

Scoring Weights, Considerations, and Rankings

Weights and Considerations

The scoring results produced a list of highest scoring concepts from each category to be carried forward for further development as part of the Coastal Rail Resiliency Study (Study).

The evaluation criteria consists of five categories, each with their own respective percentage weights based on design life (up to 30 years), ability to protect the rail line, and how well the concepts meet the goals and objectives of the Study. In addition, it should be noted that while a concept may score well in one category, it may score poorly in another. The overall scoring of each topic reflects a concept's average across all scoring criteria.

Evaluation Category	Weight
Coastal Resilience and Rail Reliability	25 percent
Implementability and Constructability	25 percent
Cost	20 percent
Public Assets and Environmental Impacts	20 percent
Related/Planned Projects	10 percent

Coastal Resilience and Rail Reliability

This criterion and associated weight evaluate how well each Alternative Concept stabilizes the railroad and keeps it protected in place for up to the next 30 years, reflecting the Study's primary objective. Scoring factors for consideration under this category include service disruptions during maintenance, sensitivity to storm surge, sea level rise, beach erosion, longevity of concept (30-year design life), as well as track resilience provided from bluff erosion.

Implementability and Constructability

This criterion and associated weight evaluate the ease and timing of implementation. Scoring factors for consideration under this topic include right-of-way requirements, schedule and speed of implementation, ability to maintain service during construction, constructability, as well as the ability to meet design criteria.

Cost

This criterion and associated weight evaluate the estimated overall cost to implement each concept using high-level rough order of magnitude cost estimates developed for each concept. If the cost is found to be prohibitive and/or particularly challenging, the scoring results reflect this. This includes construction, maintenance, and lifecycle costs for consideration.

Public Assets and Environmental Impacts

This criterion and associated weight evaluate the impacts of each concept on access to public assets and the environment, reflecting the importance of minimizing such impacts in scoring results. This includes local resources, public facilities, utilities, grade crossings, surfing and swimming, multi-use paths and pedestrian access, beach/coastal access, permitting, sensitive habitats, as well as Section 4(f) resources.

Related/Planned Projects

This criterion and associated weight evaluate how well each concept aligns with local jurisdictions' policies, as well as federal and state sustainability planning efforts. This topic ultimately considers whether each concept supports and/or supplements initiatives by other agencies to address coastal erosion challenges.

Scoring and Ranking Results

Rail

Of the three draft Alternative Concepts under the rail category, two are recommended to be carried forward for further consideration. Alternative materials for critical railroad infrastructure to reduce lifecycle costs, which can be difficult to predict and often far more costly over time, are the least challenging and can be phased, in addition to limiting impacts to surrounding communities and environmental assets. Ground improvement (track-bed stabilization) has the best influence on railroad resiliency and can be combined with bluffside ground improvements to further stabilize area, although it may impact railroad operations during construction. Elevation of the tracks comes with a high cost with construction impacts exceeding the benefits comparatively.

Rail Concept	Rank	Carry Forward
1. Raised track embankment	3 rd	No
2. Alternative materials for critical railroad infrastructure to reduce lifecycle costs	1 st	Yes
3. Ground improvement (track-bed stabilization)	2 nd	Yes

Bluffside

Of the nine draft Alternative Concepts under the bluffside category, two are recommended to be carried forward. Catchment walls along with tieback/soil nail/pin-pile walls are both proven to be a cost-effective approach that falls mostly (if not completely) within the existing right-of-way to protect tracks without requiring long-term maintenance. Stabilization grading and hydraugers are not recommended due to difficult construction and impacts to adjacent properties and communities. Drainage solutions, such as up-gradient cut-off drains, improvement via grading/detention basins/undertrack outlets, as well as surface matting and deep-rooted vegetation planting generally not recommended due to limited applicability and not being a corridor-wide solution, and ground improvements (track stabilization) are only recommended in combination with rail-related ground improvements. While deflection walls in tributaries may support the goals of this Study, it will take years to naturally replenish beach sand and must be implemented by other agencies.

Bluffside Concept	Rank	Carry Forward
1. Catchment walls	1 st	Yes
2. Stabilization grading	7 th	No
3. Tieback/soil nail/pin-pile walls	2 nd	Yes
4. Ground improvement (bluff stabilization)	5 th	No
5. Surface matting & deep-rooted vegetation planting	3 rd	No
6. Drainage improvement via grading/detention basins/ undertrack outlets	6 th	No
7. Deflection walls in tributaries	8 th	No
8. Up-gradient cut-off drains	4 th	No
9. Hydraulics	9 th	No

Beachside

Of the five draft Alternative Concepts under the beachside category, three are recommended to be carried forward, and generally consist of beach nourishment combined with either a hybrid shoreline protection structure, seawall, and/or riprap due to construction limitations within the existing right-of-way and the proven nature of such structures to protect the railroad while also improving beach access when combined with sand placement. Sand retention measures are not recommended due to impacts to recreational users (surfing/swimming) and challenging environmental approval processes. Beach nourishment only (not combined with any other solution) and watershed modifications are not recommended due to lead time, funding, sourcing, and coordination, and permitting efforts would be monumental, requiring implementation by other agencies. Beach nourishment, in particular, would require cyclical sand placements with ongoing efforts to source and test sand sites, with vast amounts of quantity needed for each placement in order for it to be effective, as demonstrated by other initiatives.

Beachside Concept	Rank	Carry Forward
1. Beach nourishment with planned replenishment (by others)	8 th	No
2.1 Beach nourishment with Riprap	3 rd	Yes
2.2 Beach nourishment with engineered rock revetment	4 th	No
2.3 Beach nourishment with seawall	2 nd	Yes
2.4 Beach nourishment with a hybrid shoreline protection structure	1 st	Yes
3. Beach nourishment with sand retention and no shoreline protection	10 th	No

Beachside Concept	Rank	Carry Forward
4.1 Beach nourishment with sand retention measures and Riprap shoreline protection structure	11 th	No
4.2 Beach nourishment with sand retention measures and engineered rock revetment	7 th	No
4.3 Beach nourishment with sand retention measures and seawall	9 th	No
4.4 Beach nourishment with sand retention measures and combination of seawall and rock	5 th	No
5. Watershed modification	6 th	No