

## MEMORANDUM

**To:** Erik Martinez – California Coastal Commission

**Cc:** Wency Ng, Alex Zhang, Krzysztof Lisaj, and Theresa Engle – San Mateo County Public Works

**From:** Robert Stevens (CSW | ST2), Dilip Trivedi, Neil Nichols, and Juanito Jamias (Moffatt and Nichol)

**Date:** April 16, 2021

**Subject:** Mirada Road Pedestrian Bridge Replacement and Bluff Stabilization

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Thank you for your April 12 comments and the discussion on April 7. Since 2018, the County has evaluated numerous options to replace the pedestrian bridge maintaining this critical coast side connection. This investigation included a study of various bridge types as well as alternative methods to stabilize the bluff including a rip rap revetment, a secant pile concrete sea wall, and the hybrid solution as presented in our application.

Based upon three years of discussions with project stakeholders including the community, State and Federal regulatory agencies, the City of Half Moon Bay, as well as the County of San Mateo's engineering, environmental, and maintenance personnel have all concluded that the proposed design is the best compromise between cost, environmental considerations, and the overall purpose of the project.

The closure of the pedestrian bridge last year due to its structural inadequacy makes completing this project this year imperative. The community has been vocal that the detour currently in place is not an acceptable solution.

We have reviewed your comments and offer a response below.

- 1. Instead of rock for the base, please consider installing sheet pile walls at the base of the shotcrete wall. This solution might eliminate the need for rock without the complications raised at the meeting regarding extending the shotcrete wall deeper.**
  - a. The installation of a sheet pile wall would need to provide protection from elevation of about 0 to elevation 5 in accordance with NAVD88. To resist overturning, the sheet piles would need to be driven into the ground by approximately 15 feet, requiring a total sheet length of about 20 feet.

To use sheet piles at this location, they would need to be heavy gage steel sheet piles that would require heavy equipment for installation that will need to be located on the beach. To protect the installation, the contractor would need to construct a pad derived from locally excavated sand and a cofferdam at the base of the bluff.

The impact associated with this approach significantly exceeds that of the design as proposed. Most significant is the sedimentary rock layer known as the marine terrace, which is a hard geologic formation in this area that starts at about -10 feet elevation. The marine terrace will be encountered within the sheet pile driving depth and will fracture the terrace. Although fracturing the marine terrace is possible with specialized equipment, it is not recommended because it will speed up natural erosion processes and compromise the overall stability of the bluff.

Please note, these sheet piles would be exposed during low sand conditions during the spring and early summer providing a very unnatural look. Finally, they will corrode and are not appropriate for this section of coastline.

**2. Please continue to explore options that would extend the shotcrete wall deeper and allow for a reduced amount of rock at the base as this would be our preference if full removal of the rock is deemed infeasible.**

- a. As discussed during our meeting with you on April 7, the shotcrete wall as proposed is like a “band-aid” on the bluff. A deeper shotcrete wall will need longer tie-backs to extend into competent material beyond the slip plane. These longer tie-backs will require an additional easement on private properties likely extending beneath the homes. The County is currently procuring an easement of 30 feet from the property owners to meet the current design's requirements.

The width and height of the rock slope protection (RSP) is dependent on the individual rock size. The rock size is based on the wave energy, which along this section of the coast is as high as 22,000 pounds per foot. To resist this wave energy, the rocks need to be approximately 2 to 3 ton in size. The overall RSP dimensions cannot be reduced without reducing rock size. Reducing the rock size or height will displace the rocks during heavy wave action requiring future maintenance and potentially damaging the bluff. This is not an acceptable solution as it potentially compromises the investment and creates a future liability for the County. As discussed, the current design affords the maximum beach area during the late spring, summer, and fall months when the sand levels are high and cover the RSP.

We investigated an alternative bluff stabilization option early in the project's development, which was a secant pile wall. Even if feasible, the cost to implement this option is high and does not provide significantly greater stability for the bluff than the proposed design. This would be a major change to the design requiring a supplemental CEQA review and changes to the permits issued by the Army Corps, RWQCB, and the CDFW. We would not be able to make these changes and secure approval prior to this year's construction season. Thus, the bridge would remain closed for another year.

**3. We still would like to explore access options adjacent to the bridge where current informal access exists including because the County will likely have to construct an access ramp for maintenance in the future.**

- a. As discussed during our meeting on April 7, the County does not want to encourage access to potentially dangerous conditions along this segment of the coastline using informal access routes.

We note that there is an existing informal access path along Mirada Road north of the pedestrian bridge that traverses the existing RSP. This was installed by the community without approval. The County will not remove this access pathway.

If future maintenance on the RSP were required, the County would complete it from Mirada Road and not access the beach.

**4. The visual design of the bridge and fencing are important components. Please explore options to color the bridge and or reduce the height and/or modify the design of the railings to improve views to and along the coast when walking/biking along this stretch. Please also explore fencing that would be made of more natural materials.**

- a. At the project's commencement, we investigated several bridge options including timber, steel, composite, and aluminum. The key factor in selecting an option was a material that did not corrode in the marine environment and that required minimal maintenance. We found that the prefabricated aluminum bridge met these criteria and has been successfully used along other segments of the coastal trail in Half Moon Bay.

Since the original bridge was constructed in the early 2000's, the building code has changed, and the seismic design criteria became more stringent. We originally thought that the project would need to replace the foundation and abutments. However, as the aluminum bridge is much lighter than the existing steel structure, we could preserve these elements speeding construction, reducing cost, and minimizing impacts to the bluff and surrounding area.

There are few manufacturers of aluminum bridges as they are a specialty item. Over the last two years, we have coordinated with GatorBridge (CMI Limited Co) regarding the design options. GatorBridge has various truss style and configuration options available. However, the physical constraints associated with the length and weight of the Mirada Road Bridge are pushing the structural limits. For instance, the project could consider using a different truss configuration, but that would increase the weight thereby requiring foundation replacement. Furthermore, the height of the truss cannot be reduced as this provides the structural capacity needed to cross the Arroyo de en Medio.

Defining the exact bridge style at this location is not possible without completing a finite element analysis. GatorBridge will not do this until they have received an order from a contractor. Due to procurement rules, the County cannot directly award the project to GatorBridge.

The County is committed to finding a solution that meets the aesthetic goals while preserving the existing bridge foundations. We recommend allowing the County to continue coordinating with the manufacturer post contract award to develop a feasible solution.

The barrier is designed to protect walkers and bicyclists from a fall of up to 30 feet. Per the Building Code, the barrier must not allow a sphere of 4 inches or more in diameter to pass and shall resist a concentrated load of 200 pounds placed at the top of rail. Therefore, they need to be robust and durable. We believe the cable rail offers the appropriate solution as it does not block views due to its narrow cross section and has a low potential of corrosion. We would be happy to explore other options as proposed by the Commission provided, they comply with the criteria previously noted.

**5. Lastly, the simulations provided in the presentation show a sort of conduit hanging from the bridge. Given that the sewer main will now be relocated completely from the project area, is this hanging conduit the electrical conduit?**

- a. No, the electrical conduit is located on the edge of the bridge. When the rendering was completed, the sewer line was still within the project.

The community is frustrated with the closure of the bridge and trail. The detour is not an acceptable option for the up to 700 tourists, residents, and commuters who use the bridge on a Saturday or Sunday. The County needs to get the project to bid by this May to begin construction by July to re-open the trail by this Fall.

Since 2018, the County has shared its approach to developing alternatives with staff from the Coastal Commission. These options ranged from low cost but highly impactful full height rip rap to a high cost secant pile wall. The County elected to advance the hybrid solution as it protects the crossing of the Arroyo de en Medio for up to the next 40 years until an ultimate solution can be developed. This option preserves the maximum beach area for users during the months when sand levels are high, and it is actually usable. The County has finalized the design, secured approval from federal and state agencies, and must obtain approval from the Commission by May in order to meet the schedule demanded by the community.