TECHNICAL EVALUATION OF PUBLIC ACCESS ALIGNMENTS FOR THE GIACOMINI WETLAND RESTORATION PROJECT

GOLDEN GATE NATIONAL RECREATION AREA/
POINT REYES NATIONAL SEASHORE
NATIONAL PARK SERVICE

PART II: TECHNICAL FEASIBILITY STUDY

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JULY 2005

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1.0 INTRODUCTION

1.1 PROJECT BACKGROUND

Point Reyes National Seashore (Seashore) is planning a wetlands restoration project for the former Giacomini Ranch in Tomales Bay, California (see Figure 1: Project Location). The Giacomini Ranch is located in the north district of Golden Gate National Recreation Area (GGNRA), which is administered by the Seashore. The National Park Service (Park Service) acquired the Giacomini Ranch in February 2000 through a combination of Congressional appropriations and funding from the California Department of Transportation (Caltrans). The Park Service entered into an agreement with Caltrans and the California Coastal Commission that enabled Caltrans to transfer its mitigation obligations for 3.6 acres of wetlands to the Park Service in exchange for funding for acquisition and restoration. As part of the purchase agreement, the Giacomini family was granted a reservation of use agreement until 2007 on approximately 463 acres of the approximately 563-acre property. The remaining 100 acres are already under Park Service management.

Since purchase of the property in 2000, the Seashore has been moving forward with the environmental planning process. It has identified the state of California's State Lands Commission (SLC) as the lead agency for the California Environmental Quality Act (CEQA) portion of the planning process and is also cooperating with the Gulf of the Farallones National Marine Sanctuary, which has jurisdiction within the southern portion of Tomales Bay. Baseline studies on existing wildlife, vegetation, wetland, and cultural resources have been or are being currently conducted. Through integration of this baseline information with restoration science tenets, Park Service directives and management policies, and mitigation and contractual obligations, the Seashore has identified a Project purpose and several goals, specifically:

1. The project should restore natural tidal and freshwater hydrologic processes in a significant portion of the Project Area, thereby promoting restoration of natural ecological processes and functions.
2. The Park Service will take a watershed-based approach to restoration such that it will emphasize opportunities to improve conditions within the entire Tomales Bay watershed, not just within the Project Area.
3. To the extent possible, the Park Service will explore both the potential for opportunities for the public to experience the restoration process as long as those opportunities do not conflict with the project's purpose and goals.

The Seashore and SLC conducted an initial public scoping in fall 2002/winter 2003 following issuance of the Notice of Intent and Notice of Preparation. Once scoping was completed, the Seashore started working with its hydrologic consultants (Kamman Hydrology & Engineering, Inc.) to develop a reasonable range of preliminary restoration and public access concepts. The five (5) preliminary concepts, which included a No Action or No Project alternative, were unveiled to adjacent landowners, members of the

general public, regulatory agencies, organizations, and technical experts in the field of wetland restoration during a series of workshops held during 2004. Feedback and input received during these workshops were used to refine the preliminary restoration and public access concepts. This second public scoping session culminated with a workshop for the general public in June 2004, with written comments and/or petitions accepted through late July 2004. Following close of scoping, the Park Service and other lead and cooperating agency staff met to discuss possible changes to preliminary concepts based on the feedback and input received during the second or 2004 scoping period. The finalized alternatives will be incorporated into the environmental document, an Environmental Impact Statement/Environmental Impact Report (EIS/EIR), which is scheduled to begin production in early 2005. A draft document is expected to be released to the public in fall 2005. The information in this document will be used for the preparation of the draft EIS/EIR.

Figure 1: Project Location

1.2 PROJECT AREA DESCRIPTION

The former Giacomini Ranch (Project Area) is located at the southern end of Tomales Bay at the mouth of Lagunitas Creek, the largest subwatershed within the Bay. Tomales Bay is an approximately 12-mile-long, one-mile-wide estuary that runs along the southern boundary of the Seashore. The Project Area is bordered by the town of Point Reyes Station to the east and Inverness Park to the west. During the 1860s, one-third to one-half of the Project Area was actually subtidal or intertidal, with most of the historic wetlands concentrated in the southeastern portion. Excessive sedimentation from logging and poor land use practices during the late 19th century and early 20th century caused an exponential increase in deltaic expansion of the existing wetlands, leading to the creation of as much as 650 acres of new salt marsh habitat between 1860 and 1950 (Josselyn and Buccholz 1983). Expansion of the delta created opportunities for agricultural expansion, as well. The first dairy was started on the property in 1917 (PWA et al 1993). Waldo Giacomini reclaimed the Project Area in 1946 and constructed levees along Lagunitas Creek. The Giacomini family has been operating the property as a dairy since that time.

Lagunitas Creek basically bisects the Project Area into two subareas: the East and West Pastures. Other drainages flowing through the Project Area and into Tomales Bay include Fish Hatchery Creek and several small drainages on the west and Tomasini Creek on the east. In addition, there are strong freshwater influences along the periphery of the Project Area from seeps along Inverness Ridge and Point Reyes Mesa. Because of the numerous drainages and seeps, the transition from Lagunitas Creek to the Inverness Ridge or Point Reyes Mesa represents more a saltwater to freshwater transition than a wetland to upland one and complicates efforts to develop paths or trails or other features (e.g., high tide refugia for wildlife) at the Project Area periphery. Tidal influence to most of the project area has been minimized, if not eliminated, by construction of approximately 7- to 10-foot-high levees. Muted tidal action is present in the northern portion of the project area because tidegates or flashboard dams have not been properly maintained. These facilities function as two-way tidegates/dams, allowing tidal waters to move up both Fish Hatchery and Tomasini Creek. Tomasini Creek has been bermed to flow along the edge of Point Reyes Mesa, thereby eliminating most of its influence from the Project Area. Fish Hatchery Creek has also been bermed to some degree.

These diverse hydrologic influences have resulted in extensive wetland development over much of the Project Area, although most of these wetlands are what might be termed "Wet Pasture" or actively managed fields dominated by non-native annual and perennial grasses. However, portions of the Project Area where a mosaic of riparian, marsh, and wet pasture is present were found to support a large number of common and special status wildlife species, particularly riparian breeding birds. This wildlife diversity is further enhanced by the proximity of habitats such as evergreen forest, coastal scrub, and undiked salt marsh that occur on the periphery of the Project Area. Several special status species specifically adapted to freshwater or brackish conditions were identified within the Project Area. California red-legged frog (*Rana aurora draytonii*) occurs primarily in

a freshwater marsh in the West Pasture that is supported by a strong freshwater seep from Inverness Ridge. Tidewater goby (*Eucyclogobius newberryi*) was documented in Tomales Bay for the first time in almost 50 years in a section of Tomasini Creek within the Project Area. Northwestern pond turtles (FSC) have been sighted in various locations along old tidal sloughs, creeks, and drainage ditches within the Project Area. California clapper rails (federally endangered) and California black rails (California threatened) have occasionally been documented in the undiked tidal marsh north of the Giacomini Ranch's West Pasture.

While the Giacomini Ranch was private property until its purchase by the Park Service in 2000, members of the local community have established some informal public access paths along a limited portion of the West Pasture levee at its northern end and a limited portion of the East Pasture levee along its southern end. These paths are described in more detail in the Phase I report (KHE et al. 2004).

1.3 REQUIREMENTS AND PROCESS FOR THE ENVIRONMENTAL DOCUMENT

The National Environmental Policy Act (NEPA) requires that federal agencies describe the Affected Environment or the existing environment of the Project Area or areas that will be affected by the proposed action or project, including areas downstream or upstream of the Project Area. It also requires an analysis of how the proposed action or project or, in the case of an EIS/EIR, the proposed alternatives, will affect the existing environment (Environmental Consequences). Both the restoration and public access components have the potential to affect the "human environment" through impacts to hydrologic, biological, and cultural resources, as well as potential land use impacts associated with public access infrastructure construction and public use. The environmental document must evaluate the potential for and degree of impacts resulting from these actions. The information in this Study document will be used for the preparation of the draft EIS/EIR document.

Public and agency scoping for the environmental document was completed in summer 2004, following a series of workshops at which the Park Service unveiled its preliminary restoration and public access concepts. During the initial public scoping held in fall/winter 2002-2003 after issuance of the Notice of Intent/Notice of Preparation, the Park Service received a number of comments regarding the potential for and appropriateness of public access as part of the wetland restoration project. At that time, a number of people called for creation of a public access path or trail that would connect the eastern and western portions of southern Tomales Bay and improve safety and access for both local residents and visitors. As a result, following the initial scoping, the Park Service incorporated a public access-related project goal and worked to develop public access components within the Project that would allow the public to experience and enjoy the restoration process without compromising the Project purpose and restoration-related goals. Park Service staff and its hydrologic consultants worked through a series of iterative meetings to develop and evaluate various potential restoration and public access

components, using information collected during baseline studies as a guide to assess potential resource impacts.

Eventually, the Park Service settled on a total of four preliminary restoration and public access concepts, with three of the four alternatives incorporating a path from Point Reyes Station to Inverness Park with a bridge over Lagunitas Creek at the location of the old Giacomini summer dam. All of the alternatives included multiple viewing platforms/elevated overlooks and interpretative exhibits.

Once preliminary restoration and public access concepts were developed, the Park Service initiated a series of workshops with the public and agencies and solicited written feedback and input. During 2004, it received more than 80 letters or petitions and met individually with community and environmental groups and members of the local community. As before, most of the comments received concerned the appropriateness of and potential for public access as a part of the wetland restoration project. Those in favor of public access either expressed support for proposed access and/or infrastructure alignments, suggested changes to proposed alignments, or suggested possible other public access alignments that were not incorporated in the preliminary concepts.

1.4 TECHNICAL STUDIES OF PUBLIC ACCESS ALTERNATIVES

In response to the considerable public scrutiny of the public access portion of the Project, the Park Service decided to contract for a technical evaluation of the potential resource impacts associated with multiple potential public access alignments and infrastructure locations. This evaluation, which was prepared by the hydrologic consultant, Kamman Hydrology & Engineering, Inc. (San Rafael, Calif.) with technical assistance from its biological consultant subcontractor, LSA Associates (Richmond, Calif.), and the Park Service, focused specifically on hydrologic, cultural, and biological resources, as well as potential constraints to resource-related portions of the Project purpose and goals (Phase I report; KHE et al. 2004). The alignments and infrastructure locations included in the analysis came from suggestions received during public scoping, internal scoping, public access studies conducted in the past (West Marin Pathway Study; Wittenkeller & Associates and Copple Foreaker & Associates 1988), and other documents (e.g., draft County of Marin General Plan 2004). This study is finalized and has been posted on the Seashore's web site: www.nps.gov/pore under "Management Documents: Giacomini Wetland Restoration Project: Technical Evaluation of Potential Public Access Alignments for the Giacomini Wetland Restoration Project - Part I: Resources Study."

This technical evaluation recommended that the Park Service narrow its consideration of potential public access alignments and infrastructure locations to those that do not constrain or impinge upon the Project purpose and goals of restoring natural hydrologic and ecological processes and functions and that have the lowest potential environmental impacts. After review of the report, the Park Service has elected to carry forward those public access alignments and locations that were rated as having low to moderate environmental impacts for a second phase of study.

2.0 STUDY METHODS

This second phase of study of public access alternatives consists of a more detailed technical analysis of the public access alignments and locations selected in the Phase I Study for their: a) technical feasibility for construction and long-term maintenance, b) acceptability from a land use point of view given proximity (if any) to adjacent landowners, and c) costs for construction and maintenance.

The selected consultant, LandPeople, landscape architects and planners, and their subconsultant, Jakaby Engineering, civil and structural engineers, prepared the current report covering the subjects listed above to aid the Park Service in obtaining further public input and selecting public access components consistent with project goals and objectives, and to evaluate potential significant impacts associated with the selected public access components. This report will be a technical support document for preparation of the environmental document for the overall Wetlands Restoration Project.

2.1 STUDY AREA

The Study Area, shown on Figure 2: Potential Public Access Alignments, includes a section of the undiked marsh to the north of the Wetlands Restoration Project Area, and is bounded to the west by the west side of Sir Francis Drake Boulevard, to the south by a point approximately 25 feet south of the south side of Levee Road, and to the east by the top of slope of Point Reyes Mesa and the north side of Mesa Road.

The Phase I report addressed thirteen potential trail alignments and five potential locations for viewing platforms/elevated overlooks. Based on the recommendations presented in the Phase I report, the Park Service has elected to narrow its consideration to the specific alignment and infrastructure locations listed below and shown in Figure 2. A total of nine trail alignments were evaluated, including several overlapping and parallel alternatives:

1. **Trail Alignment 1a** – Trail on alignment of present levee at north end of West Pasture.
2. **Trail Alignment 2c** – Trail on historic railroad grade from Mesa Road west and then north to Tomales Bay Trail.
3. **Trail Alignment 2d** – Portion of alignment of 2c, from Mesa Road west to Giacomini Hunt Shack (Overlook Point 4).
4. **Trail Alignment 2e** - Portion of alignment of 2c, from Tomales Bay Trail south to point where riparian vegetation currently blocks access.
5. **Trail Alignment 4a** – from Point Reyes Station near Giacomini dairy facilities southwest, west, and northwest around wetland area to Inverness Park, including bridge across Lagunitas Creek at former seasonal gravel dam location, through the existing County Park at White House Pool Park, and along Sir Francis Drake Boulevard.

6. **Trail Alignment 4b** – similar to 4a except connection from north of bend in Lagunitas Creek beyond White House Pool Park to Inverness Park would be by elevated boardwalk through West Pasture rather than along roadway.
7. **Trail Alignment 4c** – from alignments 4a/4b through community of Inverness Park from Gradjanski property north along east shoulder of Sir Francis Drake Boulevard to just north of Drakes View Drive.
8. **Trail Alignment 4d** – Point Reyes Station to Inverness Park via west shoulder of Highway 1, across "Green Bridge", then west along south shoulder of Levee Road/Sir Francis Drake Boulevard to White House Pool Park, then to Inverness Park via 4a or 4b alignment.
9. **Trail Alignment 4e** – same as 4d except uses the north shoulder of Levee Road/Sir Francis Drake Boulevard

Five overlook platform locations were evaluated:
1. **Platform/Overlook Location 1** – at Trail Alignment 1a
2. **Platform/Overlook Location 2** – at White House Pool Park, Trail Alignment 4a
3. **Platform/Overlook Location 3** – near Giacomini Dairy
4. **Platform/Overlook Location 4** – at Giacomini Hunt Shack, Trail Alignment 2d
5. **Platform/Overlook Location 5** – near end of Tomales Bay Trail at Railroad Point hilltop, Trail Alignment 2e

2.2 JURISDICTIONS

The Study Area includes lands under the jurisdiction of several public agencies. The Giacomini Ranch lands and the Olema Marsh lands to the south are owned and managed by the National Park Service. The right-of-way of Highway 1 is owned and maintained by the California Department of Transportation. Marin County owns the right-of-way of other public roads, including Levee Road and other portions of Sir Francis Drake Boulevard, and has responsibility for flood protection in the entire area. The White House Pool Park area is leased from the state of California's Wildlife Conservation Board by the County of Marin Parks and Open Space District (County Parks). The portion of the Olema Marsh south of Levee Road is owned by the non-profit Audubon Canyon Ranch.

2.3 METHODOLOGY

2.3.a General Approach

A series of detailed Geographic Information System (GIS) maps of the trail alignments and overlook sites were prepared as a basis for evaluating existing conditions, and physical opportunities and constraints for trails. The alignments were evaluated through field reconnaissance, photography, and preparation of cross-sections to characterize typical conditions along the routes, building on preliminary cross-section data prepared by Kamman Engineering and Hydrology staff.

Prior studies and plans for trails and bicycle facilities in the Study Area were reviewed in detail and evaluated in the context of the current conditions, opportunities and constraints. The consultants walked trail alignments, made measurements, talked with

County and user group representatives, characterized sections of alignments – particularly road alignments -- according to condition, and evaluated one to three potential options for sections of alignments. Based on conceptual designs, including some alternative design features, potential costs and construction area impacts were estimated.

A series of neighbor and stakeholder meetings were held by the Park Service and facilitated by the consultants to obtain input about the specific conditions along the various alignments, and ideas and preferences regarding the location and configuration of potential trails, and particularly specific land use issues and potential conflicts between the trail and adjacent properties.

Based on the evaluation of conditions, constraints and opportunities; review of prior trail plans and studies, and input from the public, the more precise location and configuration of the public access improvements was defined with drawings and descriptions. These provided the basis for evaluation of the technical requirements to construct and maintain the improvements, the cost to construct and maintain, the relative impact of the alignments on riparian vegetation and potential wetlands, and the potential land use impacts of the trails on adjacent properties.

2.3.b Construction Cost Analysis

Potential construction costs are estimated for each trail alignment and overlook. The estimate spreadsheets include an "Other Project Costs" column that represents cost factors associated with implementing the construction, including Design/surveying (15%), the Environmental process (10%), Review and Inspection/project administration (15%), and Contingencies (15%), for a total 55%. San Francisco Bay Area regional costs are built into the unit prices in the estimates. All costs are in 2005 dollars and would need to be factored for inflation.

Where design options are provided for trail alignments, separate cost totals are included for each option, organized from the lowest cost to the highest cost option. In addition, a column was provided in the estimates to account for optional guardrails, which add to the totals for the trail design options. Tables 4-1 and 4-2 present a summary of the lengths, types and cost of the various trail alignments, and the overlook platform costs. Detailed construction cost opinions are presented in Appendix A, which includes a Cost Estimate table and a Costs Items table, the latter containing the detailed estimates for the overlooks.

In a technical study where the site conditions for construction, and the design itself, are not precisely defined, construction cost can be estimated in only the most general terms, requiring a series of assumptions. In any case the preferred design industry term is "opinion of probable construction cost". Construction costs are highly variable depending on the details and requirements of construction, the timing and procedures for bidding and contracting the work, the amount of work that is bid at one time, and economic

conditions. Costs are likely to be significantly higher in rural Marin County than in more urbanized and accessible areas. The construction cost opinions attempt to take these factors into account to create a reasonable model of potential construction costs, based on a set of typical conditions and solutions as indicated in the report and on the trail alignment maps.

2.3.c Construction Area Impact Analysis

The analysis of each trail segment includes a rough estimate of the area of construction impact under each alternative for each alignment. A delineation of jurisdictional wetlands was not available at the time of this study. The "construction area" identified in the estimates may or may not be Section 404 wetlands and waters under the jurisdiction of the U.S. Army Corps of Engineers and/or as defined by the California Coastal Commission. The estimate of construction area impacts is provided for general comparison purposes only. A specific analysis of wetland impacts by type may be completed for the environmental document to be prepared subsequent to this study. For the current study the term is used generally to describe low-lying areas typically featuring riparian or other wetland vegetation. Along the roadsides typically such vegetation is setback approximately 2' from the edge of the road shoulder. This 2' distance was used for estimating purposes.

A summary of the estimates is provided in Table 4-2. The estimates include the "footprint" of the improvements to be constructed. In each estimate the "Total Square Footage for Impacted Area" is the area that would be occupied by fill, retaining walls, boardwalk, etc. Note that in the case of the fill or boardwalk some of the vegetation would be able to re-establish or remain. The "Construction Access Impact Area" is an assumed 3' wide area beyond the constructed facilities that would presumably experience short-term impacts. The column for guardrails reflects the additional approximate 2' width of additional construction area that would be caused by additional shoulder width for the guardrail.

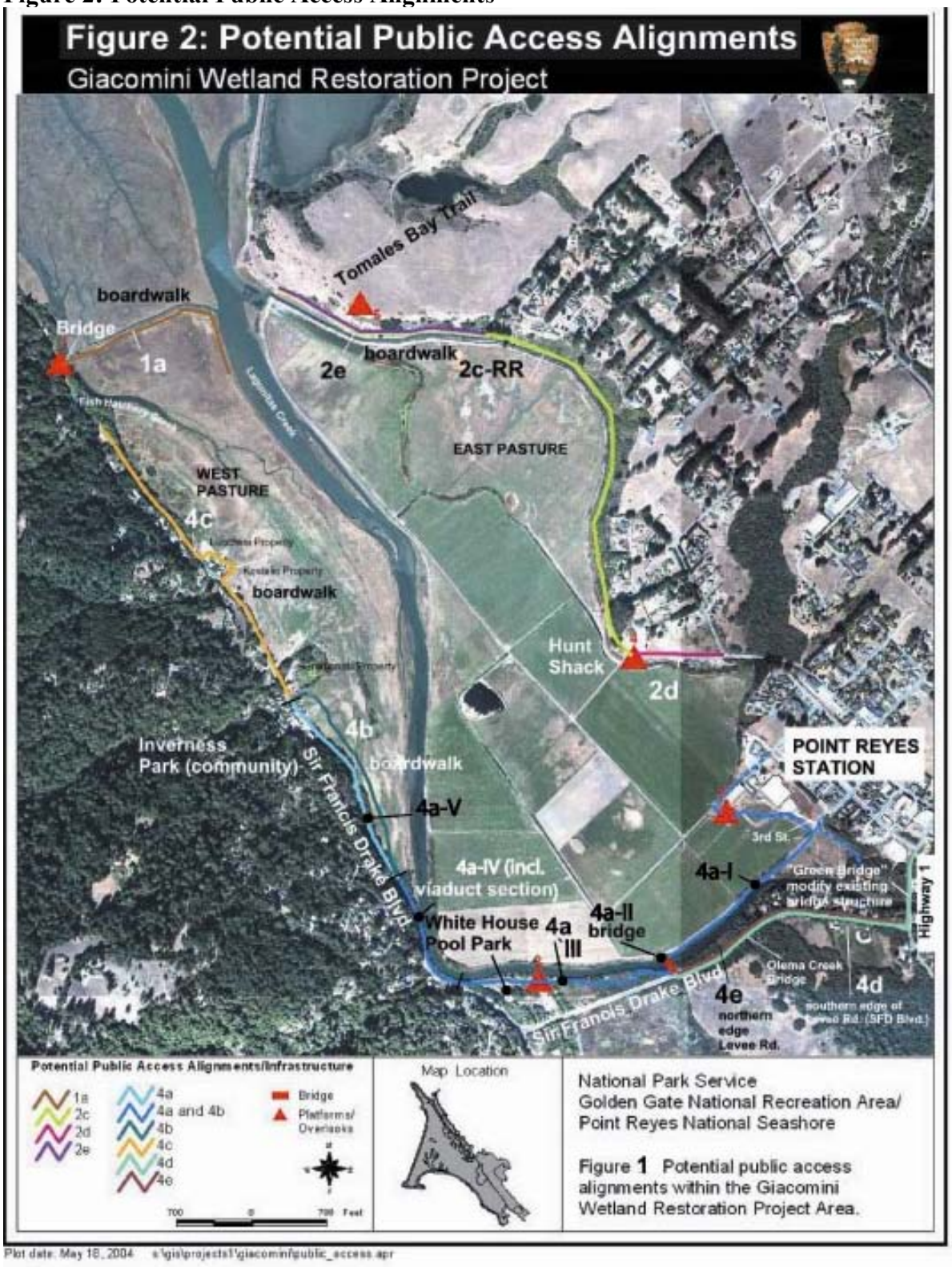
2.3.d Maintenance/Replacement Cost Analysis

The analysis of each trail segment and overlook platform includes an opinion as to the probable maintenance costs. This includes both the annualized cost for routine maintenance and periodic major maintenance, as well as the long-term replacement cost for the structure based on its projected lifespan. Summaries of the opinions of probable maintenance cost are presented in Tables 4-4 and 4-5. Maintenance costs are even more variable than construction cost, depending on who does the maintenance, and on a host of use and environmental variables. The maintenance cost opinions attempt to create a reasonable model for actual maintenance and replacement costs that could be experienced. This includes the estimated lifespan of the basic facility and the annualized cost of replacing it. All cost are in 2005 dollars and would need to be factored for inflation.

2.3.e Land Use Impact Analysis

The series of meetings with local residents and adjacent property owners provided input to analyze potential land use impacts of the trail segments, along with field reconnaissance and analysis of maps, and follow-up phone calls and emails. Meetings were held during early 2005; on March 1 with Inverness Park Area neighbors; March 22 with Point Reyes Station C Street Area neighbors and (separately) Levee Road Area neighbors; March 25 with Mesa Road Area neighbors, and April 11 with representatives of local, community, and special interest groups.

Figure 2: Potential Public Access Alignments



2.4 BACKGROUND INFORMATION

2.4.a Trail Design Standards

Publicly adopted standards for pathways and trails differ depending on the agency. Funding or approval from federal or state agencies is often contingent on meeting these standards. The standards address accessibility for persons with disabilities to implement the Americans with Disabilities Act (ADA), as well as basic design and safety.

Federal Standards. ADA sets standards for maximum gradient, cross-slopes, width, surface, and many other pathway features. Not all paths must meet ADA access standards; the law requires that the public program or activities being offered are accessible, not necessarily every facility. Guidelines interpreting ADA are contained in the Americans with Disabilities Act Guidelines (ADAG) or the Uniform Federal Access Standards (UFAS). Guidelines specific to trails exist as draft standards scheduled to be adopted as part of the implementation of ADA. The federal guidelines address trails and paths in rural and parkland settings, which is consistent with the Giacomini Wetlands access alternatives on both counts. They offer a great deal of flexibility as to width, gradient, surface, and other features compared to federal standards for urban facilities. The federal guidelines are maintained online at <http://www.acess-board.gov/outdoor/outdoor-rec-rpt.htm>. They are interpreted in a Federal Highway Administration publication, *Designing Sidewalks and Trails for Access, Part 2: Best Practices Design Guide*, September 2001. It offers an excellent guide for designing trails and pathways, especially in rural and parkland settings.

The National Park Service complies with federal regulations on ADA and generally follows the stricter of either the ADAG or UFAS. [1] Walks or paths that connect to accessible features need to be ADA-compliant. Key features in the Park need to be made accessible. However, paths need to be kept consistent with preserving the natural and cultural resources of the Park, so, if the same experience can be provided on some portion of the alignment or a different trail, there is more flexibility in the access standard.

California Trail Standards. While the California Department of Parks and Recreation has its own trail standards, the California Department of Transportation (Caltrans) standards are pertinent to the current study. Caltrans has adopted standards for bikeway facilities in Chapter 1000 of the Highway Design Manual. A "Class I Bikeway" or separate bike path (typically also used by pedestrians) must be paved, at least 8' wide, with 2' graded shoulders. There must be at least 5' of separation between the edge of the roadway pavement and the pathway pavement, unless a safety barrier is provided. A "Class II Bikeway", or bike lanes, must be paved at least 4' wide on the shoulder on each side of the road. Caltrans standards for pedestrian facilities are much more general than bikeway standards, including many types of sidewalks or paths. These standards are mandatory within state right-of-way or for facilities constructed with Caltrans funding, unless a formal exception is granted.

[1] Joanne Cody, Park Service, Denver Service Center, personal communication.

Caltrans has recently adopted a new guideline for pedestrian facilities that for the first time specifically addresses trails. Updated Design Information Bulletin No. 82, November 19, 2004, includes reference to multi-use trails that also accommodate bicycles and/or horses, but are not designated as bikeways. This Caltrans guideline, in turn, references the federal guidelines for trails and paths in rural and parkland settings noted above.

State Accessibility Standards. The Division of State Architect (DSA) is the California state agency that interprets and approves the state's standards for handicapped access. States are free to adopt standards that are more stringent than ADA, and in some aspects California's standards are more stringent. While Caltrans has reflected the federal guidelines that differentiate rural and parkland trail facilities in its recently updated pedestrian design bulletin, DSA has not yet recognized the guidelines. This will require project proponents on state land or using state funds to go individually to DSA to secure an exception to the more rigorous urban standards

Marin County standards for bicycle and pedestrian facilities within its right-of-ways are generally consistent with the Caltrans standards. The County has some flexibility to depart from them if the project is not in state ROW or funded by the state.

2.4.b PRIOR TRAIL STUDIES AND PLANS

There have been informal pathways through and around the Giacomini Dairy pasture lands for many years, and ongoing local discussions about more formal pathway improvements. The first formal attempt to address this issue was the *West Marin Pathways Study*, completed in 1988 by Brian Wittenkeller and Associates for West Marin Paths, a local non-profit group, and Marin County. This document was a detailed conceptual plan and cost estimate for a bicycle and pedestrian pathway system around the south end of Tomales Bay, including several alignments that are being considered in the current study. The concept plan was very comprehensive and ambitious. It included recommendations for bike lanes and/or paved multi-use paths along much of the route, including many routes that were on the then-private Giacomini property. It did not include a detailed evaluation of environmental, construction, and maintenance constraints and requirements. The West Marin Pathways Study was never adopted. According to local residents who participated in the process, this was because of the high (for the time) estimated implementation cost and due to environmental impacts. The estimated cost for the pathway improvements was approximately $2.75 million for design, construction, and construction contingencies, plus $1.5 million for land acquisition.

A more recent pertinent document that was adopted by the County is the June 2001 *Marin County Unincorporated Area Bicycle and Pedestrian Master Plan*, prepared by Alta Transportation Consulting for the Marin County Department of Public Works. This document contains analysis; goals, objectives and policies; a proposed system and improvements plan; and specific projects. Among the projects, on page 93, is a

recommended series of improvements in the Point Reyes and Inverness Area, including #4., Point Reyes Station to Inverness. The Plan refers to the 1988 West Marin Pathways Study. The Plan also recommends the use of railroad right-of-way, where feasible, to complete the recommended routes. The Plan does not go into detail on the precise location or configuration of these bicycle routes, but does include bikeway standards on page 8 that imply the routes would be either paved Class I separated multi-use path at least 8' wide, or paved bike lanes 4 to 5' wide on the road shoulder.

The *Marin Countywide Plan*, the County's General Plan, is currently being updated. A draft document released in February 2004 (currently posted on the County's web site at <http://www.co.marin.ca.us/pub/fm/CWP_TitlePage_Public_Draft.pdf>) includes a chapter on trails in the Natural Systems Element, and a series of maps comprising the Countywide Trails Plan. The trails chapter is very general, containing goals, policies and implementation measures to promote trails, and performance-type standards to ensure that they are useful, and well maintained. The document does not contain detailed policies or standards that would guide the evaluation of the trails under the current study. The Countywide trail maps, on Map 2-11b, show a proposed trail along Levee Road and Sir Francis Drake Boulevard the entire distance to Inverness, but the map doesn't specify the type of trail.

2.5 PUBLIC INPUT REGARDING DESIGN

For the purpose of this technical feasibility evaluation, public preferences for one trail alternative over another aren't directly considered – all the alternatives were derived from previous public scoping and environmental technical study, and all are evaluated only in terms of their construction and maintenance requirements, and potential land use impacts. Popularity of or opposition to trail alternatives should be factored into any decisions at a stage following this technical study and the subsequent environmental document. Public input is important at this stage to determine what configuration of trail should be evaluated, and to ensure that design, maintenance or use impact ideas and issues are not missed. In this respect the most significant consistent public input was that an informal, narrower than standard trail with a permeable surface is preferred by virtually all participants over a more formal asphalt paved path, or paved bike lanes (although there is not necessarily opposition to bike lanes). This preference is reflected in a statement from a 10 person Community Pathways Committee, signed by approximately 100 persons, that was presented during the earlier scoping period, requesting that the Park Service study an off-street path:

> "We envision that a perimeter path would be six feet in width wherever possible, and constructed of a durable, erosion resistant, permeable surface such as decomposed granite with a pine resin binder . . . "

This preference is significant because it departs from Caltrans or County bikeway standards and the 1988 West Marin Pathways Study, which called for a 10' wide asphalt paved path in most locations, as well as paved bike lanes along the road shoulders. The

above concept is consistent with Caltrans or federal standards for multi-use trails in rural or parkland settings.

Several participants in the public meetings requested a physical safety barrier between the trail and the roadway where the trail is in close proximity to the road.

Another design consideration resulting from the public input process is the idea that many local residents would like to use horses on the path. This has some special implications for design, and particularly for maintenance, since horses will cause much more wear on an improved path than bicycles or pedestrians. Also, a boardwalk surface could be slippery for horses, and horses' hooves on a boardwalk could generate substantially more noise than other users. The primary interest is apparently in riding along Alignment 2c, the Historic Railroad Grade, and along Alignment 4a to the old summer dam, or Alignment 4d along Levee Road to reach the Rift Trail. It is assumed that horse access is not required in White House Pool Park and on the trail alignments to the northwest (western portion of 4a, 4b, and 4c).

3.0 STUDY RESULTS

This section presents the overall and site-specific results of the study. The descriptions of the trail alternatives are generally taken from the Phase I Technical Study, with amendments reflecting public input and refinement during Phase II:

3.1 DESIGN AND ANALYSIS ASSUMPTIONS

This study is not intended to resolve all design issues and details for public access, but to provide a realistic set of concepts for the configuration of the trail along the given alignments upon which to base construction and maintenance cost estimates, and to help identify land use impacts. Based on public input, input from the Park Service and Marin County, trail and roadway design standards, and the judgment of the consultants, some recommendations and assumptions about design have been built into the study.

3.1.a General Trail Types

The trail design types vary significantly along the alignments, particularly on those alignments that follow the road shoulder. The objective was to balance compliance with applicable Marin County, state and federal standards while responding to local preferences. In general, to minimize environmental impact and to reflect community preferences the study evaluates a 6' wide trail, except in locations where potential wetlands and/or slope conditions require use of a boardwalk, or in the Caltrans right-of-way, and the trail is part of a through route. In these cases the boardwalk may be 6' wide because there is some adjacent usable level land on which to construct the remainder of the 8' wide trail, or 8' wide when there is not.

3.1.b Trail Users

In general the trail connections are assumed to be multi-use, but the use assumptions vary between alignments. Alignment 1a, a boardwalk that ends at Lagunitas Creek, is assumed to be for pedestrians only (including handicapped access). Alignment 2c, the railroad grade, is assumed to accommodate hikers and equestrians. Alignments 4a- I and II, and 4d are assumed to accommodate pedestrians, bicyclists, and equestrians. Alignments 4a-III, 4b, and 4c are assumed to accommodate pedestrians and bicyclists.

3.1.c Trail Width

As noted above, the trail width desired by local residents is 6'. In many locations construction of even this relatively narrow trail will impact potential wetlands and riparian vegetation and involve expensive construction methods. One option to reduce trail environmental impact and construction cost is to further reduce the width of the trail. However, for a multi-use path 6' is already below standard. Any further width reduction is not recommended where the trail is part of a through route, except if unavoidable at specific obstacles. In any case the width should not be less then 5' (for comparison the minimum Caltrans standard multi-use path is 8' wide with 1' clearance from adjacent objects, and Marin County Public Works has requested that the minimum trail width be

8'). In the Caltrans right-of-way of Highway 1 (part of Alignment 4d/4e) the trail is designed and estimated at 8' wide.

The presence of fences or railings adjacent to the trail reduces the effective width, particularly in situations where there will be fences or railings on both sides. Fences or railings won't allow clearance for bicycle handlebars, horses and riders, etc. Compared to a trail with no barriers on the side, the trail will be effectively one foot narrower anywhere there is an adjacent barrier. The concepts and estimates assume the trail will be 7' wide where there is a fence or railing on one side, and 8' wide where there is a fence or railing on 2 sides, except adjacent to guardrails, as explained below.

3.1.d Trail Surface

Most residents who have commented on the trail concepts, such as the Community Pathways Committee's statement for the NPS public workshop on access, have requested an informal decomposed granite (D.G.) trail surface, such as the existing trails in White House Pool Park. Although desirable for its informal natural appearance, D.G. does not necessarily provide a durable trail surface and does not comply with handicapped access standards for transportation (as opposed to rural recreation) facilities or for bike route use. One alternative is to apply a pine resin binder to the D.G., which if used properly creates a surface that is actually 3 times harder than asphalt. Unfortunately, this treatment is more expensive than asphalt, and approaches the cost of concrete.

A stable, all-weather trail section could be constructed by clearing grading and compacting the trail surface, and placing a 6 to 8" layer of compacted base rock (Caltrans Class II aggregate base) with a 2" layer of gold-colored decomposed granite (D.G.) added. Alternatively, 3" of asphaltic concrete pavement could be placed in lieu of the D.G. This is assumed to be the case in the right-of-way of Highway 1, where it may be difficult to secure Caltrans approval for an alternative material. At intervals, assumed to be every few hundred feet in the cost estimate, culverts would need to be placed under the path to allow surface and ground water to pass. In particularly wet areas, laying geotextile fabric under the base rock will help stabilize the subgrade.

In some cases, such as parts of Alignment 2c on the historic railroad grade, it may not be necessary or appropriate to construct an improved all-weather trail. A weather-dependant trail improvement alternative with no additional formal surfacing is evaluated. The cost estimate for this alternative includes clearing or trimming of encroaching vegetation, minor drainage improvements consisting of ditch work and an occasional culvert, localized surfacing such as base rock placed in wet locations, and an allowance for trail signs. While potentially suitable for recreational purposes, this weather-dependant trail type is not suitable as a transportation route because it does not comply with handicapped access standards or standards for a bicycle route facility.

3.1.e Safety Setbacks and Barriers

Many project area residents have expressed the desire for a trail separated from the roadway, or if a separate trail isn't feasible, for a safety barrier between the trail and the

road. To meet standards and to accommodate utility poles the minimum setback from the edge of the traveled lane to the trail is 5' in the concept designs. Some trail users may not consider this an adequate separation without a barrier. The design and location of a trail safety barrier requires careful consideration. The barrier could be a prefabricated or site-built concrete "K-rail" or "Jersey barrier" such as those typically seen on freeways, or a wood post and steel beam guardrail formerly used on state highways, and still used on some County roads. Alternatively, a 4' chain link fence could serve as a barrier, providing minimal protection from errant vehicles, but preventing trail users (e.g. kids, dogs, and horses) from veering into the road. This is not assumed to be an acceptable safety barrier.

Placing a barrier immediately adjacent to the road might present a hazard for vehicles that needed to make a sudden correction, or for bicyclists using the roadway that needed to make an evasive maneuver or just get off the road, and might present an obstacle for oversize vehicles. Marin County road standards call for a minimum of 4' of shoulder beyond the edge of the lane, and depending on site-specific conditions, as much as 8' of shoulder could be required.[2] Caltrans and County standards call for a safety barrier between the road and the trail in any location where the edge of the trail would be within 5' from the traveled lane. Marin County Public Works Department has requested that the safety barrier consist of a steel beam guardrail on wood posts located at least 5' clear of the traveled lane.

Placing lengths of concrete safety barrier along local roads would have a potentially significant adverse impact on scenic resources, including the ability to see the wetlands areas from autos. A post and beam guardrail would be less visually obtrusive and less obstructive to views, but would be less effective for safety and more expensive to maintain than a pre-cast K-rail type barrier.

The estimates include an alternative for a guardrail safety barrier in locations where the trail is adjacent to the road, and the road shoulder is not reserved for turnouts, parking and/or access, such as in the community of Inverness Park. The County-recommended guardrail, which is approximately 20" wide in cross-section and 28" high, would be located 5' clear of the traveled lane.[3] An additional 2' of trail width is provided in the guardrail estimate, with a corresponding increase in construction cost and construction area impact. The 2' allowance for the guardrail provides approximately 4" clearance from the edge of the trail. Based on the 4" clearance, and the fact that the guardrail has a low height, additional setback between the trail and the guardrail is not deemed necessary.

Where the outside edge of the trail would be adjacent to a drop-off created by a retaining wall or cantilevered boardwalk section, the design concepts and estimates include a 4' high chain link fence/safety railing. The fence fabric would be coated with black or green

[2] Eric Steger, Marin County Public Works Department, personal communication, April 14, 2005
[3] Note that this assumed 5' setback may not be acceptable to Caltrans or Marin County in some locations, with corresponding impacts on the wetlands and cost of trail construction.

vinyl to make it less visually obtrusive and somewhat more durable. As noted above under "Trail Width" the trail is assumed to be 1' wider adjacent to these barriers.

3.1.f Bridges

Bridges are assumed to be prefabricated trail bridge structures with an 8' width where they are in the road right-of-way and a 6' width where they are not (at Alignment 1a and Alignment 4a in White House Pool Park). Where 50' long or less, they are assumed to be fiberglass, a very low-maintenance alternative. The 200' long bridge at the old summer dam location (Alignment 4a) is assumed to be 8' wide steel, due to the increased structural requirements. It is assumed to be both galvanized and powder coated for durability in the salt air exposure.

3.1.g Utility Pole Relocation

Along some of the alignments there are utility poles, often located 3 to 4 feet from the edge of the roadway where they will not interfere with the available space for the trail, but sometimes located 8 to 13 feet from the roadway where they would interfere with the available trail space. It is generally feasible to have utility poles relocated, but they may not be relocated closer to the road than 5' due to Marin County road standards and general safety concerns. In some cases it may be feasible to relocate the poles to the outside edge of the trail, provided this does not cause the poles or lines to interfere with trees and structures. Where necessary to provide space for the trail, it is assumed that the utility poles will be relocated under the above parameters.

3.1.h Flooding

The bridges that are evaluated for crossing Lagunitas and Fish Hatchery Creeks may or may not be subject to flooding periodically depending on how they are ultimately designed. To the extent possible, structures should be constructed to not impinge upon hydrologic process or exacerbate flooding of adjacent roads and homes above currently existing levels. Other trail alignments may or may not be above the flood plain depending on the elevation of the route. These trails, boardwalks, and bridges are expected to be inundated during major flood events, or in the case of Alignment 2e to be potentially closed during wet weather.

3.1.i Trail Design Conditions and Treatments

The setting for trail construction varies frequently and significantly along the alternative trail alignments. To enable design and analysis of trails at a schematic level, a set of representative trail setting conditions was defined and mapped, and a corresponding set of trail design treatments was developed (see Figure 3). These typical conditions and treatments have been depicted in cross-sections A through F, A representing the least constrained condition, and F representing the most constrained. These conditions have been color-coded on the maps – Figures 9, 11 and 13.

Condition A typically has adequate relatively level space for a 6' trail on the shoulder of the road at least 5' from the edge of the lane (11' clear or more). Construction of the

standard trail would be straightforward. Condition A also includes situations where there are private improvements and structures adjacent to the space for the path.

Condition B occurs in developed areas such as Inverness Park where the trail will share space with the road shoulder used for parking. Typically these locations have at least 6' of space available outside of the lane. The 6' trail will typically be adjacent to the edge of the lane or pavement, and no safety barrier will be provided so that vehicles will be able to park on the shoulder.

Condition C has approximately 3' to 5' of level space beyond the 5' setback from the edge of the lane (8' to 10' clear or 1' to 3' additional width needed for the trail). Typically the outside edge of the available space is an embankment, often covered with riparian vegetation, and bordering wetland areas. In this case there are 3 options to create a trail, each of which would require some encroachment and impact on riparian vegetation, and potentially wetlands:

1. Extend the road bench by placing fill at an assumed slope of 2:1, partially destroying the riparian vegetation and eliminating a small portion of the wetland. An average additional 2' of width is assumed to be needed for estimating purposes;
2. Extend the road bench using a concrete retaining wall to reduce the encroachment into the riparian vegetation and wetland. This would require a safety railing along the wall, and an additional 1' of trail width (7' overall) to provide clearance. An average additional 3' of width is assumed to be needed for estimating purposes, requiring an 18" high retaining wall;
3. Construct a cantilevered boardwalk section over the slope and/or wetland. However, the cost/benefit of constructing a boardwalk is not justified when a short retaining wall could avoid significant impact on the riparian vegetation and potential wetlands. The boardwalk option is not estimated for Condition C.

Condition D has approximately 0' to 3' of level space beyond the 5' setback from the edge of the lane (5' to 8' clear, or 3' to 6' additional width needed for the trail). Again, there are 3 options to create a trail, each of which has relatively less encroachment and impact on riparian vegetation, and potentially wetlands:

1. Extend the road bench by placing fill at an assumed slope of 2:1, partially destroying the riparian vegetation and eliminating a small portion of the wetland. An average additional 5' of width is assumed to be needed for estimating purposes;
2. Extend the road bench using a concrete retaining wall to reduce the encroachment into the riparian vegetation and wetland. This would require a safety railing along the wall, and an additional 1' of trail width (7' overall) to provide clearance. An average additional 6' of width is assumed to be needed for estimating purposes, requiring an 36" high retaining wall;
3. Construct a cantilevered boardwalk section over the slope and/or wetland, supported by concrete piers. This would still require the trimming or removal of some wetland vegetation, but would minimize the direct impact on the potential

wetlands. The boardwalk would require a safety railing along the edge, with an additional 1' of trail width (7' overall) to provide clearance. An average additional 6' of boardwalk width is assumed to be needed for estimating purposes.

Condition E has no usable space for a trail beyond the minimum 5' setback from the roadway lanes. (0' to 5' clear, or 6' to 11' additional width needed for the trail). Again, there are 3 options to create a trail, but with more extensive construction and impacts:

1. Extend the road bench by placing fill at an assumed slope of 2:1, An average additional 9' of width is assumed to be needed for estimating purposes;
2. Extend the road bench using a concrete retaining wall. An average additional 10' of width is assumed to be needed for estimating purposes, requiring an 36" high retaining wall;
3. Construct a cantilevered boardwalk section over the slope and/or wetland, supported by concrete piers. An 8' wide boardwalk is assumed for estimating purposes.

Condition F, the segment along Lagunitas Creek, requires basically the same cantilevered boardwalk solution as Conditions D(3) and E(3), but there is the added issue of the steep slope, narrow width, and apparent instability of the creek bank, and the eventual need for a major stabilization and/or road realignment project in order to maintain the trail, and even the roadway, in place. An 8' wide boardwalk is assumed for estimating purposes, which would be offset on its foundation as illustrated to cantilever the boardwalk over the steep edge of the creek bank.

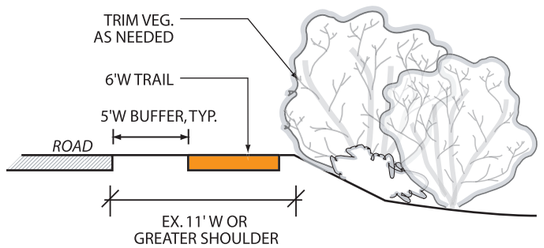
Condition O is an elevated boardwalk in the pasture.

Condition T represents roadside turnouts, where the available width for a trail typically varies from narrow to wide and back to narrow. To provide a realistic estimate of Conditions as they vary through roadside turnouts, the Conditions are assumed to be ½ A, 1/8 C, 1/8 D, and ¼ E through each turnout.

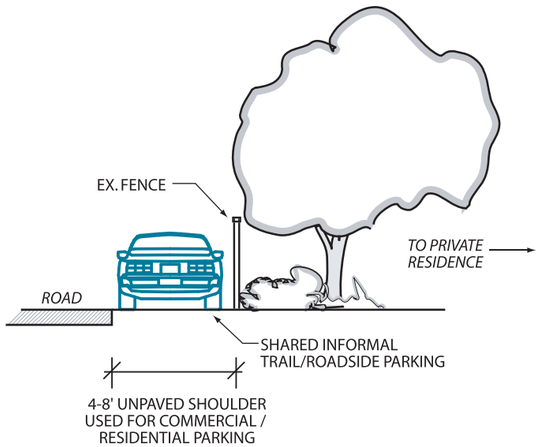
Guardrails. Provision of a guardrail along the portions of the trail that are adjacent to the road would require an additional 2' in width to the total trail section, pushing the improvements an additional 2' into the riparian vegetation and potential wetland areas and increasing construction cost. The cost estimate includes an alternative with the approximate cost and construction area impact of adding a guardrail in roadside locations where it is not precluded by parking, turnout or access requirements.

3.1.j Construction Cost Assumptions

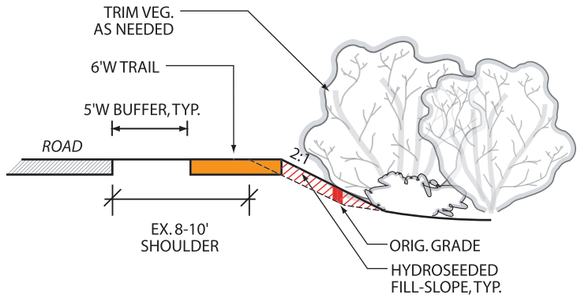
Costs were estimated by adding all Option 1, all Option 2, or all Option 3, but, ultimately, these different approaches or options could be mixed and matched during final design.



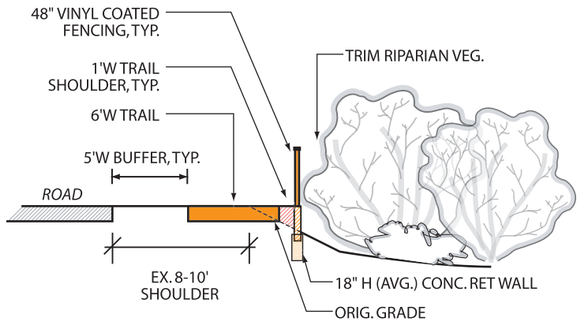
A



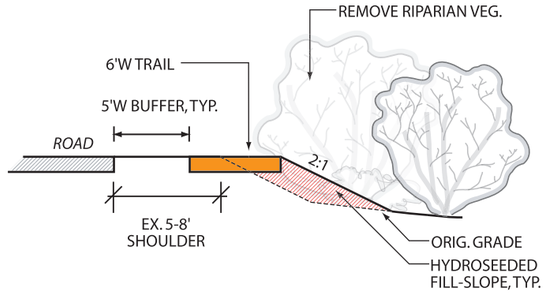
B



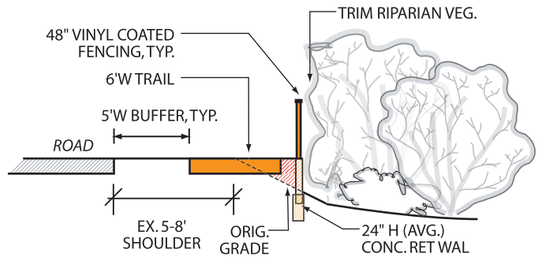
C
FILL-SLOPE



C
RETAINING WALL/
CANTILEVERED
BOARDWALK



D
FILL-SLOPE



D
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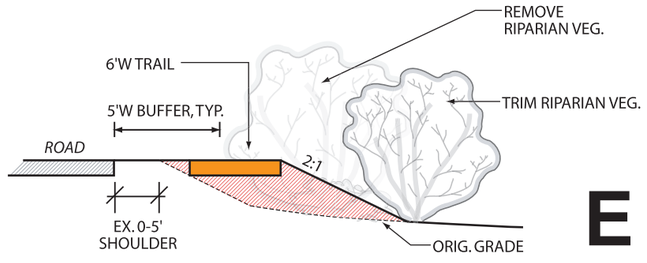
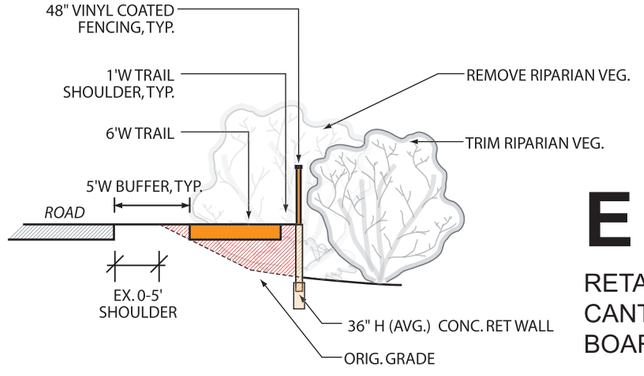
BOARDWALK



E
FILL-SLOPE



E
RETAINING WALL/
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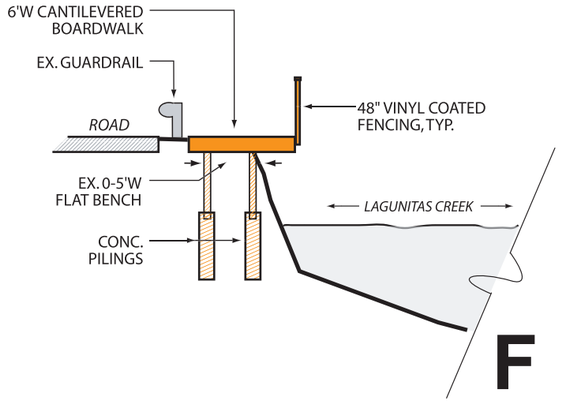
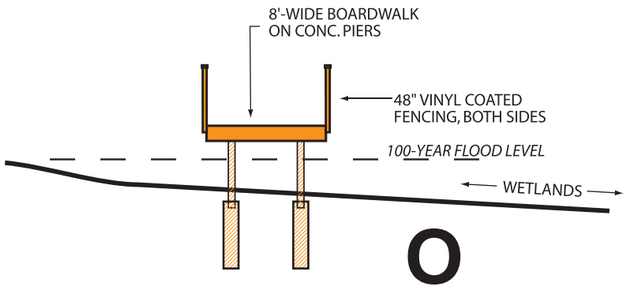
BOARDWALK



F
CANTILEVERED
BOARDWALK



O
BOARDWALK

FIGURE 3:
Typical Condition/Treatment Cross-Sections

3.2 Trail Alignment 1a –Sir Francis Drake Boulevard to Lagunitas Creek

This alignment would maintain one of the existing informal public access alignments within the Project Area. For many years, the public has accessed the Giacomini property along two unofficial trails. Trail Alignment 1a is along the top of the levee at the northern end of the West Pasture (see Figure 4). It can be accessed from a small parking area on the east shoulder of Sir Francis Drake Boulevard north of Drake's View Drive. A bridge crossing Fish Hatchery Creek at the west end of this section might be required under Restoration Alternative C, as well as a boardwalk, as the north levee would potentially be removed.

3.2.a Construction

This trail would extend from the existing pullout at Sir Francis Drake Boulevard, across a pedestrian bridge over Fish Hatchery Creek, assuming Restoration Alternatives B - D are implemented, and on a boardwalk to Lagunitas Creek and for a distance south along the west creek bank. The potential bridge would span a channel approximately 25' wide (see Photo 1). The actual span of the bridge is estimated at 35' to allow setback from the creek banks. The most cost-effective approach for the construction of this bridge would be to use a pre-fabricated fiberglass bridge on a concrete pier foundation (see Figure 5). The bridge would be elevated approximately 7' above the adjacent meadow, and approximately 4' above the 100 year flood elevation, to avoid blocking flood waters that overflow the creek banks during storm events Assuming the existing levee is removed to restore the original hydrology, a short wood ramp would lead from the slope at the edge of the turnout at Sir Francis Drake Boulevard, approximately at the existing gate, to the west end of the bridge. The boardwalk would start at the east end of the bridge, extending over the wetlands shown in Photo 2. Because this boardwalk and bridge would not offer a through connection, they are assumed to be for pedestrian use only, and are assumed to be 5 feet wide rather than the 8 to 10 feet required for a multi-use bicycle/pedestrian boardwalk.

The boardwalk (see Figure 6) would be pressure-treated wood on pressure-treated wood pilings. It would have wood frame railings with coated welded wire mesh to provide protection from falling with minimum visual impact and maximum visibility for anyone too short to see over the railing. To minimize direct impact on the wetlands, and to avoid interference with flood flows or trapping of flood-borne debris, the boardwalk would be designed with a maximum practical span of approximately 12' to 16' feet between pilings to limit the number of pilings. For structural reasons, the span may have to be reduced to as little in 10' at some locations such as bends in the boardwalk.


1. View of bridge location from SE


2. View to wetlands from W

The boardwalk structure would also be elevated approximately 7' above the surrounding meadow to be 4' above the 100 year flood elevation. Access for installation of the piles and construction of the boardwalk could be provided by all-terrain vehicles with floatation tires to minimize impact on the wetland/meadow. This has been factored into the cost estimate.

Total length Alignment 1a: 2060 l.f.

Construction elements:
Pre-fabricated Fiberglass Bridge 35'x6'
Elevated Boardwalk – 5' wide, 2025'

Total estimated construction cost: $1,139,349

Estimated Construction Area Impacts:

Total Square Footage for Impacted Area:	10,225 s.f.
3'W Construction Access Impact Area:	6,195 s.f.
Total Square Footage of Construction Area Impact:	16,420 s.f.

3.2.b Maintenance

Both the bridge and the boardwalk would require maintenance and would ultimately deteriorate to the point that they would require major repairs or replacement.

The pre-fabricated fiberglass bridge is expected to be very low maintenance, limited to replacement of the wood decking averaging 10% every 5 years. The long-term lifespan of the bridge and foundation is estimated to be 50 years, at which time it would have to be replaced at then-current costs.

The boardwalk and the wood ramp to the bridge would require annual inspection and minor repairs to deteriorated or vandalized railings or mesh. The wood planking would require replacement at an assumed interval of approximately 10% every 5 years. The major boardwalk structure has an assumed lifespan of approximately 50 years. A

catastrophic event such as a major flood could damage or destroy the boardwalk or bridge during any storm season due to their location in the flood plain. Fire is another potential event that could require replacement or significant reconstruction of the boardwalk structure.

Total estimated annual maintenance/replacement cost for Alignment 1a is $22,371.

3.2.c Land Use Impacts

Construction of the bridge and boardwalk could have potential short-term noise impacts, on nearby residences (there are no adjacent residences), as could maintenance and repair activities.

Figure 4:
Segment 1a

GIACOMINI WETLANDS PUBLIC ACCESS STUDY PHASE II

1a

5'W ELEVATED BOARDWALK

1

NEW BRIDGE ACROSS FISH HATCHERY CREEK

2e

2c

4c

Drakes View Dr

Sir Francis Drake Blvd

LEGEND

- Start/End of Condition
- Trail Alignments
- Viewing Platforms
- Parkland Boundaries
- Parcels

N
W E
S

0 50 100 200 Feet

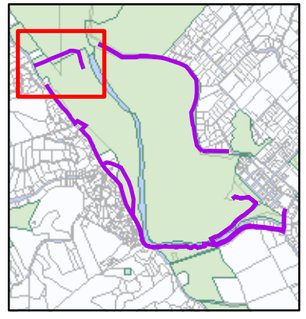
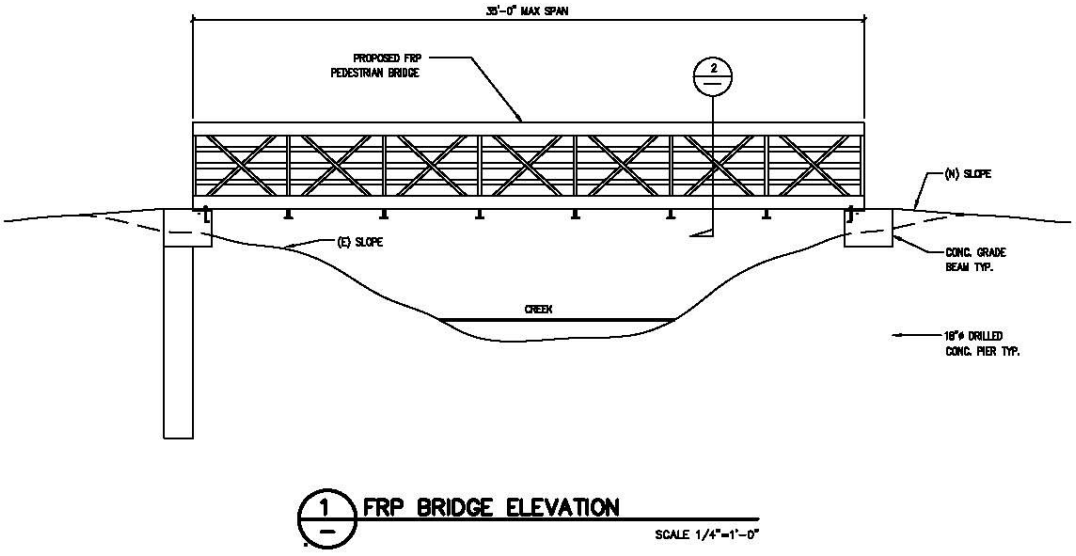
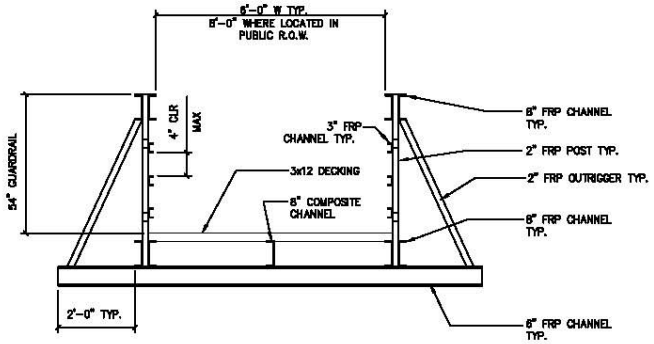


Figure 5: Alignment 1a: Prefabricated Bridge

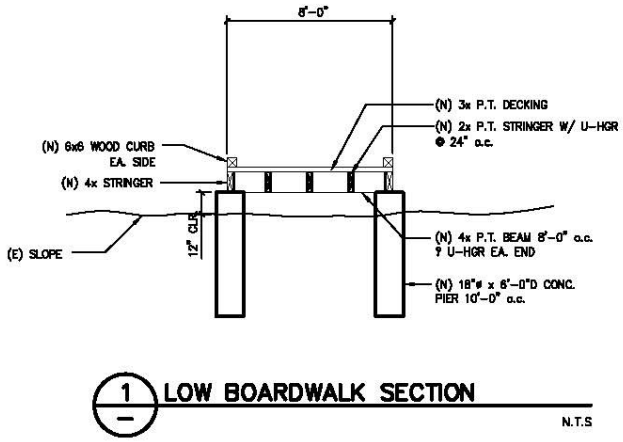


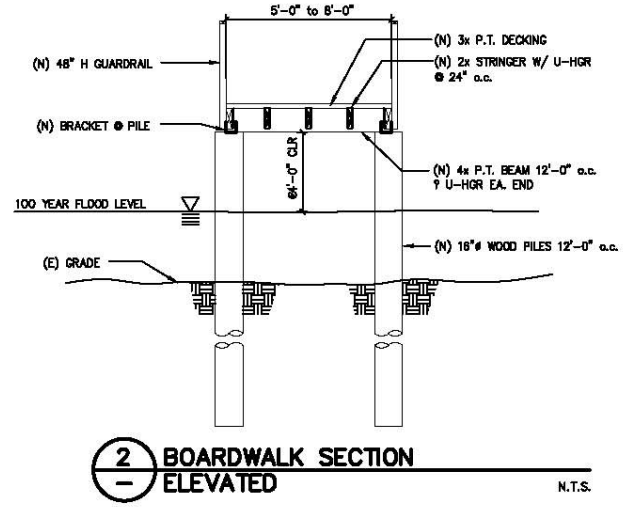
1 FRP BRIDGE ELEVATION
SCALE 1/4"=1'-0"



2 FRP BRIDGE SECTION

Figure 6: Alignment 1a: Typical Boardwalk and Elevation





3.3 TRAIL ALIGNMENT 2C – HISTORIC RAILROAD GRADE

A trail would be constructed on the historic railroad grade that exists along the eastern bank of Tomasini Creek (see Figure 7). The southern terminus of the railroad grade trail would connect to Mesa Road in Point Reyes Station. The northern reach of the railroad grade trail would connect to the existing Tomales Bay Trail, an unpaved multi-use trail that extends from just north of the Tomasini Creek outlet to Tomales Bay northeast to Highway 1. Important considerations for design of this alignment are noted in the Phase I Study:

> A large section of the Point Reyes Mesa supports seeps and springs whose waters flow down the Mesa and across the historic railroad grade into Tomasini Creek. The Giacominis actually maintained the historic railroad grade for some period after it was abandoned by the railroad, but stopped more than 10 years ago, because the amount of seep/spring flow required installation of a number of culverts and constant road maintenance (Richard and Robert Giacomini, *pers.comm*.). To ensure that erosion and sediment loading into the creek is not exacerbated by creation of a trail, the section through this area might need to be constructed as a boardwalk. However, this boardwalk would probably require maintenance to remove debris and sediment from high flows in Tomasini Creek that would spill onto these narrow floodplains during storm events.[4]

3.3.a Construction

This alignment is currently passable at the north and south ends, but gets increasingly wet toward the central portion, where it quickly becomes impassable due to dense riparian vegetation that has grown over the railroad grade, including large trees. This trail alignment would be part of a loop that would be open to multi-use, and thus is recommended to be constructed with an 8' width to accommodate shared use by horses and pedestrians, and potentially bicyclists (assuming a relatively low use volume).

A boardwalk is anticipated to be the most practical form for a trail in the wet, central portion of Alignment 2c due to the large amount of water seeping from the hillside (see Figure 8). Allowing this water to flow more or less continuously under the boardwalk would avoid need for the drainage ditches and culverts that caused the Giacominis to give up on maintaining the route. A boardwalk constructed on Alignment 2c would not need to be designed to avoid interference with flood waters. Although it is within the effective flood channel of Tomasini Creek during 50 to 100 year storms, the boardwalk would be designed to be inundated and is in a location and at a level that would not significantly block flows. It would be constructed of pressure-treated wood supported on concrete pier footings, rather than the pilings required for the Alignment 1a boardwalk, and could have shortened, more economical spans between footings. This boardwalk could potentially be constructed at a relatively low elevation (e.g. 12 to 18" above grade) and thus would not

[4] Kamman Hydrology & Engineering, Inc., LSA Associates, Inc., and Point Reyes National Seashore. 2004. Technical Evaluation of Potential Public Access Alignments for the Giacomini Wetland Restoration Project. Part I: Resources Study, P. 22. Prepared for Point Reyes National Seashore.

require safety railings. An important design consideration is that this trail alignment would probably be used by horses. A conventional boardwalk surface may be unsuitable or unsafe for use by horses, and this use would certainly increase the rate at which the boardwalk would deteriorate. Therefore, an alternative has been estimated to place an asphalt chip seal surface over the planking to accommodate horses.

3. View S from N end of 2c

4. View N from pasture of central portion of 2c

The north end of Alignment 2c, and the south end for some distance north of the Hunt Shack, are relatively dry and currently passable and might not warrant significant trail improvements if an all-weather trail is not required. Because the north end of Alignment 2c, evaluated below as Alignment 2d, connects to the unpaved Tomales Bay Trail, an unimproved trail through an often muddy cow pasture, it would not be logical to improve the trail at the north end without also improving the Tomales Bay Trail, although the latter is beyond the scope of the current study.

A rustic, weather-dependent path would require initial tree and brush removal along the trail corridor, trimming of encroaching vegetation, construction or modification of drainage ditches, localized filling and base rock surfacing in particularly wet areas, and a small allowance for signs.

The portion of Alignment 2c from the Hunt Shack to the start of the boardwalk segment should be an improved trail section to provide handicapped access to the boardwalk.

Total length Alignment 2c: 5825 l.f.

Construction elements:
Weather-Dependant Informal Path, 2512'
Low Boardwalk, 3289'
Improved All-Weather Path – 6' Wide

Total estimated construction cost: $1,582,337

Estimated Construction Area Impacts:

Total Square Footage for Impacted Area:	55,630 s.f.
3'W Construction Access Impact Area:	18,906 s.f.
Total Square Footage of Construction Area Impact:	76,867 s.f.

3.3.b Maintenance

As observed during site reconnaissance, and experienced long-term by the Giacominis, this alignment is in a wet location and will require high maintenance. The use of horses on the boardwalk would also accelerate the need for maintenance. Annual inspection and maintenance would include trimming of encroaching vegetation and removal of leaf litter from nearby trees on and adjacent to the boardwalk. This boardwalk trail section will require more frequent replacement of damaged or deteriorated planks, assumed to be 20% every 5 years, along with renewal of the asphalt chip seal surface. Due to the wetter conditions, this boardwalk is assumed to have a lifespan of approximately 30 years before the main structural components would need to be replaced.

The weather-dependant informal path portion of the alignment would require much less maintenance. Annual trimming of encroaching vegetation would be required. After major storm events and at least annually the drainage ditches associated with the trail would require cleanout, and the trail surface may need localized restoration.

The improved path section would require similar maintenance to the weather-dependant trail section. If the trail is surfaced with A.C. the lifespan before it would need to be resurfaced is assumed to be 10 years. If the path is surfaced with D.G. with a pine resin binder, the harder surface is estimated to last approximately 20 years before it needs to be resurfaced.

Total estimated annual maintenance cost for Alignment 2c is $40,687.

3.3.c Land Use Impacts

Construction of the trail, especially the boardwalk portion, could have potential short-term noise impacts, as could maintenance and repair activities. Residents in the vicinity of this trail alignment have expressed concerns about noise generated by trail users, and about the trail's impact on the wetlands and general wildlife habitat. They have also expressed concern about increased parking on Mesa Road to access the trail. The use of horses on the boardwalk portion could be an added generator of noise compared to a natural or gravel-surfaced path. This noise would be at least partially addressed by use of a chip seal surface over the boardwalk.

Figure 7:
Alignment 2c

GIACOMINI WETLANDS PUBLIC ACCESS STUDY PHASE II

5

2e

2c

WEATHER-DEPENDENT TRAIL

8'W LOW BOARDWALK

Overlook RCherry Tree Ln

Cypress Rd

Linsdale Ln

State Highway 1

Mesa Rd

2c

Los Reyes Dr

Los Reyes Rd

Los Reyes Dr

Rob Hill Rd

Ridge View Ln

8'W LOW BOARDWALK

POINT REYES STATION

COND. A TRAIL IMPROVEMENT

4

2d

USE EX. DRIVE FOR TRAIL

FARMWORKER HOUSING (SLATED FOR REMOVAL)

Mesa Rd

GRADJANSKI PROPERTY

Sir Francis Drake Blvd

LEGEND

- Start/End of Condition
- Trail Alignments
- Viewing Platforms
- Parkland Boundaries
- Parcels

N

W E

S

0 100 200 400 Feet

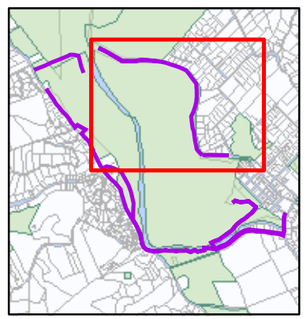
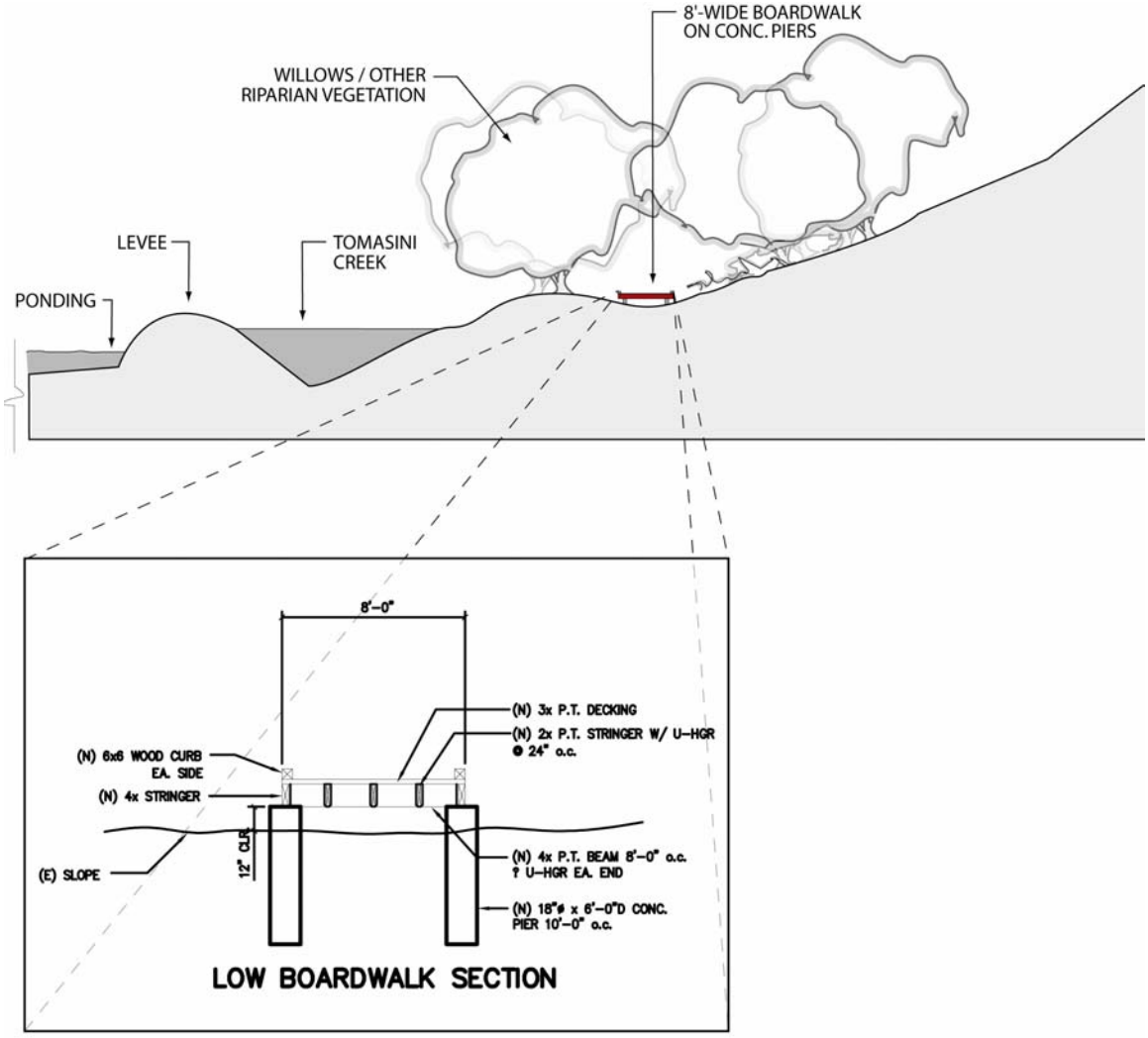


Figure 8: Alignment 2c Slope/Boardwalk Cross-Section



3.4 TRAIL ALIGNMENT 2D – HISTORIC RAILROAD GRADE, MESA ROAD TO GIACOMINI HUNT SHACK

This alignment would represent a spur access version of Trail Alignment 2c, incorporating only the portion of the historic railroad grade between Mesa Road and the Giacomini Hunt Shack. This alignment was developed based on input received during internal scoping.

5. Hunt Shack and road

3.4.a Construction

This alignment follows an existing paved road. The farm worker housing currently along the road would be removed, and the road would only provide access to the Hunt Shack, the use of which is reserved by the Giacominis for 25 years. Because there would be very little vehicular traffic, this road could be used as a trail without any improvements except for signs, a new vehicular gate, and a separate trail gate.

Total length Alignment 2d: 852 l.f.
Road functions as a path; maintenance assumed to be assigned to roads budget.

Construction elements:

Signs and gates

Total estimated construction cost: $11,518

3.4.b Maintenance

If the road is used as the path the only maintenance would be associated with wear from vehicular traffic: repairing potholes, and eventually resurfacing the road. Trail use would have very little impact on the road and the road maintenance costs are not assumed to be assigned to the trail.

Total estimated annual maintenance/replacement cost for Alignment 2d is $209.

3.4.c Land Use Impacts

Residents in the vicinity of this trail alignment have expressed concerns about noise generated by trail users, and about potential increased parking on Mesa Road to access the trail.

3.5 Trail Alignment 2e – Historic Railroad Grade, Spur Trail from Tomales Bay Trail

This alignment would represent a spur access version of Trail Alignment 2c, incorporating only the northernmost portion of the historic railroad grade between the end of the Tomales Bay Trail, and ending just north of the portion of the historic railroad grade that now supports dense riparian vegetation. It would essentially lengthen the existing Tomales Bay Trail and provide some viewing opportunities of the restored wetlands and wildlife using the northernmost portion of the Project Area. This alignment was developed based on input received during public scoping.


6. Existing trail on Alignment 2e

3.5.a Construction

The construction of this alternative would be the same as the northern portion of Alignment 2c.

Total length Alignment 2e: 2011 l.f.

Construction element:
Weather-Dependant Informal Path, 2512'

Total estimated construction cost: $24,624

Estimated Construction Area Impacts:

Total Square Footage for Impacted Area:	15,072 s.f.
3'W Construction Access Impact Area:	7,536 s.f.
Total Square Footage of Construction Area Impact:	22,608 s.f.

3.5.b Maintenance

Maintenance requirements would be the same as the informal, weather-dependant portion of Alignment 2c.

Total estimated annual maintenance/replacement cost for Alignment 2e is $979.

3.5.c Trail Alignment 4a – Point Reyes Station to Inverness Park

This alignment provides a multiple use recreational trail between Point Reyes Station and the southern perimeter of the Project Area. This alignment was developed based on input received during public scoping in 2002 and was the public access component that was

incorporated into the preliminary restoration concepts introduced to the public during scoping in 2004. It incorporates several sub-alignments that are evaluated separately in this section. If combined, all of these sub-alignments represent a trail between Point Reyes Station and Inverness Park. Some of the sub-alignments include potential Viewing Platforms, including Location #3 near the Giacomini Dairy and Elevated Overlook Location #2 at the White House Pool County Park. Completion of the entire alignment 4a would require construction of a bridge across Lagunitas Creek at the former site of the Giacomini Ranch seasonal gravel dam.

7. Giacomini Dairy area

8. Trail on N side of Lagunitas Creek

3.5.d Construction

Alignment 4a is the longest and most complex in the Study, with significant variation in construction constraints along the various sub-alignments. Because of some of the difficulties posed by construction and jurisdictional constraints, only certain sub-alignments may ultimately be selected for construction, or construction of certain sub-alignments may be phased such that those with greater technical and funding constraints and more intensive public scoping needs could be constructed at a later date following completion of additional technical and design studies and meetings with the public.

Sub-Alignment 4a-I. This sub-alignment would connect to Point Reyes Station via a trailhead near the Giacomini dairy facilities. An ADA-compliant trail would potentially connect from 6th Street heading westward to the edge of the Giacomini dairy facility mesa. At this location, interpretative exhibits and limited facilities such as picnic tables would be provided. More discussion of this Overlook Location #3 is provided later in the document. This sub-alignment would then hug the westernmost edge of the dairy facility mesa before connecting to the existing social path (Figure 9). It would also connect to the existing informal path in the County's Green Bridge Park. From the dairy, the trail would be located south of residential parcels being retained by the Giacominis fronting C Street. Fencing and signage would be provided along C Street to discourage the public from parking along C Street and/or using C Street to access the trail. The trail would follow the alignment of the existing unofficial path (along the southeastern end of the

East Pasture) to the location of the former gravel dam location. The levee along this part of the trail route is to be lowered as part of the Wetland Restoration Project, and this section of trail will be subject to inundation during major flood conditions, thereby making access weather-dependent. These paths would be relatively straightforward to construct with a base rock/decomposed granite trail section.

Total length Sub-Alignment 4a-I: 2423 l.f.

Total estimated gross construction cost: $256,067

Estimated Construction Area Impacts:

	All Options
Total Square Footage for Impacted Area:	14,568 s.f.
3'W Construction Access Impact Area:	7,359 s.f.
Total Square Footage of Construction Area Impact:	21,927 s.f.
Total Square Footage of Construction Area Impact w/ Optional Guardrail:	N/A

9. Site of old summer dam

10. Trails in White House Pool Park

Sub-Alignment 4a-II. At the old summer dam location, a major trail bridge could be constructed to link the Park Service trail with the White House Pool County park trail and the Rift Trail on the east side of Olema Marsh. The bridge would need to span approximately 200' bank to bank (see Figure 10). This is assumed to be a prefabricated steel bridge, similar to the bridge shown in Photo 11. The south end of the bridge would be located just east of an existing box culvert under Sir Francis Drake Boulevard, near the location of an existing wood trail bridge.

This major bridge would require deep drilled piers or pile foundation with concrete abutments and wing walls. Bank erosion protection such as rip-rap (large stone) armoring would be required both upstream and downstream. In keeping with the wetland restoration goals of the project, rip-rap bank protection would be kept to the minimum amount necessary. Although this armoring would protect the bridge foundation, the foundation would be designed so that the bridge would remain even if the banks were washed away, allowing the banks to be subsequently re-graded back into place after a major storm.


11. Prefabricated steel bridge

From the south side of the bridge, users could either directly connect to the White House Pool County Park path or use a proposed cross-walk on Levee Road to connect to the Olema Marsh Trail that runs along the east side of Olema Marsh (see Section 3.8 for more information).

Total length Sub-Alignment 4a-II: 440 l.f.

Total estimated gross construction cost: $819,649

Estimated Construction Area Impacts:

	All Options
Total Square Footage for Impacted Area:	2,080 s.f.
3'W Construction Access Impact Area:	1,500 s.f.
Total Square Footage of Construction Area Impact:	3,580 s.f.
Total Square Footage of Construction Area Impact w/ Optional Guardrail:	N/A

Sub-Alignment 4a-III. The White House Pool County Park path crosses two bridges as it meanders along the south bank of Lagunitas Creek. The first of these is located on the eastern end of the Park and crosses Bear Valley Creek. This bridge would need to be replaced either as a pedestrian causeway component of the bridge proposed as part of the restoration project or through construction of a separate bridge. The cost for bridge-causeway alternative is estimated as part of the wetland restoration costs and is not included in the Phase II Study. If a separate bridge were to be constructed, it would need to be replaced with a 6' wide by 35' long prefabricated fiberglass bridge spanning an approximate 25' channel north of the existing box culvert.

To the west, this sub-alignment would follow existing informal, decomposed granite-surfaced trails in the White House Pool area, which is leased from the state of California's Wildlife Conservation Board by the County of Marin Parks and Open Space District (County Parks). This sub-alignment would be developed with full approval and cooperation of the landowners, the state's Wildlife Conservation Board, and County Parks. This sub-alignment could be improved with base rock and decomposed granite to a full 6' width, or if preferred, or it could receive little or no improvements. Just north of the existing parking area for the Park, a wooden trail bridge approximately 50' long crosses the historic channel of Bear Valley Creek (see Figure 11). There is no scenario under the Wetland Restoration Plan to widen this channel. It is recommended that this bridge be replaced with a prefabricated fiberglass trail bridge, also 50' long. From the White House Pool County parking lot, an ADA-compliant path would lead to Elevated Overlook #2, which would also be ADA-compliant and enable visitors to view the restored wetlands. The sub-alignment would continue west through the park to connect with Sir Francis Drake Boulevard.

Total length Sub-Alignment 4a-III: 1993 l.f.

Total estimated gross construction cost: $333,466

Estimated Construction Area Impacts:

	All Options
Total Square Footage for Impacted Area:	400 s.f.
3'W Construction Access Impact Area:	150 s.f.
Total Square Footage of Construction Area Impact:	550 s.f.
Total Square Footage of Construction Area Impact w/ Optional Guardrail:	

Figure 9:
Alignment 4a, east

GIACOMINI WETLANDS PUBLIC ACCESS STUDY PHASE II

CROSSWALK(S) REQUIRED

ALIGNMENT TO BE DETERMINED

GIACOMINI DAIRY FACILITY

ADD SIGNAGE/FENCING ALONG RESIDENTIAL PARCELS ON C STREET

INFORMAL PATH TO GREEN BRIDGE

NEW BIKE/PED BRIDGE @ UNNAMED DRAINAGE

WIDEN EX. GREEN BRIDGE TO 8'W

NEW BIKE/PED BRIDGE

NEW 200'L STEEL BRIDGE @ OLD SUMMER DAM

OLEMA CREEK

EX. CULVERT

APPROX. EXTENT OF EX. 10'W EASEMENT

NEW CROSSWALK ACROSS LEVEE RD.

EX. BALL FIELD

NEW CROSSWALK

EX. OLEMA MARSH TRAIL

EX. BOX CULVERT

DRAINAGE

REPLACE EX. TRAIL BRIDGE

WHITE HOUSE POOL PARK

EX. BOX CULVERT

HISTORIC BEAR VALLEY CREEK ALIGNMENT

4a-I

4a-II

4a-III

4d/4e

POINT REYES STATION

6th St

5th St

A St

4th St

3rd St

2nd St

B St

C St

Mesa Rd

State Highway 1

Commodore Webster Dr

Sir Francis Drake Blvd

LEGEND

- Start/End of Condition
- Trail Alignments
- Viewing Platforms
- Parkland Boundaries
- Parcels

N W E S

0 50 100 200 300 Feet

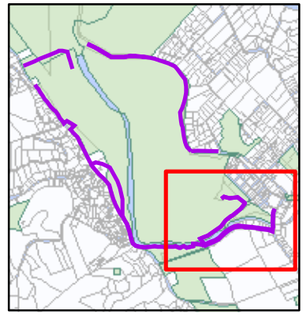
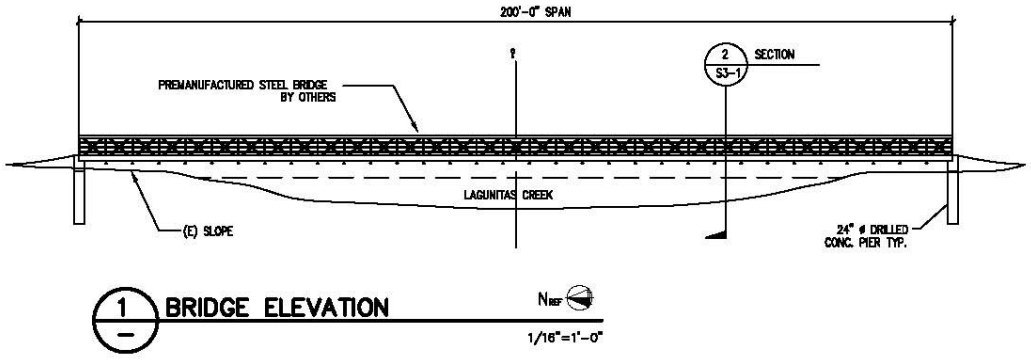
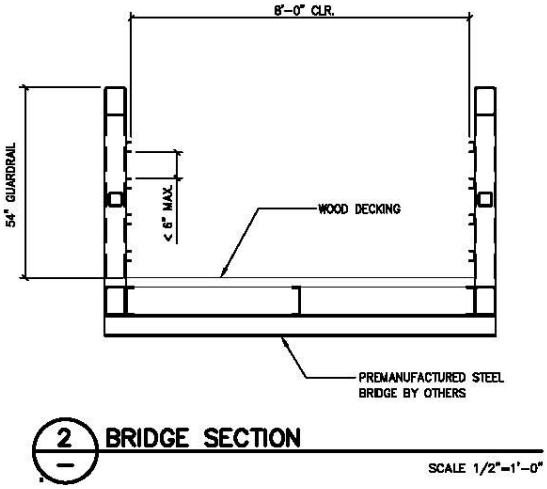


Figure 10: 200' Steel Bridge Section/Elevation





Sub-Alignment 4a-IV. Sub-Alignment 4a-III ends at Sir Francis Drake Boulevard at a turnout south of the bend in Lagunitas Creek. Sub-Alignment 4a-IV runs from White House Pool to the very southern boundary of the Giacomini Ranch's West Pasture. This sub-alignment is significantly constrained because there is very little available room for a path outside the guardrail between the road and the steep bank dropping off into the creek. Initially, an informal path connects to a wood boardwalk across a culvert outlet (see Photo 12). Beyond this point another section of the bank has fallen into the creek, leaving no room for a path, and threatening to undermine the road and utility poles (see Photo 13). Concrete beams (actually pilings) have been staked in place along this section of the road to act as a rudimentary retaining wall, but this is not a long-term solution to bank stabilization. The space behind the guardrail gradually reduces to a few feet at the north end of the guardrail. On the east side of the road is a drainage ditch and a steep cut slope left from construction of the road. The road shoulders vary from approximately 4 feet to less than a foot through this section.


12. Lagunitas Creek bend, view south


13. Lagunitas Creek bend, view north

Figure 11:
Alignment 4a, west

GIACOMINI WETLANDS PUBLIC ACCESS STUDY PHASE II

INVERNESS PARK
Vallejo
Portola Ave
Carmencita
Buena Vista Ave
Balboa Ave
Blackberry Ln
Sir Francis Drake Blvd
8'W LOW BOARDWALK
4b
4a-V
4a-IV
4a-III
REPLACE EX. 50'L FOOT BRIDGE
EX. RESTROOM
EX. PARKING/ STAGING AREA
WHITE HOUSE POOL PARK
Sir Francis Drake Blvd
EX. BOX CULVERT

LEGEND

- Start/End of Condition
- Trail Alignments
- Viewing Platforms
- Parkland Boundaries
- Parcels

N
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0 50 100 200 300 Feet

Long-term protection of the road and utility poles from creek bank failure will require a major bank protection project to be undertaken at some point. In conjunction with the bank protection project, the road bench could be widened to provide room for a separate path and Class II bike lanes. Because this is a steep narrow bank adjacent to a deep pool at the outside of a sharp bend in the creek, the bank protection will need to be carefully designed. To maintain the current channel width, sheet pilings might have to be used, rather than some less expensive solution, such as rip-rap. Another alternative might be to realign the road to the east by building a retaining wall along the steep embankment north of Balboa Avenue. Then the current failing creek bank could be replaced by rip-rap slope protection. In any case, this is a major design and construction project that will involve multiple agencies and issues. It is far beyond the scope of this study to address these design issues, and beyond the scope of a local trail improvement project to implement such improvements. Presumably the County of Marin would take the lead with the National Park Service as a participant in planning such a project to help minimize impact on resources and plan for the best trail arrangement.

Until such time as a major creek bank protection/road realignment project occurs, the only option for providing a trail though this section is to create a cantilevered boardwalk through this segment, similar to that described under Condition F (see Design Assumptions section earlier in this document for a description of the various Conditions). Including this section at the bend in Lagunitas Creek, and areas to the north, the space adjacent to the roadside available for a trail ranges from wide and flat at various turnouts to no available space except for steep slopes and areas with potential wetlands and riparian vegetation. These variable conditions have been characterized in typical cross-sections Conditions A through F (see Figure 3), A representing the least constrained condition, and F representing the most constrained. Turnouts (T) are broken down into other Conditions based on a standardized set of assumptions, as detailed in Section 3.1. These conditions have been color-coded on the maps – Figures 8, 10 and 13.

Total length Sub-Alignment 4a-IV: 1229 l.f.

Total estimated construction cost w/fill slopes (Option 1):	**$392,229**
Total estimated construction cost w/fill slopes and guardrail:	**$435,981**
Total estimated construction cost w/retaining wall (Option 2):	**$486,496**
Total estimated construction cost w/retaining wall & guardrail:	**$595,946**
Total estimated construction cost w/boardwalk (Option 3):	**$568,688**
Total estimated construction cost w/boardwalk & guardrail:	**$608,211**

Estimated Construction Area Impacts:

	Option 1	**Option 2**	**Option 3**
Total Square Footage for Impacted Area:	7,588 s.f.	4,160 s.f.	3,900 s.f.
3'W Construction Access Impact Area:	3,687 s.f.	3,687 s.f.	3,687 s.f.
Total Square Footage of Construction Area Impact:	11,275 s.f.	7,847 s.f.	7,587 s.f.
Total Square Footage of Construction Area	12,313 s.f.	8,885 s.f.	8,625 s.f.

Impact w/ Optional Guardrail:

Sub-Alignment 4a-V. This alignment extends along Sir Francis Drake Boulevard from the southern end of the Giacomini Ranch at the juncture with the potential alternative alignment, Alignment 4b to south of the Gradjanski residence in Inverness Park. It is a mixture of Conditions D, E, and, to a lesser extent, B. Turnouts (T) are broken down into other Conditions based on a standardized set of assumptions, as detailed in Section 3.1.

Total length Sub-Alignment 4a-V: 1973 l.f.

Total estimated gross construction cost w/fill slopes (Option 1):	**$260,421**
Total estimated gross construction cost w/fill slopes and guardrail:	**$368,864**
Total estimated gross construction cost w/retaining wall (Option 2):	**$594,540**
Total estimated gross construction cost w/retaining wall & guardrail:	**$884,142**
Total estimated gross construction cost w/boardwalk (Option 3):	**$794,109**
Total estimated gross construction cost w/boardwalk & guardrail:	**$923,948**

Estimated Construction Area Impacts:

	Option 1	**Option 2**	**Option 3**
Total Square Footage for Impacted Area:	18,814 s.f.	8,411 s.f.	7,615 s.f.
3'W Construction Access Impact Area:	4,932 s.f.	4,932 s.f.	4,932 s.f.
Total Square Footage of Construction Area Impact:	23,746 s.f.	13,343 s.f.	12,547 s.f.
Total Square Footage of Construction Area Impact w/ Optional Guardrail:	26,930 s.f.	16,527 s.f.	15,731 s.f.

14. South of Inverness Park

15. Approaching Inverness Park

Summary, Alignment 4a. If combined, all of the Sub-Alignments I-V and would extend from the eastern to the western perimeters of the Project Area.

Total length Alignment 4a: 8058 l.f.

Construction elements:
Improved All-Weather Path – 6' Wide, D.G./Pine Resin Binder Surface, 5349' (Condition A, B, C)
Concrete Retaining Walls w/48" Vinyl Coated Chain Link Fence, 1928' (Condition C, D, and E assuming retaining wall option)
Improved All-Weather Path – 6' Wide, D.G./Pine Resin Binder Surface, 1906' (Condition D, E assuming retaining wall option)
Cantilevered Boardwalk – 6' wide (1489' Condition D assuming boardwalk option - delete path item above)
Cantilevered Boardwalk – 8' wide, 417' (Condition E assuming boardwalk option - delete path item above)
Cantilevered Boardwalk – 8' wide (486' Condition F boardwalk)
Pre-Fabricated Steel Bridge 200' long
Pre-fabricated Fiberglass Bridge 35'x6'
Pre-fabricated Fiberglass Bridge 50'x6'

Total estimated construction cost w/fill slopes (Option 1):	**$2,061,832**
Total estimated construction cost w/fill slopes and guardrail:	**$2,214,027**
Total estimated construction cost w/retaining wall (Option 2):	**$2,490,218**
Total estimated construction cost w/retaining wall & guardrail:	**$2,889,270**
Total estimated construction cost w/boardwalk (Option 3):	**$2,771,979**
Total estimated construction cost w/boardwalk & guardrail:	**$2,941,341**

Estimated Construction Area Impacts:

	Option 1	**Option 2**	**Option 3**
Total Square Footage for Impacted Area:	43,450 s.f.	29,619 s.f.	28,563 s.f.
3'W Construction Access Impact Area:	17,628 s.f.	17,628 s.f.	17,628 s.f.
Total Square Footage of Construction Area Impact:	61,078 s.f.	47,247 s.f.	46,191 s.f.
Total Square Footage of Construction Area Impact w/ Optional Guardrail:	39,243 s.f.	25,412 s.f.	24,356 s.f.

3.5.e Maintenance

The maintenance considerations for the base rock/decomposed granite portions of Alignment 4a and its sub-alignments include annual trimming of vegetation along the trail edge, cleanout of culverts (if any) and clearing of litter and debris from the trail surface. Over a lifespan estimated at 10 years, the trail would need to be resurfaced, but on the portion used by horses this period is reduced to 5 years. Following major storm/flood events, the trail base and surface material may need to be replaced in specific locations.

The concrete retaining walls would require no maintenance over the long term, but could eventually fail due to earth movement or settlement, or erosion. The chain link fence/railing associated with the retaining walls would require occasional replacement of damaged fence fabric and posts, and eventual replacement, similar to the components of the boardwalk.

Maintenance requirements and cost for the cantilevered boardwalk sections are likely to be similar to the requirements for boardwalks in the floodplain, such as Alignment 1a and 4b.

The boardwalk in Condition F and Sub-Alignment 4a-IV would have to be founded on some creek bank areas that are clearly unstable and are gradually failing. There is a strong potential that portions of the creek bank supporting the boardwalk in the Condition F portion could eventually fail, necessitating a localized bank reconstruction project and replacement of a portion of the boardwalk. Requirements for maintenance of prefabricated bridges are as described under Alignment 1a.

Total estimated annual maintenance/replacement cost for Alignment 4a with Option 1, fill slopes is $45,857; for Option 2, retaining walls $51,444, and for Option 3, boardwalks, the estimate is $58,758.

3.5.f Land Use Impacts

Construction of the trail improvements and bridges could have short-term noise and dust impacts on neighboring properties, as could major repair or reconstruction projects. Potential land use impacts associated with use of Alignment 4a or Sub-Alignments 4a-I and 4a-II would primarily occur at the east end, at Point Reyes Station. Especially during the summer and on weekends parking in town is at a premium. Currently, residents in the area of 3rd and C Streets report visitors parking to access the area of the proposed trail for dog walking and blackberry picking. Formalizing and improving the trail, and associating it with a more extensive trail system, is likely to enlarge this parking and access. Measures that would help to reduce this impact include providing an official trailhead at the former dairy facility, with access via 6th Street, providing fencing and signage along C Street to discourage parking for trail access. Fencing could be installed to prevent access to the trail from C Street, but this would also exclude local residents.

Another potential land use impact/conflict of Alignment 4a at Sub-Alignments 4a-I and 4a-II would be on the homes on the south side of Lagunitas Creek (fronting along the north side of Levee Road). Increased use of the current informal trail would have some impact on their privacy, and could cause increased noise, and generally alter the current rural character. At the west end of the trail, at the south end of Inverness Park there could be similar impacts of increased public use along the frontage.

Though not technically a land use impact, the trail could change the visual character of the area by adding fill, walls and/or boardwalks, and constructing the major bridge at the summer dam location. Adding guardrail safety barriers could also be a significant change.

3.6 TRAIL ALIGNMENT 4B – BOARDWALK BYPASS SOUTH OF INVERNESS PARK

This is an alternative to the portion of Alignment 4a between the bend in the creek north of White House Pool and Inverness Park. It would be created by constructing an elevated boardwalk through the West Pasture to Sir Francis Drake Boulevard just south of the Gradjanski property.

3.6.a Construction

This boardwalk would have similar construction to the boardwalk described for Alignment 2c. It is recommended to be 8' wide because it would be accommodating through bicycle and pedestrian traffic along a main trail route. The boardwalk would be slightly elevated above the adjacent wetland meadow to allow surface water to normally flow below the structure and to keep the structure dry as possible. However the structure would be below the flood elevation during major storms and so is conceived as a weather dependant trail.

Total length Alignment 4b: 2243 l.f.

Construction element:
Boardwalk – 8' wide, 2243' long

Total estimated construction cost: $998,251

Estimated Construction Area Impacts:

Total Square Footage for Impacted Area:	17,944 s.f.
3'W Construction Access Impact Area:	6,729 s.f.
Total Square Footage of Construction Area Impact:	24,673 s.f.

3.6.b Maintenance

This boardwalk would have similar maintenance requirements to the boardwalk described under Alignment 2c, with a proportional increase due to the greater width.

Total estimated annual maintenance/replacement cost for Alignment 4b is $26,095.

3.6.c Land Use Impacts

This alignment would have similar impacts to residents at the south end of Inverness Park as those described under Alignment 4a.

3.7 TRAIL ALIGNMENT 4C – SOUTH INVERNESS PARK TO DRAKES VIEW DRIVE

This alignment would extend the multiple use path from the Gradjanski property at the south end of Inverness Park along the shoulder of Sir Francis Drake Boulevard to just north of Drakes View Drive (see Figure 12). It was developed based on input received

from the public during scoping. It would be combined either with Trail Alignment 4a or 4b.

16. Central Inverness Park, view north

17. Lucchesi property, view south

3.7.a Construction

This alignment has similar conditions to those described for the west end of Alignment 4a, but it is generally less constrained. At the Lucchesi and Kostelic properties near the middle of this alignment, the frontage of Sir Francis Drake Boulevard is very constrained because of a steep slope and because the two residences and associated walks, landscaping and fences are built very close to the roadway. Construction of a trail along the frontage would require major modifications to and loss of space in the front yards, construction of retaining walls, and steepening of the driveways. To avoid these impacts, the concept is to route a boardwalk some distance behind the properties. To maintain the boardwalk above potential flood waters, the surface would be located approximately 5' above the adjacent pasture surface, or 4' above the 100 year flood level. Earthwork ramps would extend from the road shoulder to tie the pathway into the boardwalk section.

Total length Alignment 4c: 3277 l.f.

Construction elements:

Improved All-Weather Path – 6' Wide
Concrete Retaining Walls w/48" Vinyl Coated Chain Link Fence, 1871' (Condition C, D, and E assuming retaining wall option)
Improved All-Weather Path – 6' Wide, 1474' (Condition D, E assuming retaining wall option)
Cantilevered Boardwalk – 6' wide, 1085' (Condition D assuming boardwalk option - delete path item above)
Cantilevered Boardwalk – 8' wide, 389' (Condition E assuming boardwalk option - delete path item above)

Elevated Boardwalk – 8’ wide, 618' (behind Lucchesi and Kostelic properties)

Total estimated construction cost w/fill slopes (Option 1):	**$690,816**
Total estimated construction cost w/fill slopes & guardrail:	**$836,988**
Total estimated construction cost w/retaining wall (Option 2):	**$1,052,028**
Total estimated construction cost w/retaining wall & guardrail:	**$1,380,203**
Total estimated construction cost w/boardwalk (Option 3):	**$1,239,131**
Total estimated construction cost w/boardwalk & guardrail:	**$1,416,962**

Estimated Construction Area Impacts:

	Option 1	**Option 2**	**Option 3**
Total Square Footage for Impacted Area:	27,662 s.f.	15,898 s.f.	15,161 s.f.
3'W Construction Access Impact Area:	9,831 s.f.	9,831 s.f.	9,831 s.f.
Total Square Footage of Construction Area Impact:	37,493 s.f.	25,729 s.f.	24,992 s.f.
Total Square Footage of Construction Area Impact w/ Optional Guardrail:	42,070 s.f.	26,747 s.f.	25,767 s.f.

3.7.b Maintenance

Maintenance of Alignment 4c would have similar requirements to the northern portion of Alignment 4a.

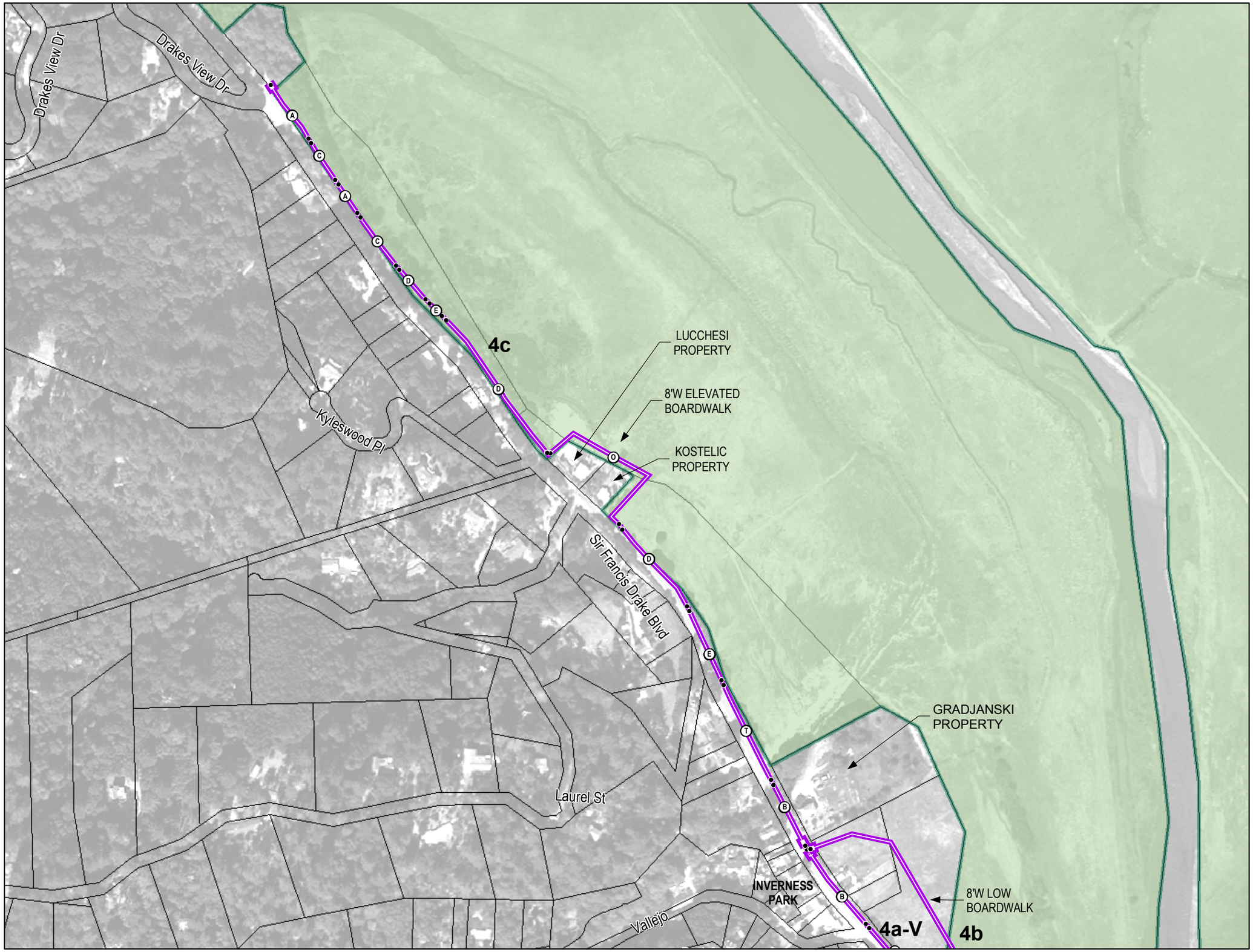
Total estimated annual maintenance/replacement cost for Alignment 4c with Option 1, fill slopes is $16,735; with Option 2, retaining wall, the cost is $22,186; with Option 3, boardwalk, the estimate is $26,850.

3.7.c Land Use Impacts

Construction of the trail improvements could have short-term noise and dust impacts on neighboring properties, as could major repair or reconstruction projects. The potential land use impacts from the formalization of a trail along this route could be noise generated by trail users affecting the adjacent property, impacts on privacy through visual intrusion, and a change in the scenic rural character that could be caused primarily by the retaining walls, railings, and safety barriers that would be installed along some portions of the trail. The trail could also interfere with parking along the property frontages, including parking serving commercial uses, except that the assumption is that parking would be allowed on the trail, which would basically be an improved road shoulder in these locations. This would mitigate any impact on parking, but limit the safety benefits of the trail.

Figure 12:
Alignment 4c

GIACOMINI WETLANDS PUBLIC ACCESS STUDY PHASE II

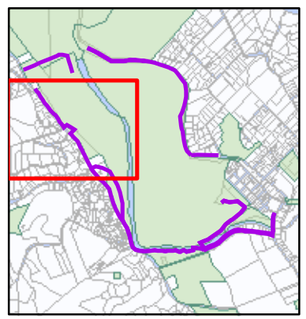


LEGEND

- Start/End of Condition
- Trail Alignments
- Viewing Platforms
- Parkland Boundaries
- Parcels

N
W E
S

Feet
0 50 100 200 300



3.8 TRAIL ALIGNMENT 4D/4E – POINT REYES STATION TO WHITE HOUSE POOL PARK VIA LEVEE ROAD

Alignment 4d uses the south shoulder of Levee Road/Sir Francis Drake Boulevard while Alignment 4e uses the north shoulder (see Figure 13). Both alignments would connect from Point Reyes Station to Inverness Park via the west shoulder of Highway 1, across the "Green Bridge", then west along the shoulder of Levee Road/Sir Francis Drake Boulevard to White House Pool Park. From there, the trail would follow one of the proposed Inverness Park alignments described under Trail Alignment 4a or 4b and then possibly connect to Trail Alignment 4c.

3.8.a Construction

The first portion of this alignment requires special consideration because it in the Caltrans right-of-way and because it involves two bridges and a major intersection at Highway 1 and Sir Francis Drake Boulevard. Caltrans is not likely to accept less than its full bikeway standards in this setting. One issue is that if a multi-use path is to be provided in lieu on bike lanes or informal use of the shoulders by bikes, provisions for bikes to cross at the beginning and end of the path are required. If this portion of the path starts at B Street and ends at Levee Road, crosswalks across Highway 1 would be required at each end point.

Moving south from B Street in Point Reyes Station, the first construction requirement for the path would be a short bridge over an unnamed creek flowing through a box culvert/bridge under Highway 1. The existing culvert is approximately 30' wide and the span for an 8' wide prefabricated fiberglass trail bridge is assumed to be 40' in order to provide setbacks from the creekbanks.

Beyond this bridge the existing road shoulder is not wide enough to accommodate a 6'wide trail without reducing the available road shoulder. A safety barrier and construction of a retaining wall to support the trail is recommended to minimize impact on the adjacent riparian vegetation. The existing Green Bridge is approximately 100' long. It has a 5' wide boardwalk on the west side, and virtually no shoulders for bikes on the bridge itself. An option to modify the bridge to provide an 8' wide multi-use path on the west has been estimated (see Figure 14). This could be accomplished by replacing the existing steel beams supporting the boardwalk with longer members, and replacing the current railing with a higher one.

Continuing south, a 4 to 5' wide pathway around the northwest corner of the intersection of Highway 1 and Sir Francis Drake Boulevard is formed by an AC curb. This path is not adequate for accommodating multiple uses. Due to the close proximity of the structure on the corner, the only practical means of creating the 8' standard bikeway width would be to utilize some of the shoulder of the roadway and place a safety barrier between the road and the trail. Depending on if a path is being considered on the south side of Levee Road (Alignment 4d) or on the north side (Alignment 4e), a crosswalk across the Levee Road portion of Sir Francis Drake Boulevard may be required at this point. This is a very wide

18. Approaching Green Bridge from N

19. Green Bridge from S

intersection that encourages speeding. Although it is beyond the scope of the current study, traffic calming improvements at this corner, such as bulb-outs (extending the curbs outward at the corners to reduce the width and turning radius), would significantly improve safety whether the trail was on the north or the south. The concept evaluated is to provide an 8' wide, A.C. paved Class I path along this portion of Highway 1, including around the corners at the intersection with Sir Francis Drake Boulevard/Levee Road. Protective guardrails would separate the pathway from the road. Crosswalks would be provided at either end to allow bicyclists and pedestrians to connect to the path.


20. Highway 1/Levee Road intersection, from NE


21. Levee Road, view east

Along Levee Road conditions vary significantly between the north and south sides. On the south a gently-sloping unpaved shoulder extends from 6 to 15' beyond the edge of the pavement. There is little or no paved shoulder. Utility poles interrupt the unpaved shoulder at locations from 3 to 6' from the edge of pavement. Beyond the unpaved shoulder there is an abrupt slope down to a lower level, generally wet area, typically

featuring riparian vegetation. The south side has only one fronting residential property, while the north side has several, plus one business – an attorney's office on the corner. The north side has intermittent paved shoulders from 3 to 5' wide, and/or unpaved shoulders providing from 5 to 6' clearance from the edge of the lanes to a series of obstructions, including fences, trees, mailboxes, utility poles, etc. Generally the north side does not feature the steep embankment beyond the roadway that occurs on the south, although there is a culvert and drainage at the apex of the curve east of Olema Creek that creates some steep drop-offs on the north.


22. Approaching Olema Creek Bridge from E


23. Levee Road W of Olema Creek Bridge

Construction of a trail on the south side of Levee Road would be facilitated by an access easement that has been secured by Marin County along the frontage of the private ball field at the eastern end of the road. This ball field generates traffic and parking that would likely impact the usability of the trail during game times, and adds to neighbors concerns about the safety of the road.


24. Parking on Levee Road during game

At Olema Creek the existing bridge, a box culvert approximately 50' wide, affords no shoulder for bikes or pedestrians. There is no scenario in the Wetland Restoration Project for the replacement of this bridge, so the installation of a parallel prefabricated trail bridge would be required. The bridge would be 8' wide and is assumed to be approximately 60' long to allow clearance from the top of bank. The shoulder approaching the existing bridge from the east is much more constrained on the north than on the south, due to an adjacent residence, driveway, fence and trees. West of Olema Creek the shoulders on both sides of Sir Francis Drake Boulevard are more generous, though utility

poles still occupy the available space, and embankments with wetland vegetation border the road shoulder. Just beyond the Olema Creek Bridge, the Olema Creek Trail connects to the south shoulder of the road. A connection to this trail, a popular destination for equestrians and hikers, is another justification for selecting the south shoulder of the road (4d) over the north. At this point there is good sight distance in both directions for a crosswalk. From this point the trail would extend west on the south side to connect to White House Pool Park and Alignment 4a.

Because there are fewer physical constraints and affected properties, Alignment 4d, on the south side of Levee Road would be more feasible to construct than Alignment 4e on the north side. As indicated on Figure 14 there are several basic conditions and design sections for construction (shown in Figure 11), depending on the width of the existing shoulder. These are essentially the same as the conditions and design concepts described for Alignment 4a, absent some conditions that do not occur here. The boardwalk trail improvement option is not estimated on Alignment 4d because the alignment is generally less constrained, and because potential wetland areas associated with Alignment 4d are not as significant or sensitive as the wetlands along Alignment 4a. However, this may conflict with Marin County's position that it would not allow fill south of Levee Road near the ball field or Olema Creek because it is a "floodway". [5]

Guardrails. Provision of a guardrail along the portions of the trail that are adjacent to the road would require an additional 2' in width to the total trail section, pushing the improvements an additional 2' into the riparian vegetation and potential wetland areas and increasing construction cost. The cost estimate includes an alternative with the approximate cost and construction area impact of adding a guardrail in roadside locations where it is not precluded by parking or access requirements. A safety barrier is not proposed along the eastern portion of Alignment 4d near the private ball field.

Total length Alignment 4d/4e: 3044 l.f.

Construction elements:

Improved All-Weather Path – 8' Wide, A.C. Surface, 472' (from B Street to Levee Road)
Improved All-Weather Path – 6' Wide, D.G./Pine Resin Binder Surface, 1782' (Condition A, C)
Concrete Retaining Walls w/48" Vinyl Coated Chain Link Fence, 1456' (Condition C, D, and E)
Improved All-Weather Path – 6' Wide, D.G./Pine Resin Binder Surface, 674' (Condition D, E)
Pre-fabricated Fiberglass Bridge 35'x6'
Pre-fabricated Fiberglass Bridge 50'x6'

Total estimated construction cost w/fill slopes (Option 1): $729,476
Total estimated construction cost w/fill slopes & guardrail: $858,579

[5] Eric Steger, Marin County Department of Public Works, personal communication, May 2005.

Total estimated construction cost w/retaining walls (Option 2): $950,147
Total estimated construction cost w/ retaining walls & guardrail: $1,198,172

Estimated Construction Area Impacts:

	Option 1	Option 2
Total Square Footage for Impacted Area:	22,203 s.f.	14,075 s.f.
3'W Construction Access Impact Area:	8,997 s.f.	8,997 s.f.
Total Square Footage of Construction Area Impact:	31,200 s.f.	23,072 s.f.
Total Square Footage of Construction Area Impact w/ Optional Guardrail:	38,693 s.f.	30,051 s.f.

3.8.b Maintenance

Maintenance requirements for this section are similar to those for the comparable parts of Alignment 4a. The Green Bridge walkway is assumed to remain part of Caltrans maintenance responsibilities.

Total estimated annual maintenance/replacement cost for Alignment 4d with Option 1, fill slopes, is 15,064; with Option 2, retaining wall, the estimate is $19,518.

3.8.c Land Use Impacts

The primary land use impact of Alignment 4d, on the west side of Highway 1 and on the south side of Levee Road would be on the attorney's office at the northwest corner of the intersection, where the Green Bridge and the existing path would need to be widened to create a Class I path, and at the single residence on the south side of the road. Both these uses could be impacted by noise, litter, and visual intrusion from increased trail use, as well as temporary noise and dust during trail construction. Residences on the north side of Levee Road could also be impacted, but to a much lesser extent.

Though not technically a land use impact, the trail could change the visual character of the area by adding fill, walls or boardwalks, new trail bridges, expanding the existing Green Bridge structure. Adding guardrail safety barriers could also be a significant change.

A potential land use conflict could occur between use of the trail and parking along Levee Road for the private ball field on the south side. Although the roadside parking is not formally dedicated for parking for this use, it would definitely conflict with the trail use. Conversely, if a safety barrier is installed for the trail, it would prevent the shoulder from being used for parking. Therefore a safety barrier is not proposed along the eastern portion of Alignment 4d near the private ball field.

Figure 13:
Alignment 4d/4e

GIACOMINI WETLANDS PUBLIC ACCESS STUDY PHASE II

GIACOMINI DAIRY FACILITY

POINT REYES STATION

C St

3rd St

2nd St

B St

INFORMAL PATH TO GREEN BRIDGE

NEW BIKE/PED BRIDGE @ UNNAMED DRAINAGE

WIDEN EX. GREEN BRIDGE TO 8'W

4a-I

4d/4e

NEW BIKE/PED BRIDGE

NEW 200'L STEEL BRIDGE @ OLD SUMMER DAM

EX. CULVERT

OLEMA CREEK

APPROX. EXTENT OF EX. 10'W EASEMENT

NEW CROSSWALK ACROSS LEVEE RD.

State Highway 1

EX. BALL FIELD

Sir Francis Drake Blvd

NEW CROSSWALK

4a-II

4a-III

EX. OLEMA MARSH TRAIL

EX. BOX CULVERT

REPLACE EX. TRAIL BRIDGE

DRAINAGE

LEGEND

- Start/End of Condition
- Trail Alignments
- Viewing Platforms
- Parkland Boundaries
- Parcels

N W E S

0 50 100 200 Feet

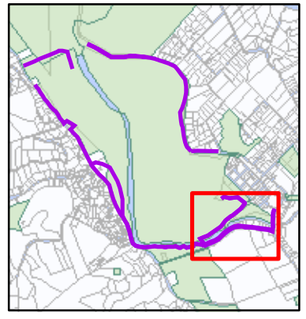
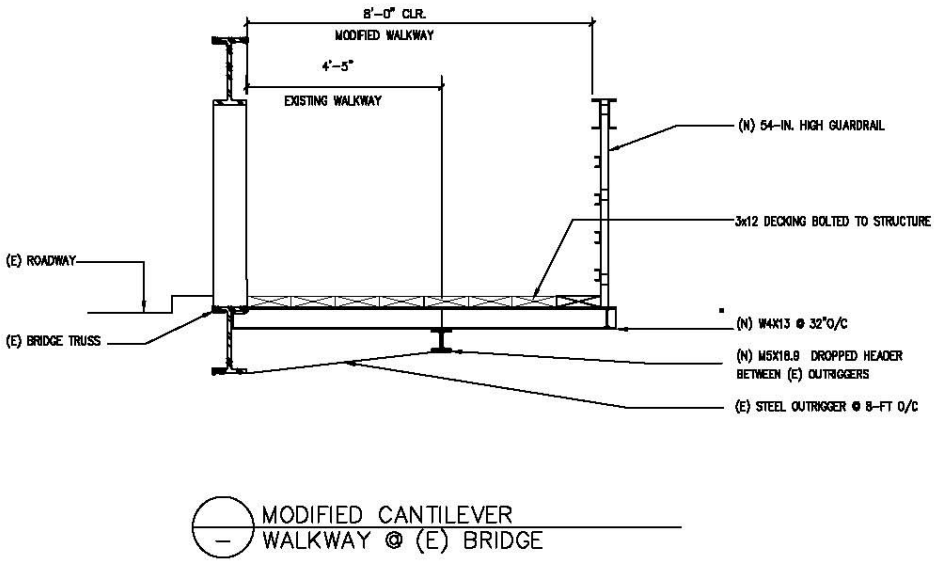


Figure 14: Green Bridge Cross-Section



3.9 PLATFORM/OVERLOOK LOCATION 1 – AT TRAIL ALIGNMENT 1A

The viewing platforms or overlooks (see Figure 2 for locations) are conceptually described to provide a basis for environmental impact evaluation and estimation of construction and maintenance cost ranges. The design concepts vary from location to location to respond to specific site opportunities and constraints.

Overlook Location 1 is on a slope overlooking the wetlands at the existing entrance to Trail Alignment 1a, one of the existing social paths. It could be a slightly elevated viewing platform with interpretative installations It may be designed as a blind to minimize disturbance to wildlife. Depending on date of construction, some riparian habitat may need to be removed to enable construction. Currently, a relatively large unvegetated opening exists, because of construction access needs associated with repair of the West Pasture levee and tidegate on Fish Hatchery Creek. This viewing platform would enable visitors to view the existing undiked tidal marsh to the north and the northern end of the West Pasture.

3.9.a Construction

This overlook could be constructed on-grade with a low retaining wall supporting a decomposed granite-surfaced area, or as a deck. To allow observation of wildlife without disturbing them, the platform would feature a wood screen fence, with viewing ports. Railings, benches and plaques with interpretive information about the Wetland Restoration and the wildlife would complete the improvements.

Total estimated construction cost:

Small structure, retaining wall and D.G. surface, wood screen and benches	**$5,000 - $10,000**

3.9.b Maintenance

Depending on materials used the platform could require very little maintenance, but wood components would eventually would need to be resurfaced, and finally, replaced . The wood screen, bench, and interpretive display components would need to be refinished and have minor repairs at an estimated 5 year interval, and be replaced at estimated 10 year intervals.

Total estimated annual maintenance/replacement cost for Overlook 1 is $300 - $700.

3.10 PLATFORM/OVERLOOK LOCATION 2 – AT WHITE HOUSE POOL PARK, TRAIL ALIGNMENT 4A

This potential public access component would involve creation of an elevated overlook and interpretative exhibit at White House Pool County Park. It would be located generally north of the County Park parking lot near an existing bridge that is often used by Park visitors for bird-watching. It may be designed as a blind to minimize disturbance to wildlife. It would be developed with full approval of and cooperation with the land

owners, the Wildlife Conservation Board, and the lessees, County Parks. This elevated overlook would enable visitors to view the restored marsh and uplands in the Giacomini East Pasture and birds and other species using the southern portion of Lagunitas Creek within the Project Area.

3.10.a Construction

The potentially ADA-compliant structure would take the form of a deck elevated above existing grade. A potentially ADA-compliant path would lead from the County White House Pool parking lot to the overlook. The platform could feature screen fence with viewing ports at varying heights to accommodate different users. Railings, benches, and plaques would complete the improvements.

Total estimated construction cost:

Larger structure, wood screen and benches on elevated wood deck and ADA accessible ramp	**$50,000 - $100,000**

3.10.b Maintenance

The wood deck, railing, screen, bench, and interpretive display components would need to be refinished and have minor repairs at an estimated 5 year interval, and be replaced at estimated 10 year intervals. If recycled plastic lumber is used for the non-structural components, the refinishing would be eliminated but minor repair would still be required at estimated 5 year intervals. The non-structural component replacement interval would be extended.

Total estimated annual maintenance/replacement cost for Overlook 2 is $2,000 - $4,000.

3.11 Platform/Overlook Location 3 – near Giacomini Dairy, Trail Alignment 4a

This potential public access component would involve creation of a viewing area and interpretative exhibit at the existing Giacomini dairy facility (see Figure 2). The westernmost portion of the dairy facility, which is located adjacent to the town of Point Reyes Station on the Point Reyes Mesa, is owned by the NPS and will come under full management in 2007. It would accessed by a potentially ADA-compliant path from 6th Street so as to minimize impacts on residents in town. Currently, this area contains the Old Calf Barn, along with some manure ponds, which the NPS proposes to remove. This facility would enable visitors to view the restored marsh and uplands in the Giacomini East Pasture and birds and other species using the southern portion of Lagunitas Creek within the Project Area. Because it would be located at a higher elevation, it would provide a broader view of the restored Project Area than some of the other potential facilities such as Viewing Platform/Elevated Overlook Locations 1 and 2.

3.11.a Construction

This viewing location would not need to be elevated, because it is already at a relatively high elevation. As this would be the closest location to town, it would presumably receive more visitor use. Interpretative plaques and displays would inform visitors about the restoration project, history of wetlands in the area, history of dairy ranching in Point Reyes, or other subjects. This overlook would be combined with the designated trailhead for Sub-Alignment 4a-I.

Total estimated construction cost:

Large, low seat wall structure w/ D.G. surface	**$15,000 - $30,000**

3.11.b Maintenance

The maintenance requirements would be similar to viewing platform location 1, with a proportional increase due to the larger size of the facility. Additional maintenance would be required due to landscaping being incorporated.

Total estimated annual maintenance/replacement cost for Overlook 3 is $2,000 - $4,000.

3.12 Platform/Overlook Location 4 – at Giacomini Hunt Shack, Trail Alignment 2d

This potential public access component would involve creation of a viewing platform and interpretative exhibit near the Giacomini Hunt Shack at the end of Trail Alignment 2d. The facility would be constructed on lands owned by the NPS. However, as a condition of the property sale in 2000, the Giacominis retained a 25-year reservation of use agreement on the Hunt Shack. Any siting of a facility in this area would need to ensure that the Giacominis were able to access the Hunt Shack for the duration of this reservation of use agreement. Currently, this area is used for storage of agricultural equipment and is largely vegetated with ruderal or weedy plant species. This facility would enable visitors to view the restored marsh and uplands in the central portion of the Giacomini East Pasture. Because it would be located on the top of the historic railroad grade berm, it would provide a slightly broader view of the restored Project Area than some of the other potential facilities such as platform/overlook locations 1 and 2, but not as broad a view as platform/overlook location 3.

3.12.a Construction

Construction features could be the same as platform/overlook location 3, but at a smaller size.

Total estimated construction cost:

Small, low seat wall structure w/ D.G. surface	**$13,098**

3.12.b Maintenance

Maintenance requirements would be similar to platform/overlook locations 2, but reduced proportionately because there would be no screening fence or landscaping, and the size would be smaller than location 2.

Total estimated annual maintenance/replacement cost for Overlook 4 is $1,000 - $2,000.

3.12.c Land Use Impacts

Neighbors on Mesa Road have expressed concern about the potential for noise and other impacts associated with this conceptual overlook location.

3.13 PLATFORM/OVERLOOK LOCATION 5 – NEAR END OF TOMALES BAY TRAIL, TRAIL ALIGNMENT 2E

This potential public access component would involve creation of a viewing area and interpretative exhibit near the end of the Tomales Bay Trail at the top of Railroad Point hilltop. The facility would be constructed on lands owned by the NPS and leased to the Martinelli family. Any siting of a facility in this area would need to ensure that terms of the lease agreement are not violated. Currently, this area is grassland that is used for grazing of beef cattle. Despite this, the vegetation community supports a fairly high percentage of plant species that are native to California grasslands. California's grasslands have been severely impacted by the introduction and spread of non-native plant species, particularly grasses, that thrive in areas with high disturbance. This facility would enable visitors to view the restored marsh and uplands in the northern portion of the Project Area, as well as the historic marsh in southern Tomales Bay. Of all the proposed viewing platforms or elevated overlook facilities, it would provide the broadest overview of the restored Project Area and Tomales Bay, although visitors seeking to bird watch would probably move down the trail closer to the Bay.

3.13.a Construction

This overlook/viewing platform would be the most remote for construction and maintenance, and would be at the most elevated site, so the design and construction should be the simplest. At this location, it is possible that the infrastructure would be limited to an interpretative sign and potentially a wooden log bench.

Total estimated construction cost:

Small D.G. surfaced area with wooden bench(es) and interpretive sign	**$2,000 - $5,000**

3.13.b Maintenance

Maintenance would be minimal, limited to repair or replacement of interpretive installations. Total estimated annual maintenance/replacement cost for Overlook 5 is $200.

4.0 CONCLUSIONS

4.1 SUMMARY

Creating suitable public access alignments and improvements in conjunction with the Giacomini Wetlands Restoration Project will be a very challenging undertaking. Most of the alignment study area is in potential wetlands, or at least in areas of riparian vegetation, except for road shoulders of varying and typically limited width. The preferred standard for a public path would be at least 8 feet wide with a paved surface and well-separated from roadways, however this would have extensive construction area/potential wetland impact, would require extensive and expensive construction, and would be inconsistent in some respects with local resident's preferences. Local residents' prefer a narrower, +/- 6' wide less formally improved pathway, such as a compacted decomposed granite surface (D.G.).

Issues of access for persons with disabilities and general use and safety standards dictate that the conceptual pathway design is wider than 6' in many locations, with a paved or boardwalk surface except where the trail would provide only recreational access. The concept design evaluated in this study is a compromise and combination of trail improvement types, including several alternatives, to aid in the detailed evaluation of environmental impacts of public access, while presenting a potentially realistic model for public access alternatives that include reasonable compromises between safe and useful public access, wetlands impacts, land use impacts, and construction cost.

The selection of the best alternatives and decisions about which alignments should be implemented will be based on weighing the interests and responsibilities of the National Park Service, the environmental and land use impacts of the alternatives, the access interests of local residents, property owners, and the general public; and the willingness/ability of Caltrans, and particularly Marin County to cooperatively plan and implement improvements that address these issues; and the ability of the agencies to fund the improvements.

4.2 CONSTRUCTION COSTS

Table 4-1: Summary of Trail Alignment Costs

Trail Segments	TOTAL	TOTAL (w/ guardrail)
Alignment 1a	$ 1,139,349	$ -
Alignment 2c	$ 1,593,855	$ -
Alignment 2e	$ 24,625	$ -
Alignment 2d	$ 11,518	$ -
Sub-Alignment 4a-I	$ 256,067	$ -
Sub-Alignment 4a-II	$ 819,649	$ -
Sub-Alignment 4a-III	$ 333,466	$ -
Sub-Alignment 4a-IV		
Total w/ Option 1 (fill slopes)	$ 392,229	$ 435,981
Total w/ Option 2 (retaining walls)	$ 486,496	$ 595,946
Total w/ Option 3 (cantilevered boardwalk - Cond. C has retaining walls)	$ 568,688	$ 608,211
Sub-Alignment 4a-V		
Total w/ Option 1 (fill slopes)	$ 260,421	$ 368,864
Total w/ Option 2 (retaining walls)	$ 594,540	$ 884,142
Total w/ Option 3 (cantilevered boardwalk - Cond. C has retaining walls)	$ 794,109	$ 923,948
Alignment 4b	$ 998,251	$ -
Alignment 4c		
Total w/ Option 1 (fill slopes)	$ 690,816	$ 836,988
Total w/ Option 2 (retaining walls)	$ 1,052,028	$ 1,380,203
Total w/ Option 3 (cantilevered boardwalk - Cond. C has retaining walls)	$ 1,239,131	$ 1,416,962
Alignment 4d		
Total w/ Option 1 (fill slopes)	$ 729,476	$ 858,579
Total w/ Option 2 (retaining walls)	$ 950,147	$ 1,198,172

Table 4-2: Summary of Potential Construction Area Impacts

	Total Square Footage for Impacted Area	3'W Construction Access Impact Area	Total Square Footage of Construction Impact	Total Square Footage of Construction Impact w/ Optional Guardrail
Alignment 1a	10,225	6,195	16,420	
Alignment 2c	55,630	18,906	76,867	
Alignment 2e	15,072	7,536	22,608	
Alignment 4a				
Sub-Alignment 4a-I	14,568	7,359	21,927	
Sub-Alignment 4a-II	2,080	1,500	3,580	
Sub-Alignment 4a-III	400	150	550	
Sub-Alignment 4a-IV				
Total w/ Option 1 (fill slopes)	7,588	3,687	11,275	12,313
Total w/ Option 2 (retaining walls)	4,160	3,687	7,847	8,885
Total w/ Option 3 (cantilevered boardwalk - Cond. C has retaining walls)	3,900	3,687	7,587	8,625
Sub-Alignment 4a-V				
Total w/ Option 1 (fill slopes)	18,814	4,932	23,746	26,930
Total w/ Option 2 (retaining walls)	8,411	4,932	13,343	16,527
Total w/ Option 3 (cantilevered boardwalk - Cond. C has retaining walls)	7,615	4,932	12,547	15,731
Alignment 4b	17,944	6,729	24,673	
Alignment 4c				
Total w/ Option 1 (fill slopes)	27,662	9,831	37,493	42,070
Total w/ Option 2 (retaining walls)	15,898	9,831	25,729	26,747
Total w/ Option 3 (cantilevered boardwalk - Cond. C has retaining walls)	15,161	9,831	24,992	25,767
Alignment 4d				
Total w/ Option 1 (fill slopes)	22,203	8,997	31,200	38,693
Total w/ Option 2 (retaining walls)	14,075	8,997	23,072	30,051

Table 4-3: Summary of Trail Alignment Maintenance Costs

Item	Annual Cost
Alignment 1a	
A. Pre-fabricated Fiberglass Bridge 35'x6'	$1,312
B. Elevated Boardwalk – 5' wide, 2025'	$21,058
Subtotal Alignment 1a	**$22,371**
Alignment 2c	
A. Weather-Dependant Informal Path, 2035'	$979
B. Low Boardwalk, 3289'	$38,281
C. Improved All-Weather Path – 6' Wide, D.G./Pine Resin Binder Surface (per 500 l.f.)	$1,427
Subtotal Alignment 2c	**$40,687**
Alignment 2d (Road functions as path, maintenance assumed to be assigned to roads budget)	
Maintain/replace signs and gates	**$209**
Alignment 2e	
Weather-Dependant Informal Path, 2011'	**$979**
Alignment 4a	
A. Improved All-Weather Path – 6' Wide, D.G./Pine Resin Binder Surface, 5349' (Condition A, B, C)	$15,022
B. Concrete Retaining Walls w/48" Vinyl Coated Chain Link Fence, 1928' (Condition C, D, and E assuming retaining wall option)	$5,587
C. Improved All-Weather Path – 6' Wide, D.G./Pine Resin Binder Surface, 1906' (Condition D, E assuming retaining wall option)	$5,504
D. Cantilevered Boardwalk – 6' wide (1489' Condition D assuming boardwalk option - delete path item above)	$13,984
E. Cantilevered Boardwalk – 8' wide, 417' (Condition E assuming boardwalk option - delete path item above)	$4,421
F. Cantilevered Boardwalk – 8' wide (486' Condition F boardwalk)	$8,867
G. Pre-Fabricated Steel Bridge 200' long	$12,850
H. Pre-fabricated Fiberglass Bridge 35'x6'	$1,312
I. Pre-fabricated Fiberglass Bridge 50'x6'	$2,302
Subtotal Alignment 4a with fill slopes (option 1)	**$45,857**
Subtotal Alignment 4a with retaining wall (option 2)	**$51,444**
Subtotal Alignment 4a with boardwalk (option 3)	**$58,758**
Alignment 4b	
Elevated Boardwalk – 8' wide, 2243' long	**$26,095**
Alignment 4c	
A. Improved All-Weather Path – 6' Wide, D.G./Pine Resin Binder Surface, 1185' (condition A, B, C)	$3,277
B. Concrete Retaining Walls w/48" Vinyl Coated Chain Link Fence, 1871' (Condition C, D, and E assuming retaining wall option)	$5,450
C. Improved All-Weather Path – 6' Wide, D.G./Pine Resin Binder Surface, 1474' (Condition D, E assuming retaining wall option)	$4,571
D. Cantilevered Boardwalk – 6' wide, 1085' (Condition D assuming boardwalk option - delete path item above)	$10,654
E. Cantilevered Boardwalk – 8' wide, 389' (Condition E assuming boardwalk option - delete path item above)	$4,032
F. Elevated Boardwalk – 8' wide, 618' (behind Lucchesi and Kostelic properties)	$8,887
Subtotal Alignment 4c with fill slopes (option 1)	**$16,735**
Subtotal Alignment 4c with retaining wall (option 2)	**$22,186**
Subtotal Alignment 4c with boardwalk (option 3)	**$26,850**
Alignment 4d	
A. Improved All-Weather Path – 8' Wide, A.C. Surface, 472' (from B Street to Levee Road)	$3,370
B. Improved All-Weather Path – 6' Wide, D.G./Pine Resin Binder Surface, 1782' (Condition A, C)	$5,236
C. Concrete Retaining Walls w/48" Vinyl Coated Chain Link Fence, 1456' (Condition C, D, and E assuming retaining wall option)	$4,454
D. Improved All-Weather Path – 6' Wide, D.G./Pine Resin Binder Surface, 674' (Condition D, E assuming retaining wall option)	$2,843
E. Cantilevered Boardwalk – 6' wide, 616' (Condition D assuming boardwalk option - delete path item above)	$6,860
F. Cantilevered Boardwalk – 8' wide, 58' (Condition E assuming boardwalk option - delete path item above)	$993
Green Bridge assumed to be part of Caltrans maintenance	-
G. Pre-fabricated Fiberglass Bridge 35'x6'	$1,312
H. Pre-fabricated Fiberglass Bridge 50'x6'	$2,302
Subtotal Alignment 4d with fill slopes (option 1)	**$15,064**
Subtotal Alignment 4d with retaining wall (option 2)	**$19,518**
Total with Fill Slopes (Option 1)	**$167,997**
Total with Retaining Wall (Option 2)	**$183,489**
Total with Boardwalk (Option 3)	**$175,949**

5.0 BACKGROUND DOCUMENTS

Marin Countywide Plan, (draft), Natural Resources Element, February 2004. Marin County Community Development Department.

Marin County Unincorporated Area Bicycle and Pedestrian Master Plan, June 2001 Alta Transportation Consulting for the Marin County Department of Public Works.

Marin Pathways Study: Report & Recommendations for the Design of a Bicycle/Pedestrian/Equestrian Pathway System for the West Shore Communities of Tomales Bay, Marin County, California. Brian Wittenkeller & Associates and Copple Foreaker & Associates. 1988. Prepared for West Marin Paths and the County of Marin.

Technical Evaluation of Potential Public Access Alignments for the Giacomini Wetland Restoration Project. Part I: Resources Study. Prepared for Point Reyes National Seashore. Kamman Hydrology & Engineering, Inc., LSA Associates, Inc., and Point Reyes National Seashore. 2004.

Appendix A:
Construction Costs Estimate

Table A-1: Cost Estimate

	Unit	Length	Width or Multiplier	Qty	Unit Price	Subtotal	Other Project Costs[1]	TOTAL	Optional Guard Rail Costs	TOTAL (w/ guardrail)
Alignment 1a										
35' L x 6' W prefab fiberglass bridge @ Fish Hatchery Creek	EA	35		1	$ 36,500.00	$ 36,500	$ 20,075	$ 56,575		
10'L Wood ramp to bridge	LF	10		10	$ 80.00	$ 800	$ 440	$ 1,240		
5' W elevated boardwalk on wood pilings (incl. 42"H railing)	LF	2015		2015	$ 345.33	$ 695,844	$ 382,714	$ 1,078,558		
Trail entrance	EA			1	$ 1,920.00	$ 1,920	$ 1,056	$ 2,976		
TOTAL SEGMENT 1a								**$ 1,139,349**		
Alignment 2c										
Boardwalk										
Clear + grub dense riparian vegetation	SF	3289	8	26312	$ 0.10	$ 2,631	$ 1,447	$ 4,078		
Rough/fine grading for construction access	SF	3289	8	26312	$ 0.60	$ 15,787	$ 8,683	$ 24,470		
8' W low boardwalk on conc. piers	LF	3289	8	3289	$ 287.13	$ 944,382	$ 519,410	$ 1,463,792		
Chip seal boardwalk surfacing	SF	3289	8	26312	$ 0.20	$ 5,262	$ 2,894	$ 8,157		
Erosion Control - hydroseed/plant disturbed area w/ native species	SF	3289	8	26312	$ 0.15	$ 3,947	$ 2,171	$ 6,118		
Subtotal Boardwalk								*$ 1,506,615*		
Condition A Trail Improvement	LF	501		501	$ 65.80	$ 32,966	$ 18,131	$ 51,097		
Subtotal Condition A Trail Improvement								*$ 51,097*		
Weather-Dependent Trail (2e)										
6'W weather-dependent/informal trail	LF	2011		2011	$ 7.90	$ 15,887	$ 8,738	$ 24,625		
Subtotal Weather-Dependent Trail (2e)								*$ 24,625*		
Alignment 2d										
Trail entrance	EA			1	$ 1,920.00	$ 1,920	$ 1,056	$ 2,976		
New road gate @ Mesa Rd entrance	EA			1	$ 5,000.00	$ 5,000	$ 2,750	$ 7,750		
Trail signage	LF	852		852	$ 0.60	$ 511	$ 281	$ 792		
Subtotal Alignment 2d								*$ 11,518*		
TOTAL SEGMENT 2c								**$ 1,593,855**		

Table A-1: Cost Estimate (cont'd)

	Unit	Length	Width or Multiplier	Qty	Unit Price	Subtotal	Other Project Costs[1]	TOTAL	Optional Guard Rail Costs	TOTAL (w/ guardrail)
Alignment 4a-I										
C Street Frontage Improvements										
Fencing	LF	785		785	$ 4.00	$ 3,140	$ 1,727	$ 4,867		
Signage	LF	785		785	$ 0.60	$ 471	$ 259	$ 730		
Subtotal								*$ 5,597*		
E. Pasture/C St. to former Summer Dam										
Trail entrance (incl. sign, trail gate, 30' fencing)	EA			1	$ 1,920.00	$ 1,920	$ 1,056	$ 2,976		
Condition A Trail Improvement	LF	2423		2423	$ 65.80	$ 159,433	$ 87,688	$ 247,122		
Trail signage (between C St. & trail head)	LF	400		400	$ 0.60	$ 240	$ 132	$ 372		
Subtotal								*$ 250,470*		
Subtotal 4a-I								*$ 256,067*		
Alignment 4a-II										
200' L x 8' W steel bridge @ Summer Dam location	EA	200		1	$ 500,000	$ 500,000	$ 275,000	$ 775,000		
120'L Ramp @ each end of bridge (LF: 50% wood/boardwalk and 50% built-up soil)	EA	120		2	$ 14,271.01	$ 28,542	$ 15,698	$ 44,240		
Trail signage (along bridge/ramps)	LF	440		440	$ 0.60	$ 264	$ 145	$ 409		
Subtotal 4a-II								*$ 819,649*		
Alignment 4a-III										
Within White House Pool (WHP) Park										
Condition A Trail Improvement	LF	1993		1993	$ 65.80	$ 131,139	$ 72,127	$ 203,266		
Replace ex. 35' L wood bridge w/ 35' L x 8' W prefab bridge	EA	35		1	$ 36,500.00	$ 36,500	$ 20,075	$ 56,575		
Replace ex. 50' L wood bridge w/ 50'L x 8' W prefab bridge	EA	50		1	$ 47,500.00	$ 47,500	$ 26,125	$ 73,625		
Subtotal 4a-III								*$ 333,466*		

Table A-1: Cost Estimate (cont'd)

	Unit	Length	Width or Multiplier	Qty	Unit Price	Subtotal	Other Project Costs[1]	TOTAL	Optional Guard Rail Costs	TOTAL (w/ guardrail)
Alignment 4a-IV										
Condition A Trail Improvement	LF	214		214	$ 65.80	$ 14,081	$ 7,745	$ 21,826	$ 10,962	$ 32,788
Condition B Trail Improvement	LF	0		0	$ 65.80	$ -	$ -	$ -		
Condition C Trail Improvement										
Option 1: Fill Slope Treatment Option	LF	10		10	$ 72.19	$ 722	$ 397	$ 1,119	$ 521	$ 1,640
Option 2: Retaining Wall Treatment	LF	10		10	$ 162.00	$ 1,620	$ 891	$ 2,511	$ 866	$ 3,377
Condition D Trail Improvement										
Option 1: Fill Slope Treatment Option	LF	498		498	$ 75.79	$ 37,743	$ 20,759	$ 58,502	$ 30,598	$ 89,100
Option 2: Retaining Wall Treatment	LF	498		498	$ 187.90	$ 93,574	$ 51,466	$ 145,040	$ 94,365	$ 239,405
Option 3: Cantilevered Boardwalk Treatment	LF	498		498	$ 293.74	$ 146,284	$ 80,456	$ 226,741	$ 24,315	$ 251,056
Condition E Trail Improvement										
Option 1: Fill Slope Treatment Option	LF	21		21	$ 85.43	$ 1,794	$ 987	$ 2,781	$ 1,672	$ 4,452
Option 2: Retaining Wall Treatment	LF	21		21	$ 280.15	$ 5,883	$ 3,236	$ 9,119	$ 3,256	$ 12,375
Option 3: Cantilevered Boardwalk Treatment	LF	21		21	$ 295.24	$ 6,200	$ 3,410	$ 9,610	$ 3,379	$ 12,989
Condition F Trail Improvement	LF	486		486	$ 390.35	$ 189,710	$ 104,341	$ 294,051		
Relocate Utility Poles along 4a-IV	EA			3	$ 3,000.00	$ 9,000	$ 4,950	$ 13,950		
Total w/ Option 1 (fill slopes)								**$ 392,229**		**$ 435,981**
Total w/ Option 2 (retaining walls)								**$ 486,496**		**$ 595,946**
Total w/ Option 3 (cantilevered boardwalk - Cond. C has retaining walls)								**$ 568,688**		**$ 608,211**
Alignment 4a-V										
Condition A Trail Improvement	LF	42		42	$ 65.80	$ 2,764	$ 1,520	$ 4,284	$ 2,151	$ 6,435
Condition B Trail Improvement	LF	329		329	$ 65.80	$ 21,648	$ 11,907	$ 33,555		

Table A-1: Cost Estimate (cont'd)

	Unit	Length	Width or Multiplier	Qty	Unit Price	Subtotal	Other Project Costs[1]	TOTAL	Optional Guard Rail Costs	TOTAL (w/ guardrail)
Alignment 4a-V (cont'd)										
Condition C Trail Improvement										
Option 1: Fill Slope Treatment Option	LF	10		10	$ 72.19	$ 722	$ 397	$ 1,119	$ 521	$ 1,640
Option 2: Retaining Wall Treatment	LF	10		10	$ 162.00	$ 1,620	$ 891	$ 2,511	$ 866	$ 3,377
Condition D Trail Improvement										
Option 1: Fill Slope Treatment Option	LF	1154		1154	$ 75.79	$ 87,462	$ 48,104	$ 135,566	$ 70,904	$ 206,470
Option 2: Retaining Wall Treatment	LF	1154		1154	$ 187.90	$ 216,837	$ 119,260	$ 336,097	$ 218,669	$ 554,765
Option 3: Cantilevered Boardwalk Treatment	LF	1154		1154	$ 293.74	$ 338,980	$ 186,439	$ 525,419	$ 56,344	$ 581,763
Condition E Trail Improvement										
Option 1: Fill Slope Treatment Option	LF	438		438	$ 85.43	$ 37,418	$ 20,580	$ 57,998	$ 34,867	$ 92,865
Option 2: Retaining Wall Treatment	LF	438		438	$ 280.15	$ 122,706	$ 67,488	$ 190,194	$ 67,915	$ 258,109
Option 3: Cantilevered Boardwalk Treatment	LF	438		438	$ 295.24	$ 129,317	$ 71,124	$ 200,441	$ 70,477	$ 270,918
Condition F Trail Improvement	LF	0		0	$ 390.35	$ -	$ -	$ -		
Relocate Utility Poles along 4a-V	EA			6	$ 3,000.00	$ 18,000	$ 9,900	$ 27,900		
Total w/ Option 1 (fill slopes)								**$ 260,421**		**$ 368,864**
Total w/ Option 2 (retaining walls)								**$ 594,540**		**$ 884,142**
Total w/ Option 3 (cantilevered boardwalk - Cond. C has retaining walls)								**$ 794,109**		**$ 923,948**
Alignment 4b										
8' W low boardwalk on conc. piers	LF	2243		2243	$ 287.13	$ 644,033	$ 354,218	**$ 998,251**		
TOTAL SEGMENT 4b										
Alignment 4c										
Condition A Trail Improvement	LF	544		544	$ 65.80	$ 35,795	$ 19,687	$ 55,483	$ 27,866	$ 83,348
Condition B Trail Improvement	LF	244		244	$ 65.80	$ 16,055	$ 8,830	$ 24,886		
Condition C Trail Improvement										
Option 1: Fill Slope Treatment Option	LF	397		397	$ 72.19	$ 28,659	$ 15,763	$ 44,422	$ 20,676	$ 65,098
Option 2: Retaining Wall Treatment	LF	397		397	$ 162.00	$ 64,314	$ 35,373	$ 99,687	$ 34,398	$ 134,085

Table A-1: Cost Estimate (cont'd)

	Unit	Length	Width or Multiplier	Qty	Unit Price	Subtotal	Other Project Costs[1]	TOTAL	Optional Guard Rail Costs	TOTAL (w/ guardrail)
Alignment 4c (cont'd)										
Condition D Trail Improvement										
Option 1: Fill Slope Treatment Option	LF	1085		1085	$ 75.79	$ 82,232	$ 45,228	$ 127,460	$ 66,665	$ 194,124
Option 2: Retaining Wall Treatment	LF	1085		1085	$ 187.90	$ 203,872	$ 112,129	$ 316,001	$ 205,594	$ 521,595
Option 3: Cantilevered Boardwalk Treatment	LF	1085		1085	$ 293.74	$ 318,712	$ 175,291	$ 494,003	$ 52,975	$ 546,978
Condition E Trail Improvement										
Option 1: Fill Slope Treatment Option	LF	389		389	$ 85.43	$ 33,232	$ 18,278	$ 51,510	$ 30,966	$ 82,476
Option 2: Retaining Wall Treatment	LF	389		389	$ 280.15	$ 108,978	$ 59,938	$ 168,916	$ 60,318	$ 229,234
Option 3: Cantilevered Boardwalk Treatment	LF	389		389	$ 295.24	$ 114,850	$ 63,167	$ 178,017	$ 62,593	$ 240,610
Boardwalk Section										
8' W Boardwalk on wood pilings	LF	618		618	$ 360.38	$ 222,713	$ 122,492	$ 345,205		
Relocate Utility Poles along 4c	EA			9	$ 3,000.00	$ 27,000	$ 14,850	$ 41,850		
Total w/ Option 1 (fill slopes)								**$ 690,816**		**$ 836,988**
Total w/ Option 2 (retaining walls)								**$ 1,052,028**		**$ 1,380,203**
Total w/ Option 3 (cantilevered boardwalk - Cond. C has retaining walls)								**$ 1,239,131**		**$ 1,416,962**
Alignment 4d										
W side of Hwy 1: B Street to Levee Rd										
8'W Condition A Trail Improvement w/ AC paving (x 33% cost factor)	LF	350	33%	350	$ 87.51	$ 30,630	$ 16,846	$ 47,476		
8'W Condition C Trail Improvement w/ Option 2: Retaining Wall Treatment (x 33% cost factor)	LF	265	33%	265	$ 215.46	$ 57,097	$ 31,403	$ 88,500		
40' prefab fiberglass bridge @ unnamed drainage	EA	40		1	$ 43,500.00	$ 43,500	$ 23,925	$ 67,425		
Green Bridge										
Widen ex. Green Bridge Bike/Ped Path to 8'	LS	100	2	200		$ 100,000	$ 55,000	$ 155,000		

Table A-1: Cost Estimate (cont'd)

	Unit	Length	Width or Multiplier	Qty	Unit Price	Subtotal	Other Project Costs[1]	TOTAL	Optional Guard Rail Costs	TOTAL (w/ guardrail)
Alignment 4d (cont'd)										
Condition A Trail Improvement	LF	999		999	$ 65.80	$ 65,734	$ 36,154	$ 101,888	$ 51,172	$ 153,060
Condition C Trail Improvement										
Option 1: Fill Slope Treatment Option	LF	517		517	$ 72.19	$ 37,322	$ 20,527	$ 57,849	$ 26,925	$ 84,775
Option 2: Retaining Wall Treatment	LF	517		517	$ 162.00	$ 83,754	$ 46,065	$ 129,819	$ 44,795	$ 174,614
Condition D Trail Improvement										
Option 1: Fill Slope Treatment Option	LF	755		755	$ 75.79	$ 57,221	$ 31,472	$ 88,693	$ 46,389	$ 135,082
Option 2: Retaining Wall Treatment	LF	755		755	$ 187.90	$ 141,865	$ 78,025	$ 219,890	$ 143,063	$ 362,953
Condition E Trail Improvement										
Option 1: Fill Slope Treatment Option	LF	58		58	$ 85.43	$ 4,955	$ 2,725	$ 7,680	$ 4,617	$ 12,297
Option 2: Retaining Wall Treatment	LF	58		58	$ 280.15	$ 16,249	$ 8,937	$ 25,185	$ 8,993	$ 34,179
Metal Beam Guard Rail (at W end only)	LF	189		189	$ 30.00	$ 5,670	$ 3,119	$ 8,789		
Olema Creek Bridge (8'W x 50'L)	EA	50		1	$ 47,500.00	$ 47,500	$ 26,125	$ 73,625		
Relocate Utility Poles along 4d	EA			7	$ 3,000.00	$ 21,000	$ 11,550	$ 32,550		
Total w/ Option 1 (fill slopes)								**$ 729,476**		**$ 858,579**
Total w/ Option 2 (retaining walls)								**$ 950,147**		**$ 1,198,172**

[1] Other Project Costs: *Design - 15%, Environmental - 10%, Review & Inspection - 15%, Contingencies - 15%*

Table A-2: Cost Items

Item	Unit	Quantity	Unit Cost	Total
Condition A Trail Improvement				
6' W baserock/DG trail	L.F.	1	$ 64.20	$ 64.20
Trail signage	L.F.	1	$ 0.60	$ 0.60
Minor drainage work (ditches + culverts)	L.F.	1	$ 1.00	$ 1.00
TOTAL COST PER L.F.				**$ 65.80**
Condition B Trail Improvement				
6' W baserock/DG trail	L.F.	1	$ 64.20	$ 64.20
Trail signage	L.F.	1	$ 0.60	$ 0.60
Minor drainage work (ditches + culverts)	L.F.	1	$ 1.00	$ 1.00
TOTAL COST PER L.F.				**$ 65.80**
Condition C Trail Improvement - Option 1: Fill Slope				
7'W vegetation clearing	S.F.	7	$ 0.15	$ 1.05
6' W baserock/DG trail	L.F.	1	$ 64.20	$ 64.20
2:1 Fill Slope (0.22cy/lf)	L.F.	1	$ 4.84	$ 4.84
Trail signage (1 per 300 L.F.)	L.F.	1	$ 0.60	$ 0.60
Hydroseed/Plant Fill-Slope w/ Native Species	S.F.	10	$ 0.15	$ 1.50
TOTAL COST PER L.F.				**$ 72.19**
Condition C Trail Improvement - Option 2: Retaining Wall Treatment				
2'W vegetation clearing	S.F.	2	$ 0.15	$ 0.30
6' W baserock/DG trail	L.F.	1	$ 64.20	$ 64.20
18"H Conc. Retaining Wall	L.F.	1	$ 75.00	$ 75.00
Backfill wall (0.07cy/lf)	L.F.	1	$ 3.15	$ 3.15
48" Vinyl-coated chain link fence on wall	L.F.	1	$ 18.00	$ 18.00
Trail signage	L.F.	1	$ 0.60	$ 0.60
Hydroseed/Plant disturbed area w/ Native Specie	S.F.	5	$ 0.15	$ 0.75
TOTAL COST PER L.F.				**$ 162.00**
Condition D Trail Improvement - Option 1: Fill Slope Treatment Option				
9'W vegetation clearing	S.F.	9	$ 0.15	$ 1.35
6' W baserock/DG trail	L.F.	1	$ 64.20	$ 64.20
2:1 Fill Slope (0.37cy/lf)	L.F.	1	$ 8.14	$ 8.14
Trail signage	L.F.	1	$ 0.60	$ 0.60
Hydroseed/Plant Fill-Slope w/ Native Species	S.F.	10	$ 0.15	$ 1.50
TOTAL COST PER L.F.				**$ 75.79**
Condition D Trail Improvement - Option 2: Retaining Wall Treatment				
2'W vegetation clearing	S.F.	2	$ 0.15	$ 0.30
6' W baserock/DG trail	L.F.	1	$ 64.20	$ 64.20
24"H Conc. Retaining Wall	L.F.	1	$ 100.00	$ 100.00
Backfill wall (0.09cy/lf)	L.F.	1	$ 4.05	$ 4.05
48" Vinyl-coated chain link fence on wall	L.F.	1	$ 18.00	$ 18.00
Trail signage	L.F.	1	$ 0.60	$ 0.60
Hydroseed/Plant disturbed area w/ Native Specie	S.F.	5	$ 0.15	$ 0.75
TOTAL COST PER L.F.				**$ 187.90**

Table A-2: Cost Items (cont'd)

Item	Unit	Quantity	Unit Cost	Total
Condition D Trail Improvement - Option 3: Cantilevered Boardwalk Treatment				
2'W vegetation clearing	S.F.	2	$ 0.15	$ 0.30
6' W cantilevered trail	L.F.	1	$ 292.09	$ 292.09
Trail signage	L.F.	1	$ 0.60	$ 0.60
Hydroseed/Plant disturbed area w/ Native Specie	S.F.	5	$ 0.15	$ 0.75
TOTAL COST PER L.F.				**$ 293.74**
Condition E Trail Improvement - Option 1: Fill Slope Treatment Option				
14'W vegetation clearing	S.F.	14	$ 0.15	$ 2.10
6' W baserock/DG trail	L.F.	1	$ 64.20	$ 64.20
2:1 Fill Slope (0.74cy/lf)	L.F.	1	$ 16.28	$ 16.28
Trail signage	L.F.	1	$ 0.60	$ 0.60
Hydroseed/Plant Fill-Slope w/ Native Species	S.F.	15	$ 0.15	$ 2.25
TOTAL COST PER L.F.				**$ 85.43**
Condition E Trail Improvement - Option 2: Retaining Wall Treatment				
7'W vegetation clearing	S.F.	7	$ 0.15	$ 1.05
6' W baserock/DG trail	L.F.	1	$ 64.20	$ 64.20
48"H Conc. Retaining Wall	L.F.	1	$ 175.00	$ 175.00
Backfill wall (0.44cy/lf)	L.F.	1	$ 19.80	$ 19.80
48" Vinyl-coated chain link fence on wall	L.F.	1	$ 18.00	$ 18.00
Trail signage	L.F.	1	$ 0.60	$ 0.60
Hydroseed/Plant disturbed area w/ Native Specie	S.F.	10	$ 0.15	$ 1.50
TOTAL COST PER L.F.				**$ 280.15**
Condition E Trail Improvement - Option 3: Cantilevered Boardwalk Treatment				
7'W vegetation clearing	S.F.	7	$ 0.15	$ 1.05
6' W cantilevered trail	L.F.	1	$ 292.09	$ 292.09
Trail signage	L.F.	1	$ 0.60	$ 0.60
Hydroseed/Plant disturbed area w/ Native Specie	S.F.	10	$ 0.15	$ 1.50
TOTAL COST PER L.F.				**$ 295.24**
Condition F Trail Improvement				
Clearing + Grubbing (5'W average)	S.F.	3	$ 0.10	$ 0.30
3'W vegetation clearing	S.F.	3	$ 0.15	$ 0.45
8' W cantilevered trail	L.F.	1	$ 371.00	$ 371.00
48" Vinyl-coated chain link fence on E side	L.F.	1	$ 18.00	$ 18.00
Trail signage	L.F.	1	$ 0.60	$ 0.60
TOTAL COST PER L.F.				**$ 390.35**
6' W baserock/DG trail				
Clearing + Grubbing	S.F.	6	$ 0.10	$ 0.60
Rough/Fine Grading	S.F.	6	$ 0.60	$ 3.60
6'W Rock paving (2" decomposed granite w/ pine-resin binder over 8" Class II ab)	S.F.	6	$ 10.00	$ 60.00
TOTAL COST PER L.F.				**$ 64.20**

Table A-2: Cost Items (cont'd)

Item	Unit	Quantity	Unit Cost	Total
Weather-Dependent/Informal Trail				
Brush trimming (2'W average)	S.F.	2	$ 0.15	$ 0.30
Minor grading	S.F.	6	$ 1.00	$ 6.00
Minor drainage work (ditches + culverts)	L.F.	1	$ 1.00	$ 1.00
Trail signage	L.F.	1	$ 0.60	$ 0.60
TOTAL COST PER L.F.				**$ 7.90**
Typical Trail Entrance				
Sign	EA.	1	$ 300.00	$ 300.00
Trail gate	EA.	1	$ 1,500.00	$ 1,500.00
30' fencing to connect to existing	L.F.	30	$ 4.00	$ 120.00
TOTAL COST PER				**$ 1,920.00**
Low Boardwalk 8x12	L.F.	1	$ 287.13	**$ 287.13**
Elevated Boardwalk w/ railings 8x12	L.F.	1	$ 360.38	**$ 360.38**
Elevated Boardwalk w/ railings 5x15	L.F.	1	$ 345.33	**$ 345.33**
Cantilevered Boardwalk 6'W (1 railng)	L.F.	1	$ 292.09	**$ 292.09**
Cantilevered Boardwalk 8'W (1 railng)	L.F.	1	$ 323.92	**$ 323.92**

Appendix B:
Estimate of Construction Area Impacts

Table B-1: Estimate of Construction Area Impact

	Unit	Length	Width	Total Square Footage for Impacted Area	3'W Construction Access Impact Area	Total Square Footage of Construct. Impact	Increase in Width Due to Optional Guard Rail (+ 2'W)	Total Square Footage of Construction Impact w/ Optional Guardrail
Alignment 1a								
35' L x 6' W prefab fiberglass bridge @ Fish Hatchery Creek (assume 5'L @ each end)	LF	10	6	60	30	90		
10'L Wood ramp to bridge	LF	10	6	60	30	90		
5' W elevated boardwalk on wood pilings (incl. 42"H railing)	LF	2015	5	10075	6045	16120		
Trail entrance (30 L.F. fencing)	LF	30	1	30	90	120		
TOTAL SEGMENT 1a				**10225**	**6195**	**16420**		
Alignment 2c								
Boardwalk								
8' W low boardwalk on conc. piers	LF	3289	8	26312	9867	36179		
Subtotal Boardwalk				*26312*		*36179*		
Condition A Trail Improvement	LF	501	6	3006	1503	4509		
Subtotal Condition A Trail Improvement				*3006*		*4509*		
Weather-Dependent Trail (2e)								
6'W weather-dependent/informal trail	LF	2512	6	15072	7536	22608		
Subtotal Weather-Dependent Trail				*15072*		*22608*		
Alignment 2d								
Use ex. AC drive	LF	852	0	0	0	0		
Subtotal Alignment 2d				*0*		*0*		
TOTAL SEGMENT 2c				**44390**	**18906**	**63296**		
Alignment 4a-I								
C Street Frontage Improvements								
New Fencing + Signage	LF	785	0	0		0		
Subtotal			*0*	*0*		*0*		
E. Pasture/C St. to former Summer Dam								
Trail entrance (30 L.F. fencing)	LF	30	1	30	90	120		
Condition A Trail Improvement	LF	2423	6	14538	7269	21807		
Subtotal				*14568*	*7359*	*21927*		
Alignment 4a-II								
200' L x 8' W steel bridge @ Summer Dam location (assume 10' @ each end)	LF	20	8	160	60	220		
120'L Ramp @ each end of bridge (LF: 50% wood/boardwalk and 50% built-up soil)	EA	240	8	1920	*1440*	*3360*		
Subtotal				*2080*	*1500*	*3580*		

Table B-1: Estimate of Construction Area Impact (cont'd)

	Unit	Length	Width	Total Square Footage for Impacted Area	3'W Construction Access Impact Area	Total Square Footage of Constr. Impact	Increase in Width Due to Optional Guard Rail (+ 2'W)	Total Square Footage of Construct. Impact w/ Optional Guardrail
Alignment 4a-III								
Condition A Trail Improvement	LF	1993	0	0	0	0		
Replace ex. 35' L wood bridge w/ 35' L x 8' W prefab bridge (assume 10 L.F. @ each end)	EA	20	8	160	60	220		
Replace ex. 50' L wood bridge w/ 50'L x 8' W prefab bridge (assume 15 L.F. @ each end)	EA	30	8	240	90	330		
Subtotal				*400*	*150*	*550*		
Alignment 4a-IV								
Condition A Trail Improvement	LF	214	6	1284	642	1926		
Condition B Trail Improvement	LF	0	6	0	0	0		
Condition C Trail Improvement								
Option 1: Fill Slope Treatment Option	LF	10	7	70	30	100		
Option 2: Retaining Wall Treatment	LF	10	1.5	15	30	45		
Condition D Trail Improvement								
Option 1: Fill Slope Treatment Option	LF	498	9	4482	1494	5976	996	6972
Option 2: Retaining Wall Treatment	LF	498	2.5	1245	1494	2739	996	3735
Option 3: Cantilevered Boardwalk Treatment	LF	498	2	996	1494	2490	996	3486
Condition E Trail Improvement								
Option 1: Fill Slope Treatment Option	LF	21	14	294	63	357	42	399
Option 2: Retaining Wall Treatment	LF	21	7.5	157.5	63	221	42	263
Option 3: Cantilevered Boardwalk Treatment	LF	21	7	147	63	210	42	252
Condition F Trail Improvement	LF	486	3	1458	1458	2916	0	2916
Total w/ Option 1 (fill slopes)				7588	3687	**11275**	1038	**12313**
Total w/ Option 2 (retaining walls)				4160	3687	**7847**	1038	**8885**
Total w/ Option 3 (cantilevered boardwalk - Cond. C has retaining walls)				3900	3687	**7587**	1038	**8625**
Alignment 4a-V								
Condition A Trail Improvement	LF	42	6	252	126	378		
Condition B Trail Improvement	LF	329	6	1974	0	1974		
Condition C Trail Improvement								
Option 1: Fill Slope Treatment Option	LF	10	7	70	30	100		
Option 2: Retaining Wall Treatment	LF	10	1.5	15	30	45		
Condition D Trail Improvement								
Option 1: Fill Slope Treatment Option	LF	1154	9	10386	3462	13848	2308	16156
Option 2: Retaining Wall Treatment	LF	1154	2.5	2885	3462	6347	2308	8655

Table B-1: Estimate of Construction Area Impact (cont'd)

	Unit	Length	Width	Total Square Footage for Impacted Area	3'W Construction Access Impact Area	Total Square Footage of Construct. Impact	Increase in Width Due to Optional Guard Rail (+ 2'W)	Total Square Footage of Construct. Impact w/ Optional Guardrail
Alignment 4a-V (cont'd)								
Option 3: Cantilevered Boardwalk Treatment	LF	1154	2	2308	3462	5770	2308	8078
Condition E Trail Improvement								
Option 1: Fill Slope Treatment Option	LF	438	14	6132	1314	7446	876	8322
Option 2: Retaining Wall Treatment	LF	438	7.5	3285	1314	4599	876	5475
Option 3: Cantilevered Boardwalk Treatment	LF	438	7	3066	1314	4380	876	5256
Condition F Trail Improvement	LF	0	3	0	0	0	0	0
Total w/ Option 1 (fill slopes)				18814	4932	**23746**	3184	**26930**
Total w/ Option 2 (retaining walls)				8411	4932	**13343**	3184	**16527**
Total w/ Option 3 (cantilevered boardwalk - Cond. C has retaining walls)				7615	4932	**12547**	3184	**15731**
Alignment 4b								
Elevated 8'W boardwalk on wood pilings	LF	2243	8	17944	6729	24673		
TOTAL SEGMENT 4b				**17944**	**6729**	**24673**		
Alignment 4c								
Condition A Trail Improvement	LF	544	6	3264	1632	4896	1	5440
Condition B Trail Improvement	LF	244	6	1464	732	2196		
Condition C Trail Improvement								
Option 1: Fill Slope Treatment Option	LF	397	7	2779	1191	3970	2	4764
Option 2: Retaining Wall Treatment	LF	397	1.5	595.5	1191	1787	1	2184
Condition D Trail Improvement								
Option 1: Fill Slope Treatment Option	LF	1085	9	9765	3255	13020	5	18445
Option 2: Retaining Wall Treatment	LF	1085	2.5	2712.5	3255	5968	5	11393
Option 3: Cantilevered Boardwalk Treatment	LF	1085	2	2170	3255	5425	5	10850
Condition E Trail Improvement								
Option 1: Fill Slope Treatment Option	LF	389	14	5446	1167	6613	17.5	13421
Option 2: Retaining Wall Treatment	LF	389	7.5	2917.5	1167	4085	9.375	7731
Option 3: Cantilevered Boardwalk Treatment	LF	389	7	2723	1167	3890	8.75	7294
Boardwalk Section								
8' W Boardwalk on wood pilings	LF	618	8	4944	1854	6798		
Total w/ Option 1 (fill slopes)				27662	9831	37493		42070
Total w/ Option 2 (retaining walls)				15897.5	9831	25729		26747
Total w/ Option 3 (cantilevered boardwalk - Cond. C has retaining walls)				15160.5	9831	24992		25767

Table B-1: Estimate of Construction Area Impact (cont'd)

	Unit	Length	Width	Total Square Footage for Impacted Area	3'W Construction Access Impact Area	Total Square Footage of Construct. Impact	Increase in Width Due to Optional Guard Rail (+ 2'W)	Total Square Footage of Constuct. Impact w/ Optional Guardrail
Alignment 4d								
W side of Hwy 1: B Street to Levee Rd								
8'W Condition A Trail Improvement	LF	160	8	1280	480	1760	1	1920
8'W Condition C Trail Improvement w/ Option 2: Retaining Wall Treatment	LF	265	8.5	2252.5	795	3048	3	3843
40' prefab fiberglass bridge @ unnamed drainage (assume 10 L.F. @ each end)	LF	20	6	120	60	180		
Green Bridge								
Widen ex. Green Bridge Bike/Ped Path to 8' (assume 15' @ each end)	SF	15	2	30	45	75		
Condition A Trail Improvement	LF	1189	6	7134	3567	10701	1	11890
Condition C Trail Improvement								
Option 1: Fill Slope Treatment Option	LF	517	7	3619	1551	5170	2	6204
Option 2: Retaining Wall Treatment	LF	517	1.5	775.5	1551	2327	1	2844
Condition D Trail Improvement								
Option 1: Fill Slope Treatment Option	LF	755	9	6795	2265	9060	5	12835
Option 2: Retaining Wall Treatment	LF	755	2.5	1887.5	2265	4153	5	7928
Condition E Trail Improvement								
Option 1: Fill Slope Treatment Option	LF	58	14	812	174	986	17.5	2001
Option 2: Retaining Wall Treatment	LF	58	7.5	435	174	609	9.375	1153
Olema Creek Bridge (8'W x 50'L) (assume 10 L.F. @ each end)	LF	20	8	160	60	220		
Total w/ Option 1 (fill slopes)				22202.5	8997	31200		38693
Total w/ Option 2 (retaining walls)				14074.5	8997	23072		30051