

CARMEL SHORELINE ASSESSMENT

**FALL 2014**

Draft Report

Prepared by

David Shonman

and

Greg D'Ambrosio

Submitted

April 15, 2015

## EXECUTIVE SUMMARY

---

The Fall, 2014 Carmel Shoreline Assessment was conducted between November 15 and December 12, 2014. It is an independent survey of Carmel’s beach, dunes, slopes, bluffs, storm water outfalls, shoreline walls, stairs, ramps, and Pathway. The Assessment focuses on conditions that affect the protection and preservation of the shoreline and the safety of its visitors. In addition to documenting individual conditions of concern, the Assessment also highlights complex and long-standing problems, and recommends maintenance, repair and management actions that can help provide effective, long-term solutions. As such, it can be a valuable complement to the Carmel Shoreline Management Plan.

This Assessment is the first to be carried out since Fall, 2003. During this eleven-year interval, several minor conditions grew into larger problems, which will be more difficult and more expensive to address.

Conditions of concern documented along the shoreline fall into several categories; here are a few examples:

### **Simple**

Conditions that can be remedied by simple, direct action from City staff:

- Shoreline information/warning signs were covered by plants or partially buried by dirt or sand (Section 8.0).
  - *Plants that could cover signs should be regularly trimmed/cleared.*
- Bushes along portions of the Pathway have been allowed to grow to a size and shape that block views of the ocean (Section 9.1).
  - *Bushes should be pruned to a height and density appropriate for their location.*
- The Handicap Access Sand Ramp was found to have a one-foot drop-off between the Pathway and the top of the ramp (Section 6.2).
  - *Ramp should be re-contoured when necessary, using white beach sand.*

### **Interlinked**

Conditions caused by a series of factors, some of which occur in other areas of the shoreline. **These multifaceted problems require multifaceted solutions:**

- A portion of a concrete side-wall supporting the 4<sup>th</sup> Ave. storm water outfall was undercut by erosion caused by people walking on an unauthorized bluff trail (Section 4.1).
  - *Undercut wall should be repaired, along with the bluff-cut that contributed to the erosion of the support wall.*
- A section of Carmel's white sand beach that has been discolored by dirt washed down from the bluff by storm water that pooled on a low portion of the Pathway above (Sections 3.1 and 6.3).
  - *The response should include re-contouring and re-surfacing the low section of Pathway, restoring the eroded bluff, re-vegetating the blufftop, as well as cleaning dirt from the beach.*

### **Recurring**

Conditions that have been observed in previous Assessments. **Long-standing problems require different strategies than those previously used:**

- Storm water outfalls covered by ice plant (Section 4.1).
  - *This recurring problem should be addressed by establishing **standard protocols** that call for plants near outfalls to be trimmed/cleared before the onset of each storm season.*
- Several bluff-cut trails continue to erode shoreline bluffs (Section 3.1).
  - *Unauthorized slope trails (**bluff-cuts**) are a long-standing problem that continues to occur because the City's previous repair attempts have not proven successful. Effective solutions will require addressing all contributing factors, including revegetation, guardrails, signage, monitoring and policing. Such an effort will likely take the combined efforts of City staff from Forestry and Beach, Public Works, Police, Community Planning and Building, and Administration, as well as various commissions and outside contractors (i.e. landscape designers).*

Among all the conditions described in this Assessment, two sets of problems were especially troubling:

### **Safety Hazards**

Conditions that pose safety hazards for shoreline visitors and City staff:

- Many loose, decayed guardrails and posts were found along the bluff edge near the Pathway (Section 9.2).
  - *These sections of guardrail must be replaced. At sites where the bluff cannot adequately support the guardrail posts, steps should be taken to either stabilize the existing bluff or to move the guardrail inland, closer to the Pathway (\*NOTE: guardrail re-positioning will require that landscape vegetation and irrigation components near the Pathway and on the blufftop also be modified accordingly).*
- At several sites along the shoreline, granite boulders that had originally been part of revetments, installed to repair damage from previous storms and protect against future damage, have either moved to other locations or have shifted and become perched atop other boulders, creating unsafe conditions (Section 5.2).
  - *The City should engage qualified personnel to re-position these boulders to locations where they can best help maintain the revetments' original design, enabling them to more effectively protect the Carmel shoreline. This will also remove perched rocks and eliminate unsafe crawl spaces.*
- During surveys for this Assessment, seawater was observed washing over the lower section of at least one shoreline stairway during and after storms (Section 6.1). In addition, storm water discharging from a few shoreline outfalls scoured sand from Carmel Beach; in the 12<sup>th</sup> Ave. cove, this resulted in a two-to-three foot-deep pit.
  - *Each of these conditions existed for only a limited period of time, but clearly posed a potential hazard to people walking on Carmel Beach, especially in the dark. To reduce the level of danger from these conditions, City staff must monitor these sites during/after storms, and during significant high tides, and must develop a way to protect people until conditions abate.*

### **Deviations from City Policies, Agreements and Design Principles**

Conditions that vary from policies, agreements and design principles adopted by the City, including the original Beach Bluff Pathway Project, Carmel Shoreline Management Plan, and Carmel Local Coastal Plan:

- Nearly all plants selected for the original Pathway landscape plan have disappeared (Section 9.1). Along most portions of the Pathway and blufftop, the original species have been replaced by plants that do not

meet the criteria established by the original landscape designers and the Carmel Beach Task Force, while other areas have been allowed to become bare (or covered with chips and bark).

- *City staff and the Forest & Beach Commission should:*
  - *review the original Pathway Landscape Plan to understand its criteria and design intent;*
  - *review what factors led to changes in the plan over the past 28 years;*
  - *select a limited number of high-visibility sites along the Pathway to be re-landscaped and maintained;*
  - *adjust staffing, training and funding, based on lessons learned, so that re-landscaping can be expanded to other areas along the Pathway.*
- The upper portions of many of Carmel’s shoreline revetments remain inadequately covered by sand (Section 5.2). Keeping its revetments covered was a commitment that the City made to the Coastal Commission to help address both safety and aesthetic concerns.
  - *The City should:*
    - *re-energize its **sand redistribution** program that proved successful during the decade following completion of the Beach Bluff Pathway Project;*
    - *conduct regular **sand profiles** (based on benchmarks already installed by the City Engineer) to gather quantitative information that can be used to determine when, and to what extent, sand redistribution can best be carried out.*

In total, the difficulty of dealing with long-term, multi-faceted problems, the lack of regular maintenance and monitoring, the deviations from the original Beach Bluff Pathway design intent, along with inadequate staffing and funding, have all combined to produce a shoreline area that falls far below the quality that was once planned for the City of Carmel-by-the-Sea.

## **CONTENTS**

---

<b>Executive Summary</b>	<b>1</b>
<b>Introduction</b>	<b>6</b>
<b>Conditions of Concern</b>	
<b>1.0 Beach</b>	<b>14</b>
<b>2.0 Dunes</b>	<b>19</b>
<b>3.0 Bluffs</b>	<b>23</b>
<b>4.0 Storm Water System</b>	<b>33</b>
<b>5.0 Shoreline Armoring Structures</b>	<b>44</b>
<b>6.0 Shoreline Access</b>	<b>57</b>
<b>7.0 Public Support Facilities &amp; Amenities</b>	<b>69</b>
<b>8.0 Signage</b>	<b>74</b>
<b>9.0 Shoreline Landscape</b>	<b>79</b>
<b>Shoreline Issues to be Considered</b>	<b>95</b>
<b>Authors</b>	<b>98</b>

## **CARMEL SHORELINE ASSESSMENT FALL 2014**

---

### **INTRODUCTION**

This report details the results of the Fall, 2014 Carmel Shoreline Assessment. As described in the City’s Shoreline Management Plan,<sup>1</sup> the Assessment is an independent report designed to assess conditions that affect the protection and preservation of Carmel’s shoreline and the safety of its visitors.

The Assessment can be a useful planning, budgeting, training and maintenance tool to help in the management of the Carmel shoreline. Analysis of conditions described in this Assessment will help determine areas in need of improvement and can focus attention on recurring problems that affect the City’s beach, dunes, slopes & bluffs, shoreline walls, storm water outfalls, stairs & ramps, and Pathway.

As originally envisioned, the Assessments were to be conducted twice each year – once in the Fall, to help prepare for the upcoming storm season, and then again in the Spring, to determine how storms had affected the shoreline. To date, Assessments have only been conducted during the fall of 2001, 2002, 2003, and now, 2014. The long interval between the current and previous Assessment presented clear evidence of what happens when relatively minor conditions are allowed to grow into larger, more complex problems that will be more difficult and more expensive to address.

Field surveys for this Assessment were conducted between November 15 and December 12, 2014, followed by a few surveys in January and February, 2015, to confirm earlier observations. During this period, the region experienced a few light-to-moderate rainfalls as well as one strong wind/rain storm. This presented opportunities to view how the Carmel shoreline and its structures (including the Pathway, stairways, bluffs and storm water system) responded to these challenging conditions.

### **Carmel Shoreline Area (Map 1)**

This Assessment covers the entire Carmel shoreline, which encompasses an area extending from Carmel Beach (in the west), Pescadero Canyon (to the north), and the City limit at the Frank Lloyd Wright House (to the south). The shoreline’s eastern boundary includes the North Dunes as it follows San Antonio Ave. southward from 4<sup>th</sup> Ave. to Ocean Ave. It then runs west and south to

---

<sup>1</sup> Shonman, D. and G. D’Ambrosio. 2003. City of Carmel-by-the-Sea Shoreline Management Plan. Approved by City Council Sept 18, 2003. 104p.



Map 1 – Carmel Shoreline Assessment (CSA) – Area of Study



cover the Ocean Ave./Del Mar beach parking areas, where it continues southward along the length of the Del Mar Dunes. From 8<sup>th</sup> Avenue to the south City limit, this boundary follows the eastern edge of Scenic Road. For purposes of the Assessment, the Carmel shoreline area's eastern boundary (from 9<sup>th</sup> to 12<sup>th</sup> Ave.s) also includes all Pedestrian Accessways/Drainage Easements that connect San Antonio Ave. to Scenic Rd.

By necessity, conditions described in this Assessment have been placed into categories listed below, but effective response to each condition might require actions that involve one or more associated categories. Wherever possible, conditions in one section of the Assessment have been linked to conditions in another section. However, an accurate linking of all causes & effects would make this Assessment more complex to use. City staff must be expected to use their knowledge and initiative when dealing with the many interlinked problems along the shore.

### **Conditions of Concern**

The Fall 2014 Assessment was based on observations of all pertinent man-made structures and natural features throughout the City's shoreline area. Photographs depicting many specific conditions are included within the Assessment. In general, only those features requiring comment were noted; features determined to be acceptable were not described in this report.

This Assessment reflects topics described in Section 8 of the Carmel Shoreline Management Plan. Each area was visually assessed for four critical factors:

- **Safety** – any features that might present a danger to shoreline users, including, but not limited to, tripping hazards (e.g. plants growing on beach access stairways or on pedestrian accessways, loose steps, pathway obstructions), loose handrails and guardrails, low branches, loose revetment rocks, holes and voids, etc.
- **Shoreline Protection** – any features installed to help protect the Carmel shoreline from damage caused by wave action and storm water runoff, including, but not limited to, integrity of shoreline revetments, seawalls and retaining walls, obstructed storm water inlets, basins, pipes, outfalls, unauthorized bluff trails, etc.
- **Coastal Viewshed** – any features that unnecessarily obscure views of the shoreline and Carmel Bay.
- **Carmel Shoreline Plans and Guidelines** – any features that vary from City goals and policies related to the Carmel shoreline, including the Carmel Local Coastal Plan, Carmel Shoreline Management Plan, and the Carmel Beach Bluff Pathway Environmental Impact Report (EIR).

The shoreline conditions assessed for this report are divided into nine categories:

- 1.0 Beach**
- 2.0 Dunes**
- 3.0 Bluffs**
- 4.0 Storm Water System**
- 5.0 Shoreline Armoring Structures**
- 6.0 Shoreline Access**
- 7.0 Public Support Facilities & Amenities**
- 8.0 Signage**
- 9.0 Shoreline Landscape**

Within each category, conditions needing attention are listed in geographic order, from north to south. Each condition is identified by a specific three-digit number (e.g. 1.1.1 or 6.2.4) that reflects its location within the Assessment. For most conditions, rectifying actions are recommended (in CAPITAL LETTERS).

## **Themes**

At its most basic level, this Assessment can be thought of as a collection of snapshots, each describing conditions observed at a specific location and time. Some conditions, like large puddles of rainwater covering sections of the Pathway, or a pit scoured into the beach by storm water discharged from one of the City's outfalls, might disappear in only a few days or weeks. But while they exist, these conditions pose hazards to shoreline users. Others, such as an uncovered trash receptacle, a warning sign or storm water outfall that is overgrown by plants, or Pathway guardrails that are decayed and loose, can be easily remedied by maintenance, repair and/or replacement.

This Assessment can be an especially valuable tool when used to identify problems that recur from year-to-year, or to focus on conditions that affect more than one shoreline element and extend through more than one staff member's area of responsibility. Here are a few examples:

### **Recurring Problems:**

Several conditions described in this Assessment have been reported in previous years. Plants draping over the discharge ends of storm water outfalls were documented in every Assessment (2001, 2002, 2003 and 2014). As described in Section 4.1.2, this continuing problem could be addressed by modifying management and training to ensure that trimming outfall vegetation before the onset of the rainy season becomes a high priority.

**Bluff-cuts** (unauthorized paths cut by foot traffic into the bluff) cause a host of problems, including trampling of protective slope vegetation, erosion of bluff

material, undercutting of shoreline protection structures, and the delivery of dirt onto Carmel’s white sand beach. Bluff-cuts have been long-standing, vexing problems, and have been documented in this, and all previous, Assessments. City staff has taken some steps to find a remedy, but as discussed in Section 3.0, effective, long-term solutions will require a coordinated effort involving Public Works, Forestry & Beach, Police, Fire, Administration (and possibly Community Planning & Building), as well as experienced landscape design contractors.

**Interlinked Problems:**

Many conditions of concern along the Carmel shoreline are the result of a combination of interlinked forces. As mentioned above, some conditions that degrade the quality of Carmel Beach start with rainwater falling on land located well above the shore. How this storm water is handled when it reaches Scenic Road will determine whether or not it will damage the Pathway, shoreline bluffs, and/or the beach itself. And the degree of bluff and beach damage depends, in part, on such factors as foot traffic using unauthorized bluff-cuts, the presence of guardrails, bluff vegetation, effective signage and policing. In dealing with complex systems such as this, a **team approach**, coordinated among City staff and contractors, can often create the best perspective for long-term solutions. This method will prove effective when dealing with many problems along the Carmel shoreline.

As these examples demonstrate, problems affecting Carmel Beach are often multifaceted ... and their solutions should also be multifaceted.

Conditions along Carmel’s shoreline are clearly complex, but do not need to be overwhelming. One of the most important tools for dealing with these problems is early detection.

**Monitoring and Inspections:**

As described in the Shoreline Management Plan, **monitoring is one of the best management tools for protecting the City’s shoreline and its visitors**. It is the most effective way to catch problems while they are still small and relatively inexpensive to address. While these Shoreline Assessments have noted conditions of concern during the Fall of 2001, 2002, 2003 and 2014, they are no substitute for timely monitoring. As mentioned throughout this Assessment, specific sites and elements should be monitored at specific times:

- all stairways and storm water outfalls – during and after rainstorms and very high tides;
- all shoreline trees – after strong windstorms;
- the Vehicle Access Sand Ramp and the Handicap Access Sand Ramp – on a regular basis; and
- the City’s shoreline irrigation system – throughout the year.

Most monitoring will be done by City staff – they spend the most time on the Carmel shore, and are most familiar with how it is affected by natural and human impacts. Staff personnel must be encouraged to constantly be on the lookout for conditions of concern, even those outside of their areas of responsibility.

In addition to the monitoring mentioned above, some shoreline elements (e.g. stairways, sea walls, retaining walls and rock revetments) should be inspected by qualified specialists (e.g. structural engineers, certified engineering geologists, *et al*). These inspections should be conducted at intervals determined in consultation with the City Engineer. To be complete, the inspections must include observations of the bases, footings and foundations of each structure. This can only be possible when the sand level is low, a condition that usually occurs during severe winters. Because developing new contracts may be a time-consuming process, the City is encouraged to establish contracts with experienced, qualified engineers months before the onset of the storm season. Contracts should specify that these specialists will be available to conduct at least a portion of their inspection when the bases of these structures are exposed.

The combination of monitoring by City staff and inspections by technically qualified personnel will help the City make effective progress toward dealing with its extraordinary shoreline.

### **Consistency in Maintenance and Repair**

With its changing winds, waves, tides, and levels of sea and sand, Carmel's shoreline is a dynamic system. In its own way, so too is the City; political, financial and operational conditions in the City change over time.

During the period since the previous Assessment (Fall, 2003), funding and staffing of the departments most closely involved with the management, maintenance and protection of the shoreline have decreased. This has limited City staff's ability to carry out many of the actions required to keep important shoreline elements (beach, Pathway, landscaping, etc.) in the top notch condition deserving of this treasured part of Carmel.

Compounding this decreased level of support is the veering away from programs, plans and design guidelines, often developed years earlier by previous City personnel, commissions, task forces and consultants.

The current staff has clearly worked hard to maintain the basic components of the shoreline. But what has been lost are some of the very things that keep Carmel special in the hearts of its residents and visitors. A landscape with naturally trimmed plants rather than square hedges, trash and recycling containers kept

within stone enclosures rather than industrial dumpsters, wood rails and posts that are well-maintained rather than decayed and falling down.

To some, these might seem like minor issues of style, but they are characteristics that contribute to a look and feel that brings visitors back year after year after year, and encourages others to settle down here. These are among the design traditions that have evolved over the years to maintain the sense of a small village by the sea. The original plans for the Carmel Beach Bluff Pathway Project, developed by the esteemed landscape designer Robert Royston and his staff, under the direction of the Carmel Beach Task Force, approved by the City Council and the California Coastal Commission, were in keeping with Carmel’s design traditions. These plans and guidelines should be reviewed, understood and honored.

### **Assessment Responses & Actions**

This Assessment is based on observations of conditions that affect the protection and preservation of Carmel’s shoreline and the safety of its visitors. As in the two previous Assessments, a draft version has been circulated to the City Forester and the Superintendent of Public Works for their comments and responses; these can be written on separate pages, and will be incorporated into the final version. Where appropriate, responders are encouraged to refer to the specific number identifying each condition (e.g. 6.1.1).

Based on these responses, the final version will show the status of each condition described in the Assessment, rating each with a single-letter code that appears in a box to the left of each response:

**R** = Repaired, replaced or otherwise remedied

**O** = On-going (City has responded in the past but condition still persists)

**M** = Maintenance (will be attended to during upcoming maintenance cycle)

**F** = Future (will be remedied when funds and/or time permit)

**N** = No work is needed at this time.

Several of the conditions may have already changed by the time this draft Assessment was submitted. Some conditions may have been remedied by City staff or contract workers. Others may have been altered by changing weather and ocean conditions. But all conditions listed in the draft Assessment represented an accurate portrait of the Carmel shoreline during the period between November 15 and December 12, 2014.

---

*No part of this Assessment is meant to take the place of regular (weekly/monthly) inspections or monitoring by City staff or consultants (e.g. qualified structural engineers, engineering geologists, et al). Conditions along the Carmel shoreline are extremely dynamic, and structures such as walls, revetments and stairways, as well as dunes, bluffs and trees, are all exposed to natural and man-made forces that can compromise their integrity and pose a threat to the public's safety. The City is urged to continue and strengthen its program of monitoring and inspection.*

## 1.0 BEACH

### General Conditions

By most metrics, Carmel Beach appeared to be in reasonably good condition when the current Assessment began in mid-November. The sand level on the beach was still high, in spite of a few previous storms. However, three issues stood out as problematic:

- Discoloration of sand from beach fires and dirt;
- Exposure of the City’s protective rock revetments due to insufficient sand redistribution; and
- Short-term erosion of beach sand from storm water discharge.

As described in Section 1.1, below, much of the sand south of 10<sup>th</sup> Ave. was discolored by coals from beach fires. These coals range in size from tiny specks to chunks several inches long; each contributes to degrading Carmel’s signature white sand beach. During the current Assessment, five specific sites within the beach fire zone had extensive patches of fire-associated debris, including partially burned wood mixed with kelp washed onto the beach by wave action. As in the past, it was noted that several beach fire sites also contain other debris, like glass, metal implements and trash, all of which reduce the quality of Carmel Beach and increase hazards for people who use the beach.

The City’s white sand is also discolored by dirt displaced from the bluffs by people using unauthorized trails, referred to as **bluff-cuts**, by storm-water run-off or a combination of forces. Bluff-cuts have a critical impact on the Carmel shoreline and are discussed in detail in Section 3.1 of this Assessment.

At many locations along the Carmel shoreline, beach visitors can see large granite rocks piled up against the base of the bluffs. These are the visible parts of a series of engineered rock revetments, installed by the City to repair storm damage and provide protection from future storms. Most of the shoreline revetments were built in 1983, in response to damage incurred during the previous winter’s El Niño storms. In addition, a few smaller revetments were built at other locations on the Carmel shore, both before and after 1983.

Restoration and maintenance of these revetments is discussed in Section 5.2 , but one important process involves Carmel’s beach sand. To reduce the aesthetic impact and safety concerns related to these granite boulders, and to help compensate for loss of beach area, the City made a commitment to the California Coastal Commission to keep its shoreline revetments covered with beach sand. This was an outgrowth

of **sand redistribution**, which had been regularly used to maintain the high sand hill at the foot of Ocean Ave. as far back as the 1960s. With approval from the Coastal Commission, the City carried out sand redistribution for several years after the El Niño repairs, successfully keeping its shoreline revetments covered. However, in recent years, many revetments have remained exposed, in spite of several sand redistribution attempts. The City must carry out these efforts in a more consistent and effective manner.

The third condition of concern is related to storm water discharged onto Carmel Beach at some of the City's shoreline outfalls. At nineteen locations, storm water collected from many parts of the City is discharged onto the beach, often with tremendous force. At two locations, storm water flowing from outfalls has cut shallow channels into the sand extending across the width of the beach. In the 12<sup>th</sup> Ave cove, storm water outfall discharge has scoured a pit that was observed to be nearly three ft. deep. These conditions exist during and after rainstorms. Within a few days to a few weeks, these features are usually leveled out by natural forces; however, while these conditions exist, they present a clear hazard, especially for people who walk on Carmel Beach in the dark. This is further discussed in Section 4.1.

### **General Recommendations**

Only one of the conditions of concern described above is dealt with in this section: the impact of open beach fires on Carmel's white sand (Section 1.1). The City Council's recent adoption of a pilot program to test the use of 26 **beach fire containers**<sup>2</sup> shows that the City is well aware of, and is ready to address, the long-standing problems caused by open fires on Carmel Beach. As noted in the Recommended Action section below, there will still be a need for on-going cleanup of the debris associated with beach fires, as well as strengthened public education and code enforcement.

---

<sup>2</sup> Also referred to as: fire kettles, fire bowls or fire rings



## 1.1 SAND DISCOLORATION - Fires

### 1.1.1a 10<sup>th</sup> Ave. to South City Limit

- **Condition:** Much of Carmel Beach south of 10<sup>th</sup> Ave. showed varying degrees of discoloration by remnants of beach fires. Several sites were covered by extensive patches of coals, partially burned firewood and other fire-associated debris:
  - Beach south of 11<sup>th</sup> Ave. stairs
  - Cove north of 12<sup>th</sup> Ave
  - Cove north of 13<sup>th</sup> Ave
  - Cove south of 13<sup>th</sup> Ave
  - Beach south of Santa Lucia

Along the beach near 11<sup>th</sup> & 12<sup>th</sup> Ave.s, and the stretch between Santa Lucia Ave. and Martin Way, coals and chunks of partially burned firewood were mixed in with kelp washed in by storm waves.

- **Comments:** In addition to discoloring beach sand, beach fire sites are often littered with broken glass, cans, metal implements and other material; at some sites, people have used small revetment rocks as fire rings. Beach fire sites are often associated with bluff-cuts, which are used to deliver firewood down to the beach.

#### ⇒ **Recommended Action:**

- CITY PLANS TO LIMIT BEACH FIRES TO 26 BEACH FIRE CONTAINERS INSTALLED SOUTH OF 10<sup>TH</sup> AVE. FOR A ONE-YEAR PILOT PROGRAM TO HELP DECREASE AMOUNT OF FIRE-DEBRIS ON THE BEACH.
- CITY SHOULD CONTINUE & STRENGTHEN ON-GOING BEACH FIRE-RELATED PROGRAMS
  - ENSURE THAT THE CONTRACT FOR WASTE HAULING SERVICES INCLUDES DETAILED SPECIFICATIONS FOR CLEANING FIRE-DEBRIS FROM BEACH;
  - INCREASE PUBLIC EDUCATION & CODE ENFORCEMENT ACTIVITIES (WILL REQUIRE CARMEL POLICE DEPT. INPUT ON WORDING OF SIGNS);
- CITY SHOULD CONSIDER PLACING TRASH CANS ON BEACH IN FIRE ZONE.



Fig 1#1



Fig 1#2



Fig 1#3



Fig 1#4

### 1.1.2 Sand Discoloration - Erosion (Section 3.1)

## 1.2 BEACH EROSION

### 1.2.1 Beach Erosion - Storm Water Discharge (Section 4.1.3)

**Section 1.0 - BEACH**  
**COMMENTS & RESPONSES**

---

## 2.0 DUNES

### General Conditions

The Del Mar Dunes and North Dunes are remnants of a once-extensive dune system that existed when the City of Carmel was founded. Both areas are characterized as “disturbed” from both current and previous human activity, as well as the growth of invasive plant species. Each area is part of the City’s Del Mar Master Plan, and the North Dunes and Del Mar Dunes Habitat Restoration Plan.

At present, some restoration and re-vegetation has been undertaken by two groups (Carmel-by-the-Sea Garden Club and MEarth Carmel). In addition, a more extensive program is now underway, led by dune restoration specialist Joey Dorrell-Canepa.

Both dune areas were surveyed for this Assessment; no issues related to safety, shoreline protection, or coastal viewshed were found.

A few conditions are noted below:

### 2.1 NORTH DUNES

#### 2.1.1 Dead Cypress Trees

- **Condition:** Several dead Monterey Cypress trees have been left standing in the North Dunes area. The City is in the process of deciding what should be done.



Fig 2#1

- **Condition:** Many stands of the “narrow-leaf ice plant” (*Conicosia pugioniformis*), an invasive plant introduced from South Africa, are growing in the North Dunes. While not as aggressive as the more common South African ice plant (*Carpobrotus edulis*) also growing along the Carmel shoreline, both should be removed as part of any restoration program in the North Dunes.



Fig 2#2

## 2.2 DEL MAR DUNES

### 2.1.1 Private Drain Pipe

- **Condition:** A few of the houses in the Del Mar Dunes have pipes that drain onto the City's dunes. It is likely that these transport drain storm water away from their houses.
- ⇒ **Recommended Action:** CITY SHOULD VERIFY THAT PRIVATE DRAIN PIPES, WHICH DISCHARGE ONTO CARMEL'S DEL MAR DUNES, DO NOT CAUSE EROSION OR OTHER NEGATIVE IMPACTS.



Fig 2#3

**Section 2.0 - DUNES**  
**COMMENTS & RESPONSES**

---

## 3.0 SHORELINE BLUFFS

### 3.1 BLUFF EROSION

#### General Conditions

Carmel Beach is located at the lowest elevation of all land within the City limits. Along the shoreline from 8<sup>th</sup> Ave. to Martin Way, people must traverse steep bluffs in order to move to and from the beach.

Over the decades, the City has built nine stairways and maintained three sand ramps for safe beach access, but some people continue to create/use **bluff-cuts** (unauthorized trails cut into the bluffs) for this purpose. Bluff-cuts trample and kill vegetation, channel and accelerate storm water run-off, erode shoreline slopes, and, at some locations, transport dark dirt and other bluff material down onto Carmel Beach's white sand.

During the planning stage of the Carmel Beach Bluff Pathway, landscape designers, along with City staff and the Beach Task Force, identified bluff-cutting as a critical challenge to the Carmel shoreline protection program.

In addition, some of the bluff-cuts located south of 10<sup>th</sup> Ave. also contribute indirectly to sand degradation because these paths are often used to bring firewood down to the beach for use in open fires, which are the primary cause of the discoloration of Carmel Beach (Section 1.1).

Over the past 30 years, the City has used a number of methods to repair existing bluff-cuts and discourage new ones from being created. However, substantial damage from this on-going problem was still evident during the current assessment – the number of bluff-cuts was reminiscent of conditions seen in the early 1980s, before the Beach Bluff Pathway Project.

For many years, City staff has placed large logs over portions of several bluff-cuts (Figs 3#1, 3#7, 3#14). Most of these logs have been oriented along the main axis of the bluff slope, many situated at steep angles. None of these sites show evidence of recent revegetation, and most still exhibit fresh footprints, indicating continued and recent use. Clearly, this method of repairing/discouraging bluff-cuts has not worked well.



## **General Recommendations**

While these bluff-cuts have been a vexing problem, the fact that some have continued to exist for more than ten years sends a clear and permissive message to beach users. The City must work to find effective and aesthetic solutions to this important and long-standing problem.

The most effective response will require a multipronged approach that uses a combination of plantings, guardrails, signage, public education and policing. Such an approach should be developed into a standard restoration/rehabilitation program that could be used to heal erosion caused by bluff-cuts, storm water run-off, and other forces.

While each bluff-cut might have a unique set of conditions, here are some general recommendations:

- **The best response will be a prompt response.** Allowing bluff-cuts and their subsequent damage to continue to exist just invites more use and more damage, requiring more expensive solutions later;
- At most sites, an effective response will involve actions on the bluff, at the blufftop, and along the Pathway;
- If a specific site lacks enough soil for good plant growth, use pressure-treated wood (or other material) to create ample beds of soil;
- While bluff-cut repairs are in progress, install plastic netting to protect new plants from being trampled. Placing a mat of green plastic netting across a bluff-cut (at the same angle as the slope) might help to deter trampling;
- Enforce Section 12.32.165 of the Carmel Municipal Code, which prohibits travel to and from the beach without using stairs or sand ramps. Issuing citations does send a message. Consult with Carmel Police Dept. on the proper wording, location and number of signs required for effective enforcement.
- Because many persistent bluff-cuts are south of 10<sup>th</sup> Ave, (within the zone where beach fires are allowed), schedule enhanced police patrols during 1-2 hours before sunset, when wood for beach fires is often delivered (sometimes using bluff-cuts).
- If these steps prove ineffective, then work to develop better responses. Persistent bluff-cuts might require advice/guidance from a professional landscape designer. In some cases (e.g. 13<sup>th</sup> cove), installation of a new stairway access might be the most appropriate solution.

- Bluff-cutting along the Carmel shoreline will be an on-going and (sadly) never-ending problem. To be effective, the City's responses, including monitoring and repair, must also be on-going and continuous.

**Protection of the Carmel shoreline is a goal worthy of solving the bluff-cut problem.**

3.1.1a **Bluff north of 9<sup>th</sup> Ave. Stairway**

- **Condition:** Bluff-cut treated with log. Fresh foot prints and recent damage show continued use.

⇒ **Recommended Action:**

- REPAIR BLUFF EROSION AS PER GENERAL RECOMMENDATIONS LISTED ABOVE;
- DEVELOP MORE EFFECTIVE ALTERNATIVE THAN SLOPE-LOG



Fig 3#1

3.1.1b **Bluff between 10<sup>th</sup> Ave. Stairway (south) and 11<sup>th</sup> Ave. Stairway**

- **Condition:** Run-off from rainwater collected in Pathway dip causes slope erosion and deposition of dirt onto beach below.

⇒ **Recommended Action:**

- WHEN PATHWAY IS RESURFACED, DIP ABOVE BLUFF DAMAGE SHOULD BE RAISED TO MATCH ADJACENT GRADE;
- REPAIR BLUFF EROSION AS PER GENERAL RECOMMENDATIONS LISTED ABOVE.



Fig 3#2

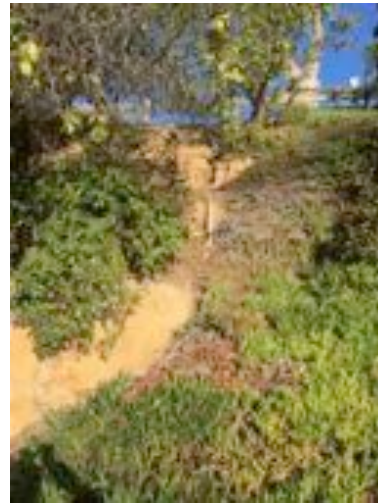


Fig 3#3



Fig 3#4

3.1.1c **Bluff between 10<sup>th</sup> Ave. Stairway (south) and 11<sup>th</sup> Ave. Stairway**

- **Condition:** Unvegetated bluff-face eroding, discharging dirt onto beach sand below

⇒ **Recommended Action:** REPAIR BLUFF EROSION AS PER THE GENERAL RECOMMENDATIONS LISTED ABOVE.



Fig 3#5



Fig 3#6

3.1.1d **Bluff north of 11<sup>th</sup> Ave. Stairway**

- **Condition:** Bluff-cut treated with log installed at steep angle.

⇒ **Recommended Action:**

- REPAIR BLUFF EROSION AS PER GENERAL RECOMMENDATIONS LISTED ABOVE;
- DEVELOP MORE EFFECTIVE ALTERNATIVE THAN SLOPE-LOG.



Fig 3#7

3.1.1e **Bluff south of 11<sup>th</sup> Ave. Stairway**

- **Condition:** Storm water run-off passing over an un-opened dry weather diverter over-topped curb during storm, eroding upper portion of bluff, damaging plants & causing bluff erosion below.

⇒ **Recommended Action:** REPAIR BLUFF EROSION AS PER THE GENERAL RECOMMENDATIONS LISTED ABOVE.



Fig 3#8



Fig 3#9



3.1.1f **Bluff between 11<sup>th</sup> and 12<sup>th</sup> Ave.s**

- **Condition:** Steep bluff-cut exposes pieces of plastic GeoWeb and PVC irrigation pipe. Lack of vegetation exposes site to run-off erosion and invites foot traffic. Reported in previous Assessments.

⇒ **Recommended Action:**

- REPAIR BLUFF EROSION AS PER THE GENERAL RECOMMENDATIONS LISTED ABOVE.
- WHEN REPORTED IN PREVIOUS ASSESSMENTS, STAFF COMMENTS INDICATED LACK OF SOIL HINDERED REPLANTING
  - EFFECTIVE RESPONSE SHOULD INCLUDE STEPS TO CREATE BEDS OF AMPLE SOIL.

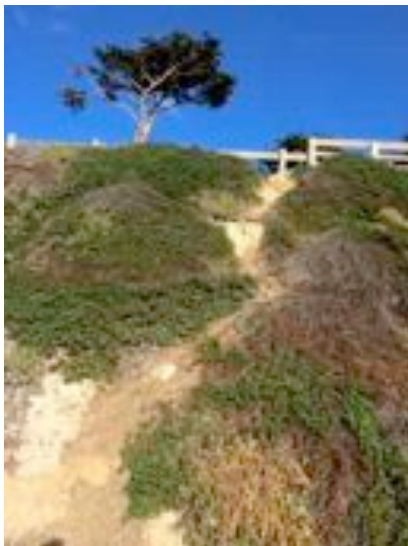


Fig 3#10



Fig 3#11

3.1.1g **Bluff between 12<sup>th</sup> Ave. and 13<sup>th</sup> Ave. Cove**

- **Condition:** Bluff-cuts create deposits of dark dirt onto beach sand. Previous City response to the upper section of one of the bluff-cuts utilized a log; bluff-cut has now widened, with fresh foot prints alongside log.

⇒ **Recommended Action:**

- REPAIR BLUFF-CUT AS PER GENERAL RECOMMENDATIONS LISTED ABOVE;
  - DEVELOP MORE EFFECTIVE ALTERNATIVE THAN SLOPE-LOG

⇒ **Alternative Recommended Action:**

- BUILD A NEW STAIRWAY AT SITE  
\*NOTE: The beach at the bottom of this bluff is one of the most popular sites on Carmel Beach; improved access here is imperative!



Fig 3#12



Fig 3#13



Fig 3#14

## 3.2 BLUFF HOLLOWES and VOIDS

### **General Conditions**

Until the late 1970's, some portions of the shoreline bluffs behind seawalls and retaining walls were backfilled with dirt that contained plant material. As this material decomposed over time, voids and hollows were created within these bluffs. Carmel's shoreline bluffs are off-limits to the public, but these voids/hollows could still pose a hazard for City staff, as well as those few citizens who bluff-cut.

All accessible bluff-fill areas behind seawalls and retaining walls were walked and surveyed; no hollows or voids were detected. This is likely due to steps taken by City staff during the 1990s.



**Section 3.0 – SHORELINE BLUFFS**  
**COMMENTS & RESPONSES**

---

## 4.0 STORM WATER SYSTEM

### 4.1 SHORELINE OUTFALLS

#### General Conditions

Nearly all of Carmel is located above the beach. Most rainwater that falls on the City flows down streets and through pipes toward the shoreline. There, it is discharged onto Carmel Beach through a system of pipes and outfalls with a water-handling capacity that was significantly improved during repairs following the 1982/83 El Niño storms. During periods of moderate- to heavy rainfall, the volume of storm water discharging from any of the City's major outfalls onto Carmel Beach can be very forceful.

With few exceptions (listed below), the City's shoreline outfalls appear to be in good condition.

The first condition of concern is the undercutting of part of the structure supporting Outfall #1 (at 4<sup>th</sup> Ave.); the damage appears to have been the result of foot traffic on an unauthorized trail (Section 4.1.1a).

The remaining shoreline outfall conditions in need of attention appear to be problematic only during rainstorms and a one- or two-week period immediately afterward:

- Seaward ends of three outfalls were partially covered by plants, which could trap storm water debris (Section 4.1.2a,b & c); and
- Storm water discharge from two outfalls each created channels that cut across the beach, while water from a third outfall scoured a nearly 3 ft-deep pit into the sand (Section 4.1.3a, b & c).

The conditions mentioned immediately above become problems for only a short time during the year, and may be easily overlooked. Once the rainy season passes, ice plant that covers outfalls will blend in with the surrounding vegetation. And within a few weeks after a rainfall, the two channels and the pit scoured by storm water discharge had been leveled out by purely natural forces. But during storms (and just afterward), these conditions could have caused major problems: blockages of storm water flow, and hazards for those who walk on the beach, especially in the dark.

## **General Recommendations**

Carmel has been well-served by its storm water system, especially since modifications during the 1980s mentioned above. A certain amount of limited outfall-generated beach erosion might be acceptable provided that it doesn't pose a hazard to the public or cause long-term erosion. With this in mind, the City should seek ways to mitigate these few storm water discharge problems.

### **The City should develop and use standard protocols, with actions to be taken before, during and after storms.** These should include:

- Trimming/clearing all vegetation away from the discharge ends of storm water outfalls well before the onset of the storm season;
- Monitoring storm water discharge on the shoreline during and after storms. If conditions are found that pose hazards to beach users (even during the dark), then the City should:
  - notify the public (with strategically placed signs) that those who walk on the beach during these periods could encounter hazardous conditions; and
  - cordon-off portions of the beach (using galvanized eye-rods and cord) where discharge-generated channels and pits interfere with safe travel.

NOTE: This is similar to the recommendations in Section 6.1, which call for shoreline stairways to be monitored and then closed when storm & tide conditions make access unsafe.

The discharge pit scoured into the sand near the 12<sup>th</sup> Ave. stairway (Section 4.1.3b) might have a structural solution: the City should seek the advice of a structural engineer regarding construction of a structure that can be added to the outfall base to deflect discharge water irrespective of sand level. During the planning of this structure, the City would be wise to consider the impact of two additional factors on any changes to the outfall:

- Certain sections of the shoreline are affected by a fast-moving **lateral current** that flows along some portions of the back beach, usually from north to south. This water becomes trapped behind a low, naturally formed, sand berm, and its rapid flow along the beach bluffs and walls should be taken into consideration when designing any structure in the back beach;<sup>3</sup>
- Review photos taken when the 12<sup>th</sup> Ave. outfall was built, to determine if erosion of its sandstone bluff will be a factor.

---

<sup>3</sup> Described in the City of Carmel-by-the-Sea Shoreline Management Plan.

#### 4.1.1 Outfall Structure

##### 4.1.1a Outfall #1 (4<sup>th</sup> Ave.)

- **Condition:** Landward end of the southern wall is undercut by erosion caused by foot-traffic on a bluff-cut trail. (\*NOTE: Other observers have noted that the slab at base of outfall is too small to effectively deflect storm water discharge.)

⇒ **Recommended Action:**

- WALL SHOULD BE CHECKED BY QUALIFIED ENGINEER;
  - REPAIR OR REBUILD, IF NECESSARY
- CONSIDER INSTALLING LARGER SLAB TO DEFLECT STORM WATER DISCHARGE
- FOCUS IMMEDIATE ATTENTION ON REPAIRING BLUFF-CUT. CONSIDER BACK-FILLING AND REVEGETATION OF SLOPE
- ELIMINATE HIGHLY INVASIVE PAMPAS GRASS.



Fig 4#1



Fig 4#2

#### 4.1.2 **Outfall Obstructions**

*Blocked storm water outfalls can become plugged with debris, interfering with discharge.*

##### 4.1.2a **Outfall #4 (8<sup>th</sup> Ave.)**

- **Condition:** Partially blocked by overhanging ice plant. (NOTE: This condition was reported in Fall 2002 & 2003 CSAs)

⇒ **Recommended Action:**

- DEVELOP & FOLLOW PROTOCOLS FOR CLEARING/TRIMMING ICE PLANT AT LEAST A FEW FT. FROM OUTFALL'S DISCHARGE END BEFORE ONSET OF STORM SEASON, AS PER GENERAL RECOMMENDATIONS.



Fig 4#3

4.1.2b **Outfall (between 9<sup>th</sup> and 10<sup>th</sup> Ave.s)**

- **Condition:** Blocked by overgrown ice plant and other vegetation.

⇒ **Recommended Action:**

- DEVELOP & FOLLOW PROTOCOLS FOR CLEARING/TRIMMING ICE PLANT AND OTHER VEGETATION AT LEAST A FEW FT. FROM OUTFALL'S DISCHARGE END BEFORE ONSET OF STORM SEASON, AS PER GENERAL RECOMMENDATIONS.



Fig 4#4

4.1.2c **Outfall #9 (South of 10<sup>th</sup> Ave.)**

- **Condition:** Partially blocked by overgrown ice plant

⇒ **Recommended Action:**

- DEVELOP & FOLLOW PROTOCOLS FOR CLEARING/TRIMMING ICE PLANT AT LEAST A FEW FT. FROM OUTFALL'S DISCHARGE END BEFORE ONSET OF STORM SEASON, AS PER GENERAL RECOMMENDATIONS.



Fig 4#5

#### 4.1.3 Outfall-Generated Erosion

*Storm water outfalls along the Carmel shoreline should not generate bluff or beach erosion.*

##### 4.1.3a South of 9<sup>th</sup> Ave.

- **Condition:** During/after a mid-December rain storm, discharge from Outfall #6 carved a channel (1-1.5 ft deep) into beach sand close to the bluff; channel became shallower as it flowed seaward. Could be a hazard to foot traffic, especially after dark.

⇒ **Recommended Action:**

- DEVELOP AND FOLLOW STANDARD STORM WATER DISCHARGE PROTOCOLS, AS PER GENERAL RECOMMENDATIONS:
  - MONITOR OUTFALL DISCHARGES DURING & AFTER STORMS.
  - NOTIFY PUBLIC OF POTENTIAL HAZARD (e.g. WARNING SIGNS, WARNING TAPE, GALVANIZED EYE-ROD & CORD BARRIER, OR OTHER METHOD).



Fig 4#6



4.1.3b **12<sup>th</sup> Ave. North Cove**

- **Condition:** Discharge from Storm Water Outfall #11 has created a 2.5 ft. deep pit. Could be a hazard to foot traffic, especially after dark.

⇒ **Recommended Action:**

- DEVELOP AND FOLLOW STANDARD STORM WATER DISCHARGE PROTOCOLS, AS PER GENERAL RECOMMENDATIONS:
  - MONITOR OUTFALL DISCHARGES DURING & AFTER STORMS.
  - NOTIFY PUBLIC OF POTENTIAL HAZARD (e.g. WARNING SIGNS, WARNING TAPE, GALVANIZED EYE-ROD & CORD BARRIER, OR OTHER METHOD).
- CONSIDER MODIFYING BASE OF OUTFALL TO DEFLECT STORM WATER DISCHARGE.



Fig 4#7

4.1.3c **South of Santa Lucia Ave.**

- **Condition:** During/after an early-December rain storm, discharge from Outfall #15 carved a channel (12” deep) into beach sand close to the bluff; channel became shallower as it flowed seaward. Poses a hazard to foot traffic, especially after dark.

⇒ **Recommended Action:**

- DEVELOP AND FOLLOW STANDARD STORM WATER DISCHARGE PROTOCOLS, AS PER GENERAL RECOMMENDATIONS:
  - MONITOR OUTFALL DISCHARGES DURING & AFTER STORMS.
  - NOTIFY PUBLIC OF POTENTIAL HAZARD (e.g. WARNING SIGNS, WARNING TAPE, GALVANIZED EYE-ROD & CORD BARRIER, OR OTHER METHOD).



Fig 4#8

#### 4.2 **STORM WATER INLETS**

*Blocked inlets can trap debris and cause erosion from uncontrolled storm water run-off.*

- **Condition:** All storm water inlets were found to be clear of obstructions.

#### 4.3 **PEDESTRIAN ACCESSWAYS/DRAINAGE EASEMENTS (PA/DE)**

- **Condition:** All PA/DEs between San Antonio & Scenic Rd. were found to be clear of obstructions. Plants from adjacent private properties were well-trimmed and did not encroach on PA/DEs.

**Section 4.0 – STORM WATER SYSTEM**  
**COMMENTS & RESPONSES**

---

## 5.0 SHORELINE ARMORING STRUCTURES

### 5.1 SEAWALLS and RETAINING WALLS

#### General Conditions

Since 1958, the City has built seawalls and retaining walls to protect its shoreline bluffs. Seawalls are structures whose foundations may be impacted by direct wave action, while retaining walls are perched higher on the bluff. Some of the oldest walls were built of “golden granite” rocks, held together by mortar. More recent walls have been built of reinforced concrete, covered with a facing of golden granite.

City documents, including the Shoreline Management Plan, often place these two types of protective walls into separate categories, but some walls along the Carmel shoreline are a combination of both:

- the seawall at 12<sup>th</sup> Ave. Point, with its southern perched retaining wall that extends toward the 13<sup>th</sup> Ave. cove (Fig.s 5#1, 5#2);
- a seawall and its perched retaining wall south of 13<sup>th</sup> Ave. (Fig.s 5#3, 5#4).

One characteristic these two wall types have in common is that both can be affected by **selective erosion**, a process which occurs when a hard granite wall is founded in, or butts against, softer material such as sandstone. Over a relatively short span of time, the sandstone erodes, leaving a gap between it and the wall. During the current Assessment, this erosion was observed at the base of the perched retaining wall that extends from the point at 12<sup>th</sup> Ave. toward the 13<sup>th</sup> Ave. cove (Section 5.1.1a). A similar condition was previously observed between the seawall south of 13<sup>th</sup> Ave. and the adjacent sandstone in February, 2004 – it was subsequently patched.

NOTE: While this Assessment was in the final editing stage, the City met with a certified engineering geologist regarding its shoreline walls; no date for a full inspection has yet been set.

#### General Recommendations

- Have all seawalls and shoreline retaining walls inspected by a qualified engineer:
  - Seawall foundations should be inspected when sand level is low; therefore contract should be established well before storm season;

- Previous observations have documented that the rock at the base of the seawalls on both north and south sides of 13<sup>th</sup> Ave stairway are undercut;
  - These should be closely inspected and repaired as needed;
- Consider use of artificial rock, or other material, as cap for exposed sandstone to prevent selective erosion.

### 5.1.1 Structure

Due to moderate weather and ocean conditions preceding the current Assessment, the bases of all City seawalls were covered by beach sand, preventing observation of any foundations. The outward sides of the bases of most shoreline retaining walls were visible; while technical analysis must await inspection by a structural engineer or certified engineering geologist, evidence of erosion at the base of one retaining wall was clearly evident (Section 5.1.1a). The seaward faces of all shoreline sea walls and retaining walls were all visually scanned for loose facing stones – none were seen. Walls were also checked for significant mortar-cracks; with the exception noted below, no other cracks were seen.

#### 5.1.1a Retaining Wall - 12<sup>th</sup> Ave. Point to 13<sup>th</sup> Ave. Cove

- **Condition:** Portions of the retaining wall base have been undercut by selective erosion of the underlying sandstone. At some locations, gravel from a French drain behind the wall has migrated seaward under the wall.

NOTE: Bluff behind retaining wall was checked to determine if loss of French drain rocks affected bluff drainage; no hollows or voids were found.

#### ⇒ **Recommended Action:**

- WALL SHOULD BE CHECKED BY QUALIFIED ENGINEER;
- GAP BETWEEN BASE OF WALL AND UNDERLYING SANDSTONE SHOULD BE REPAIRED;
- BLUFF FILL-MATERIAL BEHIND WALL SHOULD BE CHECKED DURING RAINY PERIOD TO DETERMINE IF FRENCH DRAIN IS STILL EFFECTIVE;
- CONSIDER CAPPING THE EXPOSED SANDSTONE WITH MATERIAL (e.g. ARTIFICIAL ROCK) TO PREVENT FURTHER SELECTIVE EROSION AND UNDERMINING OF RETAINING WALL



Fig 5#1



Fig 5#2

5.1.1b **Seawall/Retaining Wall between 13<sup>th</sup> and Santa Lucia Ave.s**

- **Condition:** Vertical crack in mortar at boundary between seawall and retaining wing-wall (at sandstone rock).

⇒ **Recommended Action:**

- CRACK IN MORTAR SHOULD BE FILLED WITH APPROPRIATE MATERIAL TO PREVENT WATER SEEPAGE AND DAMAGE TO FASCIA STONES;
- CONSIDER CAPPING THE EXPOSED SANDSTONE WITH MATERIAL (e.g. ARTIFICIAL ROCK) TO PREVENT FURTHER SELECTIVE EROSION AND UNDERMINING OF RETAINING WALL.



Fig 5#3



Fig 5#4



### 5.1.2 Vegetation

*Overhanging plants can mask cracks in mortar or obstructions of important drainage weep holes.*

- **Condition:** Portions of the seawalls (shown below) were covered by salt bush (*Atriplex* sp.), ice plant (*Carpobrotus* sp.) and other overhanging vegetation. This vegetation helps “soften” appearance of massive hard walls, but also obscures mortar and weep holes from inspection.

- Seawall at 10<sup>th</sup> Ave.



Fig 5#5

- Seawall North of Martin Way



Fig 5#6



Fig 5#7

⇒ **Recommended Action:**

- REMOVE DEAD PLANTS & TRIM/THIN REMAINING PLANTS;
- CONDUCT ANNUAL CLOSE INSPECTION OF WALLS BEHIND OVERHANGING PLANTS.

## 5.2 REVETMENTS

### General Conditions

In response to damage sustained by Carmel’s shoreline during the 1982/83 El Niño storms, the City installed a series of engineered rock revetments at several locations along the back beach during Phase I of the Carmel Beach Rehabilitation Project (1983). These were engineered structures, designed and supervised by an engineering-geologist who specialized in coastal protection. Each revetment was built to withstand waves of the size and force calculated to impact Carmel Beach.

As described in the Shoreline Management Plan, the primary revetments consisted of 400-600 lb. granite “core stones” stacked up against the shoreline bluffs over a layer of filter fabric, then covered with 3-5 ton granite “armor stones.” The base layer of armor stones was locked into a keyway cut into the bedrock under the beach. Under qualified supervision, the armor stones were precisely installed to achieve a slope of 1.5:1, which produced an angle-shaped structure that reached a depth of 15 to 20 ft. below the current sand level, and whose base extended 20 ft. seaward from the bluff edge.

Also during Phase I, smaller rock revetments were strategically emplaced to protect some storm water outfalls along the shore. These utilized rocks much smaller than the multi-ton armor stones.

In addition to the revetments installed during the 1983 Project, others were built with varying degrees of design and supervision, some as early as 1978, while others date after 1983.

Among the shoreline elements most in need of attention are the many granite boulders that have either moved away from protective revetments or have shifted and become perched atop other boulders, creating unsafe conditions.<sup>4</sup> Movement of revetment boulders, termed **migration**, is a characteristic of shoreline revetments. Without intervention, loss of boulders can eventually weaken the revetment’s ability to provide protection for the shoreline bluffs and storm water outfalls. The remedy is to reposition migrated boulders by placing them back onto the revetment at locations where they will help maintain the structure’s original design. This process, called **redressing**, has been used in the past to help restore portions of Carmel’s shoreline revetments.

---

<sup>4</sup> It is thought that most of these rocks were from revetments built either before or after Phase I of the Carmel Beach Rehabilitation Project (1983).

A second condition of concern is the long-term exposure of revetment boulders. As described in Section 1.0, the City committed to keep its shoreline revetments covered with beach sand to help address safety and aesthetic issues. In addition, it also allayed the Coastal Commission's concerns about loss of beach caused by the revetment's significant breadth. Using sand to cover the boulders addresses these concerns without decreasing the revetment's ability to protect against erosion. Once the boulders have been adequately covered with sand, beach visitors can have a broader area for people to enjoy, both visually and functionally. But unlike a permanent cover, once the sand is washed away by winter storm waves, the boulders' irregular faceted surfaces, as well as the spaces in-between, serve to deflect and absorb wave energy, lessening the potential for erosion.

To accomplish this task, sand is bulldozed from the lower beach and pushed over the top of each exposed revetment. This **sand redistribution** was based on a procedure used as early as the 1960s by Carmel's Public Works Dept. to maintain safe public beach access at the foot of Ocean Ave.

Sand redistribution, utilizing contractors supervised by City staff, was successfully conducted after the installation of shoreline revetments in 1983, and continued through the early 2000s. However, in recent years, many revetments have remained exposed, in spite of several sand redistribution attempts. To help protect Carmel Beach's visual quality and public safety, and to keep its commitment to the Coastal Commission, the City must carry out these efforts in a more effective manner.

### **General Recommendations**

**Revetment Redressing:** Redressing Carmel's shoreline revetments should be conducted with the advice/guidance of an engineering geologist experienced in the maintenance of these structures. Redressing will help return the revetments to a condition where they can most effectively protect the City's shoreline, as well as remove potentially hazardous perched boulders and dangerous crawl spaces along the beach.

Because each of the City's engineered revetments extends many feet under the sand, redressing is best done when the sand level is low – a situation that occurs on Carmel Beach during particularly stormy winters. However, conditions that remove sand from the beach are not usually conducive for revetment redressing. An alternative strategy

would be to photograph revetments when they are exposed during the winter, and then redress them later in the year when conditions allow.

Revetment Coverage: In discussions with current and previous City staff, it is clear that there is a difference of opinion regarding how much sand must be available in order to effectively cover the shoreline’s exposed revetment boulders. Unfortunately, information that could answer this question has not yet been gathered.

As discussed in the Carmel Shoreline Management Plan, the City was required by the Coastal Commission to conduct **beach profile surveys** along its shore. The information gathered from these surveys could have been used to help determine when, and to what extent, sand redistribution should be conducted. As part of this program, a series of benchmarks was installed on Scenic Road, but no surveys were ever conducted.

In the absence of accurate volumetric information, sand redistribution efforts will need to be conducted based on previous experience. Because this procedure is an important shoreline management tool, the City will benefit from discussions with former staff members who were directly involved in previous successful sand redistribution efforts.

**A better understanding of how Carmel’s white beach sand changes over time is a very important tool for managing its shoreline; the City is urged to commence beach profile surveys.**

### 5.2.1 Sand Cover

- **Condition:** Many of the City’s shoreline revetments were only partially covered, exposing perched boulders and dangerous open crawl spaces. (Section 5.2.2)
  
- ⇒ **Recommended Action:** AS PER THE GENERAL RECOMMENDATIONS, ABOVE, THE CITY SHOULD ACTIVELY CARRY OUT SAND REDISTRIBUTION TO ENSURE THAT SHORELINE REVETMENTS ARE COMPLETELY COVERED TO PROTECT PUBLIC SAFETY AND ENHANCE SHORELINE AESTHETICS.

### 5.2.2 Structure

*All revetments should be inspected for loose, perched, or migrating boulders.*

- **Condition:** Loose, perched, and/or migrating boulders were observed at the sites listed below. Due to moderate winter conditions, other shoreline revetments could not be assessed because sand levels were unseasonably high.
- Storm Water Outfall #2 (@ Foot of Ocean Ave.)



Fig 5#8

- Revetment/Storm Water Outfall #4 (@ North of 8<sup>th</sup> Ave.)



Fig 5#9



Fig 5#10



- Revetment @ Base of 11<sup>th</sup> Ave. Stairway



Fig 5#11

- Revetment @ South of 11<sup>th</sup> Ave.



Fig 5#12



Fig 5#13

- Revetment in cove North of 12<sup>th</sup> Ave.



Fig 5#14



Fig 5#15



Fig 5#16



Fig 5#17

- Revetment between 13<sup>th</sup> & Santa Lucia Ave.s



Fig 5#18



Fig 5#19

⇒ **Recommended Action:**

- BOULDERS IN EXPOSED REVETMENTS SHOULD BE REDRESSED BY EXPERIENCED PERSONNEL FAMILIAR WITH THESE SHORELINE PROTECTION STRUCTURES;
  - AS PER GENERAL RECOMMENDATIONS, REVETMENT BASES SHOULD BE PHOTOGRAPHED WHEN THEY ARE EXPOSED DURING THE WINTER, AND THEN REDRESSED LATER IN THE YEAR WHEN CONDITIONS ALLOW.
  - PERCHED BOULDERS AND HOLLOW SPACES SHOULD BE REARRANGED FOR PUBLIC SAFETY;
  - REVETMENTS CURRENTLY COVERED WITH SAND SHOULD BE INSPECTED FOR THESE CONDITIONS WHENEVER SAND LEVEL ALLOWS. CITY SHOULD CONTINUE SAND REDISTRIBUTION EFFORTS;
- ALL EXPOSED REVETMENTS SHOULD BE COVERED WITH SAND, AS PER GENERAL RECOMMENDATIONS.



**Section 5.0 – SHORELINE ARMORING STRUCTURES**  
**COMMENTS & RESPONSES**

---

## 6.0 SHORELINE ACCESS

### 6.1 STAIRWAYS

#### General Conditions

All of the City's shoreline stairs are exposed to salt spray throughout the year. The lower sections of some stairs (e.g. Martin Way), may be inundated by seawater during storms and high tides. And for many months, other stairs (e.g. 11<sup>th</sup> Ave.) may be buried under beach sand. These conditions, especially exposure to salt, can have a negative effect on shoreline access stairways, especially their metal screws, bolts, plates and other critical hardware.

While the current Assessment was being conducted, a structural engineer from Gerald A. Graebe & Assoc.s carried out an in-depth inspection of all the City's shoreline stairways. The results of that inspection should be considered along with this general assessment of the shoreline.

While Carmel's shoreline stairs are expected to provide safe access to and from the beach, there are times when conditions are challenging, and even unsafe. For example, during the current Assessment, the Martin Way stairs were observed several hours after a rainstorm had passed. Weather conditions had become moderate and several people were seen walking on the Pathway – a few who descended the stairway encountered seawater washing over the bottom steps. The tide was approx. +5.0 ft, and water was carried toward the stairway by a rapid **lateral current**<sup>5</sup> that sometimes flows along the seawall at this section of Carmel Beach. Fortunately, visibility was good and these people turned back before reaching the bottom; a trip down these City stairs by unwary visitors in the dark would have put them at risk.

#### General Recommendations

Stairway Inspections: The inspection of Carmel's shoreline stairways by Graebe & Assoc.s is the first by a structural engineer in recent memory. Given that these structures must withstand forces such as wave impact, exposure to salt and occasional burial under beach sand, this level of examination is imperative. How often structural inspections need to be conducted should be determined with the advice of the City Engineer. These

---

<sup>5</sup> Lateral Current is described in Section 4.1 of this Assessment

engineering reports can be complemented by annual general observations made by City Staff as well as regular Shoreline Assessments.

Stairway Monitoring: The conditions encountered on the Martin Way stairway during and after a winter rainstorm could have been hazardous to anyone using the stairway, especially in the evening. The City should develop and use **standard protocols** to ensure that the public can safely use Carmel's shoreline access stairways. These should include:

- Monitoring
  - during significant high tides; and
  - during and after storms;
- Special attention should be paid to the impact of any lateral flow, which often occurs along the back beach and seawalls near the Martin Way stairway and other locations during storm periods;
- If conditions on a stairway, or at its base, are unsafe, then the stairway should be closed to public use until safe conditions return;
- Signs should be installed to inform and warn the public about possible hazardous conditions, especially at night;
  - Signs should be developed with the cooperation of the Carmel Police Dept.

NOTE: These protocols should apply to any shoreline access stairway where waves wash over the base and/or steps during significant high tides or during/after storms (e.g. this condition has been observed at the 13<sup>th</sup> Ave. stairway during previous years).

6.1.1 **Safety**

*Passage up and down shoreline stairways should be safe and convenient.*

6.1.1a **10<sup>th</sup> Ave. (South) Stairway**

- **Condition:** Base of stairway is partially blocked by *Myoporum* branches

⇒ **Recommended Action:** TRIM VEGETATION TO PROVIDE UNOBSTRUCTED ACCESS



Fig 6#1

6.1.1b **Martin Way Stairway**

- **Condition:** Stairway descends into seawater brought in by direct wave action and lateral current during and after storms.

⇒ **Recommended Action:**

- DEVELOP AND FOLLOW STANDARD STORM/HIGH TIDE PROTOCOLS, AS PER GENERAL RECOMMENDATIONS:
  - MONITOR SHORELINE STAIRWAYS DURING SIGNIFICANT HIGH TIDES AND DURING & AFTER STORMS;
  - UTILIZE TIDE PREDICTION TABLES TO PREPARE FOR UPCOMING TIDES, ESPECIALLY THOSE THAT OCCUR DURING THE NIGHT;
  - CLOSE STAIRWAYS UNTIL SAFE CONDITIONS RETURN;
- INSTALL INFORMATION AND WARNING SIGNS TO NOTIFY THE PUBLIC OF POSSIBLE HAZARDS.



Fig 6#2

6.1.1c **Santa Lucia Stairway**

○ **Condition:** Some steps and mortar are cracked and broken.

⇒ **Recommended Action:** STEPS SHOULD BE RE-POINTED TO MATCH NEW RESTROOM STAIRS

➔ **Response (Comment/Action/Date):**

**R**

STEPS WERE RE-POINTED BY PUBLIC WORKS BEFORE NEW RESTROOM WAS OPENED TO PUBLIC



Fig 6#3

## 6.2 SAND RAMPS

### **General Conditions**

The condition of the Handicap Access Sand Ramp was disappointing. As noted below, the ramp’s slope appeared to be steeper than originally designed, and its sand was a foot lower than the level of the adjacent Pathway, making access difficult, even impossible, for those of limited mobility. Added to this were a PVC irrigation pipe and red wires (part of the irrigation control system) crossing the ramp just a few feet seaward of the Pathway edge – these were tripping hazards for foot traffic and exposed important irrigation system components to damage.

As stated in the Carmel Shoreline Management Plan: “The City of Carmel has an abiding commitment toward making its shoreline as accessible as possible, given the existing topographic conditions.” The Handicap Access Sand Ramp was designed to help the City carry out this commitment by making Carmel’s white sand available to people of limited mobility. It can be accessed from the Pathway or by a curb ramp from Scenic Road; the two parking spaces adjacent to the curb ramp are marked exclusively for Handicap Parking.

As part of the beach access system, these sand ramps are just as important as Carmel’s stairways. Given their composition, however, the sand ramps are much more dynamic and therefore require closer monitoring and on-going maintenance. The level and slope of each ramp can change very quickly. While this might not cause problems along most portions of the ramps, abrupt changes in the Handicap Access Sand Ramp adjacent to the Pathway poses a clear hazard.

Portions of the ramp were covered with tan-colored “dirt” rather than Carmel’s white beach sand. Over time, some of this material has moved down to cover a portion of the beach itself. This adds to the problem of sand discoloration described in Section 1.0.

### **General Recommendations**

**Sand Ramp Maintenance:** Primary maintenance of the City’s sand ramps should occur during the annual sand redistribution process (Sections 1.0 and 5.2.1). If the amount of available sand is truly limited, it is recommended that maintenance of the City’s access sand ramps be a top priority.

Given how rapid changes to the sand level of the Handicap Access Sand Ramp can affect safety, City staff should pay especially close attention to ramp conditions adjacent to the Pathway. At any time of year, if the ramp's sand level is too low, new beach sand should be imported from a nearby area to ensure a smooth transition between the Pathway and ramp. When maintaining Carmel's Handicap Access Sand Ramp, the City should use **only** white sand to cover the ramp.



### 6.2.1 **Obstructions**

*Safe pedestrian travel on beach access sand ramps should not be obstructed.*

#### 6.2.1a **Handicap Access Sand Ramp (between 8<sup>th</sup> & 9<sup>th</sup> Ave.s)**

- **Condition:** Sand level of ramp is too low and slope appears steeper than originally designed. There is a sudden one-foot drop-off between the Pathway and the top of the sand ramp, making it unsuitable for by people of limited mobility. Low sand level has also exposed PVC irrigation pipe and electric wires from shoreline irrigation system, creating a tripping hazard.

⇒ **Recommended Action:**

- MAINTAINING PROPER SAND LEVEL & SLOPE MUST BE A HIGH PRIORITY:
  - RECONTOUR DURING SAND REDISTRIBUTION OPERATIONS AND WHENEVER NECESSARY;
  - IF NECESSARY, IMPORT SAND FROM OTHER AREAS OF CARMEL BEACH;
- ENSURE THAT IRRIGATION PIPE & WIRES ARE PROTECTED AND ADEQUATELY COVERED;
- USE ONLY WHITE CARMEL BEACH SAND TO COVER RAMP



Fig 6#4



Fig 6#5



Fig 6#6

### 6.3 BEACH-BLUFF PATHWAY

#### **General Conditions**

The Carmel Beach Bluff Pathway is clearly one of the most popular improvements that the City has made to its shoreline. It enables pedestrians to enjoy unparalleled vistas of Carmel Beach and the Bay, and to have easy access to the numerous stairs and two sand ramps that lead down to the beach.

When the Pathway was being designed, the City chose to use decomposed granite (DG) for its “natural” appearance, rather than hard paving. In spite of its many benefits, DG is more susceptible to erosion than harder materials. Over time, the wear-and-tear of pedestrian use can damage the Pathway surface. In addition, uneven DG can allow rainfall to create puddles and mud which make pedestrian travel somewhat difficult, especially for people of limited mobility. And in a few locations, uncontrolled runoff of rain water from the Pathway was observed to erode nearby bluffs and slopes. It is clear that much of the Pathway is in need of new DG resurfacing, leveling and re-contouring.

One portion of the Pathway that deserves special treatment is located north of the 11<sup>th</sup> Ave. stairway (Section 3.1.1b). Here, the elevation of the original Pathway was lowered for a short distance to help pedestrians avoid a low-hanging tree branch. In past years, the tree died and was removed, but the dip in the Pathway still remains. During this Assessment, rainwater was observed filling the depression and then flowing over the edge of the bluff, causing slope erosion and washing dirt down onto the beach below.

#### **General Recommendations**

To ensure an even walking surface, the Pathway should be resurfaced with decomposed granite (DG). The DG recipe recommended in the RHAA plan appears to have held up well, and should be used in any future resurfacing.<sup>6</sup> As with the original laying of the Pathway, care should be taken to match the grade of the Pathway with elements such as curb-access ramps, stairway thresholds, and stone patios.

Any Pathway re-surfacing should be coordinated with changes to landscape plants and guardrails recommended in Section 9. The suggested movement of some guardrails away from the bluff edge (to

---

<sup>6</sup> The Pathway DG mix used in the original RHAA plan consisted of 95% decomposed granite + 5% cement. The cement was tinted with Davis Concrete Color (“Mesa Bluff” no. 5447), mixed dry at 2 lbs./94 lb. bag of I-II Portland Cement.

ensure stability) may affect which plants are best suited for a given site; additionally, the distance between a guardrail and the Pathway may affect where people sometimes walk and stand. Coordination of Pathway re-surfacing, guardrail re-location and planting, will help avoid conflicting actions.

As described in the General Conditions, above, erosion affecting the bluff north of 11<sup>th</sup> Ave. is associated with a portion of the Pathway intentionally designed to dip under a low tree branch. With the removal of the tree, the City can now raise the Pathway grade at this site to match the surrounding topography. This should be a component of any resurfacing of this section of Pathway. It will eliminate both the pooling of rainwater and run-off erosion of the adjacent bluff.

### 6.3.1 **Obstructions**

*Safe and convenient travel along the Pathway should not be obstructed.*

#### 6.3.1a **9<sup>th</sup> to 12<sup>th</sup> Ave.s**

- **Condition:** Uneven Pathway surface susceptible to pooling of water and mud during & after rains, creating hazards for pedestrians. At some locations, these completely cover Pathway width, forcing people to walk on landscape vegetation.

⇒ **Recommended Action:**

- PATHWAY IN NEED OF RESURFACING, AS PER GENERAL RECOMMENDATIONS.
- ENSURE CROWN-SHAPE TO NEW SURFACE TO ENHANCE PROPER DRAINAGE.



Fig 6#7



Fig 6#8

### 6.3.2 **Erosion**

*Run-off from Pathway should not cause bluff erosion.*

(see Section 3.1)

### 6.3.3 **Handicap Accessibility**

*Safe and convenient travel along the Pathway should not be obstructed.*

All interfaces between the pathway, stone patios, stairway thresholds, and curb-access ramps were smooth (transition equaled less than ½ inch). However, as noted above (Section 6.3.1a), rain- and mud-puddles on the Pathway during and after storms, and the poor condition of the Handicap Access Sand Ramp (Section 6.2.1a), create difficulties for people of limited mobility – these should be remedied.

## 6.4 **PEDESTRIAN ACCESSWAYS/DRAINAGE EASEMENTS** (see Section 4.3)

## **Section 6.0 – SHORELINE ACCESS**

### **COMMENTS & RESPONSES**

---

## 7.0 PUBLIC SUPPORT FACILITIES AND AMENITIES

### 7.1 RESTROOMS

#### General Conditions

Public restroom at the Ocean Ave./Del Mar parking lot and the new facility at Santa Lucia Ave. were clean and in excellent working order. The bluffs above the Santa Lucia restroom (both north and south of stairway) are likely to attract bluff-cutting foot traffic.

#### General Recommendations

An important key to protecting the bluffs above the new Santa Lucia Ave. restroom will be the elimination of unauthorized bluff-cut trails. This is discussed in more detail in Section 9.2.2c.

### 7.2 WASH-OFF STATIONS

#### General Conditions

With one exception noted below, the wash-off stations were in excellent condition; faucets and drains were operating as designed.

#### 7.2.1a 8<sup>th</sup> Ave. Stairway

- **Condition:** Faucet is not connected to water system. Previously reported: CSA Fall 2001, '02 and '03.

⇒ **Recommended Action:**

- CONNECT WASH-OFF STATION TO WATER SYSTEM.



Fig 7#1

### 7.3 TRASH/RECYCLING CONTAINER ENCLOSURES

#### 7.3.1 Secure Enclosure

*All trash enclosures should be convenient and kept clean for public use and trash/recycling services.*

##### 7.3.1a Ocean Ave./Del Mar Parking Lot

- **Condition:** All trash/recycling containers in this area are uncovered for easy public use, but these open containers invite feeding by gulls & crows. NOTE: All trash/recycling containers along the **Pathway** are covered, but appear to be well-used by public.

⇒ **Recommended Action:**

- CONSIDER USING CONTAINERS THAT DISCOURAGE FEEDING BY WILDLIFE;
  - ADD LIDS WITH HOLES FOR TRASH/RECYCLING
  - WORK WITH WASTE-HAULER TO DEVELOP EFFECTIVE REPLACEMENT CONTAINERS THROUGHOUT SHORELINE AREA



Fig 7#2



7.3.1b **13<sup>th</sup> Ave. Stairway Patio**

- **Condition:** Extra trash & recycling carts placed in front of enclosure, replacing large green dumpster which had been there for more than a year.

⇒ **Recommended Action:**

- **INSTALL 2<sup>ND</sup> STONE ENCLOSURE AT SITE OF PREVIOUS DUMPSTER**
  - **SHOULD BE LARGE ENOUGH TO HOLD ADEQUATE NUMBER OF SMALLER TRASH/RECYCLING CONTAINERS TO HANDLE VOLUME GENERATED BY VISITORS AT THIS SITE**



Fig 7#3



Fig 7#4



## 7.4 BENCHES

### 7.4.1 General

All benches along the shoreline were found to be in excellent condition.

## 7.5 BACKFLOW PREVENTER

### 7.5.1 Pathway South of 13<sup>th</sup> Ave.

- **Condition:** Backflow preventer installed adjacent to Pathway with shut-off valves easily in-reach.

⇒ **Recommended Action:** CONSIDER SURROUNDING WITH STONE OR WOOD ENCLOSURE TO DETER VANDALISM.



Fig 7#5

**Section 7.0 – PUBLIC FACILITIES & AMENITIES**  
**COMMENTS & RESPONSES**

---

## 8.0 SIGNAGE

### General Conditions

Signs along the City’s shoreline are meant to inform and, in some cases, warn, the public. Most of these are located along the Pathway, on/near beach access stairways and ramps, or on the Pedestrian Access/Drainage Easements that connect San Antonio Ave. with Scenic Rd. For years, the City has sought to have enough signs to notify shoreline users of beach conditions and municipal regulations, without creating visual clutter.

During this current Assessment, it became clear that nearly all signs along the Carmel shoreline are in need of replacement. Many show the results of exposure to weathering, which is harsher than conditions encountered at other City parks. Many signs are marred by rusting from fastening screws, while others are cracked or partially broken. And, like the guardrails discussed in Section 9.2, several ACCESS signs are mounted on posts that have been severely decayed by weathering – they will soon fail.

In addition to problems with the signs themselves, a few of the City’s information/warning signs are unreadable because they have become overgrown by surrounding plants. And the sign affixed onto the trash enclosure at the 8<sup>th</sup> Ave. stairway, which informs about fires, alcohol and sleeping on the beach, is almost totally buried under sand and dirt. In each of these cases, **important information cannot be communicated to the public because regular maintenance has not kept these signs clear.**

### General Recommendations

The City has authorized funds for a new Waterfront Sign Program. During the design stage of the Beach Bluff Pathway Project (1980s), the City’s Beach Task Force, landscape designers and City staff. deliberated extensively on the subject of signage. The records of those discussions and their resulting recommendations would be valuable to review while the City contemplates its current sign program.

Some of the issues considered during that original Pathway project include:

- Location – placing signs where they are most likely to be seen by shoreline visitors (different signs may require different placement – some signs will be most effective facing toward the Pathway, while others should face toward the beach);
- Visibility – keeping adjacent vegetation trimmed so that signs are not obstructed; this will require regular monitoring as well as trimming. The City should also strive to prevent its shoreline information signs from being buried by dirt or sand, as observed on the side of the trash/recycling enclosure at Scenic Rd. and 8<sup>th</sup> Ave.
- Material – given the harsh conditions that characterize the shoreline, choice of proper materials for sign construction, including posts and fasteners, will be critical;
- Wording - this is of utmost importance. Signs that have too much information are often ignored by the public, but signs that are not properly worded might not be enforceable by the police. Therefore, the wording of signs that inform about City regulations pertaining to fires, bluff-cutting, alcohol and other issues should be cleared with the Carmel Police Dept. before adoption. This should also apply to sign location.

Those involved in developing new shoreline signs for the City should also become familiar with the signage program of the California Dept. of Parks and Recreation (CDPR). Nearly all State Parks within 50 miles of Carmel are also located along the ocean's edge, and are thus exposed to the same human impacts and natural forces that are encountered along our local shoreline. Many elements of CDPR's signs could be applied to Carmel's new sign program, including materials, colors, wording and use of internationally understood symbols.

8.1 **VISIBILITY** (Obscured/ Unreadable/Damaged Signs)

*Official signs should be kept in good repair and regularly maintained to ensure that they are readable.*

8.1.1a **North Dunes**

- **Condition:** Beach information sign obscured by overgrown vegetation

⇒ **Recommended Action:** KEEP VEGETATION TRIMMED SO THAT SIGN WILL BE VISIBLE TO THE PUBLIC.



Fig 8#1

8.1.1b **Wash-off Station at 8<sup>th</sup> Ave. stairway**

- **Condition:** Beach information sign mostly buried under sand/dirt

⇒ **Recommended Action:** MOVE SIGN TO NEARBY LOCATION WHERE IT WILL BE VISIBLE TO THE PUBLIC



Fig 8#2



Fig 8#3

8.1.1b **Trash Enclosure at 11<sup>th</sup> Ave. (south) stairway**

- **Condition:** Beach information sign badly damaged. (NOTE: reported in previous Assessments)

⇒ **Recommended Action:** REPLACE ALL INADEQUATE SIGNS, AS PART OF WATERFRONT SIGN PROGRAM



Fig 8#4

**Section 8.0 - SIGNAGE**  
**COMMENTS & RESPONSES**

---

## 9.0 SHORELINE LANDSCAPE

### 9.1 PATHWAY VEGETATION

#### General Conditions

Landscape plants are clearly an important component of the Carmel Beach Bluff Pathway. In addition to their aesthetic value, plants play an important role in discouraging the creation and use of erosion-generating bluff-cuts by people who take shortcuts to access the beach.

The plants used in the original Pathway plan were selected by landscape designers at Royston, Hanamoto, Alley and Abey (RHAA), with direction from the Carmel Beach Task Force and City staff. These species met several important criteria, including low water-use, low maintenance, and ability to thrive in our “Mediterranean” climate; in addition, their flowers and leaves blended well the coastal landscape theme.

Today, almost none of the species from the original RHAA shoreline landscape plan remain at the site. At many locations, the original species have been displaced by more prosaic plants such as New Zealand spinach (*Tetragonia* sp.), mirror plant (*Coprosma* sp.) and acacia (*Acacia* sp.). At other locations, planter areas that once held landscape plants are now covered by bark and chips, or just bare ground.

This move away from the original landscape species had been noted during the earliest Carmel Shoreline Assessments (2001 and 2002). At some locations, decisions to introduce new plants were made by City staff not familiar with the RHAA plan. In other cases, aggressive exotic plants already growing along the shoreline, such as ice plant (*Carpobrotus* sp.) and acacia, were allowed to out-compete the landscape plants. During the current Assessment, as in previous years, some fast-growing species (i.e. ice plant) were observed to have partially covered important storm water outfalls, while others have hidden some of the City’s shoreline information signs.



The original Beach Bluff Pathway and landscape received much public and professional acclaim, but it has not been maintained over the years. The reasons are multifaceted but likely include:

- funding
- staffing
- training
- lack of understanding of the landscape plan; and
- lack of appreciation of the many important roles that the landscape plays in the protection and public enjoyment of the shoreline.

### **General Recommendations**

The Beach Bluff Pathway plan that was approved by the City of Carmel in the 1980s was ambitious and set a high standard – it is hoped that the City will live up to this standard.

The first step toward recapturing the qualities of the original landscape plan should be to make an honest appraisal of lessons learned:<sup>7</sup>

- What worked and what didn't?
- Did any of the original plants prove ill-suited for conditions at the site? Why?
- Are there any new species that should be added to the list of acceptable plants?
- What role did problems with the irrigation system (including pipes, fixtures, controllers and underground water tank) play?
- What level of staff and/or contractors will be required to maintain the shoreline and its landscape?
- What level of funding will be required to maintain the shoreline and its landscape?
- What would an effective management program look like?
- What administrative and training changes will be needed to ensure that approved plans and programs will be followed by staff?

Based on the answers to these and other related questions, solutions need to be developed to begin the next step:

- **re-landscaping a limited number of high-visibility sites along the Pathway.**

---

<sup>7</sup> This process might best be accomplished by the Forest and Beach Commission, with input from City Staff.

Experience gained at these sites will help determine the level of effort and funding that will be required to plant and maintain a viable and appropriate landscape. This information will be valuable in expanding the landscape to other locations along the shoreline. Such a process could take years, but the results will be a landscape that enhances Carmel's shoreline and public's enjoyment.

### 9.1.1 Plant Selection

#### 9.1.1a **Pathway (Total Length, from 8<sup>th</sup> Ave. to South City Limit)**

- **Condition:** Nearly all landscape plants now growing along the Pathway, including mirror plant (*Coprosma* sp.), New Zealand Spinach (*Tetragonia* sp.) and acacia, were not components of the original approved species list.

⇒ **Recommended Action:**

- DEVELOP PROGRAM TO REVITALIZE PATHWAY/BLUFF LANDSCAPE AS PER GENERAL RECOMMENDATIONS LISTED ABOVE;
- REVIEW RHAA PLAN TO UNDERSTAND ORIGINAL DESIGN INTENT;
- SET CRITERIA TO APPRAISE ALL PLANTS
  - ENSURE THAT DEVIATIONS FROM PLAN ARE APPROVED BY FOREST & BEACH COMMISSION;
- BEGIN RE-INTRODUCING APPROVED PLANTS IN AREAS SELECTED TO MEET THESE CRITERIA:
  - MAKE A SIGNIFICANT VISUAL IMPACT ON THE PUBLIC; AND/OR
  - PROVIDE PROTECTION FOR AN IMPORTANT ASPECT OF THE PATHWAY/BLUFF LANDSCAPE

## 9.1.2 Poorly-trimmed Vegetation

### 9.1.2a Pathway at Sand Ramp (between 8<sup>th</sup> and 9<sup>th</sup> Ave.s)

- **Condition:** Malva Rosa (*Lavatera assurgentiflora*) encroaching on public bench.

⇒ **Recommended Action:**

- TRIM TO KEEP BENCH CLEAR OF FOLIAGE;
- PRUNE TO MAINTAIN HEIGHT AND WIDTH APPROPRIATE FOR EACH SITE
  - AVOID ALLOWING PLANTS TO BLOCK VIEWS OF OCEAN;
  - USE “DROP-CROTCH” PRUNING TO MAINTAIN NATURAL “INFORMAL” APPEARANCE;
- REMOVE SELECTED PLANTS TO AVOID AN UNBROKEN WALL OF VEGETATION.



Fig 9#1

9.1.2b **Pathway between 8<sup>th</sup> & 9<sup>th</sup> Ave.s (near Handicap Access Ramp)**

- **Condition:** Acacia trimmed into solid cube-shaped hedge that blocks pedestrian views of ocean.

⇒ **Recommended Action:** MAINTINING AN ACACIA HEDGE AT THIS SITE MIGHT BE AN ACCEPTABLE METHOD OF KEEPING PEDESTRIANS ON THE PATHWAY, BUT THIS COULD BE ACHIEVED WITH A LOWER HEDGE THAT DOES NOT OBSCURE VIEWS, OR WITH A GUARDRAIL.

IF ACACIAS ARE RETAINED:

- PRUNE TO MAINTAIN HEIGHT AND WIDTH APPROPRIATE FOR EACH SITE
  - AVOID ALLOWING PLANTS TO BLOCK VIEWS OF OCEAN;
  - USE “DROP-CROTCH” PRUNING TO MAINTAIN NATURAL “INFORMAL” APPEARANCE;
  - REMOVE SELECTED PLANTS TO AVOID AN UNBROKEN WALL OF VEGETATION.

⇒ **Alternative Recommended Action:**

- DEVELOP & IMPLEMENT PLAN TO RE-LANDSCAPE PATHWAY BETWEEN 8<sup>TH</sup> AND 9<sup>TH</sup> AVE.S;
  - THIS SHOULD BE ONE OF THE SITES SELECTED FOR LANDSCAPE REVITALIZATION, AS PER GENERAL RECOMMENDATIONS, ABOVE;
  - CONSIDER REPLACING WITH PLANTS FROM APPROVED PATHWAY LANDSCAPE LIST;
  - BECAUSE SAND IS ADJACENT TO THE ROAD AT THIS SITE, CONSIDER OPPORTUNITIES TO USE NATIVE DUNE GRASS *Leymus* sp.



Fig 9#2

9.1.2c **Bluff just north of 9<sup>th</sup> Ave. stairs**

- **Condition:** Large Cypress tree partially obscured by overgrown acacias.

⇒ **Recommended Action:**

- REMOVE ACACIAS TO SHOWCASE CYPRESS;
- DEVELOP & IMPLEMENT PLAN TO RE-LANDSCAPE SITE
  - THIS SHOULD BE ONE OF THE SITES SELECTED FOR LANDSCAPE REVITALIZATION, AS PER GENERAL RECOMMENDATIONS, ABOVE;
- AS PART OF ANY LANDSCAPE PLAN, REVEGETATE & REHABILITATE ANY BLUFF-CUTS.



Fig 9#3

9.1.2d **Pathway near 10<sup>th</sup> Ave. Stairway (north)**

- **Condition:** Mirror plants (*Coprosma* sp.) trimmed into cube-shaped hedge.

⇒ **Recommended Action:**

- RE-ASSESS USE OF MIRROR PLANTS, AS PER GENERAL RECOMMENDATIONS LISTED ABOVE;
- USE “DROP-CROTCH” TRIMMING TO MAINTAIN NATURAL “INFORMAL” APPEARANCE.



Fig 9#4



9.1.2e **Pathway just north of Martin Way**

- **Condition:** Mirror plant (*Coprosoma* sp.) trimmed into solid cube-shaped hedge that blocks pedestrian views of ocean.

⇒ **Recommended Action:** MAINTINING A MIRROR PLANT HEDGE AT THIS SITE MIGHT BE ACCEPTABLE, GIVEN ITS PROXIMITY TO STEEP DROP-OFF. BUT PEDESTRIAN SAFETY COULD BE ACHIEVED WITH A LOWER HEDGE THAT DOES NOT COMPLETELY OBSCURE VIEWS OR WITH A GUARDRAIL.

- PRUNE TO MAINTAIN HEIGHT AND WIDTH APPROPRIATE FOR EACH SITE
  - AVOID ALLOWING PLANTS TO BLOCK VIEWS OF OCEAN;
  - USE “DROP-CROTCH” PRUNING TO MAINTAIN NATURAL “INFORMAL” APPEARANCE;
  - THIN BY REMOVING SELECTED PLANTS TO AVOID AN UNBROKEN WALL OF VEGETATION;
- CONSIDER USING PLANTS FROM APPROVED LIST.



Fig 9#5

### 9.1.3 Bare Planters Areas

#### 9.1.3a Pathway from 8<sup>th</sup> Ave. to South City Limit

- **Condition:** Many planter areas are now devoid of plants. Some are covered with chips and bark, others are bare. This is a major deviation from the City’s approved landscape plan.

⇒ **Recommended Action:**

- DEVELOP PROGRAM TO REVITALIZE PATHWAY/BLUFF LANDSCAPE AS PER GENERAL RECOMMENDATIONS LISTED ABOVE;
- REVIEW RHAA PLAN TO UNDERSTAND ORIGINAL DESIGN INTENT;
- SET CRITERIA TO APPRAISE ALL PLANTS;
  - ENSURE THAT DEVIATIONS FROM PLAN ARE APPROVED BY FOREST & BEACH COMMISSION;
- BEGIN RE-INTRODUCING APPROVED PLANTS IN AREAS SELECTED TO MEET THESE CRITERIA:
  - MAKE A SIGNIFICANT VISUAL IMPACT ON THE PUBLIC; AND/OR
  - PROVIDE PROTECTION FOR AN IMPORTANT ASPECT OF THE PATHWAY/BLUFF LANDSCAPE
- USE “DROP-CROTCH” TRIMMING TO MAINTAIN NATURAL “INFORMAL” APPEARANCE.



Fig 9#6



Fig 9#7



## 9.2 PATHWAY GUARDRAILS/FENCES

### General Conditions

Carmel's shoreline landscape consists of more than plants. For the public's safety and to help protect Carmel's fragile shoreline slopes and landscape, the City installed wooden guardrails at selected sites along the Pathway. During the current Assessment, each section of guardrail was checked for stability. Several sections were found to have loose rails and/or decayed/wobbly posts. While the guardrails were never intended to take the place of fences, the combination of loose or decayed rails, unstable posts and a steep bluff creates unsafe conditions.

### General Recommendations

- Unstable guardrails and support posts should be **promptly** replaced, possibly with more substantial, durable pressure-treated 8x8 posts already in use along the Pathway between 9<sup>th</sup> & 10<sup>th</sup> Ave.s and between Santa Lucia Ave. & Martin Way;
- At locations where guardrails have been weakened due to bluff erosion, it might be necessary to first stabilize the bluff, or to relocate the guardrail to a more stable location, perhaps closer to the Pathway (making more space available for landscape plants);
- Some guardrails built or repaired after completion of the Beach Bluff Pathway were fastened with nails. The original Pathway design specifications called for using bolts for all wood structures. This should be honored.

## 9.2.1 Guardrail Repair/Replacement

### 9.2.1a Pathway just south of 9<sup>th</sup> Ave. Stairway

- **Condition:** Guardrail posts are wobbly.



Fig 9#8

### 9.2.1b Pathway between 11<sup>th</sup> & 12<sup>th</sup> Ave.s

- **Condition:** Access-sign post badly decayed.



Fig 9#9

- **Condition:** Guardrails not securely fastened to post.

Replace nails with bolts



Fig 9#10

- **Condition:** Guardrails badly decayed and not securely fastened.



Fig 9#11



Fig 9#12

9.2.1e **Pathway between 12<sup>th</sup> & 13<sup>th</sup> Ave.s**

- **Condition:** Access-sign post badly decayed.



Fig 9#13

9.2.1d **Pathway north of Santa Lucia Ave.**

- **Condition:** Access-sign post badly decayed.



Fig 9#14

⇒ **Recommended Action for 8.2.1:**

- REPAIR OR REPLACE AS PER GENERAL RECOMMENDATIONS LISTED ABOVE;
- IF GUARDRAILS & POSTS ARE CLOSE TO BLUFF EDGE, CONSIDER MOVING CLOSER TO PATHWAY (AND ADDING PLANTS TO SEAWARD SIDE).
- USE BOLTS INSTEAD OF NAILS IN ALL WOOD STRUCTURES ALONG SHORELINE, AS PER ORIGINAL DESIGN.



## 9.2.2 New Guardrails Needed

### 9.2.2a Pathway just north of 9<sup>th</sup> Ave. Stairway

- **Condition:** New guardrail needed to protect bluff

⇒ **Recommended Action:**

- INSTALL AS PER GENERAL RECOMMENDATIONS LISTED ABOVE



Fig 9#15

### 9.2.2b Pathway between 13<sup>th</sup> & Santa Lucia Ave.s

- **Condition:** Sections of green plastic fencing have been installed along portions of the bluff. Some of these “temporary” fences have been in use for more than two years. They are unsightly and conflict with the original Pathway design intent.

⇒ **Recommended Action:** REMOVE AND REPLACE WITH NEW GUARDRAILS AS PER GENERAL RECOMMENDATIONS LISTED ABOVE



Fig 9#16



Fig 9#17

9.2.2c **Pathway above new restroom and north of Santa Lucia Ave. stairs**

- **Condition:** New restroom will attract bluff-cutting foot traffic.

⇒ **Recommended Action:**

TO DISCOURAGE SHORT CUTS AND PROTECT BLUFFS,

- INSTALL NEW GUARDRAILS AS PER GENERAL RECOMMENDATIONS LISTED ABOVE;
- ADD APPROPRIATE PLANTS, BOULDERS, ETC., AS PER GENERAL RECOMMENDATIONS LISTED IN Section 9.1.1;
- INSTALL WARNING SIGNS PROHIBITING BLUFF-CUTTING TO PREVENT BLUFF EROSION (COORDINATE WITH CARMEL POLICE DEPT);
- ENFORCE SECTION 12.32.165 OF THE CARMEL MUNICIPAL CODE WHICH PROHIBITS BLUFF CUTTING;
- INSTALL GALVANIZED EYE-ROD AND CABLE TO PREVENT FOOT TRAFFIC AROUND SOUTH SIDE OF RESTROOM



Fig 9#18



Fig 9#19

**Section 9.0 – SHORELINE LANDSCAPE**  
**COMMENTS & RESPONSES**

---

## SHORELINE ISSUES TO BE CONSIDERED

---

In addition to specific conditions described in this Assessment, there are some issues that should also be considered by the City; these are not yet issues of immediate concern, but should become part of the community's conversation about its shoreline:

### 1. **Nighttime Beach Use**

In various sections of this Assessment, there are references to conditions on stairways and on the beach that become more hazardous when encountered at night, for example:

- when seawater is washing over the lower steps of a stairway;
- when high tides have brought a foot or more of water to the stairway base; or
- when a storm water outfall discharge has scoured a channel or pit in the beach sand.

Each of these conditions would be relatively easy to avoid if encountered during daylight hours, but could prove hazardous at night.

Carmel Beach is open to public use during both day and night hours. With few exceptions (alcohol use, fires, camping/sleeping, and underage curfew), the City has very few rules about nighttime beach usage. Yet, some conditions pose more danger at night. Common sense clearly dictates that people should be more cautious when walking on the beach in the dark, or during/just after storms, but does the City have a greater responsibility when it comes to protecting those who visit the beach at night? This would be worth discussing during a Forest and Beach Commission meeting.

### 2. **Artificial Rock**

When most people think about Carmel Beach, they likely envision beautiful white sand and sparkling blue water. These are undeniably the key natural elements that attract both visitors and residents to our shoreline. But there are artificial components that are necessary to protect the shoreline and its visitors. Included among these are stairways, seawalls, storm water outfalls, and rock revetments. With the exception of the last element, the rest of these were designed to remain in public view throughout the year.<sup>8</sup>

As described in Section 5.1, when waves strike locations where a hard granite shoreline wall (either seawall or retaining wall) has been built adjacent to softer

---

<sup>8</sup> As mentioned in Section 5.2, if properly covered with sand, the revetments can stay out of sight for most seasons.



sandstone, an ever-widening gap will begin to form between the two. This is due to a process, referred to in this Assessment as **selective erosion**, in which less-resistant material (sandstone) erodes at a faster rate than the neighboring granite. As the gap continues to erode, seawater will gain access behind the wall, eventually threatening the whole structure.

Several years ago, along the beach between 13<sup>th</sup> Ave. and Santa Lucia, the City repaired a gap between a seawall and the adjacent sandstone; its subsequent patch seems to be holding, but will eventually widen as the sandstone continues to erode.



Gap in seawall between 13<sup>th</sup> & Santa Lucia  
(2004)



Repaired gap (2009)

All of Carmel's shoreline walls, composed of granite and mortar, and founded in softer rock, will eventually experience selective erosion. By remaining vigilant, the City can plug gaps and strengthen footings before long-term damage occurs. However, selective erosion of the footings of Carmel's seawalls can only be observed, and addressed, when the sand level is low, an event that occurs during severe winter conditions.

Given these forces, the City would benefit from any alternative that continues to provide shoreline protection, but without the maintenance associated with selective erosion.

Over the past few decades, new materials have been developed that might help solve this problem. At locations along the shore, to the north in Pebble Beach and southward below Carmel Point, artificial rock that looks strikingly similar to the native granite outcroppings, has been installed for shoreline protection. If this material proves effective, it might be feasible to use artificial rock as a cap over sandstone located adjacent to seawalls and retaining walls.

There is still much more to be understood about this alternative, especially regarding how artificial rock holds up to ocean forces over the long term, but it is well worth further investigation. The City is urged to seriously consider this

alternative, beginning with consultation with qualified shoreline protection experts.

Artificial Rock



## AUTHORS

---

Biologist **David Shonman** has protected shorelines and coastal habitats for over 30 years. He has conducted numerous studies of coastal systems, restored coastal dunes, protected endangered and threatened species, and coordinated repairs to storm-damaged shorelines in central and northern California. In 1983, he worked with Assistant City Administrator Greg D'Ambrosio to coordinate the emergency repairs to Carmel Beach (Phase I - Carmel Beach Rehabilitation Project). During the next five years, he helped coordinate the design and implementation of Phase II, which included the Scenic Road Pathway, landscaping and beach access stairs. David prepared the Carmel's first Emergency Shoreline Protection manual; he also developed and carried out a series of shoreline assessments designed to identify and correct vulnerable portions of Carmel shoreline from coastal erosion. In 2003, he was the primary author of the Carmel Shoreline Management Plan, which is now part of the City's Local Coastal Program.

**Greg D'Ambrosio** served as Carmel Forester from 1970 to 1983. During this time, he was responsible for the City's forests and parks, including Carmel Beach. In 1985, he became Assistant City Administrator, and played key roles in the City's Phase I and Phase II repairs to the Carmel shoreline after the 1982/83 El Niño storms. Greg focused on protecting and enhancing the Carmel shoreline up through his retirement in 2005; he continues in this task as an active Carmel citizen.