Carmel-by-the-Sea
Storm Drain Master Plan

Final Report By

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Executive Summary

This Storm Drain Master Plan (SDMP) establishes a prioritized capital improvement program to reduce the risk of flooding within the City of Carmel-by-the-Sea (City). The identified storm drain system improvement projects are intended to provide 10-year (10% annual exceedance) storm conveyance throughout the City.

Study Objectives

- The basic objective of this master plan document is to provide an examination of the drainage risks within the City limits and recommend actions necessary to accomplish appropriate level-of-service and reliability for storm drain systems owned by the City. Several tasks have been undertaken and completed as part of this study:
- Collection of field data to supplement GIS data for building an existing conditions model of the storm drainage network
- Assessment of the performance of existing storm drainage systems
- Assessment of the condition of the existing system
- Identification of capital improvements to reduce flood risk
- Identification of capital improvements to reduce failure risk
- Prioritization of capital improvements for risk reduction and cost benefit
- Establishment of a prioritized Capital Improvement Program (CIP) for storm drainage
- Estimation of project costs for the prioritized CIP

In accordance with California Environmental Quality Act (CEQA) Guidelines, Section 15262 (Statutory Exemptions), this SDMP is considered a planning document. The adoption of this document is exempt from the requirements to prepare Environmental Impact Reports (EIR) or Negative Declarations (ND). However, CEQA must be satisfied for any capital improvement project described in this report that may be implemented by the City in the future through the preparation of an appropriate EIR, ND, or determined to be categorically excluded.

Work Products

This master plan is intended to function as a multipurpose storm drain system resource guide for the City's staff and residents. City engineers responsible for the storm drain capital improvements should find sufficient background information and data in this document to serve as the basis for storm drainage Capital Improvement Program (CIP) implementation and/or modification. Improvement descriptions, maps, project costs, and other modeling data have been included in the appendices of this report.

Background

The City's storm drainage system consists of storm drain pipes with outlets to creek channels or Carmel Bay. Most of the City's system has capacity for the 10-year event; however, portions of the system lack the capacity necessary to meet the 10-year standard. Some known, recurring problem areas have been identified by City staff. Carmel-by-the-Sea generally drains in a westerly direction to the Carmel Bay. Tidal flooding is not a significant concern for oceanfront parcels.

System Evaluation

A MIKE URBAN rainfall-runoff model has been developed for the City which contains the portions of the overall storm drainage pipe and channel system that provide essential conveyance capacity for storm runoff. Detailed review, field investigations, analysis, and modeling of the area's storm drainage system lead to several conclusions. These conclusions have been utilized to recommend improvements to the system intended to reduce flood risk within the City. The recommended improvements are preliminary in nature and are based on currently available information. Detailed project designs will ultimately require more data, including utility locations, which remain to be obtained.

The drainage system surcharges in areas where the pipes do not provide the necessary capacity to convey runoff. Some flooding may occur in areas where the surcharge is higher than the ground surface. Generally, streets provide some capacity for conveying flow and it is not uncommon to observe gutter flows up to the top of adjacent curbs during high intensity rainfall events. Flooding greater than a foot in depth, however, is regarded as problematic regardless of the property damage caused by it. There is special concern in the City of Carmel because most residential areas lack curb-and-gutter and the existing asphalt swales and berms vary block-to-block.

The current physical condition of the drainage system was evaluated using pole-mounted camera topside observations and CCTV. The CCTV work focused on the City identified critical segments along with reaches noted during the topside work. Most of the observed system is in good condition; however, there are reaches with debris and sediment, damaged pipes, and other concerns. Improvements for the condition related projects are detailed in this report.

Capital Improvement Program

A Capital Improvement Program has been developed based on model results and suggested improvements. The roughly $8.2 million in capacity and $1.7 million in condition improvements, broken down into three priority levels, recommended by this master plan are based on the capacity and condition of the existing system and the need to correct identified deficiencies. Recommended improvements are intended for public rights-of-way and other City-owned property, not private facilities, or private property.

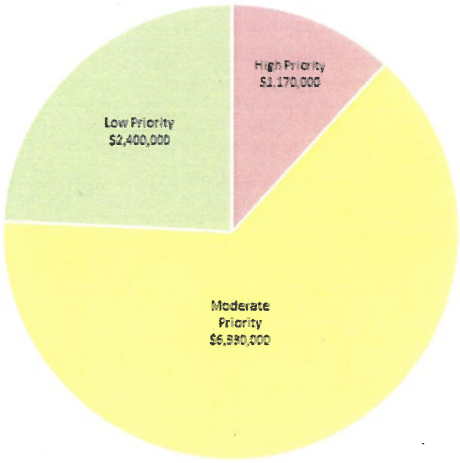

Figure ES-1: Capital Improvements Summary

Future Development

The CIP does not include the cost of new facilities related solely to new development (e.g., pipeline extensions to serve areas that are currently undeveloped). These new facilities would be constructed as part of the new developments and are not included in the CIP. Much of the future development within the City is anticipated to be in the form of infill projects. While this type of development may in fact reduce stormwater flows to the system, a detailed study should be conducted at the expense of the developer to analyze any impacts more accurately. In addition, some developments may occur in areas where the existing or possibly improved downstream systems are currently undersized. The City may request assistance from developers to improve the system and in turn be reimbursed for improvements made to the existing system.

Conclusion

This Master Plan provides a tool for citizens and City officials to use in their efforts to reduce both nuisance flooding and the likelihood of more serious storm water related hazards to private and/or public property. This study and proposed CIP are merely the conceptual starting point. It is anticipated that City staff and/or their consultants will perform more detailed studies and alternatives analyses to identify the most affordable and effective improvement projects with information gathered as part of the design process, including detailed topography, utility conflicts, available easements and rights-of-way, construction impacts, and long-term operation and maintenance.

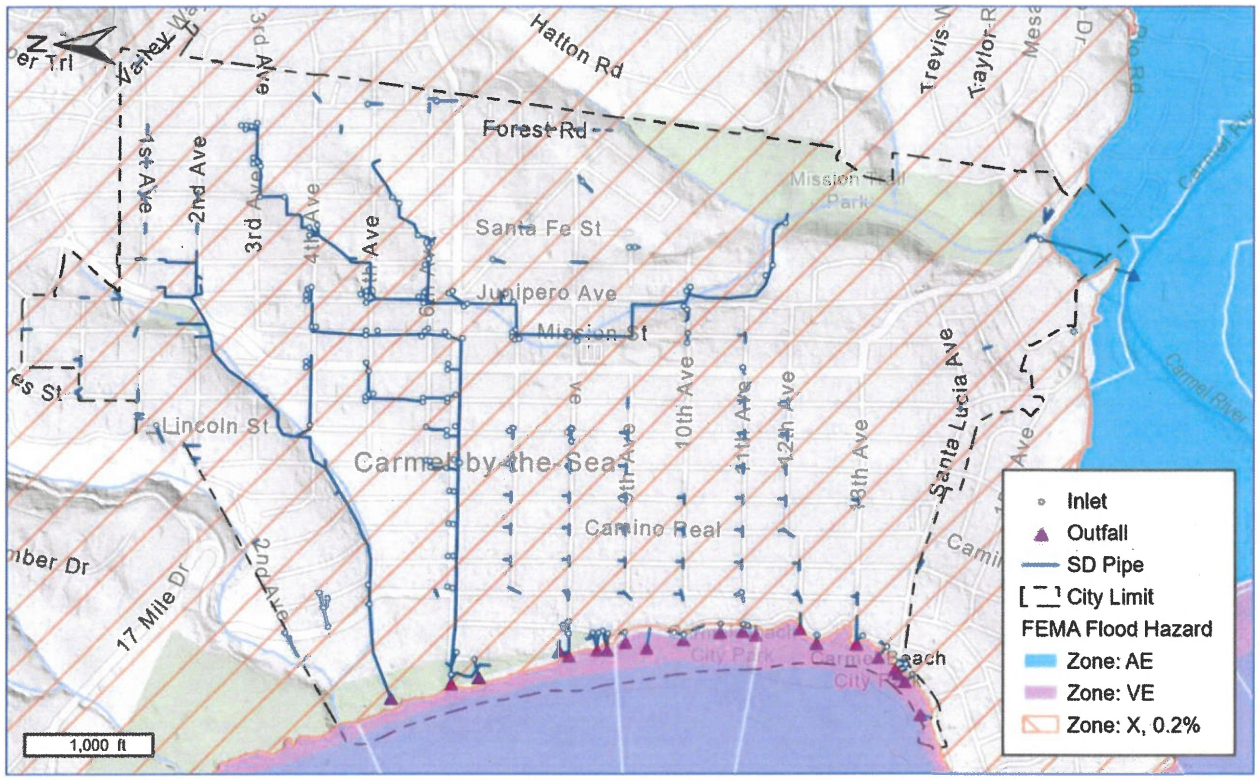

Figure 1-1: Existing Carmel-by-the-Sea Drainage System

1.5. History of Flooding within Carmel-by-the-Sea

Historical flooding information can be valuable in highlighting areas of recurring problems and prioritizing future improvements. Information about areas with known flooding problems was provided to Schaaf & Wheeler by the City employees. More discussion about the historical flooding problems in Carmel-by-the-Sea is presented in Section 4.4.

1.6. Regional Storm Water Coordination

A variety of agencies and municipalities maintain storm drainage systems within the study area. The most relevant of these is Monterey County, which maintain stormwater infrastructures outside the City of Carmel-by-the-Sea boundary. County runoff enters Carmel systems at 4th Avenue and Mission Trails Park. The City participates in the IRWMG and Regional Stormwater Resource Plan which identify stormwater capture opportunities throughout the region.

1.7. Master Plan Process

Carmel-by-the-Sea's storm drain system performance has been analyzed using the level-of-service criteria established herein to identify deficiencies and recommend capital improvements. Several tasks have been completed to reach this goal:

1) Create a hydraulic model using the GIS data provided by the city. Network features include:
   a) Manhole invert and rim elevations

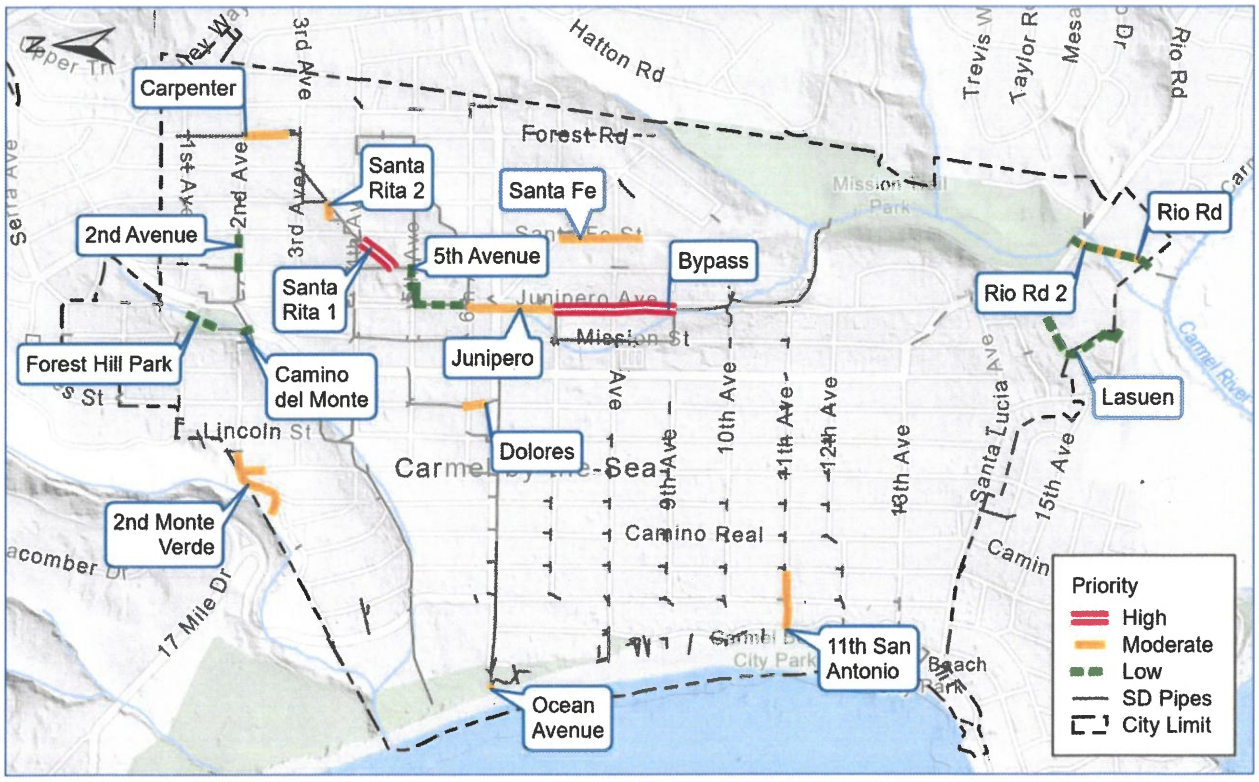

Figure 4-5: Prioritized CIP Projects

4.6.1. Annual Inspection of Pipes

CMPs typically are more susceptible to corrosion and damage compared to concrete pipes. Observations made during field inspections identified several CMPs in City of Carmel-by-the-Sea's storm drain system with visible damage and deformities. Several other pipes had varying levels of sedimentation. This project recommends performing continued CCTV video inspections. The CCTV inspections could potentially result in additional capital projects to repair the system.

4.6.2. High Priority Projects

The highest priority projects (Figure 4-5) are a combination of condition and capacity CIPs.

Mission Street Bypass

Modeling results indicate inadequacies along Junipero Avenue north of Ocean Avenue. There has also been observed flooding near 8th Avenue and Mission Street. This improvement adds an additional pipe and inlets along Junipero between 7th and 9th Avenues to provide more capacity and capture local runoff.

Santa Rita 1

The existing concrete box in an easement between Torres Street and Santa Fe Street (between 4th and 5th Avenues) has been bifurcated from the City system but may still convey local runoff. The CCTV inspection shows damage to the concrete in various locations and there is concern the box could collapse. The alignment, based on GIS, indicates the box may be under existing buildings and collapse could cause

5.5.2. Annual System Maintenance

The City currently spends roughly $90,000 per year in consulted cleaning for the drainage system and permit compliance. This work includes removing debris from the 4 CDS units and numerous inlets. The City should continue these efforts along with the additional locations identified under this study. The estimated annual fee is $90,000 for consultants and $30,000 for City staff labor.

5.5.3. Storm Drain Improvement CIP

The CIP costs priority levels are summarized in Table 5-1. Detailed project sheets with required replacement pipe for high and moderate priority CIPs are included in Appendix D.

Table 5-3: CIP Projects for the City of Carmel-by-the-Sea

Priority	Asset Name	Estimated Cost[1]
High Priority	Mission Street Bypass	$820,000
	Forest Hill Park – Emergency Repair	$130,000
	Santa Rita 1	$220,000
	High Priority Total	**$1,170,000**
Medium Priority	Junipero	$800,000
	Rio Road 1	$2,420,000
	Santa Rita 2	$170,000
	Ocean Ave	$250,000
	Santa Fe	$490,000
	Carpenter	$270,000
	11th and San Antonio	$400,000
	2nd and Monte Verde	$830,000
	Forest Hills Park - Realignment	$700,000
	Medium Priority Total	**$6,330,000**
Low Priority	2nd Avenue	$150,000
	5th and Junipero	$660,000
	Mission Trail Preserve Projects	$940,000
	Camino del Monte	$30,000
	Dolores	$20,000
	Rio Road 2	$140,000
	Lasuen	$460,000
	Low Priority Total	**$2,400,000**
Grand Total		**$9,900,000**

[1]Includes Contingencies (40%). 2020 Construction cost only. Construction cost includes mobilization, traffic control, trench, and surface restoration. Does not include costs associated with permitting, land acquisition, or other unforeseen special circumstances.