drains west to Avon Creek. Existing drainage infrastructure in this district is limited to a section of berm along the northern side of Kenneth Drive. All roads in this district are paved.

Cambria Pine Estates - Problem Assessment

No major flooding problems were noted or reported in the Cambria Pines District. Drainage problems in this district are small, localized problems that can be found throughout the Town. Please refer to executive summary and generalized conclusions of this technical memorandum regarding general solutions to common drainage problems.

Cambria Pine Estates – Recommended Solution Projects

No specific solution projects are being proposed for this district.

LODGE HILL SOUTH

Lodge Hill South – Existing Conditions

The Lodge Hill South district is located in southeastern Cambria. South of Highway 1, the district is located on moderate to steeply sloping hillsides that drain east to Fiscalini Creek (tributary of Santa Rosa Creek), north to Burton Creek (tributary to Santa Rosa Creek). There appears to be no coherent system to manage storm water in Lodge Hill. Existing infrastructure in this district is limited to some roadside berms of varying height and older storm drain pipes. Many of the roads in this district are unpaved.

Lodge Hill South – Problem Assessment

Four significant drainage problems were identified in the Lodge Hill South district: flooding along Burton Dr between Ross Dr and Ardath Dr (Problem 4); flooding of homes and roadways at Bradford Road and Orville Pl (Problem 5); flooding of basements, garages, and landscaping on McCabe Dr near Ardath Dr (Problem 6); and flooding/erosion of streets and private property near intersection of Radcliff Ave and Langton St (Problem 7). Existing drainage infrastructure and major problem areas in the Lodge Hill South district are illustrated in **Figure 5**.

Problem 4-Burton Drive Flooding between Ross Drive and Ardath Drive
The most serious flooding problem in the Lodge Hill district exists on Burton Drive between Ross Drive and Ardath Drive. Resident questionnaires indicate flooding along this portion of Burton Dr is so severe that it causes excessive erosion, makes Burton hazardous to vehicles, and makes it difficult for residents of this area to get into their driveway. Flooding problems along Burton Drive can be attributed to both topography and inadequate drainage infrastructure. Burton Drive was built along the approximate centerline of a creek that originates near the intersection of Burton Dr and Kay St. Runoff from the surrounding hillsides now flows to Burton Dr, causing flooding problems in the lower areas of the road. Additionally, drainage infrastructure along Burton Dr is limited to storm drain pipes at street intersections. Some of these pipes have now deteriorated and/or become easily clogged during the rainy season. There are no existing curbs along Burton Dr.

Problem 5-Bradford Road Flooding near Orville Place
Resident questionnaires indicate that during periods of heavy rains, streets and homes are flooded at Bradford Road near Orville Place. This is partially attributed to unrestricted runoff from upgradient roads (Richard Ave and Pierce Ave) flowing downgradient to Bradford Road. Additionally, Bradford Rd is an unpaved road. Drainage infrastructure along Bradford Rd is limited to roadside drainage

ditches that are undersized and frequently clogged during the rainy season. It is common for eroded dirt and debris from unpaved roads to clog roadside drainage ditches, reducing capacity and increasing flooding.

Problem 6-McCabe Drive Flooding near Ardath Drive
During heavy storms and periods of prolonged rain, residents of McCabe Dr near Ardath Dr experience flooding of private property and homes. Reported damages include flooded basements and garages and severe damage to landscaping. While drainage problems in this area have existed for years, the construction of seven homes over the last four years has increased runoff and exacerbated flooding. This drainage problem exemplifies poor drainage standards/requirements.

Problem 7-Radcliff Avenue and Lagton Street Flooding and Erosion
Every rainy season, flooding/erosion of streets and private property occurs near the intersection of Radcliff Ave and Langton St. Unrestricted runoff from Dovedale Ave flows west to Langton St, down Langton St, to the intersection of Radcliff Ave and Langton St. Here, runoff forms a large puddle before draining north to private properties, ultimately flowing beneath two homes to Cowper St. Dovedale Ave, Radcliff Ave, and Cowper St are all unpaved roads without berms. Severe sheet rill erosion and roadside erosion are evident at the corner of Radcliff Ave and Langton St.

Lodge Hill South - Recommended Solution Projects

Project 4 – Alternative A: Burton Drive Storm Drain
The recommended solution to flooding along Burton Dr from Ross Dr to Ardath Dr (Problem 4) is to install a subterranean storm drain system and drop inlets along Burton Dr from Ross Dr to Ardath Dr. Rolling berms placed along this segment of Burton Dr will keep runoff within the street and help to convey runoff to drop inlets. The subterranean storm drain pipe will ultimately discharge to "Burton Creek." An energy dissipater placed at the outfall to "Burton Creek" will prevent erosion of the creek channel. **Figure 6** depicts proposed drainage infrastructure in Lodge Hill South. The estimated cost for this project is approximately $325,000.

Project 4 – Alternative B: Burton Drive Roadside Ditches and Driveway Culverts
Given the estimated high cost of implementing Project 4 – Alternative A, an interim solution may be needed until funds can be appropriated to complete the project. Project 4 – Alternative B would consist of the construction and improvement of lined roadside ditches and driveway culverts along both sides of Burton Dr from Ross Dr to Ardath Dr. The cost of this alternative has not been estimated because the number of driveway culverts and the need roadway adjustments has not been determined, however, it is likely to be approximately ½ to 2/3 of the cost of Alternative A. The installation of roadside ditches could also mean the loss of some roadside parking.

Table 3: Lodge Hill Project 4 – Alternative A
Proposed Drainage Improvements – Cost Estimate

Item No.	Description	Est. Qty.	Unit	Unit Price	Total
1	Main Drainage Pipes (Burton Street), 36"	880	L.F.	$180	$158,400
2	Drop Inlets	2	E.A.	$1,500	$3,000
3	Rolled Asphalt Curbs	1,760	L.F.	$10	$17,600
4	Energy Dissipator	1	E.A.	$5,000	$ 5,000
				Subtotal	$184,000
				20% Contingency	$36,800
				20% Design	$36,800
				40% Admin/Environmental	$73,600
				Total	**$331,200**

Project 5-Bradford Road Pavement and Berm Installation
The recommended solution to Problem 5 is to pave and berm Bradford Rd and Pierce Ave. This would facilitate the containment of runoff on streets and prevent it from draining onto private property. It will likely be necessary to simultaneously construct rolling berms along Bradford Pl and Orville Pl as well. However, it should be taken into consideration that paving increases impervious surfaces, increasing runoff volume. Also, the construction of berms may concentrate runoff down gradient to other properties, exacerbating and/or creating new drainage problems elsewhere. Runoff from this area drains to the area affected by Problem 4 area.

Project 6-McCabe Drive Berm Installation
It is recommended that Problem 6 be addressed by constructing rolling berms on the east side of McCabe Dr. This would contain runoff within the street and protect private property. It may be necessary to berm unnamed road between McCabe Dr and Green St to prevent the redirection of flows from causing drainage problems downgradient. As stated before, constructing new asphalt berms in selected locations has the potential to move drainage problems to areas without adequate drainage infrastructure. Each of these small drainage projects should be evaluated in greater detail prior to construction.

Project 7-Radcliff Avenue and Langton Street Pavement and Berm Installation
It is recommended that flooding problems near the intersection of Radcliff Ave and Langton St be addressed by paving and berming Radcliff Ave, and constructing berms on the east side of Dreydon Ave. Paving and berming Radcliff Ave will allow runoff to move away from the intersection more quickly, and help to contain runoff within the streets. The east side of Dreydon Ave should be bermed as the paving and berming of Radcliff Ave would direct flows to private property on the east side of Dreydon Ave. Rolling berms already exist on the west side of Dreydon Ave. As stated above, careful thought and site-specific evaluations should be completed prior to implementation of this project.

LODGE HILL NORTH

Lodge Hill North – Existing Conditions

The Lodge Hill North district consists of the portion of Lodge Hill located north of Highway 1. Development here rests on low-lying plateaus, the edges of which drop off to steep slopes and canyons. This area drains west and north to "Burton Creek" and Santa Rosa Creek, respectively. Drainage infrastructure in this district is limited to small roadside ditches and small culverts at some street intersections (**Figure 7**). Many of these storm drains are undersized and/or become clogged during the rainy season. Burton Cir, Margate Ave, and Ramsey St are unpaved.

Lodge Hill North – Problem Assessment

Problem 8-Ramsey Street Flooding
Severe street flooding occurs along Ramsey St. Ramsey St is a dirt road positioned on the south-facing slope of a steep canyon that drains to "Burton Creek". During storm events, concentrated runoff travels over Ramsey St, resulting in severe erosion. Following a large storm event in 1998, portions of Ramsey St became so heavily eroded that it was impassable for a normal car. The road was rebuilt in the summer of 1998 but nothing has been done to address the failure mechanisms of the old road failure. This street continues to flood and erode each rainy season.

Problem 9-Wilton Drive Localized Flooding
Several localized flooding problems were also identified along Wilton Dr. The northerly section of Wilton Dr is relatively shallow. Small depressions, minimal gradients, and lack of drainage infrastructure result in temporary ponding of runoff. Resident questionnaires indicate large storm events often result in serious street flooding as well as the flooding of some homes.

Lodge Hill North - Recommended Solution Projects

Project 8-Ramsey Street Reconstruction and Paving
It is recommended that roadside drainage and erosion problems along Ramsey St (Problem 8) be addressed by the reconstruction and paving of Ramsey St and the installation of drop inlets to convey runoff from upland areas beneath Ramsey St, west to "Burton Creek" below (**Figure 8**). Rock energy dissipators should be placed at outfalls on west side of Ramsey St to avoid erosion of the steep canyon to the west.

This project will only benefit immediately adjacent property owners and should be constructed to County standards with the eventual development of this residential block. Improving Ramsey Street should be paid for by the benefiting street property owners, consistent with many other Cambria Cooperative Road improvement projects. Assigning financial responsibility for road improvements to property owners will reduce the total funding amount for drainage projects proposed in this report.

Project 9-Wilton Drive Roadside Ditches
Localized flooding problems along Wilton Dr are due to poor drainage infrastructure and minimal gradients. The recommended project for Problem 9 involves the construction of lined roadside ditches with positive drainage. Culverts would be needed beneath driveways to prevent obstruction of flow and/or the flooding of homes. The segment of Wilton Dr in the northern portion of the district

that runs east-west should have positive drainage towards “Burton Creek.” The segment of Wilton Dr in the eastern portion of the district that runs north-south should have positive drainage towards the unnamed drainage that runs parallel to this segment of Wilton Dr and flows north to Santa Rosa Creek.

Table 4: Lodge Hill North Projects 8 and 9
Proposed Drainage Improvements – Cost Estimate

Item No.	Description	Est. Qty.	Unit	Unit Price	Total
1	Drop Inlet	5	E.A.	$1,500	$7,500
2	Drainage Pipes, 18"	200	L.F.	$150	$30,000
3	Roadway Improvement 4"-thick AC	760	Tons	$150	$114,000
4	Roadway Improvement 6"-thick AB	55	Tons	$50	$2,750
5	Rolled Asphalt Curbs	4,600	L.F.	$10	$46,000
6	Energy Dissipators	1	E.A.	$1,500	$1,500
7	Roadside ditches along Wilton Drive	2500	L.F.	$25	$62,500
8	Driveway culverts	15	E.A.	$1,000	$15,000
				Subtotal	$279,250
				20% Contingency	$55,850
				20% Design	$55,850
				40% Admin/Environmental	$111,700
				Total	**$502,650**

PINE VIEW

Pine View – Existing Conditions

The Pine View district is located in central Cambria. The district drains north and east to Santa Rosa Creek and an unnamed creek (herein referred to as “Fitzhugh Creek”), respectively. Existing drainage infrastructure in this district consists of berms and storm drain pipes. Most roads in this district are paved. Refer to **Figure 9** for a map of the Pine View district.

Pine View – Problem Assessment

Problem 10-Eton Road Flooding near Wood Drive
The problem most often reported by Cambria residents in the Pine View area is located on Eton Rd near Wood Dr. Development of the subbasin since the early 1980’s has changed drainage patterns, resulting in runoff flowing east over Eton Rd and over the Fitzhugh Ranch agricultural lands. Runoff from developed areas west of Eton Rd flows over the agricultural lands on the way to “Fitzhugh Creek”.

Pine View - Recommended Solution Project

Project 10-
Drainage and erosion problems east of Eton Rd (Problem 10) cannot be mitigated without further analysis. Detailed analysis of the area should be completed to ensure that drainage is properly conveyed to Santa Rosa and/or Fitzhugh Creeks without damage to existing properties. This analysis should include the following: (1) topographic surveys of the local ditches should be completed to determine accurate flow direction patterns; (2) hydraulic analysis of existing ditches should be completed and needed improvements to the capacity made; and (3) drainage from Highway 1 should be evaluated and redirected if necessary, to provide protection to downstream properties.

Cambria Pines Lodge and Expansion

The existing lodge and support facilities is located on a 26 acre site on top of the hill north of the intersection of Burton Drive and Yorkshire Street. Runoff from the existing undeveloped property and developed facilities drains in three directions, through County Road rights of way and through established drainage courses, ultimately to Santa Rosa Creek. Storm runoff from the property has for many years contributed to erosion, sedimentation and flooding of the properties below.

The County Planning Commission, in July 2001, approved an expansion of the existing lodge which authorized an increase of approximately two acres of developed area to the existing six acres of development on the hilltop site. As part of the expansion development review process, County staff, developer consultant, Upper Salinas – Las Tablas Resource Conservation District and Natural Resources Conservation District engineers evaluated existing and proposed site drainage, sedimentation and erosion issues. The development review process included review and discussion of these issues with the North Coast Advisory Council, Cambria Community Services District, and a group of local homeowners formed and designated the “East Lodge Hill Neighbors”.

The resulting Cambria Pines Lodge expansion approval included a requirement for drainage improvements for the new facilities and existing facilities. These improvements include specifically designated and described improvements, including the provisions of interlocking pavers in parking lots to increase absorption, cisterns, collection of roof runoff and release to energy dissipators, storm water/oil residue separators, storm water diversion devises to reduce concentrated flows, and other measures. A drainage plan, a sedimentation and erosion control plan are required to be prepared, approved and implemented. These plans will include additional specific improvement measures to be implemented to reduce the affects of the expansion and existing development on adjacent properties and existing drainage facilities and systems.

These improvements will be constructed at the cost of the developer in conjunction with expansion of the lodge. It is anticipated that the facilities to be constructed in conjunction with the lodge expansion will improve the existing drainage conditions to the best extent possible for this area under regulatory conditions.

PINE KNOLL

Pine Knoll – Existing Conditions

The Pine Knoll Estates district is located just north of Mid-Village. The district is found on moderately steep south-facing hillsides that drain through the Mid-Village, ultimately draining to Santa Rosa Creek.

Pine Knoll – Problem Assessment

No major flooding problems were noted or reported in the Pines Knolls District. Drainage problems in this district are generic problems that can be found throughout the Town.

Pine Knoll – Recommended Solution Projects

No specific solution projects are proposed for this district.

PARK HILL

Park Hill – Existing Conditions

The Park Hill district is located in western Cambria. The district is bounded by Santa Rosa Creek to the north and east and by the Pacific Ocean to the west. The district slopes to the northwest, draining to Santa Rosa Creek and the Pacific Ocean. While areas east of Windsor Blvd tend to be moderately to steeply sloping, areas to the west of Windsor are relatively flat. Existing drainage infrastructure in this district includes rolling berms and storm drain pipes at major intersections. All roads in this district are paved. Few drainage problems were identified in the Park Hill district.

Park Hill – Problem Assessment

The two major problem spots in the Park Hill district consist of: the constriction of Santa Rosa Creek at the Windsor Bridge (Problem 11) and the eroded gully that flows between homes on Dorset Street and Cambridge Street (Problem 12). Existing drainage infrastructure and problem areas in the Park Hill district are shown in **Figure 10.**

Problem 11-Windsor Bridge
The Windsor Bridge currently constitutes the only entrance and egress to and from the Park Hill area as well as the Seaclift Estates. The southern approach to the bridge is significantly lower than the bridge itself. During large storm events in 1995, high flows flooded the southern approach, making Park Hill inaccessible to vehicles. While these flooding conditions are rare and last only for a few hours, such conditions could prevent emergency access to and from the Park Hill and Seaclift Estates areas during large storm events.

Problem 12-Dorset Street and Cambridge Street Gully
The second source of flooding in Park Hill is the gully that flows between homes between Dorset Street and Cambridge Street. An aboveground 18-inch corrugated plastic pipe between 426 and 424 Cambridge Street was noted during the site reconnaissance. The pipe appears to have been placed by residents in attempts to solve the flooding problems. This area collects runoff from a small

watershed (12 acres) above it. Flow continues down Cambridge St to Windsor Blvd. Runoff pools at the intersection of Cambridge St and Windsor Blvd, resulting in severe street flooding and flooding at residences there because much of the runoff at this location is unable to make the turn south down Windsor Blvd and west down Dorset, where it is discharged to the Pacific Ocean.

Park Hill – Recommended Solution Projects

Project 11-Emergency Access to and from Seaclift Estates
While the constriction at the Windsor Street Bridge is beyond the scope of this drainage study, a coalition of private and public funds was raised to purchase the East-West Ranch property, located south of Seaclift Estates, and preserve it as open space. The Cambria Community Services District has plans to build a dirt fire road that will extend from Seaclift Estates south to Marine Terrace. The fire road will provide a second emergency access to and from Seaclift Estates and Park Hill during large storm events should the Windsor Bridge become impassable.

Project 12-Cambridge Street Berm Installation
The recommended project to address flooding on Cambridge St involves the installation of berms on Lancaster St, Hastings St, Cambridge St, and Dorset St as well as the extension of the existing storm drain system that conveys flows from the corner of Dorset St and Nottingham Dr west to the sea (**Figure 11**). A storm drain should also be installed in Lancaster between Pembrook and Whitehall Ave, and second in Windsor from Cambridge to Dorset. The first storm drain will divert flow from Pembrook away from the gully, and the second will convey flow in Windsor from Cambridge to Dorset. The installation of berms will keep runoff within the streets and reduce runoff on private property, allowing it to move west within the roadways to Windsor Blvd. Windsor Blvd would need to be bermed as well, in order to convey flows south towards Dorset St. The subterranean storm drain system that runs from Dorset St and Nottingham Dr should be extended to Dorset St and Windsor Blvd. Here, a drop inlet should be installed to convey flows from Windsor Blvd west to the sea.

The drawback to this project is that some existing developed lots may not be able to outlet their rain water onto bermed streets if this project is implemented. These residences will need to manage rain water on-site, perhaps through the installation of an on-site basin in their yard.

Table 5: Park Hill Project 12
Proposed Drainage Improvements – Cost Estimate

Item No.	Description	Est. Qty.	Unit	Unit Price	Total
1	Rolled Asphalt Curbs	6500	L.F.	$10	$65,000
2	Ditch improvements	1	E.A.	$10,000	$10,000
3	Storm drain pipe (Dorset)	190	L.F.	$180	$34,200
4	Storm drain pipe (Lancaster)	400	L.F.	$180	$72,000
5	Storm drain pipe (Windsor)	500	L.F.	$180	$90,000
				Subtotal	$181,000
				20% Contingency	$36,000
				20% Design	$109,000
				40% Admin/Environmental	$36,000
				Total	**$362,000**

HAPPY HILL

Happy Hill – Existing Conditions

Located in northwestern Cambria, this district drains in a generally southwest direction, towards Santa Rosa Creek and the Pacific Ocean. Existing drainage infrastructure in this district is limited to few berms and older storm drain pipes. All streets in this district are paved.

Happy Hill – Problem Assessment

Problem 13-Canterbury Lane Drainage Problem
Perhaps the most severe drainage problem in the Happy Hill district occurs on Canterbury Lane. This drainage problem can be attributed to several factors including: (1) natural gradients; (2) lack of berms along Derby Lane and Canterbury Lane; (3) the fact that many homes on Canterbury Lane are built below street grade; and (4) an increase in impervious surface area upgradient during the development of new homes on Derby Lane. The combination of these factors results in the flooding of street and homes during large storm events. See **Figure 12** for existing drainage infrastructure in Happy Hill.

Happy Hill – Recommended Solution Projects

Project 13-Canterbury Lane Berm, Drop Inlet and Storm Drain Installation
It is recommended that drainage issues associated with Problem 13 be addressed through the installation of berms along the south side of Canterbury Lane and the installation of a drop inlet and subterranean storm drain at the corner of Canterbury Lane, near 539 Canturbury Lane. The proposed berms would keep runoff from flowing downgradient into homes on the southside of Canterbury Lane but they would cause runoff to pool in the vicinity of 539 Canterbury Lane. For this reason, a drop inlet and storm drain pipe is needed to convey these flows to the unnamed drainage below. An energy dissipater will be necessary to prevent excessive erosion at the discharge point to the drainage. Refer to **Figure 13** for proposed drainage infrastructure in Happy Hill.

Table 6: Happy Hill Project 13
Proposed Drainage Improvements – Cost Estimate

Item No.	Description	Est. Qty.	Unit	Unit Price	Total
1	Drop Inlet	1	E.A.	$1,500	$1,500
2	Drainage Pipes, 18"	300	L.F.	$150	$45,000
3	Rolled Asphalt Curbs	1,500	L.F.	$10	$15,000
4	Energy Dissipators	1	E.A.	$2,500	$2,500
				Subtotal	$64,000
				20% Contingency	$12,800
				20% Design	$12,800
				40% Admin/Environmental	$25,600
				Total	**$115,200**

LEIMERT ESTATES

Leimert Estates – Existing Conditions

Leimert Estates is the northernmost district in Cambria. Development in this district is less dense than other districts in Cambria, and generally consists or larger parcels and homes.

Leimert Estates – Problem Assessment

No major flooding problems were noted or reported in the Leimert Estates District.

Leimert Estates – Recommended Solution Projects

No specific solution projects are proposed for this district.

HISTORICAL PROBLEMS

Below is a list of reported and historic drainage problems noted in Happy Hill, Leimert Estates and Cambria Pines Estates from Dean Benedix (8/24/01) County File historical review:

1. 310 Stafford Dr – Dead end stub street (Happy Hill near Moonstone Beach Drive – 1993)
2. 5249 Nottingham (near Hastings) – Water flows down Hastings across Nottingham, resulting in bluff erosion.
3. 3140 Martindale – sink hole and inadequate street capacity.
4. Eton Rd and Burton Dr – Cambria Nursery runoff reaching Village Lane culvert, additional runoff onto Burton Dr.
5. 6211 Somerset Way – sag cul-de-sac inlet overtops adjacent driveway.
6. 444 Exeter – flat grade on Exeter south of Chiswick backs up water at Chiswick and Exeter.

GENERIC PROBLEMS AND POTENTIAL SOLUTIONS

While the cause of flooding problems varies from location to location, several cause-and-effect relationships are generally consistent throughout the community.

- The location of a home is a key factor in the resulting drainage problems that are likely to be inflicted on it. Homes located below street grade and whose driveways slope down away from the road may experience flooding in the garage or home. This is because without an adequate curb/berm, the driveway may act to convey runoff from the street above to lower elevations and sometimes into the garage or home.

  It is recommended that the Town of Cambria mandate the installation of a County standard mountable berm for all driveways/accesses to structures which are below the edge of pavement.

- Rolled asphalt berm structures were found in several areas of the Cambria Community. While it would be incorrect to label such structures as curbs and gutters, berms can often be an effective means of containing runoff within the roadway and preventing it from flowing onto private property. However, the berms observed throughout the community

were of varying heights, sometimes only 2-3 inches in height. These lower berms may do little to prevent localized flooding problems during large magnitude storm events.

It is recommended that rolled asphalt berms (Cal Trans Type E4 mountable berm with backsloped choker at a minimum of 6" above the gutter flowline) be used where berms are needed to control roadside runoff. Numerous complaints indicate many drainage problems within the Town of Cambria could be resolved with the construction of berms to control water down the street. However, it is important to note that there is a limit to the extent which berms can be installed without the eventual installation of a subterranean storm drain system. This is because berms restrict runoff to streets, reducing the amount of runoff that is infiltrated on private property, thus increasing the total volume of runoff. Berms have a finite capacity and once this capacity is reached, runoff will overtop the berms and flow onto private property. At the downstream end of a watershed, this volume can be quite substantial. Therefore, a subterranean storm drain system, an expensive improvement, is often necessary at the end of the drainage path.

Additionally, the piecemeal installation of berms can result in creating or exacerbating drainage problems at nearby properties. While the property owner that installs the berm may benefit, berms cause runoff to concentrate and can kick water off to neighboring and/or downstream properties. It is also important to note that there is a limit to the extent which berms can be installed without the eventual installation of a catchment system, an expensive improvement, at the terminus of the berm's capacity. The berm's capacity is limited and depends on the street slope.

Streets where berm installation would remedy road water running onto private property include:

Lodge Hill North area
- Berwick Drive
- Benson Avenue
- Leona Drive
- Wales Road
- Pineridge Drive
- Richard Avenue
- McCabe Drive
- Saint James Road and Bixby Road area
- Newhall Avenue sag

Happy Hill area
- Ashby Lane
- Sunbury Avenue
- Weymouth Street
- Warwick Street
- Canterbury Lane

- The greater majority of unpaved roads within the community were found on steep slopes. These roads receive runoff from impervious surfaces such as rooftops and adjacent paved roads. While having pervious roadways allows for some infiltration of runoff, unpaved

roads experience higher erosion rates and tend to result in the sedimentation and clogging of downstream drainage infrastructure.

It is recommended that all unpaved streets be paved under the County Cooperative Road Improvement Program. Under this program, benefiting property owners pay for their streets to be paved using established County procedures.

- In efforts to solve drainage problems, many private property owners have constructed or installed drainage infrastructure on their own. Because this infrastructure was resident installed, it is not maintained by SLO County Public Works. The lack of a cohesive drainage network in the community makes the regular maintenance of existing drainage infrastructure necessary but very difficult to complete through County efforts alone. As a result, many of the localized drainage problems are caused by infrequently maintained or deteriorated infrastructure on private property.

  It is recommended that a community-wide drainage maintenance entity be formed. This entity is herein referred to as the Cambria Drainage Facility Maintenance Department and is discussed later in this report.

EXISTING REGULATIONS

San Luis Obispo County Curb and Gutter Ordinance

Unless waived, San Luis Obispo County requires the installation of concrete curbs, gutters, and sidewalks along the entire street frontage of any project in the following areas: (1) all new residential subdivisions within the urban reserve line, pursuant to Title 21 of the SLO County Code; (2) all new residential multifamily categories within and urban reserve line; (3) all commercial and office and professional categories within an urban reserve line; and (4) all industrial categories within an urban reserve line. Development of existing single family lots does not require the installation of curb or gutter. While some members of the Cambria Community have shown interest in enforcing a curb and gutter ordinance (at least the curb and gutter aspect of it anyway), it is important that this ordinance be implemented carefully on a street or drainage area wide projects. Partial implementation of curbs and gutters can exacerbate or create localized drainage/flooding problems in adjacent areas lacking curbs and gutters. One alternative may be to examine properties on a case-by-case basis. If drainage infrastructure exists, then the construction of curb and gutter should be required. If it does not exist, then an alternative means of the developer providing a fee in lieu, or other means, should be considered to avoid piecemeal drainage infrastructure.

The character and level of development of the rural residential Cambria community is such that the retrofitted installation of a community supported integrated system of curbs and gutters is extremely unlikely. The community should consider incorporating the rolled asphalt berms into the road section for all new and rehabilitated roads. See discussion above on berm recommendations.

Proposed Residential Design Guidelines

The purpose of design guidelines is to provide a framework for specific standards, guidelines, and programs for new development. The plan should include guidelines for avoiding drainage and erosion impacts from new development and include, but not be limited to the following:

1. Drainage plans for new development should be designed to retain water on-site when feasible.

2. New development should avoid directing new runoff onto adjacent properties.
3. Development plans should be reviewed carefully. Drainage easements should be encouraged on key properties (down slope properties) so that drainage can be safely carried across the property released on the street below or into properly design storm water management facilities or structures
4. Hardscape should be minimized to provide more water percolation on-site.
5. All runoff from impervious surfaces shall be collected and retained onsite, or released to right-of-way through an effective erosion control device.

RECENT OR ONGOING PROJECTS IN THE COMMUNITY

Santa Rosa Creek Bypass Channel

In the 1960's Highway 1 was constructed on fill, dividing the floodplain of Santa Rosa Creek. To the south is the creek channel and to the north is the West Village. Highway 1 now acts as a low levee, separating the creek from its floodplain to the north. A significant flood event occurred in 1995 throughout the West Village. A significant portion of the damage resulted from inadequate capacity in Santa Rosa Creek at the Highway 1 bridge. This resulted in flow leaving the channel, overtopping a low creek bank levee and Bamcria Dr, flooding West Main Street, and inundating the West Village.

Flooding problems along Santa Rosa Creek in the West Village are being addressed by the construction of a by-pass channel for Santa Rosa Creek. The by-pass channel will allow overflows to move slowly through the by-pass channel and then rejoin the Santa Rosa Creek downstream without overtopping Cambria Drive or Santa Rosa Creek. The project restores controlled flooding to the historic floodplain of Santa Rosa Creek while protecting the West Village from overflows of Santa Rosa Creek.

Marine Terrace Cooperative Roads Project

Major improvements plans were completed in fall of 2002 in the Marine Terrace area of Cambria. These plans consisted of major improvements to streets and drainage west of Marlborough Lane and between Emmons Rd and Jean Street. Among the improvements were mountable roadside berms, the replacement of several storm drain pipes, and the construction of a new 36-inch storm drain pipe down Harvey Street.

Sheffield Street Pressure Storm Drain and West Village Pump Station Projects

Local runoff collects in the West Village during large storms because the existing storm drainage system relies on a series of flap gated culverts draining to Santa Rosa Creek. During large storms, high flows in Santa Rosa creek prevent these culverts from draining. Runoff backs up and ponds in the low lying areas of the West Village. As of the writing of this technical memorandum, schematic designs have been developed to reduce or eliminate flooding in the West Village from local runoff. The concept involves the combination of two facilities, a pressure storm drain and a pump station.

A pressure storm drain is proposed along Sheffield Street through the West Village. This storm drain will intercept runoff from the main Sheffield drainage and use pressure head to discharge the water directly into Santa Rosa Creek. Because the storm drain must be under pressure to discharge flow during high stages in Santa Rosa Creek, there will be no drop inlets proposed in lower portions of the West Village. Local runoff generated from watersheds above and in the West Village will directed to a pump station located at the eastern end near Windsor Ave . This pump station will collect runoff and pump into Santa Rosa creek utilizing either existing storm drainage pipes or new ones installed

across Highway 1. These projects have not been funded at this time but the County is actively seeking potential sources of funding for these improvements.

COMMUNITY-WIDE RECOMMENDATIONS

Formation of a Cambria Drainage Facility Maintenance Department

Many of the drainage/flooding problems in Cambria are exacerbated by inadequate maintenance of drainage facilities. Currently, the maintenance of drainage infrastructure in unincorporated areas of SLO County, including the Community of Cambria, is the responsibility of the SLO County Public Works Department. A small, but nonetheless vital portion of the drainage facilities are privately-owned and independently subject to maintenance or lack thereof by property owners. The remote nature of the community makes it difficult for maintenance workers to become familiar with all maintenance issues in the Community, particularly since private property owners installed a good portion of the drainage infrastructure. This means that the maintenance of some culverts and ditches are sometimes overlooked and thus, these culverts and ditches may end up becoming clogged during the rainy season. The County Public Works Department can only realistically clean out culverts and other drainage infrastructure once a year, before the rainy season, or respond to emergencies structures that tend to get easily clogged by dirt and overgrown vegetation. Because of the limited County staffing and general flood control revenue available, the community's drainage facilities do not receive as much maintenance as is needed to provide maximum drainage capacity all year long.

For the reasons listed above, it is recommended that either the existing Cambria Community Services District or a separate facility maintenance district be formed to better maintain the drainage infrastructure in Cambria. Responsibilities of the new maintenance district would include: (1) being the contact point for all resident complaints regarding drainage infrastructure in the community; (2) keeping an organized database of all new drainage infrastructure in the Community including the size and capacity of culverts and storm drains, even if this infrastructure is installed by private property owners; (3) keeping a regular maintenance schedule that may involve multiple maintenance visits where needed; and (4) responding to drainage infrastructure repairs as needed. Having a localized facility maintenance district will make it easier to maintain drainage infrastructure as needed throughout the Community.

RECOMMENDED DRAINAGE STANDARDS

Street Paving

Many streets in Lodge Hill South and Lodge Hill North and unpaved. During the rainy season, dirt roads tend to erode and clog drainage infrastructure. Clogged drainage infrastructure reduces conveyance capacity and often results in flooding/drainage problems.

It is recommended that the community move towards paving all dirt roads in the community in accordance with County standards. While paving streets will create additional impervious surface area, it will allow for the proper conveyance of runoff and a significant reduction in dirt and debris in nearby storm drain pipes. All street retrofits should be completed both in accordance with County regulations and recommended drainage standards specified here within.

Berms

Residential districts in Cambria are not required to provide curbs and gutters. It is recommended, however, that any residential, street retrofit, or other development not required to provide curbs and gutters be required to install 6" minimum height asphalt dike or berm (CalTrans Type 'E', previously described) to protect runoff from entering structures and to convey street surface water. Berms will help to contain runoff within the roadway and protect homes and private property.

It must be noted, however, that if not installed uniformly, berms have the potential to cause or exacerbate drainage problems downgradient. Containing runoff within the streets reduces the amount of runoff infiltration on private property, and increases overall runoff volume on the streets. Berms can also kick runoff onto adjacent properties.

CONCLUSION

Cambria is in need of immediate drainage improvements to mitigate the most severe flood/drainage problems in the community. All site-specific projects described in this technical memorandum are recommended, as these solutions address the most serious individual problems within the community. Implementation of Projects 1-12 would cost an estimated $1.5 million dollars. The **Table 7** below summarizes these costs.

Table 7. Summary Cost Table

District	Cost
Marine Terrace	$685,845
Lodge Hill South	$331,200
Lodge Hill North	$502,650
Park Hill	$196,500
Happy Hill	$115,200
	$1,512,495

Additionally, another $500,000 in costs should be planned to handle the numerous smaller drainage projects and the potential for unforeseen costs. This would bring the total anticipated budget to resolve the majority of the drainage issue in the residential portions of the community to around 2 million dollars. It is suggested that either the Cambria Community Service District add drainage maintenance to their responsibility, or a community facility maintenance district be formed to create a central point for all drainage issues. The CCSD or the newly formed district would greatly improve the maintenance of drainage infrastructure throughout the Community. The cost of developing such a district and how it might to structured for the community are beyond the scope of this technical memorandum and will be addressed in subsequent reports.

APPENDIX A. CAMBRIA DRAINAGE CALCULATIONS

San Luis Obispo County Community Drainage and Flood Control Studies
Cambria
Summary design table
and designed pipe dimensions
Designed for 10-yr storm events

	Area	Time of concentration	Rainfall intensity	C	Design 10-yr Q	Pipe Length	Pipe Slope	Pipe Dia.	Pipe Full Capacity
	(ac)	(min)	(in)		(cfs)	(ft)	(%)	(in)	(cfs)
(a) Castle St	78	11.1	2.7	0.45	94.8	900	6.7	36	150
(b) Emmons St	30	17.3	2.3	0.45	31.1	795	5	24	44
(C) Burton St	68	17.8	2.4	0.45	73.4	700	5	36	130

Summary Calculations Table

Marine Terrace

	Area	Time of concentration	Rainfall intensity	C	Design 10-yr Q	Pipe Length	Pipe Slope	Pipe Dia.	Pipe Full Capacity
	(ac)	(min)	(in)		(cfs)	(ft)	(%)	(in)	(cfs)
Castle St	78	11.1	2.7	0.45	94.8	900	6.7	36	150
Emmons St	30	17.3	2.3	0.45	31.1	795	5	24	44

Culvert	Drainage Area (hectares)	Average Slope	Type of Development	Hydro Soil Group	Runoff Coefficient	*i* (10 yr, 30-min)	Ca	Q (cu m/sec)	Q (cu ft/sec)
Ogden Dr	9.25	0.09	6,000 sq ft	D	0.55	53	1	0.75	26.45
Madison Dr & Ardath Dr	10.00	0.09	6,000 sq ft	D	0.55	53	1	0.81	28.60

Lodge Hill

	Area	Time of concentration	Rainfall intensity	C	Design 10-yr Q	Pipe Length	Pipe Slope	Pipe Dia.	Pipe Full Capacity
Burton St	68	17.8	2.4	0.45	73.4	700	5	36	130

Proposed Burton St Drainage Pipe:

Pipe Diameter	Elev Start	Elev End	Length	Slope	n	Area	R	Velocity	Capacity	Design Q
in	ft	ft	ft	%		sq ft	ft	ft/s	cfs	cfs
36	300	265	700	5.0	0.015	7.07	0.75	18.34	130	73

(A)Proposed Castle St Drainage Pipe:

Pipe Diameter	Elev Start	Elev End	Length	Slope	n	Area	R	Velocity	Capacity	Design Q
in	ft	ft	ft	%		sq ft	ft	ft/s	cfs	cfs
36	85	25	900	6.7	0.015	7.07	0.75	21.17	150	95

(B)Proposed Emmons St Drainage Pipe:

Pipe Diameter	Elev Start	Elev End	Length	Slope	n	Area	R	Velocity	Capacity	Design Q
in	ft	ft	ft	%		sq ft	ft	ft/s	cfs	cfs
24	120	80	795	5.0	0.015	3.14	0.5	14.04	44	31

(C)Proposed Burton St Drainage Pipe:

Pipe Diameter	Elev Start	Elev End	Length	Slope	n	Area	R	Velocity	Capacity	Design Q
in	ft	ft	ft	%		sq ft	ft	ft/s	cfs	cfs
36	300	265	700	5.0	0.015	7.07	0.75	18.34	130	74

Flow calculations @ Castle St "Avon Creek"

Overland flow

C	Elev Start ft	Elev End ft	Length ft	Slope	Tc min	
0.4	257	245	63	0.190	7	<- from Fig 4-1

Shallow Concentrated Flow

Ku	k	Elev Start ft	Elev End ft	Length ft	Slope	V ft/s	Tc min
3.28	0.5	245	170	830	0.090	4.9	2.8

Channel Flow

n	R ft	Elev Start ft	Elev End ft	Length ft	Slope	V ft/s	Tc min
0.03	1	170	85	1104	0.077	13.8	1.3

Total Tc 11.1

Annual Rainfall Range 450-550 mm (Table 4-5)

Storn event 10yrs

10min	71mm
15min	61mm

rainfall intensity in 2.7

C	I	Ca	A	Q
0.45	2.7	1	78	94.77

Flow calculations @ Emmons St Drainage Pipe

Overland flow

C	Elev Start ft	Elev End ft	Length ft	Slope	Tc min	
0.4	395	368	300	0.090	12.5	<- from Fig 4-1

Shallow Concentrated Flow

Ku	k	Elev Start ft	Elev End ft	Length ft	Slope	V ft/s	Tc min
3.28	0.5	368	277	986	0.092	5.0	3.3

Channel Flow

n	R ft	Elev Start ft	Elev End ft	Length ft	Slope	V ft/s	Tc min
0.03	1	277	120	1447	0.109	16.4	1.5

Total Tc 17.3

Annual Rainfall Range 450-550 mm (Table 4-5)

Storn event 10yrs

15min	61mm
30min	41mm

rainfall intensity in 2.3

C	I	Ca	A	Q
0.45	2.3	1	29.78	30.8223

Flow calculations @ Burton St Drainage Pipe

Overland flow

C	Elev Start ft	Elev End ft	Length ft	Slope	Tc min	
0.4	487	460	286	0.094	12.3	<- from Fig 4-1

Shallow Concentrated Flow

Ku	k	Elev Start ft	Elev End ft	Length ft	Slope	V ft/s	Tc min
3.28	0.5	460	328	1000	0.132	6.0	2.8

Channel Flow

n	R ft	Elev Start ft	Elev End ft	Length ft	Slope	V ft/s	Tc min
0.03	1	328	265	1609	0.039	9.8	2.7

Total Tc 17.8

Annual Rainfall Range 450-550 mm (Table 4-5)

Storn event 10yrs

15min	61mm
30min	41mm

rainfall intensity in 2.4

C	I	Ca	A	Q
0.45	2.4	1	68.24	73.7

Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

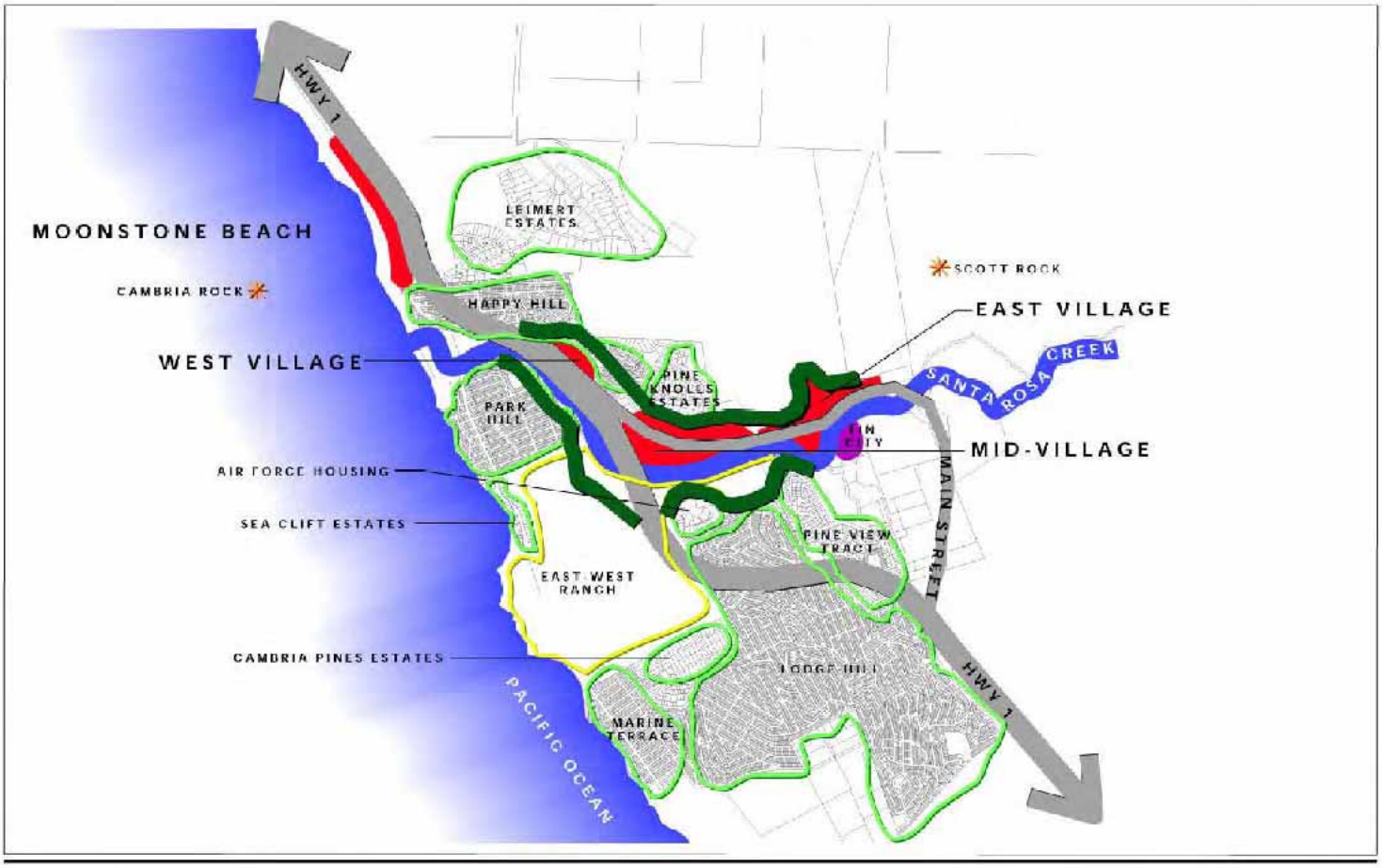
QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

SAN LUIS OBISPO
COMMUNITY DRAINAGE & FLOOD CONTROL STUDY

FEMA FLOOD HAZARD ZONES
CAMBRIA, CALIFORNIA

FIGURE

1

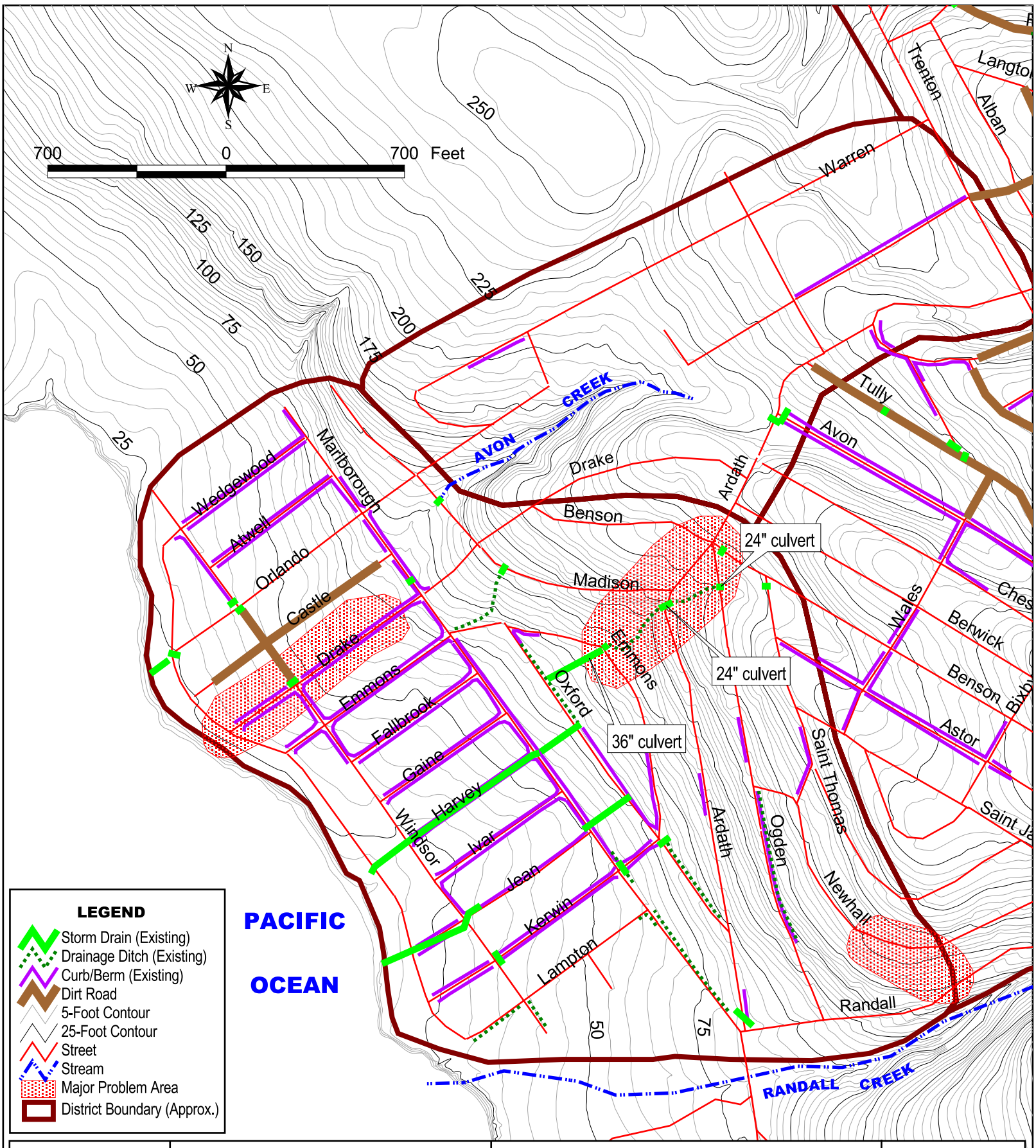


LEGEND

- COMMERCIAL DISTRICT
- LIGHT INDUSTRIAL
- RESIDENTIAL NEIGHBORHOOD
- PROPOSED DEVELOPMENT
- LANDMARKS
- ROADWAYS
- WATERWAYS
- MONTEREY PINE FRAME

SOURCE: County of San Luis Obispo, 2001. *Cambria Residential Design Plan.*

Project: SLO County H&H Project No.: 210176 Path: Z:\2001\210176\Cambria Date: 15 Oct 2003 Drawn By: KOW	QUESTA ENGINEERING CORP Civil Environmental & Water Resources P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807	SAN LUIS OBISPO COMMUNITY DRAINAGE & FLOOD CONTROL STUDY **DISTRICTS OF CAMBRIA** **CAMBRIA, CALIFORNIA**	**FIGURE** **2**



Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
31 May 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

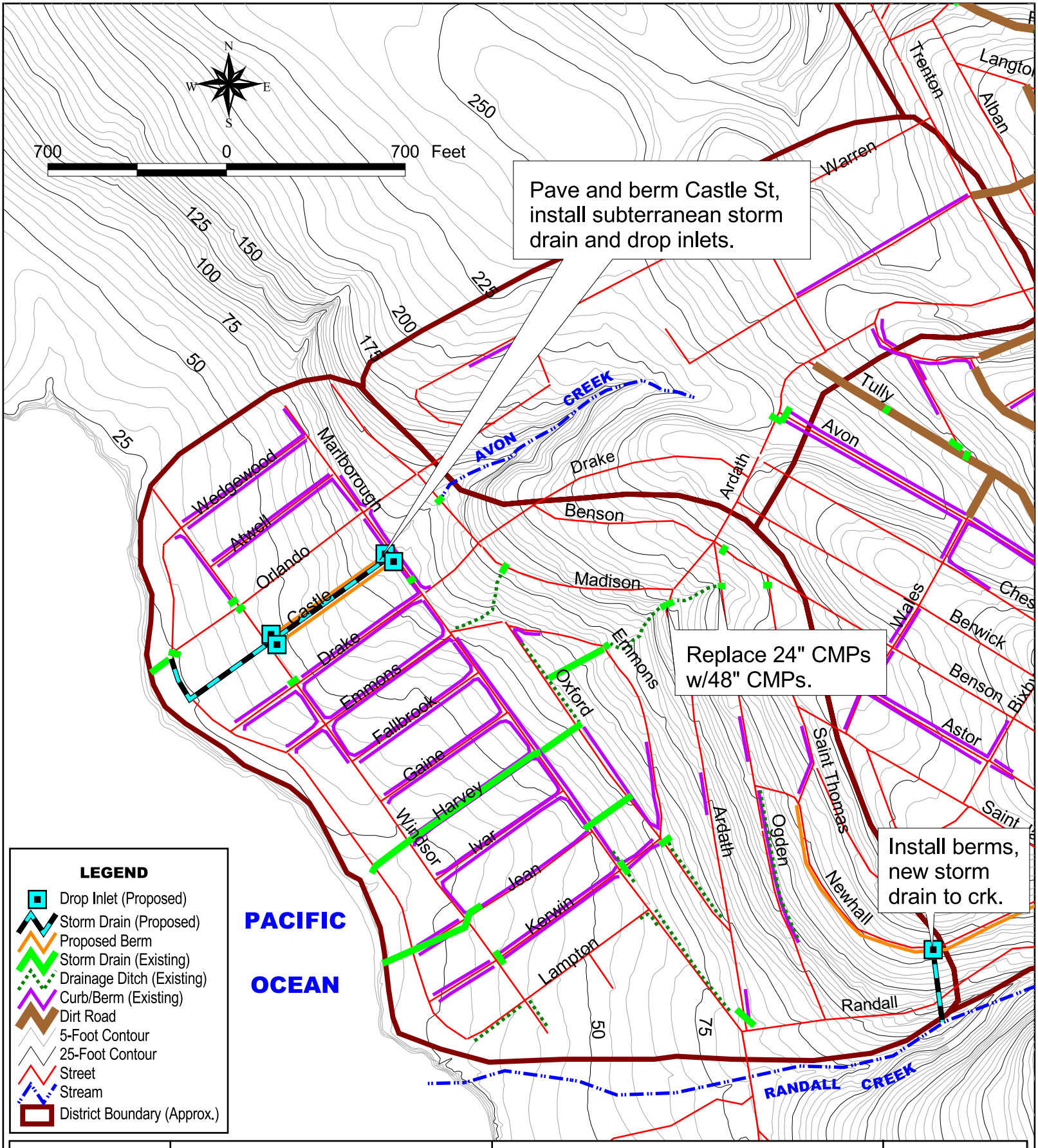
SAN LUIS OBISPO
COMMUNITY DRAINAGE & FLOOD CONTROL STUDY

EXISTING DRAINAGE INFRASTRUCTURE & MAJOR PROBLEM AREAS

MARINE TERRACE
CAMBRIA, CALIFORNIA

FIGURE

3



Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
31 May 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

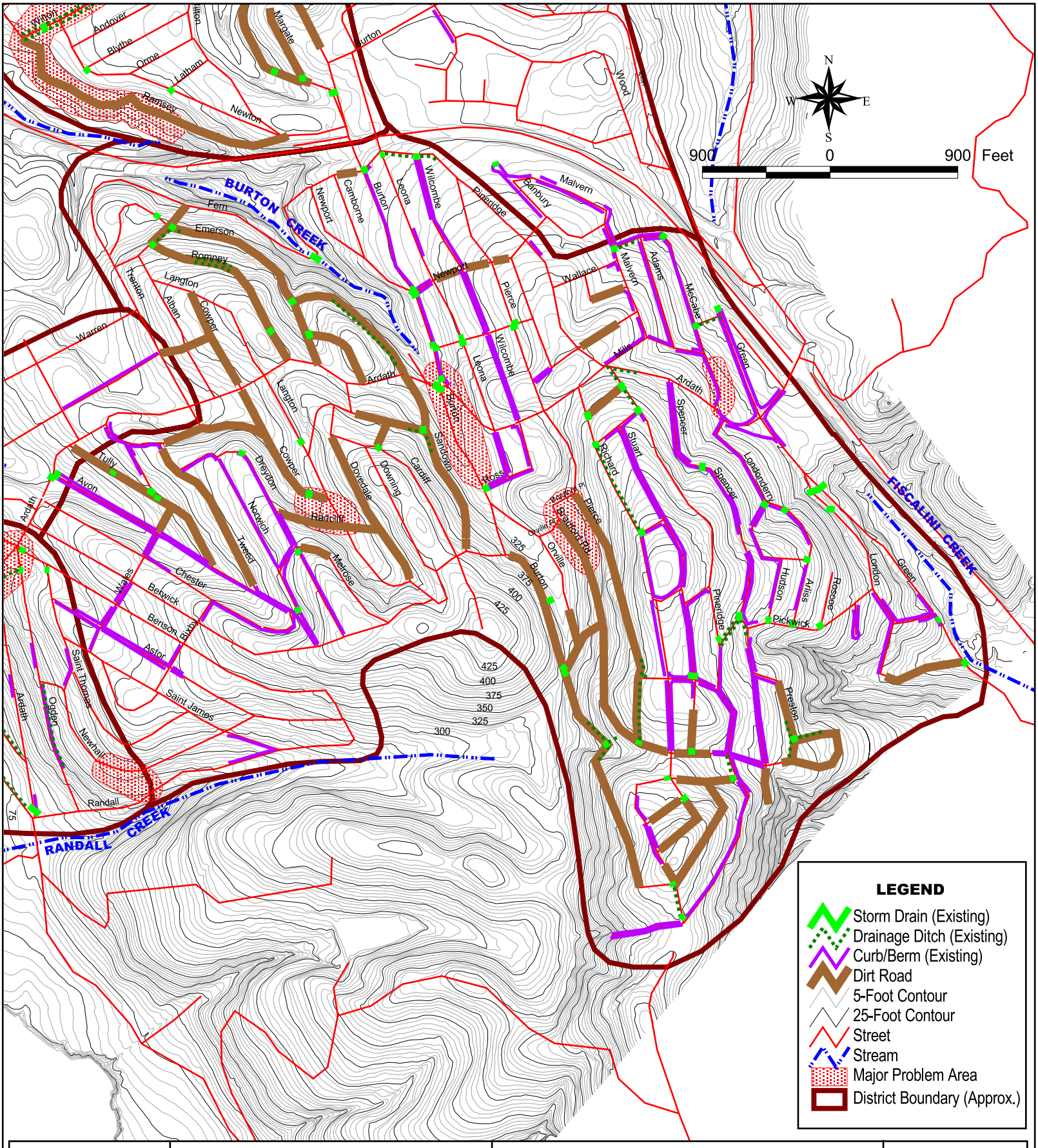
SAN LUIS OBISPO
COMMUNITY DRAINAGE & FLOOD CONTROL STUDY

PROPOSED DRAINAGE INFRASTRUCTURE

MARINE TERRACE
CAMBRIA, CALIFORNIA

FIGURE

4



LEGEND

- Storm Drain (Existing)
- Drainage Ditch (Existing)
- Curb/Berm (Existing)
- Dirt Road
- 5-Foot Contour
- 25-Foot Contour
- Street
- Stream
- Major Problem Area
- District Boundary (Approx.)

Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

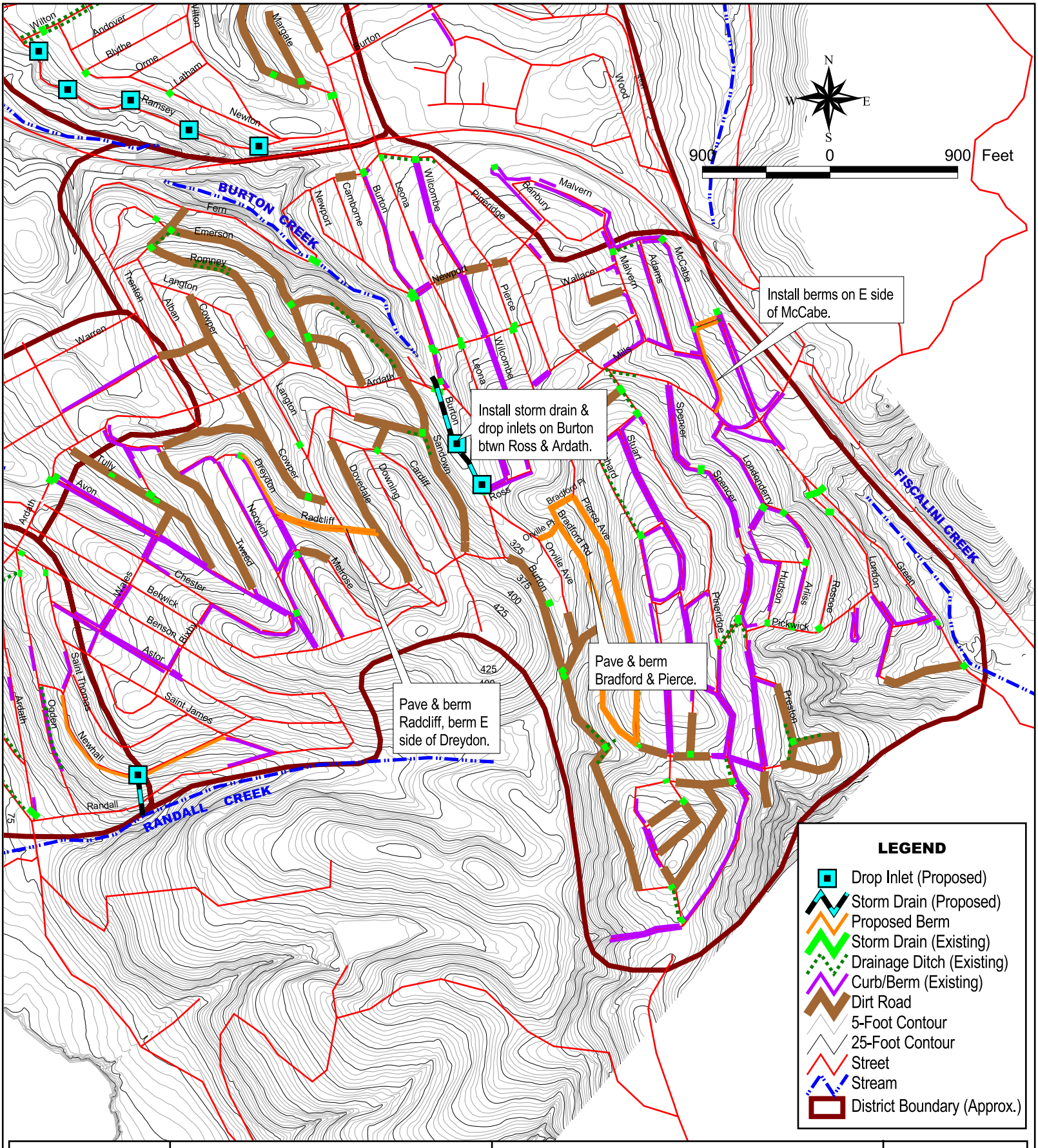
SAN LUIS OBISPO
COMMUNITY DRAINAGE & FLOOD CONTROL STUDY

EXISTING DRAINAGE INFRASTRUCTURE & MAJOR PROBLEM AREAS

LODGE HILL SOUTH
CAMBRIA, CALIFORNIA

FIGURE

5



Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

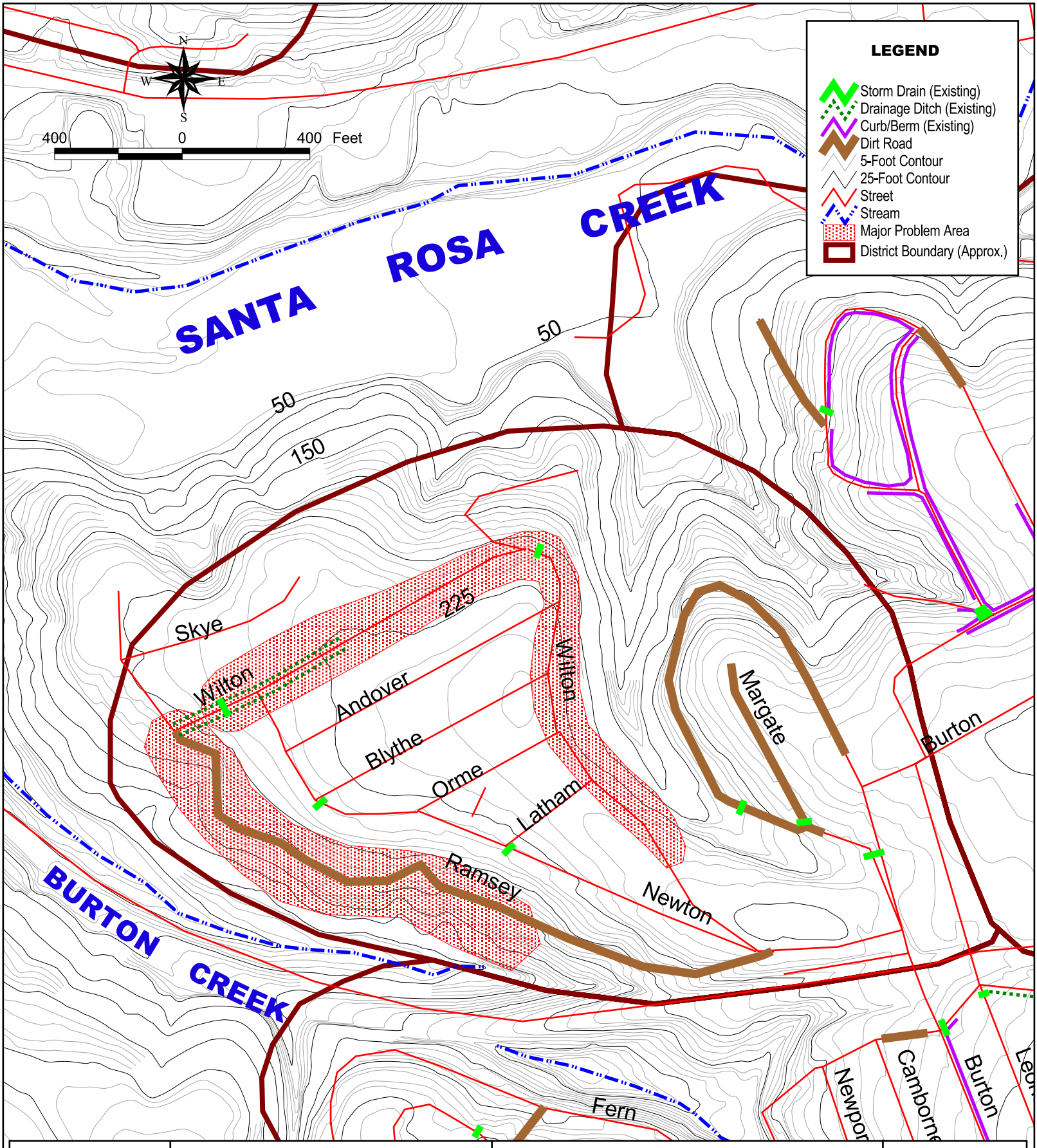
SAN LUIS OBISPO
COMMUNITY DRAINAGE & FLOOD CONTROL STUDY

PROPOSED INFRASTRUCTURE

LODGE HILL SOUTH
CAMBRIA, CALIFORNIA

FIGURE

6



Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

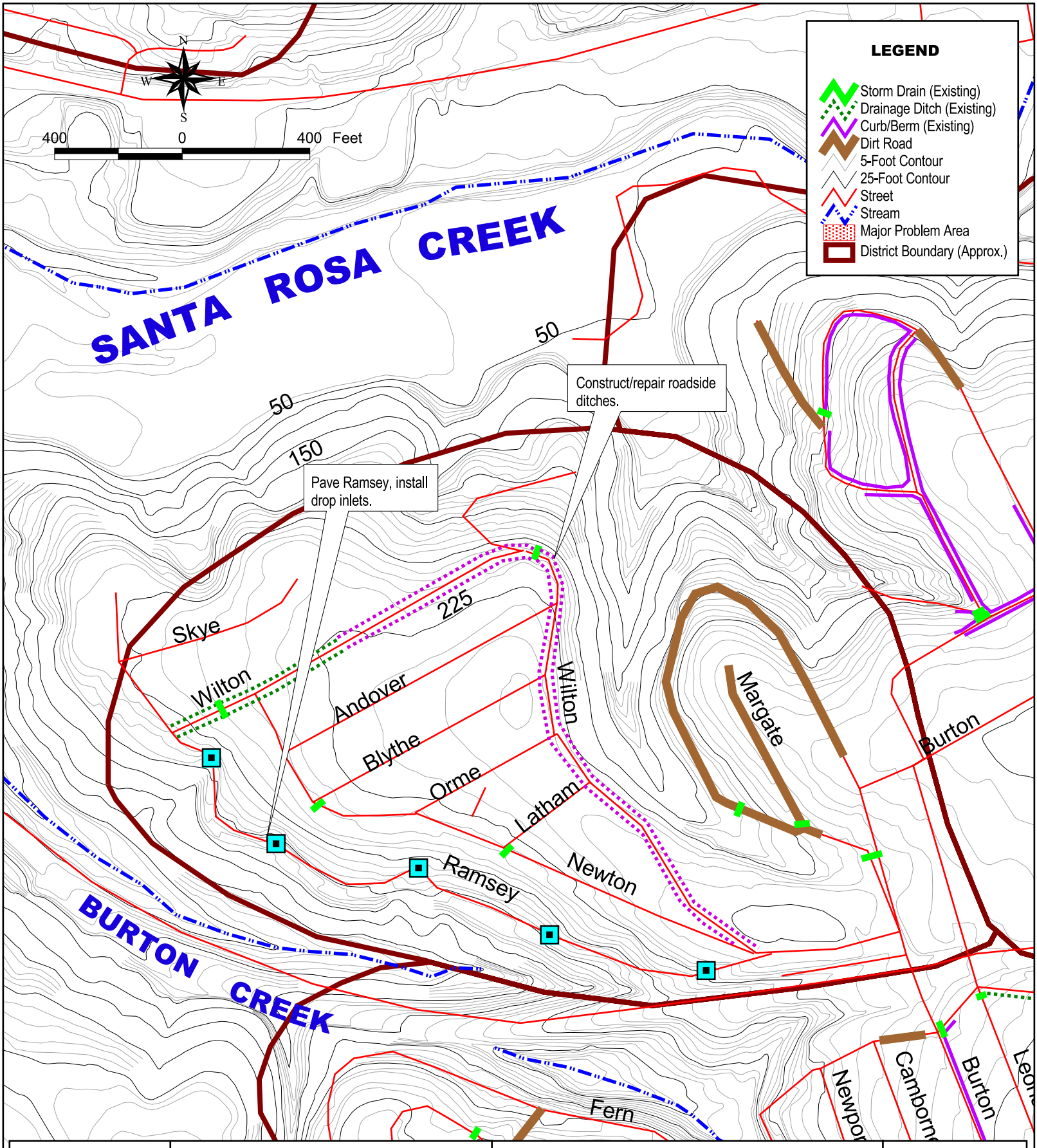
SAN LUIS OBISPO
COMMUNITY DRAINAGE & FLOOD CONTROL STUDY

EXISTING DRAINAGE INFRASTRUCTURE & MAJOR PROBLEM AREAS

LODGE HILL NORTH
CAMBRIA, CALIFORNIA

FIGURE

7



Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

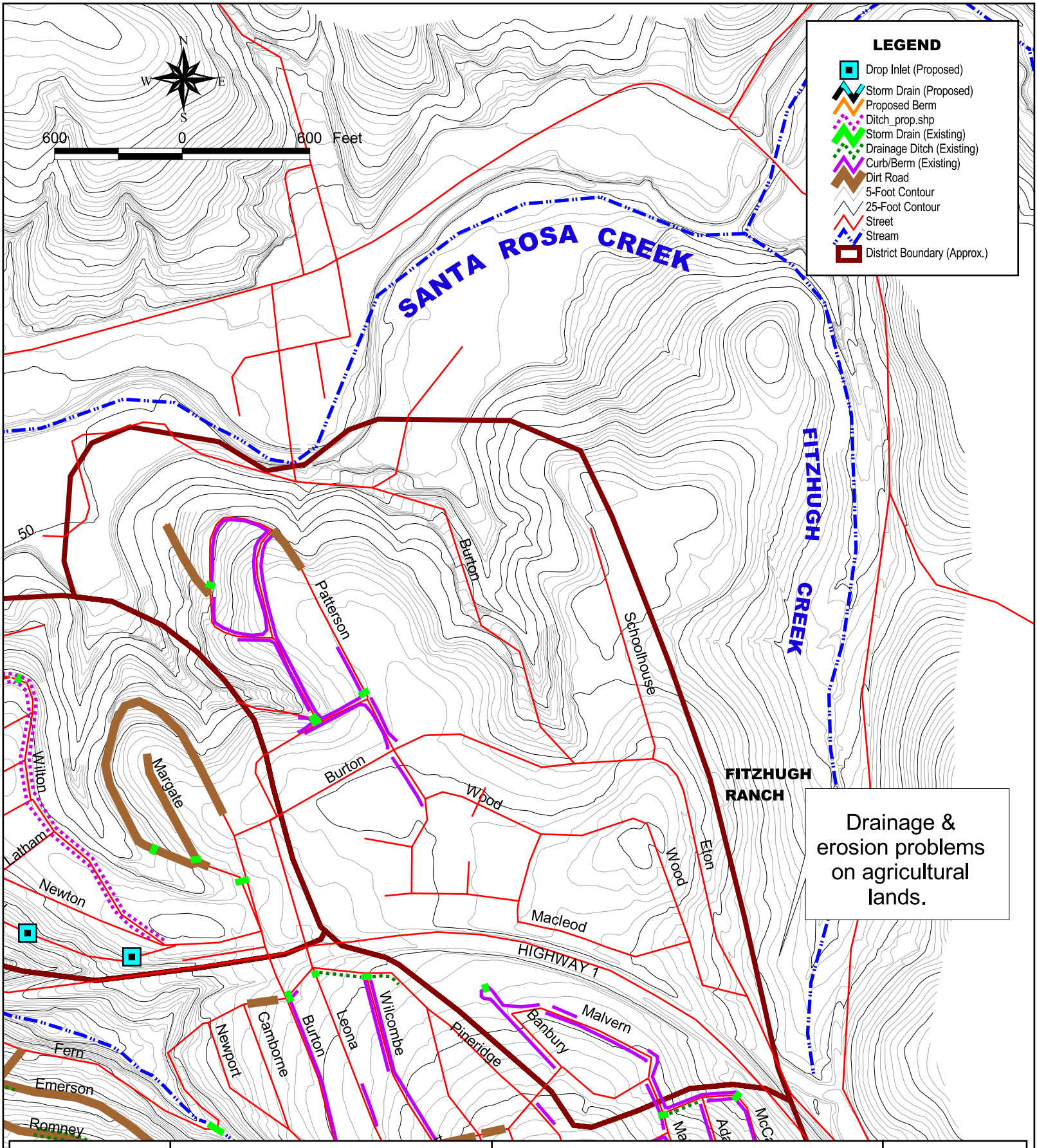
SAN LUIS OBISPO
COMMUNITY DRAINAGE & FLOOD CONTROL STUDY

PROPOSED DRAINAGE INFRASTRUCTURE

LODGE HILL NORTH
CAMBRIA, CALIFORNIA

FIGURE

8



Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

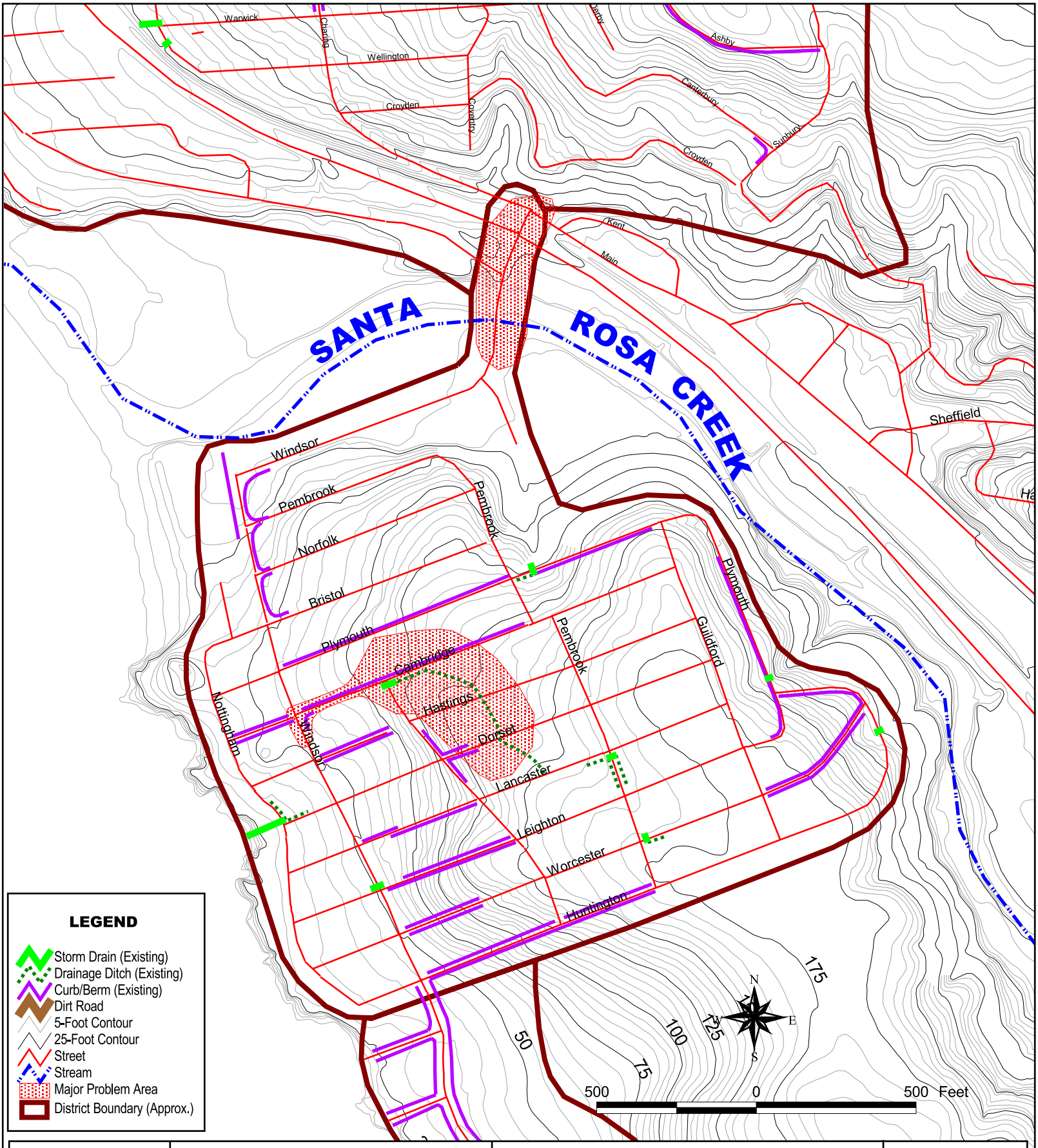
SAN LUIS OBISPO
COMMUNITY DRAINAGE & FLOOD CONTROL STUDY

LOCATION MAP

PINE VIEW
CAMBRIA, CALIFORNIA

FIGURE

9



LEGEND

- Storm Drain (Existing)
- Drainage Ditch (Existing)
- Curb/Berm (Existing)
- Dirt Road
- 5-Foot Contour
- 25-Foot Contour
- Street
- Stream
- Major Problem Area
- District Boundary (Approx.)

Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

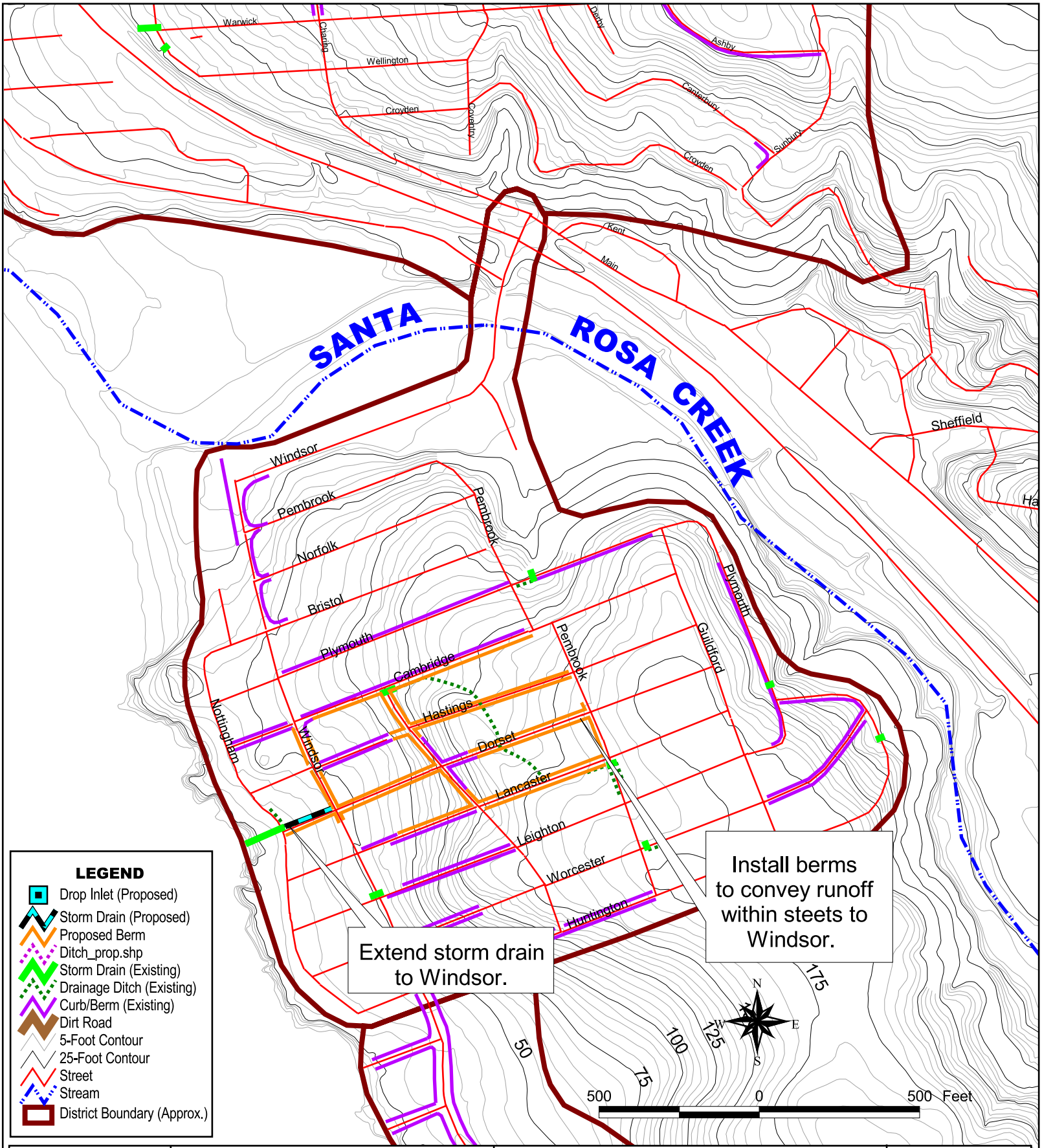
SAN LUIS OBISPO
COMMUNITY DRAINAGE & FLOOD CONTROL STUDY

EXISTING DRAINAGE INFRASTRUCTURE & MAJOR PROBLEM AREAS

PARK HILL
CAMBRIA, CALIFORNIA

FIGURE

10



Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

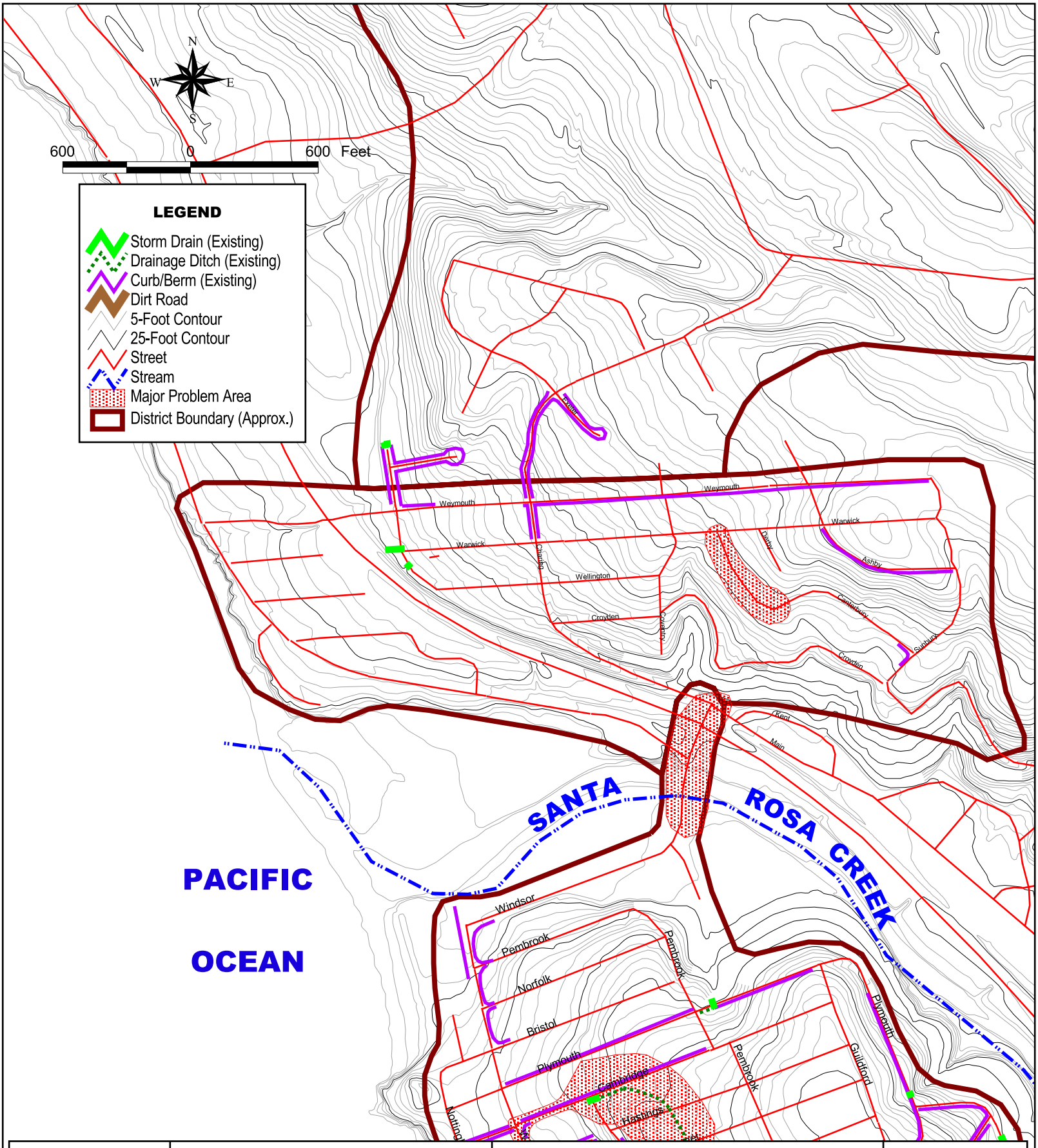
SAN LUIS OBISPO
COMMUNITY DRAINAGE & FLOOD CONTROL STUDY

PROPOSED DRAINAGE INFRASTRUCTURE

PARK HILL
CAMBRIA, CALIFORNIA

FIGURE

11



Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

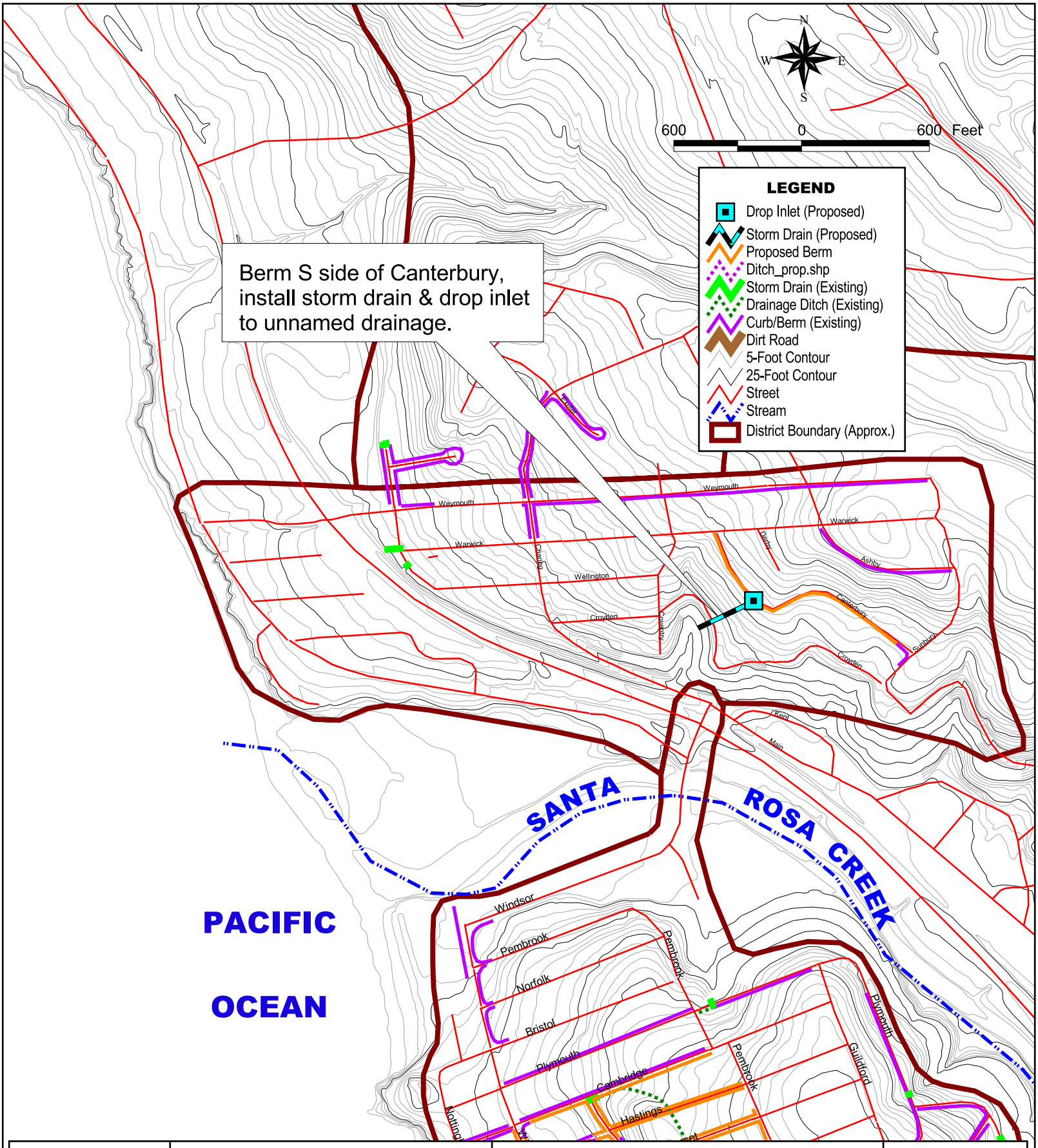
SAN LUIS OBISPO
COMMUNITY DRAINAGE & FLOOD CONTROL STUDY

EXISTING DRAINAGE INFRASTRUCTURE & MAJOR PROBLEM AREAS

HAPPY HILL
CAMBRIA, CALIFORNIA

FIGURE

12



Project:
SLO County H&H
Project No.:
210176
Path:
Z:\2001\210176\Cambria
Date:
15 Oct 2003
Drawn By:
KOW

QUESTA ENGINEERING CORP
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

SAN LUIS OBISPO
COMMUNITY DRAINAGE & FLOOD CONTROL STUDY

PROPOSED DRAINAGE INFRASTRUCTURE

HAPPY HILL
CAMBRIA, CALIFORNIA

FIGURE

13

Appendix F

ENVIRONMENTAL TECHNICAL MEMORANDUM

APPENDIX F

ENVIRONMENTAL TECHNICAL MEMORANDUM

DRAFT

Cambria
Community Drainage and Flood Control Project
Environmental Constraints Analysis

August 2003

Prepared for:
Raines, Melton, & Carella, Inc.
2001 North Main Street
Suite #400
Walnut Creek, California 94596

Prepared by:
Essex Environmental
637 Main Street
Half Moon Bay, California 94019

Essex Environmental
975 Osos Street
San Luis Obispo, California 93401

INTRODUCTION

In April 2003, a drainage and flood control study examined the existing drainage conditions of the Cambria community, identified problematic areas and issues, and developed conceptual solutions to the identified drainage and flood control issues. This environmental constraints analysis assesses the environmental impacts and constraints associated with the proposed alternatives to the drainage problems in the community of Cambria. Each proposed solution was examined for the biological resources, cultural resources, and land use constraints likely to be present in each given area.

PROJECT DESCRIPTION

To address the different flooding issues in the community of Cambria, several site-specific alternatives have been proposed. The project alternatives were examined in four areas of the Cambria Community:

1. Marine Terrace
2. Lodge Hill
3. Pine View
4. Park Hill

Marine Terrace

- Work in this area would include replacing the existing 24-inch storm drainpipes at Ogden Street and at the intersection of Madison Street and Ardath Street with 30-inch drainpipes. The drainpipes collect runoff from a large gully that originates near the intersection of Saint Thomas Avenue and Benson Avenue. The flow from the drainpipe continues into an open channel above Emmons Drive within a 36-inch reinforced concrete pipe, and then to Oxford Avenue.

- Work in this area would include paving Castle Street and installing a subterranean storm drain along Castle Street form Marlborough Lane west to an existing outlet at the end of Castle Street. When Avon Creek reaches Marlborough Lane, the runoff is not in a defined channel and water is directed onto Drake Street. The subterranean storm drain system would convey flows from Avon Creek west to the ocean and prevent these flows from inundating Drake Street. Rolling berms would also be installed along Castle Street to keep runoff within the street and help convey the runoff to the proposed drop inlets.

Lodge Hill

- Work in this area would include installing a subterranean storm drain system and drop inlets along Burton Drive from Ross Drive to Ardath Drive. Rolling berms would be placed along this segment of Burton Drive to keep runoff within the street and help to convey runoff to drop inlets. The storm drain would discharge through an existing outfall at Burton Creek. An energy dissipater would be placed at the outfall to prevent erosion of the creek channel.

Pine View

- Work in this area would include paving Ramsey Drive and installing drop inlets to convey runoff from upland areas, under Ramsey Drive, and discharge west of the road to Burton Creek below. Rock energy dissipaters would be placed at existing outfalls on the west side of Ramsey to avoid erosion along the steep canyon to the west. Runoff would pass through energy dissipaters and travel overland down a steep canyon into Burton Creek.

- Work in this area would include constructing roadside ditches with positive drainage along Wilton Drive to convey flows west into existing ditches and then overland into Burton Creek.

Park Hill

- Work in this area includes constructing rolling berms along either side of Dorset Street from Pembrook Drive to Nottingham Drive. A portion of the runoff would connect to an existing channel that runs from Dorset to Cambridge. Runoff downstream of the channel would connect to an existing storm near Nottingham Drive.

METHODS

Project alternatives were analyzed for environmental constraints that would prevent agency approval, increase costs (particularly for mitigation), or delay the project schedule. Existing documentation relative to each resource topic (e.g., biological resources, cultural resources, and land use) was examined to help determine the likelihood of constraints. Minor impacts discovered during the analysis are not included in this report because they can be avoided or minimized by using best management practices or by following engineering or design standards.

Biological Resources

Essex performed a site assessment with Raines, Melton, & Carella, Inc. (RMC) on June 30, 2003, to conduct a reconnaissance level review of biological resources in the project area. The assessment area included the proposed project sites and bordering areas. Each site was generally assessed for its potential to support sensitive biological and botanical resources. Information from the California Natural Diversity Database was combined with recent experience on other projects in the area to determine the potential for sensitive species and their habitat in the project areas.

Cultural Resources

Data on file in the San Luis Obispo County Department of Planning and Building was used to determine if cultural resources have been identified in each project area. No standard record searches or site visits were conducted.

Land Use

The San Luis Obispo General Plan, Estero Area Plan Update, and North Coast Planning Area Land Use Element and Local Coastal Plan were reviewed to determine if the project was

consistent with local policies. A Geographic Information System was used to examine the presence of prime farmland and farmland of local or state importance in the project area.

RESULTS

Environmental Constraints

Table 1 summarizes the environmental constraints that may be encountered for each project alternative. Based on this preliminary analysis, major environmental constraints include the potential presence of cultural resources (Marine Terrace-Castle Street), and potential impacts to threatened species habitat (Lodge Hill).

Permit Assessment

An assessment of the state and federal environmental permits that may be necessary for each project alternative is provided in Table 2. An estimate of the timeframe typically required to obtain each type of permit is summarized in Table 3. Based on the level of research performed for this analysis, all of the project alternatives would be possible to permit. Mitigation measures for work in Lodge Hill and on Castle Street in Marine Terrace would need to be implemented to reduce environmental impacts.

Potential Mitigation

Potential impacts to environmental resources may result from the proposed project alternatives. Those impacts may require implementation of mitigation measures to protect threatened species and cultural resources. Mitigation measures could include:

- Conducting preconstruction surveys for sensitive species for project alternatives in Lodge Hill
    - Monitoring during construction in locations where sensitive species habitat is found
- Implementing erosion and sediment control measures during construction in Lodge Hill
- Surface surveys, monitoring by qualified archeologist during ground disturbance, and identifying exclusion zones for cultural resources may be necessary depending on results of the record search for all project alternatives. Recovery and treatment could be required depending on findings.

Additional Studies/Surveys

The following studies/surveys will need to be performed in order to begin the permitting phase of the project:

- Habitat assessment in Lodge Hill
- Sensitive species survey in Lodge Hill
- Cultural resource record searches for all project alternatives

REFERENCES

Adair, Chris, Central Coast Regional Water Quality Control Board. Telephone communication with C. Schneebeck, Essex Environmental, July 23 and 25, 2003.

Barksdale, Pamela, State Water Resources Control Board. Telephone communication with L. Whitman, Essex Environmental, July 25, 2003.

Benedix, Dean, San Luis Obispo County. Telephone communication with L. Whitman, Essex Environmental, July 16, 2003.

Bishop, Johnathan, California Coastal Commission. Telephone communication with L. Quick, Essex Environmental, July 25, 2003.

Bishop, Johnathan, California Coastal Commission. Telephone communication with C. Schneebeck, Essex Environmental, July 28 and 31, 2003.

Bitting, Jennifer, Central Coast Regional Water Quality Control Board. Telephone communication with L. Whitman, Essex Environmental, March 18 and April 4, 2003.

California Department of Conservation, Division of Land Protection, Farmland Mapping and Monitoring Program. 2001. *GIS file of Important Farmland (agricultural land use).*

California Natural Diversity Database (CNDDB). 2003. California Natural Diversity Data Base. Natural Heritage Division. California Department of Fish and Game.

San Luis Obispo, County of. 1996. Coastal Plan Policies.

County of San Luis Obispo, 1999. San Luis Obispo County General Plan: Safety Element.

San Luis Obispo, County Department of Planning and Building. 1996. *North Coast Area Plan Final EIR* for the *San Luis Obispo County General Plan Land Use Element*.

County of San Luis Obispo – Department of Planning and Building. 2002. *North Coast Planning Area Land Use Element and Local Coastal Plan*.

Essex Environmental. 2003. Observations during field visit with RMC on July 1, 2003.

Fujimoto, Bruce, State Water Resources Control Board. Telephone communication with L. Whitman, Essex Environmental, July 25, 2003. (916) 341-5523.

F. H. Browne, Inc. 2003. Company website. Online: http://www.fxbrowne.com/html/EnviroEd/lwwmd/chapter9.pdf. Visited July 9, 2003.

Hutchinson, Mark, San Luis Obispo County. Telephone Communication with C. Schneebeck, Essex Environmental, July 31, 2003.

O'Neil, Carrie, San Luis Obispo Planning Department. Telephone communication with L. Quick, Essex Environmental, July 25, 2003.

U.S. Geological Survey. 1959. *Cambria Quadrangle, California*. 7.5-minute series Digital Raster Graphics.

Willey, Gary, San Luis Obispo County Air Pollution Control District Engineering Department. Telephone communication with L. Quick, Essex Environmental, July 24, 2003.

Table 1: Cambria Environmental Constraints

Alternatives	Biological	Cultural Resources[1]	Land Use
Marine Terrace			
Replace existing 24-inch storm drainpipes at Ogden Street and at the intersection of Madison Street and Ardath Street with 30-inch drainpipes. The drainpipes collect runoff from a large gully that originates near the intersection of Saint Thomas Avenue and Benson Avenue. The flow from the drainpipes continues into an open channel above Emmons Drive within a 36-inch reinforced concrete pipe, and then to Oxford Avenue.	None	None	None
Pave Castle Street and install subterranean storm drain along Castle Street form Marlborough Lane west to an existing outlet at the end of Castle Street. When Avon Creek reaches Marlborough Lane, the runoff is not in a defined channel and water is directed onto Drake Street. The subterranean storm drain system would convey flows from Avon Creek west to the ocean and prevent these flows from inundating Drake Street. Rolling berms would also be installed along Castle Street to keep runoff within the street and help convey the runoff to the proposed drop inlets.	None	There are numerous cultural resource sites along Castle Street. This area may have been a village site. Stone tools, chert flakes, and groundstone artifacts have been recovered on previous projects. Higher project costs may result from required surveys, monitoring, and mitigation for cultural resources. The project schedule may be delayed and project costs increased if cultural resources are found on site.	None
Lodge Hill			
Install subterranean storm drain system and drop inlets along Burton Drive from Ross Drive to Ardath Drive. Rolling berms would be placed along this segment of Burton Drive to keep runoff within the street and help to convey runoff to drop inlets. The storm drain would discharge through an existing outfall at Burton Creek. An energy dissipater would be placed at the outfall to prevent erosion of the creek channel.	Improvements to the outfall in the creek bank may affect threatened species habitat, including California red-legged frog (CRLF). Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for CRLF.	None	None
Pine View			
Pave Ramsey Drive and install drop inlets to convey runoff from upland areas beneath Ramsey Drive and discharge west into canyon above Burton Creek. Rock energy dissipaters would be placed at outfalls on the west side of Ramsey Drive to avoid erosion along the steep canyon to the west. Runoff would pass through energy dissipaters and travel overland down a steep canyon into Burton Creek.	None	None	None
Construct roadside ditches with positive drainage along Wilton Drive to convey flows west into existing ditches and then overland into Burton Creek.	None	None	None

[1] Cultural resource information was obtained solely from the San Luis Obispo County Department of Planning and Building. No standard record searches or site visits were conducted.

Alternatives	Biological	Cultural Resources[1]	Land Use
Park Hill			
Construct rolling berms along either side of Dorset Street from Pembrook Drive to Nottingham Drive. A portion of the runoff would flow into an existing channel that runs from Dorset to Cambridge. Runoff downstream of the channel would flow to an existing storm drain near Nottingham Drive.	None	None	None

Table 2: Cambria Permit Assessment

Alternative	Project Description	CEQA[1] Document	SHPO 106[2]	CDFG 1601[3]	Corps 404 Permit[4]	USFWS Section 7[5]	NMFS Section 7[6]	RWQCB 401[7]	SWRCB General Permit[8]	SWRCB Phase II SWMP[9]	CCC CDP[10]	Notes
Marine Terrace												
Replace existing 24-inch storm drainpipes at Ogden Street and at the intersection of Madison Street and Ardath Street with 30-inch drainpipes.	The drainpipes collect runoff from a large gully that originates near the intersection of Saint Thomas Avenue and Benson Avenue. The flow from the drainpipes continues into an open channel above Emmons Drive within a 36-inch reinforced concrete pipe, and then to Oxford Avenue.	Exempt (see notes)	No	No	No	No	No	No	No	Yes	Yes	The project qualifies for Class 1 CEQA categorical exemption because it involves minor alterations to existing public facilities and does not have the potential to affect sensitive resources.

[1] California Environmental Quality Act: Required if a state agency has to take action on a project; If the project does not qualify for an exemption, the compliance document is either a Negative Declaration (ND) or Mitigated Negative Declaration (MND) or an Environmental Impact Report (EIR)

[2] State Historic Preservation Office – Section 106 (Cultural resource information was obtained solely from the San Luis Obispo County Department of Planning and Building): Required if a project has the potential to impact cultural resources

[3] California Department of Fish and Game – 1601 Streambed Alteration Agreement: Required if a project has the potential to impact sensitive species or their habitat

[4] U.S. Army Corps of Engineers – 404 Permit: Required if a project involves work below the ordinary high water mark

[5] U.S. Fish and Wildlife Service – Section 7 Consultation: Required if a project has the potential to impact sensitive species or their habitat

[6] National Marine Fisheries Service – Section 7 Consultation: Required if a project has the potential to impact sensitive marine and anadromous fish species or their habitat

[7] Regional Water Quality Control Board – 401 Certification: Required if a project has the potential to discharge to surface water, ground water, or other water systems

[8] State Water Resources Control Board – National Pollutant Discharge Elimination System (NPDES) General Construction Permit: Required if a project involves ground disturbance of more than 1 acre

[9] State Water Resources Control Board – Phase II Storm Water Management Plan Revision: Required for potential discharges to surface water, ground water, or other water systems by small municipal separate storm sewer systems not covered by the Phase I program

[10] California Coastal Commission – Coastal Development Permit: Required if a project is located in the Coastal Zone or in streams that feed into the Coastal Zone

Alternative	Project Description	CEQA[1] Document	SHPO 106[2]	CDFG 1601[3]	Corps 404 Permit[4]	USFWS Section 7[5]	NMFS Section 7[6]	RWQCB 401[7]	SWRCB General Permit[8]	SWRCB Phase II SWMP[9]	CCC CDP[10]	Notes
Pave Castle Street and install subterranean storm drain along Castle Street form Marlborough Lane west to an existing outlet at the end of Castle Street.	When Avon Creek reaches Marlborough Lane the runoff is not in a defined channel and water is directed onto Drake Street. The subterranean storm drain system would convey flows from Avon Creek west to the ocean and prevent these flows from inundating Drake Street. Rolling berms would also be installed along Castle Street to keep runoff within the street and help convey the runoff to the proposed drop inlets.	ND[11] (see notes)	No	No	No	No	No	No	No	Yes	Yes	Because there is potential to affect cultural resources while installing the subterranean storm drain, a ND/MND will be required. However, since there are no federal permits required for the project, Section 106 Consultation is not triggered.
Lodge Hill												
Install subterranean storm drain system and drop inlets along Burton Drive from Ross Drive to Ardath Drive.	Rolling berms would be placed along this segment of Burton Drive to keep runoff within the street and help to convey runoff to drop inlets. Pipe would discharge through an existing outfall at Burton Creek. An energy dissipater would be placed at the outfall to prevent erosion of the creek channel.	ND (see notes)	Possibly (see notes)	Yes	Possibly (see notes)	Possibly (see notes)	No	Possibly (see notes)	No	Yes	Yes	Because the project involves the construction of new facilities and has the potential to affect sensitive species or their habitat, a ND/MND will be required. A Corps permit will be required if the improvements to the outfall are constructed below the ordinary high water mark. The Corps will consult with the USFWS if threatened/endangered species could be affected by outfall improvements and/or operation. If a Corps permit is required, a 401 Certification from the RWQCB and a Federal Consistency Determination from the Coastal Commission Consistency Office will also be required. Depending on the result of a cultural records search, Section 106 consultation may be required.

[11] Negative Declaration or Mitigated Negative Declaration: Required if projects with impacts that are less than significant or less than significant with mitigation

Alternative	Project Description	CEQA[1] Document	SHPO 106[2]	CDFG 1601[3]	Corps 404 Permit[4]	USFWS Section 7[5]	NMFS Section 7[6]	RWQCB 401[7]	SWRCB General Permit[8]	SWRCB Phase II SWMP[9]	CCC CDP[10]	Notes
Pine View												
Pave Ramsey Drive and install drop inlets to convey runoff from upland areas beneath Ramsey Drive and discharge west into canyon above Burton Creek.	Rock energy dissipaters would be placed at outfalls on the west side of Ramsey Drive to avoid erosion along the steep canyon to the west. Runoff would pass through energy dissipaters and travel overland down a steep canyon into Burton Creek.	Exempt (see notes)	No	No	No	No	No	No	No	Yes	Yes	The project qualifies for Class 1 CEQA categorical exemption because it involves minor alterations to existing public facilities and does not have the potential to affect sensitive resources.
Construct roadside ditches with positive drainage along Wilton Drive.	Roadside ditches would convey flows west into existing ditches and then overland into Burton Creek.	Exempt (see notes)	No	No	No	No	No	No	No	Yes	Yes	The project qualifies for Class 1 CEQA categorical exemption because it involves minor alterations to existing public facilities and does not have the potential to affect sensitive resources.
Park Hill												
Construct rolling berms along either side of Dorset Street from Pembrook Drive to Nottingham Drive.	A portion of the runoff would flow to an existing channel that runs from Dorset to Cambridge. Runoff downstream of the channel would flow to an existing storm drain near Nottingham Drive.	Exempt (see notes)	No	No	No	No	No	No	No	Yes	Yes	The project qualifies for Class 1 CEQA categorical exemption because it involves minor alterations to existing public facilities and does not have the potential to affect sensitive resources.

Table 3: Cambria Permitting Timeframes

Permit	Typical Timeframe* (months)	Notes
California Environmental Quality Act (CEQA)		
Exemption	< 1	
Negative Declaration/Mitigated Negative Declaration	6 - 12	
California Department of Fish and Game (CDFG) 1601 Streambed Alteration Agreement	3 - 6	CEQA must be completed before the 1601 Agreement can be issued.
U.S. Army Corps of Engineers (Corps) Section 404		
Nationwide Permit	1 - 3	Requires Section 7 and Section 106 consultations to be complete, if required.
Individual Permit	12 - 18	National Environmental Policy Act (NEPA) compliance is required, which can take one year or more.
U. S. Fish and Wildlife Service (USFWS)/ National Marine Fisheries Service (NMFS) Section 7 Consultation		
Informal	1 - 3	
Formal	6 - 12	
State Historic Preservation Office (SHPO) Section 106 Consultation	6 - 12	
Regional Water Quality Control Board (RWQCB) 401 Certification	1 - 3	CEQA must be completed before the 401 Certification can be issued.

State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Construction Permit	< 1	A Storm Water Pollution Prevention Plan (SWPPP) must be prepared prior to construction and implemented during construction.
SWRCB NPDES Phase II SWMP Modification	3 - 6	SWMP must be modified and submitted with Notice of Intent prior to construction. Due to the fact this program is so new, processing times may vary.
Coastal Commission Coastal Development Permit	4 - 6	Public controversy could delay this approval. Projects within appealable Coastal Commission jurisdiction require review at the state level. A federal consistency determination, which might further delay approval, is required for projects with federal agency involvement.

* Timeframes do not include time required to perform pre-applications studies, to prepare required applications, and to complete prerequisite approvals.

Appendix G

FUNDING TECHNICAL MEMORANDUM

APPENDIX G

FUNDING TECHNICAL MEMORANDUM

Technical Memorandum

Raines, Melton & Carella, Inc.
Consulting Engineers/Project Managers

San Luis Obispo County
Community Drainage and Flood Control Studies

Task: **Task 8 – Funding Assistance Review**

To: Mr. Dean Benedix, Project Manager, San Luis Obispo County

Prepared by: Jeffrey Tarantino, P.E.

Reviewed by: Lou Carella, P.E., Mary Grace Pawson, P.E.

Date: July 30, 2003

File: 34-9.B.8

1 Introduction

The San Luis Obispo County Flood Control and Water Conservation District ("District") has contracted with Raines, Melton, & Carella, Inc. ("RMC") to prepare six community drainage and flood control studies (the "Study"). The communities involved in the Study are Cambria, Cayucos, Nipomo, Oceano, San Miguel, and Santa Margarita. The problems in these communities include inadequate local drainage systems, unmaintained creeks, and inadequate conveyance capacity in creeks. Technical Memoranda detailing the problems for each of the communities and possible solutions are being completed as a separate task of this scope of work. This memorandum outlines funding source options and requirements for possible solutions to the six community drainage and flood problems.

The District is the designated County agency responsible for managing, planning, and maintaining drainage and flood control facilities in unincorporated public areas where no other agency has assumed an active role in such activities. The District is not responsible for funding the design and construction of private property benefiting from drainage and flood control improvements. Exceptions to this exist in established Community Services Districts (CSD's) where the CSD's may be specifically designated as authorized agencies responsible for or authorized to perform these as well as other services. Design and construction of drainage and flood control improvements is the responsibility of the local lead agency or sponsoring entity which implements the improvements on behalf of the property owners who benefit from the improvements. This policy is consistent with State subdivision development law, which requires the benefiting properties to finance property improvements.

Funding of management, planning, design, construction and maintaining drainage and flood control facilities in unincorporated areas comes from four primary sources:

- Local Community Funding: The property owners benefiting from the improvements are responsible for funding or obtaining funding for the implementation of the improvements. They are also responsible for funding annual maintenance of the system if the facilities primarily serve private property. The District Board's policy does not provide for the use of general flood control revenue, collected from all County properties, to be used to construct improvements that mainly benefit individual property owners.

- Supplemental Grant Program: Numerous Federal, State & Private grant programs exist which provide partial funding for drainage improvements, flood control and related watershed, stream and shore protection. It is the goal of these grant programs to provide supplemental funding for a community or agency for flood protection, flood mitigation and resource conservation and enhancement programs. Grant funding, if available, or establishment of loans through bonds sold through the formation of assessment districts, are examples of potential supplemental funding for implementation of drainage and flood control improvements. These programs are uniquely focused, have stringent qualifying regulations, specific procedural processing and monitoring requirements. These programs usually require a significant community funding or matching contribution.

- General Flood Control Fund Revenue: It is the District Board's adopted policy that general flood control revenue funding be used only for management, planning and non-roadway related maintenance services for drainage and flood control facilities. General flood control revenue is generated from County property taxes collected from all property in the County. This policy does not provide for the use of these funds for construction of new drainage or flood control improvements since this revenue is limited and is to be spent to benefit County areas at large.

- Road Fund Revenue: The use of Road fund revenue is restricted to roadway servicing maintenance and improvements, including drainage and flood control maintenance and roadway related improvements necessary to maintain the integrity and safety of the County road system. County Road funds are severely limited and inadequate relative to the needs of the expansive County maintained road system.

The realities of the overwhelming need for multi-million dollar funding for drainage and flood control facilities throughout the County and limited revenue sources pose a challenge to Communities to locally determine the desire and importance of the implementation of drainage infrastructure. For this reason, it is the policy of the District to encourage a local entity to serve as the lead agency (e.g. a CSD) to provide an implementation strategy and financing mechanism that is supported by the Community or area of benefit. If there is no local agency available or agreeable to assist in project implementation, the District is available to provide planning and management services for supporting community groups. However, if a community is unwilling to pay for the benefiting infrastructure, the project will not advance until funding is secured.

1.1 Technical Memorandum Objectives

The purpose of this technical memorandum (the "TM") is to provide a summary of various funding options for the projects developed as part of the Study. The selection of funding alternatives presented in this TM is based on the general types of drainage and flood mitigation projects proposed for the six communities, and is not project specific. The basic problems experienced and potential solutions for the six communities are summarized in Table 1 and fall into two categories; 1) local drainage, and 2) creek conveyance capacity.

Table 1 - Summary of Problems and Solutions

Problem	Alternative Solution
Inadequate Local Drainage	• Curb and Gutter • Percolation Basins • Storm Drain System
Overtopping of Creek Banks	• Larger Culverts • Improve Channels • Levees • Floodwalls • Vegetation Management • Increase Maintenance • Retention Basins

1.2 Recommended Funding Strategy

A community or area consensus must be established as an advocate for the installation of new drainage and flood control facilities. A local lead agency (e.g. CSD) or other sponsoring agency should be utilized to promote and sponsor the project on behalf of the supporting community. The County Flood Control District staff is available to assist if the local community supports the implementation but no local agency or sponsor is available or supportive of a project. Included in the community consensus must be the commitment to fund a significant portion of the initial costs of implementing and constructing the project. It should be recognized that the strongest applicants for leveraged grant or other supplemental funding have an established and effective local funding program. It is recognized that nearly all of the recommended project may need to seek and obtain leveraged supplemental funding from outside the local community. Additionally, the community or area must be committed to fund annual maintenance of the facilities to the extent they provide a benefit to private property. A commitment to maintenance is one way a local community can demonstrate a supportive and effective program to a potential grant program source.

After establishment of a supportive community and lead agency, the lead agency should apply for supplemental grant, loan and/or cost sharing funds through available programs outlined herein. The implementation of a project will depend on the success and continued support of the community and the success of the grant application process.

This TM is organized to outline first, the local funding options that the lead agency can establish, and second the outside Federal and State funding options that may be accessed to "match" local funding sources and help implement projects. Because the local match is critical to accessing outside funding, it is highly recommended that the lead agency begin to establish local funding mechanisms (even if these do not fully fund the recommended projects) in order to be more competitive for outside funds. The recommended local funding mechanisms include 1) grants, 2) taxes, 3) assessments, and 4) fees (property based and development impact). The creation of a local funding source, plus the potential procurement of Federal and State grants, establishes the framework for a comprehensive community funding program. This approach

also acknowledges the realistic nature of public projects that no capital improvement can rely solely on grants.

2 Local Funding

It must be recognized by communities needing and desiring drainage and flood control improvements that the area property owners obtain a significant benefit from the installation of these improvements. This benefit is partially demonstrated in the increased overall property value where drainage improvements have been installed. Likewise, in areas of flooding or areas where drainage infrastructure does not exist, the lack of this benefit is observed in reduced property value. Therefore, significant or majority funding from the property owners benefiting from the improvements is the primary funding source of such projects.

As previously discussed, the lead agency or sponsoring entity is the responsible agency for programming new drainage and flood control improvements where there is community support and potential funding resources. Existing CSD's could be responsible for drainage and flood control project implementation. However, the original LAFCo designated services of the CSD must include these powers. If these powers are not currently included within the CSD's current charter service designations, they can only be included by holding an election. It is assumed that the lead agency is the applicant and/or responsible agency for administering the funding options discussed in this section.

The lead agency has several options for acquiring funds for the community or area involved in the study. The primary avenues for collection of property owner revenue are taxes, assessments, and fees. Each of these is detailed in the following subsections.

2.1 Special Taxes

Taxes are the most common means for a government to raise revenue. An existing tax can be raised, or a new tax can be levied on residents in an area to fund flood control projects. By definition, this is a special tax requiring approval from two thirds of the electorate (residents). If approved, the revenue generated would be allocated specifically for drainage and flood control projects anywhere in the proposed improvement boundary. It would be the responsibility of the lead agency to determine where those funds would be spent.

This form of revenue requires all residents to pay the tax regardless of benefits received and the special tax formula does not need to be related to benefits received from the proposed projects. In order to establish the special tax, the lead agency would need to develop and adopt a formula; the Board of Supervisors approves placing the tax on the ballot. A special tax is approved by resident registered voters (except in the case of Mello-Roos CFD tax which can be approved by property owners in uninhabited areas). Figure 1 illustrates the special tax adoption process.

2.2 Benefit Assessments

A benefit assessment is a charge levied on a property to pay for public improvements or services that benefit the property. The difference between an assessment and a tax is that benefit assessment formula must quantify the relationship between the assessment charged and the benefit received by the property (if a property does not benefit, it cannot be assessed).

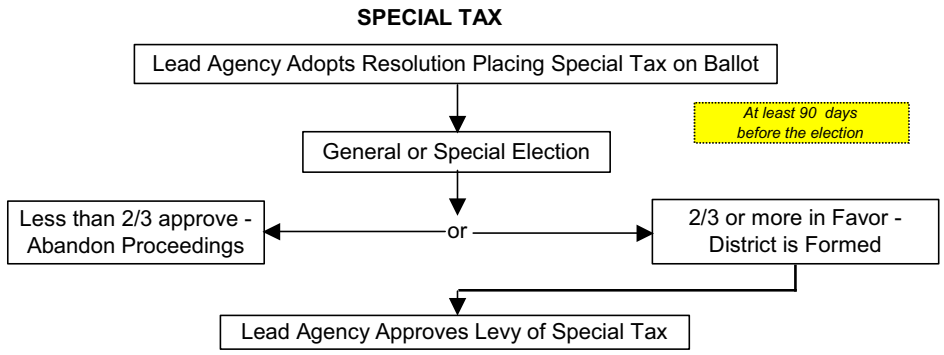


Figure 1 – Special Tax Adoption Process

All new assessments must conform to the requirements of Proposition 218, which was passed in November 1996. Proposition 218 specifically requires that property owners (not registered voters) be allowed to vote on new benefit assessments. New assessments may be approved by a simple majority approval of the property owners, with votes weighted in proportion to the assessment proposed.

In order to implement a new assessment, the lead agency must define those parcels that receive benefit and define the method of assessment in an Engineer's Report. Figure 2 illustrates the benefit assessment adoption process.

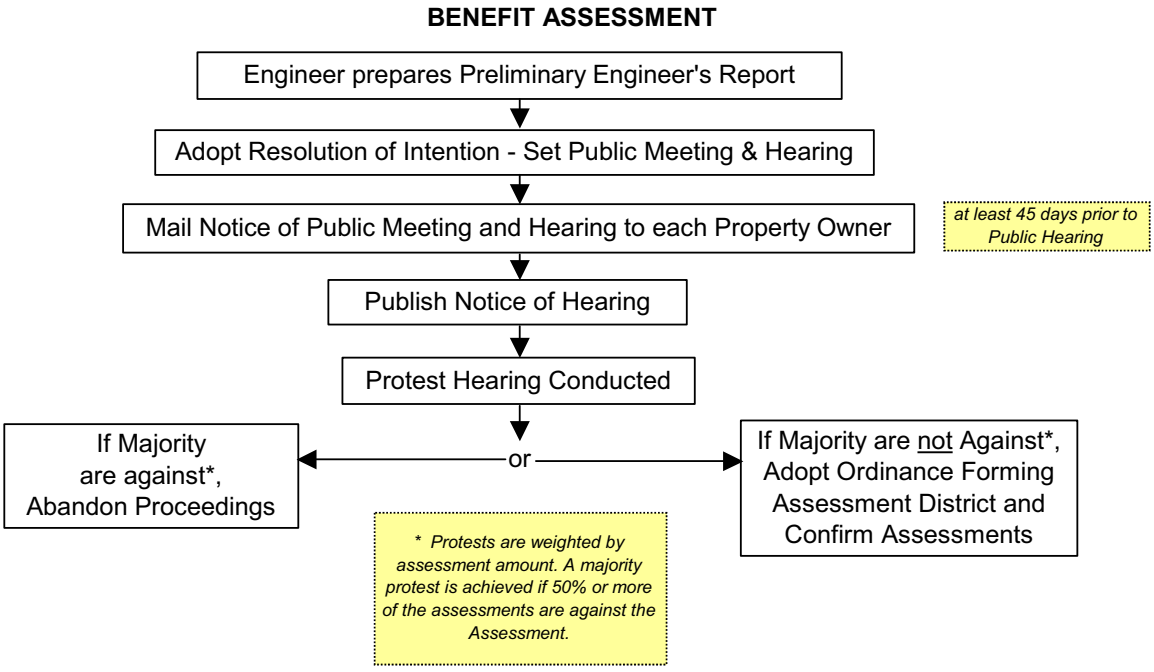


Figure 2 – Benefit Assessment Adoption Process

2.3 Property-Based Fee

A property-based user fee is a charge levied on a property to pay for public improvements or services that are used by that property. The difference between an assessment and a user fee is that assessments rely on a demonstration of special benefit (which can be hard to prove) while user's fees require demonstration of use. In the case of drainage facilities, a user fee allows a lead agency to collect revenue from properties that contribute runoff into the system but may not flood because of their location.

A user fee can be structured proportionally to the amount each parcel uses the flood control facilities rather than how much each property benefits from the services or improvements provided. This allows program costs to be spread over a larger customer base. For flood control work, user fees are typically related to impervious area on the property, which can be equated to runoff. Like the benefit assessment, a user fee may also be implemented by a 50% vote; however, before the vote may be initiated, a noticed protest hearing must take place and less than 50% written protest must be received.

In order to implement a new user fee, the lead agency must define those parcels that use the various drainage facilities and define its method of calculating a fee proportional to use. Figure 3 illustrates the user fee adoption process.

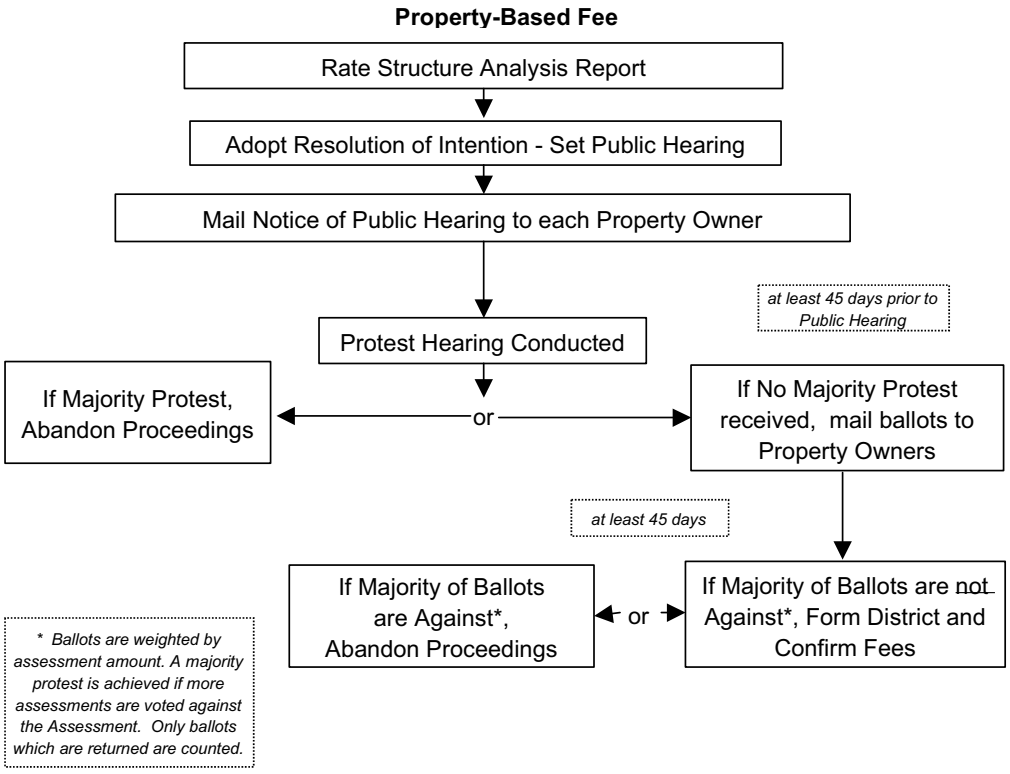


Figure 3 – Property Based Fee Adoption Process

2.4 Development Impact Fee

Government Code Section 66000 et.seq., allows the County or District to collect development fees to fund the installation of storm drain infrastructure necessary to offset the impacts of development. Development Impact Fees are tied to either General Plans or Capital Improvement Programs approved by the County or District. As regular updates of the General Plan and/or Capital Improvement Programs are prepared, additional storm drain infrastructure is identified to support the new developments and projects. The fees cannot be used to correct existing problems; although they can be used to fund a "fair share" of new projects.

Development Impact Fees are not subject to vote. They can be approved by a majority of the County Board of Supervisors or the Flood Control and Water Conservation District Board of Directors after a protest hearing. Figure 4 illustrates the adoption process.

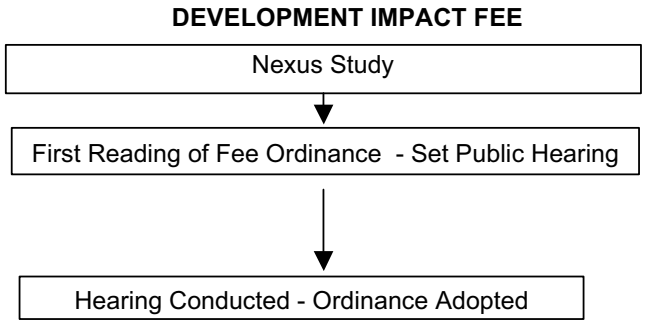


Figure 4 – Development Impact Fee Adoption Process

The County/District should implement Development Impact Fees in all the communities. The communities of Nipomo, San Miguel, and Santa Margarita would benefit from the collection of impact fees as their general plans indicate continued growth of residential and commercial properties. Cambria, Cayucos and Oceano appear built out, however, redevelopment and larger remodels (improvements that exceed a certain percentage of the current property home value) could provide the nexus for collecting impact fees.

3 Outside (Leveraged) Funding Sources from the Federal Analysis

The US Army Corps of Engineers (Corps) developed the Final Funding Program Analysis Report (FPAR) for the San Luis Obispo Creek Watershed (Report) in October 2001. The purpose of the FPAR was to inform the District of monies that might be available to fund a variety of watershed protection projects. The funding sources identified in the FPAR are included in the funding review as part of this TM. In order to not duplicate efforts, the funding sources identified in the FPAR are incorporated as part of this TM and select sections from the FPAR are included in Appendix B.

3.1 Applicable Funding Sources

Although all the funding sources identified in the FPAR relate to watershed protection, only a small number of those sources apply to the types of projects proposed by this Study. Table 2 identifies applicable funding sources described in the FPAR.

Table 2 – Applicable Funding Sources from Funding Program Analysis Report

Agency	Funding Source	Description
US Army Corps of Engineers	Flood Hazard Mitigation and Riverine Ecosystem Restoration Program	Watershed-based program focusing on providing flood protection through non-structural measures when possible
US Army Corps of Engineers	Emergency Streambank and Shoreline Erosion Protection	Allows emergency streambank and shoreline protection to prevent damage to public facilities
US Army Corps of Engineers	Section 205 Flood Control Project	Local protection from flooding by the construction of flood control works such as levees, channels, and dams.
US Army Corps of Engineers	Section 206 Aquatic Ecosystem Restoration	Carries out aquatic ecosystem restoration projects that will improve the quality of the environments.
US Army Corps of Engineers	Section 208 Snagging and Clearing	Local protection from flooding by channel clearing and excavation.
California Department of Water Resources	Urban Streams Restoration Program	Reduce damages from streambank and watershed instability and floods while restoring the environmental and aesthetic values of streams.
State Water Resources Control Board	Nonpoint Source Implementation Grant Program	Reduce erosion in channels to improve water quality through nonpoint source questions
State Water Resources Control Board	Proposition 13 Watershed Protection Program	Develop local watershed management plans and/or implement projects consistent with watershed plans

Notes:

Projects authorized under the US Army Corps of Engineers Continuing Authorities Program (CAP). The CAP provides the Corps with authority to implement small water resources projects without specific congressional authorization

3.2 Additional Requirements for Corps Funding

The Corps requires that the local sponsor[1] assist in the preparation of the planning, environmental, and design documents to ensure that the communities are involved in the project development and selection process. This requires the local sponsor to have an active role throughout the entire Corps civil works process, which can last up to seven years or more. The local sponsor is also expected to share in the cost of the project planning, design and construction (cost sharing depends on the program, but can be as high as 50 percent of the project). The local sponsor financial contribution can be in the form of in-kind service (e.g. staff time), which would offset the cash contribution requirements, but some of these costs would be in addition to the requirements defined by the Corps process. The local sponsor will incur

[1] A local sponsor is typically the local flood control agency or district responsible for programming drainage and flood control services. Local sponsors share in the cost for planning, designing and constructing a project with the Corps.

project costs that are deemed ineligible and cannot be used as part of the local sponsor financial contribution. These costs are typically project management costs incurred for administrative tasks such as management of staff, preparation of invoices, etc.

3.3 Grants

The County's planning department administers Community Development Block Grants (CDBG) on a yearly basis. This program is funded by the US Department of Housing and Urban Development (HUD) and targets low to moderate-income communities. The funding for CDBG is guaranteed each year but the level of funding varies. A detailed description of the program is included in Appendix A.

4 Additional Outside Funding Sources available through the State

In addition to the sources of funding identified in the FPAR, the State of California (State) provides funding for flood protection and erosion control projects. The California Department of Water Resources (DWR), through the Flood Protection Corridor Program (FPCP), funds watershed protection projects that have agriculture and/or wildlife benefits. For those projects that impact the California Department of Transportation (Caltrans) facilities, a standard cooperative agreement exists that can be used to share drainage project costs. The Governor's Office of Emergency Services (OES) administers grants that fund flood protection projects through the Federal Emergency Management Agency's (FEMA) Flood Mitigation Assistance (FMA) program. The State Water Resources Control Board (SWRCB) provides low interest loans for projects that address non-point source pollution through the State Revolving Fund (SRF) loans. Specifically, communities that must meet National Pollutant Discharge Elimination System (NPDES) Phase II requirements are eligible for the SRF loans. The state funding sources are summarized in Table 3 and detailed in Appendix A.

Table 3 – Additional Funding Sources

Agency	Funding Source
California Department of Water Resources	Flood Protection Corridor Program
California Department of Transportation	Cooperative Drainage Projects
Governor's Office of Emergency Services	Flood Mitigation Assistance Program
State Water Resources Control Board	State Revolving Fund Loan

The District is currently applying for assistance from FEMA through the FMA program. The District has submitted a Floodplain Management Plan (FMP) to the State of California Office of Emergency Services for approval. The FMP identifies several repetitive loss structures throughout the County to be removed from identified floodplains. As described in Appendix A, an approved FMP is required prior to applying for funds from the FMA for implementation of the proposed project. The District should continue its efforts to have the FMP approved and apply for FMA project funds to implement the proposed projects.

4.1 Typical Grant Requirements

Grants provide an opportunity for communities to reduce the total project cost that will be funded through taxes, assessments, and fees. Grant applications often require detailed information

regarding the project, the impact on the community and the environment, and project costs. Additionally, grant distributors prefer projects that provide multiple benefits including environmental restoration. Projects compete for existing funds and a majority of applications are not accepted because of this.

Once a grant is appropriated to a project, the recipient is required to complete additional paperwork including invoices, status reports, and project closeout reports. All these costs are not included as part of the grant and are the responsibility of the recipient. The costs are considered ineligible costs, not included as matching funding for project costs. These costs and application costs can be significant and need to be accounted for when preparing project budgets.

5 Additional Outside Funding Sources available through Private Sources

The FPAR identified several funding sources available through private sources. However, these programs provide funds for projects whose scope of work include environmental restoration, creation of open space, and wildlife habitat improvement projects. Projects that will be identified in the Study may not provide enough of these benefits and therefore private funding sources were removed from further consideration. In addition, the focus of these private sources is to provide funds for non-profit and tax exempt groups.

Additional private sources other than those identified in the FPAR are available for similar projects. A listing of these sources can be found on the California Watershed Database website. The website address is http://watershed.ecst.csuchico.edu/new_spin/spinmain.asp. This website provides a search engine for users to locate funding sources based on the project scope of work.

6 Funding Strategy

There are several funding opportunities available for the projects identified in the Study but the likelihood of receiving enough grant funding for all project costs is unlikely. As stated previously, the lead agency will need to fund the planning of the projects, but it is the responsibility of the community to provide permitting, environmental compliance, design and construction funding. The following case studies present example projects using a combination of funding for a sample project.

6.1 Case Study #1 – Isolated Drainage Project

For an isolated drainage project that eliminates localized ponding or street flooding through the construction of curbs and gutter, drop inlets and culverts, the benefit assessment is a logical choice. A typical funding strategy using a benefit assessment would be as follows:

- The Engineer's Report for the project would be completed by the lead agency within 3 months of start. Programming costs would be funded through the lead agency.
- Concurrently with completing the Engineer's Report, the lead agency would conduct a benefit assessment proceeding for the properties that benefit from the improvements. The benefit assessment would be in place prior to moving forward with permitting, environmental compliance, and design. The lead agency can use the assessment to secure bonds to fund construction.

- Appropriate environmental documentation is completed concurrently with the design within 9 months of start.
- Lead agency advertises project and oversees construction. Duration of the construction would be based on the magnitude of the scope, but most likely would be less than one year.
- The lead agency would continue collecting assessments on the properties until the bonds are paid off.

The total time required to complete a project under this scenario is a minimum of two years.

6.2 Case Study #2 – Comprehensive Drainage Project

For a project that includes the construction of storm drain infrastructure such as curbs and gutters, drop inlets, and storm sewer pipelines, a typical funding strategy using a benefit assessment, and if appropriate, CDBG funds would be as follows:

- An Engineer's Report for the project completed by the lead agency within 6 months of start. Programming costs would be funded through the lead agency.
- Concurrently with completing the Engineer's Report, the lead agency would conduct a benefit assessment proceeding for the properties that benefit from the improvements. The benefit assessment would be in place prior to moving forward with permitting, environmental compliance, and design. The lead agency can use the assessment to secure bonds to fund construction.
- Appropriate environmental documentation is completed concurrently with design within 12 months of start.
- Community can apply for CDBG funds, for low-income communities only, following the establishment of the user fees. Funds are distributed in August of each year and applications are typically due October of the previous year.
- Lead agency advertises project and oversees construction. Duration of the construction would be based on the magnitude of the scope and could vary between one and three years.
- The lead agency would continue collecting property based fees until the bonds are paid off.

The total time required to complete a project under this scenario is a minimum of three years.

6.3 Case Study #3 – Channel Improvements

For a project that includes work within an existing channel, a typical funding strategy using a Corps CAP agreement would be as follows:

- The lead agency, on behalf of a majority of its constituents, sends a letter to the Corps to request a CAP project.
- Corps completes a reconnaissance report to identify the problem and determine Federal interest in a project within 1 year of authorization. The benefiting constituents are not required to cost share in the preparation of the study but will be required to participate in the development through public meetings, coordination meetings with Corps staff, and review of the reconnaissance report.

- Corps completes a feasibility report and environmental document within 3 years of approval of the reconnaissance report. The benefiting constituents are required to pay for 50 percent of the total project costs as well as participate in the completion of both documents.
- Corps completes final design within 3 years of approval of the feasibility report and environmental document. The benefiting constituents are responsible for 25 percent of the project costs.
- The lead agency creates a benefit assessment district concurrently with the completion of final design. The lead agency can use the assessment to secure bonds to fund the benefiting constituents portion of the cost.
- Corps advertises and administers construction contract with construction completed between one and three years after start depending on the magnitude of the projects. The benefiting constituents are responsible for 35 percent of the construction costs.

The total time required to complete a project under this scenario is a minimum of seven years.

6.4 Case Study #4 – Drainage Facility Across Public Highway

For a project that includes construction of drainage facilities across a public highway such as Highway 1, a typical funding strategy using a property-based fee and cost sharing with Caltrans would be as follows:

- An Engineer's Report for the project would be completed by the lead agency within 6 months of start. Caltrans will require a review period for the design, which will impact the duration of the design schedule. Programming costs would be funded through the lead agency.
- Concurrently with completing the planning, the lead agency implements a property-based fee. The fee would be in place prior to proceeding with environmental documentation and design. The lead agency can use the property-based fee to secure bonds to fund construction.
- Lead agency submits a cost share agreement to Caltrans concurrently with completing design. Approval of the cost share agreement can take up to 12 months depending on the project.
- Lead agency advertises project and oversee construction. Duration of the construction would be based on the magnitude of the scope and could vary between one and three years.

The total time required to complete a project under this scenario is a minimum of three years.

7 Community Funding

Each community participating in the Study likely qualifies for one or more funding sources identified. The various funding sources identified for projects are presented in Table 4. A matrix identifying each community's problems and likely funding sources is included in

Table 5. A more detailed analysis of potential funding for each of the communities will be included with the individual community implementation strategy report that will be prepared under separate task of the agreement.

8 Conclusion/Recommendation

The study being prepared under separate task of the agreement with RMC will provide the lead agency, sponsoring agency, benefiting constituents, and/or the District with a summary of existing problems in the six communities as well as recommended solutions. This TM summarizes the various funding sources available to these entities, and the communities to implement those projects. Although several grant and cost sharing opportunities exist with various federal and state agencies, significant work is required by the lead agency and/or local sponsor to complete applications and participate in the process. In other words, these funding sources are not "free money."

Because of the effort required to apply for monies that are not guaranteed, it is recommended that the following two local funding mechanisms for projects be implemented:

- The County implement a development impact fee structure that will help assure that all new development pays fairly for its impacts.
- Subject to demonstrated community support, the lead agency should move forward with a property based fee program that assures that all users of existing drainage systems will contribute to upgrade and maintenance. Because the property based fee requires voter approval, it is recommended that the lead agency does not move forward with an election until a petition signed by more than 50% of property owners is brought to the lead agency.

Detailed recommendations for each of the communities will be included with the Study. This TM only summarizes the various sources of funding unless the funding mechanism can be implemented without a specific project scope.

The District and lead agency should continue to aggressively pursue the funding sources listed in this TM and new funding sources that may become available where communities commit themselves to support of a project. Monies received through grants and cost share can be used to offset costs born by the communities.

Table 4 – Summary of Funding Sources

Number	Agency	Funding Source
1	Community Services Districts, San Luis Obispo County Flood Control and Water Conservation District, other lead agency	Special Property Tax
2	Community Services Districts, San Luis Obispo County Flood Control and Water Conservation District, other lead agency	Benefit Assessment
3	Community Services Districts, San Luis Obispo County Flood Control and Water Conservation District, other lead agency	Property Fee
4	County of San Luis Obispo and/or San Luis Obispo County Flood Control and Water Conservation District	Development Fee
5	County of San Luis Obispo	Community Development Block Grants
6	US Army Corps of Engineers	Flood Hazard Mitigation and Riverine Ecosystem Restoration Program
7	US Army Corps of Engineers	Emergency Streambank and Shoreline Erosion Protection
8	US Army Corps of Engineers	Section 205 Flood Control Project
9	US Army Corps of Engineers	Section 206 Aquatic Ecosystem Restoration
10	US Army Corps of Engineers	Section 208 Snagging and Clearing
11	California Department of Water Resources	Urban Streams Restoration Program
12	California Department of Water Resources	Flood Protection Corridor Program
13	California Department of Transportation	Cooperative Agreement
14	State Water Resources Control Board	Nonpoint Source Implementation Grant Program
15	State Water Resources Control Board	Proposition 13 Watershed Protection Program
16	State Water Resources Control Board	State Revolving Fund Loan
17	Governor's Office of Emergency Services	FEMA Flood Mitigation Assistance Program

Community	Problems	Funding Sources from Table 4																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Cambria	1. Local Drainage	L	H	M	H												H	M
Cayucos	1. Overtopping of Cayucos Creek	L	H	M	H		L	L	L	L	L	L			L	L		M
	2. Local Drainage	L	H	M	H													M
Nipomo	1. Old Town Nipomo in Floodplain	L	H	M	H	M	L	L	L	L	L	L	L		L	L		M
	Local Drainage	L	H	M	H												H	M
Oceano	1. Local Drainage	L	H	M	H	M	L							M			H	M
San Miguel	1. Local Drainage	L	H	M	H	M	L											M
Santa Margarita	1. Overtopping of Santa Margarita and Yerba Buena Creek	L	H	M	H		L	L	L	L	L	L	L	L	L	L		M
	2. Local Drainage	L	H	M	H													M

Legend

H - High opportunity for success
M - Moderate opportunity for success
L - Low opportunity for success

Notes

1. Where no opportunity for success designation is listed, it is not considered likely that the listed funding option would be applicable

Table 5 – Summary of Funding Options

Appendix A
Potential Grant and Loan Programs

(1) Community Development Block Grants

Overview

The County's planning department administers Community Development Block Grants (CDBG) on a yearly basis. This program is funded by the US Department of Housing and Urban Development (HUD) and targets low to moderate income communities. The funding for CDBG is guaranteed each year but the level of funding varies.

CDBG funds can be used for any community development activity such as acquisition of real property, affordable housing activities, construction or rehabilitation of public facilities and improvements, clearance and demolition of buildings, provision of certain types of public services, relocation payments and assistance, removal of architectural barriers, housing rehabilitation, special economic development activities, planning studies and grant administration. A community must meet one of the three national objectives to be eligible for the funding:

- 51% or more of the community households must have incomes below 80% of the County median; or
- The project must aid in the prevention or elimination of slums or blight; or
- The project must address urgent needs that pose a serious, immediate threat to the public health or welfare.

Application Deadline(s)

October of each year

Assistance Provided

The CDBG funds can be used for planning, design, or construction of a project, however, the County planning department's preference is that a project have plans and specifications completed prior to paying out funds. The County is required to report on spending of CDBG funds on an annual basis and therefore most projects that receive CDBG funds are construction projects because funds are more likely to be expended within a year of appropriation. Applications are ranked based on the following criteria:

- Consistency with federal regulations and laws
- Community support
- Seriousness of community development need proposed to be addressed by project
- Degree to which project benefits low-income and very low-income families or persons
- Feasibility of the project to be completed as budgeted within 18 months of appropriation
- Cost effectiveness of funds requested and leveraging of other funds
- Organization's experience or knowledge regarding CDBG requirements

Funding Level	There is no cap on grant application but the County is allocated approximately $500,000 on an average year from HUD for projects similar to those identified in the study. While matching funds are not required; the County and HUD looks most favorably on projects with a matching fund component.	
Legislative Authority	Title I of the Housing and Community Development Act of 1974, Public Law 93-383, as amended	
Contacts	Address:	County of San Luis Obispo Department of Planning and Building County Government Center San Luis Obispo, CA 93408
	Telephone:	(805) 781-5787
	Internet:	http://www.co.slo.ca.us

(2) Flood Protection Corridor Program

Overview

The Flood Protection Corridor Program (FPCP) was established when California voters passed Proposition 13, the "Safe Drinking Water, Watershed Protection and Flood Protection Act" in March of 2000. The FPCP authorized bond sales of $70 million for primarily nonstructural flood management projects that include wildlife habitat enhancement and/or agricultural land preservation. Of the $70 million, approximately $5 million will go to educational programs and administrative costs. Another $5 million was earmarked by the Legislation for the City of Santee, leaving approximately $60 million for flood corridor protection projects throughout the state.

Application Deadline(s)

February of each year

Assistance Provided

The Flood Protection Corridor Program grant can be used for projects that include:

- Non-structural flood damage reduction projects within flood corridors,
- Acquisition of real property or easements in a floodplain,
- Setting back existing flood control levees or strengthening or modifying existing levees in conjunction with levee setbacks,
- Preserving or enhancing flood-compatible agricultural use of the real property,
- Preserving or enhancing wildlife values of the real property through restoration of habitat compatible with seasonal flooding,
- Repairing breaches in the flood control systems, water diversion facilities, or flood control facilities damaged by a project developed pursuant to Chapter 5, Article 2.5 of the Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection Act of 2000,
- Establishing a trust fund for up to 20 percent of the money paid for acquisition for the purpose of generating interest to maintain the acquired lands,
- Paying the costs associated with the administration of the projects.

The project location must also be located at least partially in:

- A FEMA Special Flood Hazard Area (SFHA), or
- An area that would be inundated if the project were completed and an adjacent FEMA SFHA were inundated, or
- A FEMA SFHA, which is determined by using the detailed methods identified in FEMA Publication 37, published in January 1995, titled “Flood Insurance Study Guidelines and Specifications for Study Contractors”, or

- A floodplain designated by The Reclamation Board under Water Code Section 8402(f) *[Title 23, California Code of Regulations, Division 2, Section 497.5(a)],* or a
- Locally designated Flood Hazard Area, with credible hydrologic data to support designation of at least one in 100 annual probability of flood risk. This is applicable to locations without levees, or where existing levees can be set back, breached, or removed. In the latter case, levee setbacks, removal, or breaching to allow inundation of the floodplain should be part of the project.

Funding Level

A grant cap of $5 million per project has been established, however, exceptional projects requesting funding greater than the established cap will be considered on a case-by-case basis.

Legislative Authority

Division 26, Section 79000 Safe Drinking Water, Clean Water, Watershed Protection, and Flood Protection Act

Contacts

Address: Flood Protection Corridor Program
Department of Water Resources, Division of Flood Management
1416 Ninth Street, Room 1641
Sacramento, CA 95814
Telephone: (916) 654-3620
Internet: http://www.dfm.water.ca.gov/fpcp/

(3) Cooperative Agreement

Overview

The California Department of Transportation (Caltrans) has established a process for cost sharing of drainage projects being implemented by a local agency that will benefit Caltrans facilities.

Application Deadline(s)

None

Assistance Provided

Caltrans has established a process for cost sharing of planning, design, and construction of drainage projects. The process for applying for a Cooperative Agreement is detailed in the Cooperative Agreement Manual.

Funding Level

The cost to Caltrans is based on the benefit received from the project.

Legislative Authority

Streets and Highways Code Sections 114 and 130

Contacts

Address: California Department of Transportation, District 5
50 Higuera Street
San Luis Obispo, CA 93401-5415
Telephone: (805) 549-3111
Internet: http://www.dot.ca.gov/hq/oppd/coop/cooptoc.html

(4) Flood Mitigation Assistance

Overview

FEMA provides funds on a yearly basis for each of the states to administer FMA grants. In California, the Governor's Office of Emergency Services administers these grants. The purpose of these grants is to provide local communities with funds to alleviate reoccurring flooding problems and to reduce claims on the National Flood Insurance Fund (NFIF). There are three types of grants available:

- FMA Planning Grants
- FMA Project Grants
- FMA Technical Assistance Grants

All projects that address flooding issues for areas within a Special Flood Hazard Area (SFHA)[2] are eligible for both FMA Planning and Project grants. In order to receive a FMA Project grant to implement a project to reduce flood losses, a Flood Mitigation Plan (FMP) must be completed by the lead agency and approved by FEMA. The FMA Planning Grant can be used to fund the completion of the FMP.

Application Deadline(s)

None

Assistance Provided

Prior to proceeding with a FMA Project Grant application, the grant applicant must document the flooding problem with the FMP. In addition to describing the flooding problem, the following information is included in the FMP:

- Public involvement
- Coordination with other agencies or organizations
- Flood hazard area inventory
- Review of possible mitigation actions
- State or local adoption following a public hearing
- Actions necessary to implement plan

Following the approval of the FMP, the grant applicant can apply for a FMA Project Grant. This grant is used to implement the specific project identified in the FMP including property acquisition, modification of existing culverts/bridges, elevation of National Flood Insurance Program (NFIP) insured structures, or relocation of NFIP insured structures.

The project must also meet five basic requirements to receive funding:

- Be cost effective – Project costs cannot exceed expected benefits
- Conform with applicable Federal, State, and Executive Orders
- Be technically feasible

[2] Any area within the 100-year flood plain as defined by FEMA is within a SFHA.

- Conform with the FMP
- Be located physically in a participating NFIP community that is not on probation, or benefit such a community directly by reducing future flood damages

Funding Level

- The applicant is responsible for 25% of the costs associated with each grant. The applicant can utilize in-kind services to fund half the applicant's fiscal responsibility. Examples of in-kind services include County staff time, volunteer work, donated supplies, and donated equipment.
- An applicant may receive only one FMA Planning Grant for a maximum of $50,000 in any given five year period.
- An applicant may receive multiple FMA Project Grants but the maximum total of all grants cannot exceed $3.3 million over a five-year period. The $3.3 million value includes monies received from a FMA Planning Grant.

Legislative Authority National Flood Insurance Reform Act of 1994 (NFIRA), Sections 1366 and 1367 (42 U.S.C. 4101)

Contacts

Address:	Governor's Office of Emergency Services P.O. Box 419047 Rancho Cordova, CA 95741-9047
Telephone:	(916) 845-8150
Internet:	http://www.oes.ca.gov http://www.fema.gov/fima/planfma.shtm (Copy of FEMA's Flood Mitigation Assistance Guidance)

(5) SWRCB Revolving Loan Program

Overview

Low interest loans to address water quality problems associated with discharges from wastewater and water reclamation facilities, as well as from nonpoint source discharges and for estuary enhancement.

Application Deadline(s)

Final adoption of State priority list for next State fiscal year in June

Assistance Provided

The purpose of the loan is to assist agencies and local communities meet water quality standards set forth by the Federal Clean Water Act. The loan is for projects associated with discharge from wastewater and water reclamation facilities, as well as from nonpoint sources to conform with NPDES requirements.

Funding Level

The interest rate on an SRF loan is 50% of the interest rate on the most recently sold general obligation bond. The maximum amortization period is 20 years. Loans may cover up to 100% of the cost of planning, design, and construction of NPS pollution control structures and 100% of NPS pollution control programs. The borrower will begin making annual repayments of principal and interest one year after the first disbursement of loan funds.

Legislative Authority

Federal Clean Water Act

Contacts

Address: State Water Resources Control Board
Division of Financial Assistance
1001 I Street, 16th Floor
Sacramento, CA 95814
Contact: Jeff Albrecht

Telephone: (916) 341-5717

Internet: http://www.swrcb.ca.gov/funding/

Appendix B

Excerpts from the San Luis Obispo Creek Watershed, San Luis Obispo County, California, Final Funding Program Analysis Report Prepared by the US Army Corps of Engineers, Los Angeles District October 2001

(1) Continuing Authorities Programs

Overview

Congress has provided the Corps with a number of standing authorities to study and build water resources projects for various purposes, and with specified limits on Federal money spent for a project.

Application Deadline(s)

Specific congressional authorization is not needed

Assistance Provided

- Flood Control Projects – Local protection from flooding by the construction or improvement of flood control works such as levees, channels, and dams. Non-structural alternatives are also considered
- Emergency Streambank and shoreline Erosion – Allows emergency streambank and shoreline protection to prevent damage to public facilities, e.g., roads, bridges, hospitals, schools, and water/sewage treatment plants
- Snagging and Clearing for Flood Control – Local protection from flooding by channel clearing and excavation, with limited embankment construction by use of materials from the clearing operations only.
- Aquatic Ecosystem Restoration – Carries out aquatic ecosystem restoration projects that will improve the quality of the environment, are in the public interest, and are cost effective

Funding Level

- Flood Control Projects - Federal share may not exceed $7 million for each project. Required non-Federal match: 50 percent of the cost of the project for structural measures and 35 percent of the cost of the project for nonstructural measures.
- Emergency Streambank and Shoreline Restoration - Federal share may not exceed $1 million for each project. Non-Federal share of total project costs is at least 25 percent.
- Snagging and Clearing for Flood Control – Federal share may not exceed $500,000 for each project. Required 50 percent non-Federal match including all costs in excess of the Federal cost limitation.
- Aquatic Ecosystem Restoration – Federal share is limited to $5 million. The non-Federal share is 35 percent (including studies, plans and specifications, and construction).

Legislative Authority

- Flood Control Projects – Section 205 of the 1948 Flood Control Act (FCA), as amended
- Emergency Streambank and Shoreline Restoration – Section 14, 1946 FCA, as amended
- Snagging and Clearing for Flood Control – Section 208, 1954 FCA, as amended
- Aquatic Ecosystem Restoration – Section 206, Water Resources Development Act (WRDA) of 1996

Contacts

Address:	US Army Engineer District, Los Angeles PO Box 2711 Los Angeles, CA 90053-2325
Telephone:	(213) 452-5300
Internet:	http://www.spl.usace.army.mil/

(2) Flood Hazard Mitigation and Riverine Restoration Program

Overview Informally known as "Challenge 21," this watershed-based program focuses on identifying sustainable solution to flooding problems by examining nonstructural solutions in flood-prone areas, while retaining traditional measures where appropriate. Eligible projects will meet the dual purpose of flood hazard mitigation and riverine ecosystem restoration.

Application Deadline(s) Undetermined

Assistance Provided Projects include the relocation of threatened structures, conservation or restoration of wetlands and natural floodwater storage areas, and planning for responses to potential future floods.

Funding Level The non-Federal sponsor is required to provide 50 percent for the studies and 35% for project implementation, up to a maximum Federal allocation of $300 million.

- FY2003 through FY2005 - $50 million for each FY

Legislative Authority Section 212 WRDA 1999

Contacts

Address: US Army Engineer District, Los Angeles
PO Box 2711
Los Angeles, CA 90053-2325
Telephone: (213) 452-5300
Internet: http://www.spl.usace.army.mil/

(3) Urban Streams Restoration Program – Proposition 13

Overview

The objectives of this program is to assist communities in reducing damages from streambank and watershed instability and floods while restoring the environmental and aesthetic values of streams, and to encourage stewardship and maintenance of streams by the community. Objectives of the program are met by providing local governments and citizen's groups with small grants and technical assistance for restoration projects, to encourage all segments of local communities to value natural streams as an amenity, and to educate citizens about the value and processes taking place in natural streams.

Application Deadline(s)

To Be Determined

Assistance Provided

This program supports actions that:

- Prevent property damage caused by flooding and bank erosion
- Restore the natural value of streams; and
- Promote community stewardship

Funding Level

Grants can fund projects as simple as a volunteer workday to clean up neighborhood steams, or projects as complex as complete restoration of a streams to its original, natural state.

- The Department is in the process of amending the regulations for the program, including raising the grant cap from $200,000 to $1 million
- All potential projects must have two sponsors: a local agency and a community group.

Legislative Authority

- Stream Restoration and Flood Control Act of 1984
- Costa-Machado Water Bond Act of 2000

Contacts

Address: California Department of Water Resources
Urban Streams Restoration program
Attn: Earle Cummings
PO Box 942836
Sacramento, CA 94236-0001
Telephone: (916) 327-1656
Internet: http://wwwdpla.water.ca.gov/environment/habitat/stream/

(4) Proposition 13 Watershed Protection Program

Overview

This program provides grants to municipalities, local agencies, or nonprofit organizations to develop local watershed management plans and/or implement projects consistent with watershed plans.

Application Deadline(s)

To Be Determined

Assistance Provided

Grants may be awarded for projects that implement methods for attaining watershed improvements or for a monitoring program described in a local watershed management plan in an amount not to exceed five million dollars ($5,000,000) per project. At least 85 percent of the total amount in the sub account shall be used for capital outlay projects.

Eligible projects under this article may do any of the following:

- Reduce chronic flooding problems or control water velocity and volume using vegetation management or other nonstructural methods.
- Protect and enhance greenbelts and riparian and wetlands habitats.
- Restore or improve habitat for aquatic or terrestrial species.
- Monitor the water quality conditions and assess the environmental health of the watershed.
- Use geographic information systems to display and manage the environmental data describing the watershed.
- Prevent watershed soil erosion and sedimentation of surface waters.
- Support beneficial groundwater recharge capabilities.
- Otherwise reduce the discharge of pollutants to state waters from storm water or nonpoint sources.

Funding Level

Minimum request of $50,000 and maximum of $5 million

Legislative Authority

Costa-Machado Water Act of 2000

Contacts

Address: Proposition 13 Grant Program – Phase II
Attn: Bill Campbell, Chief
Watershed Project Support Section
Division of Water Quality
State Water Resources Control Board
1001 I Street, 15th Floor
Sacramento, CA 95814

Telephone: (916) 341-5250

Internet: http://www.swrcb.ca.gov/prop13/index.html

(5) Nonpoint Source Pollution Control Program

Overview

The purpose of the NPS Pollution Control Program is "to provide grant funding for projects that protect the beneficial uses of water throughout the State through the control of nonpoint source pollution."

Application Deadline(s)

To Be Determined

Assistance Provided

Grants shall only be awarded for any of the following projects:

- A project that is consistent with local watershed management plans that are developed under subdivision (d) of Section 79080 and with regional water quality control plans.
- A broad-based nonpoint source project, including a project identified in the board's "Initiatives in NPS Management," dated September 1995, and nonpoint source technical advisory committee reports.
- A project that is consistent with the "Integrated Plan for Implementation of the Watershed Management Initiative" prepared by the board and the regional boards.
- A project that implements management measures and practices or other needed projects identified by the board pursuant to its nonpoint source pollution control program's 15-year implementation strategy and five-year implementation plan that meets the requirements of Section 6217(g) of the federal Coastal Zone Act Reauthorization Amendments of 1990.
- The projects funded from the sub account shall demonstrate a capability of sustaining water quality benefits for a period of 20 years. Projects shall have defined water quality or beneficial use goals.

Funding Level

Minimum request of $50,000 and maximum of $5 million

Legislative Authority

Costa-Machado Water Act of 2000

Contacts

Address: Proposition 13 Grant Program – Phase II
Attn: Bill Campbell, Chief
Watershed Project Support Section
Division of Water Quality
State Water Resources Control Board
1001 I Street, 15th Floor
Sacramento, CA 95814

Telephone: (916) 341-5250

Internet: http://www.swrcb.ca.gov/prop13/index.html

Appendix H

RESPONSE TO COMMENTS

APPENDIX H

RESPONSE TO COMMENTS

Comment 1: The Cambria Community Services District (CCSD) is not prepared to take the lead agency role in this project. We have neither the resources nor the capability to undertake such responsibility.

Response 1: Chapter 6 revised to indicate that the CCSD's formal position is not to take on the lead agency role for the proposed projects.

Comment 2: There appears to be no investigation into the use of pervious pavement systems in the report. As you are aware, traditional non-permeable surfaces such as asphalt and concrete promote run-off which increases erosion and flood potential. At the least, pervious pavement systems should be considered for parking lots, driveways and low-traffic public roadways. There are several such systems being marketed to replace traditional surfacing technology.

Response 2: Section 3.7.1.2 includes various concepts for minimizing storm runoff from homes and other impervious surfaces. One of the recommendations was the installation of porous pavers in place of concrete or asphalt for walkways, driveways and patios.

Comments 3: Recommendation 3.7.1.1 is difficult to understand. It is likely that 50% or more of the vacant lots in Cambria are on the down-hill side of the road. While the first part of the recommendation states "that the floor and garage elevations for all new home construction be one foot greater than the adjoining street grade", the second contradicts that language by addressing "all driveways/accesses to structures which are below the edge of pavement". Further, a larger number of streets in Cambria are not paved.

Response 3: Paragraph revised to clarify that the installation of a County standard mountable berm is intended for existing homes.

Comment 4: Appendix A, Figure 4: We found no recommendations regarding work to be done in the easement between Drake and Orlando (Avon Creek). This is a source of heavy erosion and the planned improvements above this site will increase the rate and volume of runoff through this area. This will not only cause additional erosion, but threaten underground utilities located adjacent to the creek bed. In-stream work must be included in the project to slow the flow of the run-off and protect existing infrastructure.

Response 4: The County or District does not possess a drainage easement between Drake and Orlando. Avon Creek, as shown in Photograph 2 in Appendix B, flows in private property between residences. This is a natural steeply sloping gulley with apparent capacity to convey periodic storm runoff without overtopping. The creek continues to flow between residences downstream of Marlborough. Proposed Project 2 addresses this flooding by proposing to convey flow from Avon Creek underground in a storm drain in Castle Street. An optional storm drain is proposed within private property upstream of Marlborough to convey flows from Madison.

Comment 5: Appendix A, Figure 6: Burton Creek, also known as Fern Canyon, has experienced significant erosion in the past. Water and sewer utilities are located under the ground at this location and have needed replacement and/or stabilization in the past due to the erosion caused by storm drainage. Again, increased channeling of run-off from above this site will cause an increase in the threat to water and sewer infrastructure. The plan should review, evaluate and recommend actions to address the downstream effect of proposed drainage improvements.

Response 5: It is assumed that the location referred to in the comment is the intersection of Ardath and Burton. Proposed Project 5 which recommends installing a storm drain in Burton Drive from Orville Avenue to Ardath Drive would mitigate flooding along Burton Drive. An energy

dissipater placed at the outfall is recommended to prevent erosion. The text has been revised to draw attention to existing utilities at this location and the possibility of armoring the area to prevent further damage to the utilities.

Scope and budget constraints limited the study to the development of conceptual solutions to the drainage and flooding problems. If any of the projects proceed to design, then the effects to existing utilities or capacities of downstream facilities should be evaluated. Section 3.6 was revised to qualify the need for a utility investigation and cumulative impacts analysis during the design phase.

Comment 6: Appendix A, Figure 8: There does not appear to be any improvements planned for the storm drainage that occurs from the Cambria Pines Lodge to the west and down Piney Way. This area has experienced significant erosion in the past, caused by structured culverts discharging into the natural canyon with no energy absorption. District (CCSD) facilities (sewer and water pipes) in this location have been washed out on several occasions as a result of high volume and high velocity storm run-off from up-stream urban run-off. Steps need to be incorporated in the project to protect these facilities and to reduce the environmental impacts of siltation in Santa Rosa Creek.

Response 6: Section 3.6.5.4 of the report discusses the measures implemented by the Cambria Pines Lodge to control drainage, reduce runoff and improve storm runoff water quality. If runoff from the lodge contributed to erosion problems in the canyon downstream of Piney Way, then these efforts implemented by the lodge should improve the conditions. Reports on erosion on Piney Way were not received during the community questionnaire period or in any subsequent discussions and presentations made to the North Coast Advisory Council. A rock energy dissipater, similar to that proposed in Project 11 for Ramsey Street, would reduce the velocity of runoff discharged down the canyon and would minimize further erosion. Additional recommendations described in Section 3.7.1.2 will reduce runoff from pervious surfaces that cause erosion and the subsequent siltation in creek bodies.

Comment 7: Appendix A, Figure 11: It appears that the planned culvert pipe, to be placed in project 16, delivers water to a flat area of heavy vegetation (willows) to the immediate west of Heath Lane. Due to past siltation on the North side of Windsor Boulevard., the water directed to this point has not exit opportunity, except to flood Windsor Boulevard. The plan needs to address drainage improvements on the north side of Windsor by allowing storm run-off to enter the creek, or by developing a storm channel parallel to the recently constructed Cross Town Trail segment to deliver water to the creek near the Windsor Bridge.

Response 7: The location of the planned culvert pipe on Pembrook and outlet on Windsor was revised to the mid block area. This proposed project does not change existing drainage patterns or conditions, just reduces the Pembrook flooding problem. Developing improvements to address flooding at the Windsor Bridge crossing was specifically excluded from the report. The capacity of Windsor Boulevard was not evaluated since it was assumed that Windsor has a standard minimum street capacity or there are existing flooding problems due to the bridge flooding, specifically excluded from this study. Further analysis of flooding along this area was determined to be beyond the scope of this study since it is related to the Windsor Bridge problem and conditions. Maintenance of the Santa Rosa Creek channel is required to remove sediment accumulated over the years, however, these projects have become increasingly difficult and complex to permit with the resource agencies.

Comment 8: Appendix A, Figure 11: The current drainage pathway from Plymouth to Heath Lane, behind the District (CCSD) facilities on Heath Lane, is experiencing significant erosion. The District

(CCSD) has, over the years, removed hundreds of yards of silt material that has been deposited at the bottom of this canyon in order to protect the CCSD Wastewater Treatment Plant from damage. The drainage improvements planned upstream from this location will increase the volume and velocity of storm water, causing a greater erosion problem and increasing the threat to CCSD facilities, as well as increasing siltation in Santa Rosa Creek. The project must incorporate methods to address these impacts, especially as they may impact threatened and endangered species in Santa Rosa Creek.

Response 8: The proposed projects for the Park Hill district will not increase flow to the existing culvert on Plymouth near Pembrook. Evaluation of topographic maps indicate that this existing culvert directs runoff collected from the existing curb/berm section of Plymouth (east of Pembrook) to the gully that runs down the hillside towards the CCSD wastewater treatment plant. The projects proposed for Park Hill are located in a different sub-watershed and will therefore not increase the amount of runoff down the gully.

A permanent solution to the hillside erosion problem would be the construction of a storm drain that conveys runoff to the base of the hill, where an energy dissipater would be constructed. The runoff would be directed towards an existing open channel along Windsor Boulevard. The pipe should be anchored on the surface using standard Caltrans designs. This project will not be included in the report since the road below this historic ravine is not flooded by the runoff.

Comment 9: Appendix A, Figure 13: Although the recent surfacing on Ashby Lane has addressed some of the drainage problems that exist at this location, a major problem remains with the drainage leaving Ashby and traveling downstream to Canterbury. We recommend that the project add a culvert pipe from Ashby to Canterbury to prevent erosion and future damage to private property in the area.

Response 9: It is unclear from the comment where the runoff from Ashby Lane is causing an erosion problem on Canterbury. Review of topographic maps indicates that the terrain from Canterbury to Ashby Lane is very steep, with a change in elevation of about 20 feet over a distance of about 150 feet (approximately 13 percent slope). Runoff from private residences along Ashby Lane not directed towards the public right-of-way is likely flowing down the hillside towards the homes along Canterbury. If runoff from Ashby Lane is concentrating and discharging down the hillside to Canterbury Lane, then a possible project would be to construct a drain inlet and culvert near the intersection of Ashby and Sunbury Avenue to direct flow down the gully east of Sunbury. However, it is unclear from the comment whether the runoff is from the homes along the south side of Ashby Lane or from the street itself.

Project 18 proposes the installation of berms along the south side of Canterbury Lane and an underground storm drain to convey flow from Canterbury to a gully below the street. The proposed berms would keep runoff from flowing down gradient into homes on the southside of Canterbury Lane.

Comment 10: Appendix G, Funding Technical Memorandum: There is no mention of the funds collected by the County over the past several years through the Lodge Hill Erosion Mitigation Fund. The final report should identify the amount of money collected by this fund, including interest accrued, the current status of the fund, and an accounting of any expenditures from the fund in the past. It has been suggested that this fee is still being collected. In order to develop support for the proposed project and to overcome criticism of the use of dedicated public funds, a full explanation of the status of this fund is recommended.

Response 10: The Funding Technical Memorandum was intended to be applied to each of the six communities studied in this project. Unique funding circumstances for an individual community were to be included in Chapter 5 of the report. Section 5.2.3.5 of the draft report included a paragraph recommending the use of developer fees collected from Lodge Hill area residents by the County Planning Department to pay for drainage improvements.

Comment 11: The Cambria Community Services District supports the intention of the County in addressing drainage and flood control issues in Cambria. We are concerned, however, that more attention needs to be paid to the downstream effects of certain improvements where increased volume of water, at greater velocity, is likely to result from the current design. We are particularly concerned about the potential impact that may occur on existing water and wastewater infrastructure. The plan should identify the location of all current public facilities and infrastructure and determine the best method to protect these public assets from future damage by storm drainage or flood.

Response 11: A utility investigation that located all existing utilities, such as water, sewer, gas and telephone lines, was beyond the scope of this project. The lack of a drainage district and the inconsistent placement of drainage facilities in Cambria made the identification of all existing drainage facilities in public right-of-way and private property a difficult task. Evaluating the downstream effects of the proposed project on existing utilities is better accomplished during the design phase when greater focus can be paid to one of the proposed projects. If the concentration and increase of flow created by paving, berming and installing a storm drain causes damage to downstream facilities such as water and sewer lines, and if downstream culverts lack the capacity to convey the increased flow, then work completed during the design phase will identify and mitigate for these impacts.

Comment 12: It should be noted that several of the roadways recommended for surfacing in the report are of substandard width or grade and do not meet the minimum requirements of the California Fire Code for an approved fire access roadway. Post incident analysis of almost every disasterous wildland fire in California has indicated that one of the major inhibitors to effective fire protection is the existence of sub-standard roadways. The plan should include steps to bring these roadways into compliance if they are going to be improved as suggested. It makes little sense to go to the effort of surfacing if the results of the project leave a remaining substandard street.

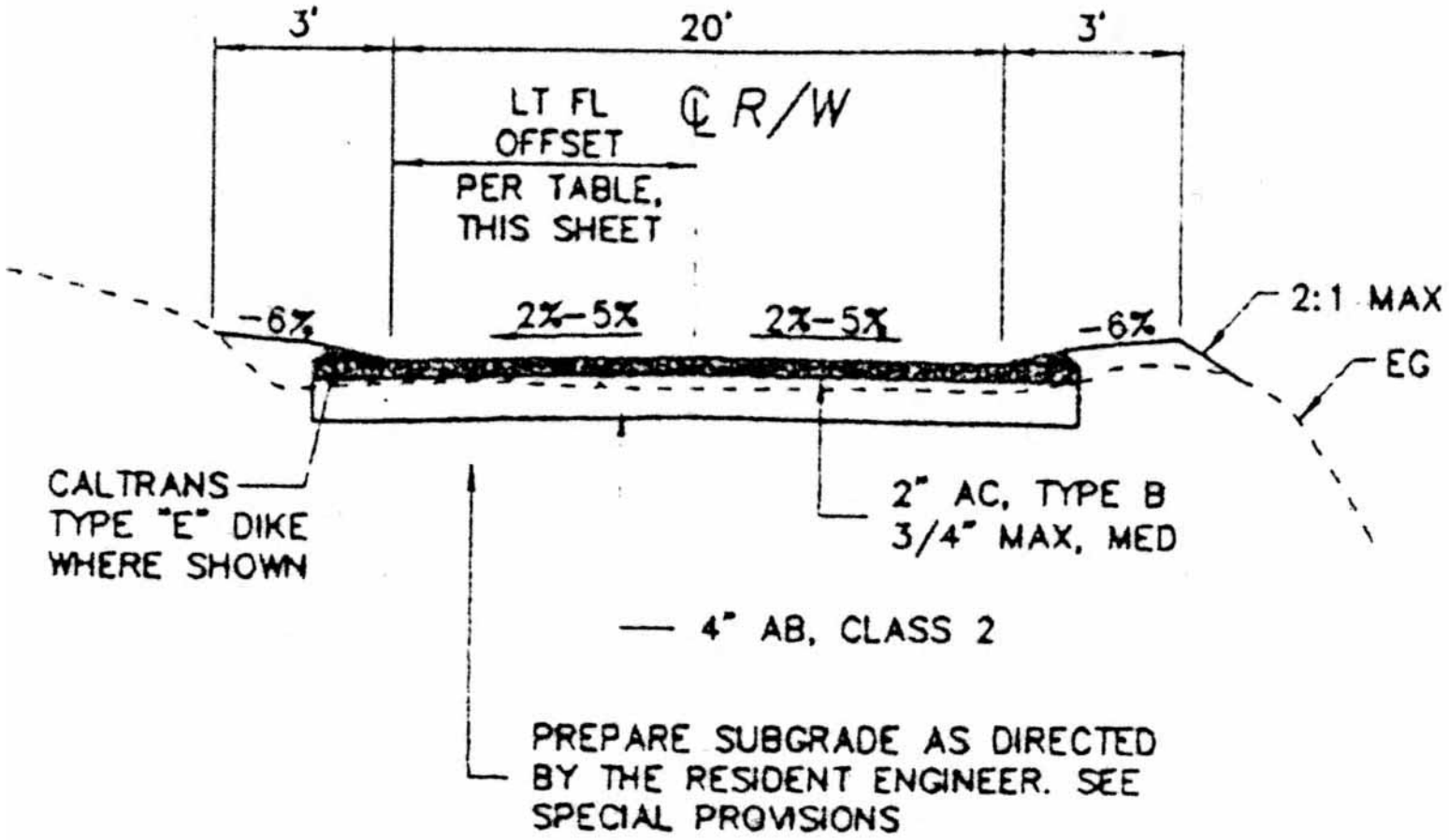
Response 12: The recommendation to re-surface roadways was to reduce damage caused by erosion. Continued erosion of un-surfaced roads increases the County's maintenance costs. Section 3.3.7 was revised to include a recommendation that if the roads are paved, that they be upgraded to comply with California Fire Code.

Comment 13: Is there any possibility that an enforceable County ordinance could be drafted to minimize storm runoff that flows from homes to the public right-of-way.

Response 13: Developing an ordinance is possible, but unlikely. The vast majority of infill lots have been developed without drainage requirements. It is doubtful that the remaining developable lots would be required to provide on-site control of drainage.

Appendix I

CALTRANS TYPE E MOUNTABLE BERM SECTION DETAIL



TYPICAL SECTION

NTS