



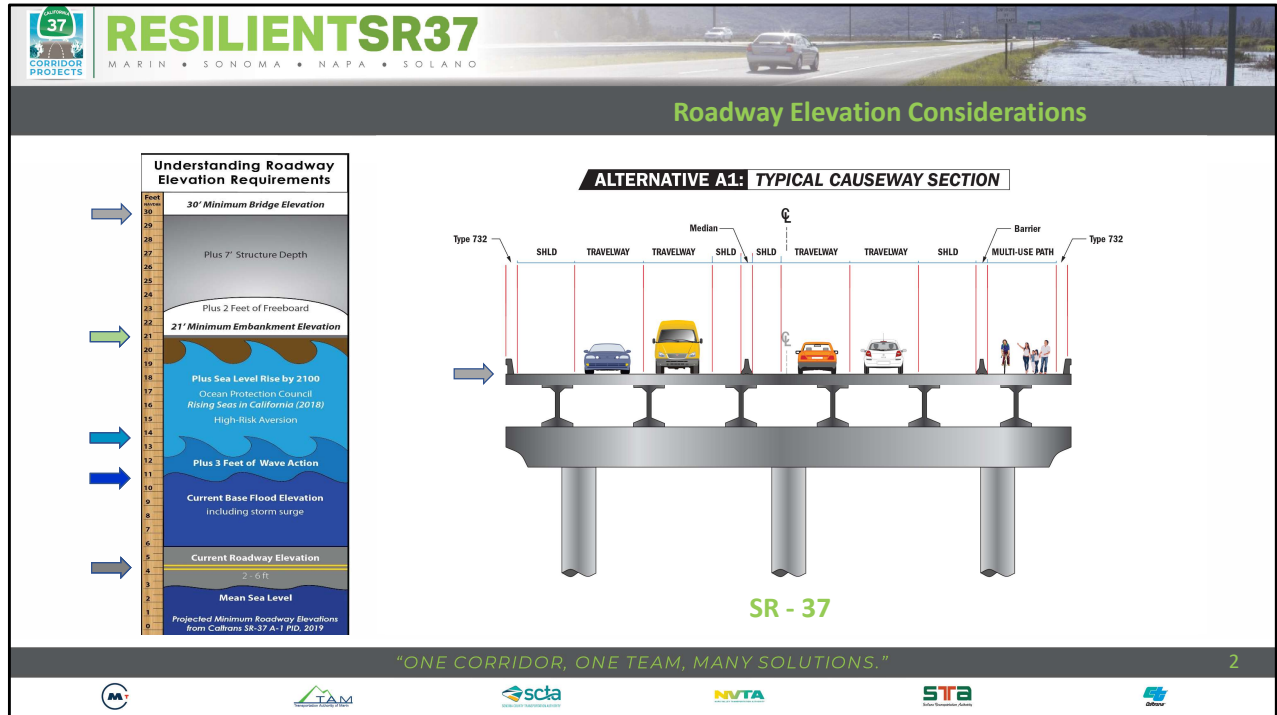
4. Alternatives Development and Public Input on Conceptual Alignments

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As mentioned earlier this evening, a key product of a PEL study is the development of alternatives that will meet the needs of the corridor.

Caltrans and its partners will be starting the development and screening of alternatives in the coming months, and we would like some initial input from the public on the range of alternatives to be considered by the PEL team.



A key challenge for the PEL study, is understanding how sea level will rise in the study area. Evaluating available data, factoring in risk, and deciding on a target for design year will ensure that an appropriate roadway design elevation is identified.

Here you can see the current elevation for portions of the corridor.

The Ocean Protection Council Guidance 2018 recommends that designs include Storm Surge and Wave Run-Up when planning projects. When you factor in Sea Level Rise projections with additional storm surge and wave run up, you can see how that could affect the elevation requirement for a roadway constructed on an embankment. However, for structures such as bridges and causeways, the minimum height is even greater because we have to account for freeboard, or space underneath the bridges and causeways to keep the structure out of the wave action. The PEL team will be coordinating our Sea Level Rise assumptions with previous studies in the corridor, and update if needed. We also need to be adaptable in our approach, knowing that Sea Level Rise Projections and Guidance may change over the course of the PEL study's schedule, and recognize we may need to modify preliminary decisions.

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Sea Level Rise Adaptation Strategies

Adaptation Strategies

Accommodate

Protect

Relocate or Retreat


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Three primary strategies exist for adapting infrastructure, such as SR 37, to Sea Level Rise.

- (1) The **Protect** strategy entails building hard barriers, such as seawalls or soft barriers like nature-based levees, and reefs to stop or buffer the encroaching water and protect assets from flooding,
- (2) The **Accommodate** strategy involves modifying assets such as highways so that they can accommodate regular or periodic flooding, and lastly,
- (3) The **Relocate, or Retreat** strategy involves relocating assets from the potential flood zone by moving them to higher ground or further inland.

Each of these strategies comes with trade-offs, as shown on the following slides, and not all strategies will work in every situation. For example, relocating existing properties, could be disruptive, expensive, and not always logistically possible. Armoring much of the coast, however, is also not practical. Therefore, selecting which combination of Sea Level Rise adaptation strategies to use in a particular location is an involved process combining scientific research, locally specific information, public and stakeholder input and support, and both high-level and detailed planning. In complex situations, such as the SR 37 corridor, a hybrid approach of these strategies is often employed.

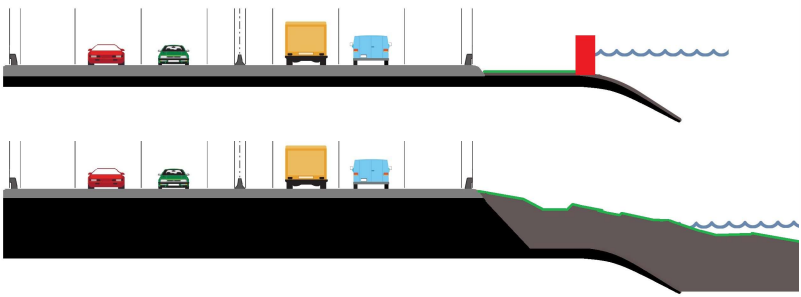


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Sea Level Rise Adaptation Strategies

- **Protect:**
 - Place hard (seawall, hardened levee) or soft barrier between development and the sea to reduce exposure to flooding or erosion.
 - Hard protection (“armoring”)
 - Soft protection (“living shorelines”)



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Here are some examples of how the Protect strategy could be used for the SR 37 corridor.


Hard protection, also known as “armoring,” consists of constructing physical structures to keep water back, such as seawalls, retaining wall, and levees.

Soft protection, or living shorelines, consists of efforts to enhance natural elements to buffer against the water, such as building up sand dunes, adding sand to beaches, and expanding wetlands.


Protection strategies have advantages and disadvantages.

One **advantage** is that it can allow existing development and infrastructure to remain in place. It can also be less costly than other strategies.

A **disadvantage** is that hard protection can contribute to beach erosion and increased flooding in adjacent areas. Soft protection likely will become a less viable strategy once sea levels rise to the higher stages of projected levels.

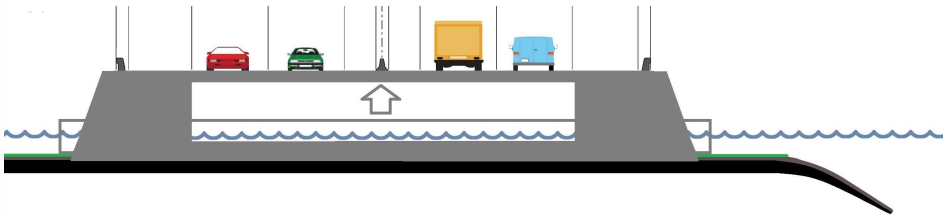


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Sea Level Rise Adaptation Strategies

- Accommodate:
 - Modify or design development in ways that will withstand SLR without damage, such as:
 - elevating infrastructure.
 - Retrofitting existing structures
 - Stormwater management



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The next adaptation strategy is **Accommodate**. This approach modifies or replaces the infrastructure so that it can withstand Sea Level Rise without damage.

An **advantage** of this approach is that it can allow existing development and infrastructure to remain in place once modified.

However, its **disadvantage** is that it can be costly and difficult in staged construction, to modify existing development in place.

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Sea Level Rise Adaptation Strategies: ACCOMMODATE



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MA TAM scia NHTA STB

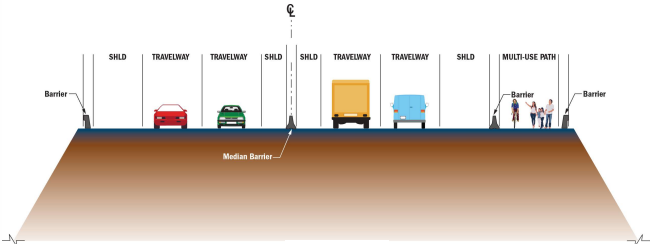
Accommodating sea level rise can include the construction of causeways as you see here.

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Sea Level Rise Adaptation Strategies: ACCOMMODATE



ALTERNATIVE A2: TYPICAL EMBANKMENT SECTION




SR 37

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Logos for MA, TAM, scia, NVTA, STB, and others.

Accommodating may also include construction of an elevated roadway on an embankment as shown here.

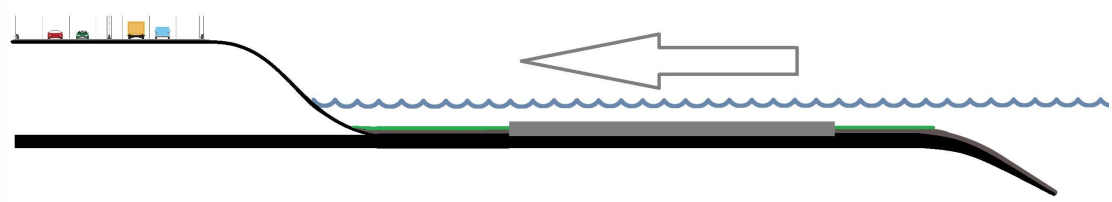


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Sea Level Rise Adaptation Strategies: RELOCATE / RETREAT

- Relocate/ Retreat:
 - Remove or move existing development to less risky areas and limit the construction of new development in vulnerable areas. This could include physically moving an asset or facility that is at risk, or adopting zoning policies that prohibit new development or require that it be “set back” from potential hazard zones.




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The final Adaptation strategy of **relocation or retreat** includes physically moving an asset or facility at risk to the sea level rise.

An advantage of this strategy is that it can provide space for beach and wetlands to migrate inland as water rises. This approach can ensure that infrastructure is, or will, be safe from flooding.

However, the disadvantages of this approach, are that it can be difficult, costly, or impossible to relocate existing infrastructure and potentially removing connection to local streets and roads.



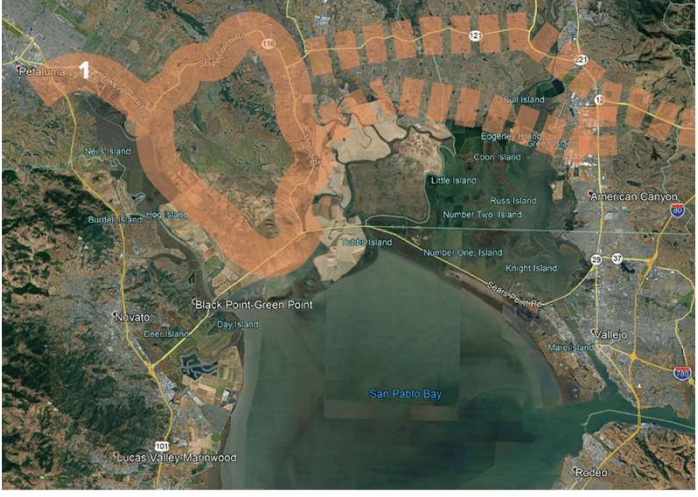
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ALIGNMENT OPTIONS

Routes that remain out of the floodplain

- These options are consistent with “Retreat” Approach by removing the roadway out of the projected floodplain.




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The PEL study will incorporate existing and past studies to determine viable protect, accommodate, and retreat or relocate strategies.

Here you can see alignments that remain out of the floodplain of the bayland marshes.

These options are consistent with “Retreat” Approach by removing the roadway out of the projected floodplain.




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ALIGNMENT OPTIONS

Routes through more narrow (shorter distances) areas of floodplain.

- These options are consistent with the “Accommodate” Approach by minimizing the length of roadway over the floodplain.
- May include a combination of causeway and embankment.




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Here you see shorter route options.

These options are consistent with the “Accommodate” Approach by minimizing the length of roadway over the floodplain and may include a combination of causeway and embankment.




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ALIGNMENT OPTIONS

Routes that follow offshore (outside of tidal wetlands areas).

- These options are consistent with “Accommodate” Approach by minimizing the length of roadway over the projected floodplain.
- They would minimize impacts to wetland area be mostly causeway structure.




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Here is a route that follows the shore, outside of wetland areas.

These options are consistent with the “Accommodate” strategy by minimizing the length of roadway over the projected floodplain.

These options could also further minimize impacts to wetland areas by placing most of the alignment on a causeway structure.



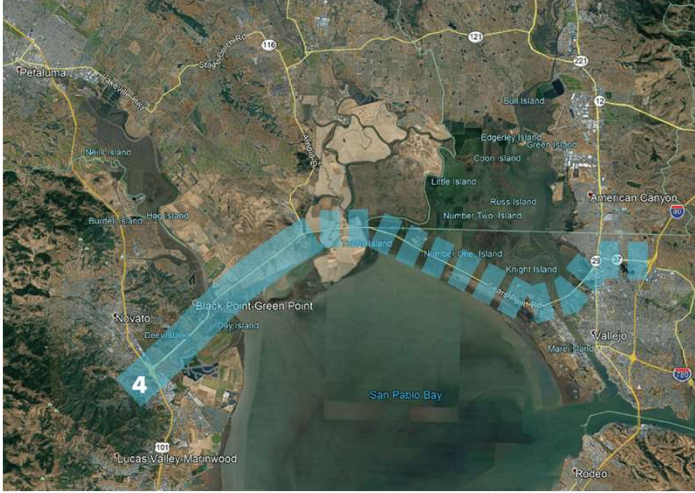
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ALIGNMENT OPTIONS

Routes along existing transportation corridors - SR 37 and/or rail corridor.

- These options could be interpreted as both “Protect or Accommodate” Approach by raising or protecting the roadway in place.




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Here are some alignment options that follow or utilize existing transportation corridors such as SR 37 and/or the rail corridor.

These options could be interpreted as both “Protect and Accommodate” because they are raising or protecting SR 37 in place.




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ALIGNMENT OPTIONS

Route across the San Pablo Bay between US 101 to Mare Island.

- This option is mostly likely an “Accommodate” Approach by placing SR 37 as a causeway over the San Pablo Bay.




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This alignment option relocates SR 37 onto a causeway over the San Pablo Bay.

It is one of those options that employs both the relocate and accommodate strategy.




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DESIGN ALTERNATIVE ALIGNMENTS

Are you interested in any of these alignments or others not presented?

#1	Routes that remain out of the floodplain
#2A/ #2B	Routes through more narrow (shorter distances) areas of floodplain
#3	Routes that follow offshore of the marshland linking to US 101 south of Novato
#4	Routes along existing transportation corridors - SR 37 and/or rail corridor
#5	Route across the San Pablo Bay between US 101 to Mare Island



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As you can see on this graphic, there are many alignment options that can be considered in the alternatives analysis process by the PEL team. We will continue to develop these options in the coming months.

Our question for you this evening, "are we missing an alignment, or a design consideration besides embankment and causeway?"

You may share your thoughts or suggestions for alignments tonight, through the chat discussion, or following this meeting, you can use of the many means and tools that we discussed to provide your feedback.

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WHAT CONSIDERATIONS SHOULD SHAPE THE RANGE OF ALTERNATIVES?

- Protecting and Enhancing Natural Resources
- Providing Modal Options
- Addressing Users Needs
- Minimizing Impacts on Existing Uses
- User Costs and Ability to Pay


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Logos: AA, TAM, scia, NCTA, STA, OHV

In addition to Sea Level Rise, when we develop alternatives, we must consider how our proposed solutions affect our communities, our environment and of course, how a change in the alignment may affect the users of SR 37.

There are many considerations – what considerations are important to you?



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THERE ARE MULTIPLE OPPORTUNITIES TO PROVIDE YOUR INPUT

Provide a comment or sign up for updates:
Email: StateRoute37@dot.ca.gov


Map your interest or concern:
www.Resilient37.org

Call the SR 37 Public Information Line:
(510) 286-1204

Take a survey/Fill out the questionnaire:
www.Resilient37.org/Questionnaire

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LIVE: We would like to hear from you and get your input.

- First, thank you for attending this meeting.
 - Please take a moment to fill out the questionnaire.
 - Email or call us.
 - Much of the information shared today can be found at Resilient37.org website
- Finally – we have an interactive map that we demonstrated earlier this evening. You can place your comment using the web application -

The image is a screenshot of a presentation slide. At the top left, there is a logo for 'CORRIDOR PROJECTS 37' and the text 'RESILIENTSR37' in large green letters, with 'MARIN • SONOMA • NAPA • SOLANO' underneath. To the right of the text is a photograph of a road with a car driving away. Below the title, a dark grey bar contains the text 'POLLING QUESTION AND RESULTS' in green. The main body of the slide is a large white rectangle, which is currently empty. At the bottom of the slide, there is a dark grey bar with the slogan 'ONE CORRIDOR, ONE TEAM, MANY SOLUTIONS.' in green, the number '17' on the right, and a row of logos for various organizations: AA, TAM, scia, NVTA, STA, and others.

Here is our final poll: Please make sure to select submit after you respond.

POLL QUESTION #5: What considerations should shape the range of alternatives?

- Protecting and enhancing natural resources
- Minimizing impacts on existing uses
- Providing modal options
- User costs and ability to pay
- Addressing users needs
- Other