

Design Memorandums

B
APPENDIX

MEMORANDUM

SANTA MARIA RIVER LEVEE TRAIL

Wallace Group Project No: 1105-0003



Date: October 3, 2024
To: Stuart Poulter, EMC Planning Group Inc.
From: Jorge Aguilar, P.E.
Subject: Bonita School Road Crossing

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This memorandum served to qualitatively compare crossing alternatives for the Santa Maria River Levee Trail (SMRLT) at Bonita School Road. The following crossing alternatives are discussed in this memorandum:

- A. Bridge overcrossing
- B. Box culvert undercrossing
- C. At grade crossing with a pedestrian hybrid beacon (PHB)

Note: An emergency call box to be included in each of the above-mentioned crossing options.



The memorandum includes the pros and cons of each alternative and general cost figures done at a preliminary design level.

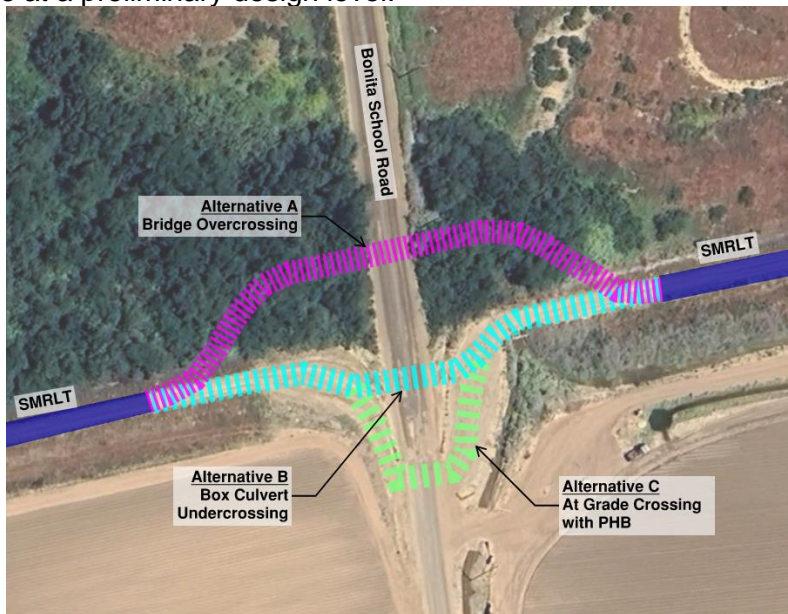


Figure 1: Crossing Alternatives

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The County of Santa Barbara is in the final design phase for a new Bonita School Road bridge over the Santa Maria River that will span 2,321 feet between the levees on the north and south edges of the river corridor. The Bonita School Rd profile will be raised approximately eight feet at the southern levee near the SMRLT, and grading will extend approximately 700' to the south along the roadway to achieve this elevation.

Alternative A: Bridge Overcrossing

A conceptual trail bridge alignment over Bonita School Road is shown in pink on Figure 1, and an example installation of a trail bridge with switchbacks is shown in Figure 2. A bridge over the roadway would provide a fully separated roadway crossing but that would require significant switchbacks to achieve the vertical clearance over the roadway. This bridge would need to be designed to accommodate all trail user mobility types and adhere to ADA standards. These switchbacks could prove to be a hindrance to many users who might try to avoid the added vertical climb and length by crossing the roadway at-grade south of the embankment. A trail bridge over the roadway might be considered to enhance the vistas the trail users' experience but would also be visible to the passing public which would create a visual impact as it would not be consistent with the surrounding area.



Figure 2: Trail Bridge Example

A trail bridge has significant challenges. The County's Bonita School Road bridge profile will be elevated ~ 8' above the current levee elevation. The minimum vertical clearance for a pedestrian bridge is 17' (2' greater than the 15' min of a roadway bridge). This means that the trail would need to ramp up 25' plus the thickness of the structure or supporting elements below the deck profile using ADA compliant slopes. There are significant environmental challenges for an overcrossing alternative due to the visual impact, adjacent riverbed and riparian area. On top of these concerns, the design and construction costs for a trail bridge overcrossing of the roadway will be substantially more expensive than the other two alternatives. Costs are estimated in the \$7M to \$12M range.

Alternative B: Box Culvert Undercrossing

A box culvert undercrossing in a roadway embankment alternative is shown in cyan on Figure 1, and an example is depicted in Figure 3. Similar to the overcrossing alternative, the box culvert would provide a fully separated roadway crossing experience that would provide safer, uninterrupted trail use. It would also be a benefit to roadway users, as it would allow uninterrupted traffic flow, reducing risks and potential accidents. The grade differential for the trail to drop under the roadway is much less than what is needed for the overcrossing alternative, particularly when the



Figure 3: Example Trail Box Culvert Crossing

roadway profile is also being raised approximately 8'. According to Chapter 1000 of the Caltrans Highway Design Manual, a trail requires 8' minimum vertical clearance; however, 10' is desirable. Including the thickness of the box culvert top and clearance for the roadway structural section, the total grade differential is approximately 4'-5'--much less than the overcrossing

alternative. This results in lower impacts and costs and is more accessible to users of all abilities. Box culvert undercrossings are typically made of reinforced concrete and other durable materials which make it a lower maintenance option. These facilities are typically low profile and blend with the surrounding embankment.

Although there are numerous benefits for selecting the box culvert undercrossing alternative, there are a few key considerations for this option. The first consideration with use of a box culvert is the visibility and safety of trail users. The trail will be depressed under the roadway and less visible to roadway users. This concern can be mitigated by installing lighting through the culvert and approaches and constructing the approach retaining walls parallel to the trail as shown on the right side of the example photo. This improves visibility and provides fewer places that aren't directly visible to users. Another challenge of the box culvert undercrossing alternative is that the dip in the profile causes a low point that may result in water ponding. However, the low point can be designed to be on either side of the culvert with either overland or underground drainage facilities to direct water off the trail. For cost comparison purposes, a box culvert undercrossing could range in cost from ~\$700k to ~\$1.2M depending on efficiencies related to other construction for the roadway and bridge replacement.

Alternative C: At Grade Crossing with PHB

The at grade crossing alternative is shown as green in Figure 1, and an example with a Pedestrian Hybrid Beacon (PHB) is depicted in Figure 4. Of the three alternatives, the at grade crossing with a PHB is the least expensive, with an estimated construction cost of approximately \$500k. Assuming no alterations to the levee, this alternative would include trail connections to an at-grade roadway crossing point. A key need for this alternative is to be



Figure 4: Example PHB Installation



sure the trail users are more visible to the traveling public.

While PHBs are proven safety countermeasures for use at crosswalks, an at-grade crossing still puts the pedestrians and vehicles in conflict and relies on drivers to obey the signs, markings, and beacons to avoid collisions with vulnerable trail users. The design speed of Bonita School Road approaching from the south is 55 mph, and an at grade crossing with a PHB would be unusual and unexpected to drivers in this rural, agricultural context, which introduces additional compliance concerns. Of the three alternatives, the at grade crossing has the highest vehicle-pedestrian conflict risk. Vehicles are required to stop when the crossing is activated, which will cause some delay to drivers on Bonita School Road.

Conclusion

The trail bridge overcrossing is the most expensive and has both environmental and user compliance concerns that make this alternative undesirable. The at-grade PHB crossing alternative is also not recommended at this high-speed rural setting primarily due to safety concerns between vehicles and vulnerable trail users. The box culvert undercrossing avoids some of the challenges associated with the overcrossing and at-grade crossing but still has some security concerns for users if not properly addressed. A box culvert undercrossing can be designed to allow proper visibility and drainage therefore, this alternative is considered the most context appropriate crossing solution for the SMRLT at Bonita School Road.

MEMORANDUM

SANTA MARIA RIVER LEVEE TRAIL Wallace Group Project No: 1105-0003



Date: October 3, 2024
To: Stuart Poulter, EMC Planning Group Inc.
From: Matt Wilkins, PLA, ASLA, APA / Jorge Aguilar, P.E.
Subject: Farmland Conflict Avoidance Planning

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Introduction

This memorandum discusses options to minimize potential conflicts between trail users, agricultural operators, and landowners along the proposed Santa Maria River Levee Trail (SMRLT). Between Highway 1 and North Blosser Road, there are seven crossings of the SMRLT as shown in Figure 1 and listed below:

1. Peralta Street
2. Farmland Crossing
3. Bonita School Road Crossing
4. Stormwater Crossing
5. Farmland Crossing
6. Stormwater Crossing
7. Farmland Crossing

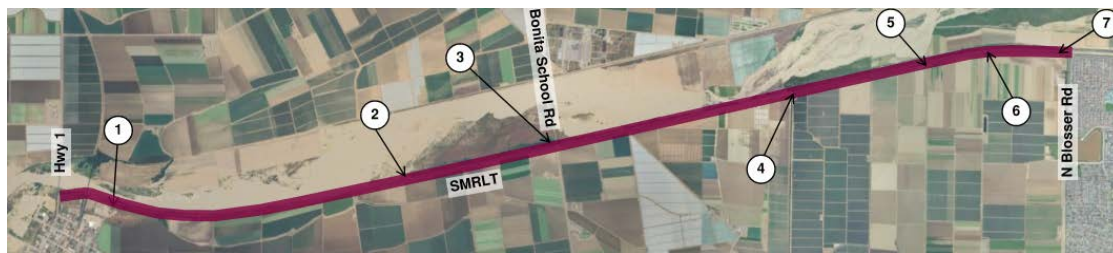


Figure 1: Farm Access Crossings of the SMRLT

Treatments at Peralta Street and Bonita School Road are discussed in separate memorandums and are therefore not included in this memorandum; however, treatments discussed herein could also have overlap with those to be applied at those crossings if needed. Figure 1 is a large scale overview of the setting for the SMRLT, there are agricultural fields along the southern edge of the trail for the entire length of the project, and there are also many on the north side of the southerly levee as well as north of the river corridor with some agricultural access crossings at the locations noted. There is fencing along the majority, but not all, of the northern limits of the agricultural fields just south of the southern levee. The trail will avoid direct impacts to the agricultural fields by remaining on top of the existing levee and it is anticipated that the steepness of the levee slopes will discourage access to the fields. However, at the existing crossings the access roads are much more traversable so this

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memorandum focuses on mitigation measures to address concerns of trail users potentially leaving the trail and wandering onto private property at these locations. The desire to discourage trespassing needs to be balanced with providing accessibility for agricultural operations and the farming equipment using these access points.

Farmland conflict avoidance features include positive directional as well as trespass avoidance signage, channelizing fencing and gates, and other strategic amenities placed at trailheads, major roadway crossings, and minor farmland access crossings.

Trailheads and Major Crossings

Entry and conform trailheads are proposed at the western end near either the Highway 1 or Peralta Street beginning and at the eastern end near North Blosser Road trail conform to the existing trail. At these two locations, specific amenities should be considered to reduce conflicts along the long stretches of trail: pet waste disposal, trash receptacles, benches, gates, and signage.

If dogs will be allowed on the SMRLT then dog waste bag dispensers should be provided at trailheads with a simple regulation sign requiring pet owners to keep dogs on leash and collect their pet waste. Trail users are required to clean up after their dogs and prevent trespass by dogs on adjacent properties in consideration of food hygiene on adjacent agricultural lands. This simple amenity has been shown to increase pet owner compliance and ease of compliance with this requirement.

Similarly, it is important to provide trash receptacles at trailheads to give trail users a place to dispose of their trash. This amenity helps minimize litter and cleanup maintenance along trail corridors.

Benches at trailheads and away from access areas for flood control activities could provide trail users with a place to rest and may include tree planting at appropriate locations to help guide trail users to stay on designated areas.

Trailhead Signage

Informational, regulatory, and warning signs should be strategically located at trailheads, as well as along the trail, to inform trail users of agricultural considerations, rules, and etiquette. Trail users should be advised to stay on the trail and be alert to operating machinery and equipment near the trail. Signs noting on-going agricultural activities should be posted at entrances to the trail, stating that the trail user agrees to use of the trail at their own risk and that intermittent closures are to be expected due to agricultural activities. Signage should note that the trail may be subject to closure without notice to accommodate agricultural operations which may include pesticide spraying, agricultural dust and debris, and burning activities in accordance with State and local laws and ordinances. It is also recommended to post signs at the trailhead stating the legal ramifications for trespassing on adjacent properties or using the trail while closed.



Example trailhead signage for these considerations are shown below:

Example Trailhead Signage



Temporary Trail Closure Procedures

At trailheads and crossings, gates and signs should be provided for County Park Rangers to close the trail to the public. The trail may need to be closed due to flooding, trail/levee maintenance work, or to facilitate agricultural operations. Agricultural activities that may require temporary closure in specific areas include but are not limited to:

- Pesticide spraying
- Agricultural Burning
- Livestock crossing
- Vehicle & Machinery crossing

The trail should be designed with the ability for its physical closure of isolated segments. The County would need to establish a plan for receiving notices of impending spraying activity from the farmers with follow-up actions, as appropriate, and the responsibility for ensuring that temporary closure and reopening of trail gates would be delegated to County Park Rangers. Example trail closure signage and gates are shown below.



At Grade Farm Crossings

As listed in the Introduction section, there are three farmland crossings and two locations where stormwater crosses underneath the levee. At these five locations, additional considerations are needed to provide access for agricultural operations, safety for trail users, and positive direction for users to remain on the trail. Each of these locations has particular considerations for their specific context. Exhibits of the potential signage placement at each of these locations are included in the attached layout exhibits. These sample crossing exhibits are expected to be refined in consultation with the landowners and agricultural operators at each location.

Access roads to the farmland should have lockable gates, and fencing should extend along the trail at least 50' on each side of the access road to encourage trail users to stay on the trail. The gates should be set back from the edge of the trail to provide space for the agricultural equipment to move off the trail while opening and closing the gate without blocking the trail. Types of fencing and gates are expected to depend on the adjacent land use negotiations.

Warning signs for both the trail user and agricultural operators should be provided to alert the upcoming crossing area. Regulatory "no trespassing" signs should also be placed along the trail and on the gates to notify the trail users to stay on the trail. Example signs are shown below.



Conclusion

There are limited agricultural operations-trail user crossings within the project limits, the separation of the levee trail location from the farmland northern limits and the steep slopes of the Santa Maria levee are expected to intuitively keep trail user to the levee limits. By providing trailhead amenities, proper fencing, gates, and signs at key points, the County can mitigate challenges related to farmland access and trespassing. These strategies will need to be supported by enforcement and maintenance by the County Park Rangers. Rangers will be responsible for the day-to-day patrolling of the trail and maintenance of the user facility components, including trash clean up and disposal, graffiti removal, and repairs to trail components, as well as installing and removing trail closure gates. The establishment of a formal trail operations and maintenance plan with input by agricultural operators and procedures for closure needs would be needed to ensure adequate trail corridor operations.

Attachments:

Farmland Crossing (2) Exhibit
Stormwater Crossing (4) Exhibit
Farmland Crossing (5) Exhibit
Stormwater Crossing (6) Exhibit
Farmland Crossing (7) Exhibit