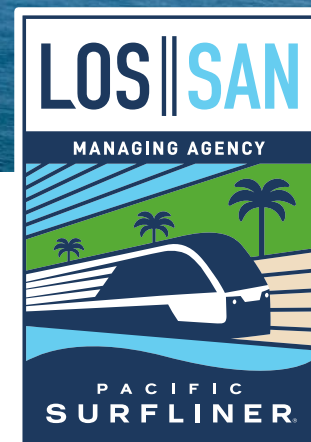




# LOSSAN Rail Corridor Coastal Resiliency Update

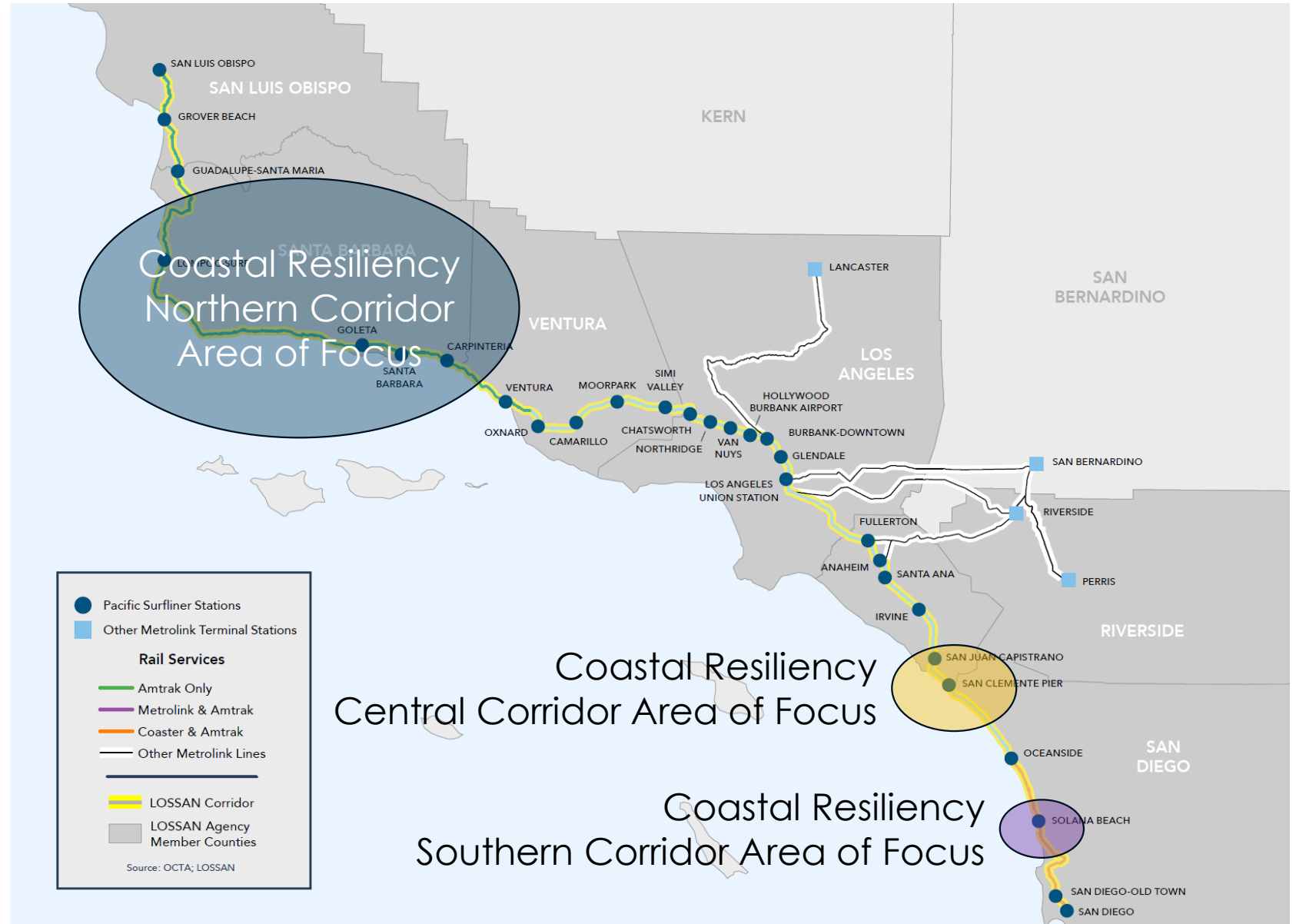
LOSSAN Technical Advisory Committee | July 11, 2024



# Coastal Resiliency

There are Coastal Resiliency challenges along the entire LOSSAN Corridor, broken into 3 key areas of focus.

- Northern Corridor Area of Focus:** LOSSAN is working with Union Pacific Railroad on a long-term strategy to stabilize the railroad.
- Central Corridor Area of Focus:** A study is underway to define short- and mid-term solutions to address resiliency issues through San Clemente.
- Southern Corridor Area of Focus:** SANDAG is performing short term repairs through Del Mar and beginning the environmental phase on long term track relocation.



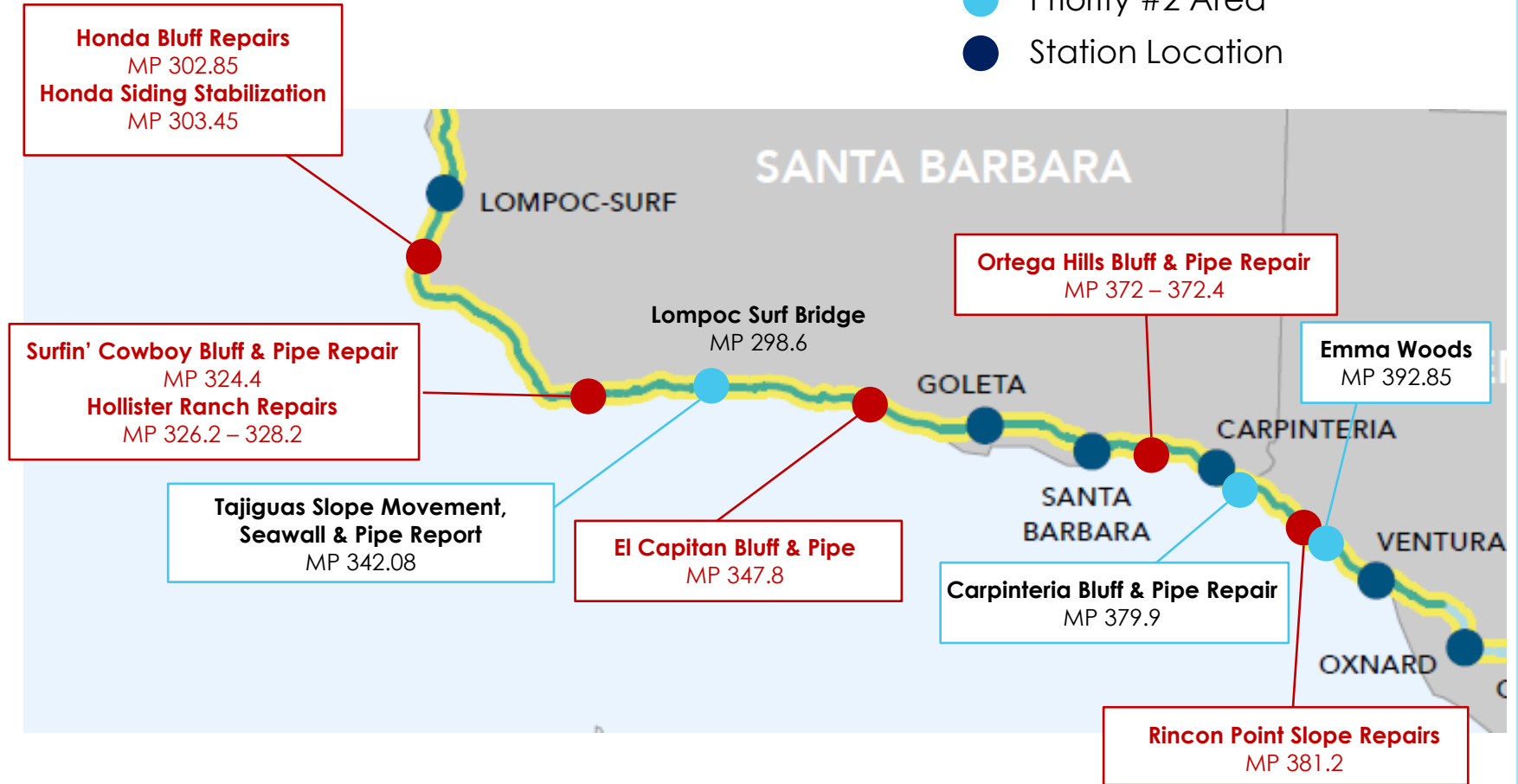


# Coastal Resiliency Program

Northern Corridor  
Area of Focus

## LEGEND

- Priority #1 Area
- Priority #2 Area
- Station Location



# Honda Bluff Repairs and Potential Track Relocation (Milepost 302.85-303.45)

## Existing Conditions

- Shoreline erosion in sandstone formation creating cavities in lower portion of bluffs
- Failure of steep sandy slopes

## Near Term Solution/On going Work

- Install slope failure monitors.
- Daily monitoring

## Longer Term Solution

- Relocate tracks inland
- Protect shoreline ~1500ft of shoreline
- Fill voids in sea caves
- May need VSFB, USACE, CCC, and State Lands permits





# Surfin' Cowboy (Milepost 324.4) & Hollister Ranch Repairs (Milepost 326.2-328.2)

## Existing Conditions

- Significant Bluff Erosion
- Loosing Slope within 8ft of Rail
- Erosion Moving Laterally
- Failure of Historic Seawall

## Near Term Solution/On going Work

- Short to intermediate term repair includes construction of a soldier pile wall high on the bluff face (at Sacate)
- **Work underway as of this presentation**

## Longer Term Solution

- Extend soldier pile and install tie-backs under the tracks.
- Replace drainage pipes
- Repair seawalls, where damaged
- Seawall work will need USACE, RWQCB, and CCC permits





# El Capitan Bluff (Milepost 347.8)

## Existing Conditions

- Scour under wooden soldier pile wall
- Pipe broken above seawall
- Slope eroding away approximately 6' to 8' away from track

## Near Term Solution/On going Work

- Fill void with rip-rap

## Longer Term Solution

- Replace pipe and headwall (built in 1916).
- Replace wood wall with concrete soldier pile wall with tie-back anchors. Fill scour hole with rock, or gabion mattress
- Improve drainage





# Ortega Hill (Milepost 372-372.4)

Existing Conditions	<ul style="list-style-type: none"><li>• Bluff erosion below tracks due to older failing storm drains</li><li>• Slope erosion above tracks due to surface water is causing erosion of shoulder and causing a loss of ballast</li><li>• Existing void under bridge creating additional instability</li></ul>
Near Term Solution/ Ongoing Work	<ul style="list-style-type: none"><li>• Removal of blockage under tracks causing additional erosion on hill side</li></ul>
Longer Term Solution	<ul style="list-style-type: none"><li>• Replacement of corrugated metal pipes with proper headwalls and anchors to toe of slope.</li><li>• Add drilled pier to secure in slope</li><li>• Stabilize bluff face with soil netting.</li><li>• Fill in the void under bridge concrete floor</li></ul>





# Rincon Point (Milepost 381.2)

## Existing Conditions

- Significant areas of hill erosion above the track area
- Tracks covered in sand after runoff from hills

## Near Term Solution/ Ongoing Work

- Dig drainage trench to better control water flow at base of the slope
- Vacuum track bed to remove sand and sediment

## Proposed Repair Summary

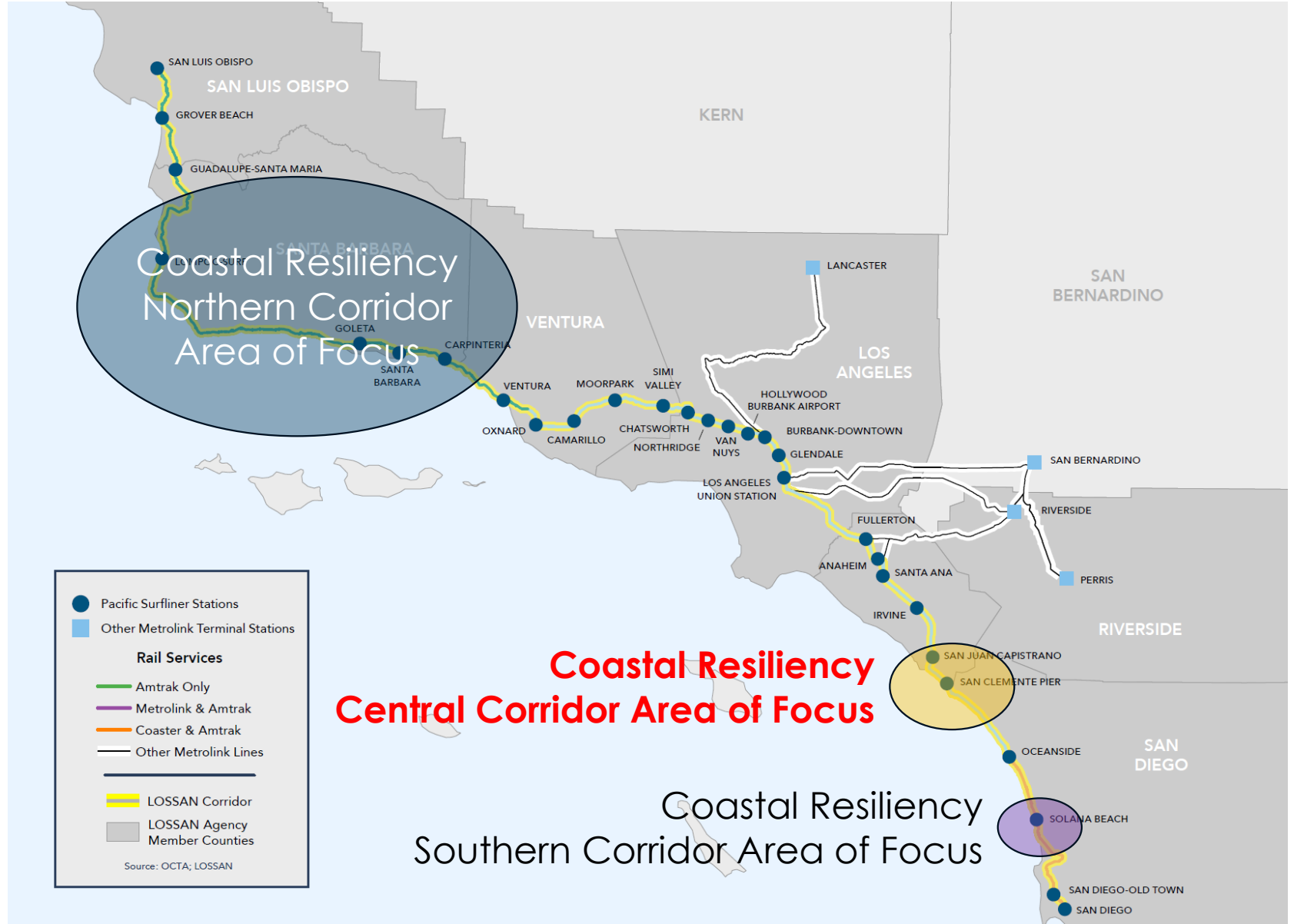
- Install storm water pipes from the farm field at top to bottom of slope
- May need easements to perform work
- Placement of rocks, revetment to shore-up bottom of slope





# Coastal Resiliency Program

Central Corridor Area of Focus



# OCTA's Role in the LOSSAN Corridor

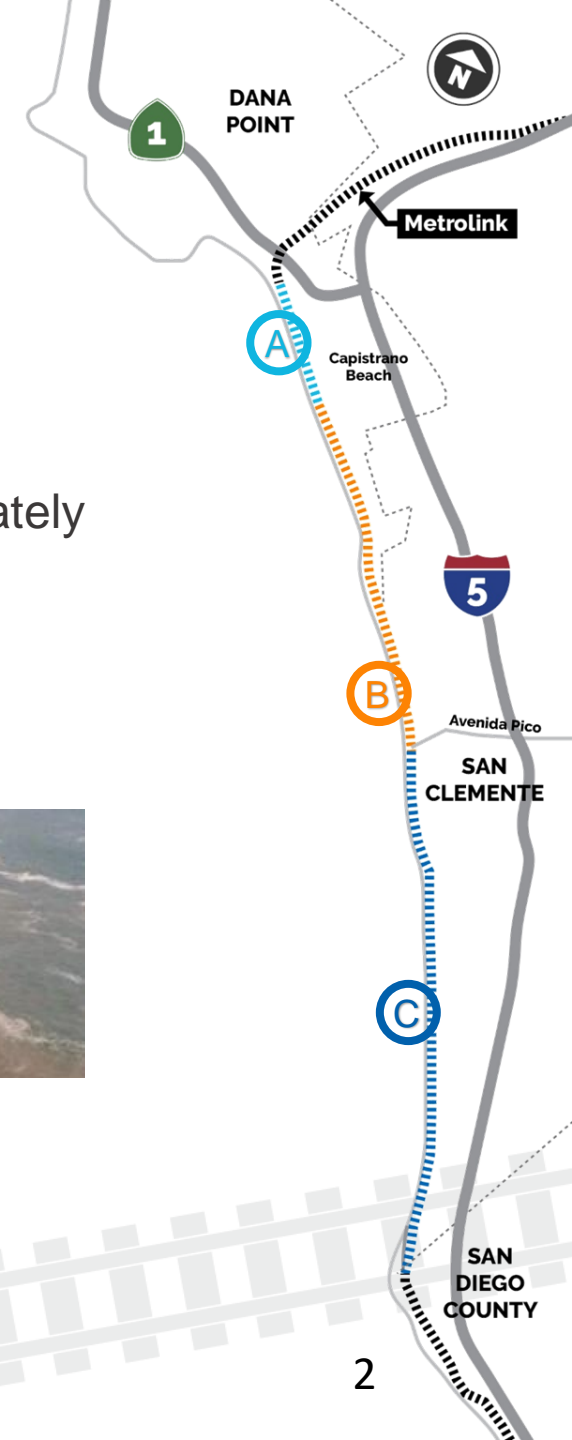
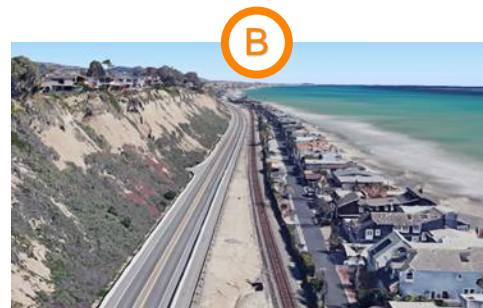
- Owns 40+ miles of the corridor, including seven miles of critical coastal track in south Orange County
- Responsibility to minimize disruptions to rail service
- Serves as the managing agency for the LOSSAN Rail Corridor Agency
- Member of the Southern California Regional Rail Authority (Metrolink) joint powers authority that uses the LOSSAN corridor

## COASTAL RAIL RESILIENCY STUDY

# OCTA's Beachside Rail Line

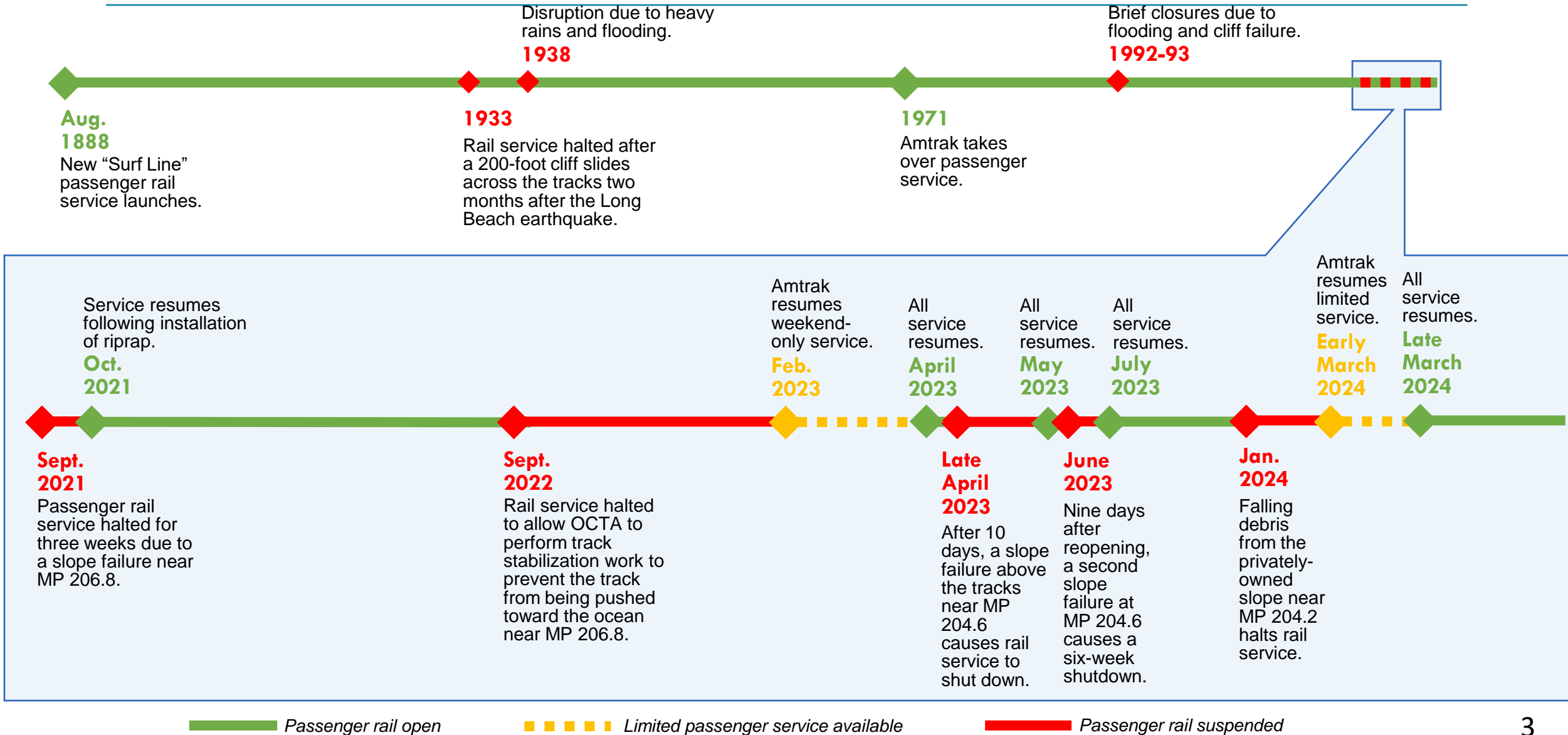
In south Orange County, tracks run along the beach, sandwiched between bluffs and the ocean.

Most of this beachside rail line is approximately 200 feet or less from the coastline.





# Passenger Rail Closures



# Local Resiliency Activities

PROJECT	ACTIVITY	COST	TIMEFRAME
Cyprus Shore Initial Track Stabilization Project (MP 206.8)	Emergency placement of riprap	\$8 million	September 2021
Cyprus Shore Track Stabilization Project (MP 206.8)	Installation of ground anchors in response to adjacent landslide	\$13.7 million+	October 2022 – August 2023
San Clemente Track Protection Project (MP 204.6)	Installation of temporary barrier wall in response to adjacent landslide	\$6 million	May – July 2023
San Clemente Track Protection Project (MP 204.2)	Removal of debris and other remedial action in response to adjacent landslide	\$TBD	Jan – TBD
San Clemente Shoreline Project (Sand Replenishment) (MP ~204.5 – 205.2)	Project would add 251,000 cubic yards of sand to the beach. Repeated at every 5-6 years interval up to 2 million cubic yards.	\$14.3 million (65% federal / 35% city cost sharing)	Fall 2023/ Winter 2024
San Clemente Nature-Based Coastal Resiliency Project Feasibility Study (community meeting)	This Study builds on the Shoreline Monitoring Program to promote long-term coastal resiliency in San Clemente.	\$570,000 (CCC LCP Grant Round 7)	Ongoing – Summer 2025

MP – Mile Post



# Coastal Rail Resiliency: A Two-Phase Approach

## Coastal Rail Resiliency Study

### Short- to medium-term solutions

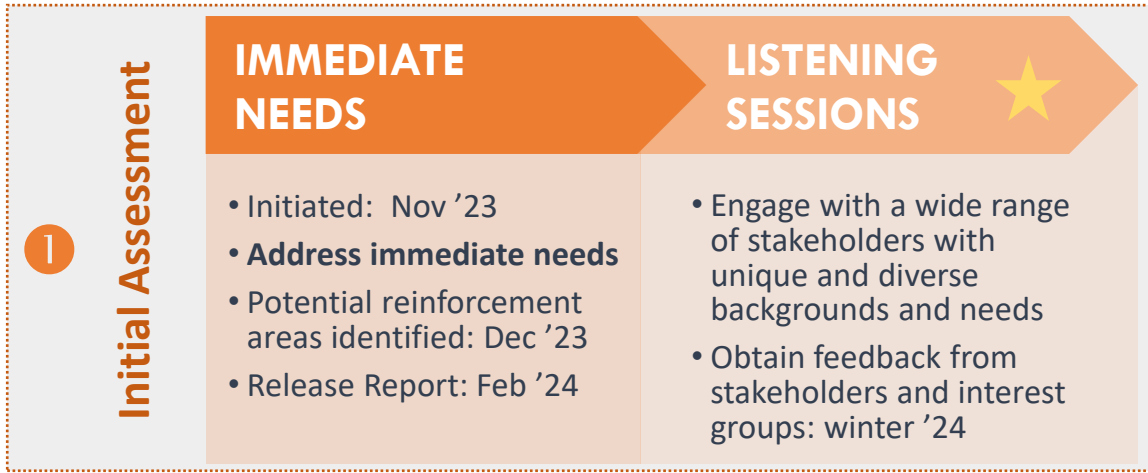
- Study underway
- Initial Assessment to address the most vulnerable areas through
- Develop options to protect 7 miles of coastal rail infrastructure at various sea levels
- Gain an understanding of climate effects on coastal rail infrastructure
- Identify potential solutions, including sand replenishment and retention
- Engage key stakeholders and agencies

## Coastal Rail Long-Term Solutions Study

### Long-term solutions

- Develop options for potential long-term solutions for the coastal section of rail line
- Create an action plan for key elements
- Partner with LOSSAN, state and federal agencies
- Engage key stakeholders and agencies

# Short- and Mid-Term Study Milestones

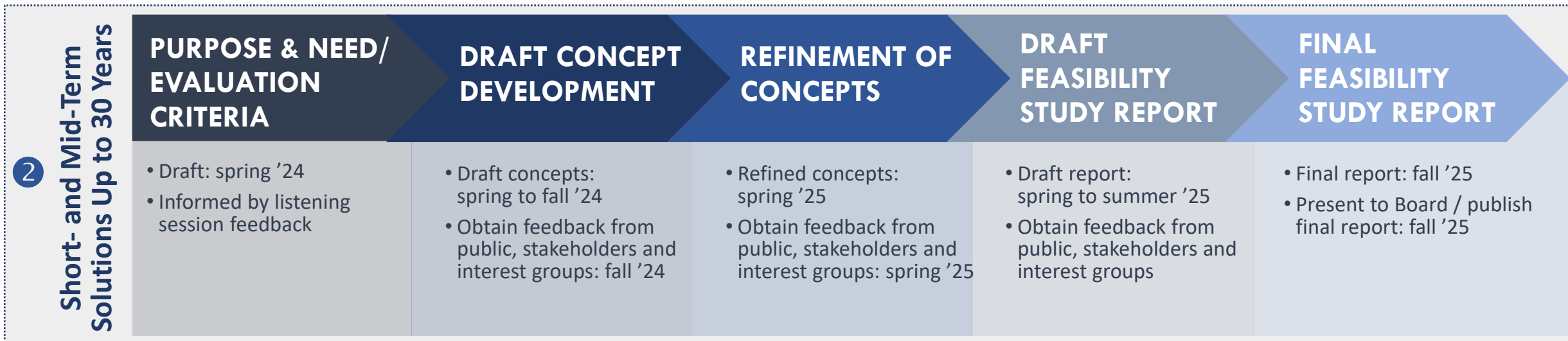


**1 Coastal Rail Resiliency Study is to address the most vulnerable areas through the initial assessment.**

**2 The study then looks at protecting the rail line in place for up to 30 years.**

**These activities are occurring simultaneously.**

1 - Step 1    2 - Step 2    ★ - Current Phase    Board – Board of Directors





# Initial Assessment Purpose and Need

- Four reinforcement areas were identified in December 2023
- Potential solutions need to be in place or substantially underway by fall 2024 ahead of next storm season
- Potential solutions evaluated at a conceptual level considering different materials, performance, costs, methods, and schedule

Area	Location (MP)	Challenge	Updated Potential Solutions
1	203.80 – 203.90	Ongoing deterioration of existing riprap protection	Rock (repair existing riprap) and sand nourishment
2	204.00 – 204.40	Erosion - no beach at high tide and direct wave attack damaging existing riprap protection	Rock (repair existing riprap) and sand nourishment
3*	204.00 – 204.50	Steep bluffs with high potential for failure that could impact the rail infrastructure	Catchment wall
4	206.00 - 206.67	Near San Clemente State Beach - erosion exposing areas of limited to no riprap protection	Engineered rock revetment and sand nourishment

\*The inland slope experienced a failure in late January 2024 within a portion of Area 3, resulting in a passenger rail shutdown for approximately two months



MP – Mile Post



# Reinforcement Areas 1 & 2: Potential Solution

## Existing Condition:

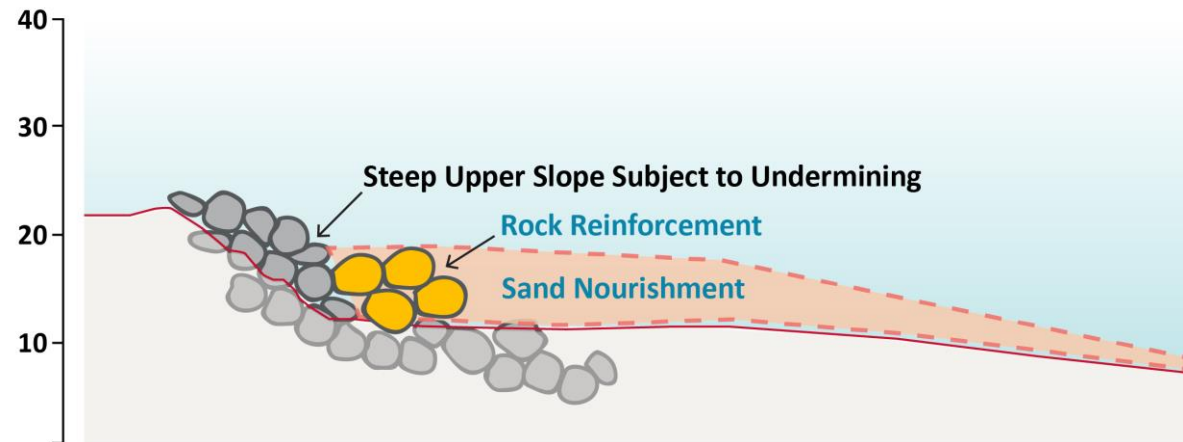


MP 203.80 – 203.90 and 204.00 – 204.40

## Potential Solution **UPDATED**:

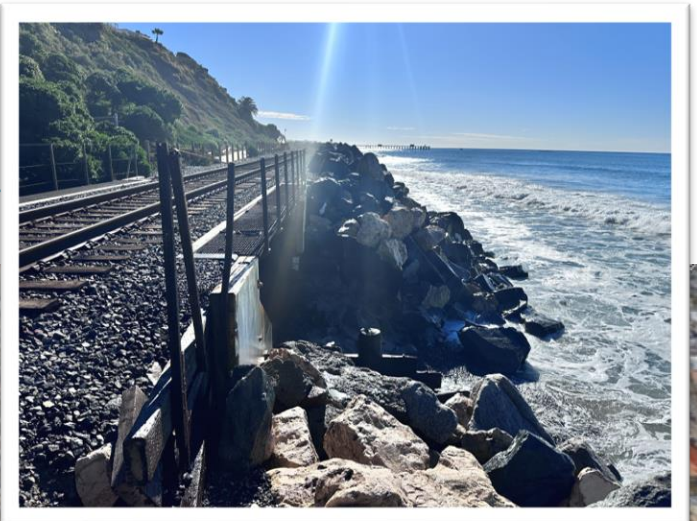
### Rock (repair existing riprap) and sand nourishment

- Place 2-ton to 6-ton rock gradation
- Minimize rock encroachment on the beach
- Sand nourishment to add approximately 50-ft-wide beach fronting rock
- Prioritize eroded and over-steepened areas
- Locations based on LiDAR survey and on-the-ground evaluation





# Reinforcement Areas 1 & 2: Location **UPDATED**



MP 203.80

MP 204.40

Area 1

Area 2

### ROCK REINFORCEMENT

- Approximately 7,000 tons of 2-ton to 6-ton rocks

### SAND NOURISHMENT

- Sand nourishment to create approximately 50-foot-wide beach between MP 203.80 and 204.40
- Approximately 240,000 cubic yards of sand needed



# Reinforcement Area 3: Potential Solution

## Existing Condition:

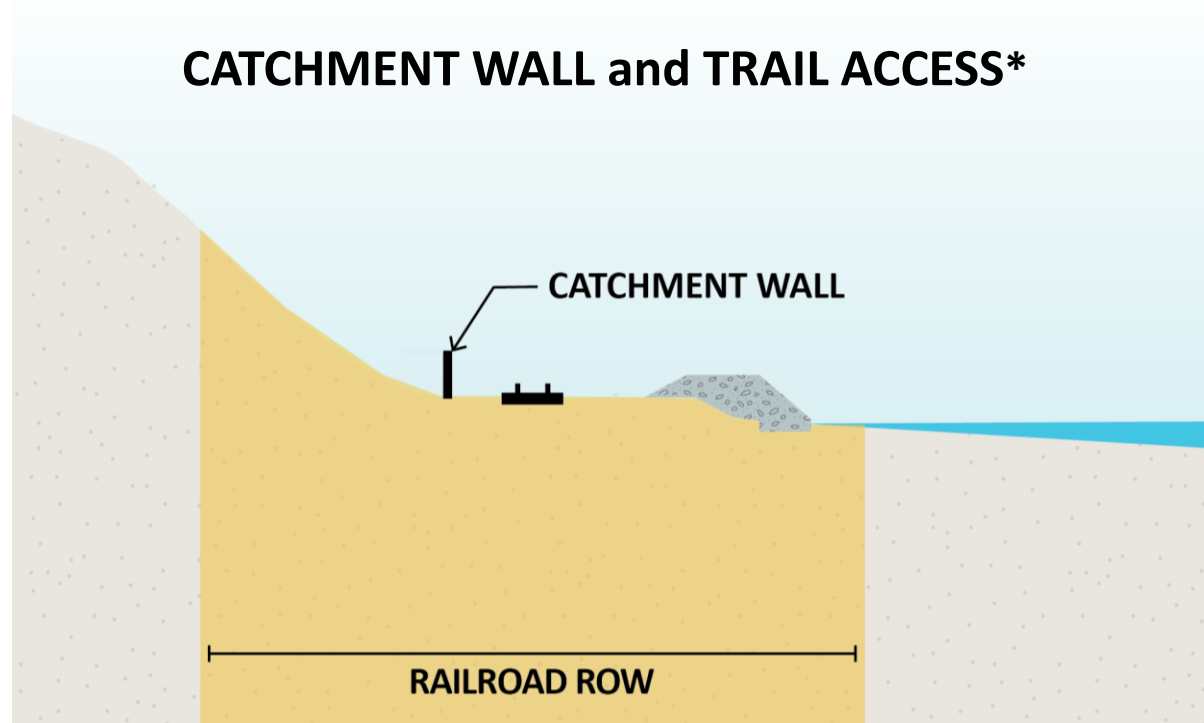


**MP 204.00 – 204.50**

Steep bluffs with a history of failure and high potential for additional movement that could impact the railroad infrastructure.

ROW - Right-of-Way

## Potential Solution - **UPDATED:**



\*Extend existing catchment wall. OCTA will work with the City of San Clemente to maintain and restore trail access.



# Reinforcement Area 4: Potential Solution

## Existing Condition:



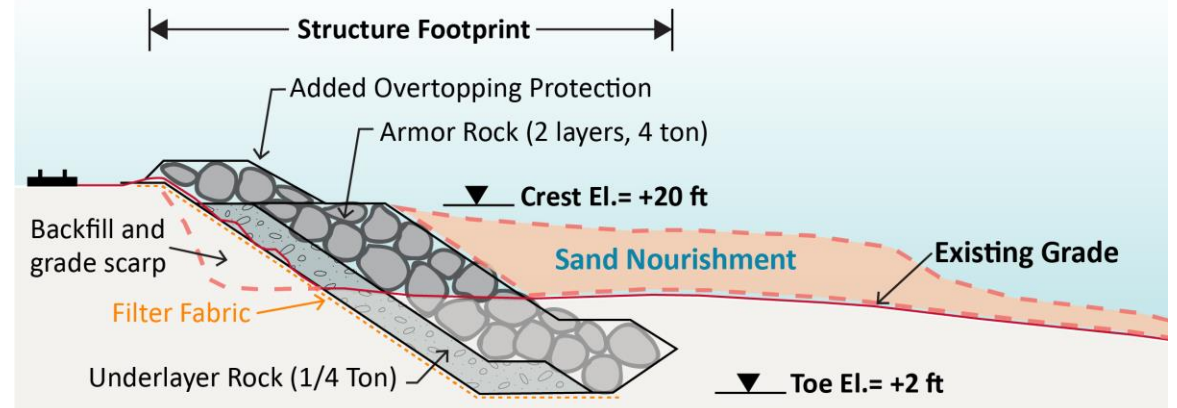
MP 206.00 - 206.67

Near San Clemente State Beach - erosion exposing areas of limited to no riprap protection.

## Potential Solution **UPDATED**:

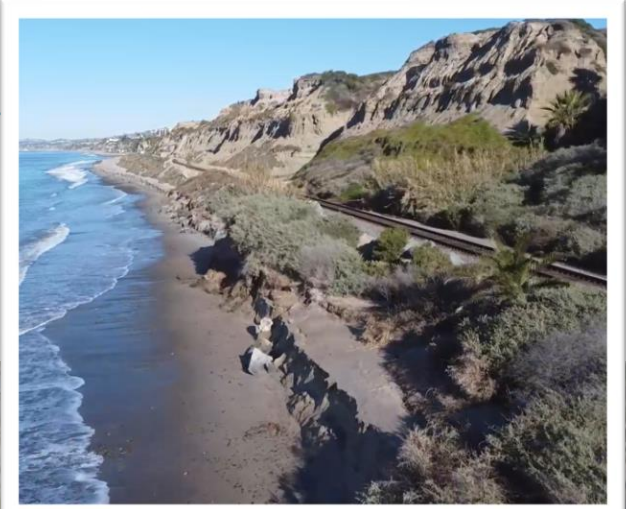
### Engineered rock revetment and sand nourishment

- Place geotextile filter fabric
- Place approximately 1/4-ton rock gradation for underlayer
- Place approximately 4-ton rock gradation
- Create approximately 80 to 100-foot-wide beach through sand nourishment fronting engineered rock revetment
- Locations based on LiDAR survey and on-the-ground evaluation





# Reinforcement Area 4: Location **UPDATED**



### ROCK REINFORCEMENT

- Approximately 60,000 to 77,000 tons of rock

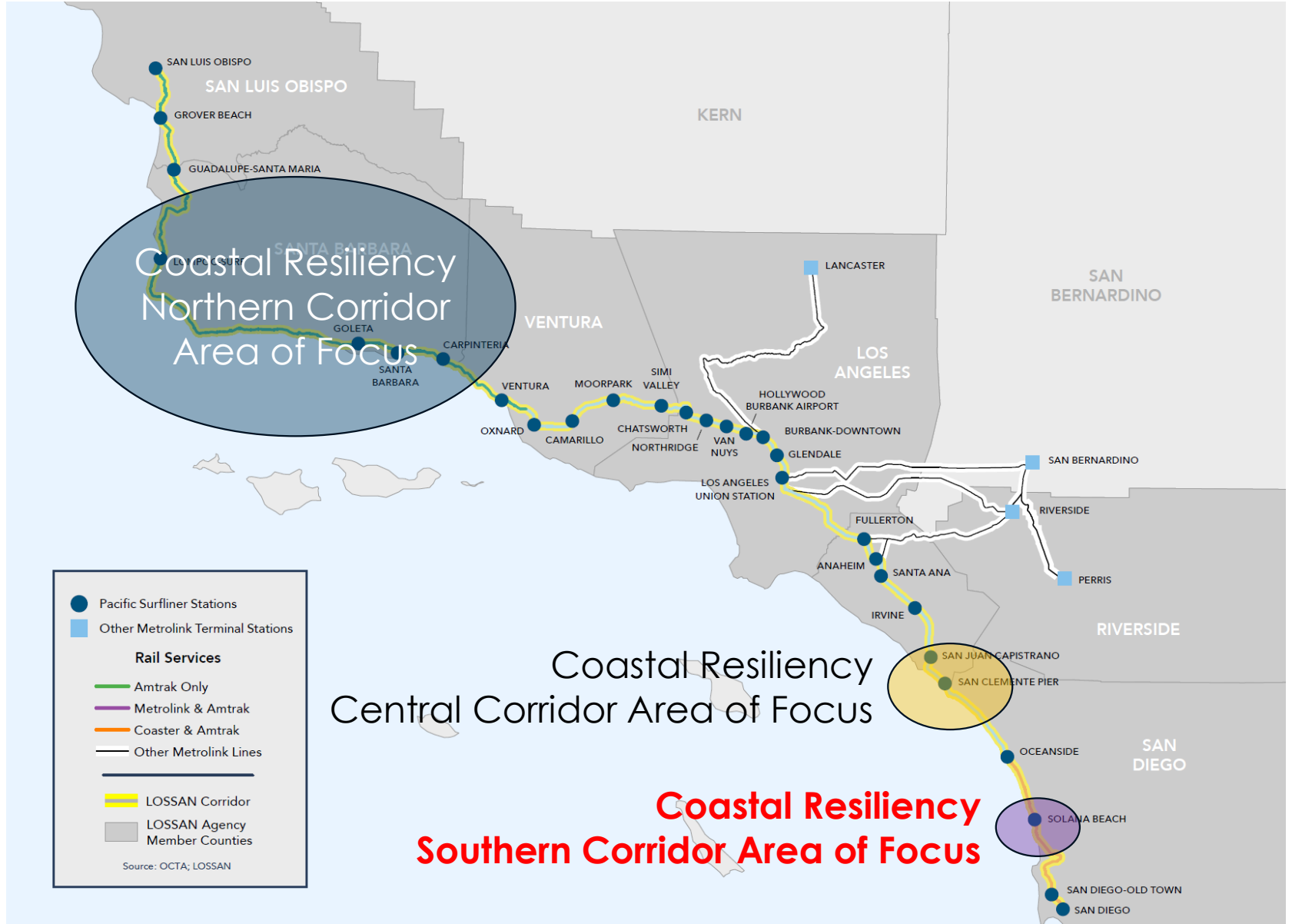
### SAND NOURISHMENT

- Sand nourishment to create approximately 80 to 100-foot-wide beach between MP 206.00 and 206.67
- Approximately 240,000 to 300,000 cubic yards of sand



# Coastal Resiliency Program

Southern Corridor Area of Focus



# Projects in Development

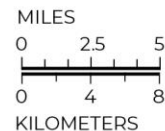
## 60-Mile San Diego Segment

### LOSSAN Rail Corridor Project Overview

May 2024

#### Project Phase

- Planning
- Design and Permitting
- Ready for Construction
- Construction

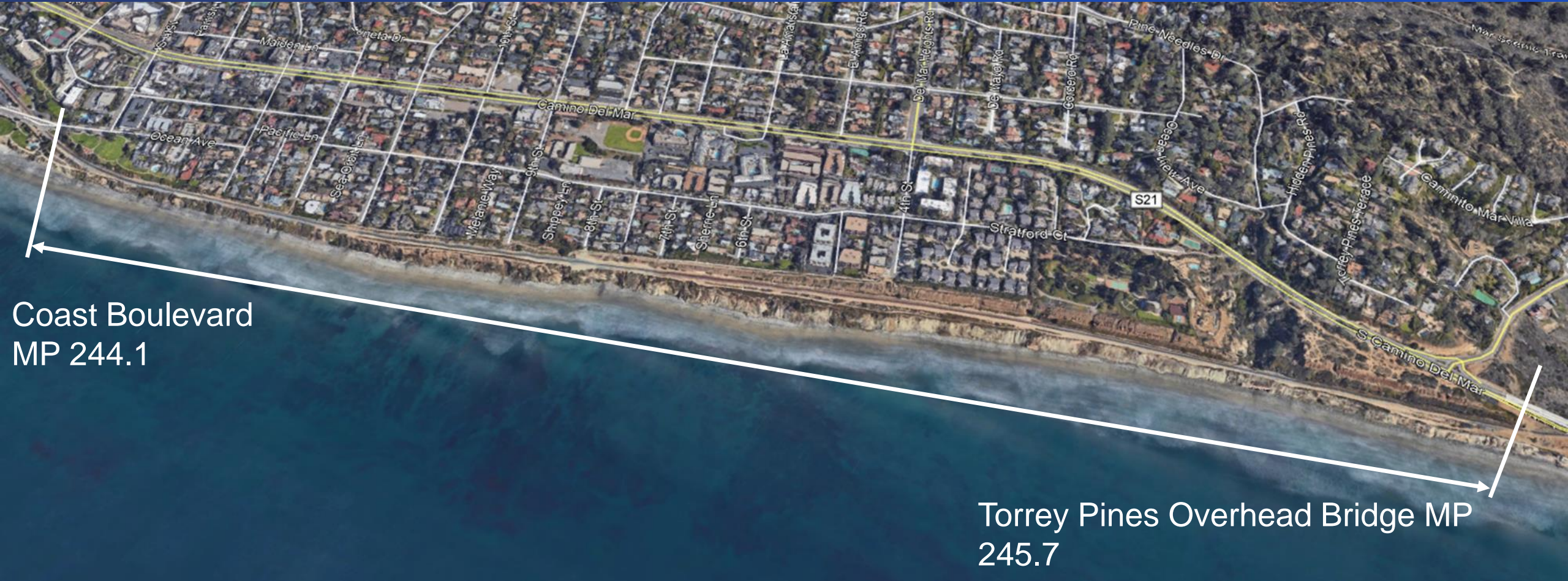




# Del Mar Bluff Stabilization Phase 5



# Del Mar Bluff Stabilization Project Area

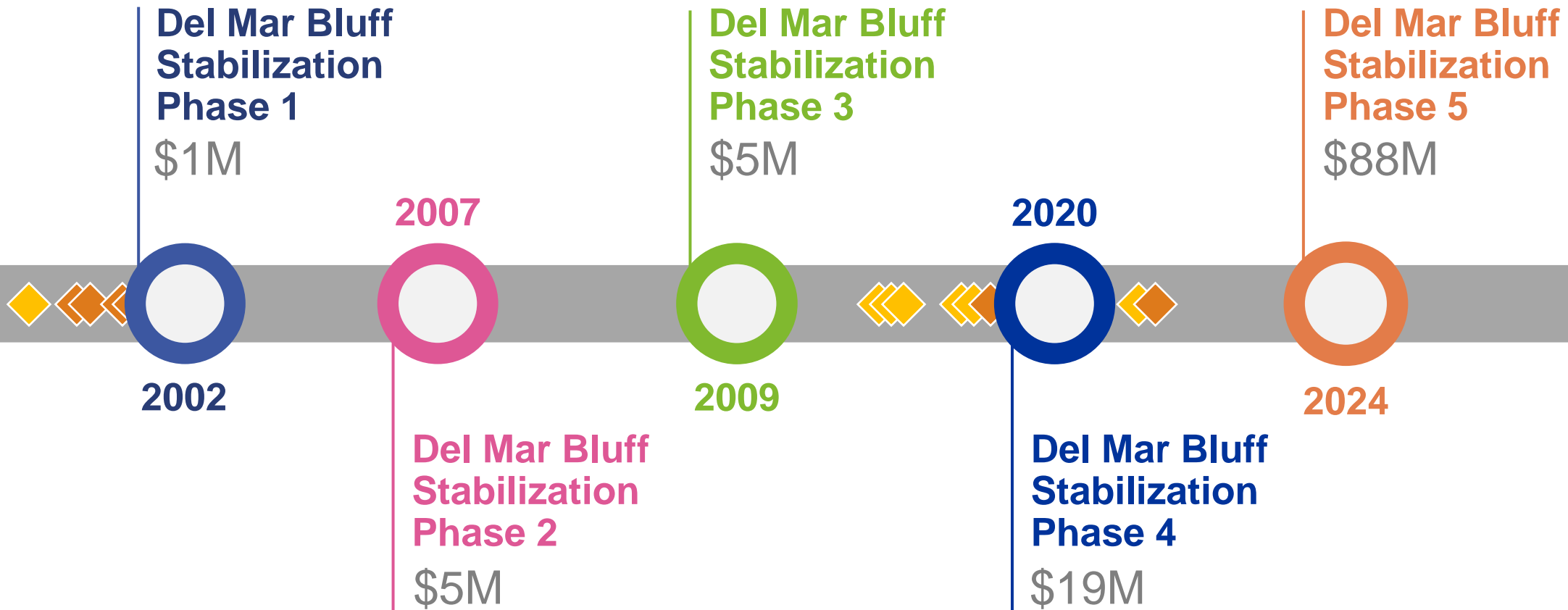


Coast Boulevard  
MP 244.1

Torrey Pines Overhead Bridge MP  
245.7



# Bluff Stabilization Projects Over Time



◆ Bluff landslide impacting rail service  
1996, 2018, 2019, 2021

◆ Emergency Repairs  
1998, 2001, 2019, 2021

# Del Mar Bluffs Stabilization Phase 5

## 1. Bluff Retreat

Measured and re-evaluated retreat between 1995 and 2020

## 2. Global Slope Stability

Static stability against sliding  
Seismic stability against sliding

## 3. Drainage

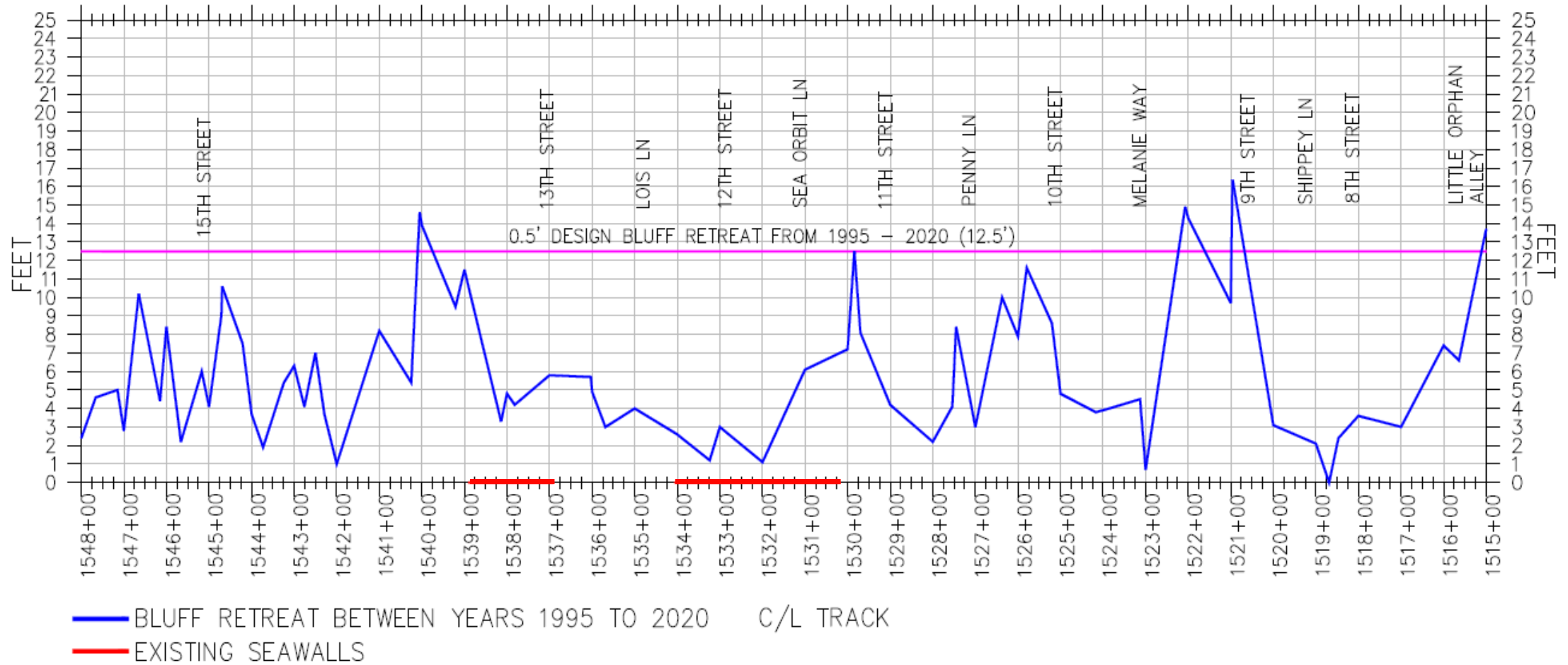
Reviewed capacity of all drainage systems





# Del Mar Bluffs

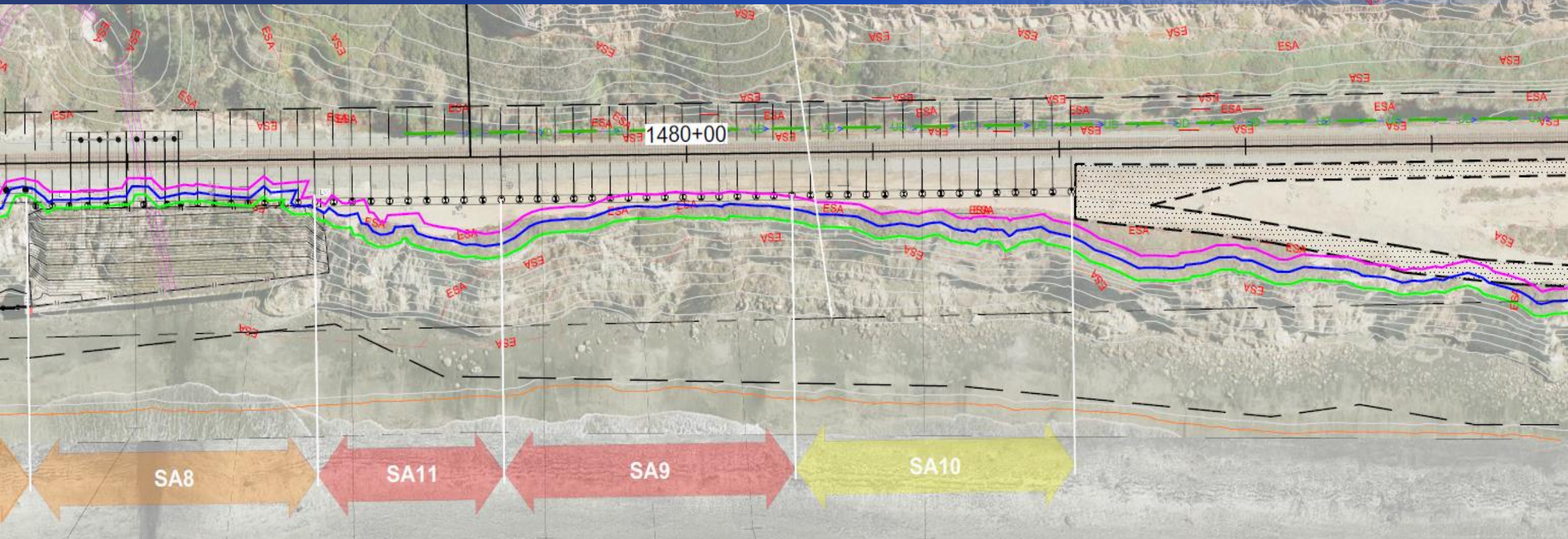
Bluff Retreat 1995 to 2020 Between 15<sup>th</sup> and 8<sup>th</sup> Street up to 6" per year





# Del Mar Bluffs

## Projected Bluff Retreat South of Anderson Canyon



STA  
1475+88

1480+00

SA8

SA11

SA9

SA10

### LEGEND

-  15 YR BLUFF RETREAT
-  30 YR BLUFF RETREAT
-  2018 TOP OF BLUFF

2010  
FS(static)=1.58  
FS(surcharge)=1.52  
FS(EQ, 0.15)=1.14  
FS(EQ, 0.28)=0.90  
@STA 1482+97

2010  
FS(static)=1.56  
FS(surcharge)=1.56  
FS(EQ, 0.15)=1.17  
FS(EQ, 0.28)=0.96  
@STA 1482+25

2020  
FS(surcharge)=1.38  
FS(EQ, 0.15)=1.07  
FS(EQ, 0.28)=0.92  
@STA 1481+81

2020  
FS(surcharge)=1.52  
FS(EQ, 0.15)=1.02  
FS(EQ, 0.28)=0.92  
@STA 1480+78

2010  
FS(static)=1.64  
FS(surcharge)=1.64  
FS(EQ, 0.15)=1.27  
FS(EQ, 0.28)=1.03  
@STA 1480+29

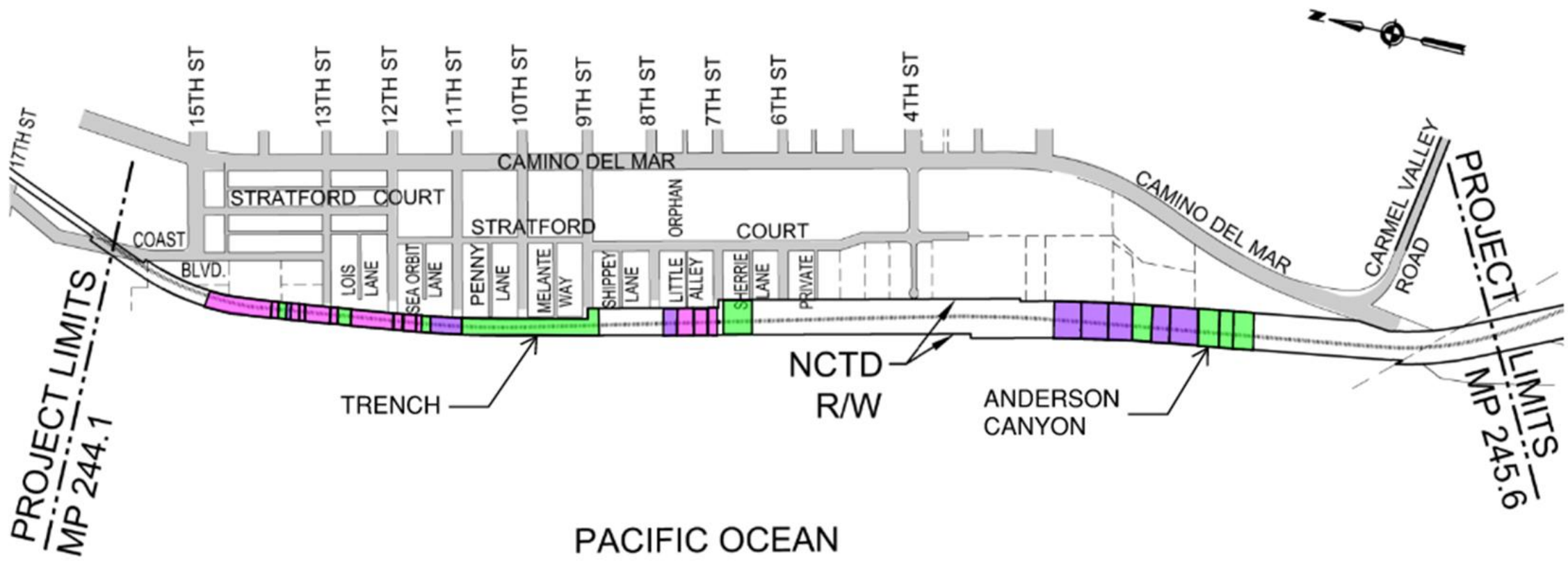
2020  
FS(surcharge)=1.46  
FS(EQ, 0.15)=1.18  
FS(EQ, 0.28)=0.98  
@STA 1479+82

2020  
FS(surcharge)=1.70  
FS(EQ, 0.15)=1.30  
FS(EQ, 0.28)=1.07  
@STA 1478+74



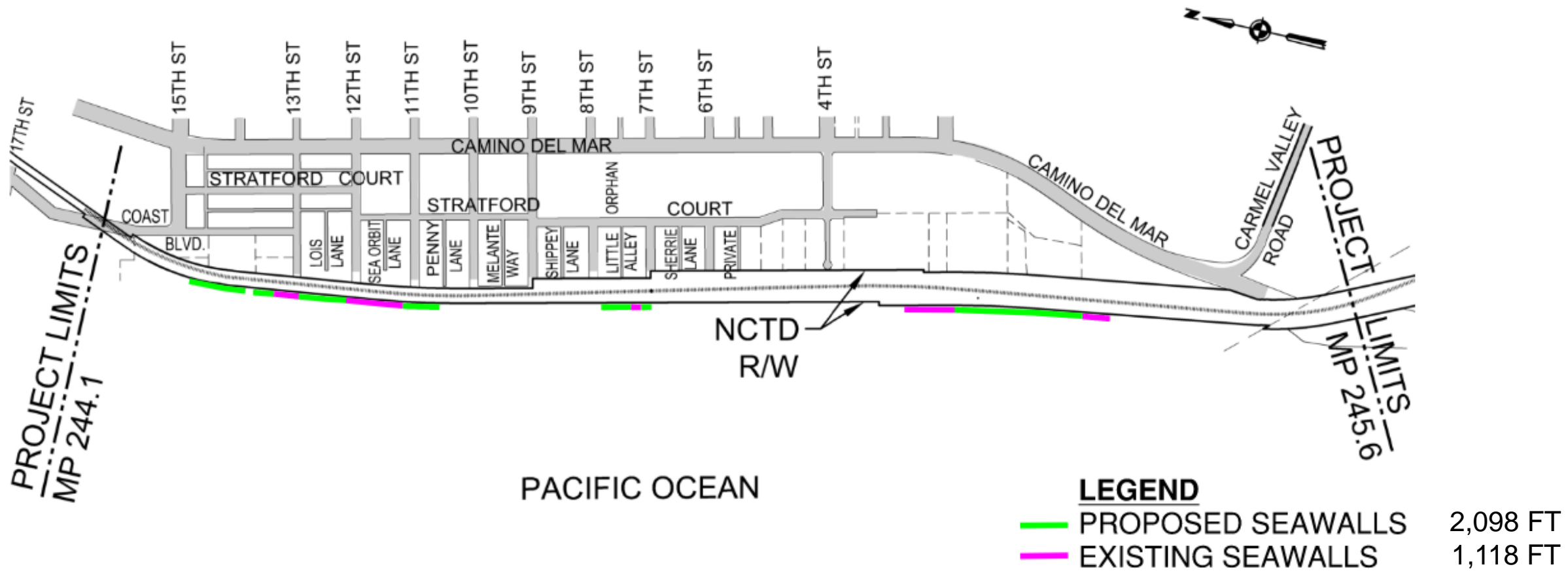
# Soldier Piles

## Existing and Planned



# Bluff Toe Protection

Existing and Planned





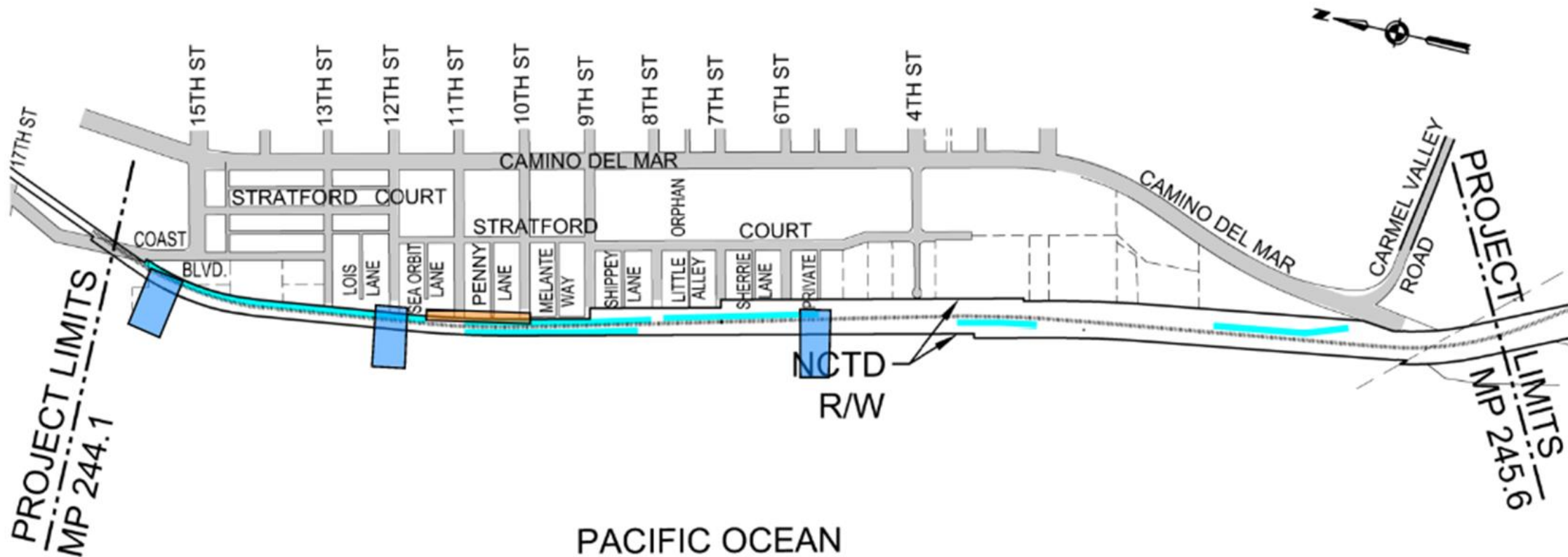
# Bluff Toe Protection piles below 11<sup>th</sup> Street





# Drainage Improvements

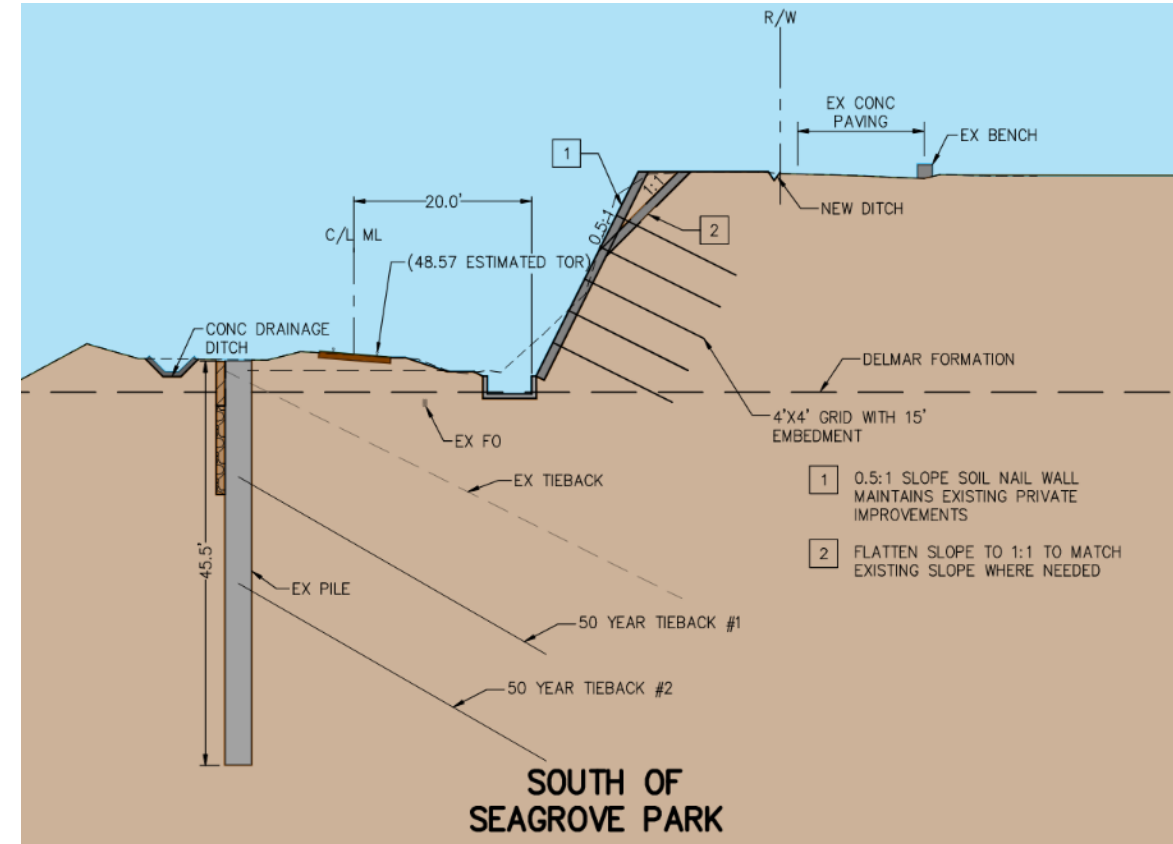
Planned



- LEGEND**
- TRACKSIDES DITCHES / UNDERDRAINS
  - CONCRETE CHANNELS
  - OUTLETS TO BEACH



# New Trackside Drain – 15<sup>th</sup> Street





# Aerial Photo Seagrove Park at 15<sup>th</sup> Street Del Mar

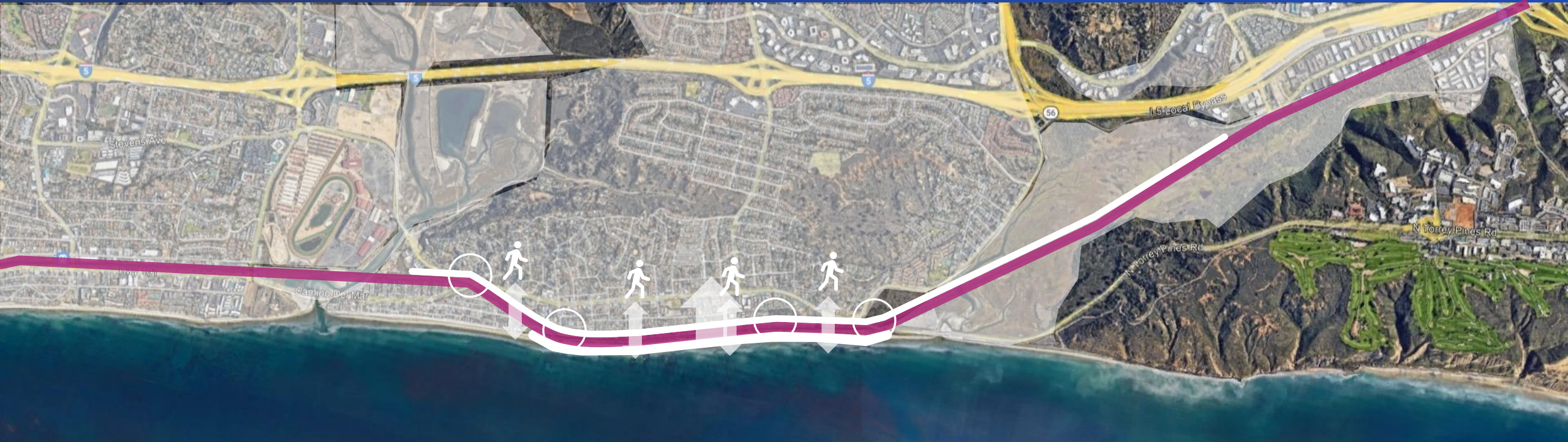




# San Diego LOSSAN Rail Realignment



# Project Goals



**1.** Relocate from Bluffs

**2.** Minimize Community Impacts

**3.** Improve Travel Times

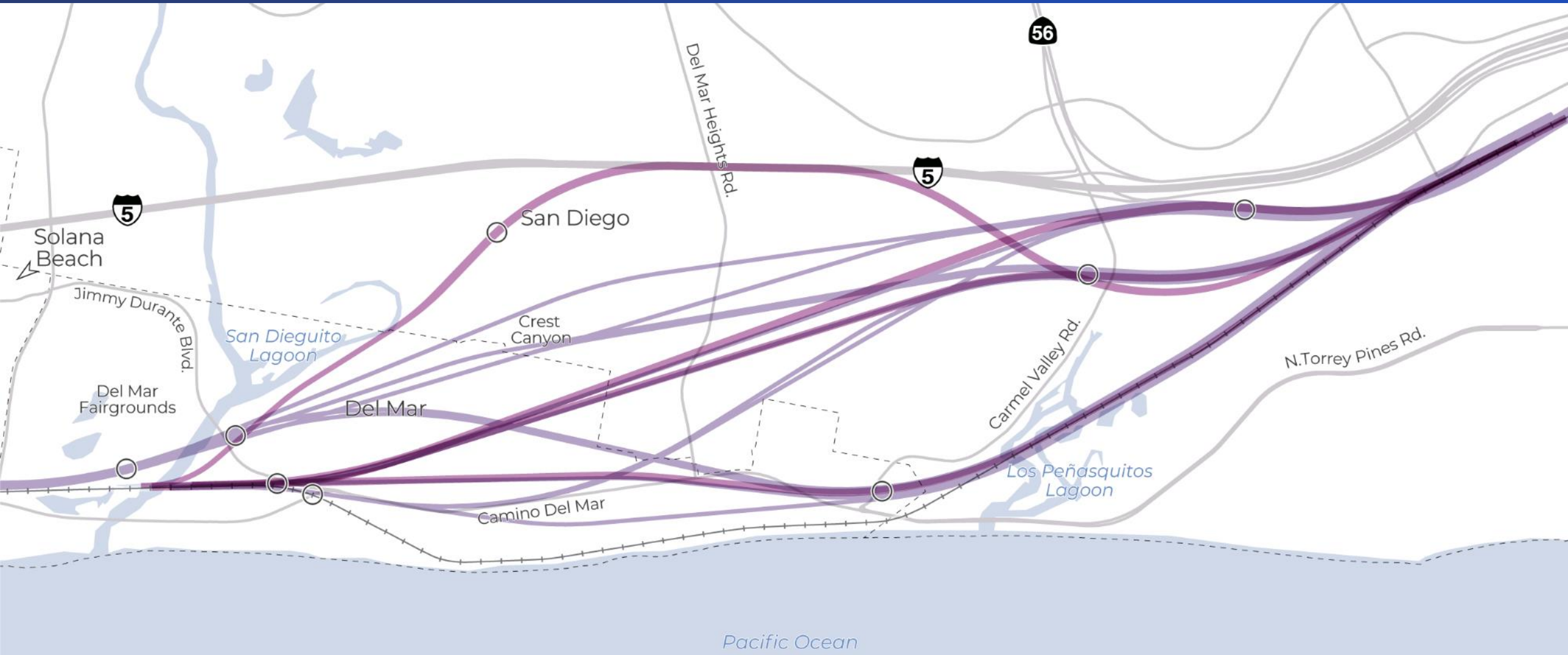
- Straighten Curves
- Double Track

**4.** Coastal Access & Safety

**5.** Preserve Wetlands

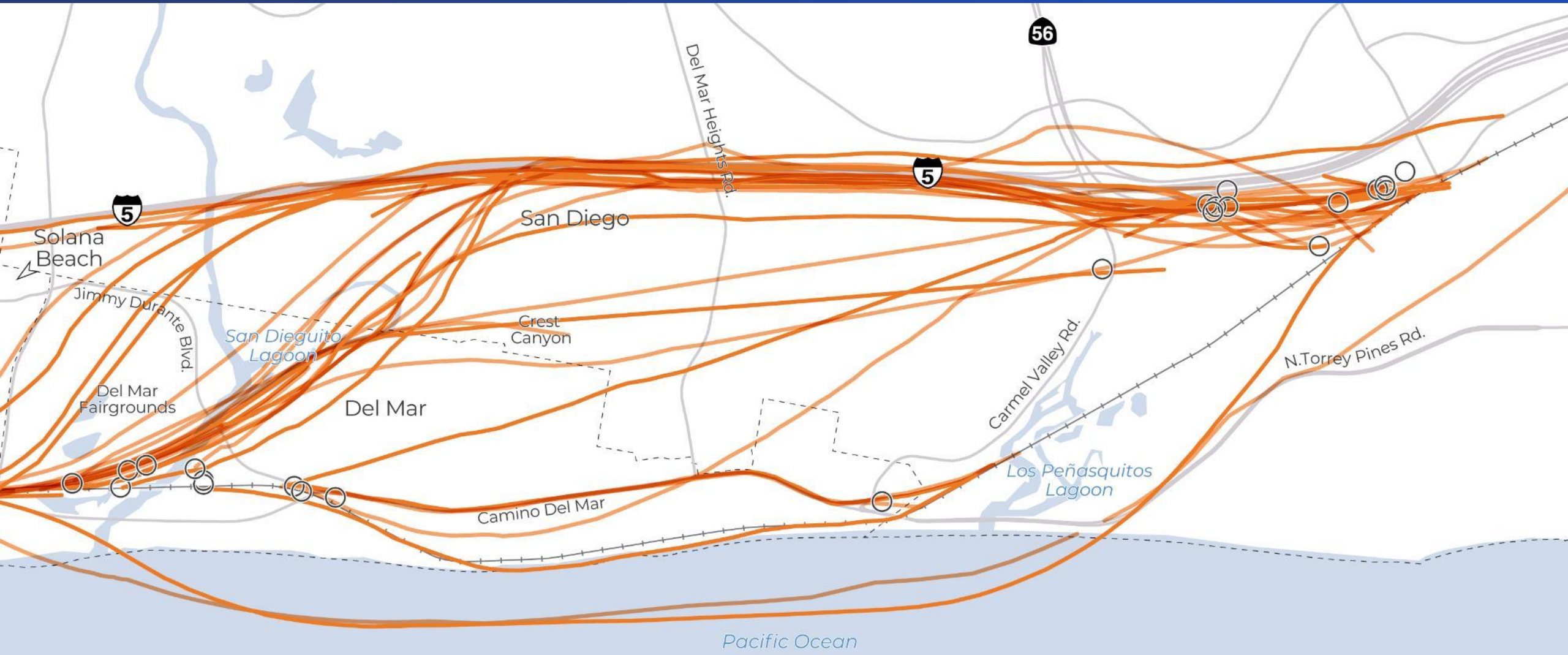


# Preliminary Alignments Studied



**DISCLAIMER:** No decision has been made on the selection of the proposed project or project alternatives. SANDAG is continuing to evaluate concepts that may be selected as project alternatives for analysis that will be studied during the formal environmental review process under the California Environmental Quality Act and the National Environmental Policy Act. All elements of the conceptual designs are preliminary and should not be construed as an announcement of the intent to acquire any private property. The images are intended to facilitate early public engagement on project concepts.

# Preliminary Alignments from Public Input

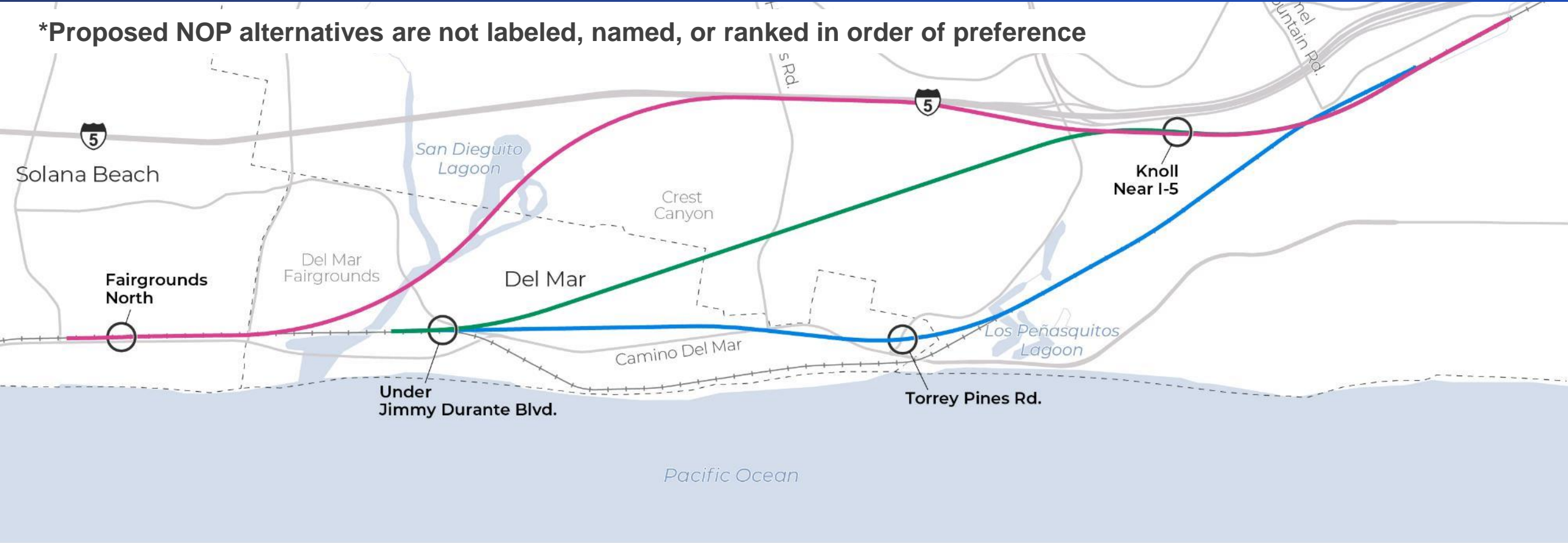


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# Proposed NOP Alternatives\*

\*Proposed NOP alternatives are not labeled, named, or ranked in order of preference

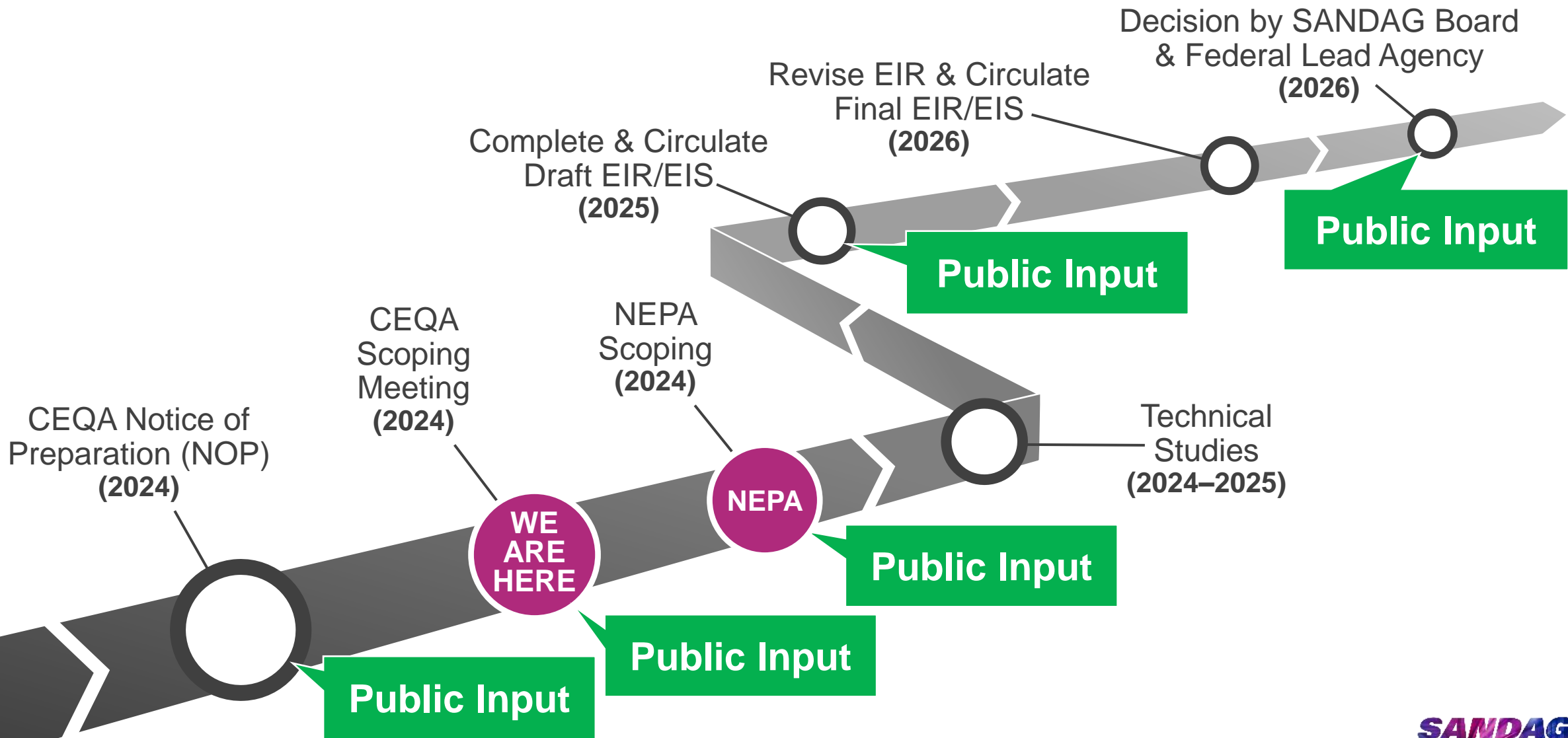


## San Diego LOSSAN Rail Realignment – Combined Proposed NOP Alternatives\*

- Alternative A
- Alternative B
- Alternative C
- Portal Location
- Existing LOSSAN Corridor Track Alignment
- Municipal Boundary

# Environmental Process

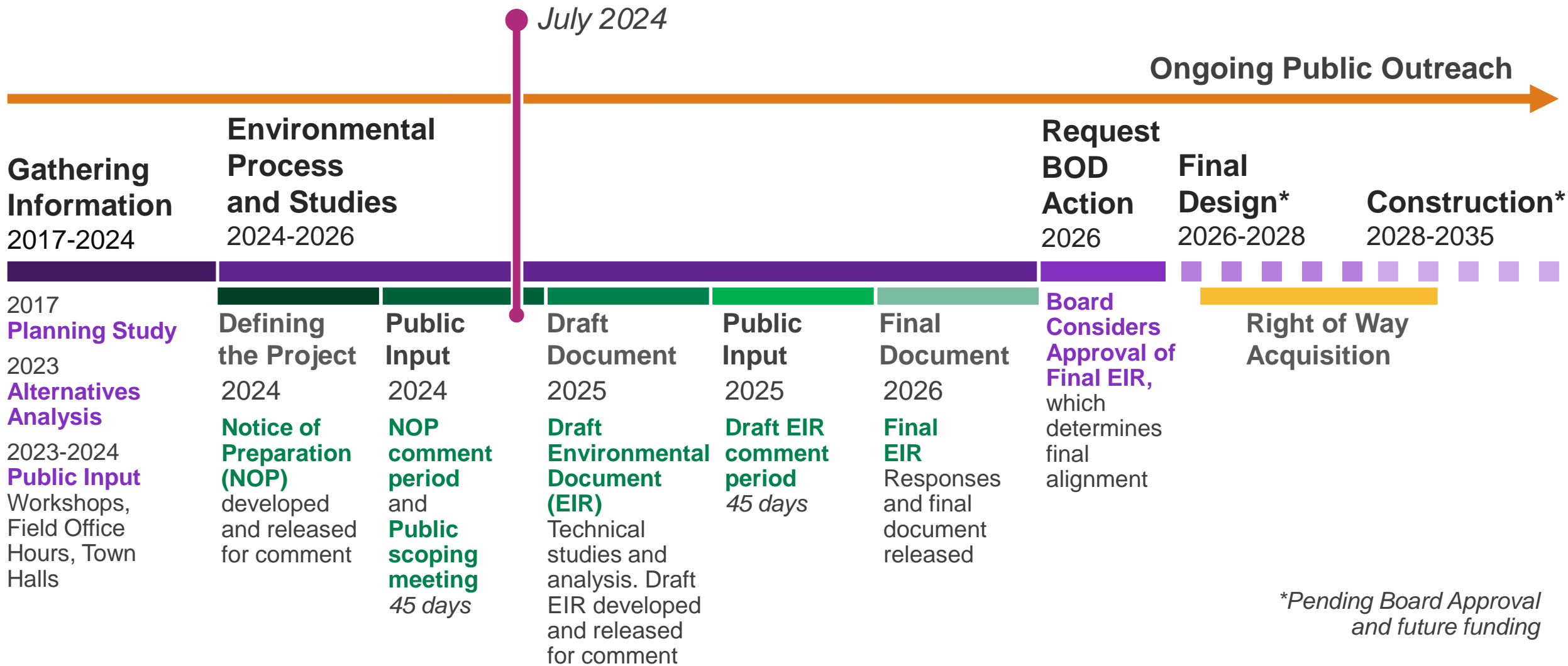
(CEQA/NEPA)





# Project Timeline

*Subject to Change*



*\*Pending Board Approval and future funding*

# Coastal Resiliency Program

Stakeholder Engagement

A corridor the length of LOSSAN requires extensive engagement to coordinate the plans and implement the solutions presented to address coastal resiliency

LOSSAN Agency Staff regularly engage with:

- Member Agency Governmental Relation Staff
- State and National Elected Officials
- Board Members
- Host Railroad and Right-of-Way Owner Technical Staff



# Coastal Resiliency Program

Statewide and  
Regional  
Engagement

Coastal Resiliency strategies and solutions have been discussed through a variety of working groups and activities:

- CA Senate Subcommittee on LOSSAN Corridor Resiliency Hearings
- LOSSAN Regional Rail Working Group
- LOSSAN Corridor Executive Leadership Working Group
- LOSSAN Regional Rail Technical Working Group
- San Diego LOSSAN Rail Realignment Project Development Team
- OCTA Coastal Rail Resiliency Study Project Development Team
- Bi-Weekly Coordination Meetings with Union Pacific
- Hi-Rail Inspections with Union Pacific

QUESTIONS?