



Orange County Transportation Authority

Regional Transportation Planning Committee Agenda

Monday, July 6, 2026 at 10:30 a.m.

Board Room, 550 South Main Street, Orange, California

Committee Members

Stephanie Klopfenstein, Chair
Mark Tetteimer, Vice Chair
Katrina Foley
William Go
Patrick Harper
Lauren Kleiman
Kathy Tavoularis

Call to Order

Pledge of Allegiance

Director Kleiman

Closed Session

There are no Closed Session items scheduled.

Special Calendar

There are no Special Calendar matters.

Consent Calendar (Items 1 through 4)

All items on the Consent Calendar are to be approved in one motion unless a Committee Member or a member of the public requests separate action or discussion on a specific item.

1. Approval of Minutes

Clerk of the Board

Recommendation(s)

Approve the minutes of the June 1, 2026 Regional Transportation Planning Committee Meeting.

Attachments:

[Minutes](#)

REGIONAL TRANSPORTATION PLANNING COMMITTEE MEETING

AGENDA

2. **Amendment to Agreement for Additional Design Services for State Route 55 Improvement Project Between Interstate 5 and State Route 91**

Jeannie Lee/James G. Beil

Overview

On February 14, 2022, the Orange County Transportation Authority Board of Directors authorized an agreement with HDR Engineering, Inc., for the preparation of plans, specifications, and estimates for the State Route 55 Improvement Project between Interstate 5 and State Route 91. An amendment to the existing agreement is required for additional design services.

Recommendations

- A. Authorize the Chief Executive Officer to negotiate and execute Amendment No. 3 to Agreement No. C-1-3643 between the Orange County Transportation Authority and HDR Engineering, Inc., in the amount of \$1,071,679, for additional design services for the State Route 55 Improvement Project between Interstate 5 and State Route 91. This will increase the maximum cumulative obligation of the agreement to a total contract value of \$11,420,281.
- B. Authorize the use of up to \$1,626,281 in Measure M2 funds, for additional design services for the State Route 55 Improvement Project between Interstate 5 and State Route 91.
- C. Authorize staff to process all necessary amendments to the Federal Transportation Improvement Program and execute or amend all necessary agreements to facilitate the above actions.

Attachments:

[Staff Report](#)

[Attachment A](#)

[Attachment B](#)

3. **Measure M2 Eligibility Recommendations for Fiscal Year 2024-25 Expenditure Reports and Maintenance of Effort Benchmark Adjustments**

Stephanie Mooney/Rose Casey

Overview

Measure M2 Ordinance No. 3 requires local jurisdictions to annually satisfy eligibility requirements to receive Measure M2 net revenues. As part of this requirement, local jurisdictions submitted fiscal year 2024-25 expenditure reports to the Orange County Transportation Authority. Separately, maintenance of effort benchmark revisions are required for five jurisdictions, consistent with the Measure M2 Ordinance.

Recommendation(s)

- A. Approve 33 of Orange County's 35 local jurisdictions (excluding the cities of Buena Park and Huntington Beach) as eligible to continue receiving Measure M2 net

REGIONAL TRANSPORTATION PLANNING COMMITTEE MEETING

AGENDA

revenues.

- B. Approve adjustments to the Measure M2 maintenance of effort benchmarks for the cities of La Habra, Laguna Beach, Laguna Niguel, Placentia, and Yorba Linda.

Attachments:

[Staff Report](#)

[Attachment A](#)

[Attachment B](#)

[Attachment C](#)

4. **Competitive Grant Programs Update**

Louis Zhao/Rose Casey

Overview

The Orange County Transportation Authority, consistent with Board of Directors-approved programming guidelines, utilizes various federal, state, and local transportation funding programs beyond those provided through Measure M2 to maximize transportation investments throughout Orange County. These funds are pursued and programmed to projects led by local jurisdictions, nonprofit agencies, and the Orange County Transportation Authority that advance Board of Directors-approved transportation priorities. Staff has prepared an overview and status update of local jurisdiction projects that have received funds, recent grant pursuits, and awards for Orange County Transportation Authority projects.

Recommendation(s)

Receive and file as an information item.

Attachments:

[Staff Report](#)

[Attachment A](#)

[Attachment B](#)

[Attachment C](#)

[Attachment D](#)

Regular Calendar

5. **Coastal Rail Resiliency Study Update**

Rebekah Soto/Rose Casey

Overview

The Orange County Transportation Authority initiated the Coastal Rail Resiliency Study in fall 2023, focusing on both short- and mid-term solutions to protect the rail line and preserve rail operations. Through this study, staff has developed Alternative Concepts that would protect the rail line in place for up to 30 years. An update on the refined Alternative Concepts and Draft Coastal Rail Resiliency Feasibility Report is provided herein.

REGIONAL TRANSPORTATION PLANNING COMMITTEE MEETING

AGENDA

Recommendation(s)

Receive and file the Draft Coastal Rail Resiliency Feasibility Report and direct staff to continue stakeholder coordination and public engagement prior to finalizing the report.

Attachments:

[Staff Report](#)

[Attachment A](#)

[Attachment B](#)

[Attachment C](#)

[Presentation](#)

6. Draft 2026 Long-Range Transportation Plan

Kristin Tso/Rose Casey

Overview

The Long-Range Transportation Plan is a multi-year planning document, developed every four years to define the long-term vision for Orange County's transportation system and serve as input into the Southern California Association of Governments' Regional Transportation Plan. The Draft 2026 Long-Range Transportation Plan reflects the Orange County Transportation Authority's existing commitments, plans, and policies while also addressing forecasted transportation needs through 2050. Staff has prepared the draft Directions 2050 LRTP Executive Summary, an overview of the full study, and is seeking direction to continue development of the final plan.

Recommendation(s)

Direct staff to incorporate input received through the public review period as appropriate and return with a draft Final 2026 Long-Range Transportation Plan for approval.

Attachments:

[Staff Report](#)

[Attachment A](#)

[Presentation](#)

[Attachment B](#)

Discussion Items

7. **Public Comments**
8. **Chief Executive Officer's Report**
9. **Committee Members' Reports**

REGIONAL TRANSPORTATION PLANNING COMMITTEE MEETING

AGENDA

10. **Adjournment**

The next regularly scheduled meeting of this Committee will be held:

10:30 a.m. on Monday, Monday, August 3, 2026

OCTA Headquarters
550 South Main Street
Orange, California

Accessibility

Any person with a disability requiring modification or accommodation to participate in this meeting should contact the Clerk of the Board's office at (714) 560-5676, no less than two business days prior to the meeting.

Agenda Descriptions and Public Availability of Agenda Materials

Agenda descriptions are intended to provide a general summary of items of business to be transacted or discussed. Posting the recommended actions does not indicate what action will be taken. The Board may take any action that it deems to be appropriate on the agenda item and is not limited in any way by the notice of the recommended action.

All documents relative to the items referenced in this agenda are available for public inspection at www.octa.net or at OCTA Headquarters, 600 S. Main Street, Orange, CA.

Meeting Access and Public Comments on Agenda Items

Members of the public can access live streaming of Board and Committee meetings at <https://octa.legistar.com/Calendar.aspx>.

Public comments will be limited to three minutes (unless otherwise determined by the Chair), and can be provided the following ways:

In-Person Comment

Members of the public may attend in person and address the Board regarding any item. Complete a speaker's card and submit it to the Clerk of the Board or notify the Clerk of the Board of the item number on which you wish to speak. The Clerk will recognize speakers during appropriate comment periods. Language translation can be provided upon request, if available.

Live Virtual Comment

Members of the public may provide live comments during the meeting by Zoom or conference call.

To join via Zoom:

<https://us02web.zoom.us/j/83074408202>

When the Clerk calls for public comments on the item/s in which you wish to speak, virtually "raise" your hand on Zoom. After the Clerk confirms the commenter's Zoom ID and unmutes them, you will be prompted to unmute yourself and may begin speaking.

To join via Conference call:

REGIONAL TRANSPORTATION PLANNING COMMITTEE MEETING AGENDA

669-444-9171

Webinar ID: 830 7440 8202

Press # to continue without Participant ID

When the Clerk calls for public comments on the item/s in which you wish to speak, dial *9 to “raise” your hand. After the Clerk confirms the commenter’s last four digits of the phone number, and unmutes them, press *6 to speak.

Written Comment

Written public comments may emailed to ClerkOffice@octa.net, and must be received by 5:00 p.m. the day prior to the meeting—noting the agenda item they are intended for. Timely public comments will be part of the public record and distributed to the Board. Public comments will be made available to the public upon request.



Committee Members Present

Stephanie Klopfenstein, Chair
Mark Tettemer, Vice Chair
William Go
Patrick Harper
Lauren Kleiman
Kathy Tavoularis

Staff Present

Darrell E. Johnson, Chief Executive Officer
Jennifer L. Bergener, Deputy Chief Executive Officer
Elia Verduzco, Employee Rotation Program
Andrea West, Clerk of the Board
Erin Galang, Clerk of the Board Specialist, Associate
James Donich, General Counsel
OCTA Staff

Committee Members Absent

Katrina Foley

Call to Order

The June 1, 2026, Regional Transportation Planning (RTP) Committee meeting was called to order by Committee Chair Klopfenstein at 10:30 a.m.

Consent Calendar (Items 1 through 8)

A motion was made by Director Kleiman, seconded by Director Tettemer, and declared passed by those present to approve the Consent Calendar (Items 1 through 8).

1. Approval of Minutes

Approve the minutes of May 4, 2026 Regional Transportation Planning Committee meeting.

2. Amendment to Agreement for Additional Design Services for State Route 91 Improvement Project Between La Palma Avenue and State Route 55

Authorize the Chief Executive Officer to negotiate and execute Amendment No. 6 to Agreement No. C-9-1557 between the Orange County Transportation Authority and WKE, Inc., in the amount of \$895,987, for additional design services for the State Route 91 Improvement Project between La Palma Avenue and State Route 55. This will increase the maximum cumulative obligation of the agreement to a total contract value of \$18,244,877.

3. Amendment to Cooperative Agreement with the California Department of Transportation for the State Route 91 Improvement Project Between State Route 55 and Lakeview Avenue

Authorize the Chief Executive Officer to negotiate and execute Amendment No. 2 to Cooperative Agreement No. C-3-2655 between the Orange County Transportation Authority and the California Department of Transportation, in the amount of \$8 million, for additional construction capital costs for the State Route 91 Improvement Project between State Route 55 and Lakeview Avenue. This will increase the maximum cumulative obligation of the cooperative agreement to a total contract value of \$109,988,000.



**4. Comprehensive Transportation Funding Programs Semi-Annual Review –
March 2026**

- A. Approve the requested adjustments to Comprehensive Transportation Funding Programs projects, Local Fair Share funds, and Senior Mobility Program funds.
- B. Authorize the Chief Executive Officer, or designee, to negotiate and execute an amendment to Cooperative Agreement No. C-3-2753 between the Orange County Transportation Authority and the City of Dana Point for the Dana Point Trolley Continuity Program in order to establish a single aggregate reimbursement match rate for the multi-year Project V grant.

5. 2026 State Transportation Improvement Program Update

Receive and file as an information item.

6. Capital Programming Update

- A. Authorize the use of \$12.224 million in Congestion Mitigation and Air Quality Improvement Program project savings from 40-foot Compressed-Natural-Gas Replacement Buses and local complete streets projects to the Alternative Fuel 60-Foot Replacement Buses Project.
- B. Authorize the reallocation of \$6.072 million in SB 125 (Chapter 54, Statutes of 2023) Transit Program funds from OC Bus Operations Startup - Connections to OC Streetcar Project for OC Streetcar operations.
- C. Authorize the reallocation of \$6.072 million in Congestion Mitigation and Air Quality Improvement Program savings from OC Streetcar operations to the Interstate 5 Improvement from County Line to Avenida Pico Project.
- D. Authorize the use of an additional \$71.705 million in Measure M2, Project S funds from OC Streetcar capital projects.
- E. Authorize staff to process all necessary amendments to the Federal Transportation Improvement Program and execute all necessary agreements.

7. Measure M2 Environmental Mitigation Program Update

Receive and file as an information item.

8. Regional Planning Update

Receive and file as an information item.



Regular Calendar

9. Consultant Selection for the Move OC Active Transportation Plan

Peter Sotherland, Section Manager of Planning & Analysis, presented this item.

A motion was made by Director Tettemer, seconded by Director Kleiman, and declared passed by those present to:

- A. Approve the selection of Alta Planning + Design, Inc. as the firm to deliver the Move OC Active Transportation Plan.
- B. Authorize the Chief Executive Officer to negotiate and execute Agreement No. C250113 between the Orange County Transportation Authority and Alta Planning + Design, Inc., in the amount of \$996,576, for a three-year term to deliver the Move OC Active Transportation Plan.

10. Agreement for Public Outreach Consultant Services for Rail Capital Projects

Chris Boucly, Senior Department Manager of External Affairs, presented this item.

A motion was made by Director Tettemer, seconded by Director Harper, and declared passed by those present to:

- A. Approve the selection of Arellano Associates, LLC, as the firm to provide public outreach consultant services for rail capital projects.
- B. Authorize the Chief Executive Officer to negotiate and execute Agreement No. C250187 between the Orange County Transportation Authority and Arellano Associates, LLC, in the amount of \$800,610, for a four-year initial term with an option term of up to 24 months to provide public outreach consultant services for rail capital projects.

11. Agreement for Public Outreach Consultant Services for Rail Capital Projects

Charvalen Alacar, Section Manager of Local Programs, presented this item.

A motion was made by Director Tavoularis, seconded by Director Go, and declared passed by those present to:

- A. Approve the award of \$55.67 million in 2026 Regional Capacity Program (Project O) funds to eight local jurisdiction projects.
- B. Approve the award of \$12.29 million in 2026 Regional Traffic Signal Synchronization Program (Project P) funds to six local jurisdiction projects.



Discussion Items

12. Update on the Interstate 5 El Toro Road Interchange Improvement Project

Niall Barrett, Program Manager of Capital Project Delivery, and Angela Hui, Principal Community Relations Specialist of Public Outreach, provided a presentation.

No action was taken on this item.

13. Fiscal Year 2026-27 Budget Workshop Follow-up

Victor Velasquez, Department Manager of Financial Planning & Analysis, referenced the Budget Workshop handout and offered to answer any questions.

No action was taken on this item.

14. Public Comments

There were no public comments received.

15. Chief Executive Officer's Report

Darrell E. Johnson, Chief Executive Officer, reported on the Orange County Chapter of the American Council of Engineering Companies Awards Program and recognized award recipients, Josue Vaglienty and Chair Federico.

16. Committee Members' Reports

There were no Committee Members' reports.

17. Adjournment

The meeting adjourned at 11:16 a.m.

The next regularly scheduled meeting of this Committee will be held:

10:30 a.m. on Monday, July 6, 2026

OCTA Headquarters
550 South Main Street
Orange, California

ATTEST

Andrea West
Clerk of the Board



July 6, 2026

To: Regional Transportation Planning Committee

From: Darrell E. Johnson, Chief Executive Officer

A handwritten signature in blue ink, appearing to read "Darrell E. Johnson", is written over the "From:" line of the header.

Subject: Amendment to Agreement for Additional Design Services for State Route 55 Improvement Project Between Interstate 5 and State Route 91

Overview

On February 14, 2022, the Orange County Transportation Authority Board of Directors authorized an agreement with HDR Engineering, Inc., for the preparation of plans, specifications, and estimates for the State Route 55 Improvement Project between Interstate 5 and State Route 91. An amendment to the existing agreement is required for additional design services.

Recommendations

- A. Authorize the Chief Executive Officer to negotiate and execute Amendment No. 3 to Agreement No. C-1-3643 between the Orange County Transportation Authority and HDR Engineering, Inc., in the amount of \$1,071,679, for additional design services for the State Route 55 Improvement Project between Interstate 5 and State Route 91. This will increase the maximum cumulative obligation of the agreement to a total contract value of \$11,420,281.
- B. Authorize the use of up to \$1,626,281 in Measure M2 funds, for additional design services for the State Route 55 Improvement Project between Interstate 5 and State Route 91.
- C. Authorize staff to process all necessary amendments to the Federal Transportation Improvement Program and execute or amend all necessary agreements to facilitate the above actions.

Discussion

The Orange County Transportation Authority (OCTA), in partnership with the California Department of Transportation (Caltrans), is implementing the State Route 55 (SR-55) Improvement Project between Interstate 5 (I-5) and State Route 91 (Project). The Project is Project F in the Measure M2 (M2)

Amendment to Agreement for Additional Design Services for State Route 55 Improvement Project Between Interstate 5 and State Route 91 *Page 2*

freeway program and is being advanced through the updated Next 10 Delivery Plan adopted by the OCTA Board of Directors (Board) in December 2025.

The Project will construct improvements in each direction between I-5 and State Route 22 and provide operational improvements to interchange ramps at Fourth Street/Irvine Boulevard, Katella Avenue, and Lincoln Avenue. An additional lane will be added to the northbound and southbound (SB) off-ramps at Fourth Street/Irvine Boulevard and to the SB SR-55 Katella Avenue off- and on-ramps. The existing SB SR-55 Lincoln Avenue off-ramp will be relocated 1,300 feet to the south, adjacent to the existing SB SR-55 Lincoln Avenue hook on-ramp from Tustin Street.

Additionally, the Project provides standard curb ramps and sidewalks along the adjacent impacted arterials within the project improvement areas that improve active transportation options and provide continuity for pedestrians. The plans, specifications, and estimates for the Project are currently being prepared by HDR Engineering, Inc. (HDR).

Additional project scope has been identified, which requires further effort to complete the design on schedule. An amendment to the project design agreement is recommended for the following additional services:

Roadway Design

- Caltrans requested modifications to the access control along Tustin Street to place the existing Southern California Edison power pole outside of Caltrans' jurisdiction.
- Due to the changes to the Caltrans multi-asset project within the project limits which includes new lighting systems, HDR is required to update the electrical plans to reflect the existing field conditions.
- To meet drainage quality requirements throughout the project area, Caltrans requested additional drainage features and planting.
- Caltrans requires all the traffic equipment within their proposed right-of-way (ROW) to be owned and operated by Caltrans. The traffic signal at the intersection of the Tustin Street off-ramp is currently owned by the City of Orange. Design modifications are needed for Caltrans' acquisition of the ramp intersection.
- Caltrans updates their standard plans and standard specifications twice every year, and roadway and structures designs need to conform to the new Caltrans standards. Design plans and specifications for the Project

Amendment to Agreement for Additional Design Services for State Route 55 Improvement Project Between Interstate 5 and State Route 91 *Page 3*

need to be updated and reviewed by various departments at Caltrans to obtain approval.

Reports

- A supplemental project report needs to be developed to document design changes. Since the original project report was approved during the environmental phase, there have been additional ROW needs identified at the Tustin Street off-ramp intersection and those need to be addressed in the supplemental project report.

ROW Engineering Services

- Additional ROW acquisition efforts are needed for the relocation of the SB Lincoln Avenue off-ramp, including the development of new ROW maps and other documentation of ROW needs.

Staff is requesting the use of an additional \$1,626,281 in M2 funds. The difference between the additional funding request and the amount of the HDR amendment is due to a discrepancy identified in the previously approved Board amount. The use of additional M2 funds for the Project is consistent with the Capital Programming Policies as this is Project F in the Next 10 Delivery Plan. This update is reflected in the Capital Funding Program Report, which depicts funding for OCTA projects.

Procurement Approach

The procurement was originally handled in accordance with OCTA's Board-approved procedures for architectural and engineering services, which conform to both state and federal laws. The original firm-fixed price agreement was executed on August 8, 2022, in the amount of \$9,110,101. This agreement has previously been amended as shown in Attachment A. It has become necessary to amend the existing agreement to add funds for additional design services.

OCTA staff negotiated the required level of effort with HDR to provide additional design services. Staff found HDR's cost proposal, in the amount of \$1,071,679, to be fair and reasonable relative to the negotiated level of effort and the independent cost estimate prepared by the OCTA project manager. The proposed amendment will increase the total contract value to \$11,420,281.

Amendment to Agreement for Additional Design Services for State Route 55 Improvement Project Between Interstate 5 and State Route 91 **Page 4**

Fiscal Impact

The additional funding for the Project is included in OCTA's Fiscal Year 2026-27 Budget, Capital Programs Division, Account No. 0017-7519-FF102-0WZ, and will be funded with a combination of federal and local M2 funds.

Summary

Staff requests Board of Directors' approval to authorize the Chief Executive Officer to negotiate and execute Amendment No. 3 to Agreement No. C-1-3643 between the Orange County Transportation Authority and HDR Engineering, Inc., in the amount of \$1,071,679, for additional design services for the State Route 55 Improvement Project between Interstate 5 and State Route 91.

Attachments

- A. HDR Engineering, Inc., Agreement No. C-1-3643 Fact Sheet
- B. Capital Funding Program Report

Prepared by:



Jeannie Lee, P.E.
Senior Project Manager
(714) 560-5735

Approved by:



James G. Beil, P.E.
Executive Director, Capital Programs
(714) 560-5646



Pia Veesapen
Director, Contracts Administration and
Materials Management
(714) 560-5619

**HDR Engineering, Inc.
Agreement No. C-1-3643 Fact Sheet**

1. February 14, 2022, Agreement No. C-1-3643, \$9,110,101, approved by the Board of Directors (Board).
 - The agreement was executed on August 8, 2022, for the preparation of plans, specifications, and estimates for the State Route 55 Improvement Project between Interstate 5 and State Route 91.
2. August 30, 2024, Amendment No. 1 to Agreement No. C-1-3643, \$0, approved by the Contracts Administration and Materials Management Department.
 - To modify the key personnel for HDR Engineering, Inc.
 - To add subconsultant EGP Consulting, Inc., to provide environmental revalidation services and permits.
3. February 10, 2025, Amendment No. 2 to Agreement No. C-1-3643, \$1,238,501, approved by the Board.
 - For additional design services for right-of-way engineering services, new electrical components, new drainage system, overhead signage, retaining wall aesthetics, updated irrigation design, and additional reports based on the California Department of Transportation (Caltrans) requirements.
4. July 27, 2026, Amendment No. 3 to Agreement No. C-1-3643, \$1,071,679, pending approval by the Board.
 - For additional design services for right-of-way engineering services, updated planting, irrigation, and electrical designs, updated standard plans and standard specifications, and additional reports based on the Caltrans requirements.

Total funds committed to HDR Engineering, Inc., after approval of Amendment No. 3 to Agreement No. C-1-3643: \$11,420,281



Capital Funding Program Report

Pending Approval by OCTA Board of Directors - July 27, 2026

State Highway Project											
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds		
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local
I-5 widening, I-405 to Yale Avenue (Segment 1)	B	\$337,943	\$47,473		\$5,421	\$95,338	\$11,374			\$178,337	
I-5 widening, Yale Avenue to SR-55 (Segment 2)	B	\$290,041	\$32,527				\$9,780			\$247,734	
I-5 widening, Alicia Parkway to El Toro Road (Segment 3)	C	\$227,523	\$49,897		\$4,728		\$16,915			\$155,983	
I-5 widening, Oso Parkway to Alicia Parkway (Segment 2)	C	\$228,675	\$48,676		\$7,921					\$172,078	
I-5 widening, SR-73 to Oso Parkway (Segment 1)	C	\$248,198	\$28,167		\$6,433	\$73,735	\$18,242	\$29,832		\$91,789	
I-5, SR-73 to El Toro Road landscaping/replacement planting	C	\$12,335	\$790			\$6,000				\$5,545	
I-5/El Toro Interchange	D	\$9,713	\$9,213							\$500	
SR-55 (I-5 to SR-91) ¹	F	\$203,761	\$7,865		\$2,641					\$193,255	
SR-55 widening between I-405 and I-5	F	\$505,720	\$160,500		\$42,375	\$80,000	\$140,000			\$82,845	
SR-57 Orangewood Avenue to Katella Avenue	G	\$135,400	\$11,500		\$3,240					\$120,660	
SR-57 truck climbing lane phase II: Lambert Road to LA County Line	G	\$32,750				\$29,500				\$3,250	
SR-91, Acacia Avenue to La Palma Avenue (Segment 3)	I	\$222,404	\$1,770		\$3,000					\$30	\$217,604
SR-91, La Palma Avenue to SR-55 (Segment 2)	I	\$380,681	\$3,460		\$4,000		\$6,641			\$40	\$366,540
SR-91, SR-55 to Lakeview Avenue (Segment 1)	I	\$132,777	\$1,770		\$5,000		\$42,566			\$30	\$83,411
SR-91, SR-57 to SR-55 (Segment 1,2 and 3) Outreach	I	\$2,000									\$2,000
SR-91, SR-241 to I-15	J	\$41,800									\$41,800
I-405 improvements, SR-73 to I-605	K	\$2,159,999	\$35,000		\$10,648			\$89,771		\$1,395,650	\$628,930
I-405 (I-5 to SR-55)	L	\$8,000	\$8,000								
I-605/ Katella Avenue interchange	M	\$53,014	\$17,800							\$35,214	
241/91 Express Lanes (HOT) connector		\$182,298	\$50								\$182,248
I-5 Improvement from County Line to Avenida Pico		\$53,050	\$53,050								
I-5 widening, I-405 to Yale Avenue (Segment 1) Multi Asset Project		\$50,144			\$36,400			\$13,744			
I-5 widening, Yale Avenue to SR-55 (Segment 2) Multi Asset Project		\$37,859			\$27,861			\$9,998			
SR-74 - Ortega Highway Gap Closure and Multimodal Improvements		\$88,513	\$30,000		\$4,250	\$43,913				\$7,200	\$3,150
SR-74 widening, City/County line to Antonio Parkway		\$40,905	\$5,285			\$10,000					\$25,620
SR-91, Acacia Avenue to La Palma Avenue (Segment 3) Multi Asset Project		\$35,046			\$26,021			\$9,025			
SR-91, SR-55 to Lakeview Avenue (Segment 1) Multi Asset Project		\$7,968			\$7,968						
State Highway Project Totals		\$5,728,517	\$552,793		\$197,907	\$338,486	\$245,518	\$152,370		\$2,690,140	\$1,551,303
Federal Funding Total		\$750,700									
State Funding Total		\$736,374									
Local Funding Total		\$4,241,443									
Total Funding (000's)		\$5,728,517									



Capital Funding Program Report

Pending Approval by OCTA Board of Directors - July 27, 2026

State Highway Project Completed											
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds		
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local
I-5 from SR-55 to SR-57, add one HOV lane each direction	A	\$41,500	\$36,191							\$5,309	
I-5 HOV lane each direction s/o PCH to San Juan Creek Road	C	\$74,300	\$11,326					\$20,789		\$42,185	
I-5 HOV lanes from s/o Avenida Vista Hermosa to s/o PCH	C	\$75,300	\$12,065			\$46,779				\$16,456	
I-5 HOV lanes from s/o Avenida Pico to s/o Avenida Vista Hermosa	C	\$83,500	\$26,867		\$1,600	\$43,735				\$11,298	
I-5/SR-74 interchange improvements	D	\$80,300				\$48,683		\$24,109	\$2,500		\$5,008
I-5/SR-74 interchange landscaping/replacement planting	D	\$1,440			\$752	\$688					
SR- 57 n/b widening, Katella Avenue to Lincoln Avenue - landscaping	G	\$2,172								\$2,172	
SR- 57 n/b widening, SR-91 to Yorba Linda Boulevard - landscaping	G	\$946								\$946	
SR-57 n/b widening, Katella Avenue to Lincoln Avenue	G	\$35,827						\$24,127		\$11,700	
SR-57 n/b widening, SR-91 to Yorba Linda Boulevard	G	\$51,354						\$39,475		\$11,879	
SR-57 n/b widening, Yorba Linda Boulevard to Lambert Road	G	\$52,871						\$41,250		\$11,621	
SR-57 n/b widening, Yorba Linda Boulevard to Lambert Road - landscaping	G	\$1,193								\$1,193	
SR-91 w/b connect existing aux lanes, I-5 to SR-57	H	\$62,977						\$27,227		\$35,750	
SR-91 w/b connect existing aux lanes, I-5 to SR-57 - landscaping	H	\$2,290								\$2,290	
SR-91 w/b (SR-55 - Tustin interchange) improvements	I	\$43,753				\$15,753		\$14,000		\$14,000	
SR-91 e/b widening, from SR-241 to SR-71	J	\$57,773			\$45,911					\$6,942	\$4,920
SR-91 w/b routes 91/55 - e/o Weir Canyon Road replacement planting	J	\$2,898				\$2,898					
SR-91 widening, from SR-55 to Gypsum Canyon Road (Weir Canyon Road/SR-241)	J	\$76,993				\$22,250		\$54,045		\$698	
I-405 s/b aux lane - University Dr to Sand Canyon Ave and Sand Canyon Ave to SR-133		\$2,328				\$2,328					
I-405/SR-22/I-605 HOV connector - landscaping		\$4,600	\$4,600								
HOV connectors from I-405 and I-605	M1	\$173,091	\$14,787					\$135,430	\$16,200		\$6,674
HOV connectors from SR-22 to I-405	M1	\$115,878	\$64,375		\$49,625				\$1,878		
State Highway Project Completed Totals		\$1,043,284	\$170,211		\$97,888	\$183,114		\$380,452	\$20,578	\$174,439	\$16,602
Federal Funding Total		\$268,099									
State Funding Total		\$563,566									
Local Funding Total		\$211,619									
Total Funding (000's)		\$1,043,284									



Capital Funding Program Report

Pending Approval by OCTA Board of Directors - July 27, 2026

1. Authorize the use of up to \$1,626,281 in Measure M2, for additional design services for the State Route 55 Improvement Project between Interstate 5 and State Route 91

Acronyms:

Aux - Auxilliary
Board - Board of Directors
CMAQ - Congestion Mitigation Air Quality Improvement Program
E/B - Eastbound
E/O - East of
FTA - Federal Transit Administration
HOT - High-Occupancy Toll
HOV - High-Occupancy Vehicle
I-15 - Interstate 15
I-405 - Interstate 405
I-5 - Interstate 5
I-605 - Interstate 605
LA - Los Angeles
M Code - Project Codes in Measure M1 and M2
M1 - Measure M1
M2 - Measure M2
N/B - Northbound
OC - Orange County
OCTA - Orange County Transportation Authority
PCH - Pacific Coast Highway
S/B - Southbound
S/O - South of
SB 1 - SB 1 (Chapter 5, Statutes of 2017)
SR-133 - State Route 133
SR-22 - State Route 22
SR-241 - State Route 241
SR-55 - State Route 55
SR-57 - State Route 57
SR-71 - State Route 71
SR-73 - State Route 73
SR-74 - State Route 74
SR-91 - State Route 91
STBG - Surface Transportation Block Grant
STIP - State Transportation Improvement Program
W/B - Westbound



July 6, 2026

To: Regional Transportation Planning Committee

From: Darrell E. Johnson, Chief Executive Officer

Subject: Measure M2 Eligibility Recommendations for Fiscal Year 2024-25 Expenditure Reports and Maintenance of Effort Benchmark Adjustments

A handwritten signature in blue ink, appearing to read "Darrell E. Johnson", is written over the "From:" line of the header.

Overview

Measure M2 Ordinance No. 3 requires local jurisdictions to annually satisfy eligibility requirements to receive Measure M2 net revenues. As part of this requirement, local jurisdictions submitted fiscal year 2024-25 expenditure reports to the Orange County Transportation Authority. Separately, maintenance of effort benchmark revisions are required for five jurisdictions, consistent with the Measure M2 Ordinance.

Recommendations

- A. Approve 33 of Orange County's 35 local jurisdictions (excluding the cities of Buena Park and Huntington Beach) as eligible to continue receiving Measure M2 net revenues.
- B. Approve adjustments to the Measure M2 maintenance of effort benchmarks for the cities of La Habra, Laguna Beach, Laguna Niguel, Placentia, and Yorba Linda.

Background

Local jurisdictions must meet Measure M2 (M2) eligibility requirements as directed by the M2 Ordinance No. 3 (M2 Ordinance) and submit eligibility verification packages to the Orange County Transportation Authority (OCTA) annually to remain eligible to receive M2 net revenues. There are 13 eligibility requirements that local jurisdictions must satisfy to remain eligible; however, not all 13 eligibility components require verification during each eligibility cycle. For reference, a summary of M2 eligibility requirements and their respective due dates are provided in Attachment A.

While OCTA staff reviews and affirms all M2 eligibility components, the M2 Ordinance requires the Taxpayer Oversight Committee (TOC) to review a subset of these components. These include the Congestion Management Plan (CMP), Mitigation Fee Program (MFP), Local Signal Synchronization Plan (LSSP), Pavement Management Plan (PMP), and Expenditure Report. The CMP, MFP, LSSP, and PMP are due by June 30 each year and are typically approved by the OCTA Board of Directors (Board) in February. Expenditure reports must be submitted on or before December 31, six months after the close of the fiscal year (FY). Expenditure reports incorporate all M2-related transportation expenditures and include maintenance of effort (MOE) spending levels. MOE is the amount of discretionary funding (e.g., general fund revenues) that local jurisdictions must spend on streets and roads purposes to ensure that they are not supplanting discretionary transportation spending with M2 revenues. This item addresses the expenditure reports that were due on December 31, 2025.

Per the M2 Ordinance, the TOC is responsible for the receipt and review of local jurisdiction expenditure reports. To assist with this responsibility, the TOC designates an Annual Eligibility Review (AER) Subcommittee to initially receive and review required M2 eligibility submittals, prior to consideration by the TOC. The findings of the AER Subcommittee and the TOC are further discussed below.

One of the eligibility requirements that is reported through the expenditure reports is the MOE expenditures or the amount of general fund or discretionary revenue that was spent on streets and roads. OCTA checks the expenditure level against the Board-established MOE benchmark for each local jurisdiction, as applicable. The MOE benchmark for each local jurisdiction must be adjusted for inflation by OCTA every three years. The latest MOE benchmark adjustments were approved by the Board in April 2026. At the time, it was noted that adjustments may be required pending receipt of final annual comprehensive finance reports (ACFR) from local jurisdictions. Adjustments are recommended based on updated or final submittals from the local jurisdictions.

Discussion

All 35 local jurisdictions submitted FY 2024-25 expenditure reports and required resolutions consistent with the December 31, 2025, deadline. OCTA staff reviewed all local jurisdictions documents to ensure completion, accuracy, and consistency with M2 Ordinance requirements.

The TOC-designated AER Subcommittee convened to review the FY 2024-25 expenditure reports. Based on the staff and AER Subcommittee's review, the TOC formally confirmed its required review at its June 9, 2026, meeting.

Based on staff and TOC review, OCTA staff recommend that 33 of Orange County's 35 local jurisdictions, excluding the cities of Buena Park and Huntington Beach, be found eligible to continue receiving M2 net revenues. The M2 eligibility review summary for FY 2024-25 expenditure reports is provided in Attachment B.

The cities of Buena Park and Huntington Beach submitted the required documentation to satisfy M2 eligibility submittal requirements this cycle. However, these cities are currently ineligible to receive M2 net revenues due to previous and separate Board actions. The separate Board actions took place on May 28, 2024 and May 14, 2025, and included interagency agreements outlining how the cities can fulfill their eligibility requirements and resume receiving M2 net revenues. Acceptance of the expenditure reports does not change the eligibility status of either city.

MOE Benchmark Adjustments

In April 2026, the MOE benchmark for each local jurisdiction was updated and approved by the Board. At the time, the cities of Irvine, La Habra, Laguna Beach, Placentia, and Yorba Linda had not adopted their final FY 2024-25 ACFR. Draft ACFR or general fund revenue trial balance figures were provided and used to calculate estimated MOE benchmarks. Since that time, OCTA has received final FY 2024-25 ACFRs from the cities of Irvine, La Habra, Laguna Beach, Placentia, and Yorba Linda. The MOE benchmark for the City of Irvine is not changing based on the final FY 2024-25 ACFR. However, changes are required for the cities of La Habra, Laguna Beach, Placentia, and Yorba Linda due to information provided in the final FY 2024-25 ACFR for these cities. The recommended MOE benchmark is provided in Attachment C.

Separately, based on information provided by the City of Laguna Niguel (Laguna Niguel), OCTA determined that an adjustment to Laguna Niguel's MOE benchmark was warranted to reflect the exclusion of an eligible one-time revenue that was submitted during staff's review of adjustments prior to the Board's April 2026 approval. Accordingly, the revisions to the MOE benchmark for Laguna Niguel are being included in this report.

The recommended revised MOE benchmarks for the Cities of La Habra, Laguna Beach, Laguna Niguel, Placentia, and Yorba Linda are recommended for Board approval and are provided in Attachment C.

OCTA has communicated with the cities of La Habra, Laguna Beach, Laguna Niguel, Placentia, and Yorba Linda regarding the MOE benchmark changes. With Board approval, these local jurisdictions will be responsible for submitting the MOE certification to the revised MOE benchmark and also for documenting their spending consistent with the revised MOE benchmarks (Attachment C) when they submit their final expenditure reports for FY 2026-27.

Summary

In June 2026, the OCTA TOC convened and affirmed receipt and review of the FY 2024-25 M2 expenditure reports for the 33 eligible local jurisdictions. Board approval is recommended to find the 33 local jurisdictions eligible to continue receiving M2 net revenues. In addition, staff recommends approval of the updated MOE benchmark for the cities of La Habra, Laguna Beach, Laguna Niguel, Placentia, and Yorba Linda.

Attachments

- A. Measure M2 Eligibility Requirements and Submittal Schedule Summary
- B. Measure M2 Eligibility Review Summary of Fiscal Year 2024-25 Expenditure Reports
- C. Maintenance of Effort Benchmark by Local Jurisdiction – Revised ¹

Prepared by:



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Approved by:



Rose Casey
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(714) 560-5729

Measure M2 Eligibility Requirements and Submittal Schedule Summary

Compliance Category	Frequency (Due Date)	Required in Current Cycle
Capital Improvement Program	Annual (June 30, 2025)	✓
Circulation Element/Master Plan of Arterial Highways Consistency	Biennial (June 30, 2025)	✓
Congestion Management Program	Biennial (June 30, 2025)	✓
Expenditure Report	Annual (December 31, 2025)	✓
Local Signal Synchronization Plan	Every Three Years (June 30, 2026)	
Maintenance of Effort	Annual (June 30, 2025)	✓
Mitigation Fee Program (MFP)	Biennial ¹ (June 30, 2025)	✓
No Supplanting of Developer Fees	Annual (June 30, 2025)	✓
Pavement Management Plan (PMP)	Biennial ² (June 30, 2025)	✓
Timely Submittal of Project Final Reports	Within Six Months of Project Completion	✓
Timely Use of Net Revenues	Annual (June 30, 2025)	✓
Traffic Forum Participation	Annual (June 30, 2025)	✓
Transit and Non-Motorized Transportation Land-Use Planning Strategies	Annual (June 30, 2025)	✓

¹ Jurisdictions must submit their updated program and revised fee schedule or process methodology when the jurisdiction updates their MFP and/or nexus study, regardless of eligibility submittal schedule.

² 14 local jurisdictions update their PMPs on odd-numbered fiscal years, while 21 local jurisdictions update their PMPs on even-numbered fiscal years.

Measure M2 Eligibility Review Summary of Fiscal Year 2024-25 Expenditure Reports

Local Jurisdiction	Expenditure Report Received by Deadline	Resolution Received by Deadline	MOE Benchmark Met	Received and Reviewed by TOC
Aliso Viejo	Yes	Yes	Yes	Yes
Anaheim	Yes	Yes	Yes	Yes
Brea	Yes	Yes	Yes	Yes
Buena Park ¹	N/A	N/A	N/A	N/A
Costa Mesa	Yes	Yes	Yes	Yes
County of Orange ²	Yes	Yes	N/A	Yes
Cypress	Yes	Yes	Yes	Yes
Dana Point	Yes	Yes	Yes	Yes
Fountain Valley	Yes	Yes	Yes	Yes
Fullerton	Yes	Yes	Yes	Yes
Garden Grove	Yes	Yes	Yes	Yes
Huntington Beach ³	N/A	N/A	N/A	N/A
Irvine	Yes	Yes	Yes	Yes
La Habra	Yes	Yes	Yes	Yes
La Palma	Yes	Yes	Yes	Yes
Laguna Beach	Yes	Yes	Yes	Yes
Laguna Hills	Yes	Yes	Yes	Yes
Laguna Niguel	Yes	Yes	Yes	Yes
Laguna Woods	Yes	Yes	Yes	Yes
Lake Forest	Yes	Yes	Yes	Yes
Los Alamitos	Yes	Yes	Yes	Yes
Mission Viejo	Yes	Yes	Yes	Yes
Newport Beach	Yes	Yes	Yes	Yes
Orange	Yes	Yes	Yes	Yes
Placentia	Yes	Yes	Yes	Yes
Rancho Santa Margarita	Yes	Yes	Yes	Yes
San Clemente	Yes	Yes	Yes	Yes
San Juan Capistrano	Yes	Yes	Yes	Yes
Santa Ana	Yes	Yes	Yes	Yes
Seal Beach	Yes	Yes	Yes	Yes
Stanton	Yes	Yes	Yes	Yes
Tustin	Yes	Yes	Yes	Yes
Villa Park	Yes	Yes	Yes	Yes
Westminster	Yes	Yes	Yes	Yes
Yorba Linda	Yes	Yes	Yes	Yes

1. The City of Buena Park is excluded as the local jurisdiction was found ineligible to receive net M2 revenues by the Orange County Transportation Authority's Board of Directors on May 28, 2024, due to disallowed LFS expenditures.

2. MOE is based on a three-year average of discretionary fund expenditures for transportation purposes prior to 1990, plus adjustments required by the M2 Ordinance No. 3. However, Orange County Public Works and their predecessor agencies did not—and do not—use discretionary funds for transportation purposes. The sources of their transportation funds have been various restricted or partially restricted funds (e.g., HUTA, federal grants, assessment districts, developer impact fees, community facilities districts, Subdivision Map Act Highway, and bridge fees, etc.).

3. The City of Huntington Beach is excluded as the local jurisdiction was found ineligible to receive net M2 revenues by the Orange County Transportation Authority's Board of Directors on May 12, 2025, due to disallowed LFS expenditures.

Acronyms

- FY - Fiscal Year
- HUTA - Highway Users Tax Account
- LFS - Local Fair Share
- M2 - Measure M2
- MOE - Maintenance of Effort
- N/A - Not Applicable
- TOC - Taxpayer Oversight Committee

Maintenance of Effort Benchmark by Local Jurisdiction - Revised ¹

Local Jurisdiction	MOE Benchmark	Adjustment	New MOE
Aliso Viejo	\$ 815,389	\$ -	\$ 815,389
Anaheim	\$ 17,144,752	\$ -	\$ 17,144,752
Brea	\$ 1,162,643	\$ -	\$ 1,162,643
Buena Park	\$ 6,240,882	\$ -	\$ 6,240,882
Costa Mesa	\$ 11,323,661	\$ -	\$ 11,323,661
County of Orange ²	N/A	N/A	N/A
Cypress	\$ 4,500,828	\$ -	\$ 4,500,828
Dana Point	\$ 1,965,562	\$ -	\$ 1,965,562
Fountain Valley	\$ 2,216,833	\$ -	\$ 2,216,833
Fullerton	\$ 5,898,993	\$ -	\$ 5,898,993
Garden Grove	\$ 5,300,132	\$ -	\$ 5,300,132
Huntington Beach	\$ 7,748,444	\$ -	\$ 7,748,444
Irvine	\$ 12,317,865	\$ -	\$ 12,317,865
La Habra ³	\$ 2,321,872	\$ 2,579	\$ 2,324,451
La Palma	\$ 255,885	\$ -	\$ 255,885
Laguna Beach ³	\$ 2,049,609	\$ 390,563	\$ 2,440,172
Laguna Hills	\$ 392,310	\$ -	\$ 392,310
Laguna Niguel	\$ 1,182,730	\$ (4,950)	\$ 1,177,780
Laguna Woods	\$ 156,417	\$ -	\$ 156,417
Lake Forest	\$ 302,552	\$ -	\$ 302,552
Los Alamitos	\$ 253,044	\$ -	\$ 253,044
Mission Viejo	\$ 3,740,933	\$ -	\$ 3,740,933
Newport Beach	\$ 17,103,720	\$ -	\$ 17,103,720
Orange	\$ 4,324,828	\$ -	\$ 4,324,828
Placentia ³	\$ 1,026,022	\$ (1,934)	\$ 1,024,088
Rancho Santa Margarita	\$ 546,922	\$ -	\$ 546,922
San Clemente	\$ 1,691,789	\$ -	\$ 1,691,789
San Juan Capistrano	\$ 631,334	\$ -	\$ 631,334
Santa Ana	\$ 11,234,319	\$ -	\$ 11,234,319
Seal Beach	\$ 785,290	\$ -	\$ 785,290
Stanton	\$ 418,916	\$ -	\$ 418,916
Tustin	\$ 2,273,110	\$ -	\$ 2,273,110
Villa Park	\$ 519,668	\$ -	\$ 519,668
Westminster	\$ 2,564,889	\$ -	\$ 2,564,889
Yorba Linda ³	\$ 3,359,491	\$ (7,376)	\$ 3,352,115
Total	\$ 133,771,634		\$ 134,150,516

¹ The MOE benchmark adjustment is based on the percent change in the construction cost index (CCI) for the immediately preceding three-year period. The adjustment cannot exceed the percent change in the jurisdiction's general fund revenue (GFR) over the same period of time. If there is a negative growth in the jurisdiction's GFR, the local jurisdiction will have a zero percent MOE adjustment. The CCI percent change from 2022 to 2025 is 49.57 percent.

² Orange County Public Works and their predecessor agencies did not—and do not—use discretionary funds for transportation purposes. The sources of their transportation funds have been various restricted or partially restricted funds (e.g., HUTA, federal grants, assessment districts, developer impact fees, community facilities districts, Subdivision Map Act Highway, and bridge fees etc.).

³ Final Annual Comprehensive Financial Report (ACFR) had not been adopted or released at the time of the original MOE benchmark calculation. A draft ACFR figure was provided and used to calculate an estimated benchmark. OCTA has since received the jurisdiction's final ACFR and an update to their MOE benchmark is required.

Acronyms:

HUTA - Highway Users Tax Account

MOE – Maintenance of Effort

N/A – Not Applicable

OCTA - Orange County Transportation Authority



July 6, 2026

To: Regional Transportation Planning Committee
From: Darrell E. Johnson, Chief Executive Officer
Subject: Competitive Grant Programs Update

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Overview

The Orange County Transportation Authority, consistent with Board of Directors-approved programming guidelines, utilizes various federal, state, and local transportation funding programs beyond those provided through Measure M2 to maximize transportation investments throughout Orange County. These funds are pursued and programmed to projects led by local jurisdictions, nonprofit agencies, and the Orange County Transportation Authority that advance Board of Directors-approved transportation priorities. Staff has prepared an overview and status update of local jurisdiction projects that have received funds, recent grant pursuits, and awards for Orange County Transportation Authority projects.

Recommendation

Receive and file as an information item.

Background

The Orange County Transportation Authority (OCTA) issues periodic calls for projects (call) using non-Measure M2 (M2) federal, state, and local funds to help local jurisdictions and nonprofit agencies meet a variety of transportation needs. The calls include the Southern California Association of Governments (SCAG) federal fiscal year (FFY) 2026-27 and 2027-28 Surface Transportation Block Grant (STBG) Congestion Mitigation and Air Quality Improvement (CMAQ) Programs, Orange County Complete Streets Program (OCCSP), Enhanced Mobility for Seniors and Individuals with Disabilities (EMSD) Program, Pavement Management Relief Funding (PMRF) Program, Bicycle Corridor Improvement Program (BCIP), and Arterial Pavement Management (APM) Program.

OCTA typically issues a complete streets call, which promotes multimodal facilities designed for all users utilizing OCCSP or the BCIP, every two to three years. The EMSD Program is also programmed through a regular call which is similarly issued every two to three years. The calls addressing pavement management, utilizing PMRF and APM Program funds are issued on an ad hoc basis but have typically

occurred using one-time state or federal funding at least every three to four years. Each program has a primary focus or goal, as noted in the following table.

OCTA Program	Primary Program Goal	Program Fund Source
SCAG FFY 2026-27 and 2027-28 STBG/CMAQ	Supports multimodal street and transportation improvements that enhance safety, accessibility, and air quality	Federal STBG and/or CMAQ programs
OCCSP	Support development of accessible and safe streets that accommodate a variety of transportation modes	Federal STBG and/or CMAQ programs
EMSD	Support services provided to seniors and individuals with disabilities	Non-M2 local transit funds
PMRF	Support pavement maintenance and preservation needs	Federal Coronavirus Response and Relief Supplemental Appropriations Act Highway Infrastructure Program funds and State Highway Account funds
BCIP	Support the development of Orange County’s bicycle network	Federal CMAQ funds
APM	Support pavement maintenance and preservation needs	Federal STBG funds

In addition to these directly issued calls, OCTA also supports local jurisdictions pursuing federal and state earmarks and grants from state and federal sources such as the Active Transportation Program’s regional component through SCAG and the California Transportation Commission. OCTA may partner with local jurisdictions to seek external funds when combining multiple projects into a single application to increase the chances of being awarded.

OCTA directly competes in federal, state, and local transportation funding opportunities through various discretionary funding programs to support OCTA Board of Directors (Board)-approved priority planning, capital, and operating needs. Securing funding through these programs is consistent with the programming policies and helps preserve M2 and more flexible local funding sources, allowing OCTA to advance a greater number of priority projects. Current priority projects, identified by the Board through approved planning documents, include the Coastal Rail Infrastructure Resiliency Project, Pacific Coast Highway Bridge Replacement, State Route (SR)-91 Eastbound Corridor Operations Project, State Route 57 Truck Climbing Lane, Clean Transportation Initiatives, Los Angeles

2028 Olympic and Paralympic Games Transportation Services, Metrolink Locomotive Replacement, Track and Structures, Metrolink Operations, OC Connect (Garden Grove to Santa Ana Rails-to-Trails), OC Loop, First Street Complete Streets and Transit Signal Priority (TSP), and bus infrastructure investments. Identifying priority projects in advance of funding opportunities and securing Board approval for those projects positions OCTA to readily pursue new funding opportunities as they are made available. Every discretionary grant award is presented to the Board for formal acceptance.

Discussion

Since 2010, the Board has approved \$299.2 million in non-M2 local, state, and federal funds to Orange County local jurisdictions and nonprofit agencies through 12 calls. This has supported 281 transportation projects including active transportation, street rehabilitation, mobility options for seniors and individuals with disabilities, as well as streets and roads enhancement/landscaping activities. As of the drafting of this report, 197 projects which have received \$107.7 million in non-M2 funds are considered fully complete and closed out. The specific status of these completed projects is no longer tracked in the report. The table below reflects the status of active projects, their respective phases of work, and the phases of work completed or cancelled during this reporting cycle. Currently, \$191.5 million in awarded funds support a total of 120 phases through the FFY 2026-27 and 2027-28 STBG/CMAQ, OCCSP, EMSD, PMRF, BCIP, and APM funding programs.

A summary of the current awarded project phases is provided in the table below, and additional details on the status of active projects are provided in Attachment A.

Phase of Work/ Status	PLAN	ENV	DES	ROW	CON¹	Total Phases
Planned	0	1	9	3	31	44
Started	3	8	14	3	48	76
Subtotal	3	9	23	6	79	120
Completed ²	0	5	3	2	5	15
Total	3	14	26	8	84	135
Cancelled ²	0	0	1	0	1	2

Notes and abbreviations:
 1. Includes EMSD capital and operating projects.
 2. Reflects only those project phases that were completed or canceled during this reporting cycle.

Planned – Indicates the funds for this phase have not been obligated or a contract has not yet been executed.
 Started – Indicates the funds for this phase have been obligated or a contract has been executed.
 Completed – Indicates the work related to this phase is complete.

CON – Construction ENV– Environmental
 DES – Design ROW – Right-of-way

Discretionary Funding Update

In December 2025, staff presented updates to the Board on OCTA grant pursuits, highlighting the submission of six grant applications in the first half of fiscal year (FY) 2025-26. The update also included eight federal earmark requests advanced in coordination with the Government Relations Division during the federal appropriations cycle for the previous reporting period.

Since the December update, seven grant applications have been submitted for a total request amount of \$102.1 million from state and federal sources. These applications reflect a broad range of countywide transportation priorities, including active transportation safety planning, multimodal corridor improvements, clean transportation and bus infrastructure investments, cybersecurity initiatives, and alternative fuel transit vehicle procurements, all aimed at improving regional mobility, system resiliency, operational reliability, and transportation safety across Orange County.

Additionally, working in coordination with the Government Relations Division, four federal earmark requests totaling \$10.7 million were submitted during the second half of FY 2025-26 to support major transportation infrastructure investments across Orange County. These requests support regional transportation infrastructure improvements, including maintenance and rehabilitation activities, rail station modernization efforts, and multimodal corridor enhancements to improve system reliability, safety, and regional connectivity, further advancing OCTA's mobility and infrastructure priorities through competitive and discretionary funding opportunities. A summary of these grant and earmark submittals is provided in Attachment B.

Over the last six months, OCTA has been awarded \$144.6 million in grant funding supporting 16 projects (several applications were submitted in prior periods).

The following projects have received various competitive grant funding totaling \$5.6 million:

- Security Cameras and Access Controls at OCTA Transportation Centers – \$960,000 through the Federal Transit Administration Buses and Bus Facilities Program
- OC Connections for Los Angeles 2028 Olympic and Paralympic Games – \$4 million through the Mobile Source Air Pollution Reduction Review Committee Transportation Demand Management Program
- Connected Paths: Building a Regional Inventory for Active Transportation (lead agency: SCAG; sub-applicants: OCTA, Los Angeles County Metropolitan Transportation Authority, and Ventura County Transportation Commission) – \$700,000 through the California Department of Transportation's Sustainable Transportation Planning Grant Program

The following projects received awards totaling \$130.1 million through the SCAG FFY 2026-27 and 2027-28 STBG/CMAQ programs:

- Alternative Fuel Replacement Buses: 18 60-Foot Buses – \$30 million
- First Street Complete Streets and TSP Project – \$2 million
- OC Connect – \$14.4 million
- Pacific Coast Highway Railroad Bridge Replacement – \$5.5 million
- Interstate 5 (I-5) Improvement Project from San Diego County Line to Avenida Pico – \$40 million
- OC Streetcar Operations – \$14.7 million
- State Route 74 Ortega Highway Gap Closure and Multimodal Improvements – \$1.5 million
- Southern California Regional Rail Authority/Metrolink Rehabilitation and Renovation – \$22 million

The following projects received congressional earmark awards totaling \$8.8 million through Community Project Funding (CPF) or Federal Highway Infrastructure Programs:

CPF:

- OC Loop – Segment A (City of La Habra) La Habra Union Pacific Rail Line Bikeway – \$3 million

Federal Highway Infrastructure Programs:

- I-5 Improvement Project Segment 2 – \$1.7 million
- State Route 55 (I-5 to SR-91) Improvement Project – \$3 million
- I-5 Improvement Project from San Diego County Line to Avenida Pico – \$850,000
- Technology and Signal Upgrades – \$250,000

Staff will present future items to the Board as necessary to formally accept these grant awards and to incorporate the funds into the relevant project budgets. Details of these awards are also provided in Attachment B.

A list of near-term OCTA priority projects targeted for funding through ongoing grant efforts is provided as Attachment C. These efforts include OCTA's continued pursuit of competitive grant opportunities to fund and advance priority projects. The Capital Funding Program Report included as Attachment D summarizes the approved funding for projects, including OCTA-issued federal, state, and locally funded calls.

Summary

Status reports on externally funded OCTA grants awarded to local jurisdictions and a list of grant pursuits for OCTA priority projects are provided. Recent grant awards and funding activities are also summarized.

Attachments

- A. State and Federal Grant Programs Project Status
- B. Competitive Grants Update
- C. Orange County Transportation Authority Priority Project List
- D. Capital Funding Program Report

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State and Federal Grant Programs Project Status

2019 BCIP ¹						
Agency	Project Title	Phase	Award	Matching Funds	Total Project/ Phase Cost	Status
Brea	OC Loop Brea Gap Closure ²	R,C	\$ 2,219,000	\$ 2,011,000	\$ 5,730,000	Completed - R Started - C
Costa Mesa	Adams Avenue and Pinecreek Drive Intersection Project	C	\$ -	\$ -	\$ -	Completed - C
La Habra	La Habra Union Pacific Rail Line Bikeway	R	\$ 1,948,800	\$ 487,200	\$ 2,436,000	Started
Orange	Santiago Creek Multipurpose Extension Project	E	\$ -	\$ -	\$ -	Completed
San Clemente	South El Camino Real Lane Reconfiguration and Buffered Bike Lane Project	C	\$ -	\$ -	\$ -	Completed
Santa Ana	Bristol Street Protected Bike Lanes - Phase II Warner Avenue to St. Andrew Place	C	\$ 1,508,045	\$ 347,393	\$ 1,855,438	Started
Santa Ana	Bristol Street Protected Bike Lanes - Phase III St. Andrew Place to Edinger Avenue	D,C	\$ 655,820	\$ 586,430	\$ 1,242,250	Completed - D Started - C
Santa Ana	Bristol Street Protected Bike Lanes - Phase V 1st Street to Civic Center Drive	D,C	\$ 1,320,320	\$ 598,273	\$ 1,918,593	Started - D Planned - C
Santa Ana	Warner Avenue Protected Bike Lanes	D,C	\$ 1,116,126	\$ 326,079	\$ 1,442,205	Started - D Planned - C
2019 BCIP Phases Completed		12	\$ 15,766,271	\$ 16,831,170	\$ 32,597,441	
2019 BCIP Phases In Progress		8	\$ 8,768,111	\$ 4,356,375	\$ 14,624,486	
2019 BCIP Total Program³		20	\$ 24,534,382	\$ 21,187,545	\$ 47,221,927	

2021 PMRF ¹						
Agency	Project Title	Phase	Award	Matching Funds ⁴	Total Project Cost ⁵	Status
Costa Mesa	Fairview Road Improvement Project (from Adams Avenue to Wilson Street)	C	\$ 331,116	\$ -	\$ 1,600,000	Started
Dana Point	Stonehill Drive Slurry Seal Project	C	\$ 200,000	\$ -	\$ 200,000	Started
La Palma	La Palma Avenue Pavement Preservation and Improvements Project	C	\$ 200,000	\$ -	\$ 400,000	Started
Laguna Beach	Zone 3 Collector Road Improvements	C	\$ 200,000	\$ -	\$ 780,000	Started
Santa Ana	Grand Avenue Roadway Rehabilitation from 1st Street to McFadden Avenue	C	\$ 972,882	\$ -	\$ 1,072,882	Stared
Yorba Linda	La Palma Avenue Improvement Project from West City Limit to 1,350' West of Old Village Road	C	\$ 200,000	\$ -	\$ 240,350	Started
2021 PMRF Phases Completed		21	\$ 6,964,828	\$ -	\$ 23,243,430	
2021 PMRF Phases In Progress		6	\$ 2,103,998	\$ -	\$ 4,293,232	
2021 PMRF Total Program³		27	\$ 9,068,826	\$ -	\$ 27,536,662	

Notes:

1. Phases/projects completed before this reporting cycle are included only in the totals. Those completed during this period are shown here, with individual amounts consolidated into the cumulative totals.
2. Total project cost includes \$1,500,000 in non-match agency funds.
3. Total does not include cancelled projects.
4. Local match not required for PMRF.
5. Total project costs include non-match agency funds.

2024 EMSD						
Agency	Project Title	Phase	Allocation	Match	Total Phase Cost	Status
Age Well Senior Services, Inc.	Replacement Vehicles for Age Well Senior Services	C	\$ 989,656	\$ 122,315	\$ 1,111,971	Started
	Operating Assistance for Age Well Senior Services	C	\$ 309,840	\$ 77,460	\$ 387,300	Started
		C	\$ 42,570	\$ 4,730	\$ 47,300	Started
Abrazar, Inc.	OC Equity Mobility Management - Abrazar	C	\$ 878,400	\$ 97,600	\$ 976,000	Started
Huntington Beach	Rider Notifications	C	\$ 19,810	\$ 2,201	\$ 22,011	Started
Irvine	Irvine On Demand - Rides for Older Adults	C	\$ 463,983	\$ 51,554	\$ 515,537	Started
		C	\$ 181,009	\$ 20,112	\$ 201,121	Started
Newport Beach	Vehicle Replacements	C	\$ 217,800	\$ 24,200	\$ 242,000	Started
AbleLight, Inc.	Transportation for People with Developmental Disabilities	C	\$ 254,778	\$ 28,309	\$ 283,087	Started
Southland Integrated Services, Inc.	Transportation Services for Seniors and the Disabled	C	\$ 343,578	\$ 38,175	\$ 381,753	Started
		C	\$ 227,596	\$ 56,900	\$ 284,496	Started
Access California Services	AccessCal's Access to Transportation Program	C	\$ 115,769	\$ 12,863	\$ 128,632	Started
		C	\$ 6,874	\$ 764	\$ 7,638	Started
		C	\$ 600,000	\$ 150,000	\$ 750,000	Started
Korean Community Services, Inc. dba KCS Health Center	KCS's Senior Mobility & Integrated Healthcare Program	C	\$ 534,600	\$ 59,400	\$ 594,000	Started
		C	\$ 3,313	\$ 368	\$ 3,681	Started
		C	\$ 470,112	\$ 117,528	\$ 587,640	Started
Orange County Adult Achievement Center dba My Day Counts	My Day Counts 2025 -2026 Capital Replacement	C	\$ 917,610	\$ 101,957	\$ 1,019,567	Started
Laguna Woods	City of Laguna Woods Senior Mobility Program Augmentation Project	C	\$ 325,000	\$ 81,250	\$ 406,250	Started
Community SeniorServ, Inc. dba Meals on Wheels, Orange County	Enhanced Transportation Initiative	C	\$ 247,467	\$ 27,496	\$ 274,963	Started
SoCal Senior Services, LLC	Healthy Aging Center Laguna Woods	C	\$ 246,048	\$ 61,512	\$ 307,560	Started
Seal Beach	Seal Beach - Service Expansion	C	\$ 100,000	\$ 25,000	\$ 125,000	Started
Alzheimer Family Services Center	Patient Transportation	C	\$ 267,746	\$ 29,750	\$ 297,496	Started
North County Senior Services	Acacia Adult Day Services	C	\$ 276,188	\$ 69,047	\$ 345,235	Started
Costa Mesa	Senior Taxi Program	C	\$ 237,600	\$ 59,400	\$ 297,000	Started
Dayle MacIntosh Center for the Disabled	Mobility Management Professionals Program	C	\$ 300,000	\$ 33,333	\$ 333,333	Started
2024 EMSD Phases Completed		0	\$ -	\$ -	\$ -	
2024 EMSD Phases In Progress		27	\$ 8,623,864	\$ 1,358,393	\$ 9,982,257	
2024 EMSD Total Program		27	\$ 8,623,864	\$ 1,358,393	\$ 9,982,257	

2023 OCCSP - Wave 1 ¹						
Agency	Project Title	Phase	Award	Matching Funds	Total Project/ Phase Cost	Status
Anaheim	Nohl Ranch Open Space Trail	C	\$ 3,359,000	\$ 459,000	\$ 3,818,000	Started
Brea	Tracks at Brea - Western Extension ⁶	C	\$ 1,320,000	\$ 180,000	\$ 5,730,000	Started
Costa Mesa	Adams Avenue Bicycle Facility Project – Harbor Boulevard to Fairview Road	C	\$ -	\$ -	\$ -	Completed
Costa Mesa	Fairview Road Active Transportation Improvements – Adams Avenue to Fair Drive	D,C	\$ 1,935,000	\$ 264,000	\$ 2,199,000	Started - D Started - C
Costa Mesa	Adams Avenue Active Transportation Project – Multipurpose Trails ⁷	C	\$ 4,223,000	\$ 1,677,000	\$ 6,413,000	Started

Notes:

1. Phases/projects completed before this reporting cycle are included only in the totals. Those completed during this period are shown here, with individual amounts consolidated into the cumulative totals.
5. Total project cost includes \$4,230,000 in non-match agency funds.
7. Total project cost includes \$513,000 in non-match agency funds.

Laguna Hills	Paseo De Valencia and Cabot Road Active Transportation Enhancements ⁸	E,D,C	\$ 4,278,000	\$ 595,000	\$ 8,200,000	Completed - E Completed - D Started - C
Orange	PLAN - Citywide Active Transportation Plan	PLAN	\$ 308,000	\$ 42,000	\$ 350,000	Started
Placentia	Atwood Multi-Use Trail	D,C	\$ 2,753,000	\$ 377,000	\$ 3,130,000	Started - D Started - C
San Clemente	Complete Streets Along Avenida Calafia	E,D,C	\$ 792,000	\$ 108,000	\$ 900,000	Completed - E Completed - D Planned - C
Yorba Linda	Connect Savi Ranch ⁹	E,R,C	\$ 3,076,000	\$ 419,000	\$ 4,495,000	Completed - E Started - R Started - C
2023 OCCSP W1 Phases Completed		6	\$ 3,008,000	\$ 412,000	\$ 4,170,000	
2023 OCCSP W1 Phases In Progress		12	\$ 22,044,000	\$ 4,121,000	\$ 34,235,000	
2023 OCCSP W1 Total Program		18	\$ 25,052,000	\$ 4,533,000	\$ 38,405,000	

2023 OCCSP - Wave 2 ¹						
Agency	Project Title	Phase	Award	Matching Funds	Total Project/ Phase Cost	Status
Buena Park	PLAN - Orangethorpe Avenue Complete Streets Planning Study	PLAN	\$ 308,000	\$ 42,000	\$ 350,000	Started
Fullerton	Harbor Boulevard Complete Streets Improvement Project ¹⁰	E,D,C	\$ 4,854,000	\$ 661,000	\$ 5,868,000	Started - E Started - D Planned - C

Notes:

1. Phases/projects completed before this reporting cycle are included only in the totals. Those completed during this period are shown here, with individual amounts consolidated into the cumulative totals.
8. Total project cost includes \$3,327,000 in non-match agency funds.
9. Total project cost includes \$750,000 in non-match agency funds.
10. Total project cost includes \$535,000 in non-match agency funds.

2023 OCCSP - Wave 2 (Continued) ¹						
Agency	Project Title	Phase	Award	Matching Funds	Total Project/ Phase Cost	Status
Huntington Beach	Banning Avenue Roundabout and Southeast Corridors Complete Streets Improvements	E,D,R,C	\$ 5,000,000	\$ 731,000	\$ 5,731,000	Started - E Started - D Started - R Planned - C
Irvine	Venta Spur Trail and Jeffrey Road Pedestrian and Bicycle Bridge	C	\$ 5,000,000	\$ 1,000,000	\$ 6,000,000	Planned
Irvine	Harvard Avenue Complete Streets and Safety Improvements	E,D,C	\$ 4,312,000	\$ 588,000	\$ 4,900,000	Started - E Started - D Planned - C
Laguna Niguel	South Forbes Road/Oso Creek Trail Active Transportation Enhancements	E,D,C	\$ 3,142,000	\$ 428,000	\$ 3,570,000	Completed - E Started - D Planned - C
Mission Viejo	Mission Viejo Quad Cities Trail	E,D	\$ 4,787,000	\$ 653,000	\$ 5,440,000	Started - E Started - D
Orange	Riverdale Avenue Complete Street Improvements ¹¹	D,C	\$ 2,573,000	\$ 351,000	\$ 2,999,000	Started - D Planned - C
Tustin	Main Street Enhancement Project	C	\$ 3,172,000	\$ 432,000	\$ 3,604,000	Started
2023 OCCSP W2 Phases Completed		1	\$ 273,000	\$ 37,000	\$ 310,000	
2023 OCCSP W2 Phases In Progress		19	\$ 33,148,000	\$ 4,886,000	\$ 38,462,000	
2023 OCCSP W2 Total Program		20	\$ 33,421,000	\$ 4,923,000	\$ 38,772,000	

2023 OCCSP - Wave 3 ¹						
Agency	Project Title	Phase	Award	Matching Funds	Total Project/ Phase Cost	Status
Buena Park	PLAN - Stanton Avenue Complete Streets Planning Study	PLAN	\$ 308,000	\$ 42,000	\$ 350,000	Started
Brea	Laurel Elementary School Safety ¹²	C	\$ 590,000	\$ 81,000	\$ 1,024,000	Planned
County of Orange	Los Patrones Parkway Bikeway Widening and Safety Improvements	C	\$ 2,764,000	\$ 1,843,000	\$ 4,607,000	Planned
Huntington Beach	Hamilton Avenue Corridor Complete Streets Improvements	E,D,R,C	\$ 3,971,000	\$ 542,000	\$ 4,513,000	Started - E Started - D Planned - R Planned - C
Laguna Beach	Coast Highway Sidewalk Gap Closures to Achieve Complete Streets (Cardinal Drive to 7th Avenue)	C	\$ 5,000,000	\$ 1,194,000	\$ 6,194,000	Planned
Los Alamitos	Los Alamitos Reimagine Downtown Street & Bicycle Corridor Improvement Project	C	\$ 5,000,000	\$ 2,343,000	\$ 7,343,000	Planned

Notes:

1. Phases/projects completed before this reporting cycle are included only in the totals. Those completed during this period are shown here, with individual amounts consolidated into the cumulative totals.

11. Total project costs includes \$75,000 in non-match agency funds.

12. Total project costs includes \$353,000 in non-match agency funds.

2023 OCCSP - Wave 3 (Continued) ¹						
Agency	Project Title	Phase	Award	Matching Funds	Total Project/ Phase Cost	Status
Orange	Santiago Creek Bike Trail Gap Closure	E,R,C	\$ 4,904,000	\$ 669,000	\$ 5,573,000	Started - E Planned - R Planned - C
Stanton	Orangewood Complete Streets	E,C	\$ 3,237,000	\$ 493,000	\$ 3,730,000	Completed - E Started - C
Yorba Linda	Valley View Safety ¹³	E,D,C	\$ 511,000	\$ 70,000	\$ 656,000	Started - E Started - D Planned - C
2023 OCCSP W3 Phases Completed		1	\$ 31,000	\$ 20,000	\$ 51,000	
2023 OCCSP W3 Phases In Progress		16	\$ 26,285,000	\$ 7,277,000	\$ 33,990,000	
2023 OCCSP W2 Total Program		17	\$ 26,316,000	\$ 7,297,000	\$ 34,041,000	

2023 OCCSP - Wave 4						
Agency	Project Title	Phase	Award	Matching Funds	Total Project/ Phase Cost	Status
Huntington Beach	Magnolia Street Corridor Complete Streets Improvements	E,D,R,C	\$ 4,687,000	\$ 640,000	\$ 5,327,000	Started - E Started - D Planned - R Planned - C
2023 OCCSP W3 Phases Completed		0	\$ -	\$ -	\$ -	
2023 OCCSP W4 Phases In Progress		4	\$ 4,687,000	\$ 640,000	\$ 5,327,000	
2023 OCCSP W4 Total Program		4	\$ 4,687,000	\$ 640,000	\$ 5,327,000	

2025 STBG/CMAQ						
Agency	Project Title	Phase	Award	Matching Funds	Total Project Cost	Status
Anaheim	Anaheim Boulevard Rehabilitation: La Palma Avenue to East Simmons Avenue	C	\$ 6,947,000	\$ 2,907,000	\$ 9,854,000	Planned
Anaheim	Santa Ana River Multimodal Bridge	C	\$ 7,000,000	\$ 2,000,000	\$ 9,000,000	Planned
Costa Mesa	Adams Avenue Active Transportation Improvements – Multipurpose Trails	C	\$ 2,777,000	\$ 1,677,000	\$ 4,454,000	Planned
Costa Mesa	Fair Drive For All Project	D	\$ 679,000	\$ 121,000	\$ 800,000	Started
Fullerton	Euclid Street - Valencia Avenue to State Route 91 Project	D	\$ 324,000	\$ 43,000	\$ 367,000	Planned
Santa Ana	Euclid Street Vision Zero Improvement Project Segment 1 - First Street to McFadden Avenue	C	\$ 5,699,000	\$ 738,000	\$ 6,437,000	Planned
Santa Ana	Euclid Street Vision Zero Improvement Project Segment 2 - Hazard Avenue to First Street	C	\$ 5,092,000	\$ 660,000	\$ 5,752,000	Planned
Tustin	Red Hill Avenue Rehabilitation Project (Sycamore Avenue to Bryan Avenue)	C	\$ 7,000,000	\$ 1,700,000	\$ 8,700,000	Planned
Brea	Tracks at Brea Final Phase Gap Closure	C	\$ 1,771,000	\$ 229,000	\$ 2,000,000	Planned

Notes:

1. Phases/projects completed before this reporting cycle are included only in the totals. Those completed during this period are shown here, with individual amounts consolidated into the cumulative totals.
13. Total project costs includes \$75,000 in non-match agency funds.

2025 STBG/CMAQ (Continued)						
Agency	Project Title	Phase	Award	Matching Funds	Total Project Cost	Status
Buena Park	Commonwealth Avenue Complete Streets and Pavement Rehabilitation Project	C	\$ 2,921,000	\$ 379,000	\$ 3,300,000	Planned
Fountain Valley	Rehabilitation and Resurfacing of Talbert Avenue, from East City Limit to Ward Street	C	\$ 2,640,000	\$ 660,000	\$ 3,300,000	Planned
Fullerton	Yorba Linda Boulevard – State College Boulevard to Bradford Avenue Street Rehabilitation Project	D	\$ 290,000	\$ 38,000	\$ 328,000	Planned
Huntington Beach	Garfield Avenue & Goldenwest Street Roadway	D	\$ 531,000	\$ 69,000	\$ 600,000	Planned
Huntington Beach	Goldenwest Street Roadway Improvements	D	\$ 531,000	\$ 69,000	\$ 600,000	Planned
Irvine	Venta Spur Trail and Jeffrey Road Pedestrian and Bicycle Bridge	C	\$ 4,000,000	\$ 500,000	\$ 4,500,000	Planned
Laguna Beach	Laguna Canyon Road: Protect & Connect	D	\$ 7,000,000	\$ 6,222,000	\$ 13,222,000	Planned
Mission Viejo	Marguerite Parkway Roadway Rehabilitation	C	\$ 400,000	\$ 52,000	\$ 452,000	Planned
Orange	Santiago Canyon Road Rehabilitation Project	D	\$ 238,000	\$ 42,000	\$ 280,000	Planned
Placentia	Palm Drive ¹⁴	D	\$ -	\$ -	\$ -	Cancelled
Placentia	Rose Drive	D	\$ 189,000	\$ 25,000	\$ 214,000	Planned
San Clemente	San Clemente North Beach Train Station Area Improvements and Transportation Demand Management	E,D	\$ 850,000	\$ 187,000	\$ 1,037,000	Planned - E Planned - D
Santa Ana	Euclid Street Vision Zero Improvement Project Segment 3 - McFadden Avenue to Edinger Avenue	C	\$ 4,671,000	\$ 605,000	\$ 5,276,000	Planned
Stanton	Western Avenue Rehabilitation Project	C	\$ 2,000,000	\$ 500,000	\$ 2,500,000	Planned
Seal Beach	Seal Beach Boulevard Pavement Rehabilitation	D	\$ 1,104,000	\$ 276,000	\$ 1,380,000	Planned
Tustin	Jamboree Road Rehabilitation Project (Interstate 5 to Portola Parkway)	C	\$ 7,000,000	\$ 4,600,000	\$ 11,600,000	Planned
Tustin	Tustin Ranch Road Pedestrian Bridge	C	\$ 7,000,000	\$ 7,450,000	\$ 14,450,000	Planned
Westminster	Goldenwest Street Improvements	C	\$ 5,492,000	\$ 712,000	\$ 6,204,000	Planned
Yorba Linda	Yorba Linda Boulevard/Savi Ranch Class I/IV Bikeway (Savi Ranch Parkway Widening and Connect Savi Ranch)*	C	\$ 2,416,000	\$ 330,000	\$ 2,746,000	Planned
2025 STBG/CMAQ Phases Completed		0	\$ -	\$ -	\$ -	
2025 STBG/CMAQ Phases in Progress		28	\$ 86,562,000	\$ 32,791,000	\$ 119,353,000	
2025 STBG/CMAQ Total Program		28	\$ 86,562,000	\$ 32,791,000	\$ 119,353,000	

Notes:

14. Project canceled due to funding and schedule constraints; the City has decided to deliver the project with local funds through a more streamlined environmental review process.

Active Transportation Program - Regional Component - Cycles 1-7 ¹						
Agency	Project Title	Cycle	Total ATP Award	Agency Funds	Total Project Cost	Status
Brea	Tracks at Brea - Gap Closure	5	\$ -	\$ -	\$ -	Completed
County of Orange	OC Loop Coyote Creek Bikeway (Segment O)	5	\$ 4,644,000	\$ 1,961,000	\$ 6,605,000	Started
Santa Ana	Raitt Street Protected and Buffered Bike Lane	5	\$ 5,499,000	\$ -	\$ 5,499,000	Started
Anaheim	Anaheim Pedestrian Crosswalk Safety Improvements	6	\$ 1,112,000	\$ -	\$ 1,112,000	Planned
Anaheim	Rio Vista Safe Routes to School Project	6	\$ 1,312,000	\$ -	\$ 1,312,000	Started

Notes:

1. Phases/projects completed before this reporting period are included only in the totals. Those completed during this reporting period are shown here, with individual amounts consolidated into the cumulative totals.

Active Transportation Program - Regional Component - Cycles 1-7 (Continued) ¹						
Agency	Project Title	Cycle	Total ATP Award	Agency Funds	Total Project Cost	Status
Buena Park	Dale/Whitaker Complete Streets Project	6	\$ 4,368,000	\$ 227,000	\$ 4,595,000	Started
Fullerton	Bridging the Gap: Nutwood Avenue Bicycle and Pedestrian Mobility Enhancements	6	\$ 7,140,000	\$ -	\$ 7,140,000	Started
Santa Ana	Jackson Elementary and Diamond Elementary SRTS	6	\$ 8,262,000	\$ -	\$ 8,262,000	Started
Santa Ana	MacArthur Intermediate and Taft Elementary SRTS	6	\$ 4,900,000	\$ -	\$ 4,900,000	Started
Santa Ana	Madison ES Roosevelt-Walker Academy Century HS SRTS	6	\$ 9,990,000	\$ -	\$ 9,990,000	Started
Santa Ana	Memory Lane and Flower Street Bikeway	6	\$ 5,000,000	\$ 1,264,000	\$ 6,264,000	Started
Santa Ana	Mendez Intermediate Advance Learning Santiago Elementary School Sierra Intermediate SRTS	6	\$ 9,987,000	\$ -	\$ 9,987,000	Started
Santa Ana	Santa Ana High School and Heninger Elementary School SRTS	6	\$ 8,222,000	\$ -	\$ 8,222,000	Started
Orange	Santiago Creek Bike Trail Gap Closure	7	\$ 2,302,000	\$ 20,618,000	\$ 22,920,000	Started
Santa Ana	Heroes Elementary School, Carver Elementary School, Willard Intermediate School, Wilson SRTS	7	\$ 3,350,000	\$ 7,694,000	\$ 11,044,000	Started
ATP Cycles 1-7 Regional Projects Completed			\$ 49,121,000	\$ 20,148,000	\$ 69,269,000	
ATP Cycles 1-7 Regional Projects In Progress			\$ 76,088,000	\$ 31,764,000	\$ 107,852,000	
ATP Cycles 1-7 Regional Projects Total Program			\$ 124,161,000	\$ 51,912,000	\$ 177,121,000	

State Funded OCTA Nominated Local Agency Led Projects						
Agency	Project Title	Program	Award	Agency Funds	Total Project Cost	Status
Fullerton	Transit and Intercity Rail Capital Program (TIRCP) - Direct Current Fast Charging (DCFC) at the Fullerton Transportation Center	TIRCP	\$ 625,000	\$ -	\$ 625,000	Planned
Santa Ana	TIRCP - Bike Lockers at Santa Ana Regional Transportation Center (SARTC)	TIRCP	\$ 2,650,000	\$ -	\$ 2,650,000	Planned
Santa Ana	TIRCP - DCFC at SARTC ¹⁵	TIRCP	\$ -	\$ -	\$ -	Canceled
Santa Ana	First Street Multimodal Boulevard Design	REAP 2.0	\$ 4,300,000	\$ -	\$ 4,300,000	Started
Santa Ana	McFadden Avenue Transit Signal Priority and Complete Streets	REAP 2.0	\$ 3,690,000	\$ -	\$ 3,690,000	Started
Completed			\$ 3,357,000	\$ -	\$ 3,357,000	
Started			\$ 7,990,000	\$ -	\$ 7,990,000	
Planned			\$ 3,275,000	\$ -	\$ 3,275,000	
Total			\$ 14,622,000	\$ -	\$ 14,622,000	

Notes:

15. Project canceled since the City received a separate grant that fully funded the project; funding was reprogrammed to an alternate Santa Ana project (Bike Lockers at SARTC).

Completed Programs			
2012 BCIP - 17 Completed Projects			
	Award	Matching Funds	Total Project Cost
2012 BCIP Total Program³	\$ 6,811,200	\$ 1,368,865	\$ 8,180,065
2014 BCIP - 5 Completed Projects			
	Award	Matching Funds	Total Project Cost
2014 BCIP Phases Completed³	\$ 1,100,736	\$ 4,111,454	\$ 5,212,190
2016 BCIP - 18 Completed Projects¹⁶			
	Award	Matching Funds	Total Project Cost
2016 BCIP Total Program³	\$ 15,649,955	\$ 2,474,999	\$ 18,124,954
2014 APM Program - 42 Completed Projects			
	Award	Matching Funds	Total Project Cost
2014 APM Total Program³	\$ 19,864,978	\$ 30,958,336	\$ 50,823,314
2021 EMSD - 12 Completed Projects¹⁷			
	Award	Matching Funds	Total Project Cost
2021 EMSD Total Program³	\$ 2,279,832	\$ 364,170	\$ 2,644,002

Notes:

3. Total does not include cancelled projects.

16. Last two phases under the 2016 BCIP recently completed during this current reporting cycle.

17. Last project under the 2021 EMSD recently completed during this current reporting cycle.

Planned - Indicates that the funds for this phase have not been obligated and/or allocated.

Started - Indicates that the fund for this phase have been obligated and/or allocated.

Completed - Indicates that the work related to this phase is complete.

Withdrawn - Indicates that the agency chose to not go forward with obligation/allocation.

Acronyms

ADA - Americans with Disabilities Act

APM - Arterial Pavement Management

ATP - Active Transportation Program

BCIP - Bicycle Corridor Improvement Program

C - Construction

CMAQ - Congestion Mitigation and Air Quality Improvement Program

D - Design (includes PS&E)

E - Environmental (includes PA&ED)

EMSD - Enhanced Mobility for Seniors and Disabled

ES - Elementary School

HS - High School

I-5 - Interstate 5

JOST - Jeffrey Open Space Trail

OC - Orange County

OCCSP - Orange County Complete Streets Program

OCTA - Orange County Transportation Authority

PLAN - Plan

PMRF - Pavement Management Relief Funding Program

REAP 2.0 - Regional Early Action Plan Grants of 2021

R - Right-of-way

ROW - Right-of-way

SRTS - Safe Routes to School

STBG - Surface Transportation Block Grant Program

W1 - Wave One

W2 - Wave Two

W3 - Wave Three

W4 - Wave Four

Competitive Grants Update

Competitive Grant Awards Pending Board Acceptance July 2023 through June 2026 (Fiscal Year (FY) 2023-26)							
No.	Board Acceptance	Federal / State	Agency	Program	Project	Status	Award Amount
1	TBD (Award Notice: May 2026)	State	Caltrans	Sustainable Transportation Planning Grant	Connected Paths: Building a Regional Inventory for Active Transportation - Lead: SCAG Sub-applicants: OCTA, LA Metro, and VCTC	Submitted	\$700,000
2	TBD (Award Notice: February 2026)	Federal	FTA	Bus Program	Security Cameras and Access Controls at OCTA Transportation Centers	Awarded	\$960,000
5	TBD (Award Notice: January 2026)	Federal	Federal Earmark (Rep. Sanchez)	CPF ¹	OC Loop Segment A (La Habra) (La Habra Union Pacific Rail Line Bikeway)	Awarded	\$3,000,000

Competitive Grant Awards and Federal Earmarks Not Requiring Board Acceptance July 2023 through June 2026 (Fiscal Year (FY) 2023-26)							
No.	Board Acceptance	Federal / State	Agency	Program	Project	Status	Award Amount
6	N/A (Award Notice: January 2026)	Federal	Federal Earmark (Rep. Kim)	Highway Infrastructure Programs ²	SR-55 (I-5 to SR-91) Improvement Project	Awarded	\$3,000,000
7	N/A (Award Notice: January 2026)	Federal	Federal Earmark (Rep. Min)	Highway Infrastructure Programs ²	Technology/Signal Upgrades	Awarded	\$250,000
8	N/A (Award Notice: June 2024)	Federal	SCAG	Carbon Reduction Program ³	ZEB Purchase	Awarded	\$15,048,000
9	N/A (Award Notice: March 2024)	Federal	Federal Earmark (Rep. Levin)	Transit Infrastructure Grants ²	Coastal Rail Corridor Relocation Study	Awarded	\$4,000,000
10	N/A (Award Notice: November 2023)	Federal	Federal Earmark (Rep. Kim)	Highway Infrastructure Programs ²	OC Loop Segment A (La Habra) (La Habra Union Pacific Rail Line Bikeway)	Awarded	\$3,000,000
11	N/A (Award Notice: November 2023)	Federal	Federal Earmark (Rep. Kim)	Highway Infrastructure Programs ²	SR-91 Improvement Project	Awarded	\$4,000,000

Board Accepted Competitive Grant Awards and Federal Earmarks July 2021 through June 2026 (FY 2021-26)							
No.	Board Acceptance	Federal / State	Agency	Program	Project	Status	Award Amount
12	May 2026	State/ Federal	MSRC	Transportation Demand Management - County Transportation Commission Partnership Program	OC Connections for LA28	Awarded	\$4,000,000
13	April 2026	Federal	SCAG	STBG / CMAQ	SCRRA Rehabilitation/Renovation	Awarded	\$22,000,000
14	April 2026	State	SCAG	STBG / CMAQ	SR-74 Ortega Highway Gap Closure & Multimodal Improvements	Awarded	\$1,500,000
15	April 2026	State	SCAG	STBG / CMAQ	First Street Complete Streets and Transit Signal Priority (in the City of Santa Ana) (Construction)	Awarded	\$2,000,000
16	April 2026	State	SCAG	STBG / CMAQ	OC Connect (Garden Grove-Santa Ana Rails-To-Trails)	Awarded	\$14,420,000

Notes:

1. Congressionally directed spending.
2. Administered through Caltrans; Board acceptance not required.
3. Award received through an FTA transfer; Board acceptance not required.

Competitive Grants Update

Board Accepted Competitive Grant Awards and Federal Earmarks July 2021 through June 2026 (FY 2021-26) (Continued)							
No.	Board Acceptance	Federal / State	Agency	Program	Project	Status	Award Amount
17	April 2026	State	SCAG	STBG / CMAQ	Zero Emission Buses:18 60-foot Buses	Awarded	\$30,000,000
18	April 2026	State	SCAG	STBG / CMAQ	PCH Railroad Bridge (SCRRA Orange Subdivision MP 200.2 Bridge Replacement in Dana Point - Lead: SCRRA Supported by OCTA	Awarded	\$5,544,000
19	April 2026	State	SCAG	STBG / CMAQ	I-5 Improvement Project San Diego County Line to Avenida Pico (HOV Lane)	Awarded	\$40,000,000
20	April 2026	State	SCAG	STBG / CMAQ	OC Streetcar Operations	Awarded	\$14,704,000
21	December 2025	Federal	DHS - FEMA	TSGP	VIPR and ATAC/Transportation Center Surveillance Protection (City of Newport Beach)	Awarded	\$431,327
22	September 2025	State	Caltrans	Caltrans Sustainable Transportation Planning Grant	Move OC: A Vibrant Path to Active Transportation (Countywide Active	Awarded	\$600,000
23	September 2025	State	CTC / SCAG	ATP Cycle 7 / SCP ⁴ - Active Transportation & Safety	Countywide Active Transportation Plan - Move OC	Awarded	\$416,000
24	December 2024	Federal	FRA	CRISI Program	Coastal Rail Infrastructure Resiliency Project (Coastal Rail Stabilization Priority Projects)	Awarded	\$100,000,000
25	December 2024	State	CTC	TCEP Advanced Programming ⁵	Coastal Rail Infrastructure Resiliency Project (Coastal Rail Stabilization Priority Projects)	Awarded	\$80,000,000
26	December 2024	State	CalSTA	TIRCP	Coastal Rail Infrastructure Resiliency Project (Coastal Rail Stabilization Priority Projects)	Awarded	\$125,000,000
27	November 2024	Federal	DHS	TSGP	Countywide Transit System Operational Deterrence - VIPR	Awarded	\$116,600
28	September 2024	Federal	US EPA	Brownfields Program - Multipurpose Grants	OC Connect Environmental Site Assessment	Awarded	\$1,000,000
29	July 2024	State	Caltrans	Sustainable Transportation Planning Grants	ZEB Infrastructure Readiness Study	Awarded	\$200,000
30	July 2024	Federal	Federal Earmark (Rep. Correa)	CPF ¹	OC Connect (Garden Grove- Santa Ana Rails-To-Trails)	Awarded	\$750,000
31	May 2024	State/ Federal	CTC	LTCAP ⁶	Coastal Rail Infrastructure Resiliency Project -	Awarded	\$12,000,000
32	May 2024	State	DTSC	Equitable Community Revitalization Grant	OC Connect Environmental Site Assessment	Awarded	\$350,000
33	September 2023	State	CTC	TCEP	SR-91 Multimodal Improvements	Awarded	\$42,566,000
34	September 2023	State	CTC	ATP Cycle 6	Next STEP 2.0	Awarded	\$850,000
35	July 2023	State	SCAG	REAP 2.0	Harbor Boulevard Cloud-Based Transit Signal Priority Stage 2	Awarded	\$1,000,000

Notes:

1. Congressionally directed spending.
4. SCAG's SCP is funded through the CTC's ATP.
5. The advanced programming mechanism allows the CTC to allocate TCEP funds ahead of the regular cycle for projects seeking federal grants. These funds serve as a non-federal match to enhance grant competitiveness and are contingent on federal grant approval.
6. The LTCAP and ATP Cycle 5 are state-administered programs that provided OCTA with federal awards.

Competitive Grants Update

Board Accepted Competitive Grant Awards and Federal Earmarks July 2021 through June 2026 (FY 2021-26) (Continued)							
No.	Board Acceptance	Federal/ State	Agency	Program	Project	Status	Award Amount
36	July 2023	State	SCAG	REAP 2.0	Reconnecting Communities Through Complete Streets	Awarded	\$550,000
37	July 2023	State	SCAG	REAP 2.0	Orange County Cyclic Counts 2024-2025	Awarded	\$400,000
38	July 2023	State	SCAG	REAP 2.0	Next STEP 2.0	Awarded	\$1,250,000
39	July 2023	State	SCAG	REAP 2.0	McFadden Avenue Transit Signal Priority and Complete Streets	Awarded	\$3,690,000
40	July 2023	State	SCAG	REAP 2.0	Bikeway Connectivity Study	Awarded	\$500,000
41	July 2023	State	SCAG	REAP 2.0	Orange County Mobility Hubs Pilot Concept of Operations	Awarded	\$300,000
42	July 2023	State	SCAG	REAP 2.0	First Street Multimodal Boulevard Design	Awarded	\$4,300,000
43	July 2023	State	SCAG	REAP 2.0	Active Transportation Outreach and Engagement Support	Awarded	\$400,000
44	July 2023	State	SCAG	REAP 2.0	Fullerton Park-and-Ride Joint Use Master Plan	Awarded	\$500,000
45	July 2023	State	SCAG	REAP 2.0	Harbor Boulevard Cloud-Based Transit Signal Priority Stage 1	Awarded	\$400,000
46	July 2023	State	CalSTA	TIRCP	Central Mobility Loop	Awarded	\$39,407,895
47	July 2023	State	CalSTA	TIRCP	Coastal Rail Corridor Relocation Study	Awarded	\$5,000,000
48	July 2023	Federal	US DOT	SMART	Pilot Innovative Cloud-Based Transit Signal Priority (Harbor Boulevard)	Awarded	\$1,600,000
49	March 2023	State	CalSTA	TIRCP	OC Streetcar	Awarded	\$149,841,000
50	August 2022	Federal	FTA	Low-No Program	Orange County Zero-Emission Paratransit Bus Pilot	Awarded	\$2,507,895
51	August 2022	Federal	DHS	TSGP	Operational Deterrence – VIPR and ATAC	Awarded	\$36,635
52	June 2022	State	Caltrans	Sustainable Transportation Planning Grants	Countywide Transportation Demand Management Strategic Plan	Awarded	\$150,000
53	September 2021	State/ Federal	CTC	ATP Cycle 5 ⁶	Garden Grove-Santa Ana Rails-to-Trails Gap Closure	Awarded	\$3,000,000
54	September 2021	State	MSRC	Clean Transportation Funding	OC Fair Express Bus Service	Awarded	\$289,054
55	September 2021	State	SCAG	Sustainable Communities Program	Bus Stop Safety and Accessibility Plan	Awarded	\$300,000
Total Grant Requests Awarded							\$747,828,406

Federal Earmarks Requests Pending Award Decision January 2025 through June 2026 (FY 2024-26)							
No.	Submittal Date	Federal/ State	Agency	Program	Project	Status	Grant Request
56	February 2026	Federal	Federal Earmark (Rep. Levin)	CPF ¹	PCH Bridge Replacement (MP 200.2)	Submitted	\$600,000
57	February 2027	Federal	Federal Earmark (Rep. Sanchez)	CPF ¹	OC Loop Segment A	Submitted	\$2,250,000

Notes:

- 1. Congressionally directed spending.
- 6. The LTCA and ATP Cycle 5 are state-administered programs that provided OCTA with federal awards.

Competitive Grants Update

Federal Earmarks Requests Pending Award Decision January 2025 through June 2026 (FY 2024-26) (Continued)							
No.	Submittal Date	Federal/State	Agency	Program	Project	Status	Grant Request
58	February 2026	Federal	Federal Earmark (Rep. Min)	CPF ¹	Metrolink Station Repairs - City of Irvine	Submitted	\$850,000
59	February 2026	Federal	Federal Earmark (Rep. Kim)	CPF ¹	SR-91 ECOP ⁷	Submitted	\$7,000,000
Total Earmark Requests Pending Award/Rejection							\$10,700,000

Competitive Grant Submittals Pending Grant Award Decision July 2025 through June 2026 (FY 2025-26)							
No.	Submittal Date	Federal/State	Agency	Program	Project	Status	Grant Request
60	June 2026	State	CTC	ATP Cycle 8	Orange County E-bike Crash Data Framework Development Plan	Submitted	\$794,000
61	June 2026	State	CTC	TCEP Advanced Programming ⁵	SR-91 ECOP - Lead: OCTA Sub-applicant: RCTC	Submitted	\$30,000,000
62	May 2026	State	CalSTA	TIRCP	Clean Transportation Corridor	Submitted	\$40,000,000
63	March 2026	State	CalOES (via FEMA)	SLCGP	Data Classification and Protection Assistance	Submitted	\$175,000
64	March 2026	State	CEC	Clean Transportation Program - Implementation of MDHD ZEV Infrastructure Blueprints 2.0	Santa Ana Bus Base Hydrogen Fueling Modifications	Submitted	\$4,000,000
65	February 2026	Federal	US DOT	BUILD	SR-91 ECOP - Lead: RCTC Sub-applicant: OCTA	Submitted	\$25,000,000
66	January 2026	State	CARB	HVIP	Seven ZE 60-Foot Buses (2026 XH60 New Flyer)	Submitted	\$2,184,000
67	May 2025	State	CARB	HVIP	Ten Battery Electric Buses (2026 XE40 New Flyer)	Submitted	\$1,560,000
68	May 2025	State	CARB	HVIP	40 Fuel Cell Electric Buses (2026 XHE40 New Flyer)	Submitted	\$10,320,000
Total Grant Requests Pending Award/Rejection							\$114,033,000

Competitive Grant Submittals Not Awarded Notified July 2025 through June 2026 (FY 2025-26)							
No.	Submittal Date	Federal/State	Agency	Program	Project	Status	Grant Request
69	November 2025	State	Caltrans	Sustainable Transportation Planning Grant	State College/Bristol Corridor Study	Not Awarded	\$663,975
70	November 2025	State	Caltrans	Caltrans Sustainable Transportation Planning Grant	Countywide Transit Signal Prioritization Study	Not Awarded	\$700,000
71	September 2025	State	CalOES	HMGP	OCTA M2 EMP Preserves Fire Hardening Project	Not Awarded	\$350,460
72	June 2025	Federal	FTA	Low-No Program/Bus Program	Three 60-foot Alternative Fuel Buses and Workforce Development	Not Awarded	\$7,500,000
73	April 2025	Federal	Federal Earmark (Senator Schiff)	CPF ¹	Zero Emission Vanpools	Not Awarded	\$3,000,000
74	April 2025	Federal	Federal Earmark (Senator Padilla)	CPF ¹	Zero Emission Paratransit	Not Awarded	\$3,000,000
75	April 2025	Federal	Federal Earmark (Rep. Tran)	CPF ¹	SR-57 Truck Climbing Lanes	Not Awarded	\$3,000,000
76	April 2025	Federal	Federal Earmark (Rep. Correa)	CPF ¹	SR-91 Segment 3 Acacia Street to La Palma Avenue	Not Awarded	\$3,000,000
77	January 2025	Federal	US DOT	BUILD (Formerly RAISE)	SR-91 Segment 2	Not Awarded	\$25,000,000
Total Grant Requests Not Awarded							\$46,214,435
Total Grant Requests Submitted and Awarded/Not Awarded							\$918,775,841

Notes:

1. Congressionally directed spending.
5. The advanced programming mechanism allows the CTC to allocate TCEP funds ahead of the regular cycle for projects seeking federal grants. These funds serve as a non-federal match to enhance grant competitiveness and are contingent on federal grant approval.
7. Joint earmark request with RCTC, funding secured to be split between the two agencies.

Competitive Grants Update

Acronyms

ATAC - Anti-Terror Anti-Crime
ATP - Active Transportation Program
Brea - City of Brea
BUILD - Better Utilizing Investments to Leverage Development Grant Program
Bus Program - Buses and Bus Facilities Program
CalOES - California Governor's Office of Emergency Services
CalSTA - California State Transportation Agency
Caltrans - California Department of Transportation
CEC - California Energy Commission
CMAQ - Congestion Mitigation and Air Quality Improvement Program
CPF - Community Project Funding
CRISI - Consolidated Rail Infrastructure and Safety Improvements
CTC - California Transportation Commission
DHS - Department of Homeland Security
DTSC - Department of Toxic Substances Control
ECOP - Eastbound Corridor Operations Project
EMP - Environmental Mitigation Program
FEMA - Federal Emergency Management Agency
FRA - Federal Railroad Administration
FTA - Federal Transit Administration
FY - Fiscal Year
Garden Grove - City of Garden Grove
HMGP - Hazard Mitigation Grant Program
HOV - High-Occupancy Vehicle
HVIP - Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project
HIP - Highway Infrastructure Programs
I - Interstate
LA28 - Los Angeles 2028 Olympic and Paralympic Games
La Habra - City of La Habra
LA Metro - Los Angeles County Metropolitan Transportation Authority
Low-No Program - Low or No-Emission Grant Program
LTCAP - Local Transportation Climate Adaptation Program
M2 - Measure M2
MP - Mile Post
MSRC - Mobile Source Air Pollution Reduction Review Committee
MDHD ZEV - Medium- and Heavy Duty Zero-Emission Vehicle
N/A - Not Applicable
Next STEP 2.0 - Next Safe Travels Education Program 2.0
OC - Orange County
OCMF - Orange County Maintenance Facility
OCTA - Orange County Transportation Authority
OC Loop (La Habra and Brea) - Orange County Loop (La Habra and Brea)
PCH - Pacific Coast Highway
RAISE - Rebuilding American Infrastructure with Sustainability and Equity Discretionary Grant
REAP 2.0 - Regional Early Action Planning Grants 2.0
RCTC - Riverside Transportation Commission
Rep. - Representative
Santa Ana - City of Santa Ana
SCAG - Southern California Association of Governments
SCP - Sustainable Communities Program
SCRRRA - Southern California Regional Rail Authority
SMART - Strengthening Mobility and Revolutionizing Transportation
SLCGP - State and Local Cybersecurity Grant Program
SR - State Route
STEP - Safe Travels Education Program
STBG - Surface Transportation Block Grant Program
TBD - To Be Determined
TCEP - Trade Corridor Enhancement Program
TIRCP - Transit Intercity Rail Capital Program
TSGP - Transit Security Grant Program
US DOT - United States Department of Transportation
US EPA - United States Environmental Protection Agency
VCTC - Ventura County Transportation Commission
VIPR - Visible Intermodal Protection and Response
XHE40 - Xcelsior Hydrogen Electric 40-Foot Bus
XE40 - Xcelsior Electric 40-Foot Bus
XH60 - Xcelsior Hydrogen 60-Foot Articulated Bus
ZE - Zero-Emission
ZEB - Zero-Emission Bus

Orange County Transportation Authority Priority Project List

Project	Planning Document Consistency ¹
Bus Transit	
Zero-Emission Bus (Long Term)	Zero-Emission Bus Roll Out Plan Long-Range Transportation Plan (LRTP)
Future Paratransit Fleet Replacement - Zero-Emission	Zero-Emission Bus Roll Out Plan LRTP
Harbor Boulevard Connected Bus Pilot	Central Harbor Boulevard Transit Corridor Study Orange County (OC) Transit Vision LRTP
Harbor Boulevard High-Capacity Transit Expansion Environmental	Central Harbor Boulevard Transit Corridor Study OC Transit Vision LRTP
Zero-Emission Vanpools	LRTP
First Street Transit Signal Priority and Complete Streets	Master Plan of Arterial Highways (MPAH) LRTP OC Transit Vision
McFadden Avenue Transit Signal Priority and Complete Streets	MPAH LRTP OC Transit Vision
Solar Panels at the Orange County Transportation Authority (OCTA) Bus Bases	Zero-Emission Bus Roll Out Plan LRTP
Facility Improvements	OCTA Comprehensive Business Plan LRTP Transit Asset Management Plan
Bus Stop Improvements	OC Transit Vision LRTP
Future Bravo!/Rapid Projects	OC Transit Vision LRTP
Orange County Mobility Hubs Pilot Concept of Operations	Orange County Mobility Hubs Plan LRTP
Fullerton Park-and-Ride Transit Oriented Development Site Design Concepts	Fullerton Joint Development Study LRTP
Transit Security	LRTP

Project	Planning Document Consistency ¹
Rail Transit	
Coastal Rail Infrastructure Resiliency Project	Rail Infrastructure Study Hazard Mitigation Plan OC Rail Defense Against Climate Change L RTP
Olympic Readiness Project: Orange County Maintenance Facility Phase 1	SoCal Connect L RTP
Metrolink Locomotive Replacement, Track, and Structures	SoCal Connect L RTP
Metrolink Operations and Fare Revenue Loss	SoCal Connect L RTP
OC Streetcar Operations and Maintenance	L RTP
Pacific Coast Highway Coastal Rail Bridge	SoCal Connect L RTP
Ongoing Metrolink Operations and Station Needs	SoCal Connect L RTP
Active Transportation and Complete Streets	
OC Loop - Segment A and B (Cities of La Habra and Brea)	Orange County Bike Connectors Gap Closure Feasibility Study OC Active L RTP
OC Connect - Santa Ana - Garden Grove Rails-to-Trails	Orange County Bike Connectors Gap Closure Feasibility Study OC Active L RTP
Katella Avenue Pedestrian Bridge	L RTP
Electric (E) Bicycle / E-Motorcycle Safety Plan	OC Active Safe Routes to School (SRTS) Action Plan Systemic Safety Plan L RTP
Active Transportation Outreach	OC Active SRTS Action Plan L RTP
Bicycle Counts	OC Active SRTS Action Plan Active Transportation Counts Program Study L RTP
National and State Highway System	
Interstate 5 (I-5) [Yale-State Route 55 (SR-55)] Segment 2	L RTP Measure M2 (M2)
SR-55 [I-5 to State Route 91 (SR-91)]	SR-55 Comprehensive Multimodal Corridor Plan (CMCP) L RTP M2
Ortega Highway Wildlife Crossing	L RTP

Project	Planning Document Consistency ¹
Managed Lanes	
I-5 (Avenida Pico to San Diego Line)	South Orange County Multimodal Transportation Study LRTP
Freight / Trade Corridors	
State Route 57 (Lambert Road to Orange County Line)	LRTP
SR-91 Eastbound Corridor Operations Project	SR-91 Implementation Plan LRTP
Technology / Signal Upgrades	LRTP

Notes

1. Cost information is not included as estimates change over time.



Capital Funding Program Report

Pending Approval by OCTA Board of Directors - July 27, 2026

Bus Transit Project												
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds			
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local	
Go Local - Step 1	S	\$5,730								\$5,730		
Mobile ticketing equipment	S	\$4,036						\$4,036				
M2 Project V Community Circulators	V	\$53,767									\$53,767	
M2 Project W Safe Transit Stops (City)	W	\$1,708									\$1,708	
M2 Project W Safe Transit Stops (OCTA)	W	\$370									\$370	
40 Hydrogen Fuel-Cell 40-Foot Buses		\$65,595	\$29,831					\$35,764				
Alternate Fuel Replacement 60-Foot Buses (20)		\$55,605	\$42,224					\$13,381				
Anaheim Transportation Network suballocation		\$9,493		\$9,493								
Associated Transportation Improvements		\$556		\$556								
Bike Lockers at Santa Ana Regional Transportation Center (SARTC)		\$2,000						\$2,000				
Bravo! 553 (operating costs)		\$7,275	\$5,721					\$1,554				
Bus engine repowers (173)		\$12,365	\$12,365									
Capitalized cost of contracted services FY 2021-22 to FY 2025-26 (ACCESS and contracted fixed-route contracts)		\$463,410		\$365,958								\$97,452
DCFC Charging at Fullerton Transportation Center and SARTC		\$1,250						\$1,250				
Digital bus stop sign 13" along high quality transit corridors (143 signs)		\$2,500				\$2,500						
Enhanced Mobility for Seniors and Disabled (EMSD) Call		\$2,280										\$2,280
Facilities upgrades, modifications, and replacement projects		\$1,739					\$1,739					
Harbor Boulevard Connected Bus Pilot Stage I		\$2,000		\$1,600				\$400				
Harbor Boulevard Connected Bus Pilot Stage II		\$6,776						\$6,776				
Harbor Boulevard dynamic bus lane (environmental/engineering)		\$5,100						\$5,100				
Harbor Boulevard high-capacity transit expansion environmental		\$14,000	\$14,000									
Heating-Ventilation Replacement at Santa Ana Bus Base		\$4,593						\$4,593				
Hydrogen Fueling Station at Garden Grove Bus Base		\$22,080						\$8,156	\$13,924			
Installation of Battery-Electric Chargers at Santa Ana Bus Base		\$2,790						\$2,790				
Non-fixed-route paratransit operations assistance - FY 2021-22 to FY 2025-26		\$257,046		\$97,682								\$159,364
OC Bus Operations - Connections to OC Streetcar		\$6,072							\$6,072			
OC Connections for LA28		\$4,400							\$4,000			\$400
OC Mobility Hubs Strategy		\$297	\$263				\$34					
Open payment system and smart fareboxes		\$26,500							\$26,500			
Preventive maintenance - including salaries and benefits (includes ATN & Laguna Beach)		\$327,556		\$327,556								
Purchase 117 replacement paratransit vehicles		\$14,995		\$14,995								
Purchase 131 replacement paratransit vehicles		\$29,023		\$29,023								
Rehabilitation and renovation at OCTA bus facilities		\$1,509		\$1,207								\$302
Rideshare/vanpool		\$20,232	\$20,232									
Safety Projects		\$565		\$565								
Security Cameras and Access Controls at OCTA Transportation Centers		\$1,200		\$960								\$240



Capital Funding Program Report

Pending Approval by OCTA Board of Directors - July 27, 2026

Bus Transit Project											
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds		
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local
Security Gates at Garden Grove, Santa Ana, Anaheim bus bases		\$5,859					\$5,859				
Transit Security and Operations Center		\$68,261			\$3,660	\$10,381	\$43,828	\$5,603			\$4,789
Transit service expansion planning		\$9,000	\$9,000								
Vanpool Program - capital lease		\$12,999	\$12,999								
Zero-emission bus (future)		\$34,084	\$22,624					\$11,460			
Zero-emission bus and bus facility		\$142,955	\$115,594					\$27,361			
Zero-emission Paratransit Vehicle Pilot		\$5,016		\$2,508				\$2,507			\$1
Bus Transit Project Totals		\$1,714,587	\$284,853	\$852,103	\$3,660	\$12,915	\$66,965	\$167,688	\$5,730	\$55,845	\$264,828
Federal Funding Total		\$1,140,616									
State Funding Total		\$247,568									
Local Funding Total		\$326,403									
Total Funding (000's)		\$1,714,587									

Bus Transit Project Completed											
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds		
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local
ACCESS and fixed-route radio systems upgrade		\$22,465		\$4,434	\$341			\$16,239			\$1,451
Bravo! 529 buses (six)		\$3,595	\$549					\$3,046			
Bus replacement - articulated alternative fuel buses (60-Foot)		\$31,105	\$22,250	\$8,855							
Bus replacement (40-Foot and ACCESS)		\$149,009	\$29,198	\$68,139							\$51,672
Engine rebuild		\$16,294		\$14,824				\$1,470			
FTA Section 5310 Enhanced Mobility of Seniors and Individuals with Disabilities		\$3,657		\$3,657							
FTA Section 5316 Jobs Access and Reverse Commute		\$13,962		\$13,962							
FTA Section 5317 New Freedom		\$6,388		\$6,388							
Goldenwest Transportation Center parking structure		\$4,000	\$3,400								\$600
Goldenwest Transportation Center surface lot		\$2,000						\$1,200			\$800
Heating ventilation unit replacements		\$92					\$92				
iShuttle replacement buses (12)		\$6,760					\$6,084				\$676
MSRC County Transportation Commission Partnership Program		\$2,761						\$1,924			\$837
Purchase 201 40-foot alternative fuel replacement buses (OCTA)		\$124,221		\$124,221							
Standby backup generators at Anaheim and IRCC bases		\$1,601					\$1,601				
Transit Security Program		\$3,167						\$3,167			
VSS upgrades at OCTA facilities		\$1,159		\$960				\$199			
Zero-emission Bravo! buses (ten-battery electric) and bus infrastructure		\$11,289					\$6,295	\$4,994			
Zero-emission hydrogen fuel cell buses (ten)		\$12,978					\$5,640	\$7,338			



Capital Funding Program Report

Pending Approval by OCTA Board of Directors - July 27, 2026

Bus Transit Project Completed											
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds		
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local
Bus Transit Project Completed Totals		\$416,503	\$55,397	\$245,440	\$341		\$19,712	\$39,577			\$56,036
Federal Funding Total		\$301,178									
State Funding Total		\$59,289									
Local Funding Total		\$56,036									
Total Funding (000's)		\$416,503									



Capital Funding Program Report

Pending Approval by OCTA Board of Directors - July 27, 2026

Local Road Project											
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds		
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local
State-Local Partnership Program (SLPP) formula grant call	M1/Q	\$54,445						\$24,945	\$1,280	\$27,249	\$971
M2 Project O Regional Capacity Program call	O	\$402,211						\$24,254		\$377,957	
SR-57 truck climbing lane phase I - Lambert Road interchange improvement	O	\$121,500			\$7,719	\$74,705				\$19,254	\$19,822
M2 Project P Regional Signal Synchronization Program call	P	\$158,828	\$1,774					\$11,762	\$4,546	\$140,746	
Regional Traffic Signal Synchronization (Edinger Avenue, MacArthur Boulevard/Talbert Avenue, and Warner Avenue)	P	\$15,000					\$10,200			\$4,200	\$600
M2 Project Q Fair Share Program (FY 2016-17 through FY 2021-22)	Q	\$361,621								\$361,621	
M2 Project X Environmental Clean Up	X	\$64,449								\$64,449	
Active Transportation Program - regional call		\$82,704	\$6,359		\$62,653	\$92		\$107			\$13,493
Bicycle Corridor Improvement Program (BCIP)		\$63,128	\$43,755								\$19,373
Bristol Street widening		\$44,750									\$44,750
Countywide Signal Synchronization Baseline		\$15,000	\$15,000								
First Street Complete Streets and Transit Signal Priority		\$6,559	\$2,000					\$4,300			\$259
Local Agency led SCCP projects		\$3,357					\$3,357				
M1 Combined Transportation Funding Program (CTFP)		\$34,000							\$34,000		
McFadden Avenue Transit Signal Priority Pilot		\$3,690						\$3,690			
OC Connect Santa Ana - Garden Grove Rails to Trails		\$22,070	\$14,420		\$3,750	\$3,900					
OC Loop - Segment A (City of La Habra)		\$50,154	\$2,402		\$3,340	\$42,389					\$2,023
OC Loop - Segment B (City of Brea)		\$20,677	\$7,368		\$4,012	\$6,149					\$3,148
Orange County Complete Streets (Wave 3)		\$34,706	\$26,316								\$8,390
Orange County Complete Streets (Wave 4)		\$5,229	\$4,687								\$542
Orange County Complete Streets Program (Wave 1)		\$40,915	\$25,062								\$15,853
Orange County Complete Streets Program (Wave 2)		\$40,072	\$33,421								\$6,651
Pavement Management Relief Funding Program		\$9,469			\$3,811			\$5,658			
SCAG sustainability planning grants		\$720			\$671						\$49
Traffic signal improvements		\$15,000				\$12,000					\$3,000
Transportation enhancement activities		\$22,172			\$15,628						\$6,544
Local Road Project Totals		\$1,692,426	\$182,564		\$101,584	\$139,235	\$13,557	\$74,716	\$39,826	\$995,476	\$145,468
Federal Funding Total		\$284,148									
State Funding Total		\$227,508									
Local Funding Total		\$1,180,770									
Total Funding (000's)		\$1,692,426									



Capital Funding Program Report

Pending Approval by OCTA Board of Directors - July 27, 2026

Local Road Project Completed											
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds		
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local
Grand Avenue widening, 1st Street to 4th Street	O	\$12,537	\$6,708								\$5,829
Kraemer Boulevard grade separation	O	\$63,830	\$22,044					\$16,973		\$22,981	\$1,832
Lakeview Avenue grade separation	O	\$110,702	\$37,102		\$9,709			\$27,344		\$21,792	\$14,755
Orangethorpe Avenue grade separation	O	\$106,043	\$38,240		\$18,600			\$30,324		\$16,182	\$2,697
Placentia Avenue grade separation	O	\$64,539						\$33,386		\$27,453	\$3,700
Raymond Avenue grade separation	O	\$125,419						\$95,482		\$22,373	\$7,564
State College Boulevard grade separation	O	\$99,380	\$27,161		\$10,887			\$34,785		\$15,460	\$11,087
Tustin Avenue/Rose Drive grade separation	O	\$96,638	\$45,957					\$22,534		\$26,384	\$1,763
M2 Fair Share State - Local Partnership Grant Program	Q	\$7,032						\$3,516		\$3,516	
Antonio Parkway widening		\$32,553	\$15,499								\$17,054
ARRA transportation enhancements		\$6,833			\$4,049				\$500		\$2,284
Arterial Pavement Management Program		\$50,951	\$19,655		\$604						\$30,692
Atlanta Avenue widening		\$4,160	\$2,278								\$1,882
Firestone Boulevard widening at Artesia Boulevard		\$2,468	\$2,059								\$409
Local Agency American Reinvestment and Recovery Act of 2009 rehabilitation projects		\$32,369			\$32,369						
Del Obispo Street widening	M1	\$6,419	\$3,740								\$2,679
I-5 at La Paz Road interchange improvements	M1	\$8,942	\$2,800						\$1,792		\$4,350
Imperial Highway Smart Streets	M1	\$1,900						\$200	\$200		\$1,500
Traffic Light Synchronization Program (TLSP), countywide - Proposition 1B	M1	\$8,000						\$4,000	\$4,000		
Local Road Project Completed Totals		\$840,715	\$223,243		\$76,218			\$268,544	\$6,492	\$156,141	\$110,077
Federal Funding Total		\$299,461									
State Funding Total		\$268,544									
Local Funding Total		\$272,710									
Total Funding (000's)		\$840,715									



Capital Funding Program Report

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Rail Project											
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds		
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local
OC Streetcar (New Starts)	M1/S	\$720,705	\$130,132	\$171,961				\$175,427		\$243,185	
OC Streetcar (non-New Starts)	M1/S	\$16,702		\$342					\$6,904	\$9,313	\$143
Coastal Rail Infrastructure Resiliency Project Environmental Phase 2	R	\$10,220			\$8,176					\$2,044	
Coastal Rail Stabilization Priority Project	R	\$313,580			\$103,824		\$80,000	\$128,800		\$956	
Cyprus Shore Initial Track Stabilization Projects (MP 206.8)	R	\$8,000								\$7,000	\$1,000
Cyprus Shore Track Stabilization Projects (MP 206.8)	R	\$14,110	\$6,000		\$1,210	\$6,000		\$200		\$700	
Future VSS	R	\$217		\$174							\$43
Inland Slope Rehabilitation Phase II	R	\$8,170					\$2,400			\$5,770	
Irvine Station Improvement Project	R	\$6,330						\$6,330			
Metrolink new capital	R	\$21,977	\$2,121	\$19,856							
Metrolink Operating Subsidy - FY 2023-24 to FY 2027-28	R	\$271,246		\$71,212				\$135,745		\$64,289	
Metrolink rehabilitation/renovation	R	\$231,117	\$22,000	\$209,117							
Metrolink station and track improvements, and rehabilitation	R	\$3,063		\$2,617							\$446
MP 204.2 Mariposa Point	R	\$9,200				\$9,200					
OC Maintenance Facility	R	\$91,230				\$20,000		\$71,230			
Pacific Coast Highway Coastal Rail Bridge	R	\$21,263				\$15,000					\$6,263
Pedestrian Audible Warning System (PAWS)	R	\$2,036						\$1,818			\$218
Placentia Commuter Rail Station	R	\$34,825	\$50			\$2,500		\$400		\$8,000	\$23,875
Rail track and structures	R	\$86,468						\$86,468			
San Clemente Track Protection (MP 204.6)	R	\$5,500				\$3,000	\$2,500				
San Juan Creek Bridge replacement	R	\$65,581	\$945	\$38,513	\$913		\$5,578	\$18,253		\$1,379	
SCRRA operating subsidy assistance	R	\$2,510								\$2,510	
OC Streetcar operations	S	\$166,938	\$26,682					\$80,731		\$35,396	\$24,129
Rail Project Totals		\$2,110,988	\$187,930	\$513,792	\$114,123	\$55,700	\$90,478	\$705,402	\$6,904	\$380,542	\$56,117
Federal Funding Total		\$815,845									
State Funding Total		\$851,580									
Local Funding Total		\$443,563									
Total Funding (000's)		\$2,110,988									

Rail Project Completed											
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds		
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local
Fullerton Transportation Center parking expansion	M1/R	\$33,667				\$11,250		\$11,035	\$9,718		\$1,664
Laguna Niguel-Mission Viejo Station parking improvements and expansion (ADA ramps)	M1/R	\$5,581	\$3,204	\$732					\$1,645		
Metrolink Grade Crossing safety improvements (OCX)	M1/R	\$80,618						\$18,250	\$7,600	\$30,710	\$24,058
Metrolink rolling stock	M1/R	\$158,009	\$42,230	\$35,390				\$36,300	\$44,089		



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Rail Project Completed											
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds		
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local
Metrolink service track expansion	M1/R	\$119,957						\$51,399	\$68,558		
Orange Transportation Center parking structure	M1/R	\$31,003	\$2,555	\$2,644		\$13,762			\$1,850	\$420	\$9,772
Sand Canyon Avenue grade separation	M1/R	\$62,050	\$10,536					\$28,192	\$3,116	\$5,352	\$14,854
M2 Project S Fixed-Guideway Anaheim Rapid connection	M1/S	\$9,924		\$1,516					\$6,000	\$1,286	\$1,122
Anaheim Regional Intermodal Transportation Center (ARTIC) construction	M1/T	\$184,164	\$33,250	\$37,253	\$3,501	\$29,219			\$43,900	\$35,291	\$1,750
Fullerton Transportation Station expansion planning, environmental PSR	M1/T	\$0	\$0						\$0		
Santa Ana grade separation planning and environmental PSR	M1/T	\$1,333	\$1,180						\$153		
Santa Ana Transportation Station planning and environmental PSR	M1/T	\$1,003	\$888						\$115		
17th Street grade separation environmental	R	\$2,476								\$2,476	
Anaheim Canyon Station	R	\$34,200	\$30,432							\$2,000	\$1,768
Control Point at 4th Street	R	\$2,985		\$2,985							
Control Point Stadium crossover	R	\$6,490		\$3,245				\$3,245			
Fullerton Transportation Center stair rehabilitation	R	\$1,065		\$1,030							\$35
Laguna Niguel to San Juan Capistrano passing siding	R	\$35,956	\$24,652	\$1,015		\$3,000		\$6,734			\$555
LOSSAN Corridor grade separations PSR in the Cities of Anaheim, Orange, and Santa Ana	R	\$2,699								\$2,699	
Metrolink grade crossing safety improvements ROW	R	\$3,025								\$3,025	
North Beach crossings safety enhancements	R	\$348						\$166		\$182	
Positive Train Control (Metrolink)	R	\$39,916		\$4,492	\$1,234			\$34,190			
Rail Crossing signal lights and pedestrian gates	R	\$252						\$252			
Rail station platform safety improvements (Cities of Fullerton, Irvine, and Tustin)	R	\$553						\$553			
Safety repairs for San Clemente Pier Station	R	\$122						\$122			
San Clemente Beach Trail crossings safety enhancements	R	\$4,999						\$2,170		\$2,251	\$578
Slope and culvert improvements	R	\$300		\$300							
Slope stabilization Laguna Niguel-Lake Forest	R	\$5,168		\$4,834						\$334	
Tactile tile project	R	\$1,569		\$1,538						\$31	
Ticket vending machines	R	\$6,857									\$6,857
Transit Rail Security (monitors, fencing, video surveillance)	R	\$163						\$163			
VSS at commuter rail stations	R	\$4,409		\$3,594				\$56			\$759
Go Local	S	\$7,730							\$7,730		
M2 Project S Transit extensions to Metrolink (Rubber Tire)	S	\$733								\$733	
ARTIC environmental, ROW, program management support, site plan	M1	\$41,369							\$8,869		\$32,500
Fiber Optics installation (Metrolink)	M1	\$23,183		\$10,903				\$10,479	\$1,801		
Laguna Niguel-Mission Viejo Station parking expansion (south lot)	M1	\$4,135						\$695	\$3,440		
Tustin Rail Station parking expansion	M1	\$15,390				\$1,100		\$7,181	\$7,109		
Rail Project Completed Totals		\$933,401	\$148,927	\$111,471	\$4,735	\$58,331		\$211,182	\$215,693	\$86,790	\$96,272



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Rail Project Completed												
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds			
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local	
Federal Funding Total		\$265,133										
State Funding Total		\$269,513										
Local Funding Total		\$398,755										
Total Funding (000's)		\$933,401										



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State Highway Project											
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds		
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local
I-5 widening, I-405 to Yale Avenue (Segment 1)	B	\$337,943	\$47,473		\$5,421	\$95,338	\$11,374			\$178,337	
I-5 widening, Yale Avenue to SR-55 (Segment 2)	B	\$290,041	\$32,527				\$9,780			\$247,734	
I-5 widening, Alicia Parkway to El Toro Road (Segment 3)	C	\$227,523	\$49,897		\$4,728		\$16,915			\$155,983	
I-5 widening, Oso Parkway to Alicia Parkway (Segment 2)	C	\$228,675	\$48,676		\$7,921					\$172,078	
I-5 widening, SR-73 to Oso Parkway (Segment 1)	C	\$248,198	\$28,167		\$6,433	\$73,735	\$18,242	\$29,832		\$91,789	
I-5, SR-73 to El Toro Road landscaping/replacement planting	C	\$12,335	\$790			\$6,000				\$5,545	
I-5/El Toro Interchange	D	\$9,713	\$9,213							\$500	
SR-55 (I-5 to SR-91)	F	\$202,135	\$7,865		\$2,641					\$191,629	
SR-55 widening between I-405 and I-5	F	\$505,720	\$160,500		\$42,375	\$80,000	\$140,000			\$82,845	
SR-57 Orangewood Avenue to Katella Avenue	G	\$135,400	\$11,500		\$3,240					\$120,660	
SR-57 truck climbing lane phase II: Lambert Road to LA County Line	G	\$32,750				\$29,500				\$3,250	
SR-91, Acacia Avenue to La Palma Avenue (Segment 3)	I	\$222,404	\$1,770		\$3,000					\$30	\$217,604
SR-91, La Palma Avenue to SR-55 (Segment 2)	I	\$380,681	\$3,460		\$4,000		\$6,641			\$40	\$366,540
SR-91, SR-55 to Lakeview Avenue (Segment 1)	I	\$132,777	\$1,770		\$5,000		\$42,566			\$30	\$83,411
SR-91, SR-57 to SR-55 (Segment 1,2 and 3) Outreach	I	\$2,000									\$2,000
SR-91, SR-241 to I-15	J	\$41,800									\$41,800
I-405 improvements, SR-73 to I-605	K	\$2,159,999	\$35,000		\$10,648			\$89,771		\$1,395,650	\$628,930
I-405 (I-5 to SR-55)	L	\$8,000	\$8,000								
I-605/ Katella Avenue interchange	M	\$53,014	\$17,800							\$35,214	
241/91 Express Lanes (HOT) connector		\$182,298	\$50								\$182,248
I-5 Improvement from County Line to Avenida Pico		\$53,050	\$53,050								
I-5 widening, I-405 to Yale Avenue (Segment 1) Multi Asset Project		\$50,144			\$36,400			\$13,744			
I-5 widening, Yale Avenue to SR-55 (Segment 2) Multi Asset Project		\$37,859			\$27,861			\$9,998			
SR-74 - Ortega Highway Gap Closure and Multimodal Improvements		\$88,513	\$30,000		\$4,250	\$43,913				\$7,200	\$3,150
SR-74 widening, City/County line to Antonio Parkway		\$40,905	\$5,285			\$10,000					\$25,620
SR-91, Acacia Avenue to La Palma Avenue (Segment 3) Multi Asset Project		\$35,046			\$26,021			\$9,025			
SR-91, SR-55 to Lakeview Avenue (Segment 1) Multi Asset Project		\$7,968			\$7,968						
State Highway Project Totals		\$5,726,891	\$552,793		\$197,907	\$338,486	\$245,518	\$152,370		\$2,688,514	\$1,551,303
Federal Funding Total		\$750,700									
State Funding Total		\$736,374									
Local Funding Total		\$4,239,817									
Total Funding (000's)		\$5,726,891									



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State Highway Project Completed											
Project Title	M Code	Total Funding	Federal Funds			State Funds			Local Funds		
			STBG/CMAQ	FTA	Other Fed.	STIP	SB1	Other State	M1	M2	Other Local
I-5 from SR-55 to SR-57, add one HOV lane each direction	A	\$41,500	\$36,191							\$5,309	
I-5 HOV lane each direction s/o PCH to San Juan Creek Road	C	\$74,300	\$11,326					\$20,789		\$42,185	
I-5 HOV lanes from s/o Avenida Vista Hermosa to s/o PCH	C	\$75,300	\$12,065			\$46,779				\$16,456	
I-5 HOV lanes: s/o Avenida Pico to s/o Avenida Vista Hermosa	C	\$83,500	\$26,867		\$1,600	\$43,735				\$11,298	
I-5/SR-74 interchange improvements	D	\$80,300				\$48,683		\$24,109	\$2,500		\$5,008
I-5/SR-74 interchange landscaping/replacement planting	D	\$1,440			\$752	\$688					
SR- 57 n/b widening, Katella Avenue to Lincoln Avenue - landscaping	G	\$2,172								\$2,172	
SR- 57 n/b widening, SR-91 to Yorba Linda Boulevard - landscaping	G	\$946								\$946	
SR-57 n/b widening, Katella Avenue to Lincoln Avenue	G	\$35,827						\$24,127		\$11,700	
SR-57 n/b widening, SR-91 to Yorba Linda Boulevard	G	\$51,354						\$39,475		\$11,879	
SR-57 n/b widening, Yorba Linda Boulevard to Lambert Road	G	\$52,871						\$41,250		\$11,621	
SR-57 n/b widening, Yorba Linda Boulevard to Lambert Road - landscaping	G	\$1,193								\$1,193	
SR-91 w/b connect existing aux lanes, I-5 to SR-57	H	\$62,977						\$27,227		\$35,750	
SR-91 w/b connecting existing aux lanes, I-5 to SR-57 - landscaping	H	\$2,290								\$2,290	
SR-91 w/b (SR-55 - Tustin interchange) improvements	I	\$43,753				\$15,753		\$14,000		\$14,000	
SR-91 e/b widening, SR-241 to SR-71	J	\$57,773			\$45,911					\$6,942	\$4,920
SR-91 w/b routes 91/55 - e/o Weir Canyon Road replacement planting	J	\$2,898				\$2,898					
SR-91 widening, SR-55 to Gypsum Canyon Road (Weir Canyon Road/SR-241)	J	\$76,993				\$22,250		\$54,045		\$698	
I-405 s/b aux lane - University Drive to Sand Canyon Avenue and Sand Canyon Avenue to SR-133		\$2,328				\$2,328					
I-405/SR-22/I-605 HOV connector - landscaping		\$4,600	\$4,600								
HOV connectors from I-405 and I-605	M1	\$173,091	\$14,787					\$135,430	\$16,200		\$6,674
HOV connectors from SR-22 to I-405	M1	\$115,878	\$64,375		\$49,625				\$1,878		
State Highway Project Completed Totals		\$1,043,284	\$170,211		\$97,888	\$183,114		\$380,452	\$20,578	\$174,439	\$16,602
Federal Funding Total		\$268,099									
State Funding Total		\$563,566									
Local Funding Total		\$211,619									
Total Funding (000's)		\$1,043,284									

Capital Funding Program Report

OCTA

Pending Approval by OCTA Board of Directors - July 27, 2026

1. Authorize staff to request that the Southern California Association of Governments make all necessary amendments to the Federal Transportation Improvement Program.
2. Authorize the Chief Executive Officer, or designee, to negotiate and execute any required agreements or amendments to facilitate the recommendation above and the execution of recent grant awards.

Acronyms:

ADA - Americans with Disabilities Act
ARRA - American Recovery and Reinvestment Act
ATN - Anaheim Transportation Network
Aux - Auxiliary
Board - Board of Directors
B - M Code Category for I-5 Improvements (Segment 1 – 2)
C - M Code Category for I-5 and SR-74 Corridor Projects
Call - Call for Projects
City - Local Agency
CMAQ - Congestion Mitigation and Air Quality Improvement Program
D - M Code Category for I-5/SR-74 Interchange Projects
DCFC - Direct Current Fast Charger
E/B - Eastbound
E/O - East of
F - M Code Category for SR-55 Widening Projects
Fed. - Federal
FTA - Federal Transit Administration
FY - Fiscal Year
FFY – Federal Fiscal Year
G - M Code Category for SR-57 Widening Projects
HOT - High-Occupancy Toll
HOV - High-Occupancy Vehicle
I-5 - Interstate 5
I-15 - Interstate 15
I-405 - Interstate 405
I-605 - Interstate 605
I - M Code Category for SR-91 Improvements and Multimodal Projects
IRCC - Irvine Rail Control Center

Acronyms:

J - M Code Category for SR-241/SR-91 Corridor Connections
K - M Code Category for I-405 Improvements (SR-73 to I-605)
LA – Los Angeles
LOSSAN - Los Angeles – San Diego – San Luis Obispo Rail Corridor
L - M Code Category for I-405 (I-5 to SR-55) Improvements and Wave 1 Projects
M1 – Measure M1
M2 – Measure M2
M - M Code Category for I-605/Katella Interchange Projects
MP - Milepost
MSRC - Mobile Source Air Pollution Reduction Review Committee N/
B - Northbound
M Code – Project Codes in Measure M1 and M2
OCX - Orange County Crossing (Metrolink Grade Crossing Safety Program)
OC - Orange County
OCTA - Orange County Transportation Authority
O - M Code Category for Regional Capacity Projects (Project O) PCH - Pacific Coast Highway
P - M Code Category for Regional Signal Synchronization (Project P)
Prop 1B - Proposition 1B Transportation Bond Program
Project S - M2 Fixed-Guideway / Anaheim Rapid Connection / Transit Extensions to Metrolink
Project V - M2 Community Circulators Program
Project W - M2 Safe Transit Stops Program
Project X - M2 Environmental Cleanup Program
Project Z - M2 Transit Extensions or Zero-Emission Programs
PSR - Project Study Report

Acronyms:

Q - M Code Category for Fair Share Program (Project Q)
R - M Code Category for Rail Projects / Metrolink / LOSSAN Corridor ROW - Right of Way
S - M Code Category for Streetcar and Fixed-Guideway Projects
SB 1 - Senate Bill 1 (Chapter 5, Statutes of 2017)
SCAG - Southern California Association of Governments
SCCP – Solutions for Congested Corridors Program
SCRRA - Southern California Regional Rail Authority
SR - State Route
SHA – State Highway Account
STBG - Surface Transportation Block Grant
STIP - State Transportation Improvement Program
S/B – Southbound
S/O – South of
T - M Code Category for ARTIC and Rail PSR Environmental Planning
VSS - Video Surveillance System
W/B - Westbound
Wave 1 - Orange County Complete Streets Program (Wave 1 Call)
Wave 2 - Orange County Complete Streets Program (Wave 2 Call)
Wave 3 - Orange County Complete Streets Program (Wave 3 Call)
Wave 4 - Orange County Complete Streets Program (Wave 4 Call)



July 6, 2026

To: Regional Transportation Planning Committee

From: Darrell E. Johnson, Chief Executive Officer

Subject: Coastal Rail Resiliency Study Update

A handwritten signature in blue ink, appearing to read "Darrell E. Johnson", is written over the "From:" line of the header.

Overview

The Orange County Transportation Authority initiated the Coastal Rail Resiliency Study in fall 2023, focusing on both short- and mid-term solutions to protect the rail line and preserve rail operations. Through this study, staff has developed Alternative Concepts that would protect the rail line in place for up to 30 years. An update on the refined Alternative Concepts and Draft Coastal Rail Resiliency Feasibility Report is provided herein.

Recommendation

Receive and file the Draft Coastal Rail Resiliency Feasibility Report and direct staff to continue stakeholder coordination and public engagement prior to finalizing the report.

Background

The Orange County Transportation Authority (OCTA) owns and maintains approximately 47 miles of operating railroad right-of-way (ROW), with 42 miles along the Orange Subdivision and 5.35 miles along the Olive Subdivision. A map of both subdivisions is provided in Attachment A. This rail corridor is part of the Los Angeles–San Diego–San Luis Obispo Rail Corridor that serves intercity and commuter passenger and freight rail service.

Beginning in fall 2021, several bluff failures, landslides on the inland side, and diminishing beaches on the seaward side in the City of San Clemente have resulted in a series of rail service disruptions, totaling nearly one year of rail operating impacts.

In late 2023, OCTA initiated the South Coast Rail Infrastructure Feasibility Study and Alternative Concepts Analysis (also known as the Coastal Rail Resiliency Study [Study]) which focuses on the seven-mile stretch of coastal rail line in

south Orange County. The Study was undertaken to assess existing and future risks, challenges, and potential solutions to protect the rail line in place. During the first half of 2024, nearly three dozen meetings were held with stakeholders, regulatory agencies, and the public to gather feedback on the Study and early action items. These early action items include four imminent high-risk areas that if not immediately addressed, could result in additional unforeseen emergencies that further impact rail operations. Input included requests to integrate natural solutions, consider the impacts of armoring actions, consult with relevant experts, and maintain reliable passenger rail service. These areas are all located within the City of San Clemente, and continue to experience storm surges, bluff failures, erosion, and other factors, which the OCTA Board of Directors (Board) declared a state of emergency, later referring to these areas as the Coastal Rail Stabilization Priority Projects. Emergency actions include riprap repairs at three sites, a catchment wall, demolition of the damaged Mariposa Point Bridge and restoration of the pedestrian beach trail, targeted sand nourishment, and other stabilization efforts to further buffer the rail line. OCTA has secured over \$300 million in state and federal funding along with local funds to support these early action efforts to help ensure continued safe and reliable rail operations. While this emergency work is ongoing, the Study explores opportunities to protect the rail corridor for the short- to mid-term, defined as up to 30 years, between the City of Dana Point and the Orange County/San Diego County Line.

Discussion

Draft Alternative Concepts for the short- to mid-term effort were presented to the OCTA Board in February 2025. In October 2025, OCTA staff presented the Board with an update on the Study, including the evaluation framework and results of the screening and scoring process used to assess the range of draft conceptual alternatives previously presented to the Board, intended to best address long-term vulnerability of the coastal rail corridor. At that time, staff identified those alternatives recommended to be short-listed and carried forward for further feasibility evaluation and outlined the basis for eliminating lower-performing concepts. The alternatives carried forward following that evaluation include four beachside, two bluffside, and two rail concepts to serve as a list of pre-screened options for application along seven typical segments of the seven-mile corridor, which have similar land-use characteristics shown in Attachment B. The primary objective of these concepts is to protect the rail operations against bluff erosion, coastline retreat, and rail vulnerabilities. Discussion and feedback received from the Board primarily highlighted the importance of making sand part of the beachside concepts and the ongoing need to continue coordination with other agencies to address erosion concerns along this coastal rail segment. The short-listed alternative concepts from October 2025 have been further refined, integrating feedback received from the Board and the public for this update, noting no significant material changes to the alternative concepts themselves; however, there is an emphasis on beach

nourishment to be part of any hard armoring solution to protect the railroad in place.

Since the most recent update, the Study has progressed from screening-level evaluation to a fully developed Draft Feasibility Report (July 2026 [Attachment C]). The tables provided on pages 31 through 34 of the attachment provide the list of concepts under each category with a summary of reasoning for being eliminated or carried forward. Two additional public meetings were hosted by OCTA to solicit public input on the concepts to be carried forward. The first meeting was held virtually on October 28, 2025. The second meeting was held in-person at the San Clemente City Hall on Wednesday, October 29, 2025, with 48 and 26 participants, respectively. Attendees included residents, community-based organizations, key stakeholders, agencies, and participants from previous listening sessions. Spanish interpretation was provided for both meetings, and in-person attendees were able to review informational display boards and speak with the project team beforehand.

Summary of community comments on short-listed concepts:

- Strong support for sand nourishment and desire for recurring placement to be integrated into sand retention strategies;
- Concern that shoreline protection structures would permanently eliminate sandy beaches; and
- Desire for more clarity on long-term planning and rail relocation.

Actions taken to respond to comments:

- Provide additional conceptual design information to the public and include in the same in the Draft Coastal Rail Resiliency Feasibility Study Report (Feasibility Report); and
- Provide the public with information on next steps after Feasibility Report completion.

The Draft Feasibility Report formalizes the prior analysis and significantly expands the technical documentation supporting the alternatives recommended for continued advancement. The Draft Feasibility Report does not alter the fundamental direction previously presented to the Board; rather, it matures the analysis and provides a comprehensive planning-level technical foundation to support future environmental review and funding decisions. In addition, while the policy conclusions remain consistent, the Draft Feasibility Report reflects substantial advancement in analytical depth, engineering refinement, cost definition, and implementation framing. The most significant updates are summarized below.

Screening Methodology

The Feasibility Report documents the evaluation methodology summarized in October 2025. This includes detailed descriptions of the screening criteria, scoring framework, performance measures, and qualitative considerations used to evaluate conceptual alternatives. Where the October 2025 update presented the results at a summary level, the Draft Feasibility Report now provides the underlying narrative justification supporting both advancement and elimination decisions. This formal documentation strengthens the defensibility of the process and establishes a clear administrative record in advance of potential environmental review. Importantly, the formal documentation confirms that the alternatives carried forward in October 2025 remain appropriate for continued evaluation based on performance, constructability, resilience benefits, and long-term feasibility.

Engineering and Technical Analysis

The Draft Feasibility Report reflects a more advanced level of technical detail, with expanded engineering analysis addressing corridor constraints, implementation complexity, and key factors, such as geotechnical conditions, bluff stability, erosion, drainage, constructability, ROW implications, and environmental sensitivity.

It should be noted that the one-time sand placement with an engineered rock revetment shoreline structure (beachside Concept No. 2.2) has remained within the overall range of concepts considered. While it was not initially advanced as a short-listed option due to potential ROW constraints and construction-related operational risks, other shoreline structure options (e.g., seawalls and riprap) were previously considered more feasible. However, geotechnical investigations conducted in late 2025 and early 2026 identified buried riprap within the ROW, which may limit the feasibility of seawall construction in certain areas.

As a result, the short list of beachside concepts has been expanded to include Concept No. 2.2. No new alternatives have been introduced, and the overall range of concepts remains unchanged. Operational impacts have also been further developed, including service continuity, potential construction staging, and long-term system reliability. While the analysis remains at a planning level, the engineering review is substantially more refined than in the October 2025 update, providing clearer insight into risks, phasing considerations, and the effort required to advance each alternative.

Stakeholder Engagement

OCTA conducted extensive stakeholder engagement throughout the Study to support coordination with local jurisdictions along the corridor, such as the cities of Dana Point, San Clemente, and San Juan Capistrano, regulatory agencies including the California Coastal Commission, California State Parks, and the United States Army Corps of Engineers, California Department of Transportation and Orange County State Parks, in addition to public engagement.

Stakeholder-focused efforts included stakeholder listening sessions, regular technical coordination meetings, and ongoing engagement with representatives from separate coastal erosion-focused work groups. Stakeholder input informed the identification of corridor vulnerabilities, development and refinement of alternative concepts, evaluation criteria, and implementation considerations. Feedback received throughout the Study helped ensure that recommended strategies balance rail reliability, coastal resilience, environmental stewardship, public access, constructability, and long-term community priorities.

Climate Vulnerability and Risk Context

The Draft Feasibility Report more directly frames the corridor's vulnerability within the context of projected sea level rise, ongoing coastal erosion, bluff instability, and increasing exposure to extreme weather events. The analysis emphasizes the cumulative nature of risk to long-term rail operations and the increasing cost and disruption associated with continued reliance on short-term stabilization alone.

While interim stabilization measures may extend the operational life of the existing alignment, the Feasibility Report reinforces the finding that such measures do not eliminate long-term structural vulnerability. The corridor remains exposed to progressive degradation under projected climate conditions. This framing provides additional context for long-term decision-making and underscores the importance of advancing long-term resiliency planning in parallel with ongoing maintenance and stabilization efforts.

Phasing and Implementation Strategy

The Draft Feasibility Report introduces a clearer articulation of how corridor resiliency may reasonably proceed in phases. The Study now more explicitly distinguishes between:

- Near-term stabilization and risk mitigation measures;
- Mid-term reinforcement or adaptation strategies; and
- Long-term transformative corridor solutions intended to address permanent vulnerability.

This phased framing was less fully developed in the October 2025 update and the Draft Feasibility Report now provides improved clarity regarding sequencing, funding strategy development, and policy decision points. It also better aligns resiliency planning with realistic capital programming horizons and regional coordination efforts.

Key Findings

The Draft Feasibility Report reaffirms several key findings previously presented to the Board:

- The coastal rail corridor faces long-term structural vulnerability;
- Continued reliance on short-term stabilization measures alone does not eliminate systemic risk;
- The alternatives carried forward in October 2025 remain the most viable concepts for further advancement; and
- Significant interagency coordination and capital investment will ultimately be required to ensure uninterrupted long-term rail service.

The Draft Feasibility Report does not recommend a final project selection but provides the foundation necessary to move into the next phase of evaluation and further refinement to determine a scope of work for project development.

Ongoing Considerations

Advancing corridor resiliency will require sustained regional collaboration, funding strategy development, environmental clearance, and continued stakeholder engagement. Implementation of the alternatives under consideration will occur over multiple years in partnership with state and regional agencies. The Draft Feasibility Report positions the Board to consider next-phase advancement with a more robust technical and administrative foundation than was available in October 2025.

Next Steps

Subject to Board direction, staff anticipates initiating the next phase of work, which may include:

- Advancement of priority alternatives into formal environmental review;
- Further engineering refinement and technical analysis;
- Development of funding and phasing strategies;
- Continued coordination with partner agencies and corridor stakeholders; and
- Ongoing monitoring of coastal conditions and operational exposure.

Staff will return to the Board with future actions as specific project development milestones are reached.

Attachments

- A. Map of Orange and Olive Subdivisions
- B. Typical Sections
- C. Coastal Rail Resiliency Study - Feasibility Report - DRAFT

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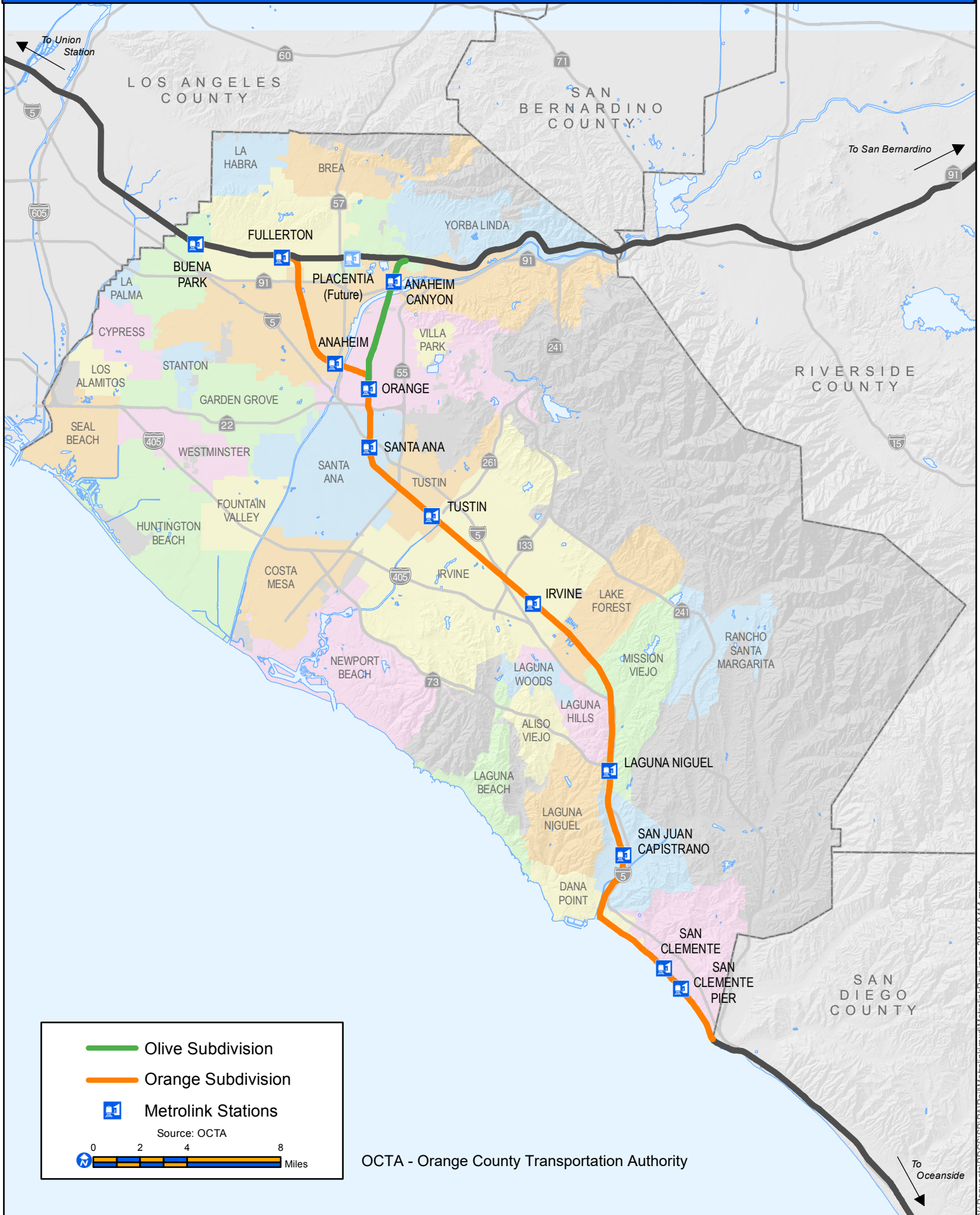
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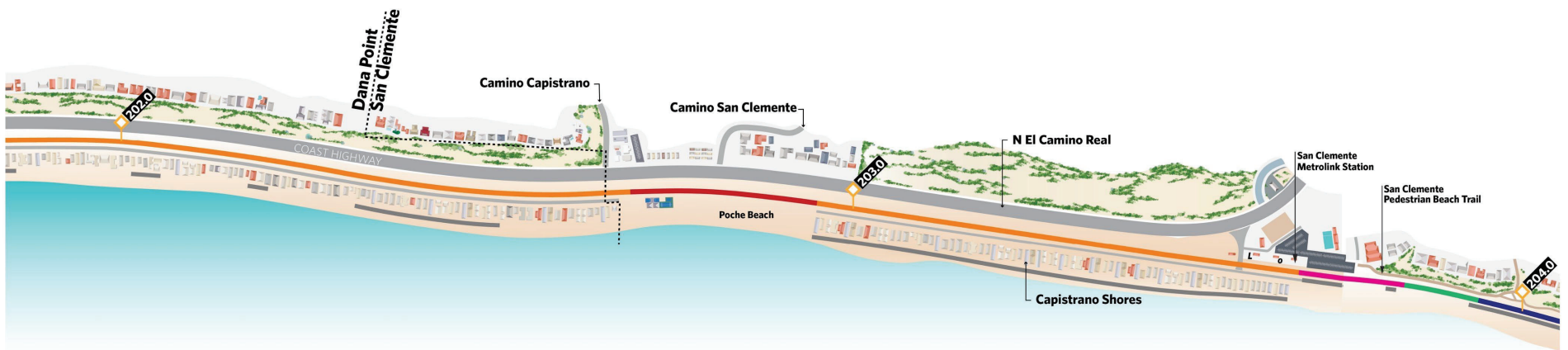
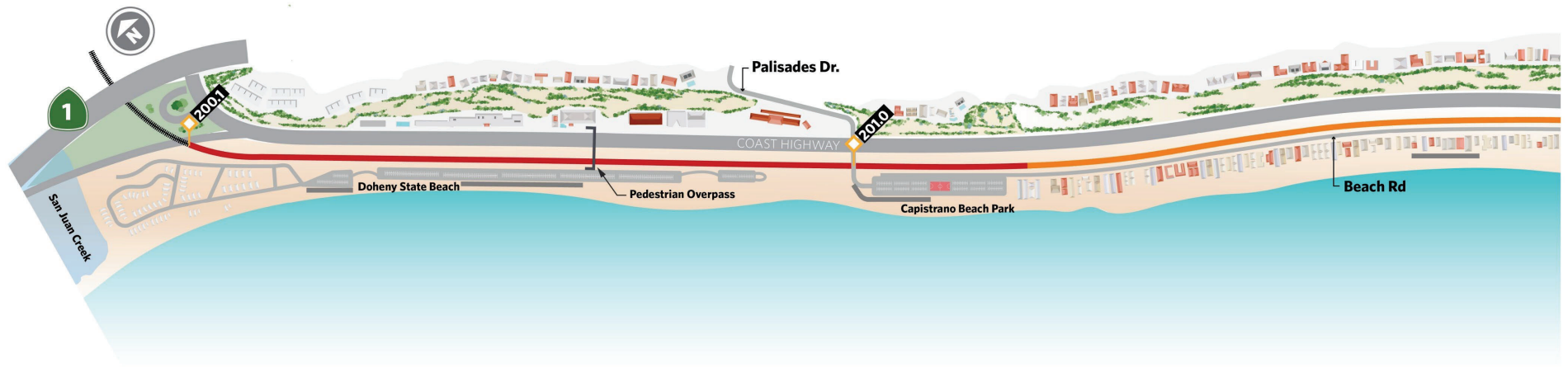
Map of Orange and Olive Subdivisions

ATTACHMENT A



OCTA - Orange County Transportation Authority

Typical Sections



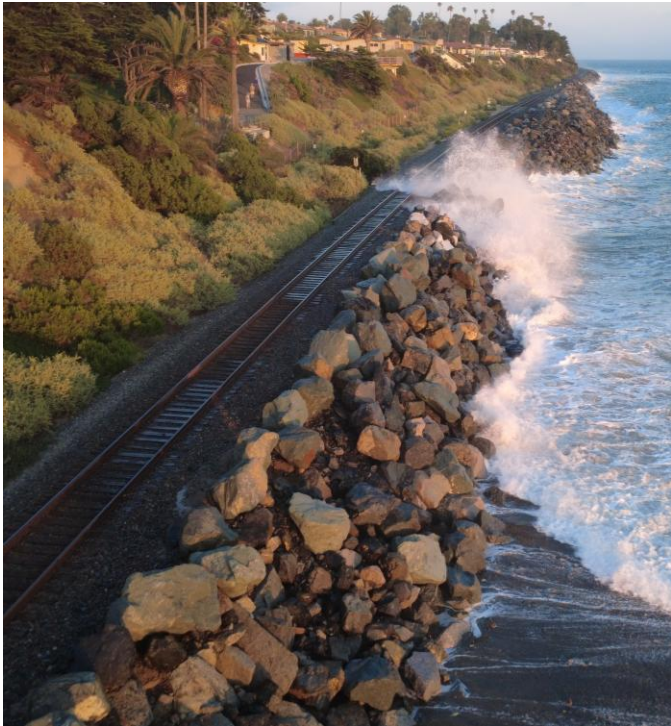
COASTAL RAIL RESILIENCY STUDY

Dr. - Drive
N - North
Rd - Road

Typical Sections (Continued)



COASTAL RAIL RESILIENCY STUDY



Coastal Rail Resiliency Study - Feasibility Report

DRAFT

Orange County Transportation Authority

Southern California
July 2026



Prepared by:





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Executive Summary

The Orange County Transportation Authority (OCTA) owns a critical 40-mile segment of the 351-mile Los Angeles-San Diego-San Luis Obispo Rail Corridor (LOSSAN Corridor) between San Clemente and Fullerton, California. This corridor is the second busiest intercity passenger rail corridor in the United States and serves as a vital freight and Strategic Rail Corridor Network (STRACNET) defense route connecting major ports and military bases. It also serves Amtrak Pacific Surfliner intercity trains, Southern California Regional Rail Authority (SCRRA) Metrolink regional rail service, and BNSF Railways (BNSF) freight trains. Any disruptions affect regional mobility, interstate commerce, and military readiness. Within this system, the 7-mile segment between Dana Point (north of Doheny State Beach) and San Clemente (north of Trestles Beach) is among the most vulnerable rail corridors in the State of California. The coastal alignment and exposure to the Pacific Ocean create vulnerabilities to catastrophic failure to the various rail operations due to coastal bluff erosion, dry beach loss, revetment deterioration, and geologic landslide bluff failure. In recent years, these conditions have led to repeated service disruptions, particularly in the San Clemente area, posing risk to reliable rail service for both passenger and freight rail operations.

OCTA is committed to providing a safe, reliable, and resilient railroad corridor that supports the movement of people, freight goods, and national defense operations. However, the corridor's stability is increasingly threatened by ongoing coastal erosion, more frequent and intense storm events, and accelerating sea level rise. There is a projected 1.3 to 1.7 feet of sea level rise by 2055, expected to result in 13 to 17 feet of beach width loss. These conditions have led to persistent bluff failures and landslides that jeopardize the integrity of the rail line and disrupt regional mobility. This Feasibility Study is therefore essential to identify long-term, sustainable solutions that protect this critical transportation corridor and support its continued function for passengers, freight operators, and national military readiness. Building on OCTA's 2024 Initial Assessment (see Appendix A), this Feasibility Study identifies, evaluates, and shortlists potential adaptation concepts and engineering solutions that can enhance operational reliability and protect the coastal rail corridor from Dana Point to Trestles Beach in the short (less than 10 years) to medium term (up to the next 30 years). The Study identifies and assesses the most vulnerable locations along the corridor where hazards pose risks of structural damage or operational disruptions, and it develops alternative concepts that reduce future service interruptions and closures. Ultimately, this Feasibility Study supports responsible stewardship of the railroad corridor by advancing multi-beneficial solutions that enhance service reliability, strengthen coastal resilience, and deliver positive outcomes for the surrounding community.

Study Approach

In response to these challenges, OCTA initiated the Coastal Rail Resiliency Study to identify practical, implementable solutions to maintain safe and reliable rail operations over the next 30 years. The Feasibility Study analyzes the corridor within three geographic zones—rail, bluffside, and beachside—each associated with distinct hazard types. To support a context-sensitive evaluation, the corridor is divided into seven Typical Sections that share similar physical



characteristics, land uses, and historic erosion conditions. These typical sections help identify which adaptation strategies are appropriate for each part of the alignment.

A total of 23 alternative concepts were developed across three categories:

- **Rail Concepts** (3) – Improve structural stability of the track foundation and extend the useful life of rail infrastructure.
- **Bluffside Concepts** (9) – Address bluff erosion, sliding, and debris hazards originating leeward (east) of the corridor from blocking the tracks.
- **Beachside Concepts** (11) – Address coastal erosion, flooding, and wave overtopping hazards seaward (west) of the corridor impacting track stability.

Concepts were developed through technical analysis, community feedback, and input from an Expert Panel comprising coastal engineers, geomorphologists, geotechnical specialists, and environmental experts. The alternative concepts are developed as a coordinated program of improvements that combine rail stabilization, bluff protection, and coastal/shoreline protection measures. There were multiple rounds of community outreach conducted throughout the study. Community and stakeholder input played a significant role in shaping beachside concepts, particularly emphasizing sand placement, access to recreational areas, and sensitivity to environmental and permitting constraints.

Screening and Evaluation Process

Each concept was evaluated using a structured scoring framework aligned with the project's Purpose and Need. Five evaluation categories, weighted according to technical and community priorities, guided the scoring:

- Resilience and Rail Reliability (25 percent)
- Implementability and Constructability (25 percent)
- Public Assets and Environmental Impacts (20 percent)
- Cost (20 percent) Alignment with Related/Planned Projects (ten percent)

Within these categories, concepts were scored from 0 to 5 on criteria such as longevity, storm/sea-level rise resilience, maintenance requirements, constructability, environmental compatibility, permitting feasibility, and alignment with regional coastal programs. Community feedback directly influenced the weighting of public-facing criteria and led to modifications, including incorporation of one-time sand placement into most beachside concepts.

All 23 concepts were scored independently; the highest-performing concepts within each solution category were then shortlisted for more detailed technical analysis.

Shortlisted Concepts

The screening process resulted in eight concepts being advanced for further study:



Rail Concepts

- Alternative materials for critical railroad infrastructure (lower lifecycle costs, minimal construction impacts)
- Ground improvement (track bed stabilization; high value for long-term track stability)

Bluffside Concepts

- Catchment walls (effective, low-impact alternative concept for smaller-scale slope failures)
- Tieback/soil-nail/pin-pile walls (proven method to stabilize moderate-scale bluff hazards)

Beachside Concepts

- One-time sand placement with riprap shoreline protection
- One-time sand placement with engineered rock revetment shoreline protection
- One-time sand placement with seawall shoreline protection
- One-time sand placement with combination (seawall and rock) shoreline protection

These concepts represent the most feasible and effective options for improving resilience while balancing environmental, community, operational, and permitting considerations. They are intended to be applied programmatically and may be combined in different ways depending on the conditions within each Typical Section.

Next Steps

The Feasibility Study helps establish a program of projects for the coastal rail corridor to address risks along the bluffs, the beach, and within the railroad right-of-way. The shortlisted concepts will undergo more location-specific detailed technical and environmental analysis, including engineering feasibility assessments, refined coastal and geotechnical evaluations, advanced engineering, and coordination with partner agencies. OCTA will also seek funding for the program of projects to help advance the short-listed concepts to support the resilience and reliability of the coastal rail corridor. This Feasibility Study guides the selection and sequencing of short to medium-term improvements to maintain railroad operations within the existing railroad right-of-way for the next 30 years and support regional planning for a long-term coastal rail strategy. A separate long-term study will be led by the State to develop solutions beyond 30 years, including potential rail line relocation.



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1. Project Background and Purpose

In Fall 2023, OCTA initiated the Coastal Rail Resiliency Study (CRRS) to evaluate and respond to the increasing coastal hazards affecting the seven-mile segment of the LOSSAN Corridor between Dana Point (north of Doheny State Beach) and San Clemente (north of Trestles Beach) near the border of San Diego County in the south. This corridor – one of the nation’s busiest passenger rail routes and a critical freight and Department of War Strategic Rail Corridor Network (STRACNET) defense asset – is increasingly vulnerable to shoreline erosion, beach narrowing, storm-driven overtopping, bluff instability, and sea-level rise. These conditions have resulted in repeated service disruptions and emergency stabilization efforts, underscoring the need for a coordinated, short-term (less than ten years) to medium-term (up to 30 years) resilience strategy.

Building on OCTA’s 2024 Initial Assessment, this Feasibility Study expands the analytical scope by integrating coastal engineering, geomorphology, shoreline change monitoring, geotechnical assessment, and multi-hazard risk evaluation. Twenty-three adaptation concepts were developed and refined through technical analysis, stakeholder and community engagement, and input from an expert multidisciplinary panel. The study utilizes a programmatic, typical-section–based framework to make sure that adaptation strategies are context-sensitive, scalable, and aligned with both short- and medium-term operational needs.

1.1. Purpose and Need

This Feasibility Study provides the technical foundation for identifying short- to medium-term improvements capable of sustaining rail operations for the next 30 years while protecting public access, recreational assets, and environmentally sensitive coastal resources. It also supports long-range regional planning for the future of coastal rail alignments in Southern California. The Project Development Team developed the Project Charter (Appendix B) to document the goals and objectives of the study and develop the framework of the purpose and need for the project.

Purpose:

- Identify, evaluate, and compare adaptation concepts that enhance resilience and operational reliability across a 30-year planning horizon.
- Develop a programmatic, typical-section–based framework for applying rail, bluff, and beachside adaptation concepts.
- Support safe, reliable, and uninterrupted passenger, freight, and STRACNET defense mobility.
- Inform the selection of feasible short- to medium-term projects and prepare for future design, permitting, and funding efforts.
- Establish data and technical basis to inform long-term coastal rail planning beyond the 30-year timeframe.

Need:



- A resilient and stable rail corridor capable of withstanding erosion, bluff failure, storm impacts, and sea-level rise.
- Reduced frequency and severity of hazard-related rail closures affecting passenger, freight, and defense operations.
- Improved safety and reliability through mitigation of projected geotechnical and coastal hazards.
- Coordinated regional solutions to sediment management, beach erosion, bluff stability, and shoreline evolution.
- Protection of public assets, coastal access, recreation, and adjacent environmental resources.

1.2. Goals and Objectives

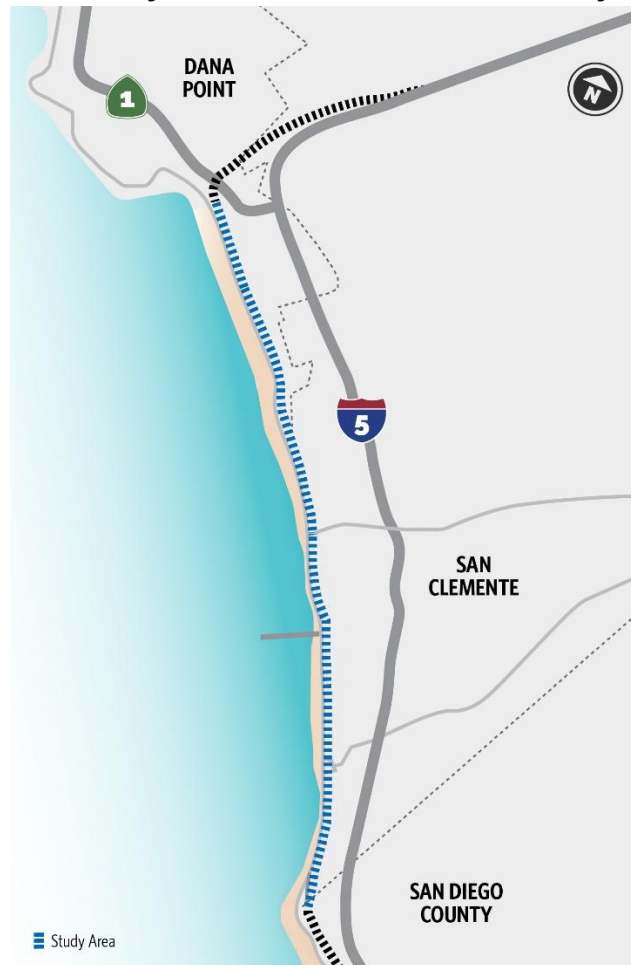
The goals and objectives of the CRRS are to guide the development and prioritization of adaptation concepts that enhance safety, reliability, environmental stewardship, and long-term operability of the coastal rail corridor. This Feasibility Study reflects multidisciplinary analysis, community engagement, and expert guidance to ensure practical, scalable resilience strategies entailing:

- Identify feasible rail, bluffside, and beachside concepts that address erosion, landslides, flooding, and climate-driven coastal evolution.
- Establish a robust, data-driven and physics-based, multi-hazard risk assessment process for evaluating vulnerability across typical sections.
- Develop a programmatic, corridor-wide framework for applying adaptation concepts based on localized conditions.
- Maintain uninterrupted passenger, freight, and defense mobility by mitigating hazard-related service disruptions.
- Protect environmental and cultural resources, including sensitive habitats and Section 4(f) properties.
- Preserve or enhance public coastal access, recreation, and multi-use trail connectivity.
- Strengthen coordination with local, regional, state, and federal agencies to support integrated coastal resilience planning.
- Incorporate community priorities into the evaluation and refinement of adaptation concepts.
- Establish monitoring and adaptive management practices to guide long-term performance and future planning.
- Identify funding, permitting, and implementation pathways for short- to medium-term project delivery.

2. Study Area and Existing Settings

The Coastal Rail Corridor in southern Orange County is owned by OCTA and has passenger rail operations by Southern California Regional Rail Authority (Metrolink) and Amtrak (Pacific Surfliner), and freight rail operations by BNSF. The segment of railroad from Dana Point to Trestles Beach, which runs along the coastline, is part of the greater 351-mile LOSSAN Corridor. The study area, as shown in Figure 1, is a seven-mile segment of the Coastal Rail Corridor with a single track between Mile Post (MP) 200.0 and MP 207.4, running from Dana Point/San Clemente (Doheny State Beach) in the north to Trestles Beach near the border of San Diego County in the south. The study corridor runs west of the Coast Highway/El Camino Real and passes through the cities of Dana Point and San Clemente in Orange County.

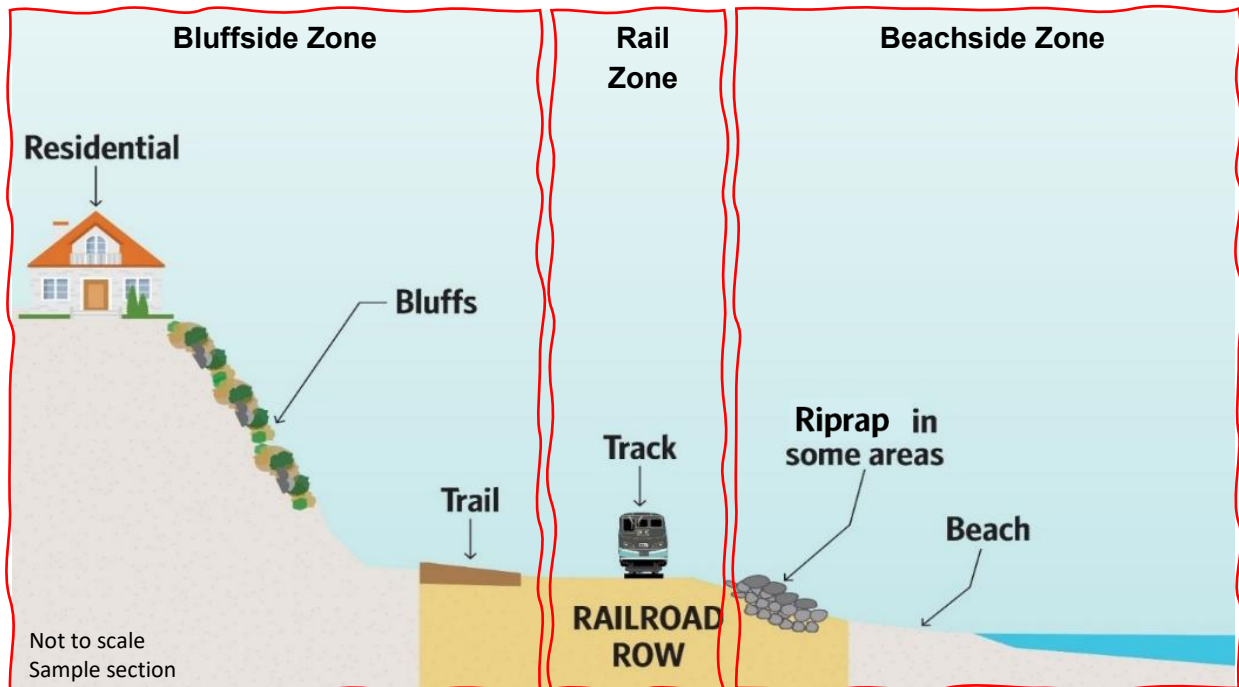
Figure 1. Study Area for Coastal Rail Resiliency Study



The railroad corridor has been analyzed in three zones in the cross-shore direction (illustrated in Figure 2), including the Bluffside Zone, Rail Zone, and Beachside Zone. These zones have unique challenges and alternative concepts to address the challenges. The Rail Zone is the area within the railroad Right-of-Way (ROW) where the track bed is located. It also has critical rail assets, such as stations, signals, and communications infrastructure. The Bluffside Zone is the area directly inland of the railroad tracks. It is defined by intermittent inland bluffs, some of

which support blufftop residential properties and recreational trails. In several sections of the study area, paved roads and the Pacific Coast Highway (PCH) run parallel to the tracks on the east side, offering a buffer from bluff erosion. The Beachside zone is the area between the tracks and the ocean. This zone features a range of shoreline settings, including riprap armoring along the seaside of the railroad, as well as sandy beaches that accommodate recreational infrastructure, including lifeguard stations, restrooms, and athletic courts.

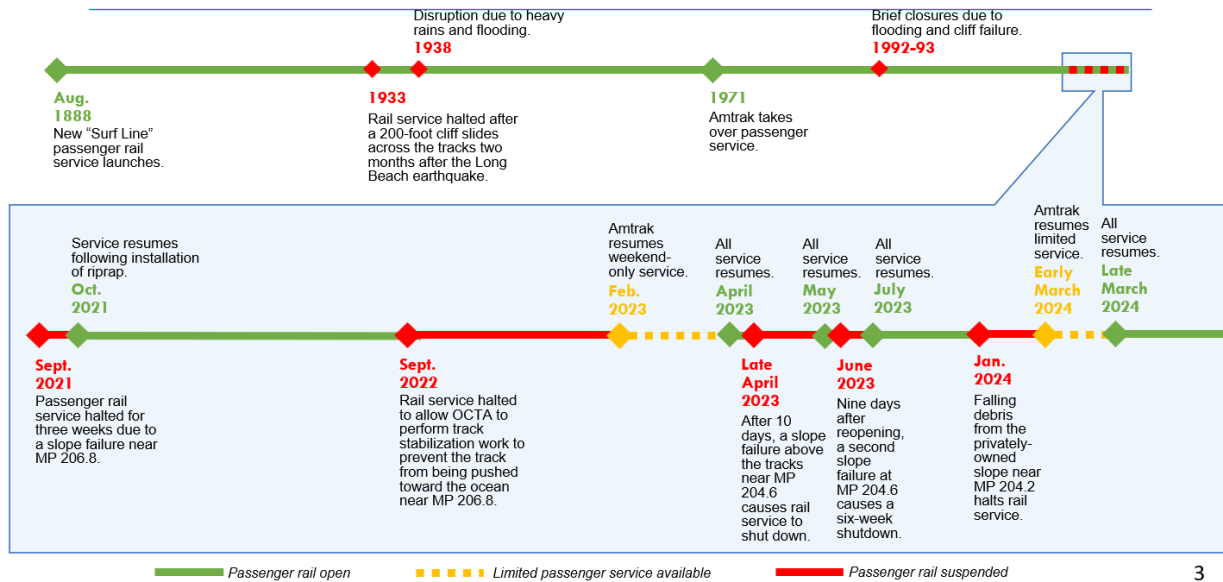
Figure 2. Zone Types



The coastal rail corridor has had a history of closures dating back several decades. However, rail operations have been impacted greatly over the last five years. Figure 3 provides a timeline of the history of passenger rail closures along the coastal rail corridor.



Figure 3. History of Passenger Rail Closures



Recent and ongoing areas of instability that have caused or threatened significant disruptions to passenger rail operations, listed from north to south, are provided in Table 1.

Table 1. Recent Rail Closures Impacting Passenger Rail Operations

Closure	Location (MP)	Period	Type of Closure	Days
Mariposa	204.2	1/24/24 – 3/5/24	Full Closure	42
Mariposa	204.2	3/6/24 – 3/25/24	Limited Daily Service	20
Casa Romantica	204.6	4/27/23 – 5/26/23	Full Closure	30
Casa Romantica	204.6	6/5/23 – 7/16/23	Full Closure	42
Cyprus Shore	206.7	9/30/22 – 2/3/23	Full Closure	127
Cyprus Shore	206.7	2/4/23 – 4/16/23	Limited Weekend Service	72

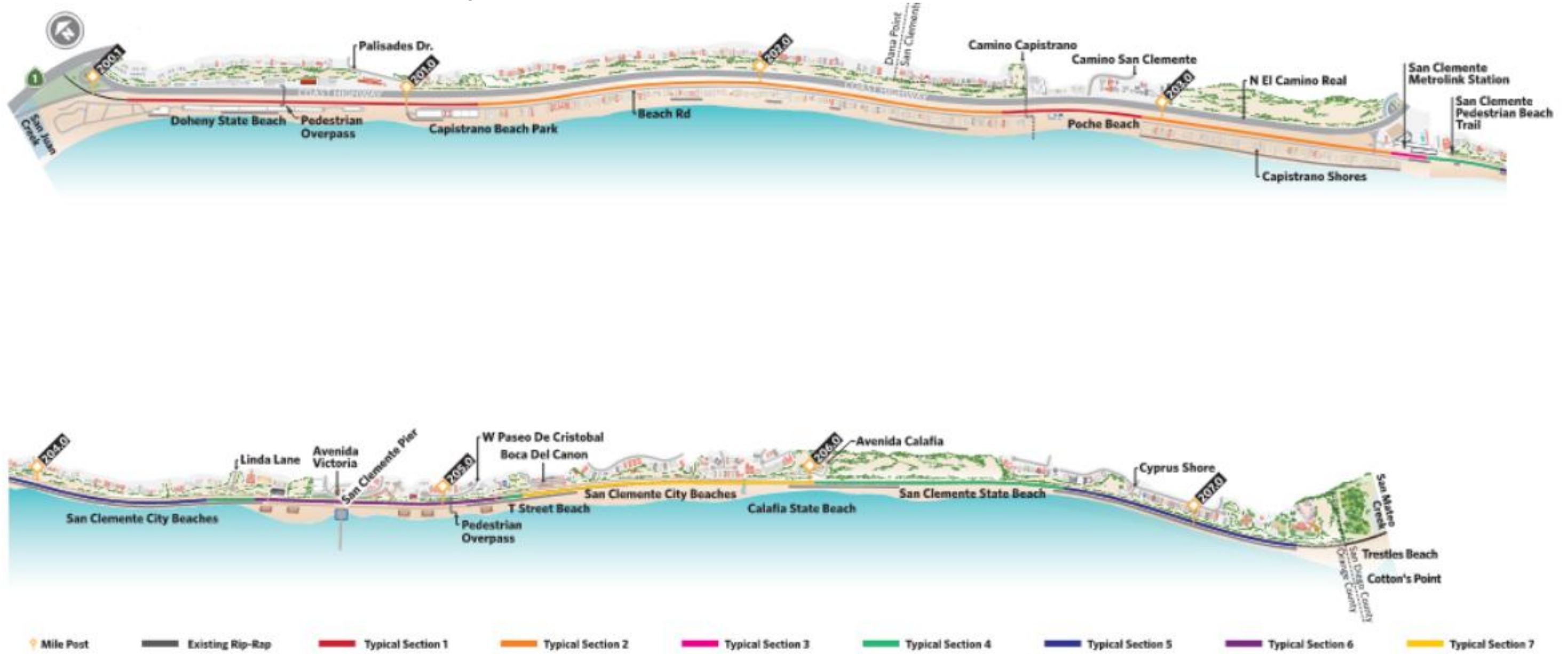
2.1. Existing Settings

Existing settings in the study area were defined in typical cross-shore sections to support a context-sensitive approach for developing potential concepts. These sections present comparable surrounding land uses, spacing between different Zone Types (Figure 2), and geotechnical characteristics. Figure 4 provides an overview of the study area and the delineated footprints of typical sections that apply within it.

Figure 4. Overview of Typical Sections through Study Area



Figure 5. Coastal Rail Corridor Between Dana Point to Trestles Beach (north to south)





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2.1.1. Typical Section 1: Railroad between Roadway and Beach

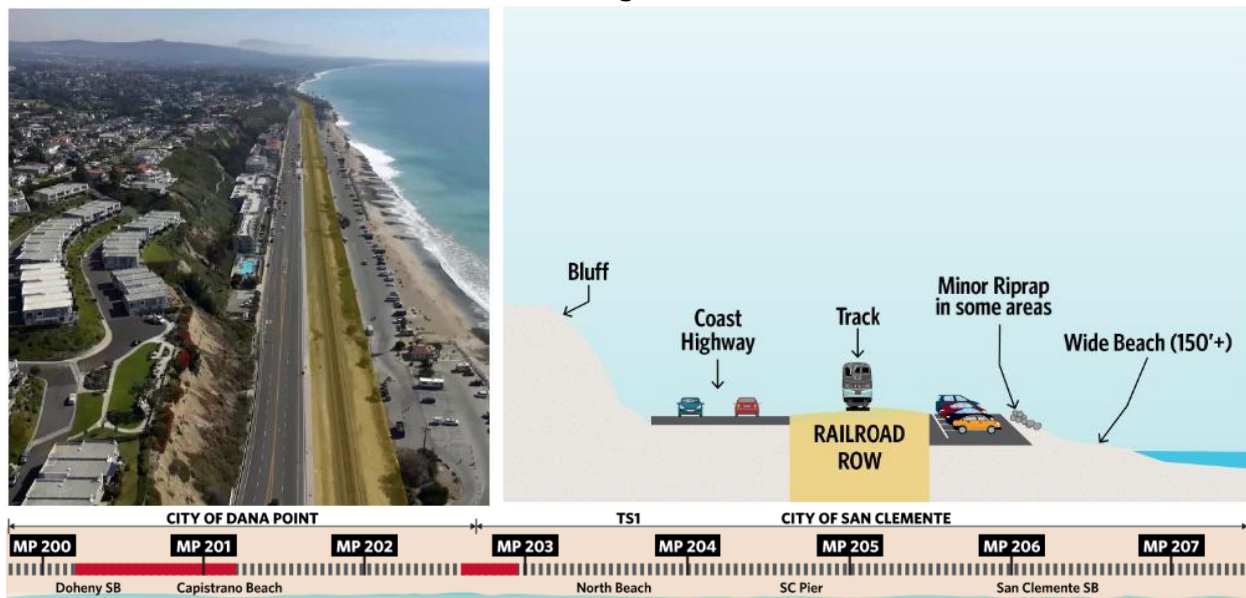
The Typical Section 1 typology features, from landward to seaward, inland bluffs (some with blufftop and street-level residential properties), Coast Hwy, a single-track rail corridor, parking, intermittent riprap, and beach (Figure 6). The sandy beach in this typical section is wide (approximately 150 feet from the riprap to the mean high water (MHW) shoreline¹). Approximately 1.35 miles (see Table 2) of the corridor is comprised of this typology. These segments include the corridor near Doheny State Beach and Capistrano Beach.

Table 2. Limits of Typical Section 1

Begin Limit (MP)	End Limit (MP)
200.20	201.20
202.60	202.95

On the landside of the track, Coast Hwy provides a buffer for bluff erosion for this typical section. Private developments, existing riprap, and wide sandy beaches seaside of the track also provide some protection from coastal erosion. This typical section has been the site of previous sand placement efforts, most recently, Orange County Parks placed sand at Doheny State Beach and Capistrano Beach in 2023 and 2024. Concepts recommended for Typical Section 1 include rail and beach adaptation projects.

Figure 6. Typical Section 1 – Aerial Photograph, Cross-Sectional Sketch, and Alignment Diagram



¹ MHW is a tidal datum representing the average of observed high-water elevations at NOAA tide stations. The reference tide station for this study was NOAA’s La Jolla station.



2.1.2. Typical Section 2: Railroad between Roadway/Trail and Homes

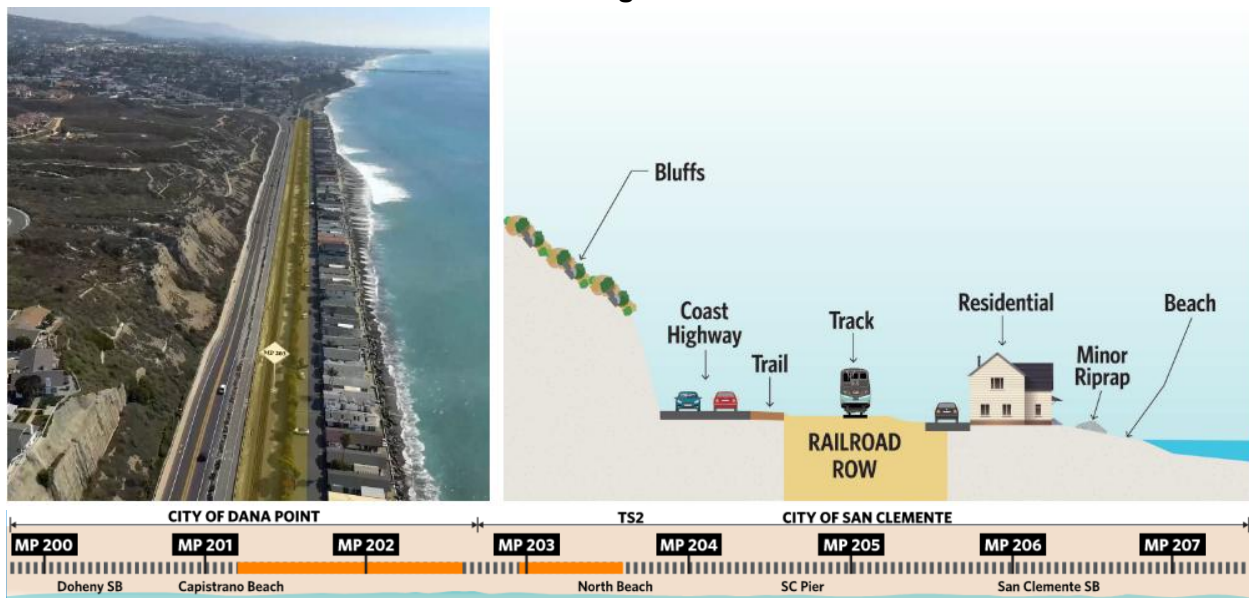
The Typical Section 2 typology features, from landward to seaward, inland bluffs, Coast Hwy, a recreational trail, a single track, residential streets, residences, intermittent riprap, and narrow beach (less than 100 feet from the riprap to the MHW shoreline) sections (see Figure 7). Approximately 2.07 miles (see Table 3) of the corridor is comprised of this typology. These segments include areas south of Capistrano Beach and areas in San Clemente near North Beach.

Table 3. Limits of Typical Section 2

Begin Limits (MP)	End Limits (MP)
201.20	202.60
202.95	203.62

On the landside of the track, Coast Hwy provides a buffer against bluff erosion for this typical section. On the seaside of the track, Beach Road, residential development, intermittent riprap armoring, and sandy beach separate the track from the ocean. Concepts recommended for Typical Section 2 include rail and beach adaptation projects.

Figure 7. Typical Section 2 – Aerial Photograph, Cross-Sectional View and Alignment Diagram



2.1.3. Typical Section 3: Railroad between Development and Beach

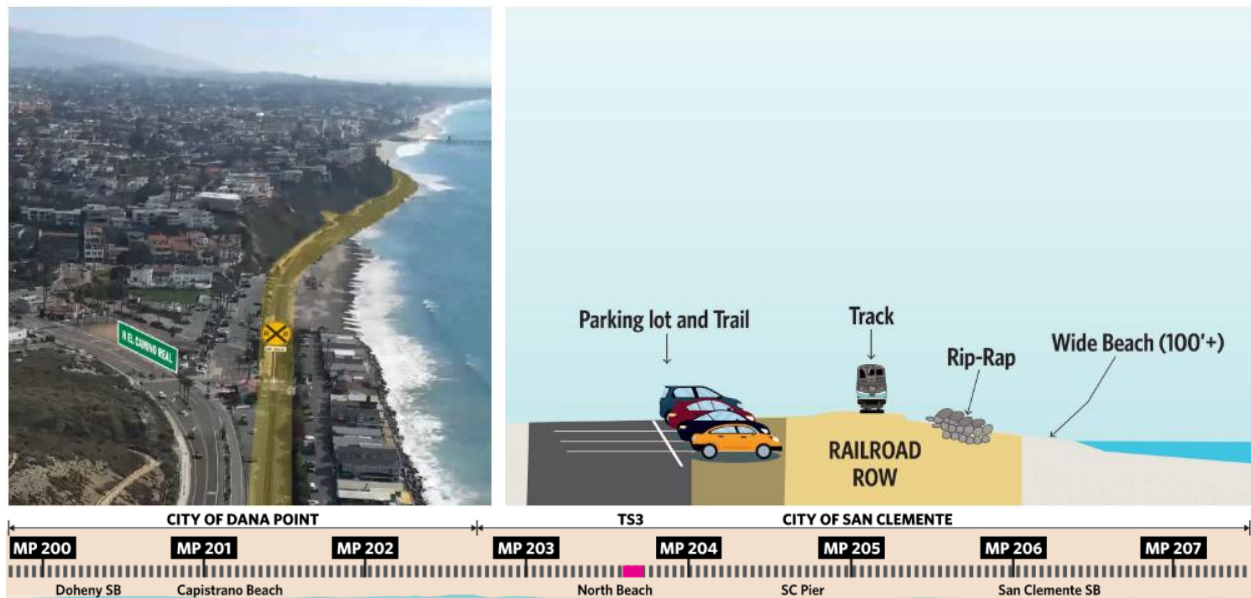
The Typical Section 3 typology features, from landward to seaward, paved parking lots, a single track, riprap, and narrow beach (less than 100 feet from the riprap to the MHW shoreline) (see Figure 8). Approximately 0.1 mile (see Table 4) of the corridor is comprised of this typology. This segment includes North Beach in the City of San Clemente.

Table 4. Limits of Typical Section 3

Begin (MP)	End (MP)
203.62	203.72

There are no adjacent bluffs landside of the track in this typical section. The only protection this section of track has against coastal erosion is riprap armoring and up to 100-foot-wide sandy beach, which has been the site of previous sand placement efforts by the City of San Clemente and OCTA as recently as 2024 and 2025. The beach width in this typical section has varied, with widths up to 100 feet wide. It is worth noting that the shoreline has been dynamic over recent years with fluctuating beach widths and elevations. Concepts recommended for Typical Section 3 include rail and beach adaptation projects.

Figure 8. Typical Section 3 – Aerial Photograph, Cross-Sectional View and Alignment Diagram



2.1.4. Typical Section 4: Railroad between Bluff/Trail and Beach

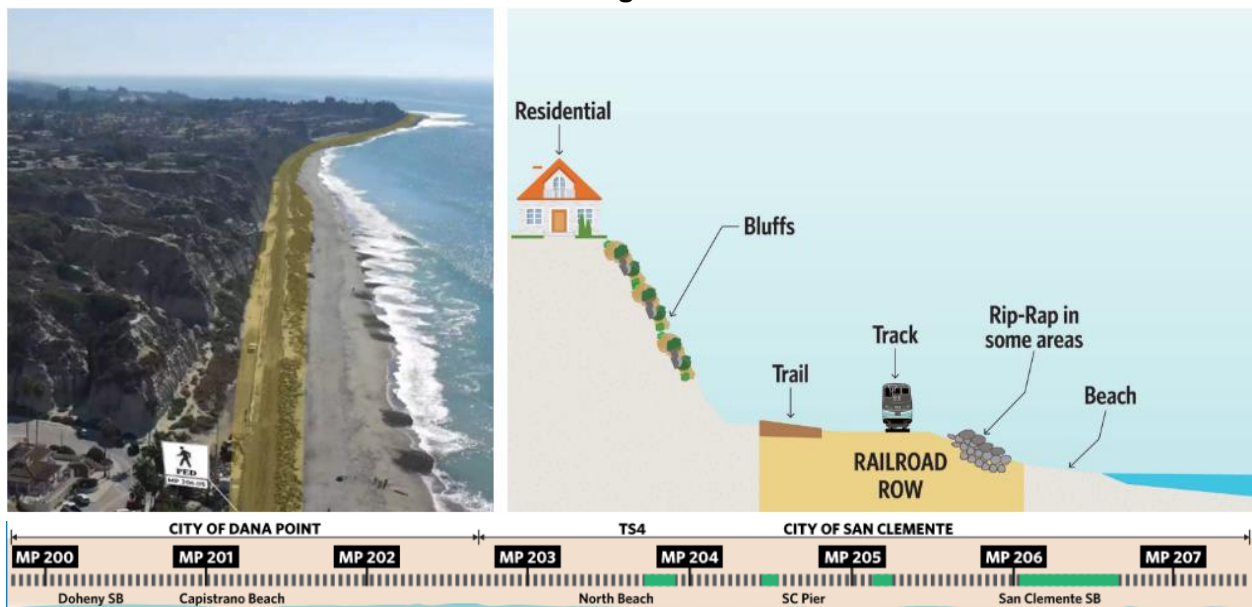
The Typical Section 4 typology features, from landward to seaward, inland bluffs topped with a mix of single-family and multifamily residential development, a pedestrian trail, a single track, intermittent riprap, and sandy beach with a variable width (50-150 feet from the riprap to the MHW shoreline) (see Figure 9). Approximately 1.02 miles (see Table 5) of the corridor is comprised of this typology. These segments include sections of North Beach, T-Street Beach, and San Clemente State Beach.

Table 5. Limits of Typical Section 4

Begin Limits (MP)	End Limits (MP)
203.72	203.92
204.42	204.54
205.16	205.22
206.02	206.66

The track here is in proximity to steep inland bluffs prone to erosion and landslides. The unpaved trail east of the track provides minimal buffer against large debris and slides. The only protection this section of track has against coastal erosion is riprap armoring and a wide sandy beach (up to 150 feet from the riprap to the MHW shoreline). Concepts recommended for Typical Section 4 include bluff, rail, and beach adaptation projects.

Figure 9. Typical Section 4 – Aerial Photograph, Cross-Sectional View and Alignment Diagram



2.1.5. Typical Section 5: Railroad between Bluff/Trail and Ocean

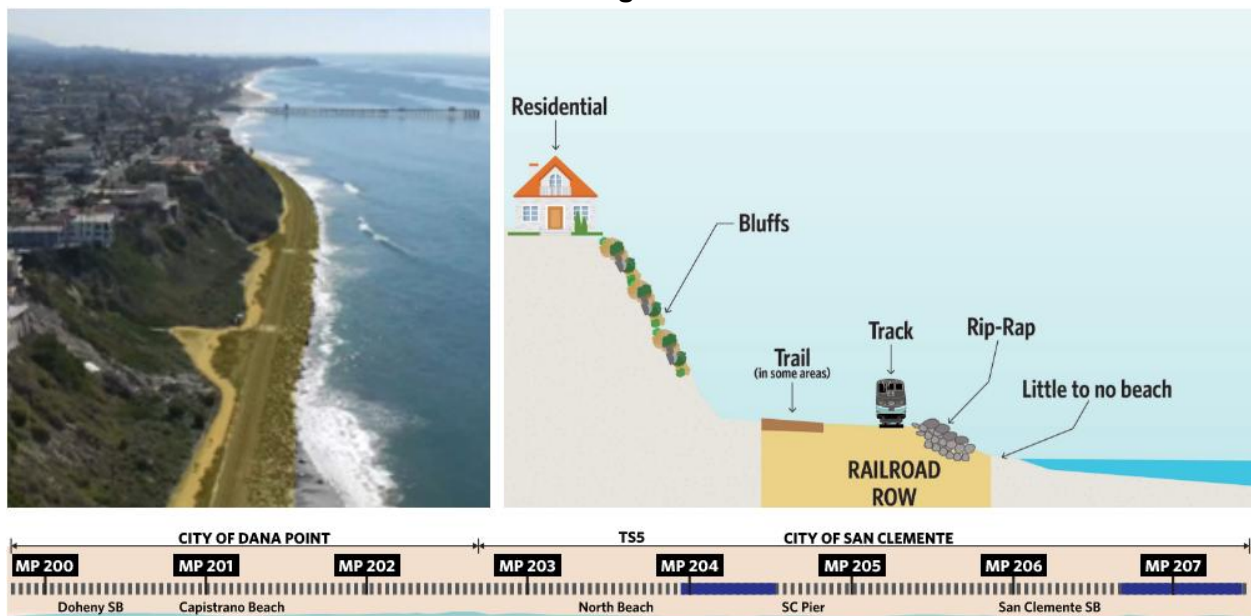
The Typical Section 5 typology features, from landward to seaward, inland bluffs topped with large multifamily and single-family residential developments, intermittent pedestrian trails, a single track, riprap, and little to no beach (less than 100 feet from the riprap to the MHW shoreline). This typology is similar to Typical Sections 4 and 7, but without the wide sandy beach between the track and the water (see Figure 10). Approximately 1.09 miles (see Table 6) of the corridor is comprised of this typology. These segments include the stretch between North Beach and the San Clemente Pier through the Mariposa area and south of San Clemente State Beach from Cyprus Shore to the county line.

Table 6. Limits of Typical Section 5

Begin Limits (MP)	End Limits (MP)
203.92	204.42
206.66	207.25

These sections are in proximity to steep inland bluffs prone to erosion and landslide adjacent to the track. The unpaved trail landside of the track provides little to no buffer against large debris and landslides. The only protection this section of track has against coastal erosion is riprap armoring because there is little to no sandy beach in this typical section. These sections of track are prone to wave overtopping, which causes track instability and creates maintenance issues for the railroad. Concepts recommended for Typical Section 5 include bluff, rail, and beach adaptation projects.

Figure 10. Typical Section 5 – Aerial Photograph, Cross-Sectional View and Alignment Diagram





2.1.6. Typical Section 6: Railroad between Bluff and Trail/Beach

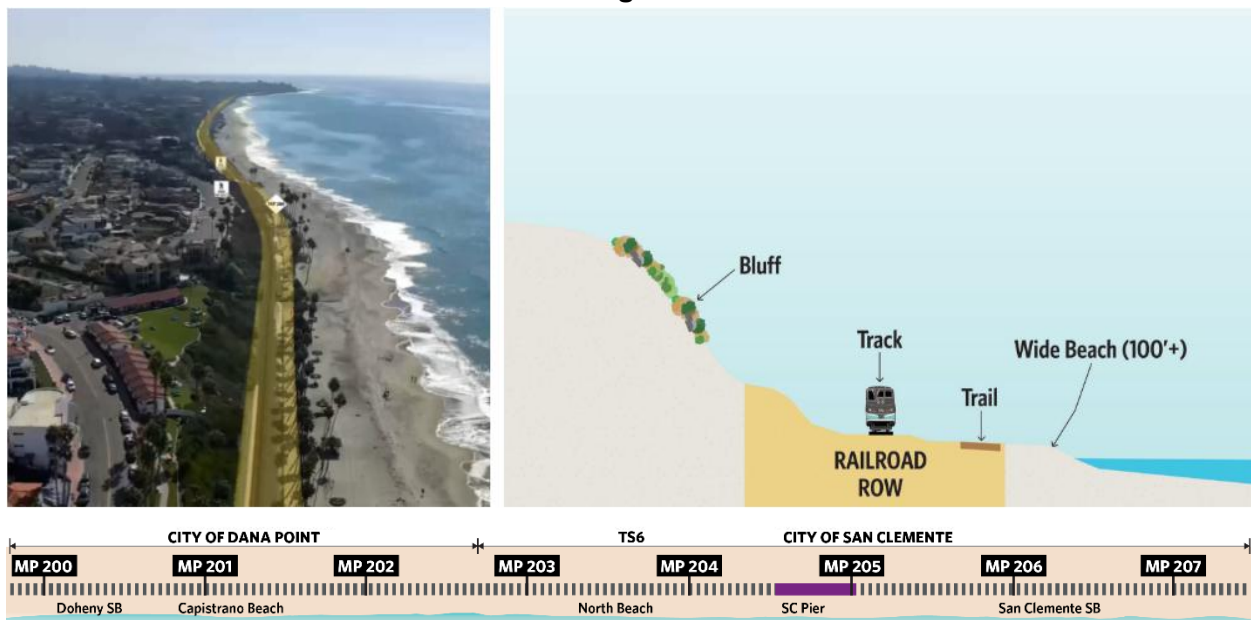
The Typical Section 6 typology features, from landward to seaward, inland bluffs, a single track, a recreational trail, and wide (between 100-200 feet from the trail to the MHW shoreline) beach sections (see Figure 11). Approximately 0.62 miles (see Table 7) of the corridor is comprised of this typology. This segment includes the beach around San Clemente Pier.

Table 7. Limits of Typical Section 6

Begin Limits (MP)	End Limits (MP)
204.54	205.16

Bluffs in this area are less steep and feature no residences atop the bluffs, unlike Typical Sections 4 and 5. In these sections, the track is set back from the water, separated by a pedestrian trail and wide sandy beaches to the seaward side. The track in this area has not historically been subject to coastal erosion or wave overtopping thanks to the wide beach, and riprap has not been required at this location. This typical section has been the site of previous sand placement efforts, most recently the United States Army Corps of Engineers federal sand placement program in 2024, with planned renourishments every six years². Concepts recommended for Typical Section 6 include bluff, rail, and beach adaptation projects.

Figure 11. Typical Section 6 – Aerial Photograph, Cross-Sectional View and Alignment Diagram



² <https://www.sanclemente.gov/300/San-Clemente-Sand-Replenishment>

2.1.7. Typical Section 7: Railroad between Trail and Beach

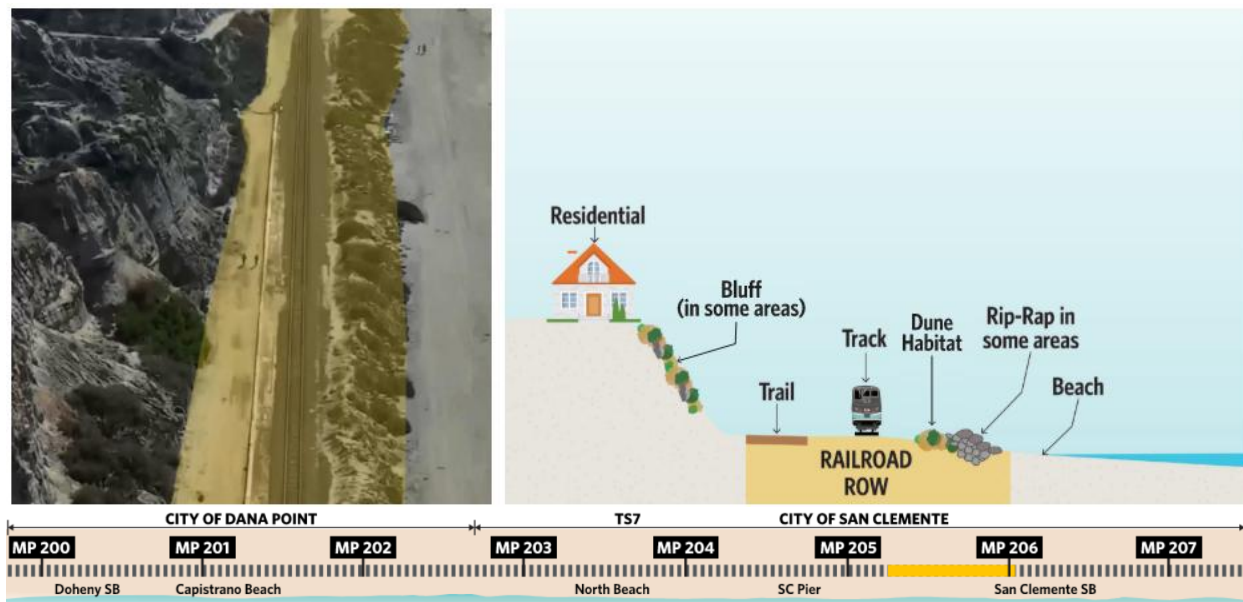
The Typical Section 7 typology features, from landward to seaward, inland bluffs, a pedestrian trail, a single track, intermittent riprap, and beach sections of variable width (50 - 100 feet from the riprap to the MHW shoreline) (see Figure 12). Approximately 0.80 miles (see Table 8) of the corridor is comprised of this typology. These segments include segments of the corridor south of the San Clemente Pier and near San Clemente State Beach.

Table 8. Limits of Typical Section 7

Begin Limits (MP)	End Limits (MP)
205.22	206.02

These sections are in proximity to steep inland bluffs prone to erosion and landslides adjacent to the track. The unpaved trail east of the track provides little to no buffer against potential large debris and landslides. For areas around MP 205.30, 205.75 and 206.00, bluffs are not present and have residential development located landward of the unpaved trail. These sections of track have riprap armoring, dune habitat, and narrow sandy beach seaward of the are acting as a buffer to protect the track from coastal erosion. Concepts recommended for Typical Section 7 include rail and beachside adaptation projects.

Figure 12. Typical Section 7 – Aerial Photograph, Cross-Sectional View and Alignment Diagram



2.2. Summary of Typical Sections

Table 9 summarizes the existing natural and built environment conditions between the railroad ROW and the coastline and if the Typical Section is at risk of service disruption from natural erosion or storm events from the bluffside, rail, and beachside in the short- to medium-term.



Table 9. Summary of Typical Sections with Service Disruption Risk

	Typical Section 1	Typical Section 2	Typical Section 3	Typical Section 4	Typical Section 5	Typical Section 6	Typical Section 7
Existing conditions between rail & coastline	Public parking & beach	Street, residences & beach	Beach	Beach	Little to no beach	Trail & beach	Dunes & beach
Bluffside Risk				✓	✓	✓	
Rail Risk	✓	✓	✓	✓	✓	✓	✓
Beachside Risk			✓	✓	✓	✓	✓



3. Short- to Medium-Term Alternative Concept Development

A total of 23 Alternative Concepts were developed following preliminary assessments and technical analyses, community and stakeholder engagement, and expert panel engagement. The alternative concepts fall into three zone types or categories focused on different aspects of alignment resiliency: Rail Zone, Bluffside Zone, and Beachside Zone alternative concepts. Each alternative concept represents an individual intervention that can be used as a single component or in combination with other concepts.

3.1. Community-Informed Alternative Concept Refinement

The list of alternative concepts was refined in response to various rounds of stakeholder and community input. This feedback was collected over the course of the study and helped identify additional priorities and concerns, leading to the inclusion of new alternatives and the addition of sand replenishment to all the beachside concepts to address local community and regulatory agency concerns about coastal access, beach erosion, and to enhance coastal protection. Community and scientific insight around addressing root causes and drivers of shrinking sandy beaches (coastal squeeze) also led to the addition of watershed modification (i.e., sediment transport in San Juan Creek) to the beachside concepts being considered. More details on community engagement efforts and local concerns can be found in the Community Engagement Report found in Appendix C.

3.2. Expert Panel Review

After the initial alternative concept list was developed, an expert panel was convened to assess the initial alternative concepts and provide feedback. The expert panel consisted of a two-day, in-person session between December 3 and 4, 2024, in San Clemente, which included presentations, discussions, and a site visit. The goal of this process was to engage with academic and professional experts from various disciplines, including coastal geomorphology, marine biology, geotechnical engineering, and coastal engineering, to document their input regarding the CRRS. A complete summary of the Expert Panel Review can be found in Appendix D. The expert panel consisted of the following members:

Table 10. Expert Panel Participants

Name	Affiliation	Role or Discipline
Jeff Ball	Orange County Business Council	Moderator
Adam Young, PhD	Scripps Institution of Oceanography	Coastal Geomorphology
Lawrence Honma	Merkel & Associates	Marine Biology
James Gingery, PhD, P.E., G.E.	Keller West	Contractor/Geotechnical Engineer
Wenkai Qin, PhD	NV5	Coastal Engineer



The panel experts were selected based on their previous work and knowledge of the various disciplines related to coastal challenges in the region. The section below summarizes the panel's specific recommendations and how they were incorporated.

3.2.1. Alternative Concept Feedback

The expert panel recommendations led to the addition of one new alternative concept and several modifications to the initial alternative concept list. The recommendations were based in part on similar cases and best practices seen elsewhere in the region.

- **New Rail Alternative Concept:** The panel recommended grouting of the rail track bed. The team incorporated the feedback, adding a new rail alternative concept, *Rail 3 – Ground improvement (track-bed stabilization)*.
- **Alternative Concepts with Sand Retention Measures:** The panel also recommended including sand retention measures in tandem with sand placement (beach nourishment) programs. This included shore-connected structures, such as groins, or offshore alternative concepts, such as artificial reefs or breakwaters. These recommendations are reflected in beach concepts where the team added four additional alternative concepts (4.1 to 4.4) that included sand retention measures to four existing alternative concepts (2.1 to 2.4) that were originally various shoreline protection structures paired with sand placement.
- **Armoring Alternative Concepts:** The panel recommended engineered revetements and riprap over seawalls, as seawalls require deeper foundations, reflect wave energy, and are more challenging to construct due to obstructions from existing buried riprap. The team opted to keep all the original shoreline protection structures from the initial alternative concept list, including seawalls, to assess them using the criteria screening process.
- **Program of Alternative Concepts:** The panel recommended that concepts be applied as a program of alternative concepts per typical section aligned with the project team's existing plan.
- **Habitat Friendly Materials:** The panel recommended considering habitat friendly concrete (e.g., eco-concrete) armor units as an alternative to stone armoring, where practical.

3.2.2. Criteria Recommendations

The expert panel identified several considerations to incorporate into the criteria screening process. While most recommendations aligned with the draft criteria, they did result in minor modifications to the screening criteria.

- **Biological and Cultural Assessments:** The panel recommended including screening criteria weigh heavily on biological and cultural assessments for the project area. In response, the team assigned the screening category "Public Assets & Environmental Impacts" a weight of 20 percent of the total concept score.
- **Permitting Requirements:** The panel advised incorporating permitting complexity and timelines into the evaluation process to anticipate regulatory challenges and delays. The existing permitting criteria in the draft screening were retained without changes.
- **Elevation Challenges:** The panel advised that criteria account for height requirements of an elevated rail option and potential challenges in constructability, permitting, or community



opposition. However, the constructability and public assets categories address these factors; therefore, the existing criteria were retained without changes.

3.2.3. General Study Considerations

The expert panel also provided feedback that applied broadly to the project rather than to specific concepts. Those recommendations are captured below and noted for future consideration but are not pertinent at this feasibility study phase.

- **Monitoring Protocols:** The panel emphasized the need for monitoring to establish baseline and post-construction conditions.
- **Biological Resource Surveys:** The panel advised that baseline biological resource surveys be performed on both land and offshore areas.
- **Mitigation Contributions:** The final project level recommendation was to consider out-of-kind fee contributions or funding to other agencies' efforts to mitigate potential impacts.
- **Repurposing materials:** Other recommendations included the consideration of opportunities to repurpose materials from inland of the rail in any applicable concepts. This includes the opportunity to apply sustainable best practices in reusing component or earthen site materials with the potential added benefit of cost savings and reduction in materials transportation. The recommendation was noted for future consideration but not applied to this phase of the study.

3.3. Alternative Concepts

The following sections detail the finalized list of alternative concepts for evaluation.

3.3.1. Rail Concepts

These alternative concepts address the stability and resilience of the rail tracks themselves.

Table 11. List of Rail Concepts

Alternative Concept Name
1 – Elevated tracks
2 – Alternative materials for critical railroad infrastructure to reduce lifecycle costs
3 – Ground improvement (track-bed stabilization)

3.3.2. Bluffside Concepts

These alternative concepts focus on the reduction of impacts to passenger and freight rail safety and service due to bluff erosion, bluff failure events such as landslides, and shortlisted reinforcement methods suitable to minimize future rail track damage and/or blockage.

Table 12. List of Bluffside Concepts

Alternative Concept Name
1 – Catchment walls (bluff failure)
2 – Stabilization grading (buttressing)
3 – Tieback / Soil-Nail / Pin-Pile Walls (bluff failure)



- 4 – Ground improvement
- 5 – Surface matting and deep-rooted vegetation planting (surface erosion)
- 6 – Surface drainage improvement / detention basins / undertrack outlets
- 7 – Deflection walls in tributaries (sediment discharge)
- 8 – Up-gradient cut-off drains (groundwater control)
- 9 – Hydraulaugers (Horizontal drains for groundwater control)

3.3.3. Beachside Concepts

These alternative concepts aim to address coastal erosion and flooding hazards on the beach (west) side of the tracks, where wave overtopping or erosion-induced track destabilization may impact passenger and freight rail safety and service.

Table 13. List of Beachside Concepts

Alternative Concept Name
1 – Beach nourishment with planned replenishment (assumed to be every 5 years and implemented by other agencies outside of OCTA)
2.1 – One-time sand placement with riprap shoreline protection structure
2.2 – One-time sand placement with engineered rock revetment shoreline protection structure
2.3 – One-time sand placement with seawall shoreline protection structure
2.4 – One-time sand placement with combination shoreline protection structure
3 – One-time sand placement with sand retention measures and no shoreline protection structure
4.1 – One-time sand placement with sand retention measures and riprap shoreline protection structure
4.2 – One-time sand placement with sand retention measures and engineered rock revetment shoreline protection structure
4.3 – One-time sand placement with sand retention measures and seawall shoreline protection structure
4.4 – One-time sand placement with sand retention measures and combination shoreline protection structure
5 – Watershed modifications



4. Screening Methodology

A screening methodology was developed to evaluate each alternative concept and identify the most effective resilience solutions to support safe and reliable rail service in the short- to medium-term future along the entire 7-mile study area corridor. Individual location project-specific design and permitting will be handled during the next phase of this program. Screening for the corridor-wide solutions began with a comprehensive review of previous studies, regional planning efforts, and industry best practices to identify essential considerations and develop a range of potential screening criteria. The criteria were then organized into broader categories that could be weighed according to study priorities.

4.1. Identification of Screening Criteria

The Project Development Team established evaluation categories and criteria based on the Project Purpose and Need and Project Charter, which emphasize safety, reliability, and consistency with regional planning objectives. Additional evaluation criteria were identified using the Federal Transit Administration (FTA) 2024 Transit Resilience Guidebook, which reinforce the importance of local policy alignment and coastal plan integration. Public input, including feedback from local stakeholders, advocacy groups, community-based organizations, and the public at large, further informed the criteria to reflect community concerns and priorities.

4.2. Screening Categories

The sections below explain the evaluation categories, define the scorable criteria within each category, and detail the corresponding scoring (performance measures). The criteria scores define low to high favorability scores (respectively, 0 to 5) for each criterion as well as some key questions that were discussed during the scoring process.

Table 14. Screening Categories and Criteria

Categories	Criteria
Resilience and Rail Reliability	Ability to maintain service during maintenance
	Longevity of concept (optimal conditions)
	Sensitivity to storms, sea level rise, beach erosion
	Track resilience – bluff stability
Cost	Construction costs
	Maintenance costs
	Lifecycle costs
Implementability and Constructability	Ability to maintain service during construction
	Speed of implementation
	ROW requirements
	Constructability
	Ability to meet design criteria
Public Access, Assets and Environmental Impacts	Local resources
	Public facilities
	Utilities



	Grade crossings
	Surfing and swimming
	Multi-use paths and pedestrian access (parallel to beach)
	Beach/coastal access
	Permitting
	Sensitive habitats
	Section 4(f) resources
Alignment with Related/Planned Projects	Consistent with local municipality preferences, ongoing, and future projects
	Consistent with federal, State, and regional projects and planning efforts

4.2.1. Resilience and Rail Reliability

Evaluate each alternative concept’s ability to meet the core objective of the project: supporting rail resilience and minimizing service disruptions across the study/project range of up to 30 years. This category assesses how effectively alternative concepts sustain rail operations under typical and extreme conditions, including general longevity, vulnerability to coastal hazards, and bluff stability. The criteria consider how each alternative concept performs to reliably protect rail infrastructure against risks to service continuity, safety, and long-term performance.

Table 15. Resilience and Rail Reliability Criteria (Sub Criteria) Definitions

Criteria	Scoring 0-5 with “5” or “high” being most desirable
Ability to maintain service during maintenance	<p>Fail (0): The concept may lead to long-term service interruptions during maintenance due to critical impact on the rail infrastructure.</p> <p>Low (1): The concept results in frequent or prolonged service disruptions during maintenance, lasting weeks or months.</p> <p>Medium (3): The concept may lead to intermittent service disruptions during maintenance, lasting a few days.</p> <p>High (5): The concept allows maintenance to occur with minimal service impacts, limited to off-peak hours or weekends.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>Will the concept require rail service interruptions for maintenance? If so, how long and at what frequency?</i> • <i>Is there a way maintenance can be performed with minimal disruption (such as night and weekend phasing) or will it require extended service disruptions?</i>
Longevity of concept	<p>Fail (0): The concept is incompatible or unsuitable for the area and would show signs of degradation within a few weeks or months of implementation.</p> <p>Low (1): The concept has a short operational lifespan and requires major intervention within five years.</p> <p>Medium (3): The concept has a moderate lifespan and would require replacement or upgrade within 15 years.</p> <p>High (5): The concept remains effective for close to 30 years with minimal need for replacement or major upgrades.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>What is the expected operational life of the concept under typical conditions, and will it remain functional throughout the 30-year project horizon?</i> • <i>What is the failure rate of the concept across 30 years?</i>



<p>Sensitivity to storms, sea level rise, beach erosion</p>	<p>Fail (0): The concept amplifies the effects of present-day storm events, sea level rise, and erosion, jeopardizing rail infrastructure and the surrounding environment.</p> <p>Low (1): The concept is highly vulnerable to present day storm events, sea level rise, and coastal erosion, risking damage or failure.</p> <p>Medium (3): The concept is designed to withstand moderate storm events (10- to 50-year return events) with limited damage to the rail infrastructure.</p> <p>High (5): The concept is designed to withstand severe storm events (50- to 100-year return events) with sea level rise and projected long-term coastal changes.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>What is the rating or ability of the concept to withstand storm events and rising sea levels at present-day intensity?</i> • <i>What is the rating or ability of the concept to withstand storm events and rising sea levels at projected future intensities or major storm events?</i>
<p>Track resilience – bluff stability</p>	<p>Fail (0): The concept would accelerate rail corridor exposure to bluff erosion and landslide risks, jeopardizing track integrity and increasing risks of service interruptions.</p> <p>Low (1): The concept leaves the rail corridor exposed to bluff erosion and landslide risks, threatening track integrity and passenger and freight rail service.</p> <p>Medium (3): The concept reduces the rail corridor's exposure to bluff erosion and landslide risks, requiring mild to moderate emergency repairs following severe storm events.</p> <p>High (5): The concept fully stabilizes the bluff, preventing erosion and landslides that could impact passenger and freight rail operations.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>What is the rating or ability of the concept to effectively prevent bluff erosion and landslides that could compromise track stability or require emergency repairs?</i> • <i>Will the concept offer bluff erosion and landslide protection across the 30-year span?</i>

4.2.2. Cost

Assess the high-level cost magnitudes associated with each alternative concept from initial implementation through long-term maintenance and lifecycle phases, relative to a “no action” scenario across the same geographic areas and a study/project range of 30 years. This category evaluates high-level capital investment, ongoing operations and maintenance (O&M) needs, and total lifecycle costs to determine whether an alternative concept presents a cost-effective solution or prohibitive costs beyond available funding that could impact implementation feasibility or long-term sustainability of the concept.



Table 16. Cost Criteria (Sub Criteria) Definitions

Criteria	Scoring 0-5 with “5” or “high” being most desirable
<p>Construction costs</p>	<p>Fail (0): The concept requires high capital investments that would escalate over time.</p> <p>Low (1): The concept requires the highest capital investment compared to (or relative to) other alternatives.</p> <p>Medium (3): The concept requires a mid-range capital investment relative to other alternatives.</p> <p>High (5): The concept requires the lowest capital investment relative to other alternatives.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>What is the estimated capital cost to implement the concept, and how does it compare to other alternatives?</i> • <i>What are the impacts of construction on the surrounding community?</i>
<p>Maintenance costs</p>	<p>Fail (0): The concept requires significant, ongoing, and continuously increasing maintenance costs.</p> <p>Low (1): The concept requires frequent maintenance and the highest maintenance costs relative to other alternatives.</p> <p>Medium (3): The concept requires sporadic maintenance, requiring moderate maintenance costs.</p> <p>High (5): The concept requires no maintenance after construction, requiring limited long-term upkeep and incurring low to no maintenance costs.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>How frequent or regularly will maintenance be required for the concept after construction?</i> • <i>What are the projected annual O&M costs for the concept over the concept’s usable life?</i>
<p>Lifecycle costs</p>	<p>Fail (0): The concept incurs high and increasing lifecycle costs, requiring investments that outlast concept lifecycle.</p> <p>Low (1): The concept has the highest combined capital and -long-term maintenance, operations, and disposal costs over its full lifespan relative to other concepts.</p> <p>Medium (3): The concept has moderate combined capital and long-term maintenance, operations, and disposal costs over its full lifespan relative to other concepts.</p> <p>High (5): The concept has the lowest combined capital and -long-term maintenance, operations, and disposal costs over its full lifespan relative to other concepts.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>How frequently will lifecycle replacements or upgrades be required for the concept after construction?</i> • <i>What is the total estimated cost of the concept over its full lifecycle, including construction, maintenance, replacement, operations, and disposal needs?</i>

4.2.3. Implementability and Constructability

Evaluate each alternative concept’s feasibility for construction and service delivery within the existing corridor and project footprint, relative to a “no action” scenario across the same geographic areas and a 30-year study horizon. This category assesses whether an alternative concept is suitable considering the unique characteristics of the project area, and whether it can



be implemented without sustained service disruptions, taking into account factors such as construction complexity, ROW requirements, implementation timeline, and ability to meet design standards. The goal is to determine whether the alternative concept offers a practical and timely path to delivery or presents challenges that could delay or complicate implementation.

Table 17. Implementability and Constructability Criteria (Sub Criteria) Definitions

Criteria	Scoring 0-5 with "5" or "high" being most desirable
Ability to maintain service during construction	<p>Fail (0): The concept requires long-term disruptions to rail operations that may significantly deter ridership over time.</p> <p>Low (1): The concept requires rail operations to be suspended for more than 30 days within a single year, significantly disrupting service.</p> <p>Moderate (3): The concept requires brief suspensions to rail service lasting no more than a week each year.</p> <p>High (5): The concept allows construction to proceed without any interruption to rail operations.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>If the concept requires suspension of rail service during construction, will the disruption be partial or full, and how long will it last?</i> • <i>Can construction-related disruptions to rail service be reduced, phased, or scheduled to minimize impacts?</i>
Speed of implementation	<p>Fail (0): The concept requires extensive preliminary work (permitting, design, or construction complexity) that delays concept implementation beyond projected timelines.</p> <p>Low (1): The concept requires 5 or more years to implement due to permitting, design, or construction complexity.</p> <p>Medium (3): The concept can be implemented within four to five years.</p> <p>High (5): The concept can be implemented within four years or less.</p> <p>Key Question:</p> <ul style="list-style-type: none"> • <i>What is the estimated timeline for full implementation of the concept, including permitting, design, and construction?</i>
ROW requirements	<p>Fail (0): The concept requires substantial permanent acquisition of additional ROW, involving several private property owners, complex easements, and incurring legal challenges.</p> <p>Low (1): The concept requires some permanent acquisition of additional ROW outside the existing corridor, involving numerous private property owners or complex easements.</p> <p>Medium (3): The concept may require some medium to long-term easements, involving a limited number of property owners.</p> <p>High (5): The concept is fully contained within the existing corridor and does not require any new ROW, aside from possible short-term or temporary easements.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>Will the concept require the acquisition of additional permanent ROW outside the existing corridor, and is that land publicly or privately owned?</i> • <i>Will the concept require acquiring temporary easements for construction outside of the existing ROW?</i> • <i>How much additional land acquisition will the concept require?</i>



<p>Constructability</p>	<p>Fail (0): The concept is extremely complex and there is no example in the region where it was built. Low (1): The concept presents high technical complexities and would require major adaptation to be locally feasible. Medium (3): The concept is moderately complex but similar projects have been built in the region in the past. High (5): The concept is very simple and fully adapted to the local context, with several examples of similar projects built in the region.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>How complex is the project from a technical standpoint?</i> • <i>Are there relevant case studies of similar projects in the region?</i>
<p>Ability to meet design criteria</p>	<p>Fail (0): The concept does not address any of the key goals and objectives of the project and would even counteract the agency's efforts. Low (1): The concept does little to fulfill the goals and objectives of improving rail resiliency along the corridor. Medium (3): The concept would partially meet the design criteria and goals and objectives of the project. High (5): The concept complies with the long-term goals and objectives of the project.</p> <p>Key Question:</p> <ul style="list-style-type: none"> • <i>How well does this concept address the imperative needs identified in this project?</i>

4.2.4. Public Access, Assets, and Environmental Impacts

Evaluate each alternative concept’s potential impacts on public infrastructure, recreational assets, and environmental resources relative to a “no action” scenario across the same geographic areas and a study/project range of 30 years. The criteria assess whether the alternative concept preserves or enhances access, safety, and ecological integrity, or introduces disruptions that could reduce public benefit, increase vulnerability of local ecosystems, or negatively impact surrounding communities. It also looks at permitting requirements and whether permitting complexities would prohibitively hinder project implementation.

Table 18. Public Assets and Environmental Impacts Criteria (Sub Criteria) Definitions

Criteria	Scoring 0-5 with “5” or “high” being most desirable
<p>Local resources</p>	<p>Fail (0): The concept causes permanent alterations or disruptions to the operations or accessibility of local resources. Low (1): The concept causes significant disruption to the operations or accessibility of local amenities, such as attractions, schools, cultural resources, emergency resources, local businesses, etc. Medium (3): The concept causes some temporary disruptions to the operations or accessibility of local resources. High (5): The concept protects or enhances the operations or accessibility of local resources.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>What local resources exist in the proximity of the alignment and might be impacted throughout the corridor?</i> • <i>Will the concept result in degradation or improvement of local resources?</i> • <i>Will the concept result in temporary impacts on local resources in the vicinity due to construction or implementation during the 30-year project span?</i>



Public facilities	<p>Fail (0): The concept permanently deteriorates or removes public facilities.</p> <p>Low (1): The concept significantly affects availability of public facilities such as restrooms, or recreational areas through closures, relocations, or restricted access.</p> <p>Medium (3): The concept temporarily affects availability of public facilities.</p> <p>High (5): The concept protects or enhances continuous availability of existing public facilities.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>Will the concept require permanent relocation or removal of nearby public facilities such as restrooms, recreational areas, or community spaces?</i> • <i>Will the concept cause temporary closures or restricted access to public facilities in the vicinity due to construction or implementation within the 30-year project span?</i>
Utilities	<p>Fail (0): The concept results in long-term service outages and interruptions and may affect the integrity and safety of the local utility network.</p> <p>Low (1): The concept results in extensive disruptions, relocations, or service outages for multiple utilities (water, electricity, gas, sewage, or communications, etc.).</p> <p>Medium (3): The concept results in temporary service disruptions or outages for more than one utility.</p> <p>High (5): The concept maintains uninterrupted service for all adjacent utilities (water, electricity, gas, sewage, or communications, etc.).</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>Are utilities at risk of service disruptions?</i> • <i>Will the concept require permanent relocation of nearby utilities, such as water, electricity, gas, sewage, or communications infrastructure?</i> • <i>Will the concept cause temporary service disruptions to utilities, such as water, electricity, gas, sewage, or communications, in the vicinity due to construction or implementation within the 30-year project span?</i>
Grade crossings	<p>Fail (0): The concept causes permanent disruptions or elimination of existing grade crossings and major re-routing of roads and tracks.</p> <p>Low (1): The concept causes multiple disruptions to grade crossings, including closures or re-routing of roads and tracks.</p> <p>Medium (3): The concept causes temporary disruptions to grade crossings, including closures or re-routing of roads and tracks.</p> <p>High (5): The concept avoids impacts on grade crossings and maintains or improves service levels and circulation patterns.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>Are grade crossings at risk of increased delays, closures, or safety concerns?</i> • <i>Will the concept require permanent relocation, closure, or reconfiguration of nearby rail grade crossings?</i> • <i>Will the concept cause temporary disruptions to rail grade crossings, such as closures or detours, due to construction or implementation within the 30-year project span?</i>



<p>Surfing and swimming</p>	<p>Fail (0): The concept leads to permanent changes that make the area unsuitable for surfing or swimming.</p> <p>Low (1): The concept significantly alters or obstructs surf breaks and swimming areas, reducing availability of recreational resources.</p> <p>Medium (3): The concept causes temporary disruptions or minor alterations of the swimming and surfing experience.</p> <p>High (5): The concept preserves the availability and quality of surfing and swimming recreational resources.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>Are surf breaks or swimming areas at risk of degradation, loss of access, or elimination?</i> • <i>Will the concept permanently alter or eliminate the existing surf breaks or designated swimming areas?</i> • <i>Will the concept cause temporary disruptions or reductions in access to surf breaks or swimming access due to construction or implementation within the 30-year project span?</i>
<p>Multi-use paths and pedestrian access</p>	<p>Fail (0): The concept permanently removes or severely restricts access to pedestrian and multi-use paths, with no replacements or alternatives.</p> <p>Low (1): The concept results in reduced access, removal, or relocation of multi-use paths and pedestrian routes.</p> <p>Medium (3): The concept causes temporary disruptions or partial relocations of pedestrian paths, with mitigations.</p> <p>High (5): The concept maintains or enhances pedestrian and multi-use path access, potentially adding new connections or re-opening closed paths.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>Will pedestrian access or multi-use paths face increased safety risks, reduced connectivity, or deterioration if no improvements are made?</i> • <i>Will the concept result in permanent removal, relocation, or significant alteration of existing pedestrian pathways or multi-use trails?</i> • <i>Will construction or implementation of the concept cause temporary closures, detours, or reduced access for pedestrians and non-motorized users over the 30-year project span?</i>
<p>Beach/ coastal access</p>	<p>Fail (0): The concept permanently eliminates access to lateral beaches or coastal areas.</p> <p>Low (1): The concept results in multiple closures, long-term disruptions, or loss of lateral beaches and coastal areas, limiting public movement and recreation.</p> <p>Medium (3): The concept results in limited closures, short-term disruptions, or partial loss of access to lateral beaches and coastal areas, but public movement and recreational use are largely unaffected.</p> <p>High (5): The concept maintains full access to existing lateral beaches and coastal areas and may expand capacity for movement and recreation.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>Will lateral beach and coastal areas face increased erosion, reduced connectivity, or diminished recreational use if no improvements are made?</i> • <i>Will the concept result in permanent loss or significant alteration of lateral beaches or coastal areas used for recreation?</i> • <i>Will construction or implementation of the concept cause temporary closures, restricted movement, or reduced recreational areas along lateral beaches and coastal areas over the 30-year project horizon?</i>



<p>Permitting</p>	<p>Fail (0): The concept involves prohibitive permitting barriers with multiple agencies and has low likelihood of approval.</p> <p>Low (1): The concept involves complex permitting processes requiring multiple agencies and may include elements that are difficult to approve, such as hard infrastructure.</p> <p>Medium (3): The concept involves moderate permitting effort with multiple agencies but has reasonable likelihood for approval and manageable coordination.</p> <p>High (5): The concept is eligible for exceptions or streamlined permitting processes, with minimal agency coordination.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>Will the concept face significant permitting challenges due to its design, agency involvement, or environmental requirements?</i> • <i>Does the concept entail complex permitting that is prohibitively long?</i> • <i>Are there components of the concept that could facilitate the permitting process, such as local priorities, the use of nature-based solutions or demonstrated environmental benefits?</i>
<p>Sensitive habitats</p>	<p>Fail (0): The concept directly affects critical or sensitive habitats, with no realistic options for mitigation.</p> <p>Low (1): The concept affects multiple sensitive habitats, with impacts that are difficult to mitigate.</p> <p>Medium (3): The concept affects some sensitive habitats, but impacts are limited and have feasible mitigation.</p> <p>High (5): The concept avoids sensitive habitats entirely.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>Does the concept have the potential to impact sensitive habitats?</i> • <i>Are any of these impacts possible to mitigate?</i>
<p>Section 4(f) resources</p>	<p>Fail (0): The concept causes irreversible damage to Section 4(f) resources, such as parks, historic sites, or recreational areas, and may have legal consequences.</p> <p>Low (1): The concept causes permanent impacts on protected Section 4(f) resources with few feasible mitigation strategies.</p> <p>Medium (3): The concept causes temporary or minor impacts on Section 4(f) resources with mitigation strategies available.</p> <p>High (5): The concept avoids all impacts on Section 4(f) resources and maintains the integrity of these areas.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>Are there any Section 4(f) resources in the vicinity of the alignment along the corridor?</i> • <i>Will the concept result in temporary or permanent impacts on Section 4(f) resources, and can any such impact be mitigated or avoided?</i>

4.2.5. Related/Planned Projects

Evaluate each alternative concept's alignment with existing and planned coastal initiatives across local, regional, and state levels relative to "no action" across the same geographic areas and study/project range of 30 years. The criteria assess consistency with policies/plans, funding eligibility, permitting feasibility, and public support toward each alternative concept to identify whether the alternative concept supports a cohesive regional effort or presents conflicts that could increase the difficulty or feasibility of implementation.



Table 19. Related/ Planned Projects Criteria (Sub Criteria) Definitions

Criteria	Scoring 0-5 with “5” or “high” being most desirable
Consistent with city preferences, ongoing, and future projects	<p>Fail (0): The concept counteracts city policies, planning initiatives, local studies, or goals and may face city opposition and legal challenges.</p> <p>Low (1): The concept is inconsistent with or in conflict with city policies or planning initiatives, such as coastal preservation, transportation, or climate action plans. The concept is not aligned with local goals or studies within the specified locations or time ranges. The concept faces public concern or opposition, or it fails to reflect community preferences, such as support for nature-based solutions, improved beach access, and other locally valued priorities.</p> <p>Medium (3): The concept is partially aligned with city policies or planning initiatives and some local goals. Similar concepts have received mixed public comments/support, which may require modification for broader acceptance.</p> <p>High (5): The concept is fully aligned with local policies or planning initiatives, including coastal preservation, transportation, and environmental sustainability plans. It is compatible with local goals or studies in the specified locations and time ranges. There is strong public support for the concept, and it aligns with community sentiments and preferences, such as favoring nature-based solutions, improving beach access, and reflecting local values.</p> <p>Key questions:</p> <ul style="list-style-type: none"> • <i>Does the concept align with goals and plans outlined by local cities, transportation agencies, or regional plans focused on coastal resilience?</i>
Consistent with federal, state, projects, and planning efforts	<p>Fail (0): The concept is incompatible with federal or State planning efforts and conflicts with key guidelines (e.g., California Coastal Commission). It risks disqualification from funding or regulatory rejection.</p> <p>Low (1): The concept is inconsistent with broader planning efforts and contradicts regional frameworks, such as Coastal Zone Management programs and State Adaptation Plans. It does not meet federal and State (California Coastal Commission) guidelines, jeopardizing funding and increasing permitting complexity.</p> <p>Medium (3): The concept aligns with some federal or State planning efforts and may meet basic permitting requirements but does not qualify for streamlined processes or funding incentives.</p> <p>High (5): The concept is fully aligned with regional planning efforts and complements frameworks like Coastal Zone Management programs and State Adaptation Plans. It meets all relevant federal and State (California Coastal Commission) guidelines, qualifies for funding, and benefits from streamlined permitting.</p> <p>Key Questions:</p> <ul style="list-style-type: none"> • <i>Does the concept align with goals and plans outlined by the Coastal Commission and other regional, State, and federal agencies?</i> • <i>Is it consistent with State and federal mandates and eligible for funding and streamlined permitting?</i> • <i>Does it support collaboration across jurisdictions and contribute to long-term regional climate resilience?</i>

4.3. Screening Process – Scores and Weights

Each criterion was assigned a point score ranging from 0 to 5, with 0 indicating a failing performance and 5 indicating the most favorable outcome for that criterion. To provide robust



and informed evaluations, scoring across alternative concept categories was guided by stakeholder insight and in-depth discussions with subject matter experts from multiple disciplines:

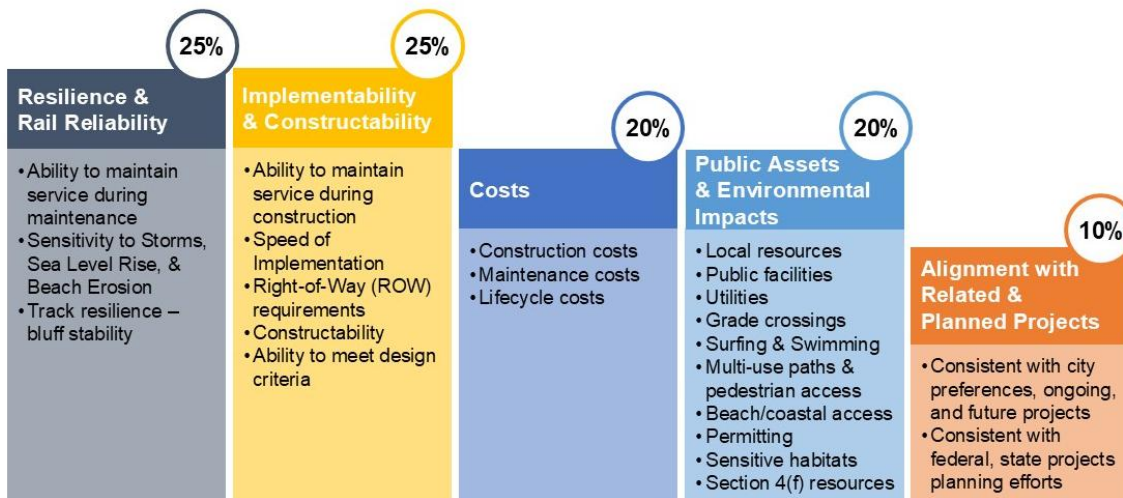
- Geotechnical engineering specialists contributed to assessments of Rail and Bluffside concepts.
- Coastal, rail and civil engineering specialists provided input on Rail and Beachside concepts.
- Rail and civil engineering professionals supported scoring across all alternative concept types to ensure that scoring reflected the proposed alternative concept overall.
- Environmental planning specialists informed evaluations of Sensitive Habitats and Section 4(f) Resources across all alternative concepts.

Total scores for each evaluation topic were weighed using a multiplier based on their assigned percentage. The weighting framework was informed by the project's Purpose and Need, as well as input from stakeholders and the community.

The following weights were assigned to each Evaluation Category (out of 100 percent):

- Coastal Resilience and Rail Reliability (25 percent)
- Implementability and Constructability (25 percent)
- Costs (20 percent)
- Public Assets & Environmental Impacts (20 percent)
- Related/Planned Projects (ten percent)

Figure 13. Evaluation Criteria and Weights



The alternative concepts were ranked from highest to lowest total point score within each solution type: rail, bluffside, and beachside. The top-scoring alternative concepts in each category will be carried forward for further analysis. A detailed scoring sheet for each alternative concept is included in Appendix E.



Table 20. Example Alternative Concept Scoresheet Methodology Categories, Criteria, and Point Scoring

Category		Criteria	Points (0-5)	Total Points Per category
Example Concept:	Resilience and Rail Reliability	Ability to maintain service during maintenance	3	11
		Longevity of concept (optimal conditions)	5	
		Sensitivity to storm, sea level rise, beach erosion	2	
		Track resilience – bluff stability	1	
Rail 1 Elevated Tracks	Cost	Construction costs	1	9
		Maintenance costs	5	
		Lifecycle costs	3	
Elevated Tracks	Implementability and Constructability	Ability to maintain service during construction	1	8
		Speed of implementation	1	
		ROW requirements	2	

4.4. Community Engagement

Community engagement and feedback played a critical role in shaping the evaluation framework and influencing how different factors were weighted. Public comments and advocacy groups expressed strong support for sand placement and emphasized the importance of maintaining safe, continuous access to coastal trails and lateral sandy beaches for recreation and resilience. Concerns about shoreline erosion and the impacts of hard shoreline protection structures were incorporated into the screening methodology.

In response to rounds of community input, the following actions were taken:

1. The categories “Public Assets and Environmental Impacts” and “Related/Planned Projects” were assigned weights of 20 percent and ten percent, respectively—together making up 30 percent of the total evaluation.
2. A one-time sand placement component was added to all shoreline protection structure concepts to help buffer the rail corridor and provide community benefits. Initially, three standalone alternative concepts without sand placement were considered for evaluation: Riprap, Engineered Rock Revetment, and Vertical Seawalls. These alternative concepts were ultimately removed from final scoring because they were inconsistent with community preferences or established plans and policies. One-time sand placement is now included in ten of the 11 beachside concepts, with the exception of the Watershed Modification alternative concept.
3. A sand placement-only alternative concept was added and evaluated in direct response to public preference. This also served as an exercise to evaluate the feasibility of reproducing ongoing local and regional sand placement projects on a corridor scale.

A comprehensive summary of the community engagement program and comments received are detailed in (See: Appendix C. Community Engagement Report).



5. Refined Alternative Concepts Shortlisted and Advanced for Further Study

The screening and evaluation process yielded a total of eight shortlisted alternative concepts to advance for further study. These alternative concepts are the top scoring in their respective categories (Rail, Bluffside, Beachside) and determined to be suitable to be used alone or in combination with other alternative concepts to address the hazards along the corridor. Based on expert panel recommendations, it would be ideal to have at least two concepts be carried forward for each category to provide a menu of options for implementation. In one category (beachside), the scores were very close together, so more than two alternative concepts were carried forward. Full scoring results and justifications can be found in Appendix E.

5.1. Results, Justifications, and Analysis

5.1.1. Rail Concepts

Two of the three Rail Concepts were shortlisted:

2. Alternative materials for critical railroad infrastructure to reduce lifecycle costs
3. Ground improvement (track-bed stabilization)

Table 21. Rail Concept Ranks and Summary Reasoning

Rail Concept	Rank	Shortlisted	Summary Reasoning
1. Elevate Tracks	3	No	High cost and construction impacts to rail service would make this alternative concept difficult to implement.
2. Alternative materials for critical railroad infrastructure to reduce lifecycle costs	1	Yes	Will limit impacts on surrounding communities and environmental assets. Easiest to implement and phase.
3. Ground improvement (track-bed stabilization)	2	Yes	Will have the greatest influence on railroad resiliency. May intermittently impact railroad operations during construction. May be combined with other bluffside alternatives.

5.1.2. Bluffside Concepts

Two of the nine Bluffside Concepts were shortlisted:

1. Catchment Walls
3. Tieback / Soil-Nail / Pin-Pile Walls

**Table 22. Bluffside Concept Ranks and Summary Reasoning**

Bluffside Concept	Rank	Shortlisted	Summary Reasoning
1. Catchment Walls	1	Yes	Proven cost-effective approach within the ROW to protect tracks.
2. Stabilization Grading	8	No	Difficult to construct, may impact adjacent private properties.
3. Tieback / Soil-Nail / Pin-Pile Walls	2	Yes	Proven cost-effective approach within the ROW to protect tracks.
4. Ground Improvement (stabilization)	5	No	May be combination with rail improvements related to ground improvements.
5. Surface Matting and Deep-Rooted Vegetation Planting	3	No	May be implemented in combination with other improvements, but not a corridor wide solution.
6. Drainage Improvement (grading / detention basins / undertrack outlets)	6	No	Limited to specific areas of reoccurring impacts, but not a corridor-wide solution.
7. Deflection Walls (in tributaries)	9	No	Requires periodic post-storm monitoring to maintain effectiveness. Only recommended in specific areas, but not a corridor wide solution.
8. Up-Gradient Cut-Off Drains	4	No	Only recommended in specific areas, but not a corridor wide solution.
9. Hydraulugs	7	No	Difficult to construct and impacts on residential neighborhoods beyond ROW

5.1.3. Beachside Concepts:

Four of the eleven Beachside Concepts were shortlisted.

- 2.1. One-time sand placement with riprap shoreline protection structure
- 2.2. One-time sand placement with engineered rock revetment shoreline protection structure
- 2.3. One-time sand placement with seawall shoreline protection structure
- 2.4. One-time sand placement with a combination of shoreline protection structures

Table 23. Beachside Concept Ranks and Summary Reasoning

Beachside Concept	Rank	Carried Forward	Summary Reasoning
1. Beach nourishment with planned replenishment with No Shoreline protection structure	5	No	The scale of the effort, including lead time, funding, sand sourcing, permitting, and required sand volumes, would be a monumental undertaking, as demonstrated by similar large-scale regional initiatives. Maintaining a 30-year design life would require a regularly scheduled replenishment program managed by agencies with long-term coastal



			stewardship responsibilities. OCTA's governance structure as a transportation agency limits its ability to serve as the lead entity for an ongoing sand replenishment program, particularly given the unpredictability of sand movement during storm events.
2.1 One-time sand placement with Riprap shoreline protection structure	3	Yes	Proven solution that can be constructed within the railroad ROW while also improving beach access when combined with sand placement.
2.2 One-time sand placement with Eng. Rock Revetment shoreline protection structure	4	Yes	Will require extensive railroad operations impacts but still recommended in specific locations where ROW is wide enough to not have extensive operational impacts.
2.3 One-time sand placement with Seawall shoreline protection structure	2	Yes	Feasible solution that can be constructed within the railroad ROW while also improving beach access when combined with sand placement.
2.4 One-time sand placement with a Combination of shoreline protection structure	1	Yes	Feasible solution that can be constructed within the railroad ROW while also improving beach access when combined with sand placement.
3. One-time sand placement with sand retention measures and No shoreline protection	11	No	Negative impacts on recreational users (surfing/swimming) and may be very difficult to receive environmental approval and permitting.
4.1 One-time sand placement with sand retention measures and Riprap shoreline protection structure	8	No	Negative impacts on recreational users (surfing/swimming) and may be very difficult to receive environmental approval and permitting.
4.2 One-time sand placement with sand retention measures and Eng. Rock Revetment shoreline protection structure	9	No	Negative impacts on recreational users (surfing/swimming) and may be very difficult to receive environmental approval and permitting.
4.3 One-time sand placement with sand retention measures and Seawall shoreline protection structure	7	No	Negative impacts on recreational users (surfing/swimming) and may be very difficult to receive environmental approval and permitting.
4.4 One-time sand placement with sand retention measures and Eng. Rock Revetment shoreline protection structure	6	No	Negative impacts on recreational users (surfing/swimming) and may be very difficult to receive environmental approval and permitting.



5. Watershed modification	10	No	Must be implemented by other agencies and will take years to naturally replenish beach sand.
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5.2. Summary of Shortlisted Alternative Concepts

The following shortlisted alternative concepts will be brought to the public again for additional stakeholder engagement and feedback.

Two rail concepts carried forward:

1. Alternative materials for critical railroad infrastructure to reduce lifecycle costs
2. Ground improvement (track-bed stabilization)

Two bluffside concepts carried forward:

1. Catchment Walls
3. Tieback / Soil-Nail / Pin-Pile Walls

Four beachside concepts carried forward:

- 2.1. One-time sand placement with riprap shoreline protection structure
- 2.2. One-time sand placement with engineered rock revetment shoreline protection structure
- 2.3. One-time sand placement with seawall shoreline protection structure
- 2.4. One-time sand placement with combination of seawall and revetment shoreline protection structure

6. Technical Assessment of Shortlisted Alternative Concepts

A preliminary technical assessment was performed on the eight shortlisted alternative concepts that emerged from the criteria screening process. These were completed to provide a more detailed understanding of the selected alternative concepts and their applicability to the specified Typical Sections of the corridor. Together, the Coastal Assessment (Section 6.1) and the Geotechnical Assessment (Section 6.2) describe the performance of the Beachside and Bluffside concepts in mitigating coastal erosion, flooding, sea level rise, and unstable bluff conditions that may affect the railway over the short to medium term over the next 30 years. By combining these perspectives, this section establishes the technical foundation for determining the location and type of targeted interventions necessary to maintain short and medium-term rail safety and resilience.

6.1. Coastal Assessment: Beachside Concepts

The focus of this coastal assessment of the shortlisted beachside concepts is to provide an initial assessment of the vulnerability of the rail corridor to coastal erosion and flooding, and related potential damage to the rail infrastructure over the next 10 to 30 years. The vulnerability assessment will help identify critical zones with high risk of damage to the rail corridor and will include an initial evaluation of beachside concepts' applicability in reducing coastal vulnerabilities.

6.1.1. Description of Shortlisted Beachside Concepts

The following sections provide descriptions of the shortlisted beachside concepts along with potential performance and potential implementation locations.

Concept 2.1 One-time Sand Placement with Riprap Shoreline Protection Structure

The project shoreline contains sections of rock riprap shore protection that are in varying conditions of repair. This alternative concept includes the placement of engineered new riprap or engineered repair of existing riprap, including retrieval of displaced riprap, combined with a one-time sand placement. The primary opportunities for implementation of this concept are in areas of existing riprap in need of repair. A typical section of One-time Sand Placement with Riprap Shore Protection Restoration is shown in Figure 14. An example of this action is the riprap repair project constructed in 2025, where an approximately 3,100-foot reach of contiguous riprap shore projection was repaired between North Beach and Linda Lane, with a before and after photo shown in Figure 15.

Figure 14. Typical Riprap Repair Restoration to The Existing Riprap

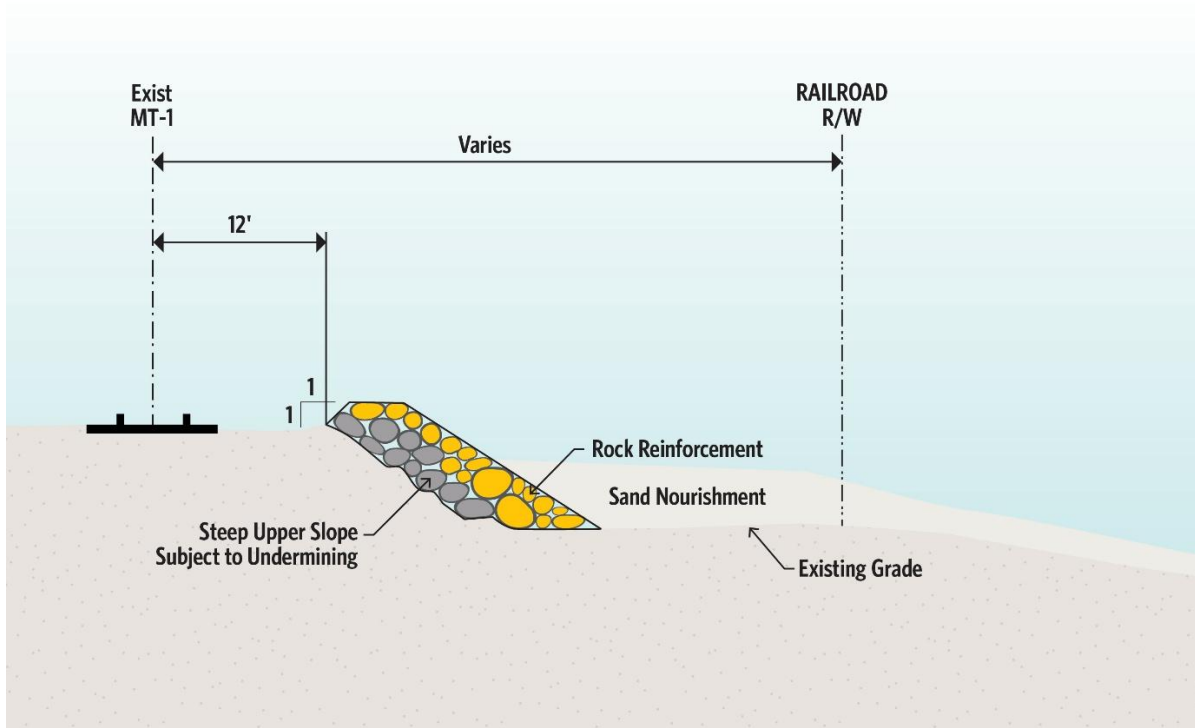
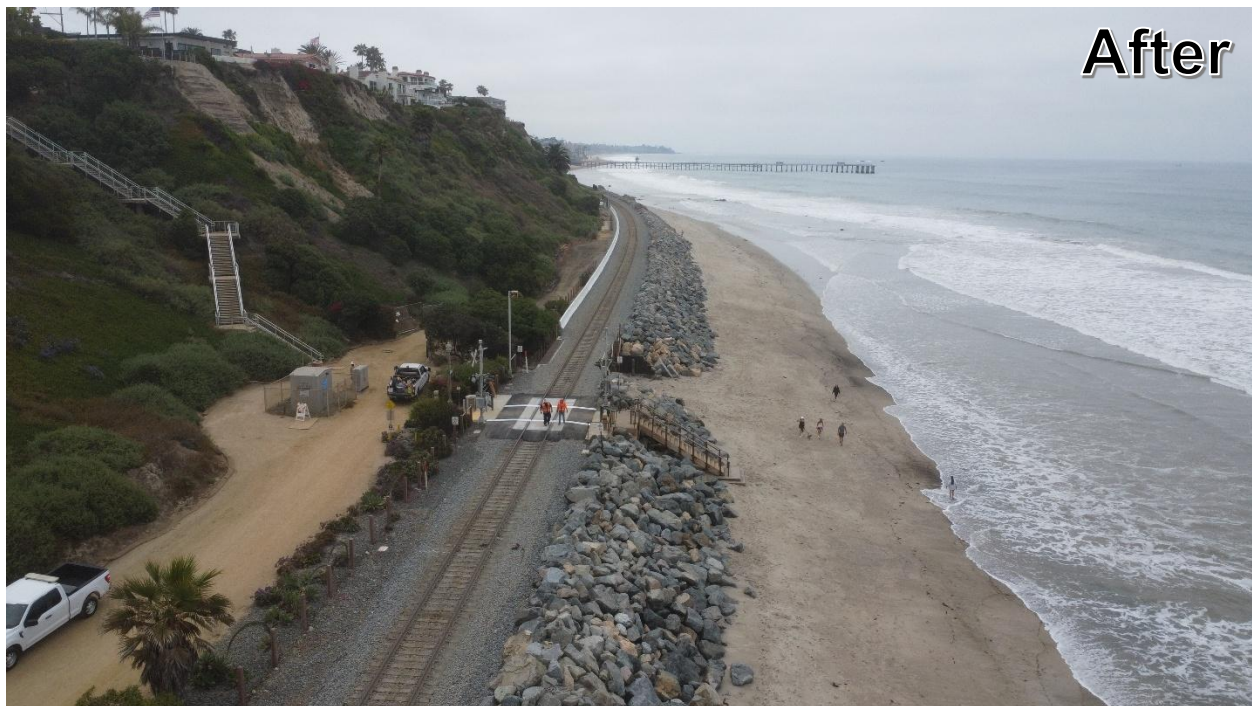
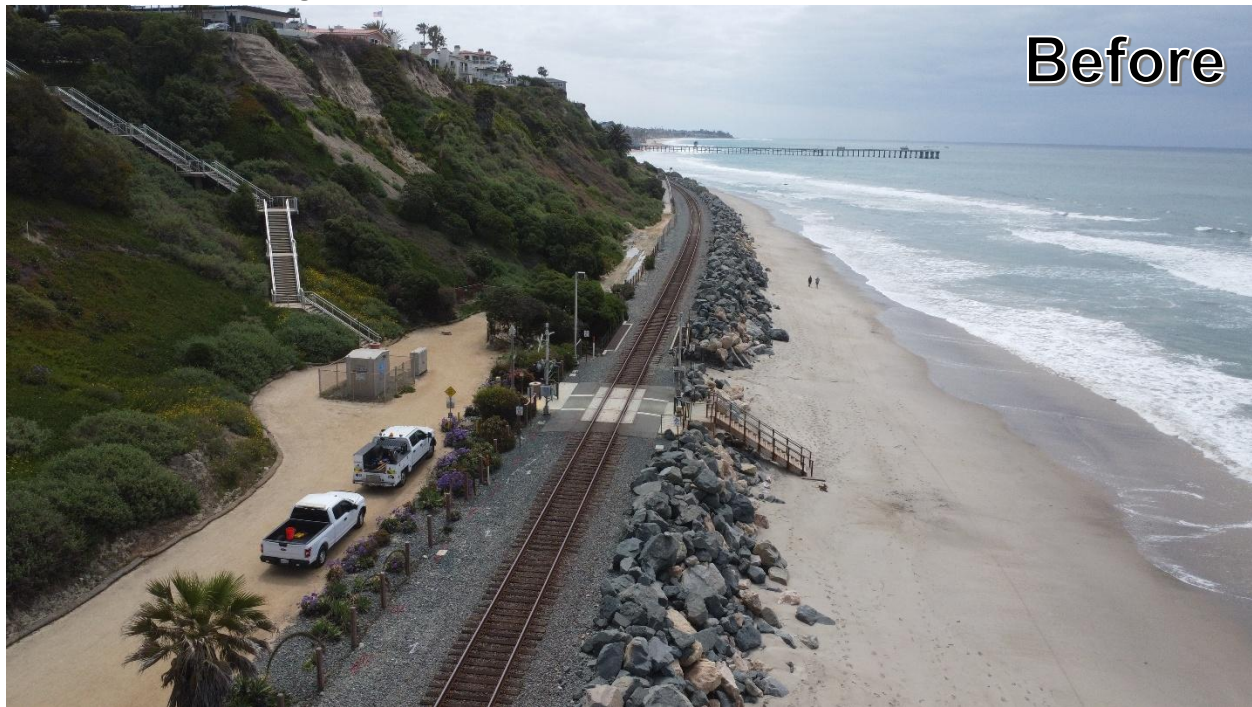


Figure 15. Riprap Repair at MP 204 Before and After

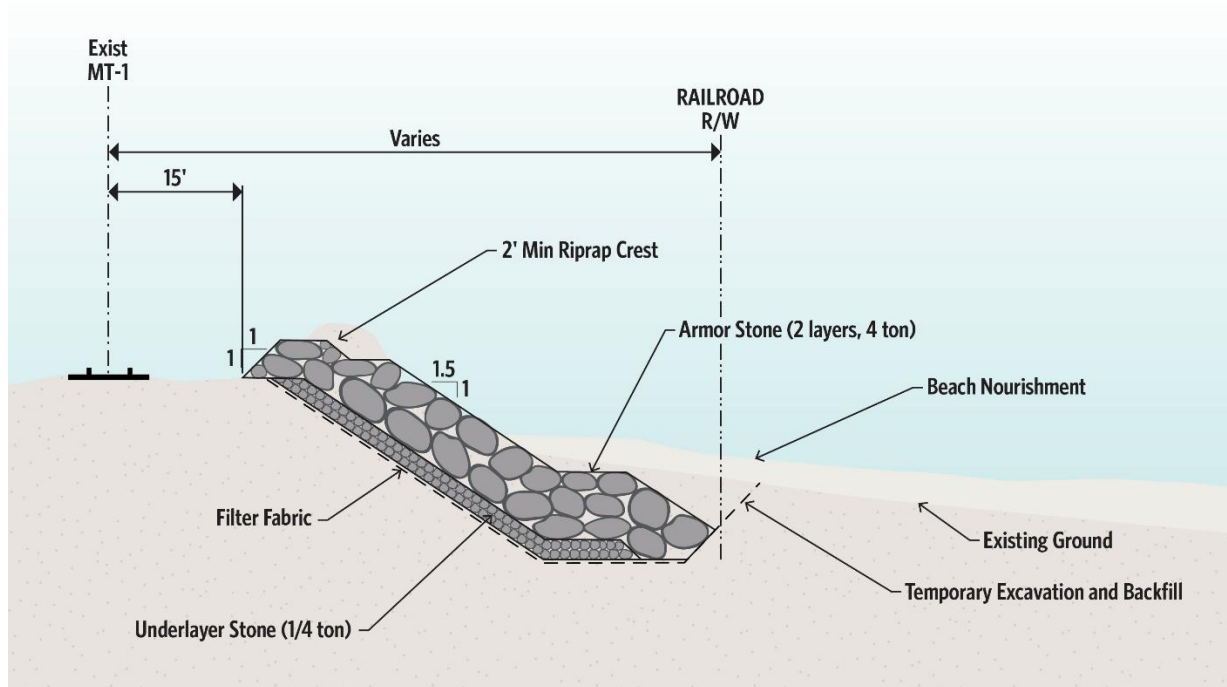


Concept 2.2 One-time Sand Placement with Engineered Rock Revetment Shoreline Protection Structure

Engineered revetments are typically constructed of quarried stone sized for stability based on extreme design wave and water level conditions. Figure 16 illustrates a typical engineered revetment structure. Key components include:

- Excavated slope of sufficient depth to protect against structure undermining from wave action,
- Placement of geotextile filter fabric underlayer to guard against sediment loss under wave attack,
- Smaller underlayer stone, and
- Outer double layer of armor stone.

Figure 16. Typical Engineered Revetment Shore Protection



Key constraints related to engineered revetment feasibility include the following: (1) the structure footprint must remain within the existing railroad ROW; and (2) construction excavation must remain outside the railroad's zone of influence for construction to occur without temporary shoring. Figure 16 illustrates the 15-foot offset from the track centerline and maximum slope of 1.5H:1V (SCRRA DCM 15.4.1) to avoid the zone of influence. The concept details and dimensions shown in the figure are typical design values to withstand extreme waves and water levels in Study Area.

Figure 17 shows the potential implementation locations for an engineered revetment. Green areas indicate locations where the revetment section would remain within the ROW, while red areas represent regions where the revetment section would likely encroach beyond the ROW. Opportunities for the construction of a fully engineered revetment are limited to two discrete segments in the southern portion of the project area. Figure 18 shows an aerial photo of areas along the coastal rail corridor where engineered revetment could potentially be implemented. A revetment toe elevation of +2 ft NAVD88 was assumed to protect against toe undermining. Areas where bedrock is above this elevation would result in a reduced revetment footprint due

to a higher elevation of revetment toe, providing greater opportunity of implementation within the ROW.

Figure 17. Locations of Potential Application of Engineered Revetment Shore Protection

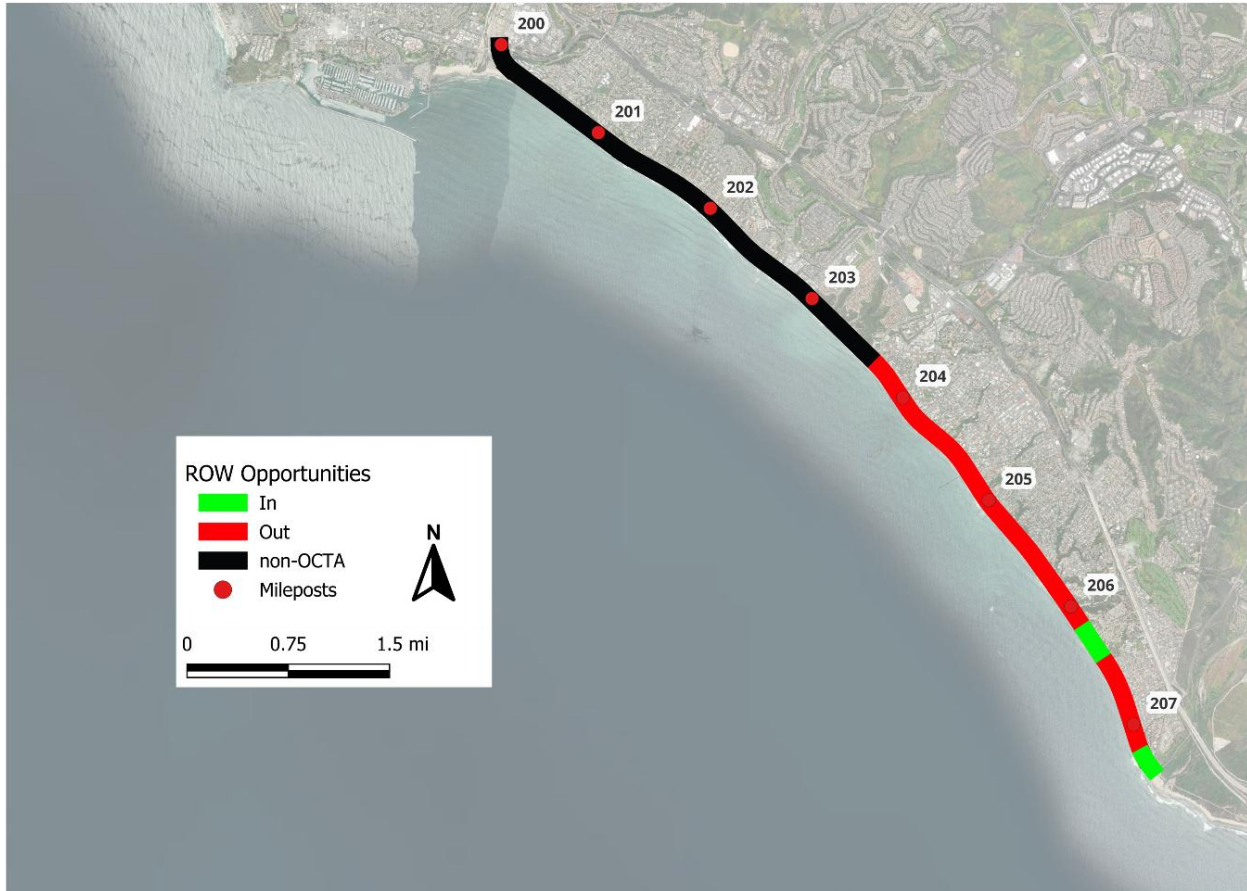


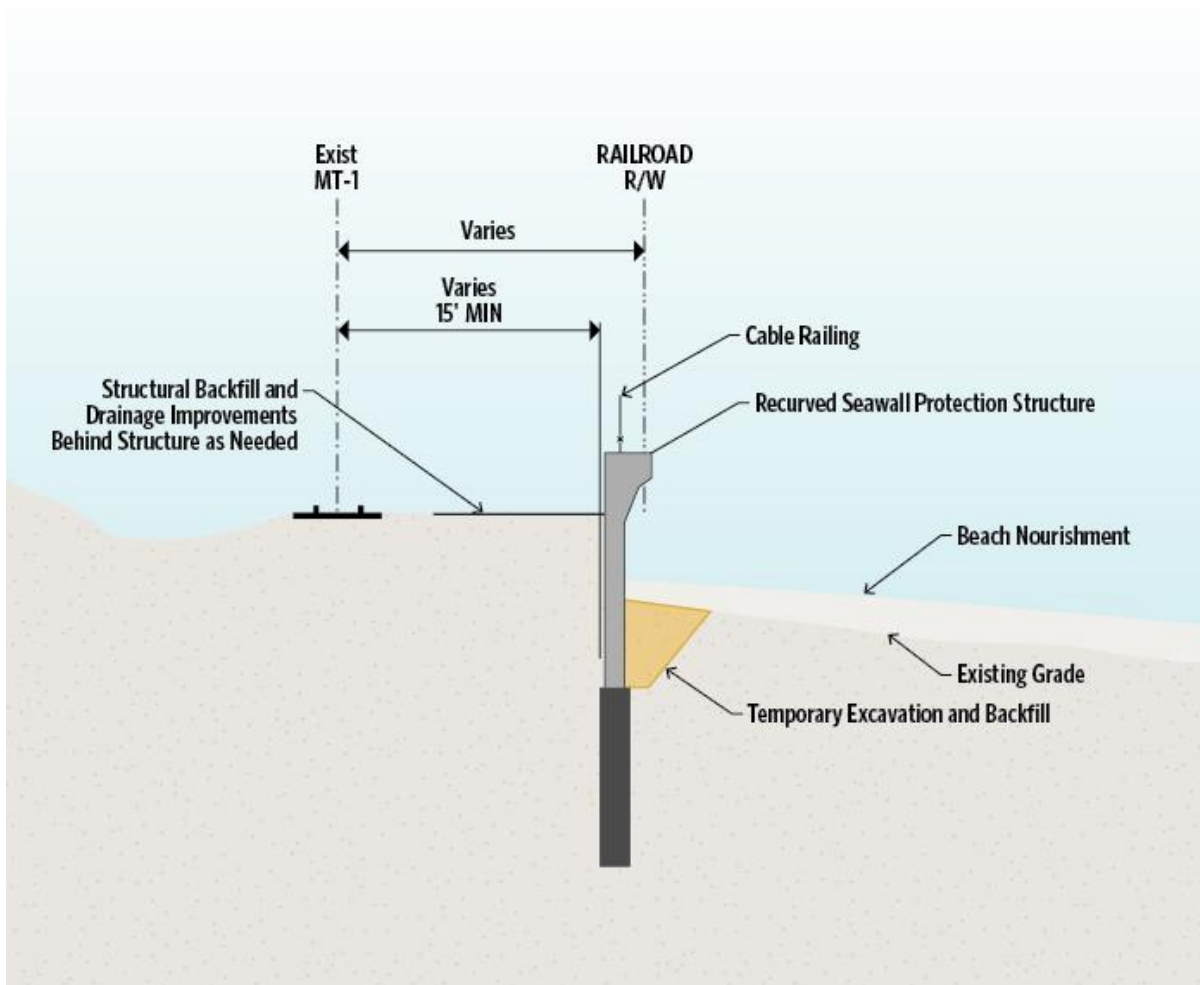
Figure 18 Area Requiring Shoreline Protection (MP 206.0 - MP 206.7)



Concept 2.3 One-time Sand Placement with Seawall Shoreline Protection Structure

A seawall could be constructed along the seaward alignment of the railway to protect the rail corridor from coastal erosion and flooding. This alternative would be paired with one-time sand placement in front of the seawall. Figure 19 depicts a typical seawall cross section. As shown, a vertical structure would require excavation into the seaward rail corridor slope to maintain the required offset from the rail tracks. While generally requiring less overall footprint area than a rock revetment, design challenges include proper foundation and lateral stability.

Figure 19. Typical Seawall Shore Protection



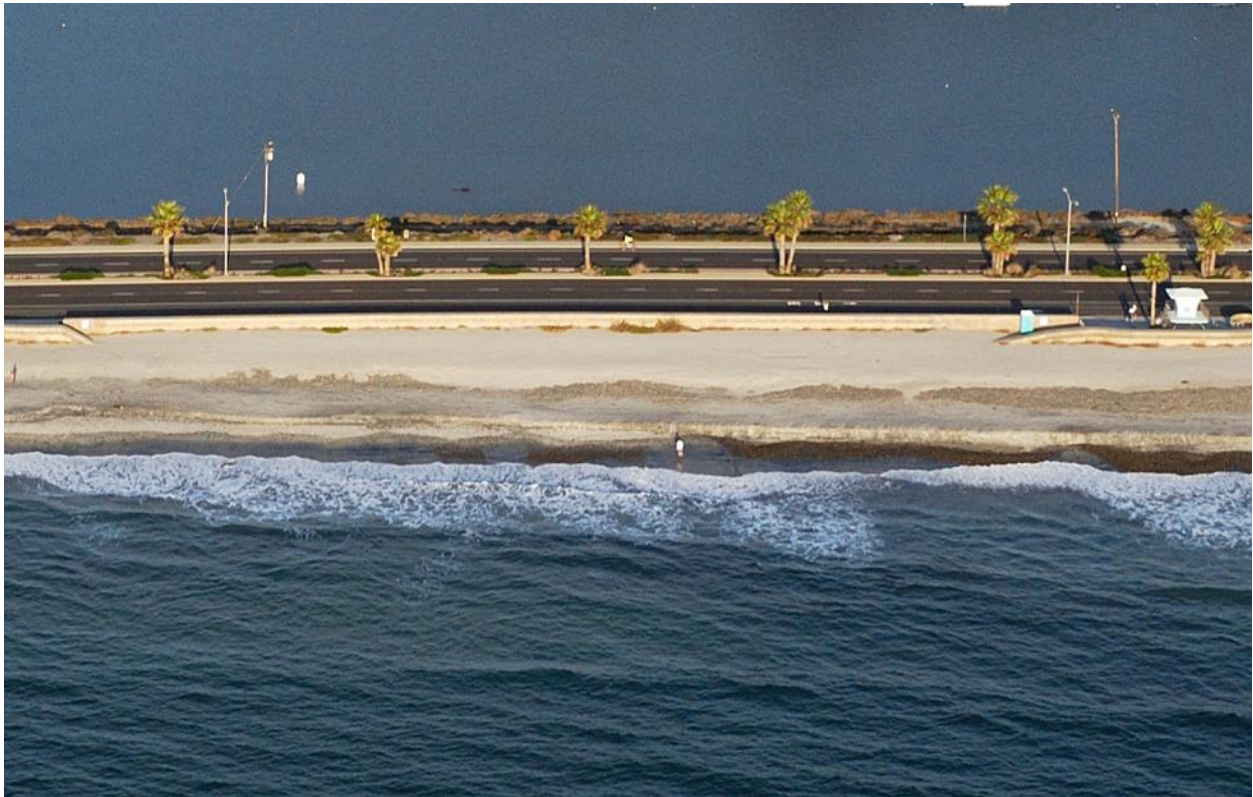
Seawalls are commonly used as shoreline protection measures in Southern California. They are considered more reflective of wave action (lower wave energy absorption) compared to other alternatives, such as rock revetment, and may cause potential surf zone impacts. A rendering of a seawall structure near San Clemente State Beach is shown in Figure 20. Examples of seawalls in Carlsbad, CA and Malibu, CA are shown in Figure 21 and Figure 22 respectively.

Detailed geotechnical investigations are required to establish seawall feasibility due to both physical constraints and ROW limitations. Existing buried riprap lies in many locations beneath and on the seaward side of the railway, complicating construction if the riprap is not removed. Relocating the seawall alignment seaward to avoid buried riprap may result in the seawall and its toe protection being placed outside the ROW limits and increase encroachment onto the public beach areas.

Figure 20. Rendering of Seawall at San Clemente State Beach

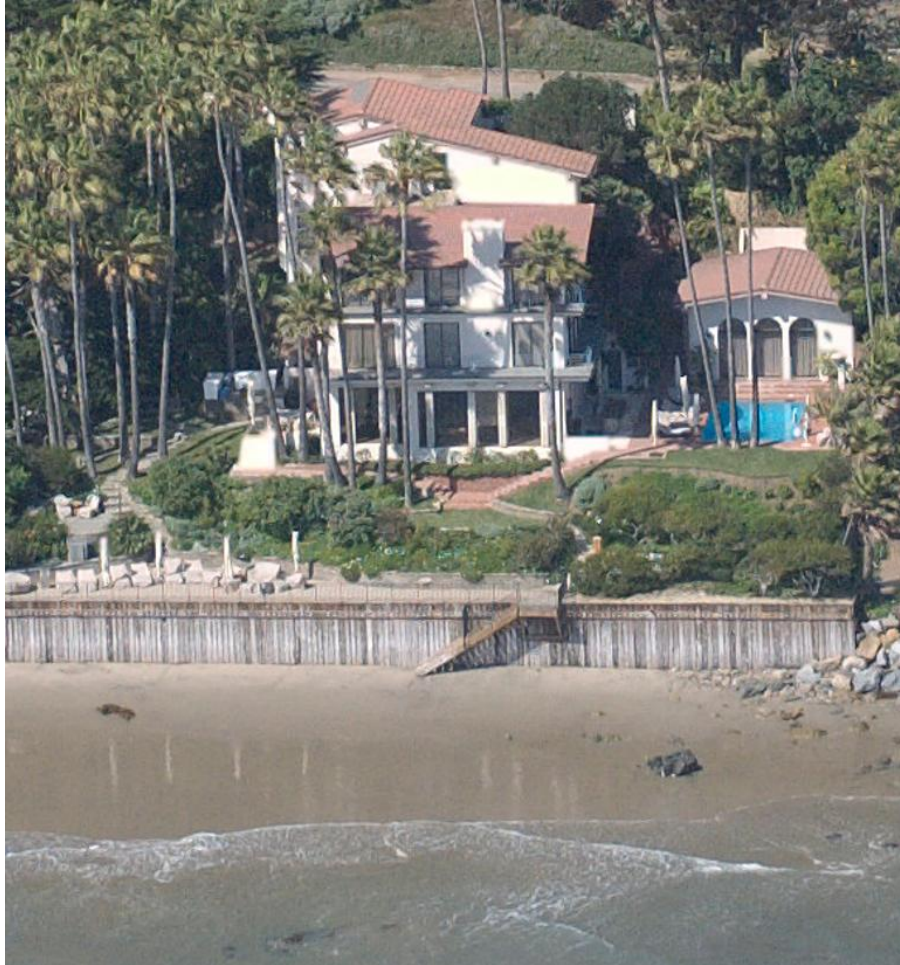


Figure 21. Seawall in Carlsbad, CA



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Figure 22. Seawall in Malibu, CA



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Concept 2.4 One-time Sand Placement with Combination Seawall/Revetment Shoreline Protection Structure

In areas where a vertical seawall would be feasible from a constructability standpoint, a hybrid seawall-revetment structure concept could be considered that would incorporate the reduced footprint benefits of a seawall with the additional wave energy dissipation and reduced wave reflection by adding a relatively smaller revetment section seaside of the seawall. The revetment dimensions are typically larger than what would be required for seawall toe protection. The intent of the combination of the two alternative concepts is to provide a robust shore protection structure with enhanced shoreline erosion and flood reduction performance. The fronting revetment can further extend the life of the seawall structure due to the reduction of direct wave impact forces on the wall. An example of this hybrid structure is illustrated in Figure 23. A similar concept was included in OCTA's Rail Defense Against Climate Change Plan in January 2021, as shown in Figure 24. Examples of a combination wall in Laguna Beach, CA and Ventura County, CA are shown in Figure 25 and Figure 26 respectively.

Figure 23. Typical Combination Seawall/Revetment Shore Protection

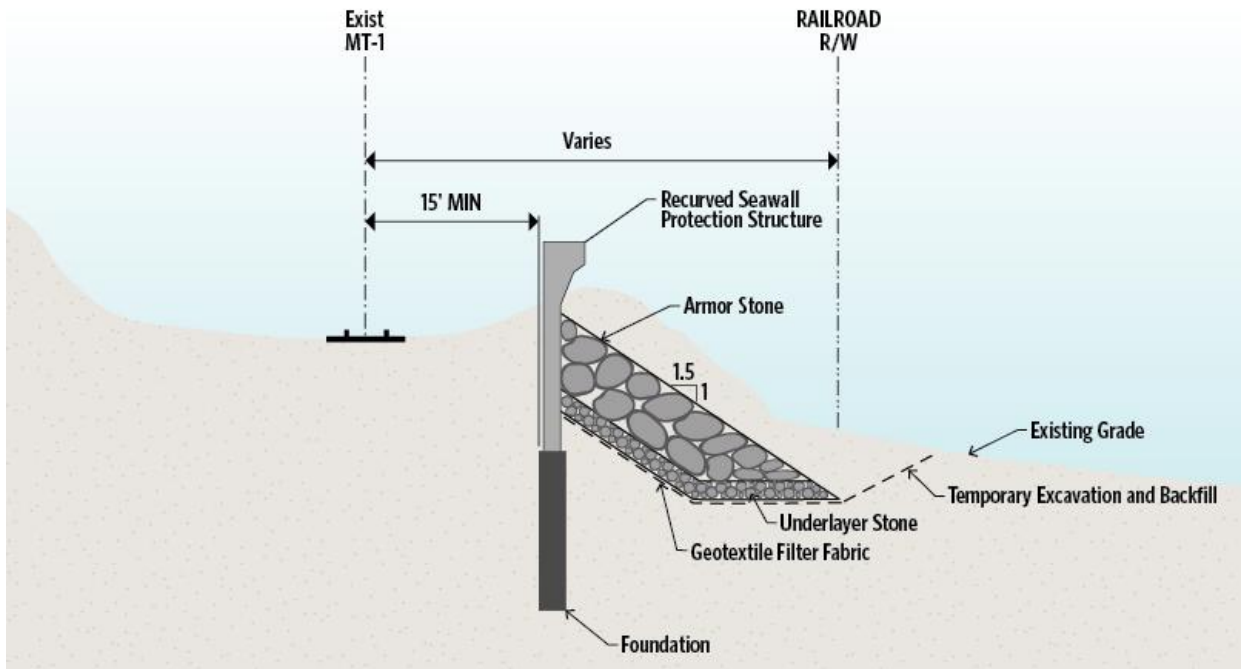


Figure 24. Revetment with Seawall Concept from OCTA's 2021 Study



FIGURE 25 | Improved Revetment with Seawall Concept with Hypothetical Elevations

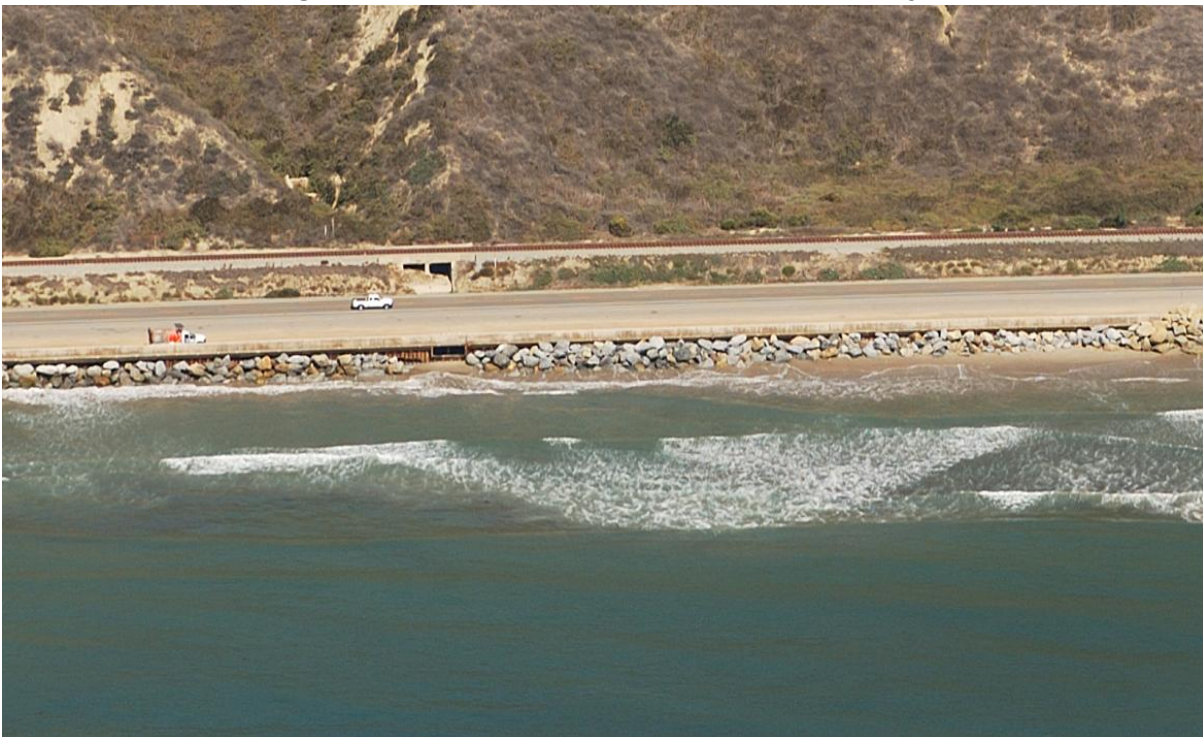


Figure 25. Combination Wall in Laguna Beach, CA



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Figure 26. Combination Wall in Ventura County, CA



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6.1.2. Shoreline Conditions

With the shortlisted beachside concepts described in the preceding section, the next step in their technical assessment is to describe the coastal setting and processes along the OCTA coastal rail corridor. The purpose of the analysis is to compile existing local beach width data and document how conditions have and are projected to change over time. This information is

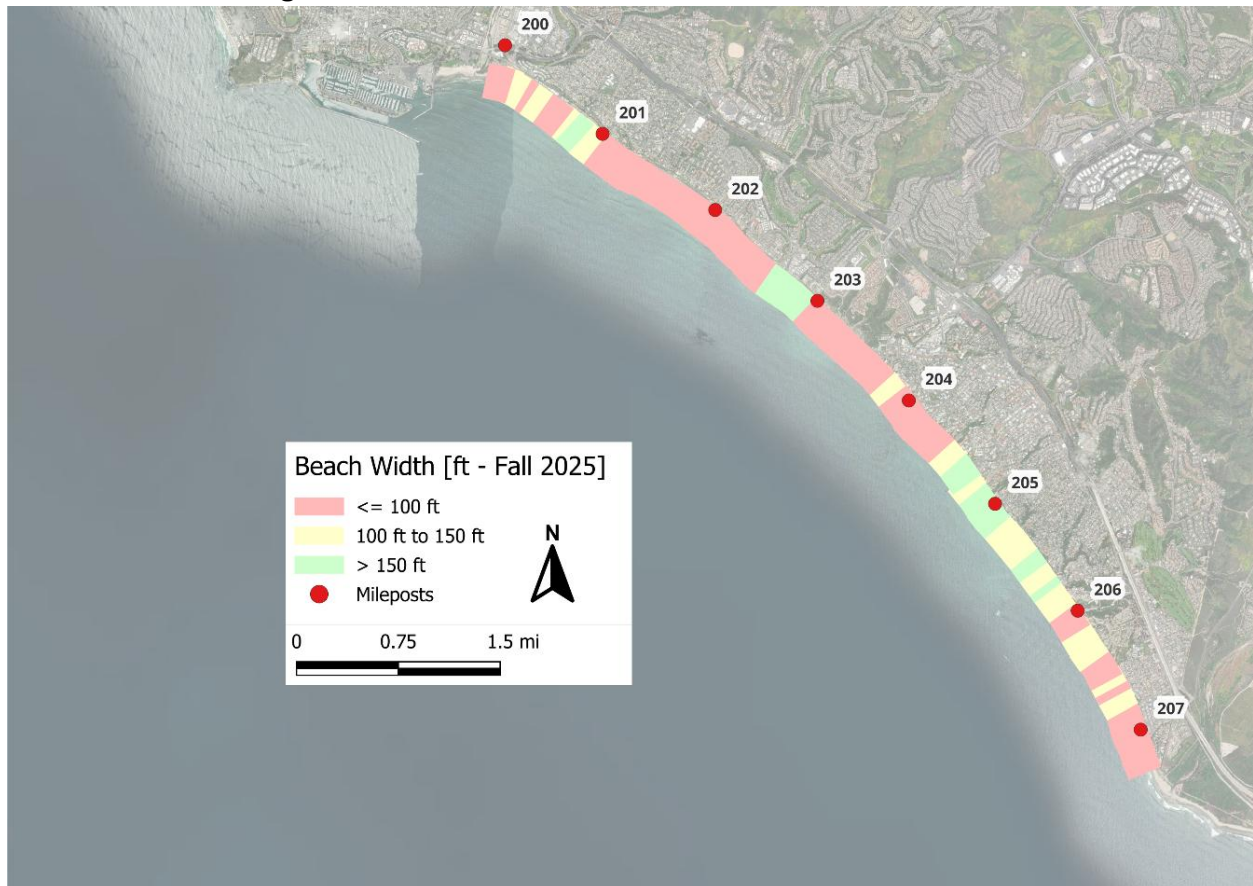
used to conduct a high-level vulnerability risk assessment of the rail corridor to coastal erosion and flood damage over the 30-year projected life of the alternative concepts.

Current (2025) Shoreline Position

The current (2025) beach widths were derived by mapping the MHW shoreline position based on LiDAR (Light Detection and Ranging) surveys conducted in March 2024 and March 2025. The 2025 LiDAR data coverage extends as far north as MP 203.6. LiDAR acquired in 2024 was used north of this location.

Beach width was calculated as the horizontal distance between the landward limit of the sandy beach and the point at which the beach intersected the plane of the MHW tidal datum. Figure 27 summarizes the beach widths in the study area relative to the back beach according to color bands representing defined ranges of beach width. The beach widths range from 162 feet to 2 feet. The greatest beach widths are located south of the San Clemente Pier, a site of recent sand placement project completed in late 2024. The narrowest beaches (2 feet) are adjacent to North Beach fronting the Capistrano Shores manufactured home community, as well as near Cyprus Shore.

Figure 27. Current Beach Width from LiDAR DEM 2025





Shoreline Change Trends

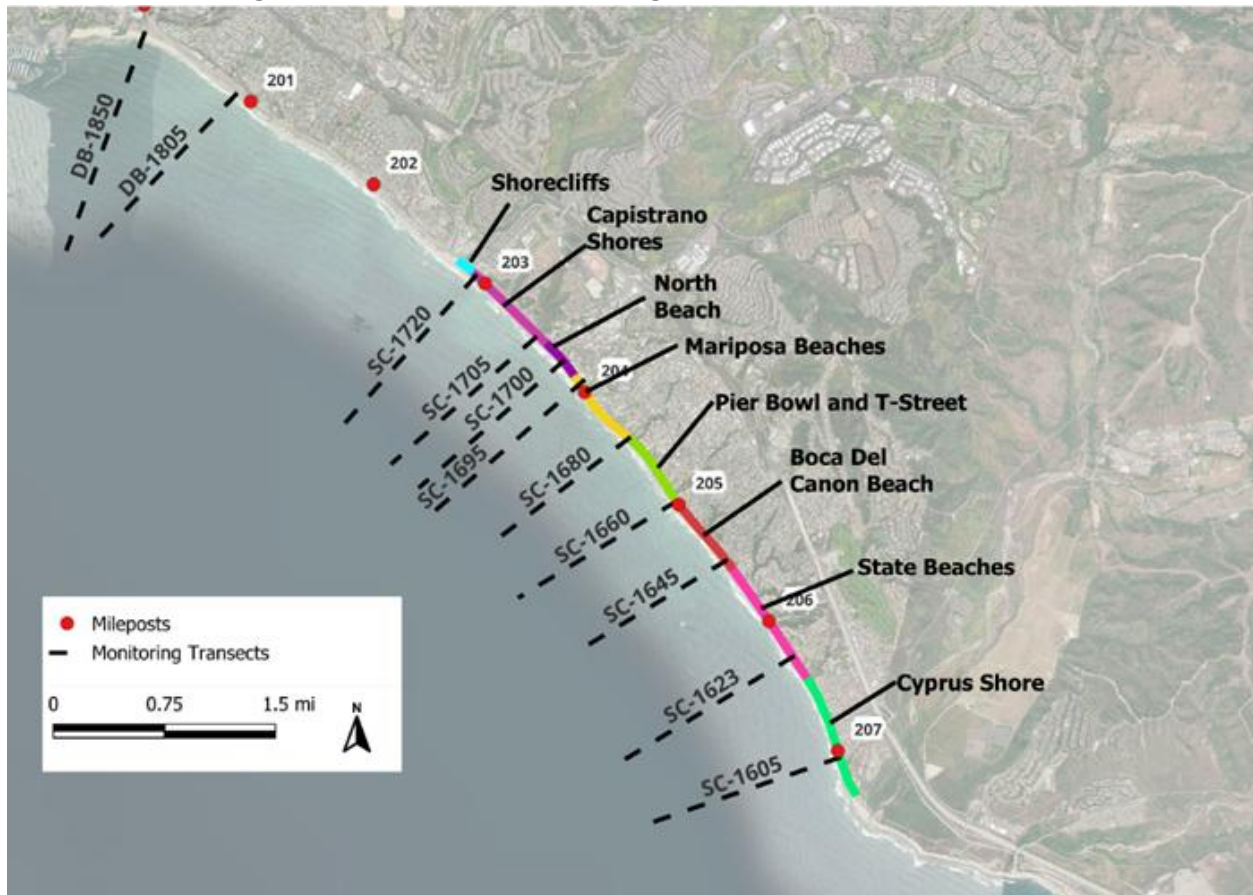
Beach transects

The City of San Clemente maintains a shoreline monitoring program that includes semi-annual beach profile surveys at 11 locations within the project area (Coastal Frontiers Corporation, 2025). The surveys extend offshore from the back beach to beyond the depth of closure, i.e., the seaward limit of active sand movement by wave action. Beach profile surveys have been conducted each fall and spring since 2001 with a hiatus between 2007 and 2022. The fall surveys document the condition of the beach prior to the winter wave season (typically among the widest beaches of the year), while the spring surveys document the condition of the beach at the end of the winter wave season (typically among the narrowest beaches of the year). The data provide relevant information on seasonal, annual, and long-term beach width changes in the region.

Figure 28 shows a map of the shoreline including Mile Post (MP) and shoreline monitoring transect locations. The shoreline sections are colored individually to provide a clear distinction between the different sections.

Surveys indicate seasonal shoreline change with a consistent pattern where winter conditions cause erosion in the northern and portions of the central transects, while summer conditions cause recovery primarily in the central and southern transects. Northern profiles at Doheny (DB-1850, DB-1805) indicated repeated erosion with limited recovery, reflecting a persistent narrowing trend, whereas North Beach (SC-1702, SC-1700) shows more stable seasonal response. Central transects (SC-1705, SC-1695) remain chronically narrow with minimal seasonal response. In contrast, the Pier Bowl and southern transects (SC-1680, SC-1660, SC-1645, SC-1623) typically experience reduced winter erosion and stronger summer accretion. This accretive response diminishes toward Cottons Point (SC-1605), which remains consistently erosive, resulting from a persistent north-to-south littoral transport.

Figure 28. Shoreline Monitoring Beach Transect Locations



Beach widths were derived from the profile data as the horizontal distance between the landward limit of the beach and the point at which the beach profile intersects the plane of the MHW tidal datum. Beach width trends then were derived for the period from 2001 to 2025. The shoreline change trend for each of the monitoring transects is shown in Figure 29 as colored bands representing eroding (exceeding one foot/year or more of shoreline erosion), stable (-1.0 to one foot/year), and accreting (exceeding one foot/year of accretion) conditions based on linear trends of observed beach widths. The beaches showing the greatest erosional trends are north of North Beach and along Cyprus Shore.

Figure 29. Shoreline Change Trends from Beach Transect Data



CoastSat Shoreline Change Trends

Advances in image processing techniques have enabled shoreline mapping using historical satellite imagery (Vos, K, et al. 2019). CoastSat provides satellite-based estimates of shoreline change at 330-foot (100-meter) intervals along the coast for the period from 1984 to 2022. Data frequency is roughly every 6 months from 1984 to 2000 and every 2 to 4 weeks from 2000 to 2022. The accuracy of mapped shorelines is stated as plus or minus 50 feet (plus or minus 15 meters). The satellite-derived shorelines are not adjusted to a common vertical datum, which introduces additional inaccuracies (e.g., the developers estimated plus or minus seven meter inaccuracy associated with tide elevations at Narrabeen, Australia, which has a comparable tidal regime to southern California). As such, individual data points are not comparable to localized survey data such as the beach transects, but given the high sampling frequency and assumption of random error, the CoastSat data can be used to evaluate decadal trends.

Figure 30 shows the shoreline change trend derived from CoastSat data for the period from 2001 to 2022. Based on the same metrics for eroding, stable, and accreting beaches, the CoastSat evaluation agrees reasonably well with the transect-based evaluation. Erosion predominates in the northern and southern portions of the region. The central portion of the region (between MP 204.2 and MP 206.5) is characterized by stability or accretion.

Figure 30. Shoreline Change Trends from CoastSat Data



Shoreline Retreat Attributable to Future Sea Level Rise

This Coastal Resiliency Study investigates beachside shoreline protection measures over a 30-year planning horizon. The current science to support planning for sea level rise (SLR) in California is summarized in the *Sea Level Rise Guidance 2024 – 2024 Science and Policy Update*.³ Table 24, excerpted from the 2024 guidance, provides SLR projections at the nearest tide station in La Jolla, California.

³ California Ocean Protection Council, 2024, *State of California – Sea Level Rise Guidance – 2024 Science & Policy Update*.

**Table 24. Sea Level Scenarios for La Jolla, CA Tide Station**

Median values of Sea Level Scenarios, in feet, for each decade from 2020 to 2150, with a baseline of 2000. All median scenario values incorporate the local estimate of vertical land motion.

YEAR	LOW	INT-LOW	INTERMEDIATE	INT-HIGH	HIGH
2020	0.2	0.2	0.3	0.3	0.3
2030	0.3	0.4	0.4	0.4	0.5
2040	0.4	0.5	0.6	0.7	0.8
2050	0.5	0.7	0.8	1.0	1.3
2060	0.6	0.8	1.1	1.6	2.0

For a maximum 30-year design life, the reference year is approximately 2055. The following SLR values are interpolated between Year 2050 and Year 2060 for Intermediate-High and High SLR scenarios:

- Year 2055 (interpolated) Intermediate-High SLR value: 1.3 ft
- Year 2055 (interpolated) High SLR value: 1.7 ft

Assuming a typical nearshore slope of (10:1), the loss of beach width associated with these SLR scenarios is:

- Year 2055 Intermediate-High SLR beach width reduction: 13 ft
- Year 2055 High SLR beach width reduction: 17 ft

Level of Rail Corridor Coastal Shore Protection

Existing rail corridor shore protection was categorized into four broad types based on evaluation of recent and historical aerial images and drone videos: (1) shoreline protected by non-OCTA infrastructure, (2) competent riprap (including recently repaired), (3) existing riprap in need of repair, and (4) little to no existing protection. Typical Sections 1 and 2 (Figures 6 and 7) provide an example of shoreline protected by non-OCTA infrastructure (i.e., public or private infrastructure is located seaward of the rail corridor). An example of a recently repaired riprap section is shown in Figure 31 and Figure 32 for a shoreline section between MP 203.9 and MP 204.5 (between North Beach and Linda Lane). In this area, the repair consisted of placing new rocks onto the damaged existing riprap section. Figure 33 shows a small reach at MP 206.6 with little to no existing shoreline protection.

Figure 31. Recent Revetment Repair between North Beach and Linda Lane



Figure 32. Photos from MP 204.5

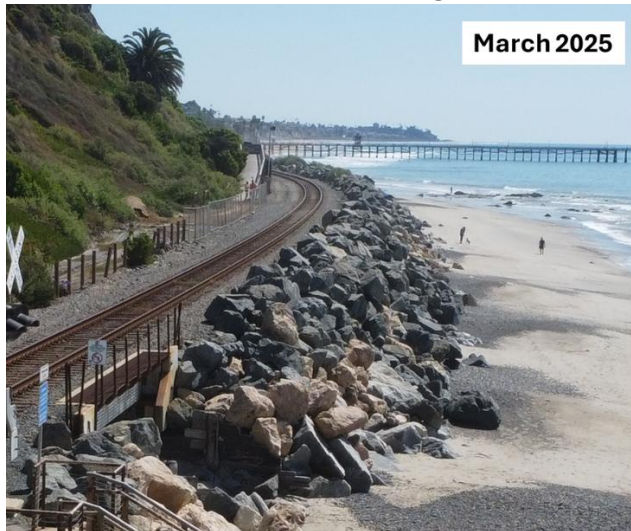


Figure 33. Aerial View of Little to No Shore Protection South of San Clemente State Beach Near MP 206.6



6.1.3. Vulnerability-Based Assessment for Beachside Protection of Rail Corridor

The entire length of shoreline from North Beach (MP203.6) to Cyprus Shores (MP207.3) was evaluated to assess vulnerability of existing coastal rail infrastructure and the need to implement one or more of the beachside concepts. The region from Doheny State Beach to North Beach (MP200.2 to MP203.6) was excluded because rail infrastructure in this region is effectively protected by existing public or private development (e.g., Typical Section 1 where parking lots or roads are located seaward of the ROW (Figure 6), or Typical Section 2 where private development is located seaward of the ROW (Figure 7)). The evaluation considers shoreline conditions in combination with the existing level of shoreline protection in place. Sea level rise and related beach width loss were considered qualitatively when assigning categories.

The shoreline condition was assessed based on present-day beach width (Figure 27) and observed shoreline change trends (Figure 29 and Figure 30). Shoreline segments were categorized as *Critical*, *Compromised*, or *Adequate* based on a combination of parameters as illustrated in Figure 34. The range of categories is intended to define the likely protective capacity of the beach under current and future conditions (short-term: less than ten years; medium-term: up to 30 years). Shoreline segments with beach widths less than 100 feet were designated *Critical* regardless of the prevailing shoreline change trend, reflecting the limited protective capacity of the beach during a modest storm event under present conditions.



Shoreline segments with beach widths exceeding 150 feet and characterized by stable or accreting shorelines were designated *Adequate* under the assumption that these beaches offer adequate protective capacity at present and in the future. Shoreline segments designated *Compromised* reflect conditions that presently offer limited protective capacity during extreme storm events and may have diminished protective capacity in the future (over the medium-term period; up to 30 years).

Figure 34. Shoreline Conditions Assignment Matrix

		Beach Width		
		<= 100 ft	100 to 150 ft	> 150 ft
Shoreline Change Rate	Eroding <= -1 ft/yr	Critical	Compromised	Compromised
	Stable -1 to 1 ft/yr	Critical	Compromised	Adequate
	Accreting > 1 ft/yr	Critical	Compromised	Adequate

The vulnerability of the rail infrastructure was evaluated based on the assigned shoreline condition (Figure 35) and the existing level of protection in place. Three categories of shoreline protection were considered: 1) little to no protection, 2) riprap in need of repair, and 3) competent riprap (including recently repaired). As illustrated in Figure 35, shoreline segments were categorized as High, Moderate or Low Risk based on a combination of the shoreline condition and shoreline protection in place. All segments characterized as Adequate shoreline condition were designated Low Risk in recognition that the beach alone provides a sufficient buffer to the rail infrastructure. High Risk designations were assigned to areas with limited or degraded shoreline protection fronted by Critical or Compromised shoreline conditions. The Moderate Risk designation was used in areas with competent and/or recently repaired riprap fronted by Critical or Compromised shoreline conditions in recognition that these areas may be susceptible to damage during extreme storm events.

The results of the vulnerability assessment are shown in Figure 36. Only the regions near the San Clemente Pier and just north of San Clement State Beach are categorized as Low Risk. The remainder of the shoreline segments from North Beach to Cyprus Shore are considered High Risk or Moderate Risk.

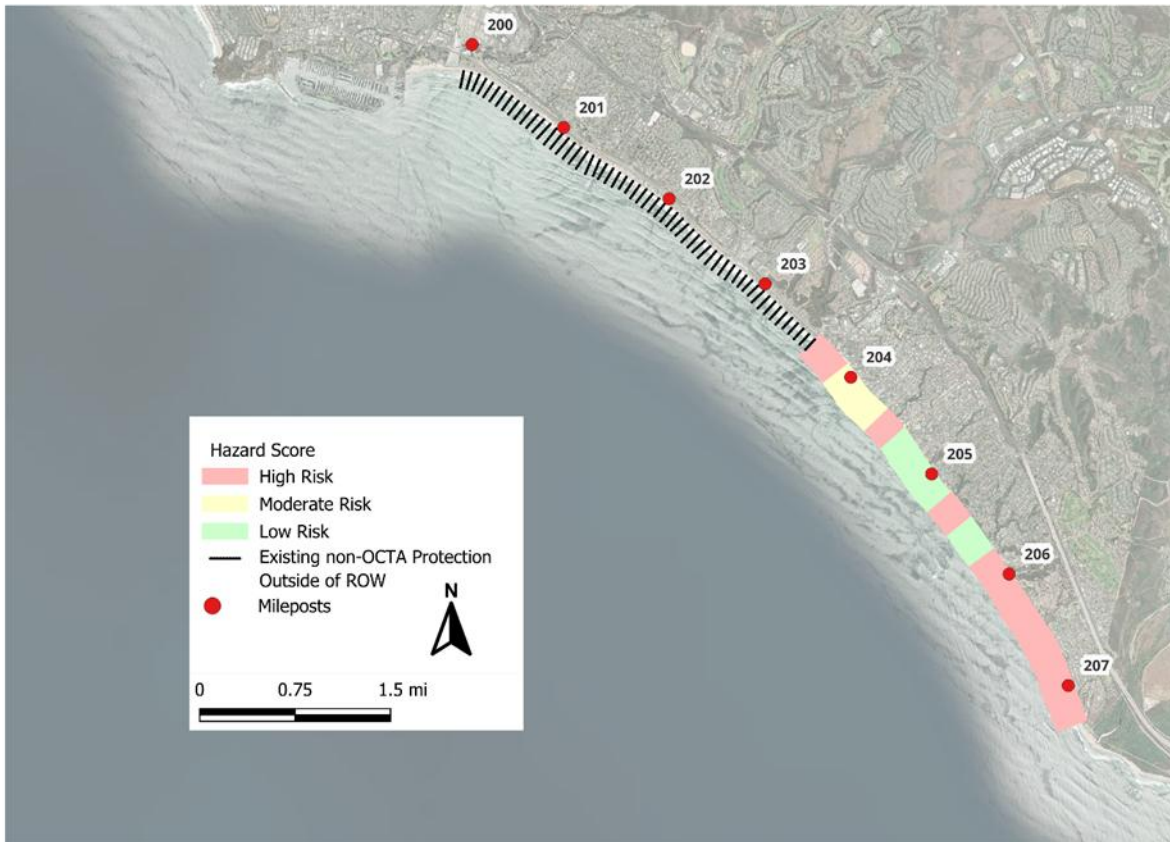


Implementation of one or more of the beachside concepts should be considered in the High to Moderate Risk areas, with the High Risk areas addressed as soon as practical. The beachside concept selected will depend on several factors, including available ROW, geotechnical considerations, and constructability (e.g., excavation constraints). As indicated in Section 6.1.1, the ROW is not sufficient to accommodate an engineered revetment in most areas. Similarly, buried riprap within the ROW may complicate construction of the seawall concepts.

Figure 35. Coastal Hazard Risk Assessment Assignment Matrix

Infrastructure Protection \ Shoreline Condition	Critical	Compromised	Adequate
Little to No Protection	High	High	Low
Riprap in need of Repair	High	High	Low
Presently Competent and/or Recently Repaired Riprap	Moderate	Moderate	Low

Figure 36. Coastal Hazard Risk Assessment Assignment Map



6.2. Geotechnical Assessment: Rail Concepts

Field reconnaissance indicates that the area of readily visible concern lies within the Mariposa ROW area where deposits appear susceptible to potential liquefaction and lateral spreading. Confirmation of this hazard and risk potential in this area will require future geotechnical study. Similar hazard conditions may exist in other areas of the alignment where deposits of saturated alluvium and/or older undocumented fill occur in areas coincident with the discharge of rivers into the ocean. The shortlisted concept alternative considered most efficient for track-bed stabilization against potential liquefaction and lateral spreading hazards is a process of in-situ ground improvement or ground stabilization, involving the use of Deep Soil Mixing (DSM) and/or a Stone Column placement befitting subsurface conditions. The process allows stabilization of a target soil mass without removing hazard-prone soils. The use of these alternative concepts is considered suitable where it is imperative to maintain track operations during the construction process.

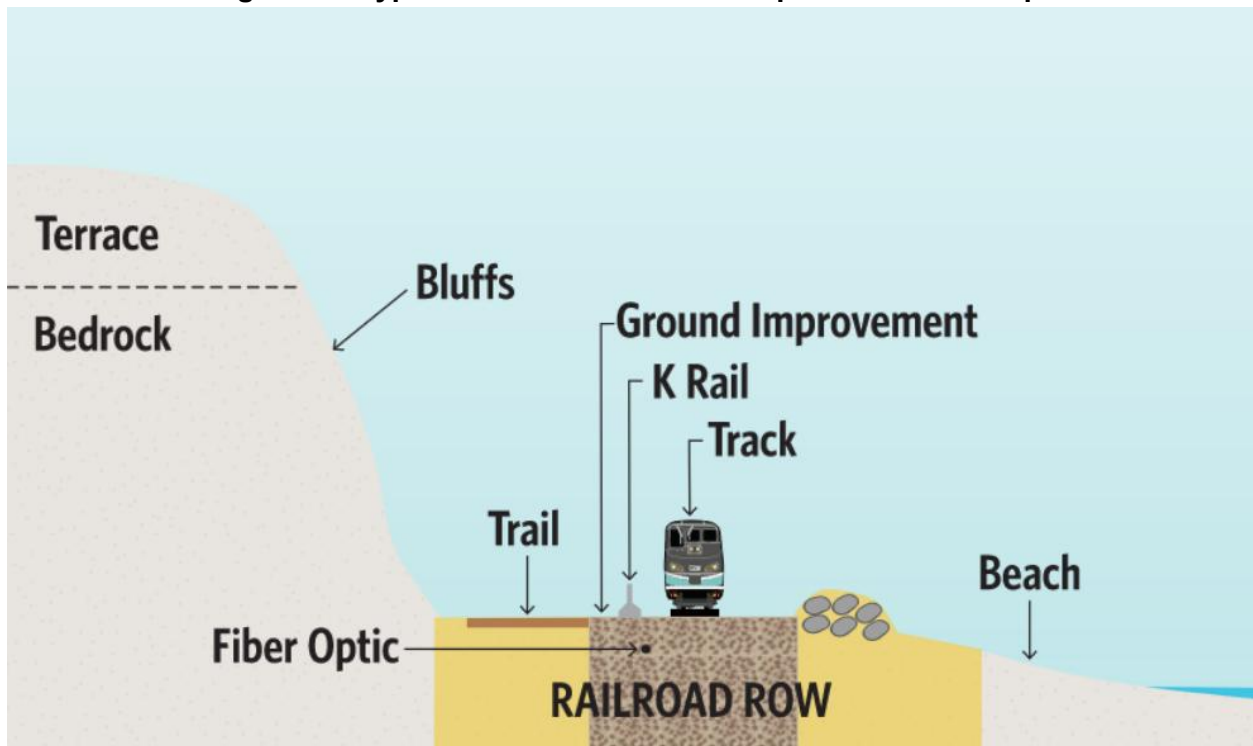
6.2.1. Shortlisted Rail Stabilization Concepts

Descriptions of shortlisted rail concept alternatives for ground improvement are provided below.

Deep Soil Mixing

Description – One of the most reliable ground stabilization methods for mitigating loosely consolidated saturated soil deposits, prone to liquefaction or significant settlement, is the process of DSM. The DSM process involves the in-place treatment of adverse soil with cement, strengthening of loose/saturated soils by mixing cement into the adverse soil mass, transforming the soil mass into the consistency of a cement-treated soil. The resulting properties provide conditions where the hazard is significantly mitigated and suitable for long-term support for existing ROW improvements. The DSM method can mitigate the full depth of an adverse soil deposit within the ROW. The resultant strength and stiffness of the product can be verified by post-construction strength tests. Typical Section A below depicts the conceptual layout of a ground improvement alternative (Figure 37).

Figure 37. Typical Section A - Ground Improvement Concept



Construction – The construction process is typically accomplished through use of large-diameter auger drilling equipment. Augers up to 8 feet in diameter are used to penetrate the full depth of soils, normally terminating in bedrock or competent soils. The cement is introduced through the center of the auger, and upon auger extraction, the soils are blended with the cement, leaving behind the design ratio mix of material.

Testing – Cylinder samples of the soil mix are prepared during construction. After the initial set-up period in the field, the cylinders are delivered to a physical laboratory for strength conformance testing.

Constraints – It requires pre-design sampling for mix design. It is a more costly process than other densification methods. Soil variability can influence column continuity and effectiveness.



Stone Columns

Description – Also referred to as vibro-replacement or vibro-displacement columns, the stone column method is another widely used and effective method of increasing resistance to liquefaction, settlement, lateral spreading, and cyclic strength losses during earthquakes, within loose and otherwise saturated sediments. The method is among the most economical alternative concepts to address liquefaction and lateral spreading hazards within the ROW. The process not only yields densified columns of rock, but also densified soils adjacent to the column. Adverse soils are ultimately entirely densified to form a broad stable deposit that provides long-term support to existing ROW infrastructures.

Design –To facilitate design, a subsurface geotechnical exploration is warranted within the area of potential concern. Drilling, sampling, laboratory testing, and cross section preparation are necessary to provide design parameters and construction bidding.

Construction – Auger holes for stone columns are typically on the order of 3 feet in diameter and embedded into competent soils or bedrock. It involves the introduction of imported crushed-stone rock into a tightly spaced pattern of drilled auger shafts, penetrating the full depth of an adverse soil deposit. The crushed rock is mechanically placed into the auger hole, then compacted down-hole using a vibratory probe/plate in intervals from the bottom up. The general area of Stone Columns is consistent with that presented in Figure 37 above, for ground improvement.

Limitations – The effectiveness of stone columns is limited to a specific range of gradation and percentage of fines. Soils suitable for this application require adequate lateral confinement. The method is generally ineffective in soils that are highly plastic, contain excessive fines, and are soft clays. A specialty contractor is required to facilitate design and construction.

6.3. Geotechnical Assessment: Bluffside Concepts

A preliminary geotechnical assessment of each shortlisted bluffside alternative concept was performed to identify areas of high rail corridor vulnerability due to sea cliff instability. The assessment was targeted for future periods of ten to 30 years. From the assessment, the alternative concepts considered most suitable to address existing and eminent conditions of slope instability were derived. The figures shown in the sections below depict the general layout of bluffside concepts.

6.3.1. Shortlisted Bluffside Concepts

Descriptions of shortlisted bluffside concept alternatives and representative conceptual figures are provided below along with applications and anticipated locations along the rail corridor.

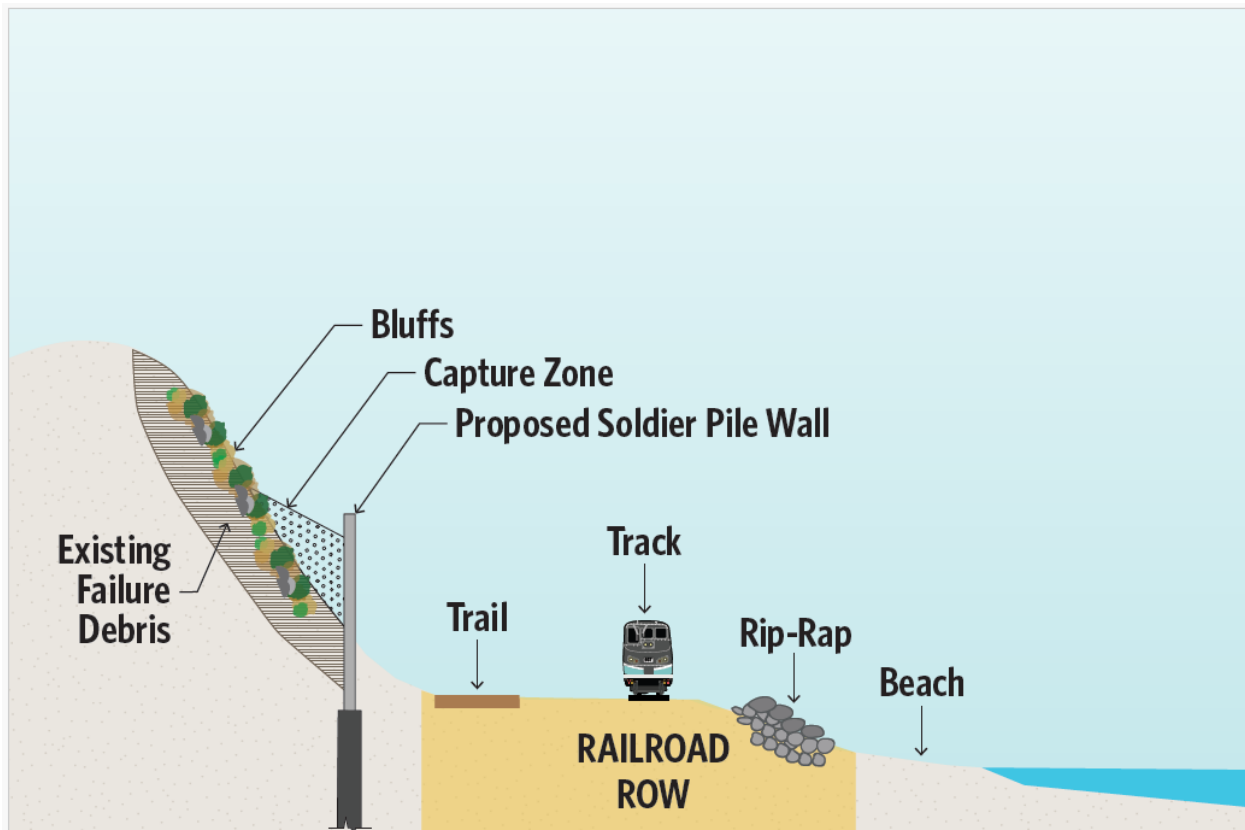
Catchment Wall

Description – Catchment walls are fixed, vertical, impact-resistant barriers that act as structural containment boundaries along the base of a slope. They are intended to catch, arrest, or block advancement of future rockfalls, shallow landslides, earthflows, heavy erosion, and/or mobilized nuisance soil material that would otherwise encroach into the rail corridor ROW. The walls are similar in function to rockfall barrier walls, retaining walls, and structural deflection walls. Use of

such walls is convenient where conventional catchment ditches or fences are excluded or infeasible, or where ROW constraints require vertical structural solutions. Catchment walls are represented by a free-board area extending above the top of a soldier pile wall.

The walls consist of relatively short-spaced vertical soldier piles embedded into stable soils or bedrock at depth, with soil retention manifested by stacking of horizontal timber lagging between piles. An open free-board area established behind an upslope section of the wall serves as a zone to capture future slope debris. In similar conditions elsewhere along the ROW, these walls have served as simple but effective structures to stabilize slopes and maintain track operations. The walls can serve their purpose for lengthy periods until more permanent slope repairs can be implemented, and the walls can be abandoned. Typical Section B below depicts the general layout of a Catchment Wall concept (Figure 38).

Figure 38. Typical Section B - Catchment Wall Concept



Design – Where relatively narrow ROW areas exist, larger, more structurally demanding walls may be warranted. The closer a wall is to the source of an unstable bluff, the higher the demand for wall performance can be expected. Freeboard wall heights can be adjusted to accommodate variable volumes of expected debris.

Construction – The freeboard sections of a catchment wall consist of a timber/pile wall extending above the top of a soldier pile wall. The wall establishes an open area where future bluff failure debris can collect instead of advancing in the track ROW.



Maintenance – The downslope mobilization of slope debris into a catchment area will require periodic removal of captured debris in order to accommodate the capture of any future material.

Tieback / Soil-Nail Wall / Pin-Piles

Tieback / Soil-Nail / Pin-Pile systems are grouped as one style of concept alternative, given general similarities in purpose and slight differences in construction methodology. The systems transfer loads into competent material behind the wall to increase factors-of-safety within slopes subject to moderate-size failures. Once installed, it is possible to conceal all elements of construction from view by burial of the walls below the ground surface.

Tieback Walls

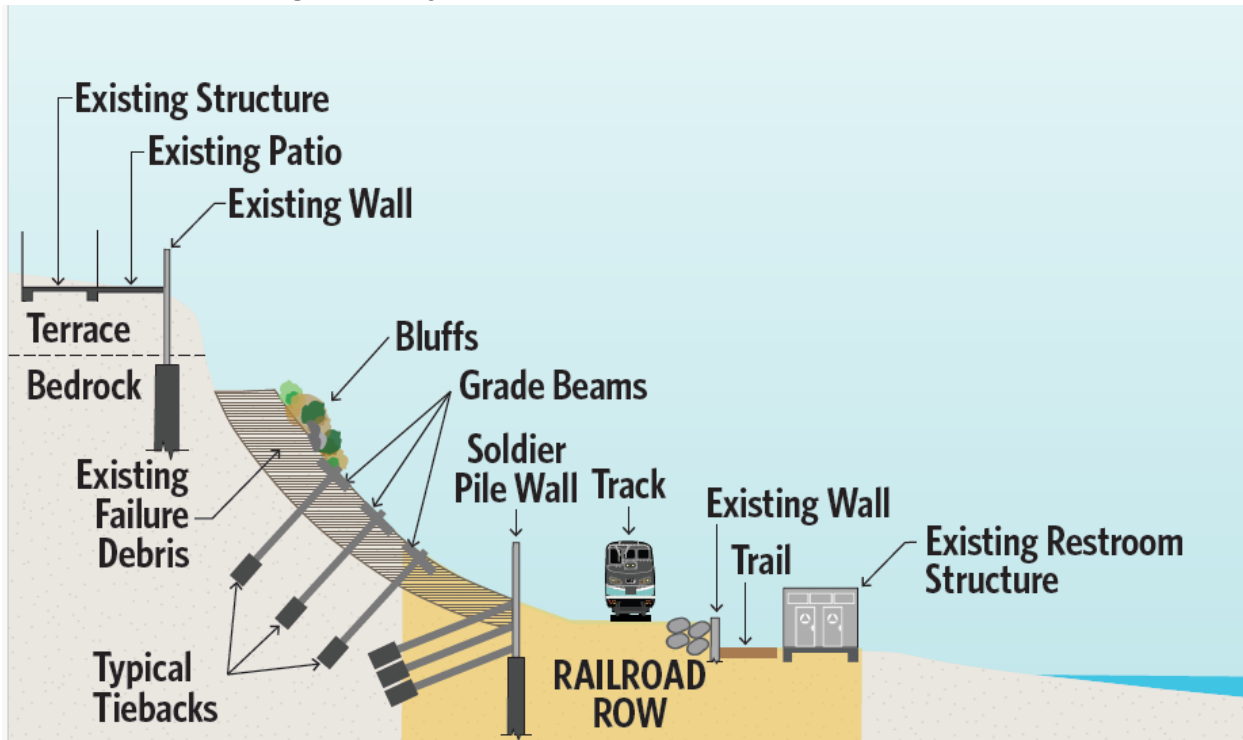
Description – Tieback systems provide a practical means of limiting lateral movements and construction impacts in areas of required deep cuts, constrained sites, or walls subjected to significant surcharge, as well as areas where it is necessary to increase the resisting forces associated with future slope failures. A tieback system is typically comprised of one or multiple vertical rows of prestressed anchors penetrating a vertical soldier pile wall or series of diaphragm/shotcrete-grade beams slightly angled toward/into a slope face. The use of tieback walls reduces structural demands and deflections compared to conventional cantilever retaining walls.

The systems are commonly employed where retained heights exceed 15 vertical feet, where near-vertical excavation or permanent grade separation is required, and/or there is insufficient space available for larger slope cuts or spread footing area availability.

Anchors typically consist of solid steel bars or lengths of flexible braided steel cables. The anchors are inserted into open shallow angle boreholes drilled into a slope, then grouted in place. Upon reaching design strength, the bonded tieback zones are placed in tension, tested, and permanently anchored to a grade beam at specific design loads.

Design – Anchor design is based on achieving adequate bond capacity in competent earth materials and providing an unbonded length that extends beyond the theoretical failure surface for global stability. Preliminary design commonly assumes a minimum unbonded length of approximately 15 to 25 feet. Final values are confirmed by pre-production and proof testing. The wall face and soldier piles are designed for recommended earth pressures (active or at-rest, depending on wall restraint), with lagging or shotcrete between piles, as required. Typical Section C below depicts the conceptual layout of soldier pile wall and grade beam type Tieback Wall alternatives (see Figure 39).

Figure 39. Typical Section C – Tieback Wall Concept



Constraints – Tieback anchors often extend beneath an area of adjoining public/private property with easements, jurisdictions, and/or public ROW. Legal agreements between affected owners/agencies are warranted before installation. Use of tieback anchors can also be limited due to the presence of existing utilities. Early coordination with owners and permitting agencies is recommended to confirm allowable anchor zones, setback requirements, and utility conflicts. Where permissions cannot be obtained, use of the soil-nail concept alternative may be more attractive.

Construction – Tieback anchor systems are installed by specialty subcontractors. Construction is performed in a top-down sequence where wall height increases along with consecutive anchor row installation. Tendons are installed at downward inclinations at lengths penetrating zones of retained soils/failure debris. The anchors include a bonded tieback length to provide pullout resistance, founded in competent soil or bedrock behind zones of expected failure wedge. Anchors include an unbonded length between slope face and bonded zone to accommodate anchor stressing/tensioning. The anchors are ultimately tested and locked off at a specified load to limit wall movement.

Testing – The stages of tieback wall construction include installation of grade-beam facing or soldier piles, excavation to the next level, drilling and grouting anchors, testing and lock off, then repeat to final grade. Anchor testing includes pre-production verification and proof testing with acceptance criteria on load/elongation and lock-off. Where granular or raveling soils are present, special drilling methods or casing may be needed for anchor and pile holes.

Drainage – Permanent walls should incorporate subdrainage behind the facing to reduce hydrostatic pressures, and anchor hardware should include corrosion protection appropriate for



service life and exposure. For walls cast directly against shoring, prefabricated drains or equivalent measures are often used to manage groundwater and seepage.

Soil-Nail Wall

Description – Soil-nail walls are often used to stabilize existing ground and support vertical or near-vertical excavations for bluff stabilization where top-down construction is advantageous to maintain traffic and access. These walls are preferred where conventional temporary sloping is impractical due to ROW constraints, adjacent structures, utilities, or where excavation heights exceed what can be maintained safely unsupported. They are particularly effective in dense granular soils, stiff fine-grained soils, weathered rock, and residual soils that can maintain short-term vertical cuts (commonly 4 to 6 feet) during nail installation. The walls act in conjunction with a retained soil mass to form a reinforced soil block with improved shear strength. Soil-nail walls are used most efficiently under conditions where retained materials have adequate stand-up time and can form a competent reinforced mass once nailed. Figure 40 depicts the conceptual layout of a Soil-Nail Wall alternative.

Construction – Wall construction typically proceeds in stages, the general order of which includes excavation of an initial grade-beam facing, anchor drilling and grouting, reinforcement and drainage installation, shotcrete facing, anchor testing, and lock off. The process is then repeated for the next lower nail row. A typical row includes a closely spaced row of nails or passive steel bars penetrating a pre-excavated cut face. Minimum nail lengths commonly fall between 15 and 45 feet, depending on global stability demands and wall height. Bars are installed in near-horizontal, pre-drilled holes at short horizontal and vertical intervals. Unlike tieback walls, the steel bars are not pre-tensioned, and construction does not involve the use of grade beams or soldier piles. After the nails are placed, a drainage system is installed on the slope prior to applying or spraying a layer of reinforced shotcrete, providing structural continuity across the excavation face. The sprayed concrete that forms the visible wall surface can be added with color and texture for a natural look, and planter pockets to accommodate vegetation growth.

Design – Soil-nail wall design accounts for internal stability (nail tensile capacity, pullout resistance, bond stresses), external stability (global stability, sliding, overturning), and seismic performance using drained shear strength parameters.

Constraints – Soil-nails involve the use of generally shorter length steel bars than a tieback wall system, which may or may not extend into neighboring private or public property, warranting legal encroachment agreements between affected owners/agencies before installation. Soil-nail wall construction is often more difficult in loose clean sands, very soft clays, or where cobbles/boulders impede drilling. Construction requires sufficient temporary stand-up time for each lift, and it is not ideal where excessive groundwater inflow or seepage is present, unless specialized drilling/grouting methods are employed.

Testing – The nails require pre-production verification and proof testing with acceptance criteria on load/elongation and lock-off.

Drainage – Walls should incorporate subdrainage behind the facing to reduce hydrostatic pressures, and anchor hardware should include corrosion protection appropriate for service life and exposure.

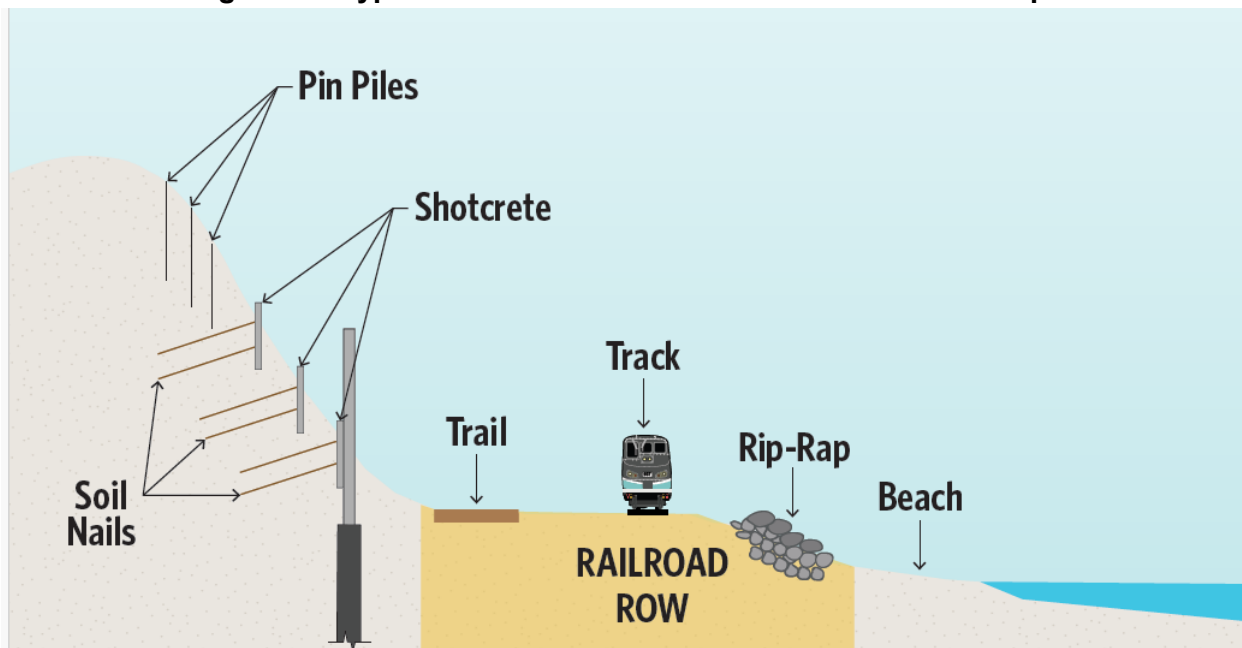
Pin-Piles

Description – Pin-piles are small-diameter, near-vertical shear-pins installed behind the face of a slope to provide shear resistance and stabilize slopes. The piles act as shear dowels, transferring forces into competent underlying soils and limiting lateral movement of the retained ground. Pin-piles are used commonly in areas where earthwork is constrained or local instabilities require deep reinforcement and where soft or compressible near-surface soils require reinforcement without full excavation, and shear transfers into competent underlying soils are required.

Although not considered a wall system in the same sense as a tieback or soil-nail wall, pin-piles function as a drilled element that resists lateral movement and shearing by developing skin friction and end bearing in denser or stiffer materials at depth.

Typical Section D below depicts the conceptual layout of Soil-Nail / Pin Pile Wall alternatives (see Figure 40).

Figure 40. Typical Section D – Soil-Nail / Pin Pile Wall Concept



Construction – Pins typically consist of high-strength steel pipes or threaded bars driven into a slope face at close horizontal and vertical spacing until a required load resistance is achieved. Installation is performed using small, highly portable equipment, such as pneumatic hammers or hydraulic rams, which offer a major advantage for sites with limited access. Field documentation is typically performed by a geologist, who maintains a log of stratigraphy and verifies compliance with design criteria.



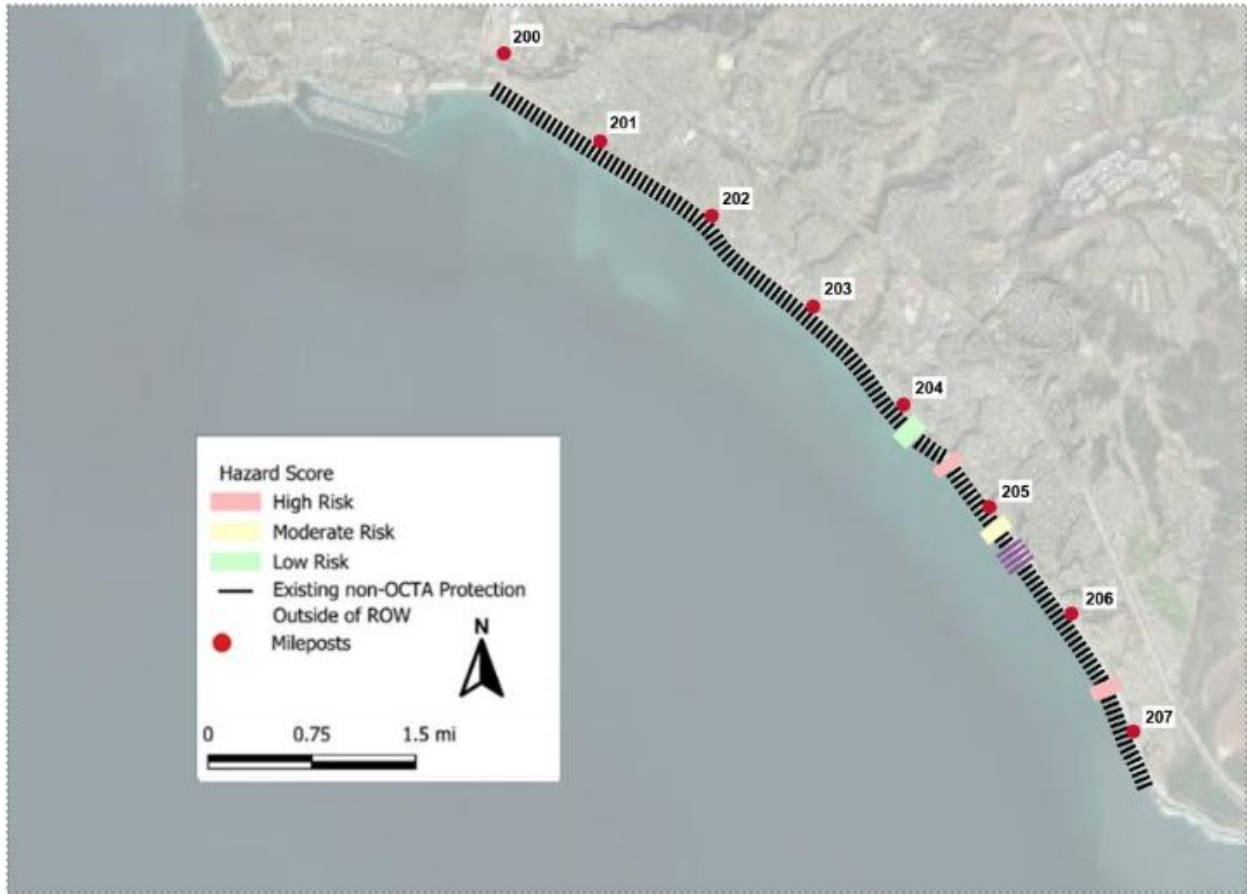
6.3.2. Summary and Locations

Table 25 summarizes the bluffside areas where catchment or tieback / soil-nail wall / pin-pile installation are considered favorable alternative concepts for bluffside stabilization. Included are approximate MP segments, reference name designations, and associated geotechnical cross sections constructed to depict general surface/subsurface conditions and conceptual configurations.

Table 25. Summary of Bluffside Concept Locations

MP Segment	Location Reference	Concept Type	Typical Section	Figure No.
204.15 to 204.24	Mariposa	Ground Improvement	A	Figure 37
204.52 to 204.56	Corto Lane	Catchment Wall	B	Figure 38
205.18 to 205.25	Mayor	Soil-Nail Wall / Pin Pile Wall	D	Figure 40
205.30 to 205.50	Christobal	Tieback Wall	C	Figure 39
206.60 to 206.65	Vista Blanca	Catchment Wall	B	Figure 38

Figure 41. Bluff Hazard Risk Assessment Assignment Map





7. Next Steps

The next steps of this process include conducting a more in-depth technical analysis of the shortlisted alternative concepts, such as engineering feasibility and environmental assessments. As the study progresses, these alternative concepts may be applied to typical track sections either individually or in combination to more effectively address the resilience challenges for each of the corridor's varied section typologies.

7.1. Funding

To support the next phases of the CRRS, funding will need to be identified across federal, State, and local levels. Relevant programs span areas such as rail safety, transportation infrastructure, climate and coastal resilience, sea-level rise adaptation, and nature-based solutions. Each funding source is evaluated based on its alignment with CRRS objectives, precedent from similar projects, geographic or agency fit (e.g., LOSSAN, OCTA), consistency with project goals, and overall funding availability. Sources rated as High Relevance have directly supported comparable efforts or are specifically designed for climate-resilient transportation. Low Relevance sources may focus on criteria such as zero-emission transit, local mobility, or equity, which are less central to this project's scope.

It is important to note that there is potential funding uncertainty due to changes in federal policy, particularly those that reduce emphasis on climate adaptation, equity, or environmental restoration. This risk applies primarily to federal programs. However, some California and local sources, while supported by State legislation and voter-approved funding, could also be affected by changes to federal matching requirements or reduced federal support for interagency coordination.

7.1.1. Federal Funding Sources

Funding Source	Description	Relevance	Justification
CRISI – Consolidated Rail Infrastructure and Safety Improvements Program (FRA)	Rail safety, infrastructure, and climate resilience	High	OCTA previously received 100 million for CRRS; directly supports rail corridor upgrades.
PROTECT – Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation Program (FHWA)	Surface transportation resilience, including coastal infrastructure	High	Targets climate-threatened infrastructure like LOSSAN; eligible for planning and construction.
RAISE – Rebuilding American Infrastructure with Sustainability and Equity and Reconnecting Communities Program (USDOT)	Multimodal access, equity, and infrastructure upgrades	High	LOSSAN corridor projects have received prior awards; supports community access and resilience.



Corridor Identification and Development Program (FRA)	Planning and development for intercity rail corridors	High	LOSSAN is a designated corridor; supports long-term planning and relocation feasibility.
National Railroad Partnership Program / Federal-State Partnership for Intercity Passenger Rail (FRA)	Capital projects that rehabilitate, repair or improve performance of intercity passenger rail service. Support planning, environmental review, and final design of projects	High	Most recent NOFO provided added emphasis on railroad safety, which is a key argument of stabilization efforts.
STGB - Surface Transportation Block Grant Program (USDOT)	Regional planning and preliminary engineering	High	Already contributed more than two million to CRRS; supports early-phase infrastructure planning.
RRIF – Railroad Rehabilitation and Improvement Financing (USDOT)	Credit assistance program supporting rehabilitation of rail equipment or facilities. Reimburses planning and design expenses.	High	Focused on development and rehabilitation of railroad infrastructure.
TIFIA - Transportation Infrastructure Finance and Innovation Act (USDOT)	Credit assistance program supporting large-scale passenger rail vehicle and facilities projects	High	Provides market-competitive alternatives to support large-scale projects.
National Coastal Resilience Fund (NFWF in partnership with NOAA)	Nature-based coastal resilience and habitat restoration	Medium	Relevant if CRRS includes dune restoration or bluff stabilization; competitive and habitat focused.
NOAA Regional Coastal Resilience Grants Program	Planning and implementation of coastal hazard mitigation	Low	Supports hazard mitigation and planning; less rail-specific and highly competitive.

7.1.2. State Funding Sources

Funding Source	Description	Relevance	Justification
TIRCP – Transit and Intercity Rail Capital Program (CalSTA)	Capital funding for rail modernization and resilience	High	LOSSAN corridor has received major awards; supports double tracking and climate adaptation.
LTCAP – Local Transportation Climate Adaptation Program (Caltrans)	Local agency support for climate-threatened infrastructure	High	OCTA has requested 25 million; designed for infrastructure like CRRS.
SB 1 Sea-Level Rise Adaptation Planning Grant – Track 1	Planning for sea-level rise impacts on infrastructure	High	Directly supports planning for vulnerable coastal infrastructure like rail corridors.



(Ocean Protection Council)			
California State Coastal Conservancy	Coastal access, bluff stabilization, and climate adaptation	High	Strong track record funding similar projects in Southern California coastal zones.
Caltrans Transit Grants Program	Transit operations, planning, and infrastructure	Low	Offers broad transit support; applicable but less targeted to coastal rail resiliency.
Low Carbon Transit Operations Program (LCTOP)	Supports zero-emission transit and disadvantaged communities	Low	Relevant if CRRS includes zero-emission components or equity-focused access.
AB 109 Climate Adaptation and Resiliency Program (California Budget Act of 2017)	Budget Act funding for climate resilience	Low	Budget-based and less predictable; applicable for planning and adaptation.

7.1.3. Local and Regional Funding Sources

Funding Source	Description	Relevance	Justification
Orange County Fifth District Infrastructure Funding (Supervisor Katrina Foley)	Local discretionary funds for coastal and transportation projects	High	OC 5 th District has previously allocated funds for CRRS; strong advocacy and alignment.
Measure M2 (Orange County)	Sales tax revenue for transportation improvements	High	OCTA-administered fund; eligible for planning, environmental review, and construction.
LOSSAN Corridor Capital Investment Program	Coordinated regional funding for corridor-wide upgrades	High	CRRS is a top priority for LOSSAN; facilitates joint funding and advocacy.
BNSF Public Infrastructure and Investments	Discretionary grant program that supports resilient and sustainable rail	High	As a key partner in the region, BNSF would also benefit from rail stabilization efforts
San Clemente Capital Improvement Program (CIP)	Local infrastructure and coastal protection	Medium	City has partnered on stabilization projects; limited scale but supportive.

7.2. Project Development

The CRRS develops a roadmap for potential future projects along the coastal rail corridor to protect the railroad in place for at least the next 30 years. The shortlisted alternative concepts from this study will be further developed and analyzed in future stages of the project. These next steps include location-specific feasibility analyses, preliminary engineering, environmental impact studies, and final design.



7.3. Long-Term Studies

This Feasibility Study focuses on identifying concepts that would support ongoing rail operations over the short- and medium-term. Beyond the 30-year timeline used to conduct this assessment, additional studies will be needed to identify long-term solutions to sustain rail resiliency and the system's ability to weather increasingly severe climate events. These long-term efforts will be led at the State level.



8. Conclusion

A total of 23 alternative concepts were evaluated through a detailed screening process, resulting in 8 shortlisted alternative concepts identified for further study and future implementation to enhance rail resilience along the approximate 7-mile segment of the LOSSAN corridor in south Orange County. These alternative concepts were organized into three categories: rail, bluffside, and beachside. Each concept category corresponds to specific resilience challenges the concepts aim to address. Shortlisted alternative concept selection was guided by a weighted scoring methodology that considered rail resilience, cost-effectiveness, constructability, public assets, environmental impact, and alignment with planned projects. Ongoing stakeholder and community engagement played a key role in shaping the evaluation, helping to develop and ultimately select alternative concepts that best balance the project's goal of improving rail resiliency with public concerns.



Appendix A. CRRS Initial Assessment – Technical Memo



Orange County Transportation Authority

Coastal Rail Resiliency Study

Initial Assessment Technical Memorandum

Cities of Dana Point and San Clemente, CA

Prepared By:



Prepared for:



January 2024

Last Updated: February 13, 2024

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Executive Summary

The Orange County Transportation Authority (OCTA) embarked on the Coastal Rail Resiliency Study (CRRS) in fall of 2023 with the goal of developing alternative concepts for maintaining railroad operations within the existing railroad corridor for the next 30 years. Concurrently, multiple inland bluff failures and coastal erosion events created state of emergencies in which operators such as Metrolink, Amtrak and BNSF had to cease operations. Acknowledging that these shutdowns in operations are causing financial burdens on taxpayers, OCTA is expediting an Initial Assessment of this coastal railroad corridor from Mile Post 200.00 to MP 207.40, which will be an appendix to the overall CRRS document.

The Goals and Objectives of the Initial Assessment are to conduct an existing conditions assessment of the railroad corridor by identifying areas that are susceptible to risk from bluff failures and coastal erosion within the next two years, resulting in a shutdown of railroad operations. The Initial Assessment was completed between October 2023 and January 2024 and is limited to improvements identified by the project team through site reconnaissance within the railroad right-of-way. This will build upon previous studies that OCTA, the County, and the Cities of San Clemente and Dana Point have conducted over the last several years. Finally, it will identify potential solutions and strategies along with next steps that OCTA and other stakeholders could take to keep the tracks operational. The potential solutions and strategies are documented under the Recommendations and are categorized in three areas by degree of concern: Potential Reinforcement Areas, Potential Monitoring Areas, and Potential Emergent Areas. All three of these categories will require further engineering and environmental studies to determine preferred remediation solution with a defined scope, schedule and budget that would be integrated into an Implementation Plan. The areas identified are based on site reconnaissance, however changing site conditions can lead to other imminent threats that are not highlighted in the Initial Assessment. It is also important to note that the Potential Reinforcement Areas and Potential Monitoring Areas do not indicate the implementing lead agency/entity.

Providing potential solutions is only a portion of the overall plan needed to address the needs along this coastal railroad corridor. The next steps address Governance challenges by revealing the need for better definition of roles and responsibilities of key stakeholders. The lead agency must develop an Implementation Plan that will be informed by a clear strategy on how to navigate the Regulatory Permitting process. Future emergencies are unavoidable but the response can be enhanced by the development of procedures which incorporate lessons learned from past emergencies. Given the nature of the bluff failures and coastal erosion, emergency response time can be expedited by stockpiling of Materials typically used in an emergency situation. Lastly, timely engagement of stakeholders must be considered so that each of their constituents are informed.

Introduction/Background

The coastal Rail Corridor in southern Orange County is owned by OCTA and operated by the Southern California Regional Rail Authority (SCRRA or Metrolink) and Amtrak Pacific Surfliner for passenger service and by the Burlington Northern-Santa Fe Railroad (BNSF) for freight service. This segment of railroad is part of the greater 351-mile Los-Angeles-San Diego-San Luis Obispo Rail Corridor (LOSSAN Corridor). The Department of Defense (DOD) has designated this key railroad line as a part of the Strategic Rail Corridor Network (STRACNET). Over the past three years, coastal Rail Corridor operations have been adversely affected by the processes of coastal bluff erosion, beach loss, revetment loss, and bluff failures. Recent bluff failures at MP 204.20 Mariposa Pedestrian Bridge, MP 204.60 Casa Romantica, and reactivation of an ancient landslide at MP 206.80 Cyprus Shore (Figure 1) have resulted in significant interruptions to railroad operations. The coastal Rail Corridor is subject to future similar threats, which can further impact railroad operations. OCTA, along with its rail operators, are seeking solutions to further reinforce this critical Rail Corridor.



Figure 1 MP 206.80 Track Stabilization Project (Cyprus Shore) May 2023

To reinforce the coastal Rail Corridor, OCTA is leading a CRRS to develop short to medium-term solutions for the seven-mile segment of coastal Rail Corridor between Mile Post (MP) 200.00 to MP 207.40 (see below). The CRRS will develop alternative concepts to protect the railroad in its current corridor for the next 30 years. The alternative concepts will be implementable in the short term (up to 10 years) and the medium term (11 to 30 years). The CRRS will coordinate with key stakeholders and interest groups in the region to take into consideration their needs and also participate in regional solutions. A separate long-term study will examine future coastal railroad corridor solutions beyond the 30-year horizon. Planning for

the long-term study is under discussion and the lead agency has not yet been determined for that effort.

As an initial assessment to address immediate needs (next 2 years), the project team has conducted field reconnaissance to identify and assess areas along the OCTA coastal railroad corridor (MP 200.00–207.40). The assessment resulted in identification of areas warranting immediate monitoring and/or requiring corrective action and mitigation. The objective of this assessment is to identify and prioritize areas of immediate action to avoid and minimize potential emergencies that impact railroad operations. This segment of the railroad in South Orange County has experienced extended service disruptions over the last several years that have severely impacted the reliability of passenger rail service and thus, the riders who depend on the service. The measures identified within this Initial Assessment are intended to be actionable by OCTA and its railroad operator and maintainer, Metrolink.

The potential reinforcement areas identified will require additional design advancement, environmental approach, and permitting strategy to implement. The areas cover direct actions that can be implemented by OCTA or Metrolink to protect its infrastructure and avoid impacts to operations. Additionally, there are other solutions and efforts being led by other stakeholders to address regional erosion issues such as sand replenishment and OCTA will coordinate with the respective parties. While this Initial Assessment is limited to immediate actions to be performed by the railroad, the short- and medium-term solutions being explored will not be limited to that narrowed scope and will consider other regional solutions such as sand replenishment, seawalls, and groins and breakwaters as well.

Goals and Objectives

The goals and objectives of the Initial Assessment summarized in this memorandum is to (1) review the existing conditions of the coastal rail corridor, (2) research historical events and actions that have taken place to protect the railroad and coastline, (3) conduct field reconnaissance to note emergent areas, and (4) make recommendations for monitoring areas and potential reinforcement along the coastal Rail Corridor. This technical memorandum provides a roadmap of projects and implementation strategies that are immediately actionable by the railroad.

Methodology

The project team conducted a review of coastal processes, readily available literature, and a geologic/geotechnical reconnaissance of the site to develop recommendations for monitoring and identification of potential reinforcement areas.

The monitoring areas are identified as locations with observed signs of potential near-term concern. The areas should be monitored for additional movements and any signs of emerging distress using topographic surveys, site observations, and monitoring equipment. The tracked data should be utilized to develop a baseline condition and to compare against possible thresholds for future action.

Furthermore, the project team has identified potential reinforcement areas that are recommended to reinforce critical rail infrastructure and avoid an emergency that impacts rail operations. These potential reinforcement areas may need to be studied further through alternatives analysis to select a recommended path forward and develop environmental and permitting strategies to be ready for construction.

The areas were identified based on the project team's research and field reconnaissance; however, the risk of additional wave erosion impacts, bluff instability impacts and local erosion in other areas still exists with changing climate conditions and landscape. The potential reinforcement solutions presented in this memorandum, along with additional site-specific alternatives, can be implemented elsewhere throughout the corridor.

Previous Efforts by OCTA

This Initial Assessment builds on previous OCTA efforts in its pledge to study climate change impacts and implement sustainability measures. In January 2021, OCTA released its "OCTA Rail Defense Against Climate Change Plan," which focused on the approximately 25-mile section of railway from Jeffery Road in Irvine to the Orange/San Diego County border and evaluated Metrolink Stations in Orange County south of Irvine, CA. The purpose of the plan was to characterize and understand future climate-related risk to the rail system and passengers to identify strategies to help mitigate those risks and to preserve the continuity of the rail service into the future.

Areas of previous bluff and coastal erosion were also reviewed, as has occurred most recently at MP 204.20 Mariposa Pedestrian Bridge bluff failure, MP 204.60 at Casa Romantica, and the reactivated ancient landslide at MP 206.80 at Cyprus Shore. Metrolink maintenance crews continue to observe, inspect, and place riprap slope protection for shoreline erosion areas as they develop. This Initial Assessment considers previously impacted areas and suggests other complementary solutions and strategies to maintain railroad operations.

Overview of Baseline Conditions

The project team collected data to document the existing conditions through field reconnaissance with Metrolink maintenance staff, geotechnical desktop studies pertinent to the coastal corridor, and mining through Metrolink's storage office, which contained records for maintenance through the coastal corridor. The project team compiled the existing conditions informed by the data collection and organized per expertise:

- Coastal and geotechnical identifying possible causes for erosion and degradation; and
- Impacts on Metrolink assets: track, drainage, signals.

Data Collection

Site Visits

Two site visits were conducted to observe existing conditions and identify vulnerabilities to coastal erosion, potential bluff failures, and impacts to the coastal rail corridor. The first covered

MP 203.70 to Calafia State Beach at MP 206.00 on November 28, 2023; the second covered the remaining reach from MP 206.00 to MP 207.40 on January 12, 2024. Key observations related to coastal erosion, bluff stability and local erosion, and related flooding/overtopping vulnerability are summarized as follows:

- Metrolink personnel indicated there were no coastal erosion issues north of Metrolink Station (MP 203.70) except at Capistrano Beach Park where there is a rail crossing. The County of Orange has been managing shoreline protection along this reach. The Rail Corridor is not threatened at this location.
- Metrolink personnel identified an area of recent shoreline erosion and subsequent riprap installation near MP 203.85.
 - The riprap slope, historically stacked from railcars along this reach, has face profiles exceeding ratios of 1:1 (horiz:vert) (see Figure 8 and Figure 12, below).
- Metrolink personnel cited another erosional hotspot location at Mariposa Point near MP 204.20 and spanning the length of an elevated pile-supported pedestrian walk/bridge paralleling the shoreline. After the site visit, this area experienced a bluff failure with runout onto the track at MP 204.20 on January 24, 2024, which halted rail operations. This area is known to have lost significant beach deposits and riprap shore protection in recent years (see Figure 9, below). Recent riprap was placed between Mariposa Point and the marine safety building. Additionally, failures and groundwater seepage are a chronic occurrence within the adjacent bluff.
- No additional areas vulnerable to coastal erosion and flooding were identified from the San Clemente Pier southward to San Clemente State Beach (MP 206.50).
- From just south of the Calafia State Beach parking lot, near MP 206.00 to approximately MP 206.60, the rail corridor has little or no riprap shore protection. The shoreline fronting the rail corridor indicates advancing erosion, with vertical scarps in the native beach material exceeding 10 feet near the rail line (see Figure 10).
- Metrolink personnel indicated continued chronic maintenance issues following storm events within the limits of the San Clemente State Beach Campground, MP 206.00 to MP 206.50, with sediments generated by bluff erosion and the mouths of canyons.
- In the vicinity of MP 207.00, Metrolink personnel indicated emergency riprap repairs have been required.
- Riprap was observed to also include much smaller stone and the upper portions of the slope are very steep (steeper than 1:1) (see Figure 11).

Desktop Studies

The project team performed a search of available literature including published geologic maps, state hazard maps, and historical aerial photographs. The documents were reviewed to identify areas of historical bluff instability and establish levels of potential risk to future impacts along the coastal Rail Corridor.

While no new beach profile data were collected for this effort, the City of San Clemente recently initiated a fall and spring beach profile survey program to cover years 2022 through 2025. The program measures changes in shoreline topography and bathymetry at 12 sites from Doheny Beach to San Mateo Point. shows the locations of the beach profile sites in relation to the OCTA Coastal Railroad ROW (MP 200.20–MP 207.40). The purpose of the shoreline monitoring program is to facilitate and plan shoreline projects and to document the impact of natural events such as El Niño and sea level rise (SLR). The program augments historic data sets acquired by the U.S. Army Corps of Engineers (USACE) in the 1980s and a prior City of San Clemente monitoring program covering 2001–2007.

Figure 3 shows the mean high water (MHW) level beach width, which represents the width of the beach from the backshore edge of sand seaward to the MHW elevation. The MHW beach width is generally considered to represent the *dry beach width*. The shaded gray area illustrates the envelope of historical measured beach widths based on available data from 1983–2009. The dark blue line shows the beach width measured in fall 2022, when beach survey monitoring was reinitiated. Between MP 202.00 to 203.00, the beach monitoring results show the fall 2022 beach width to be at or below historic minimums, and up to 50 feet narrower than the historical range; however, dry beach width remains in this area and the rail is set back from the shore. Between MP 203.00 to 204.00, most of the beach remains at or near historic minimum width, with no dry beach through much of this area. A more dramatic reduction in dry beach width is demonstrated in the vicinity of Cyprus Shore (MP 207.05) where, in fall 2022, there was no dry beach measured. Survey measurements prior to 2009 (range shown in gray) near Cyprus Shore indicate a beach not narrower than 100 feet. These measurements are consistent with the onset of coastal erosion and related flooding and damage within the Rail Corridor that warranted emergency remedial shore protection and stabilization construction at that location.

Figure 4 includes the fall 2023 beach width and illustrates relatively little change compared to the fall 2022 shoreline position.

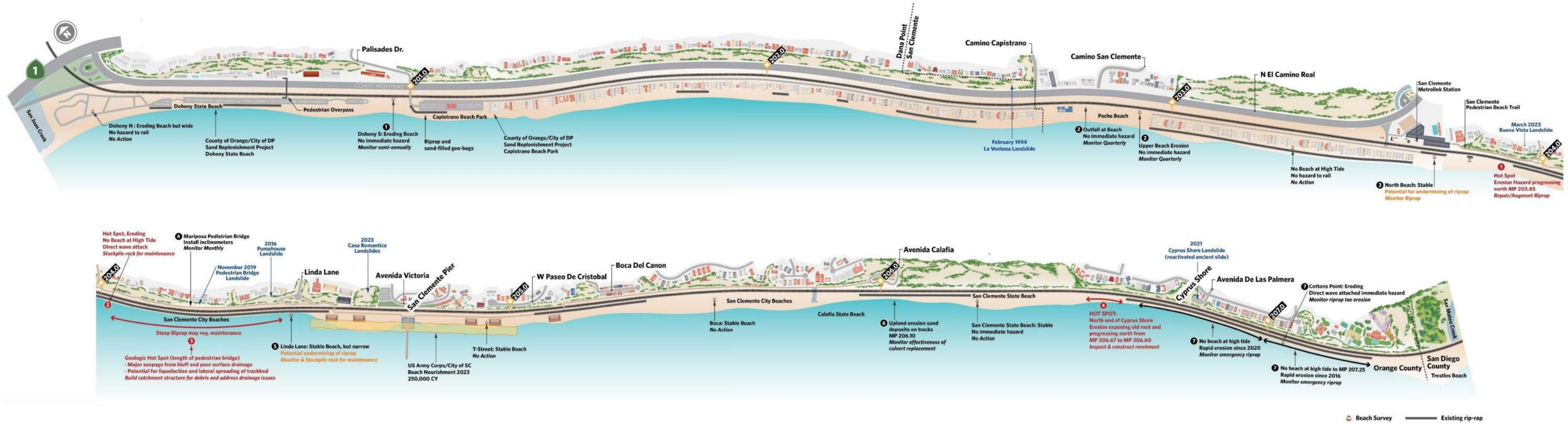


Figure 2 MP 200.00–MP 207.40, Dana Point and San Clemente Monitoring and Potential Reinforcement Area Locations

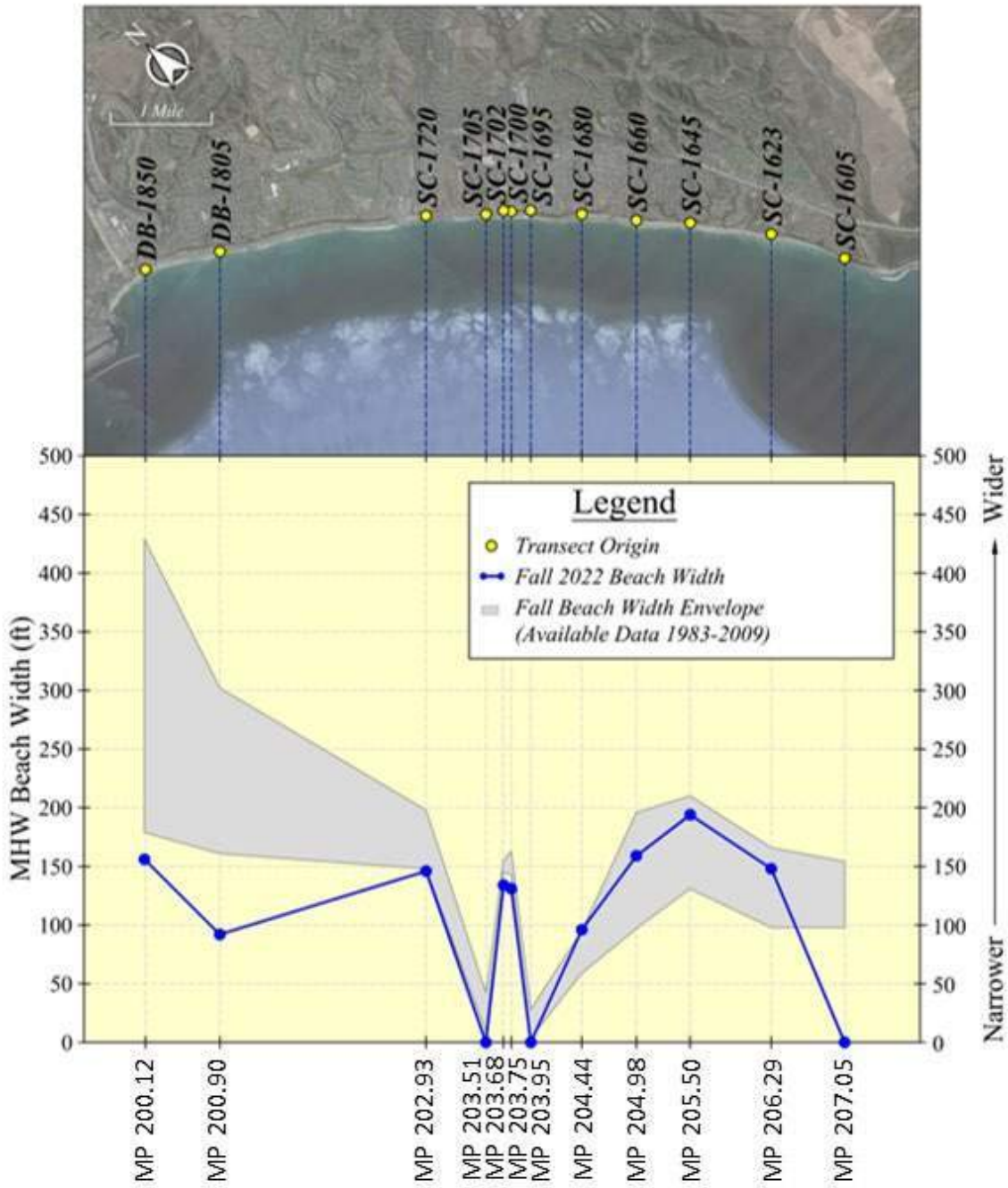


Figure 3 Fall 2022 Beach Widths Relative to Historic Shoreline Position per Survey Comparisons Conducted by Coastal Frontiers

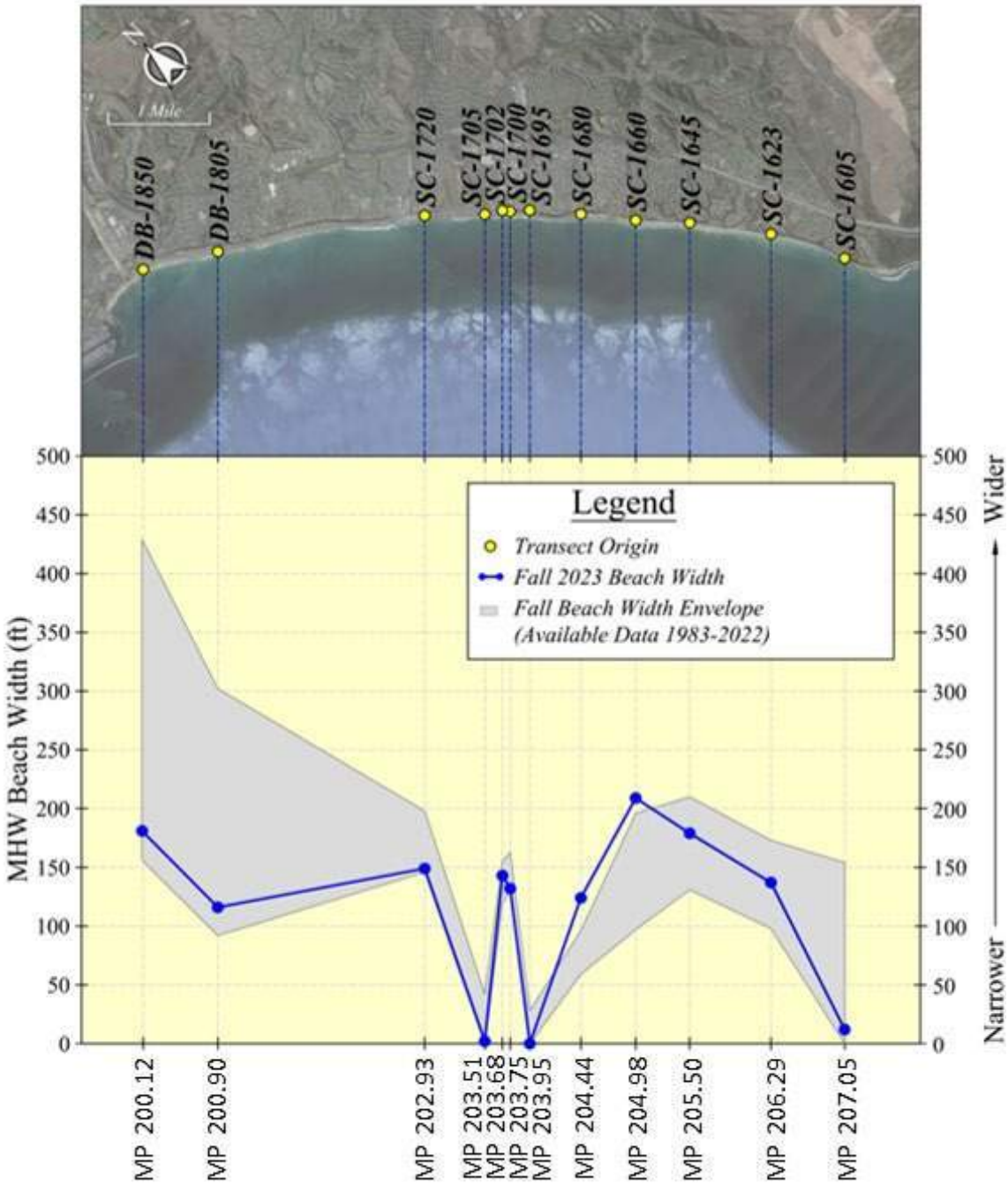


Figure 4 Fall 2023 Beach Widths Relative to Historic Shoreline Position per Survey Comparisons Conducted by Coastal Frontiers

Previous Metrolink Activities

As part of the project team’s effort to document past maintenance activity along the ROW between MP 200.00 and 207.40 on the Orange Subdivision, representatives made a visit to SCRRRA’s Melbourne warehouse on December 12, 2023, to search for relevant track

maintenance records, project as-builts, and various historical documents stored within the vault. As part of this research, six documents were found relevant to the project area:

- Preliminary Geotechnical Investigation for proposed site of Metrolink North Beach commuter rail station in San Clemente, dated March 4, 1994. The report details soil conditions within the project area and notes the site being an active floodplain at the time as well as an instance of flooding within the area. Page 3 of 25 states, “Prior for the general development of the area, the site was considered an active floodplain. The winter storms of 1993 caused the Segunda Deshecha Cañada drainage channel to flood.”
- Railroad Cross-Sections at Dana Point, dated January 16, 1998. This survey report generated in response to a request by the Capistrano Bay District regarding ROW encroachment from a non-reinforced concrete block garden wall. The report describes existing conditions of the wall relative to the OCTA ROW, as well as impacts (i.e., interference) to any future ROW maintenance and future construction.
- Plan set for Metrolink North Beach commuter rail station in San Clemente (at 1850 Avenida Estacion), dated May 27, 1994. Of note are the grading plans (sheet PC-0004) and cross-sections (PC-0007) showing changes within ROW and immediate vicinity.
- City of Dana Point Landslide Remediation and Slope Reconstruction Construction Documents, dated May 5, 1994. This plan set details a proposed tieback system to stabilize the slope along the Coast Highway. The project is not railroad-related, as the slope in question is located on the other side of the Coast Highway away from the tracks, but the grading plan (sheet C-2) does show proposed impacts within OCTA ROW (i.e., removal of retaining wall).
- Preliminary Plans for Multi-Use Beach Trail within City of San Clemente, dated unknown. Project-related impacts/modifications (pedestrian access, overpasses) within the railroad ROW are marked up throughout the set, with the last sheet in the set (C-14) detailing the proposed trail in relation to the existing tracks.
- FEMA/OES Disaster 1585 for 2/16/05–2/23/05 Winter Storms. A collection of project worksheets, images, and correspondences related to repairs made at various locations throughout the SCRRA network following storm damage within the as-specified time frame (incident period). Each site worksheet details the type(s) of damage done by the storms.

Additionally, SCRRA has noted the potential presence of historical track outages and emergency responses documented within its internal database system. HDR was not provided access and this information has not yet been provided to HDR.

Existing Conditions

Coastal

Shoreline monitoring since 2022 indicates that most shorelines in the study area are retreating (eroding), with historical minimum beach widths at the northern extent of the study area (MP

200.00 to 204.30) and the southern extent (MP 206.60 to 207.20 - Cyprus Shores). Ongoing actions by the City of San Clemente to monitor the beach profile and rate of change will continue. Recent action (December 2023) by the USACE to nourish the beach with 250,000 cubic yards of sand will supplement the lack of supply to the beach system but is unlikely to affect the overall trajectory of beach erosion in the near term. At the time of this initial assessment, the project is on hold due to poor sand quality from initial loads.

Vulnerabilities related to shoreline erosion and related wave overtopping have been identified to present near-term imminent risk (0 to 2 years) to rail operations and/or infrastructure. For vulnerabilities related to reduced shore protection resulting from damage to existing sloping riprap, the only viable short-term strategy is to repair the damaged structure. Repair options include addition of riprap in areas where it has been dislodged and displaced downslope and seaward. Minor improvements that would not represent new development may include use of larger armor stone, with repair operations supported by placement operations from the seaward side of the riprap slope when sufficient dry beach is available to support construction operations during low tide conditions. Rock placement from beach side of the slope generally results in higher-quality construction via improved nesting of adjacent stone and tighter placement density, resulting in greater stability and durability.

Recent coastal erosion has also been observed along the reach between MP 206.00 and MP 206.60 where little to no riprap exists. This may present an opportunity to construct sections of engineered revetment, which provide significantly greater shore protection performance in the longer term. Compared to the rocks placed in riprap slope protection, the rocks placed in a properly engineered revetment will remain in place, thereby providing more protection from wave-induced beach erosion and associated wave overtopping. The key advantages of an engineered revetment versus a riprap slope are listed below:

- Founding the toe of revetment in a keyway excavation, preferably established in shallow bedrock to minimize erosional undermining.
- Placement of geotextile filter fabric within the temporary back-cut behind the revetment to reduce loss of finer embankment material by piping.
- Employment of specialized revetment stone design to promote added hydraulic stability, including revetment-perpendicular long-axis placement and careful nesting and armor stone size placement.

Construction constraints include beach accessibility, sufficient beach width, availability of equipment, and time-sensitive construction hours during periods of low tides. Based on site observations, discussions with Metrolink personnel, and analysis of beach profile survey data, potential reinforcement areas for the coastal rail corridor shoreline protection include:

- Ongoing revetment damage and deterioration at MP 203.80.
- Ongoing revetment damage and deterioration along Mariposa Point between MP 204.00 and MP 204.50.
- Unprotected Rail Corridor from MP 206.00 to MP 206.60.

- Ongoing revetment damage and deterioration in localized areas between MP 206.60 and MP 207.40.

Geotechnical

A majority of the coastal bluff along the coastal rail corridor has experienced failures in some manner as part of natural and/or anthropogenic processes of landward retreat. Such typically involve a failure of bluff-top terrace deposits, weathered bedrock within the bluff face, and surface vegetation. Causes can often be attributed to construction of unpermitted bluff-top retaining structures by private property owners acting as dams to subsurface waters and increased hydrostatic pressures. Where bluffs are set back a greater distance from the coastal rail corridor, these failures commonly result in runout of deposits that do not reach the corridor. In locations where the bluff lies in closer proximity to the corridor, these failures can encroach into/over the tracks requiring removal of debris and sometimes installation of pile-lagging walls parallel to the tracks. While these failures are often spectacular from a general public and media perspective, they tend to pose only a low threat to the integrity of the corridor, requiring short-lived maintenance efforts to restore track service.

Rare along the bluff is the occurrence of larger deep-seated landslides involving bedrock with basal ruptures projecting beneath the tracks. Such tend to involve reactivation of older pre-existing ancient landslides in response to a loss of beach support, conditions of natural or anthropogenic groundwater, anthropogenic modification of driving forces in areas landward of the corridor, or combinations thereof.

Track

The existing track alignment consists of a single track line within the project limits. The operational speeds vary from 40 miles per hour (mph) to 90 mph for passenger trains and 40 mph to 50 mph for freight trains. There are two passenger stations within the project limits at San Clemente North Beach and San Clemente Pier.

The track corridor has various cross sections throughout the project limits. The typical cross sections are summarized below:

- MP 200.00–MP 201.20: Pacific Coast Highway to the east of the track alignment and Beach Road and Doheny State Beach and Capistrano State Park to the west of the track.
- MP 201.20–MP 202.65: Pacific Coast Highway to the east of the track alignment and residential homes to the west of the track.
- MP 202.65–MP 202.95: Pacific Coast Highway to the east of the track alignment and Poche Beach to the west of the track.
- MP 202.95–MP 203.60: Pacific Coast Highway to the east of the track alignment and residential homes to the west of the track.
- MP 203.60–MP 207.70: Bluffs to the east of the track and various widths of beach to the west of the track.

Drainage

Surface drainage issues persist within various segments of the coastal rail corridor. The primary issues tend to occur in close proximity to the toe of bluffs. Local graded track-side drainage ditches have been installed as part of maintenance efforts to control surface waters locally, but many have been eroded and/or become infilled with sediment over time, causing ponding. Locations of poor drainage are highlighted below.

Signals

Signal equipment in the area requires more maintenance than other areas outside of the coastal corridor due to the corrosive forces from the marine atmosphere. Additional coatings and selected materials are used for the signal equipment throughout the project limits; however, the frequent maintenance needs remain necessary.

Summary of Emergent Areas

The project team reviewed recent and historical aerial photography, beach profile surveys, and publicly available studies to characterize long-term and recent trends. As evidenced by extensive armoring along nearly the entire study area, shoreline erosion has been a historical concern and has recently reemerged as a major concern in several locations. An extensive historical investigation was not performed for this study as the project team’s efforts focused on immediate (up to 2 years) issues throughout the study area. Aerial maps of the coastal rail corridor are provided in the appendix of this report for reference to areas summarized below. Below is a color-coded summary of potential evolving site conditions to the rail corridor associated with bluff stability and coastal erosion. Areas highlighted in green are considered representative of a low potential impact. Those of moderate impact are highlighted in yellow. Areas considered a higher potential emergent impact to the rail corridor are highlighted in red.

Table 1. Summary of Emergent Areas, MP 200.00–201.00

MP 200.00–201.00	Bluff setback relatively distant from the Rail Corridor; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential impact to Rail Corridor considered low. Coastal erosion potential impact is low, due to wide beaches and park infrastructure between the Rail Corridor and shoreline.
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Table 2. Summary of Emergent Areas, MP 201.00–202.00

MP 201.00–201.70	Bluff set-back relatively distant from the Rail Corridor; steep/high bluff profile; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential impact to Rail Corridor considered low. Coastal erosion potential impact is low, due to park infrastructure and private properties between the Rail Corridor and shoreline.
MP 201.70–201.90	Bluff set-back relatively distant from Rail Corridor; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential for bedrock landslide runout into Rail Corridor is low in near term and potentially moderate in long term. Coastal erosion potential impact is low, due to private properties between the Rail Corridor and shoreline.

MP 201.90–202.10	<p>Bluff set back relatively distant from Rail Corridor ; steep/high bluff profile; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential impact to Rail Corridor considered low.</p> <p>Coastal erosion potential impact is low, due to private properties between the Rail Corridor and shoreline.</p>
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Table 3. Summary of Emergent Areas, MP 202.00–203.00

MP 202.10–202.30	<p>Bluff set-back relatively distant from Rail Corridor; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential for bedrock landslide runout onto Rail Corridor considered low in the near term and elevated in in the long term.</p> <p>Coastal erosion potential impact is low, due to private properties between the Rail Corridor and shoreline.</p>
MP 202.30–202.50	<p>Bluff set back relatively distant from Rail Corridor; steep/high bluff profile; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential impact to Rail Corridor considered low.</p> <p>Coastal erosion potential impact is low, due to private properties between the Rail Corridor and shoreline.</p>
MP 202.50–202.65	<p>Location of large past bedrock landslide with runout over/beyond Rail Corridor; bluff stabilized by wall repair; potential future impact considered low.</p> <p>Coastal erosion potential impact is low, due to private properties between the Rail Corridor and shoreline.</p>
MP 202.65–202.80	<p>Bluff condition absent due to mouth of canyon crossing; Rail Corridor subject to potential liquefaction, lateral spreading, and tsunami hazards; threat assessment to Rail Corridor requires geotechnical exploration.</p> <p>Coastal erosion potential impact is moderate. Drainage crossing armor should be monitored and some repair needed following major storms.</p>
MP 202.80–202.98	<p>Location of past bluff instability; bluff stabilized by wall repair; potential impact to Rail Corridor considered low.</p> <p>Coastal erosion potential impact is moderate, as dry beach remains.</p>
MP 202.98–203.01	<p>Location of 2:1 (horiz:vert) bluff layback and surface drain installation; potential impact to Rail Corridor considered low.</p> <p>Coastal erosion potential impact is low, due to private properties between the Rail Corridor and shoreline.</p>

Table 4. Summary of Emergent Areas, MP 203.00–204.00

MP 203.01–203.11	<p>Bluff set-back relatively distant from Rail Corridor; steep/high bluff profile; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential impact to Rail Corridor considered low.</p> <p>Coastal erosion potential impact is low, due to private properties between the Rail Corridor and shoreline.</p>
MP 203.11–203.50	<p>Location of 2:1 (horiz:vert) bluff layback and surface drain installation; potential impact to Rail Corridor considered low.</p> <p>Coastal erosion potential impact is low, due to private properties between the Rail Corridor and shoreline.</p>

MP 203.50–203.71	Bluff condition absent due to canyon crossing; area subject to potential liquefaction, lateral spreading, and tsunami hazards; threat assessment to Rail Corridor requires geotechnical exploration. Coastal erosion potential impact is low, due to private properties between the Rail Corridor and shoreline.
MP 203.71–204.00	Bluff set-back relatively distant from Rail Corridor; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential for terrace/bedrock landslide runoff into Rail Corridor considered low in near-term, more elevated in long term.
MP 203.71-203.80	Coastal erosion potential impact is moderate from 203.71 to 203.80.
MP 203.80–203.90	Coastal erosion potential impact is high near MP 203.80 to 203.90 due to beach narrowing and ongoing erosion progressing north from the existing riprap.

Table 5. Summary of Emergent Areas, MP 204.00–205.00

MP 204.00–204.30	Rail Corridor located on/or adjacent to bluff; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; shoreline eroded; heavy riprap protection in place; heavy seepage in bluff face; track bed underlain by older slide debris that is saturated and subject to potential liquefaction and lateral spreading; high potential for terrace/bedrock landslide, liquefaction, and/or wave erosion impacts to Rail Corridor. Coastal erosion potential impact is high due to direct wave attack, displaced stones, ongoing maintenance requirements, and steep riprap slopes.
MP 204.20	January 24, 2024, bluff failure occurred on adjacent property with runoff onto tracks, impacting Mariposa Pedestrian Bridge and halting rail service; slide movement sheared sections of pedestrian bridge deck from its bents due to lateral pressure on the structure; slide debris shifted Enviro-blocks at former slope toe onto the Rail Corridor; slide mass graded to 2:1 (h:v) and covered with Visqueen; threat of future bluff failures and Rail Corridor closures remains high. Coastal erosion potential impact is high due to direct wave attack, displaced stones, ongoing maintenance requirements, and steep riprap slopes.
MP 204.30–204.37	Bluff set-back relatively distant from Rail Corridor; steep/high bluff profile; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential for terrace/bedrock landslides and runoff onto Rail Corridor considered low in the near-term, more elevated long term.
MP 204.30–204.37	Coastal erosion potential impact is high due to direct wave attack, displaced stones, ongoing maintenance requirements, and steep riprap slopes.
MP 204.37–204.42	Location of past terrace/bedrock landslide (Pumphouse Landslide); unrepaired slide mass remains in relatively close proximity to Rail Corridor; potential reactivation of slide and runoff onto Rail Corridor considered moderate; potential damage to sewer pumpstation due to continued landslide creep, and possible runoff onto Rail Corridor requiring maintenance considered low to moderate in the near-term. Coastal erosion potential impact is moderate due to narrow beach and condition of existing riprap exposed to wave action and beach. Monitoring is warranted.
MP 204.42–204.46	Bluff condition absent; potential impact to Rail Corridor considered low.
MP 204.46–204.55	Existing building mitigates bluff stability concerns; potential impact to Rail Corridor considered low.
MP 204.55–204.58	Bluff set back relatively distant from Rail Corridor; low bluff height; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential impact to tracks considered low; potential impacts to railroad signal house and railroad switching system at Corto Lane Ped Crossing near the toe bluff considered moderate. Coastal erosion potential impact is low to moderate in this vicinity due to beach width and existing infrastructure.

MP 204.58–204.65	Location of past terrace/bedrock landslide (Casa Romantica Landslide); slide mass stabilization in progress; timber/pile wall installed at toe; potential impact to Rail Corridor considered low.
MP 204.65–204.75	Low bluff profile; Rail Corridor subject to potential liquefaction, lateral spreading, and tsunami hazards; threat assessment to Rail Corridor requires geotechnical exploration.
MP 204.75–204.91	Bluff set back relatively distant from Rail Corridor; moderate bluff profile; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential impact to Rail Corridor considered low.

Table 6. Summary of Emergent Areas, MP 205.00–206.00

MP 204.91–205.11	Bluff height relatively moderate; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential impact to Rail Corridor considered low.
MP 205.11–205.25	Bluff height relatively high; location of past terrace/bedrock landslides (SCL Mayor Landslide); slide debris remains; potential impacts to Rail Corridor due to slide reactivation considered moderate.
MP 205.25–205.38	Bluff condition absent; potential impact to Rail Corridor considered low.
MP 205.38–205.50	Bluff set back relatively distant from Rail Corridor; steep bluff profile; potential impact to Rail Corridor considered low.
MP 205.50–205.58	Bluff set back relatively distant from Rail Corridor; steep/high bluff profile; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential impacts to Rail Corridor considered low.
MP 205.58–205.7	Bluff set back relatively distant from Rail Corridor; steep/high bluff profile; periodic bluff failures involving terrace and weathered bedrock deposits notable historically; potential terrace/bedrock landslide runout onto Rail Corridor considered moderate.
MP 205.70–205.82	Bluff condition absent; potential impacts to Rail Corridor considered low.
MP 205.82–205.95	Bluff set back relatively distant from; steep/high bluff; bedrock relatively stable; potential impact to Rail Corridor considered low. Coastal erosion potential impact is moderate due to narrow beach and existing exposed riprap.
MP 205.95–206.03	Bluff set back sufficient distance from Rail Corridor; potential impact to Rail Corridor considered low. Coastal erosion potential impact is moderate due to narrow beach and existing exposed riprap.

Table 7. Summary of Emergent Areas, MP 206.00–207.00

MP 206.03–206.30	Bluff set back relatively distant from Rail Corridor; steep/high bluff profile; bedrock relatively stable, area subject to canyon outwash flooding and erosion; potential impact to Rail Corridor considered low to moderate.
MP 206.30–206.55	Bluff set back relatively distant from Rail Corridor; steep/high bluff profile; bluffs susceptible to potential bedrock landslides; potential for landslide runout into Rail Corridor considered moderate.
MP 206.55–206.64	Location of recent landslide with runout onto Rail Corridor; landslide remains unmitigated; potential slide reactivation and runout into Rail Corridor considered moderate to high. Coastal erosion potential impact is high due to narrow beach, recent erosion and exposure of the fill slope supporting the track between MP 206.60 and 206.65.
MP 206.64–206.72	Bluff set back relatively distant from Rail Corridor; bluff height moderate; bluff susceptible to bedrock landslides; potential bluff impacts to Rail Corridor considered moderate to high. Coastal erosion potential impact is high due to narrow beach, recent erosion and exposure of the fill slope supporting the track in the vicinity of MP 206.60 to 206.65.
MP 206.72–207.34	Bluff set back relatively distant from Rail Corridor; area of ancient Calle Ariana Landslide (repaired) extending beneath Rail Corridor; moderate bluff height; bluff susceptible to bedrock landslides; future potential impact to Rail Corridor considered low to moderate.

Coastal erosion potential impact is moderate to high due to lack of a dry beach and riprap placed to stabilize the shoreline. Ongoing monitoring and reinforcement of the existing riprap is expected near Cypress Shore.

Recommendations

Potential Strategies and Solutions

- Strategy 1. Proactive Monitoring of the Shoreline.** The project team recommends OCTA and SCRRA implement a monitoring program that combines topographic survey and site observations at various locations and frequencies. These data will allow OCTA and SCRRA to establish baseline conditions that will support other strategies. This strategy can be implemented in a matter of months. We also suggest up to three low-cost water level sensors be installed at appropriate locations (bridge crossings, pier, and Dana Point) for a real-time alert of high-water conditions and potential wave damage. These real-time high-water conditions in concert with real-time offshore wave buoy data could help establish coastal metrics for threshold and support rationale for reinforcement actions.
- Strategy 2. Establish Thresholds for Reinforcement.** Long-term, short-term, and seasonal shoreline position (MHW contour) relative to the Rail Corridor centerline of track should be assessed, and thresholds set for acting against imminent emergent conditions. Thresholds may vary spatially based on the geometry and elevation of the Rail Corridor and comparison longer term trends. Establishing thresholds will allow OCTA and SCRRA to plan responses for the coming storm(s) or storm season and provide a rationale to regulatory agencies to support action and emergency after-the-fact permitting. This strategy can be implemented within six months of implementing Strategy 1.
- Strategy 3. Prepare for Maintenance.**
- 3A. OCTA and SCRRA should stockpile sufficient tonnage of rock to reinforce existing riprap when stones are displaced and to add rock to emerging erosion areas as identified by monitoring. At minimum, not less than 5,500 tons of 2–6-ton rock should be stockpiled at the ready for responding to erosion of existing riprap and emergent hot spots.
 - 3B. OCTA to coordinate with SCRRA and its maintenance contractor to develop a 2 to 5-year scope, estimated cost, and schedule to respond to short-term recurring slope movements and coastal erosion. This plan could include but is not limited to stockpiling riprap in various sizes, acquiring or leasing areas accessible by rail equipment to stage and load the stockpiled riprap, and ensuring that adequate equipment such as rail side car loaders and large excavators are readily available.
- Solution A. Engineered Revetment.** The project team recommends OCTA pursue design and implementation of engineered revetment sections in potential reinforcement

areas that currently have limited or no riprap shore protection. These structures will provide greater durability and survivability, plus are more effective at dissipating wave energy to minimize wave overtopping and associated track inundation. Constructing an engineered revetment will entail access on the dry beach, which requires advanced planning to work at low tide.

Solution B. Riprap Reinforcement. Continued placement (stacking) of riprap to repair and reinforce existing riprap from the trackway will continue to be needed as stones are displaced and undermined by storms. This method is a stopgap measure and is not expected to resist all storms or withstand significant erosion of the beach beyond the toe of the riprap slope.

Monitoring Areas

A coastal shoreline monitoring program (see Figure 5) is recommended to quantify changes in both the condition of the shore protection and the overall shoreline position relative to the rail ROW. The recommended monitoring program includes on-the-ground site observations and drone-based topographic and aerial photogrammetric surveys conducted at low tide. A summary of the Monitoring Areas along with frequency of monitoring are provided in Table 8 below.

Site Observations

Potential reinforcement areas should be visually observed by a qualified coastal engineer after storm events and on a monthly basis during winter. The purpose is to observe the existing condition of the existing shoreline and existing protection for signs of further deterioration or damage.

Drone-based Photogrammetry and Topographic Survey

Each potential reinforcement area should be monitored monthly and after significant coastal storm events to assess the vulnerability of the railway to damage from coastal erosion. The monitoring should include acquisition of topographic and photographic data (orthometric and oblique aerial imagery) documenting the condition of the region between the railroad and the Mean Higher High Water (MHHW) contour (i.e., the dry beach and rock shore protection). The recommended program could be conducted using a small Unmanned Aircraft System (sUAS) operated by personnel with Federal Aircraft Administration (FAA) Remote Pilot Certification (Small UAS, Part 107) and a Real-Time Kinematic Global Navigation Satellite System (RTK GNSS). Structure-from-Motion (SfM) techniques can then be used to develop an ortho-rectified composite image (orthomosaic) of the survey area and a detailed Digital Elevation Model (DEM) from the sUAS and RTK GNSS data with a resolution of approximately 0.1 foot or better. This technique has recently been used to monitor rock shore protection in Southern California and to rapidly identify localized areas of revetment deterioration, including rock displacement. Both the DEM and aerial imagery can be used to assess changes in the beach configuration and rock shore protection to identify potential areas of concern. Long-term changes also can be



Figure 5. Summary of Monitoring Locations and Reinforcement Areas

assessed using historical topographic data obtained in the vicinity, and physical reconnaissance by professional geologists and engineers where available.

Proactive monitoring would allow OCTA to set a baseline condition and evaluate the progression of erosion, movement of tracks in areas of underlying instability, establish thresholds for immediate maintenance, and justify actions to regulatory bodies when emergent issues arise. Drone-based monitoring allows efficient capture of large areas, including those areas that do not require intensive monitoring efforts at this time.

Site 1: Doheny South, MP 200.80 – 201.00

The adjacent shoreline infrastructure at Doheny State Beach (see Figure 6) to the west and Capistrano Beach Park to the east have experienced erosion, and erosion control measures have been implemented. The project team recommends shoreline monitoring in this area where beach has not yet eroded to the point of imminent threat to the rail but may do so in the future. Semi-annual monitoring concurrent with spring/fall beach monitoring is recommended.



Figure 6. Monitoring Site 1: South Doheny Beach Erosion near Parking Lot

Site 2: Poche Beach, MP 202.70

Outfalls and drainages allow waves to propagate inland, and in combination with ongoing beach erosion may erode the rail ROW in future. Quarterly monitoring is recommended. See Figure 7.



Figure 7. Monitoring Site 2: MP 202.70, Poche Beach Outfall and Pedestrian Underpass

Site 3: North Beach, MP 203.65 – 203.70

There is ongoing coastal erosion at the base of the riprap slope causing stone to be undermined and dislodged downslope. This reach should be monitored as part of the coastal shoreline monitoring program. See Figure 8.



Figure 8. Monitoring Site 3: MP 203.65, North Beach, November 2023

Site 4: Mariposa Pedestrian Bridge, MP 204.00–204.30

The project team recommends installation of a series of slope monitoring equipment such as inclinometers, tilt sensors, gauges, etc. along an approximately 1,000-linear foot rail corridor section, between the rail corridor and existing pedestrian bridge. Casings should be installed approximately 100 feet on-center and penetrate saturated surficial sediments (fill, colluvium, slide debris), and extend into competent bedrock at depth. Baseline readings (monitoring) should be performed during the week following installation. Future rounds of monitoring should be conducted twice within the next month and once a month thereafter for a year. Subsequent readings should be performed twice annually. Monitoring should also take place following significant events that could potentially manifest in track movement, including, but not limited, to future earthquakes, bluff failures, significant storms, or significant beach erosion.

There is ongoing coastal (beach) erosion along the base of riprap slopes causing stone to be undermined and dislodged seaward. This reach should be monitored as part of the coastal shoreline monitoring program. See Figure 9.



Figure 9. Monitoring Sites 4 and 5: MP 204.00–204.30, Mariposa Pedestrian Bridge – January 21, 2024.

Site 5: Linda Lane, MP 204.50

There is ongoing coastal erosion at the base of the riprap slope causing stone to be undermined and dislodged seaward. This reach should be monitored as part of the coastal shoreline monitoring program.

Site 6: Avenida Calafia, MP 206.10

The face of the sea cliff is entrenched by several small to large size re-entrant canyons generating periodic sediment discharge into low-lying terrain along the landward Rail Corridor margin. Impacts have included flooding, blocking of drainage structures, and deposition of sediment within the Rail Corridor during larger storm events. See Figure 10. Frequent post-

storm maintenance efforts have been required to preserve train service, including removal of sediment and ponded water, restoration of surface flow, and installation of concrete blocks at the mouth of canyons in attempt to restrain sediment transport.



Figure 10. Monitoring Site #6: MP 206.10, Calafia State Beach, January 2024

Possible solutions to mitigate the above conditions may include the following:

- Construction of sediment catchment ditches or walls at toe of bluff;
- Construction of drainage channels at toe of bluff to improve surface drainage and act as sediment catchment ditches;
- Improve, enlarge, and/or install additional under-track drainage outlets connecting to the beach;
- Improve surface drainage by grading the northeastern track zone to accommodate the distribution of runoff to new and/or existing outlets;
- Stabilize erosion-prone areas of bluff and canyons with jute-matting or similar methods to minimize erosion of bare ground;
- Introduce native plants on slopes underlain by colluvium/slope wash and older alluvium); and
- Improve sediment barriers at canyon discharge points.
- Construction of drainage channels at toe of bluff to improve surface drainage and act as sediment catchment ditches.
- Improve, enlarge, and/or install additional under-track drainage outlets connecting to the beach.

- Improve surface drainage by grading the northeastern track zone to accommodate the distribution of runoff to new and/or existing outlets,
- Stabilize erosion prone areas of bluff and canyons with jute-matting or similar methods to minimize erosion of bare ground.

Site 7: Cyprus Shore to County Line, MP 206.70–207.25

This reach (see Figure 11) should be monitored as part of the coastal shoreline monitoring program to ensure that the riprap section is stable and withstanding wave and weather conditions.



Figure 11. Monitoring Site 7: MP 206.70–207.25, Cyprus Shore to County Line, December 2023

Table 8. Summary of Monitoring Areas

Site	Location (MP)	Description	Monitoring (Frequency)
1	200.80–201.00	Doheny South: Eroding Beach	Riprap condition and beach erosion (Semi-annually, Post-storm)
2	202.70	Poche Beach South Shore Pedestrian Underpass and outfall at beach	Beach erosion and scour protection around structures (Quarterly)
3	203.65–203.70	North Beach: Potential for undermining of riprap	Riprap condition and beach erosion (Semi-annually, Post-storm)
4	204.00–204.30	Mariposa Pedestrian Bridge	Install slope monitoring equipment to assess potential track-bed movement (Monthly, post-storm, post-landslide, and post-earthquake)
5	204.50	Linda Lane: Stable beach but narrow	Riprap condition and beach erosion (Semi-annually, Post-storm)
6	206.10	Calafia State Beach: upland erosion sand deposits on tracks	Effectiveness of culvert replacement (Post-storm, King Tides)
7	206.60–207.25	Cyprus Shore to County Line	Monitor effectiveness of emergency riprap (Semi-annually, Post-storm)

Potential Reinforcement Areas

Four areas were identified by the project team through its initial assessment for potential reinforcement to further solidify the stability of the railroad corridor. The potential reinforcement areas are initial concepts that will require additional analysis and investigation in terms of alternative analysis, site access, constructability, and permitting. Each site has potential limitations that need to be examined further. The Potential Reinforcement Areas are summarized in Table 9 below. **It is important to note the following descriptions for the potential reinforcement work do not indicate the implementing lead agency/entity.**

Site 1: MP 203.80 to MP 203.90

Place new rock and/or rework existing rock that has fallen out of section to restore the structure slope and crest elevation, thereby providing beach erosion protection and reduction in wave overtopping. Where possible, place new, larger rock and/or rework existing rock in a way that reduces the slope, thereby improving the stability of the rocks. See Figure 12 and Figure 13.



Figure 12. Potential Reinforcement Area 1: MP 203.85, November 2023

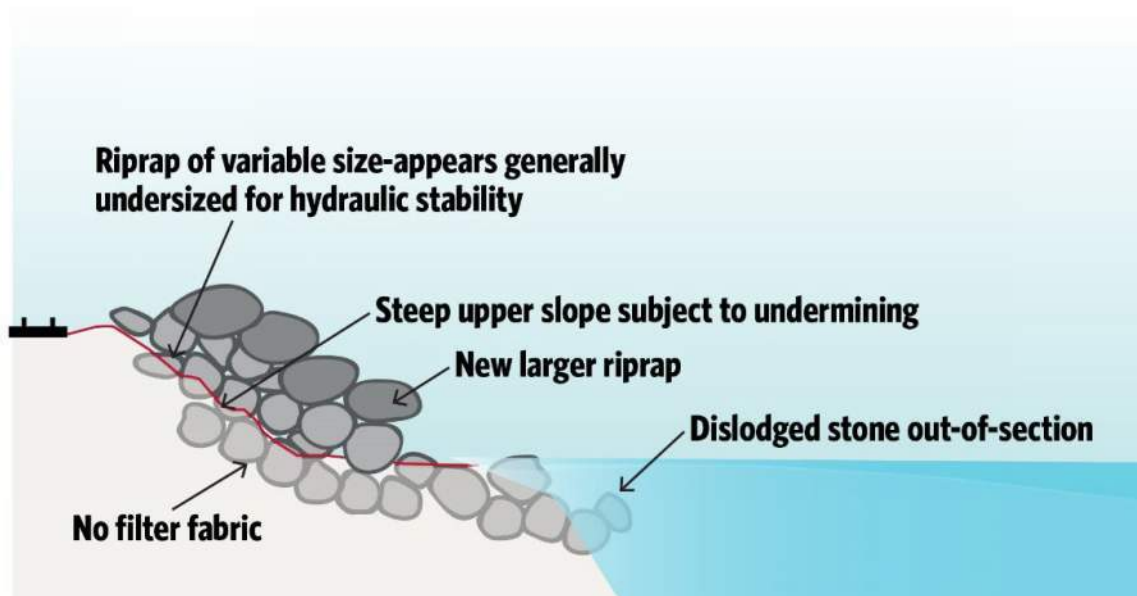


Figure 13. Potential Temporary Reinforcement Solution for Sites 1 and 2 where existing riprap exists

Site 2: MP 204.00 to MP 204.40

Place new rock and/or rework existing rock that has fallen out of section to restore the structure slope and crest elevation, thereby providing beach erosion protection and reduction in wave

overtopping. Where possible, place new, larger rock and/or rework existing rock in a way that reduces the slope, thereby improving the stability of the rocks. See Figure 13.



Figure 14. Potential Reinforcement Site 2: MP 204.10, November 2023

Site 3: San Clemente City Beaches

Following identification of this site needing immediate attention, a landslide occurred that led to the suspension of passenger and freight rail service on January 24, 2024. OCTA and Metrolink took immediate action and performed the following remediation work:

- Removal of two damaged spans of the pedestrian bridge
- Grading of the slope, clearing of debris in drainage culvert, placement of riprap and geotechnical fabric to allow culvert drainage, placement of Visqueen plastic, slope monitoring
- other best management practices to prevent surface water infiltration

However, due to inclement weather and continual movement of the earth, passenger rail service has yet to resume as of early February 2024.

Additional work is anticipated which could include design and construction of a temporary solution within the railroad right-of-way to protect the tracks. Investigate the source(s) of chronic failures affecting the bluff face, which could involve water as the culprit for the underlining

issues. Other parties are anticipated to be responsible for the remaining remedial work to restore the Beach Trail access.

See Figure 15 and Figure 16.

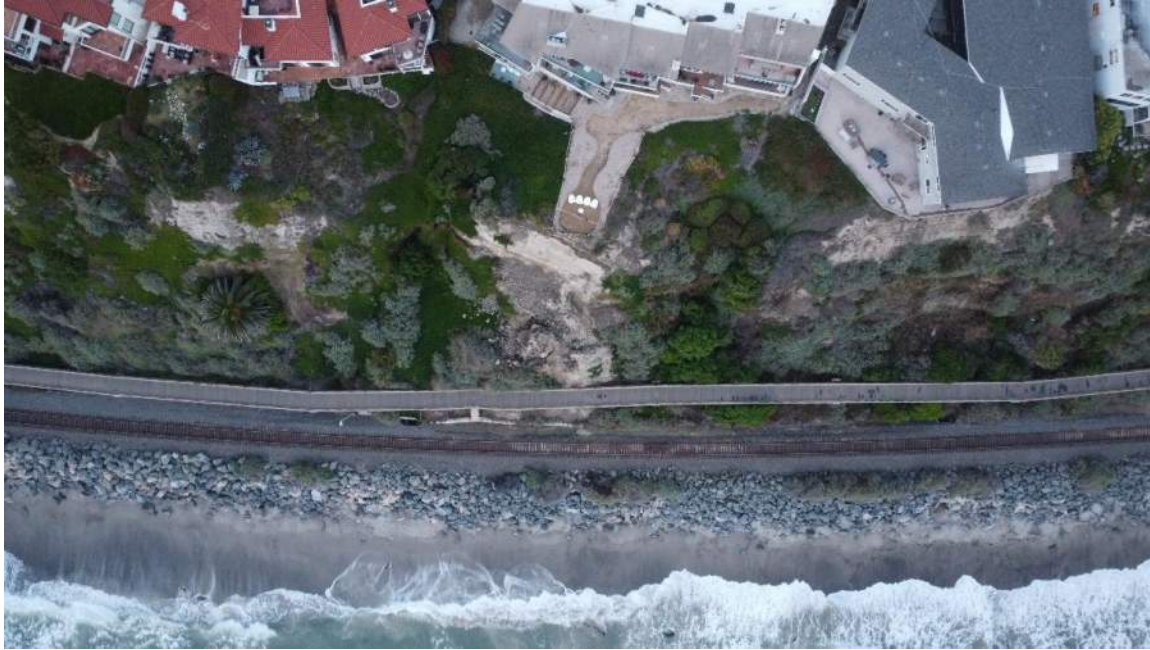


Figure 15. Potential Reinforcement Site 3: MP 204.00 to 204.50, steep bluffs, potential to impact tracks, poor track-side drainage with potential for liquefaction – January 21, 2024

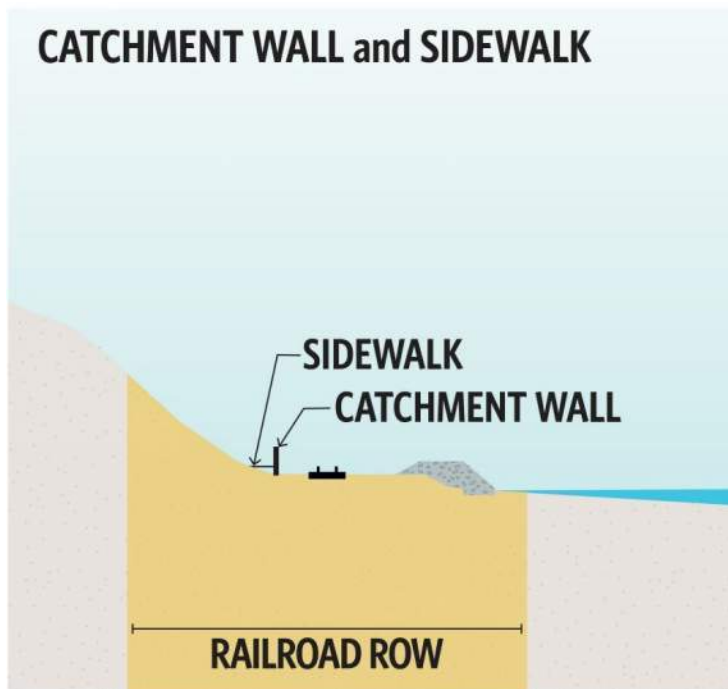


Figure 16. Potential Solution for Reinforcement Site 3

Site 4: North End Cyprus Shore

Installation of an engineered revetment with filter fabric to minimize piping (movement of fine-grained sediment through voids in the rocks) and a layered-stone placement design with keyway founded in bedrock or to a toe elevation of +2 ft or lower is recommended. Dual purpose of revetment is to arrest continued landward retreat of soils into Rail Corridor. See Figure 17 and Figure 18.



Figure 17. Potential Reinforcement Site 4: MP 206.00 to 206.67, North End of Cyprus Shore Project, July 2023

Loss of riprap exposes unstable deposits of beach sand, slide debris, and/or fill deposits beneath ROW, subject to rapid retreat as erosion and toppling during future storms.

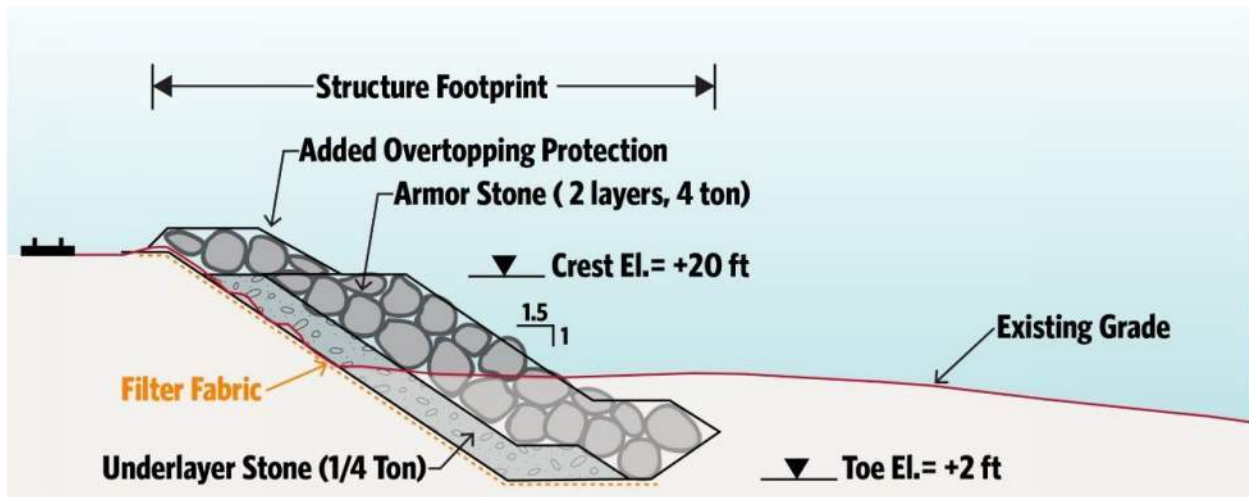


Figure 18. Potential Solution for Reinforcement Site 4 with Engineered Revetment Section

Table 9. Summary of Potential Reinforcement Areas

Site	Location (MP)	Description	Potential Solution(s)	Potential Limitation(s)
1	203.80–203.90	Erosion Hazard deteriorating	Repair/Augment Riprap	Access, constructability, permitting
2	204.00–204.40	Erosion: No beach at high tide and direct wave attack	Stockpile rock for maintenance	Access, constructability, permitting
3	204.00–204.50	Geologic: Major seepage from bluff face and poor surface drainage lead to track-bed saturation and potential for liquefaction and lateral spreading of track-bed	Build subdrain cutoff for groundwater, catchment structure for slope debris surface drainage control	Access, constructability, utility conflicts
4	206.00–206.67	North end of Cyprus Shore: Erosion exposing old riprap	Inspect and construct revetment as needed	Access, constructability, permitting

Other Key Considerations

Governance (Roles and Responsibilities)

As a part of the next steps for the Coastal Rail Resiliency Study, OCTA will develop a Governance Plan to provide a vision for roles, responsibilities, and an implementation plan for capital projects. OCTA is the owner of the ROW and Metrolink is the operator and maintainer of the ROW. However, both agencies have professional services and construction contracts that enable them to deliver capital projects. Roles and the implementation plan will consider the roles and responsibilities of OCTA and other key stakeholders in the region.

Environmental Clearance Strategy

As defined by State Legislature, California Environmental Quality Act (CEQA) Statutory Exemptions (SE) exist to cover specific types of projects with special qualifications. These exemptions are delineated in Public Resource Code (PRC) Section 21080 et seq.

California Code of Regulations, Title 14, Section 15269(b) allows for emergency repairs to publicly owned service facilities “necessary to maintain service essential to the public health, safety or welfare.” This includes emergency repairs that “require a reasonable amount of planning to address an anticipated emergency.” Further, Section 15269(c) allows for an SE for:

Specific actions necessary to prevent or mitigate an emergency. This does not include long-term projects undertaken for the purpose of preventing or mitigating a situation that has a low probability of occurrence in the short-term, but this exclusion does not apply:

- (i) If the anticipated period of time to conduct an environmental review of such a long-term project would create a risk to public health, safety or welfare, or
- (ii) If activities (such as fire or catastrophic risk mitigation or modifications to improve facility integrity) are proposed for existing facilities in response to an emergency at a similar existing facility.

Given the amount of recent storm damage including shoreline erosion, land subsidence, gradual earth movements, and landslides, there is a high probability that further damage will occur within this corridor that jeopardizes the continued use of the existing railroad infrastructure.

To streamline the environmental process for the recommended maintenance activities proposed for potential reinforcement areas, it is recommended that a single, corridor-wide SE be utilized. This SE should identify the extent of the project corridor, Dana Point (MP 200.00) to San Clemente (MP 207.40), and list all potential improvements, including, but not limited to, placing riprap from the railroad ROW, constructing engineered revetment with riprap, and building catchment walls. The SE should specifically use language to include emergency actions that may be required within the corridor (see further discussion below). Alternately, an SE can be filed for individual potential reinforcement areas projects identified in this study.

If a federal nexus is established through a federal permit (such as a USACE permit) or federal funds are applied either entirely or in part by the federal government to any of the work in this corridor, the National Environmental Policy Act (NEPA) may apply. The NEPA Class of Action (Categorical Exclusion, Environmental Assessment, or Environmental Impact Statement) would be coordinated with and determined by the federal lead agency.

Regulatory Permitting Strategy

Potential reinforcement areas may also need to comply with other applicable federal, state, and local laws. All potential reinforcement areas identified above are located within the Coastal Zone Boundary. As such, all potential reinforcement areas require some level of coordination with the California Coastal Commission (CCC). Depending on the location and extent of potential improvements, USACE, Regional Water Quality Control Board (RWQCB), United States Fish

and Wildlife Service (USFWS), and California Department of Fish and Wildlife (CDFW) regulatory requirements, among others, may need to be addressed, as discussed below.

Coastal Development Permitting

All work proposed on tidelands, submerged lands, and other public trust lands must be coordinated with and potentially receive a permit from the CCC. In addition, activities authorized, funded, or carried out by the federal government that affect coastal zone resources must be reviewed by the CCC for consistency with the federally approved California Coastal Management Program, including the California Coastal Act (CCA) (PRC 30330, and 30400).

Coastal Development Permits (CDPs) are the regulatory mechanism by which proposed projects in the coastal zone comply with the policies of Chapter 3 of the CCA. Specifically, California Code of Regulations, Title 14 – Natural Resources, Section 13252 details repair and maintenance activities pertinent to this transportation corridor that require a CDP and including repair and/or maintenance of surface or subsurface structures. CDPs are required for any repair or maintenance to facilities or structures or work located in an environmentally sensitive habitat area, any sand area, within 50 feet of the edge of a coastal bluff or environmentally sensitive habitat area, or within 20 feet of coastal waters or streams that include the placement or removal of materials (including riprap, sand, etc.) or when the presence of mechanized equipment or construction materials is needed.

The executive director of the CCC has the discretion to exempt ongoing routine repair and maintenance activities of local governments, state agencies, and public utilities (such as railroads) involving shoreline works protecting transportation roadways per Cal. Code Regs. tit. 14 §13252 3(c)(e). Therefore, it is recommended as a first step that OCTA request an exemption from the Executive Director of the Commission for any maintenance work and/or work in all potential reinforcement areas.

If an exemption is not granted, a secondary option is to apply for a singular Ongoing Maintenance Activities Permit for the corridor, as allowable under Cal. Code Regs. tit. 14 § 13252 3(d). The CCC may issue a permit for maintenance activities for a term in excess of the two-year term provided by these regulations. Issuance of this permit may also require preparation of an associated CDP to address potential effects maintenance activities may have on natural/coastal resources. Therefore, it is recommended that OCTA prepare, process, and obtain Ongoing Maintenance Activities Permit for maximum time allowable, since this step is crucial to streamlining proactive prevention of damage to railroad infrastructure moving forward.

To move forward with discussions for this type of a Maintenance Activities Permit, it is recommended that OCTA request a pre-application meeting with Coastal Staff to discuss the preparation of a Maintenance Improvement Plan for the Reinforcement Areas that includes:

- Type of maintenance/improvement required (materials, quantities, etc.).
- Environmental footprint, including construction access, temporary, and permanent impact areas.
- Post-maintenance/improvement requirements (materials, quantities), where warranted.

- Drone footage and/or LiDAR for the corridor as proof of existing conditions for permitting purposes.
- Discussion of preparation of a CDP in support of this work.

It is also recommended that field surveys (Biological Resources, Aquatic Resources Delineation, and Cultural Resources) be completed for the corridor with the subsequent reports used for the support of the permitting process and mitigation.

There is an alternate option for CDP available for federal activities, development projects, permits and licenses, and/or support to state and local governments. The CCC has a Federal Consistency Unit that implements the Coastal Zone Management Act (CZMA) of 1972. All federal activities affecting the coastal zone must undergo a review for consistency with the CZMA process called a Consistency Determination for federal agencies activities and development projects or a Consistency Certification for federal permits and licenses, and/or federal funding to state and local agencies. This process is intended to allow for coordination among federal agencies, plus allowing the public an opportunity to participate in the process.

Clean Water Act Permitting

Depending upon the location(s) and extent of each proposed improvement and/or maintenance activity and their impacts to aquatic resources, Clean Water Act permitting may be required with the USACE and RWQCB or State Water Resources Control Boards (Water Boards). Permits for Section 404 of the Clean Water Act are addressed through USACE and may be covered under nationwide permits, such as Nationwide Permit 13 (NWP 13), which covers bank stabilization less than 500 feet in length solely for erosion protection, Regional Permits, which cover projects considered to have insignificant environmental impacts, or Individual Permits for projects with severe impacts with no practical alternative. Individual Permits may require environmental assessment under NEPA. Implementation of Section 401 of the Clean Water Act Water Quality Certification and Waste Discharge is delegated to the State Water Boards.

Porter-Cologne Water Quality Control Act

Depending upon the location(s) and extent of each proposed improvement and/or maintenance activity and their impacts to aquatic resources, the Porter-Cologne Water Quality Control Act may need to be addressed. The Porter Cologne Water Quality Control Act is the clean water act of California that expanded the enforcement authority of the Water Boards in California.

Lake and Streambed Alteration Agreement

If any portion of proposed improvement and/or maintenance activity is determined to substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake, per the CDFW Fish and Game Code Section 1602 a Streambed Alteration Agreement (SAA) may be needed.

Endangered Species

Depending upon the location(s) and extent of each proposed improvement and/or maintenance activity and their proximity to biological resources, state and or federally listed species may be

affected. Depending on the species and the presence of a federal nexus, consultation with USFWS and/or National Oceanic and Atmospheric Administration may be necessary in addition to CDFW to comply with the California Endangered Species Act (CESA).

Other Coordination

The California State Lands Commission (SLC) has jurisdiction of the landward boundary of “sovereign lands,” defined as the area between the ordinary high-water mark for tidal waterways and the ordinary low-water mark for navigable non-tidal waterways. The area between the ordinary low-water mark and the ordinary high-water mark at navigable non-tidal waterways are subject to the Public Trust Easement. As such, the location of improvements should be overlain with the Mean High Tide Line (MHTL) and early coordination should occur with the SLC to decide whether a lease is required to complete the activity.

Procedures for Emergency Response

Emergency Response Protocol

It is recommended that a coordination protocol be put into place between OCTA and Metrolink to streamline emergency responses, as follows:

- 1) Metrolink Maintenance identifies immediate emergency maintenance need within the corridor.
- 2) OCTA, Metrolink, and Professional Services Support meet to discuss scope of maintenance required and suggests the following level staff are included:
 - a. OCTA: Executive Leadership and staff.
 - b. Metrolink: Executive Leadership and Maintenance.
 - c. Professional Services Support: Engineering Lead(s), Geotechnical Lead(s), and support staff.
- 3) Metrolink notifies (i.e., via emails and/or telephone communications) OCTA and Professional Services Support the following information about the emergency response:
 - a. Type of maintenance activity (e.g., riprap placement).
 - b. Project limits.
 - c. Quantity of material import.
 - d. Type of construction equipment required.
 - e. Construction access requirements (rail, beach, etc.).
 - f. Proposed construction timeframe and whether the improvement is temporary or permanent.
 - g. Provide as-builts and plans as soon as available.
- 4) The team determines if environmental clearance or permitting is required and notifies agencies (if needed). Critical factors to consider include but are not limited to whether

maintenance locations are outside the railroad ROW and/or locations in the railroad ROW that have the potential to impact sensitive natural/coastal resources.

Emergency Environmental Clearance

If any of the key maintenance locations turns into an emergency, the SE for the corridor (recommended above in Environmental Clearance Strategy Section) should be leveraged for environmental clearance without the need for a new SE for each emergency location. Until a corridor-wide SE is in place, each location would require a new SE be filed for individual potential reinforcement areas projects identified in this study.

Emergency Regulatory Permitting

The CCC defines emergency work as "... generally a period of 24 to 72 hours after the emergency occurrence" If the Ongoing Maintenance Activities Permit, discussed above, is not yet in place at the time of the emergency, early coordination with the CCC and any other location-appropriate agencies should occur as soon as possible after the incident (and preferably prior to the repair) to assess the need for the following emergency permitting:

- CCC Emergency CDP, followed by a formal CDP application, potentially with mitigation included.
- USACE Regional General Permit (RGP) #63 and coordination with RWQCB:
 - RGP #63 provides for a rapid respond for protection activities in emergency situations, defined specifically by USACE when there is a "clear, sudden, unexpected, and imminent threat to life or property demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services (i.e., a situation that could potentially result in an unacceptable hazard to life or a significant loss of property if corrective action requiring a permit is not undertaken immediately).
- Section 401/Section 404/Porter Cologne Act/CDFW 1602/FESA/CESA.
- Coordination with SLC for MHTL and potential lease needed for emergency location(s).

Stockpiles of Materials Needed in Emergency

Stockpiles of armor stone (2– to 6-ton tons in size) should be established so that materials can be readily delivered to reinforcement and repair areas as needed. For existing riprap with direct wave attack (not including Cyprus Shore), stockpiled materials should be approximately 2 tons per foot length. Therefore, about 5,500 tons of stone should be prepared at the ready. This stone could be used for engineered revetment or riprap placement.

For emergent areas at developing reinforcement areas at the north end of Cyprus Shore, additional new armor stone will be needed and the amount will depend upon the design and length selected by OCTA for reinforcement. These areas may require about 10 tons per foot length.

Engagement of Stakeholders

There are a number of stakeholders that will be engaged throughout the life of the study to obtain input and feedback. OCTA is actively collaborating and soliciting input from stakeholders and interest groups to help inform and shape the short- and medium-term design concepts. OCTA will host listening sessions with the following groups, but are not limited to:

- Project Development Team (PDT).
- Stakeholder Working Group (SWG).
- Freight and Goods Movement.
- Coastal and Marine Habitat Community-Based Organizations.
- Emergency Responders.
- Major Employers, Key Destinations, and Other Business Interests.
- Residential Groups.
- Elected Officials Roundtable.
- General Public.

A listening session was held to present the draft monitoring and potential reinforcement areas to solicit feedback from key stakeholders and interest groups to understand how the solutions can coincide with and contribute to ongoing efforts to develop a resilient coastline.

Next Steps

The monitoring sites and the potential reinforcement areas identified within this technical memorandum should be studied further and advanced through the design, environmental, and permitting processes. Each project needs to be evaluated further and have a more detailed design developed, as well as have an environmental and permitting strategy developed so projects can be advanced to construction in a timely manner. The areas were identified based on the project team's research and field reconnaissance; however, the risk of additional coastal wave impacts, bluff instability impacts, and local erosion in other areas still exists with changing climate conditions and landscape.

The potential reinforcement areas will also need to be coordinated with key stakeholders such as the City of San Clemente, City of Dana Point, CCC, State Parks, SLC, Metrolink, BNSF, Amtrak, and others. This coordination will take place through outreach efforts to gather input and inform key stakeholders of improvements to the railroad corridor.

It is recommended that OCTA develop a Project Delivery Plan that expands on each of these recommended areas by developing an Alternatives Analysis and select a Preferred Alternative to advance to Project Acceptance and Environmental Document (PA/ED). Key stakeholders and permitting agencies should be engaged during this process. With concurrence, the projects should be advanced to Final Design and Construction. The Project Delivery Plan should also consider the potential for bundling projects together for greater efficiency.



Appendix B. Project Charter

PROJECT CHARTER

South Coast Rail Infrastructure Feasibility Study/ Alternative Concepts Analysis

DATE PREPARED: February 20, 2024

OBJECTIVE

This Project Charter will document the goals and objectives of the Coastal Rail Resiliency Study (CRRS). This document is the framework in developing the Purpose and Need for the CRRS. The CRRS will study a seven-mile stretch of the railroad corridor in south coastal Orange County from approximately milepost (MP) 200 to MP 207.4 with the main goal of protecting the rail line under its existing alignment. The approximate seven-mile study area (see Figure 1) includes the cities of Dana Point, San Clemente, and unincorporated portions of the counties of Orange and San Diego. The Project Charter will provide critical guidance to the Project Development Team (PDT), Stakeholder Working Group (SWG), and others to expedite and complete this phase of the study.

This study will address two main challenges. The first entails addressing the continuous beach loss on the west side of the railroad track; and the second involves contending with erosion/landslide issues on the east side of the track. The loss of beach on the west side has led to service disruptions and emergency projects which involved adding riprap to stabilize the railroad. Erosion/landslides on the east side of the track have also led to service disruptions and emergency projects to protect the integrity of the track. The concepts for future work are subject to environmental and coastal regulatory approvals consistent with California Environmental Quality (CEQA), National Environmental Policy Act (NEPA). This process will entail stakeholders' coordination and evaluating the feasibility of improvements that would make the railroad more resilient to unforeseen climate-related events up to the next 30 years. OCTA has been coordinating with the cities in the project area as well as regulatory/permitting agencies including California Coastal Commission, State Lands Commission, and the United States Army Corps of Engineers.

The study context should develop the basis for protecting the railroad in its current alignment while continuing to allow passenger train and freight movement, as well as maintaining availability for strategic military operations. As defined by the United States Department of Defense, the rail line between Los Angeles and San Diego is designated as a Strategic Rail Corridor Network, which consists of key railroad lines most important to national defense. The study area will include approximately 500 feet to the east and west of the existing LOSSAN Corridor, though longer-term considerations will likely extend beyond these limits. This study will take into consideration federal, state, and local sustainability planning efforts and incorporate elements of these plans, as appropriate.

BACKGROUND/PROJECT DESCRIPTION

Over the past several years, storm surges, combined with several other environmental

factors including sea level rise and bluff erosion, have damaged the Los Angeles-San Diego-San Luis Obispo Rail Corridor (LOSSAN Corridor) and adjacent infrastructure. The LOSSAN Corridor is the second busiest rail corridor in the nation. This has resulted in increased required maintenance and emergency repair measures to stabilize the infrastructure. The emergency repairs have also involved substantial service disruptions and delays, and significant cost to OCTA and the state. To minimize further unexpected disruptions to rail service, OCTA prepared an Initial Assessment (site conditions between November 2023 and January 2024) of the seven-mile stretch of the railroad to identify and assess next steps for the most critical segments of the rail line. This effort resulted in identification of sites that required monitoring and in need of immediate reinforcement actions. Immediately following the assessment period, one of the identified sites experienced a substantial slope failure and led to the closure of the railroad in late January 2024. Therefore, this underscores the urgency that reinforcement actions are required. It is important to note the railroad has experienced an unprecedented number of service disruptions over the last several years, as compared to disruptions that generally occur once every several decades in the past.

In addition to the Initial Assessment timeframe to address immediate needs (0 to 5 years) to protect the rail line, the focus of the CRRS will be on the short- (5 to 10 years) and medium-terms (11 to 30 years). Evaluation criteria will be developed with stakeholder input to establish a framework to vet and develop a set of viable Alternative Concepts (AC) along with the associated design geometric concepts that will address coastal rail protection.

This feasibility study will support the development of partnerships and assist in directing priorities for future rail planning efforts, including potential project-level preliminary engineering and environmental analysis.

The following objectives are key to the success of this study:

- Develop the study's purpose and need to help guide short-term and medium-term decision making.
- Identify and assess the most critical segments of the seven-mile stretch of the railroad to determine if immediate actions are warranted to mitigate risk of additional service disruptions (i.e. Initial Assessment - 0 to 5 years).
- Assess existing and future risks, issues, and challenges with the maintenance and operation of rail services along the existing LOSSAN Corridor alignment in the study area.
- Assess and identify short- (5 to 10 years) and medium-term (11 to 30 years) solutions to address the seven-mile segment of the LOSSAN rail corridor.
- Conduct listening sessions with a multitude of stakeholders to better understand their views.
- Identify and engage key stakeholders at the local, state, and federal levels.
- Seek the advice of a panel of experts on potential solutions as well as the root causes of the issues.

- Develop partnerships with stakeholders and work collaboratively to identify, advance, and implement immediate, and short- and medium-term solutions along the LOSSAN Corridor within the study area.
- Assess and compare potential project alternatives for compliance with the local jurisdiction's City policies and on-going Local Coastal Plan.
- Prepare a preliminary geotechnical report that will help to guide the assessment of the Alternative Concepts (ACs).
- Analyze and include as part of this analysis past and current beach sand profiles.
- Assess and report on potential impacts of the ACs to local resources, facilities, and utilities for the cities of Dana Point and San Clemente.
- Assess recreational impacts such as effects on surfing, multi-use path, California State Parks, and swimming resources.
- Identify up to six (6) ACs and develop strategies for the LOSSAN Corridor within the study area.
- Conduct a preliminary environmental analysis on the initial set of ACs and refine them.
- Identify the core elements for an emergency maintenance and operation deployment plan in the event of future incidents.
- Develop an action plan for implementation of the recommended short- and medium-term improvements as well as a framework and action plan for identifying potential long-term improvements. Identify follow-up activities and recommend coordination with existing projects along the LOSSAN corridor, as appropriate.

PUBLIC OUTREACH

This study will solicit the input of a multitude of stakeholders and forge partnerships with other entities and agencies. Listening sessions will be held to gather collaborative input from key stakeholders in various public and private sectors. Listening sessions are the initial public outreach milestone and seek to:

- Identify key stakeholders
- Share expectation to maintain in-place the existing coastal rail line and minimize passenger and freight service disruptions for up to 30-years
- Assess vulnerabilities and issues of concern
- Identify potential opportunities to further enhance collaboration
- Document feedback

Listening session attendees participated in a facilitated discussion regarding potential reinforcement areas, rail corridor resilience and service disruptions, ways to enhance communication and ideas to enhance railroad stability.

Listening sessions were conducted with the PDT, SWG, Major Employers/Business Interests, Freight and Goods Movement, Emergency Responders, Coastal and Marine Habitat Community Based Organizations, residential groups, the public and local, state, and federal elected officials.

Stakeholder engagement will continue intermittently throughout the CRRS study at key milestones including but not limited to initial concept development, refinement of concepts, and development of the draft feasibility study report.

The PDT members would include staff or representatives from, but are not limited to: OCTA, Metrolink, LOSSAN/Amtrak, Caltrans, BNSF, and the cities of San Juan Capistrano, San Clemente, and Dana Point, County of Orange (including Orange County Board of Supervisor – District 5, Orange County Parks, and Orange County Flood Control District).

The SWG members would include the PDT with additional members from:

- Federal agencies: United States Army Corps of Engineers, United States Fish and Wildlife Service, Federal Railroad Administration (FRA), Federal Transit Administration, Surface Transportation Board, United States Marine Corps, etc.
- State agencies: California State Parks, California Coastal Commission (CCC), California Department of Fish and Wildlife, San Diego Regional Water Quality Control Board, State Lands Commission, etc.

The Community Stakeholder Roundtable would include representatives from:

- Non-governmental organizations: homeowners associations, environmental organizations, community-based organizations, etc.

The Elected Roundtable would include but not limited to local, state and federal elected officials and staff.

- OCTA Board of Directors, Orange County Board of Supervisors, U.S. Senate, U.S. House of Representatives, California State Assembly, California State Senate, LOSSAN Board of Directors, etc.

The Panel Expert members would include the following specialties:

- Geology
- Seismology
- Oceanography
- Coastal Resilience
- Climate Change

DRAFT

Coastal Rail Infrastructure Resiliency Project Project Location

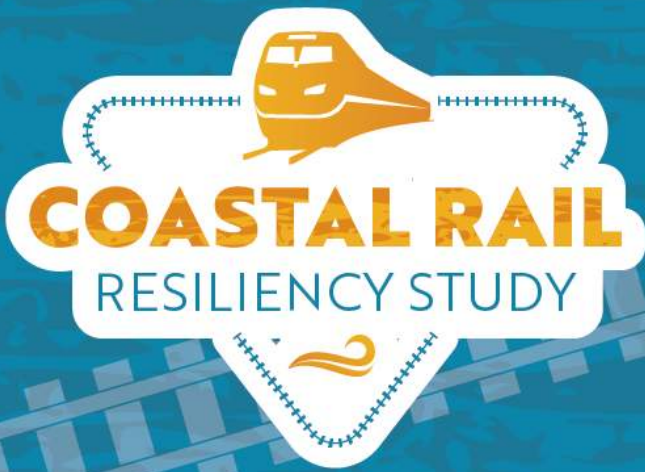


6/28/2023

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Appendix C. Community Engagement Report



Community Engagement Summary Report

June 2026

Prepared for: Orange County Transportation Authority (OCTA)
550 South Main Street
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Orange, CA 92863-1584



Prepared by: Arellano Associates
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Detailed engagement documentation, including full meeting summaries, presentation materials, and outreach records, is maintained separately from this report and available upon request.

Referenced Engagement Documents

- CRRS Listening Sessions Summary Report (2024)
- CRRS Public Meetings Summary Report – July 2025
- CRRS Public Meetings Summary Report – October 2025
- CRRS Public Meetings Summary Report – August 2026 (upon completion)

Executive Summary

The Orange County Transportation Authority (OCTA) conducted a multi-phased community engagement program to inform the Coastal Rail Resiliency Study (CRRS), which evaluates strategies to protect the coastal rail corridor for the next 30 years while maintaining reliable passenger and freight operations.

Engagement was designed to reach corridor communities, stakeholders, and partner agencies early and throughout the study process. Activities included stakeholder listening sessions and multiple rounds of public meetings, supported by bilingual outreach through digital, print, and direct notification methods. Across all phases, engagement emphasized accessibility, transparency, and opportunities for both verbal and written input.

What We Heard

Community and stakeholder input was consistent across engagement phases. Participants expressed strong support for beach nourishment and nature-based approaches, emphasizing the importance of maintaining sandy beaches as both a protective buffer and a valued community asset. Coastal access, recreational use, and preservation of the coastal environment were identified as key priorities.

At the same time, stakeholders raised concerns about the potential impacts of hard shoreline protection structures, including beach loss, reduced access, and long-term environmental effects. Many participants also emphasized the need for long-term, sustainable solutions that address underlying coastal processes, including sediment supply and shoreline change.

How Input Shaped the Study

Public input directly informed the development and evaluation of alternative concepts. In response to community priorities, beach nourishment was incorporated into all shoreline protection concepts, and a beach nourishment-only concept was added to evaluate a nature-based approach as a standalone strategy.

Community feedback also influenced the evaluation framework. Criteria related to public access, environmental impacts, and consistency with community and regional priorities were given increased weight, ensuring that community considerations were integrated alongside technical and cost factors.

In addition, shoreline protection concepts that did not include beach nourishment were not advanced, as they were inconsistent with community preferences and broader planning considerations.

Outcome

The engagement process helped shape a refined set of alternatives that balance engineering feasibility with community priorities. While technical analysis identified constraints related to constructability, permitting, and long-term performance, community input played a key role in ensuring that the alternatives reflect local values related to coastal access, recreation, and environmental stewardship.

The Final Community Engagement Report documents this process and demonstrates how input from stakeholders and the public informed the CRRS, supporting the development of feasible, community-informed solutions for the coastal rail corridor.

1. Engagement Overview

The Coastal Rail Resiliency Study (CRRS) engagement program was designed to inform corridor communities and stakeholders, gather meaningful input, and support development of community-informed resilience strategies for the coastal rail corridor. Engagement occurred throughout the study process and included stakeholder listening sessions, public meetings, and bilingual outreach using both traditional and digital communication methods. Input received through these efforts helped inform refinement of alternative concepts and elements of the study evaluation framework.

1.1 Community Engagement Approach

A coordinated, bilingual (English/Spanish) outreach program was implemented to inform corridor communities and stakeholders, encourage participation, and provide multiple opportunities for input throughout the study.

Engagement combined direct stakeholder outreach with broad public notification using both traditional and digital methods. Outreach activities included stakeholder email invitations and reminders, e-blasts, social media outreach, newspaper advertisements, postcard mailings, community flyer distribution, press releases, and project webpage updates. A bilingual outreach toolkit was also shared with Project Development Team members and partner organizations to help expand awareness through their respective networks.

Engagement opportunities were provided in both in-person and virtual formats, with Spanish interpretation available at public meetings. Participants were able to provide verbal and written input throughout the study process.

Table 1 - Engagement Methods Summary

Outreach Method	Description / Reach
E-blasts	Distributed to stakeholder database; contact list grew to 900+ subscribers

Outreach Method	Description / Reach
Social Media	Paid and organic outreach across Facebook, Instagram, and X in English and Spanish
Newspaper Advertising	Ads placed in San Clemente Times and Dana Point Times
Direct Mail	Bilingual postcards mailed to corridor-adjacent properties
Community Flyers	Distributed at community centers, libraries, schools, and city facilities
Door-to-Door Outreach	Conducted for bluff resident listening session
Press Releases	Issued prior to public meeting rounds
Outreach Toolkit	Shared with partner agencies and PDT members to expand reach

1.2 Listening Sessions Overview

OCTA conducted 11 listening sessions between January and May 2024 to gather input from agencies, stakeholder groups, businesses, advocacy organizations, residents, and elected officials. The sessions were intended to identify concerns, understand corridor vulnerabilities, and inform concept development early in the study process.

Several listening sessions included discussion of OCTA’s Initial Assessment and related stabilization efforts, as stakeholders sought to understand the distinction between immediate actions being taken to address vulnerable corridor locations and the CRRS’s longer-term focus on evaluating resilience strategies for the next 30 years.

Table 2 - Listening Sessions Stakeholder Participation Summary

Stakeholder Group	Format	Participants
Agencies and Rail Partners	Virtual / Hybrid	53
Businesses and Freight Interests	Virtual	16
Emergency Responders	Virtual	4
Coastal and Environmental Organizations	Hybrid	34
Residential and Bluff Communities	Virtual / In-Person	324
Elected Officials	In-Person	23
Total		431

1.3 Public Meetings Overview

OCTA conducted three rounds of public meetings in 2025 to present draft and refined alternatives, gather community feedback, and share evaluation results and next steps. Meetings were conducted in both in-person and virtual formats, with Spanish interpretation available at each session. A final round of public meetings is planned for August 2026 to gather feedback on the Draft Feasibility Study Report prior to finalization.

Table 3 - Public Meeting Participation Summary

Public Meeting Round	Focus	Participation
Round 1 – July 2025	Draft alternative concepts	150
Round 2 – October 2025	Refined alternatives and evaluation results	74
Round 3 – August 2026	Draft Feasibility Study Report	TBD

2. Key Community and Stakeholder Input

Community and stakeholder input throughout the Coastal Rail Resiliency Study (CRRS) was consistent across engagement phases and stakeholder groups, with several key themes emerging.

2.1 Nature-Based Solutions and Beach Nourishment

Participants expressed strong support for beach nourishment as a primary strategy to address coastal erosion and protect the rail corridor. Many stakeholders emphasized the importance of maintaining sandy beaches as a natural buffer while also preserving their environmental and recreational value.

2.2 Coastal Access and Recreation

Stakeholders consistently highlighted the need to maintain safe, continuous access to beaches, coastal trails, and recreational areas. Protecting the usability and connectivity of these resources was identified as a critical priority for the surrounding communities.

2.3 Shoreline Protection Concerns

Participants raised concerns about the potential impacts of shoreline protection structures such as riprap, revetments, and seawalls. These concerns focused on beach narrowing, reduced access, and potential long-term environmental effects.

2.4 Long-Term Resilience and Sustainability

Community members and stakeholders expressed interest in solutions that address the underlying drivers of coastal erosion, including sediment supply and shoreline dynamics. There was also interest in exploring regional and watershed-based strategies to improve long-term coastal resilience.

2.5 Transparency and Ongoing Engagement

Participants emphasized the importance of clear communication, transparency in decision-making, and continued opportunities for input as the study progresses.

3. How Community Input Influenced the Study

Community and stakeholder input played a meaningful role in shaping the development, evaluation, and refinement of alternative concepts in the CRRS. Feedback was incorporated throughout the study and influenced the alternatives considered and the framework used to evaluate them.

3.1 Refinement of Alternative Concepts

Public input directly informed the evolution of beachside concepts. In response to strong community preference for nature-based approaches, beach nourishment was incorporated into nearly all shoreline protection alternatives to provide both coastal resilience and community benefits.

A beach nourishment-only concept was also introduced to reflect stakeholder interest in evaluating a standalone nature-based strategy. In addition, input related to sediment supply and coastal processes contributed to the inclusion of watershed modification concepts to explore long-term opportunities for improving sand availability.

3.2 Integration into Evaluation Framework

Community priorities were incorporated into the screening and evaluation process. Criteria related to public access, environmental impacts, and consistency with community and regional priorities were elevated in importance.

As a result, the categories *Public Assets and Environmental Impacts* and *Related/Planned Projects* together account for 20 percent of the total evaluation weighting, ensuring that community considerations were meaningfully reflected alongside technical, cost, and constructability factors.

3.3 Modification and Elimination of Alternatives

Community input contributed to the decisions about which concepts advanced through the screening process. For example, shoreline protection approaches without beach nourishment were not carried forward.

At the same time, the evaluation process balanced public input with technical feasibility, permitting requirements, and long-term performance. For example, while a sand-only approach was strongly supported, technical analysis identified challenges in achieving the study's 30-year reliability objectives without recurring beach nourishment, including substantial long-term commitments for sand sourcing, placement, monitoring, permitting, and funding. The shortlisted beachside alternative concepts include a one-time beach nourishment component, reflecting its high priority within the community.

3.4 Alignment with Implementation Considerations

Stakeholder input reinforced the importance of aligning potential solutions with regulatory requirements, environmental considerations, and regional planning efforts. This helped ensure that the refined alternatives reflect both community priorities and the practical realities of implementation.

4. CONCLUSION

The Coastal Rail Resiliency Study community engagement program was designed to inform, engage, and gather feedback from a broad range of communities, stakeholders, and partner agencies throughout the study process. Through listening sessions, public meetings, and ongoing outreach, OCTA created opportunities for meaningful dialogue regarding the future of the corridor.

As the study progressed, community and stakeholder input helped shape the refinement and evaluation of alternative concepts, resulting in a set of alternatives that balance the need to protect the rail line as a vital passenger, freight, and defense transportation asset while also reflecting community priorities related to beach preservation, coastal access, recreation, and environmental stewardship. Input from community members, advocacy organizations, and state and federal resource agencies contributed to the incorporation of beach nourishment and other community-benefit considerations into the alternatives evaluated through the study.

The process demonstrates how technical analysis, regulatory considerations, and community values can be integrated to support informed decision-making. The resulting alternatives provide a foundation for advancing rail resiliency while preserving the coastal resources and public amenities that are important to the communities served by the corridor.



Appendix



Appendix A

A.1 Fact Sheet

A.2 FAQ

A.3 Public Meeting Flyer

A.4 Postcard Mailer

A.5 E-blast Example

A.6 Social Media Example

A.7 Press Release Example

A.8 Newspaper Advertisement Example

ORANGE COUNTY COASTAL RAIL RESILIENCY STUDY



OCTA is evaluating strategies to ensure uninterrupted rail operations in south Orange County.

AT A GLANCE

- FUNDING:** \$2 million+
(Surface Transportation Block Grant Program & Measure M2)
- CONTACT:** Chris Boucly
Senior Department Manager
Public Outreach
(714) 560-5326
CRRS@octa.net
- WEBSITE:** OCTA.net/CRRS

Fact Sheet Updated 6/18/25

STUDY OVERVIEW

OCTA is studying rail challenges in south Orange County to assess existing and future environmental risks and issues with operations and maintenance along the Los Angeles – San Diego – San Luis Obispo (LOSSAN) Rail Corridor. The study will evaluate strategies to address these challenges.

OCTA owns 40+ miles of rail between the cities of San Clemente and Fullerton. This vital link in the 351-mile LOSSAN Rail Corridor is the second busiest passenger rail corridor in the nation and annually carries more than \$1 billion in freight throughout Southern California. Between Los Angeles and San Diego, the line is designated as a Strategic Rail Corridor Network by the Department of Defense due to its connectivity with military bases and major ports.

Near heavily populated and built-out residential and commercial areas, this rail line is vulnerable to catastrophic failure due to changing environmental conditions and coastal erosion, rendering passenger rail service inoperable for extended periods. Service suspension has occurred multiple times over the last several years, underscoring the importance of addressing the vulnerability of the railroad.

STUDY OBJECTIVES

The Coastal Rail Resiliency Study (CRRS) will evaluate strategies to protect the railroad in place for up to 30 years and ensure uninterrupted rail operations while minimizing passenger and freight service disruptions. It will include a detailed analysis of seven miles of critical coastal rail corridor between Dana Point and San Clemente up to the San Diego County line (map of study area on reverse).

Key milestones include conducting an initial assessment to identify and evaluate locations at immediate risk; establishing evaluation criteria to vet potential alternative concepts; developing these concepts, and ultimately, presenting draft and final feasibility study reports.

A separate long-term study will look at potential rail line relocation to an inland alignment between San Juan Capistrano and San Onofre State Beach. Given the potential magnitude of this effort, it will require the involvement of state and federal agencies. Discussions are underway to determine which agency is best positioned to lead that effort.

PUBLIC INVOLVEMENT

Public involvement is a critical study component and fundamental to shaping its outcome. Initial listening sessions with stakeholders took place in 2024. Additional stakeholder and public meetings will continue through the end of the study.

STUDY MILESTONES



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P.O. Box 14184
Orange, CA 92863-1584
(714) 560-OCTA
www.octa.net

ORANGE COUNTY COASTAL RAIL RESILIENCY STUDY



Frequently Asked Questions (FAQ)

STUDY BACKGROUND

What is the Coastal Rail Resiliency Study (CRRS)?

OCTA is studying challenges in south Orange County to assess existing and future environmental risks to passenger rail operations and maintenance along the Los Angeles – San Diego – San Luis Obispo (LOSSAN) Rail Corridor. The Study will develop and evaluate alternative concepts that can be applied to the bluffs, beaches, and rail infrastructure components along the coastal segment of the corridor.

What is the purpose of the Study?

Near heavily populated and built-out residential and commercial areas, rail service operates along a 7-mile stretch of beach in South Orange County. This portion of the LOSSAN Rail Corridor is affected by changing environmental conditions and coastal erosion, which has rendered passenger rail service inoperable for extended periods. Service has been suspended multiple times over the last several years, underscoring the importance of the Study.

What are the Study objectives?

The Study will evaluate alternative concepts to protect the railroad in place for up to 30 years to help minimize interruptions to passenger and freight rail operations. The Study will include a detailed analysis of seven miles of vulnerable coastal track stretching between Dana Point-San Clemente south to the San Diego County Line.

Key milestones include establishing evaluation criteria to vet potential alternative concepts to protect the rail line; developing these concepts; and ultimately presenting draft and final feasibility study reports. Feedback from the public and other stakeholders will be solicited at multiple milestones during the Study and integrated in the course of its development.

Who is leading this Study and what is the coordination with other agencies?

OCTA is leading the Study to protect the existing railroad in place. OCTA is assessing the feasibility of the alternative concepts at a high-level. The concepts will be further refined and developed upon the completion of this Study as a part of a comprehensive coastal capital program.

Who uses this corridor and why is this rail corridor important?

This segment of the 351-mile LOSSAN Rail Corridor is a vital transportation link that supports daily commuters and travelers, plays an essential role in national defense, and serves as a key BNSF freight line.

The South County portion of the LOSSAN Rail Corridor also has a diverse range of interests and stakeholders, including multiple federal, state, and local agency jurisdictions, residential and business property owners. The area has significant coastal habitat and serves millions of recreational users and tourists each year.

The LOSSAN Rail Corridor is the second busiest passenger rail corridor in the nation and annually carries more than \$1 billion in freight throughout Southern California. Between Los Angeles and San Diego, the line is also designated as a Strategic Rail Corridor for national defense.

FUNDING AND SCHEDULE

How is the Study funded?

The Study is funded by the federal Surface Transportation Block Grant Program and through OCTA's local half-cent sales tax for transportation improvements – Measure M2.

What is the Study schedule?

The Study began in Fall 2023 and the Final Feasibility Study Report is scheduled for completion in Summer 2026.

ENVIRONMENTAL IMPACTS

What is causing coastal erosion in San Clemente?

Coastal erosion in San Clemente is caused by multiple factors including lack of sand supply and slope failure. The erosion has become an all-too-familiar story in recent years along Southern California's coast, with shrinking beaches and unstable slopes bringing nearby infrastructure – homes, roads, railways, utilities – much closer to the ocean tides.

For more information on sea-level rise, please see the City of San Clemente's [Sea Level Rise Vulnerability Assessment](#).

ORANGE COUNTY COASTAL RAIL RESILIENCY STUDY

What coastal infrastructure will be impacted by changing environmental conditions and sea-level rise along the coastal rail corridor?

Coastal erosion is threatening south Orange County's coastline, and the effects have become more severe in recent years. The railroad track, homes along the coast, and recreational facilities on the beaches are facing increased risk. Passenger rail service has been suspended on multiple occasions between Orange and San Diego counties for several months as crews conducted emergency repairs caused by beach erosion in San Clemente.

What has OCTA done to protect the tracks in San Clemente?

OCTA and Metrolink have completed four emergency projects to protect the railroad track in San Clemente as a result of coastal erosion and slides from private and city property above the track making it unsafe to operate passenger rail service.

The projects include:

- Installing ground anchors into a slope adjacent to the private Cyprus Shore community. The sliding slope created destabilizing track movement. The project cost approximately \$21.7 million, and OCTA secured funding from state and federal sources to fund the project (Figure 1).



Figure 1: Cyprus Shore

- Constructing a \$6 million temporary barrier wall below the City of San Clemente-owned Casa Romantica Cultural Center and Gardens where a landslide from the City's property forced debris onto the track making it unsafe to operate passenger rail service. The project was funded with state and local dollars (Figure 2).



Figure 2: Casa Romantica

- A catchment wall was constructed at Mariposa Point in San Clemente where a private property landslide caused a City of San Clemente-owned bridge to collapse and forced debris onto the track making it unsafe to operate passenger rail service. The approximately \$9.2 million project was funded by the state (Figure 3).



Figure 3: Mariposa Point

- Restored existing degraded riprap protection between MP 203.80–203.90 and MP 204.00–204.40 to the tracks. The work addressed ongoing wave damage and beach erosion that has resulted in overall riprap loss from the standard design section, over-steepened slopes, unstable stones, exposure of the rail embankment to wave action, and overall degradation in protective capacity to the rail embankment in San Clemente, California. OCTA restacked and repositioned existing riprap that had fallen out of section and had become over-steepened. OCTA also installed approximately 5,895 tons of rock between the track and typical toe of slope within the railroad ROW to repair the track embankment (Figure 4).



Figure 4: Area 1 and 2

Does operation of trains exacerbate the erosion or landslide potential of coastal bluffs?

The railroad has been in operation for over 130 years and there is no evidence to suggest that operating trains causes bluff erosion or landslide activity. Bluff erosion and landslide activity in the area is associated with steep slopes, unfavorable geologic conditions, surface runoff and groundwater saturation.

The protection of the rail line provides a buffer between beach erosion and inland private properties. The challenges on the inland side of the rail line will remain, unless the surface erosion and groundwater-associated issues are addressed.

ORANGE COUNTY COASTAL RAIL RESILIENCY STUDY

None of the recent landslides at Cyprus Shores, Casa Romantica, or the Mariposa Pedestrian Trail were associated with vibrations from trains traveling through the area. In addition, rail service has been stopped and restarted at

each of these locations without any correlation between movements on any of the landslides. This data has been verified with measurements taken in real-time using both below ground and surface motion sensors, which provide a continuous stream of data. These sensors indicated correlations between slope movement and rainfall as well as tidal cycles. The sensors did not indicate any landslide movements associated with rail operations. Therefore, the data does not support claims that train vibrations activate or exacerbate landslides.

Why isn't OCTA monitoring vibration and moisture content along the bluffs in San Clemente? Is that something you should understand to predict landslides?

Recognizing that the bluffs are generally outside of OCTA's right-of-way, we are limited in our ability to conduct activities on property outside of our control. It is clear the bluffs contain persistent groundwater flow demonstrated by naturally occurring springs visible along the entire alignment. Because of this, monitoring groundwater would not provide actionable data to predict exact landslide locations that would potentially impact rail service. There is no evidence or correlation of train movements causing vibrations significant enough to contribute to activating landslides in this corridor (see previous detailed answer).

NEIGHBORING AND PAST STUDIES

What are examples of studies and work that have been completed so far?

There are many local, regional and state projects that have come before this Study, each providing context and understanding to various aspects and challenges. A few projects and studies that will help inform the process ahead are:

- San Diego Association of Governments (SANDAG) Del Mar Rail Realignment (ongoing) – assessing the conditions and options to continue rail service in San Diego County.
- OCTA's San Clemente Track Protection Project (2023) – included installation of a temporary barrier wall in response to an adjacent landslide.
- San Clemente Coastal Resiliency Plan (2021) – to assess how sea-level rise and sand erosion will impact the coastal town.
- OCTA's Rail Infrastructure Study Defense Against Climate Change (2020) – an early study to assess the potential effects of climate change on OCTA's rail corridor.

- City of Dana Point Sea Level Rise Vulnerability Assessment (2019) – to assess City's vulnerability of infrastructure, land uses, and coastal resources in the Dana Point coastal zone.
- City of San Clemente Sea Level Rise Vulnerability Assessment (2019) – to assess City's vulnerability of infrastructure, land uses, and coastal resources in the San Clemente coastal zone.
- OC Sand Compatibility Use Program (2017) – recommended policy and action to promote the availability of upland sand sources for beach nourishment to guide the formulation of Orange County's opportunistic beach nourishment program.
- OC Coastal Regional Sediment Management Plan (2013) – information to develop policies and/or execute management sub-plans to restore and preserve the future vitality of Orange County beaches and coastal areas.

SAND SOURCE, VIABILITY, AND MANAGEMENT

Why isn't sand only sufficient to provide protection for the railroad?

Sand only is being considered as an alternative concept, however the protection offered by sand diminishes over time. Sand nourishment projects typically require replenishment cycles to replace the sand that erodes and is redistributed along the shore, which requires perpetual cost to monitor and maintain. While OCTA is supportive of a regional solution to bring more sand back to South County beaches, the LOSSAN Rail Corridor is a strategic and critical rail network that cannot afford to be disrupted. A sand-only solution may not provide the desired design life to protect the crucial asset under extreme erosion or storm conditions without significant planned maintenance and/or placement of large sand volumes that may not be permissible due to recreational and environmental impacts.

What are the differences between the United States Army Corps of Engineers (USACE) and California Coastal Commission (CCC) agency objectives regarding sand management approaches?

The USACE's objectives are to keep navigational channels clear, provide shoreline protection to avoid and minimize aquatic resource losses, and allow for commerce to travel. The CCC's primary objectives are to preserve public access to the coast, enhance coastal access where possible, conserve natural resources within the Coastal Zone, and plan for long-range coastal development.

ORANGE COUNTY COASTAL RAIL RESILIENCY STUDY

Why is armoring structure preferred to protect the railroad? How does the armoring structure protect against wave action that can damage the railroad?

Armoring provides key protection and stability to the railroad as the last line of defense. We plan on pairing the armoring with sand nourishment, however the sand is subject to higher erosion and lateral transport, and therefore the armoring is required to protect and stabilize the track embankment. Seawalls are an alternative armoring structure that provide last line of defense to the railroad with a smaller beach footprint.

The railroad track embankment is built of porous ballast, which is naturally draining. The armoring is designed to be interlocking with voids, which allows for good drainage and energy absorption which reduces erosive forces on the railroad. Armoring is durable and cost effective with its ability to withstand harsh environmental conditions, making it suitable for the railroad as it requires minimal maintenance.

PUBLIC PARTICIPATION

How can the public provide input on the Study?

Stakeholders will have a number of opportunities to learn about the evolving alternative concepts and provide input throughout the Study. A series of Listening Sessions were held in 2024 with a variety of interest groups including a series of public meetings to learn from a broad and diverse range of key stakeholders and interested parties. Additional public meeting opportunities will occur throughout the Study in the development of a draft and final study report.

How can I get involved?

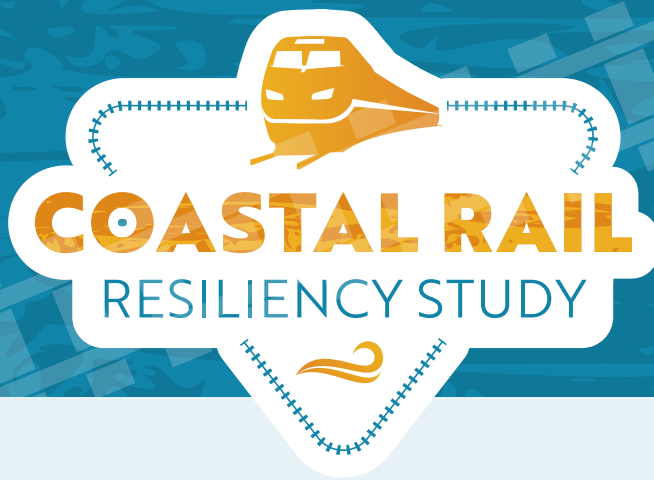
Public participation and engagement will be ongoing throughout the Study development. Please sign-up to receive Study updates at OCTA.net/CRRS.

Who do I contact with Study questions?

Please direct public comments and inquiries to OCTA's Senior Public Outreach Department Manager, Chris Boucly, either via email at cboucly@octa.net or by phone at (714) 560-5326.



Orange County Transportation Authority
550 S. Main Street
P.O. Box 14184
Orange, CA 92863-1584
(714) 560-OCTA
www.octa.net



Join our public meetings and share your input!

The Orange County Transportation Authority (OCTA) recently initiated the Coastal Rail Resiliency Study (CRRS). The train tracks between Dana Point and the county line are used for travel by commuters, tourists, goods movement and the Department of Defense.

The CRRS is exploring solutions to protect approximately seven miles of coastal railroad in place for up to 30 years.

We want to hear from you!

Join our virtual and/or in-person public meetings to learn more about the study and provide your input. The same information will be presented at each meeting.

Public Meeting #1 (Virtual)

Thursday, April 11, 2024

5:00 – 6:30 p.m.

Zoom Link: <https://bit.ly/CRRS-PublicMtg1>

Webinar ID: 871 3383 6211

Call-in: +1 (669) 900-6833

Public Meeting #2 (In Person)

Thursday, May 30, 2024

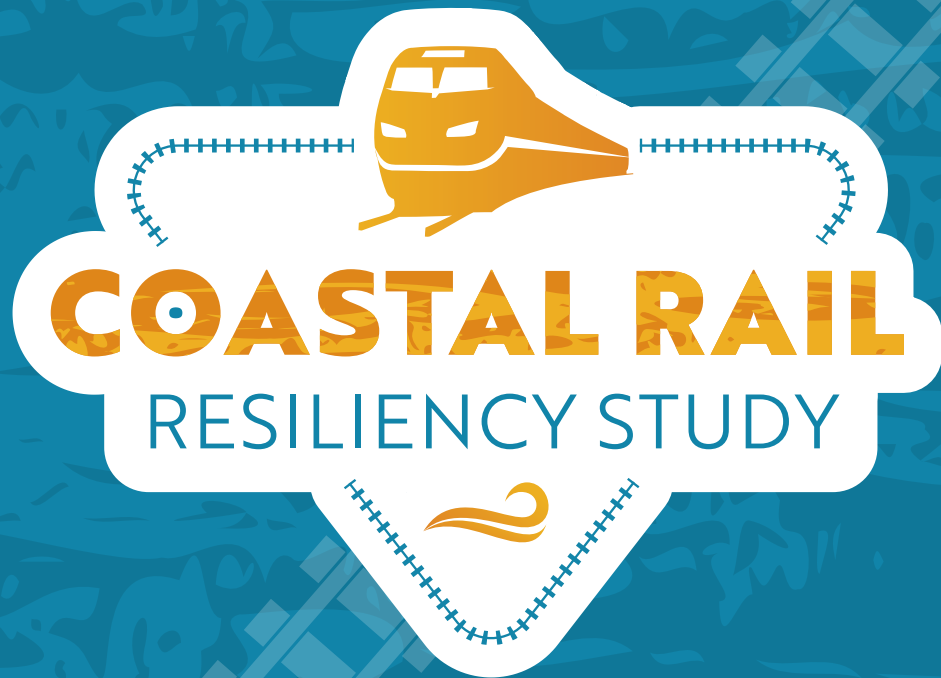
5:00 – 6:30 p.m.

San Clemente City Hall

910 Calle Negocio, San Clemente, CA 92673

Spanish interpretation will be available at both meetings. Special accommodations and additional interpretations are available by calling 714-636-7433. Requests must be made at least 72 hours in advance of a scheduled meeting.





Scan to sign up for updates!
!Escanee para inscribirse y recibir notificaciones!

Join our public meetings and share your input!

The Orange County Transportation Authority (OCTA) recently initiated the Coastal Rail Resiliency Study (CRRS). The train tracks between Dana Point and the county line are used for travel by commuters, tourists, goods movement and the department of defense.

The CRRS is exploring solutions to protect approximately seven miles of coastal railroad in place for up to 30 years.

¡Participe en nuestras reuniones públicas y comparta su opinión!

La Autoridad de Transporte del Condado de Orange (OCTA) inició recientemente el Estudio de Resiliencia del Ferrocarril Costero (CRRS). Las vías del tren entre Dana Point y la línea del condado son utilizadas por viajeros, turistas, movimiento de mercancías y el departamento de defensa.

El CRRS está explorando soluciones para proteger aproximadamente siete millas de ferrocarril costero por hasta 30 años.

We want to hear from you!

Join our virtual and/or in-person public meetings to learn more about the study and provide your input. The same information will be presented at each meeting.

Public Meeting #1 (Virtual)

Thursday, April 11, 2024

5:00 – 6:30 p.m.

Zoom Link: <https://bit.ly/CRRS-PublicMtg1>

Webinar ID: 871 3383 6211

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Spanish interpretation will be available at both meetings. Special accommodations and additional interpretations are available by calling 714-636-7433. Requests must be made at least 72 hours in advance of a scheduled meeting.

¡Queremos escuchar su opinión!

Participe en nuestras reuniones públicas virtuales y/o en persona para obtener más información sobre el estudio y dar su opinión. La misma información se presentará en cada reunión.

Reunión pública #1 (Virtual)

Jueves, 11 de abril de 2024

5:00 a 6:30 p.m.

Enlace de Zoom: <https://bit.ly/CRRS-PublicMtg1>

ID del seminario web: 871 3383 6211

Por teléfono en español: +1 (571) 317-3112

Código de acceso: 625-161-933

Reunión pública #2 (En persona)

Jueves, 30 de mayo de 2024

5:00 a 6:30 p.m.

San Clemente City Hall

910 Calle Negocio, San Clemente, CA 92673

Habrá interpretación en español en las dos reuniones. Adaptaciones especiales e interpretaciones adicionales están disponibles llamando al 714-636-7433 por lo menos 72 horas antes de cada reunión.



Orange County Transportation Authority
c/o Arellano Associates
5851 Pine Avenue, Suite A
Chino Hills, CA 91709



Jessica Rangel

From: Orange County Transportation Authority <crrs@projectinfo.ccsend.com>
Sent: Tuesday, April 9, 2024 10:05 AM
To: Jessica Rangel
Subject: Reminder: Join us for a Virtual Public Meeting on 04/11!



[Español](#)

Dear Community Member/Stakeholder:

The Orange County Transportation Authority (OCTA) recently initiated the Coastal Rail Resiliency Study (CRRS). The train tracks between Dana Point and the county line are used for travel by commuters, tourists, goods movement and the department of defense. The CRRS is exploring solutions to protect approximately seven miles of coastal railroad in place for up to 30 years. ***We want to hear from you! Join our public meetings to learn more about the study and provide your input.***

Upcoming Public Meetings

Public Meeting #1 (Virtual)

Thursday, April 11, 2024
5:00 – 6:30 p.m.
Webinar ID: 871 3383 6211
Call-in: +1 (669) 900-6833

[Register Here](#)

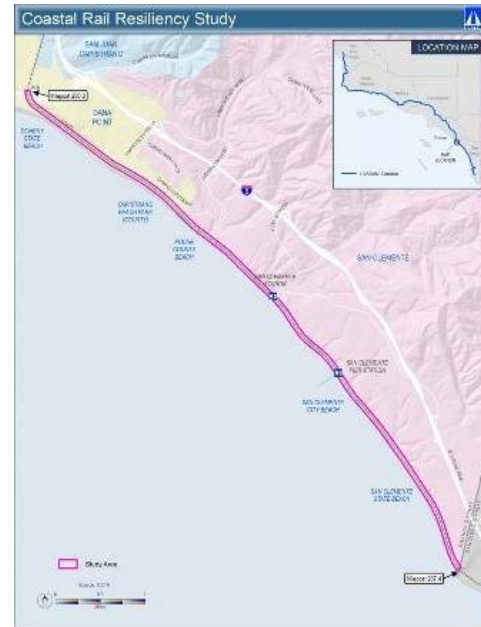
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5:00 – 6:30 p.m.
San Clemente City Hall
910 Calle Negocio, San Clemente, CA 92673

Spanish interpretation will be available. Special accommodations and additional interpretations are available by calling 714-636-7433. Requests must be made at least 72 hours in advance of a scheduled meeting.

Study Overview

OCTA is Orange County's lead transportation agency which owns and is tasked with maintaining an operable segment of the Los Angeles-San Diego-San Luis Obispo Rail Corridor (LOSSAN), one of the state's busiest passenger rail routes and an essential link in the region's freight and goods movement network. The purpose of this study is to identify and analyze short- and medium-term improvement concepts that could protect the existing railroad along its current alignment ensuring uninterrupted service and benefiting economic vitality.



Key Milestones

Key milestones expected from the CRRS include conducting a vulnerability assessment to identify and evaluate locations at immediate risk; establishing evaluation criteria to vet potential alternative concepts; developing these concepts, and ultimately presenting draft and final feasibility study reports. OCTA will build on previous efforts led by others, as appropriate. Additionally, maintaining active stakeholder involvement will be crucial throughout this study, beginning with a series of listening sessions and continuing with consistent engagement throughout the 24-month study duration.

Contact Us

For more information regarding the study, please visit the website at octa.net/crrs.

Orange County Transportation Authority (OCTA) | 550 S Main St, Orange, CA 92868

Unsubscribe_jrangel@arellanoassociates.com



OCTA

April 3 · 🌐

You're invited! The **Coastal Rail Resiliency Study (CRRS)** is exploring solutions to protect approximately seven miles of coastal railroad in place for up to 30 years. Join our public meetings to learn more about the CRRS and share your thoughts.

📅 Thurs., April 11 | 5:00–6:30 p.m. 📍 Zoom

📅 Thurs., May 30 | 5:00–6:30 p.m. 📍 San Clemente City Hall

Visit www.octa.net/CRRS for m... See more



Join Our

Public Meetings and Share Your Input!

Thursday, April 11 | 5:00 – 6:30 p.m.

Thursday, May 30 | 5:00 – 6:30 p.m.

OCTA.net/CRRS



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21 5 ➦

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💬 Comment



FOR MORE INFORMATION:
 Eric Carpenter (714) 560-5697
 Megan Abba (714) 560-5671

FOR IMMEDIATE RELEASE:
 March 11, 2024

OCTA Continues Rail Protection Work on Both Emergency and Longer-Term Basis

While emergency work in San Clemente has been top priority, OCTA continues to work with local, state and federal partners to study and secure funding for lasting solutions

ORANGE – While the Orange County Transportation Authority and Metrolink team continues emergency work to protect the rail line in San Clemente at Mariposa Point, OCTA is pushing ahead on a study to find lasting solutions to prevent additional emergencies by addressing other areas in need of reinforcement.

On Monday, the OCTA Board received an update on the Coastal Rail Resiliency Study and an initial assessment that identified sites along the coastal rail line recommended for monitoring and reinforcement to ensure that rail traffic can continue moving without additional interruptions.

“We understand this rail line is vital for the safe movement of people and goods in Orange County and the region,” said OCTA Chair Tam T. Nguyen. “So even as we complete the emergency work, OCTA is moving forward on many fronts, along with all our partners and stakeholders, to make sure we are protecting the coastal rail line for many years to come.”



The OCTA-led Coastal Rail Resiliency Study aims to evaluate and implement strategies to fortify the railway in the vulnerable 7-mile stretch between Dana Point and the San Diego County Line and to keep rail traffic moving through the area for the next 30 years, while longer-term solutions are explored.

The initial assessment presented to the Board on Monday identified seven areas along that stretch in need of reinforcement and monitoring, to prevent additional soil and debris from privately owned hillsides from falling into the rail right of way. The potential solutions are meant to protect the track from threats on the coastal and inland side caused by erosion and storm surges, among other risks.

Potential solutions for near-term reinforcement include installing monitors to analyze soil or track movement, building additional catchment walls, and engineering placement of large protective

boulders (known as riprap) where appropriate.

Bringing in additional sand on the coastal side, as mentioned by numerous community groups and members of the public, is also being studied as part of the longer-term solution.

The immediate goal is to address the areas identified in need of reinforcement as soon as possible before the next storm season arrives. OCTA will continue to work with local, state and federal partners and explore all funding options.

At the same time, OCTA is working on the Coastal Rail Resiliency Study, meeting with groups of stakeholders in individual listening sessions to discuss the study and get input all along the way.

Two listening sessions with the public are being planned:

- **April 11, a virtual public meeting via Zoom will be held to get public input.**
- **May 21, an in-person public meeting will be held in San Clemente. (Details about the time and location of that meeting are still being finalized.)**
- **To register to attend either meeting and receive updates, please visit: www.octa.net/CRRS.**

While the areas in need of immediate reinforcement are being addressed, the Coastal Rail Resiliency Study continues. The initial concepts developed with community input are scheduled to be presented later this year, then refined, before a draft plan to address protecting the rail line in place for the next 10 to 30 years goes to the OCTA Board in 2025.

Because California continues to grapple with the increasing prevalence of storm-related damage to its transportation infrastructure, OCTA recognizes the importance of adaptive strategies to maintain safe and efficient rail services.

OCTA will also work with all partners and stakeholders to explore long-term solutions for protecting rail movement for generations to come – solutions that could eventually include moving the rail line inland. As part of those long-term efforts, OCTA is advocating for state-led capital project effort to address concerns along the 351-mile LOSSAN corridor to safeguard the future of rail transportation across the region.

Update on Emergency Work

The OCTA and Metrolink team are continuing work on a nearly 200-foot-long catchment wall at Mariposa Point (Milepost 204.2) in San Clemente to protect the track, following a Jan. 23 landslide on a privately owned slope above the rail line.

The 33 steel beams that form the foundation of the wall were finished last week, and the team on Monday finished installing the wooden panels that will make up the wall to prevent additional soil and debris from falling into the rail right of way.



On March 6, Amtrak Pacific Surfliner resumed limited passenger service through the area during morning and evening hours, so that the wall construction could continue throughout daytime hours.

With the catchment wall in place, grading, drainage and additional track work will continue throughout this week. Once the construction work is finished, OCTA, Metrolink and the LOSSAN Rail Corridor Agency will work together to safely restore full passenger service as soon as possible. That schedule is still being determined.

Passengers are asked to check for the latest service updates at www.metrolinktrains.com and www.pacificsurfliner.com/alerts.

For more information and updates on the current rail work visit www.octa.net/railupdates.

###

***About OCTA:** The Orange County Transportation Authority is the county transportation planning commission, responsible for funding and implementing transit and capital projects for a balanced and sustainable transportation system that reflects the diverse travel needs of the county's 34 cities and 3.2 million residents. With the mission of keeping Orange County moving, this includes freeways and express lanes, bus and rail transit, rideshare, commuter rail and active transportation. To sign up for more OCTA news, visit octa.net/GetConnected*

If you would rather not receive future communications from Orange County Transportation Authority, let us know by clicking [here](#).
Orange County Transportation Authority, 550 S Main St, Orange, CA 92868 United States

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Giant crochet transforms Casa Romantica

BY ANGÉLICA ESCOBAR

The art gallery at Casa Romantica has transformed. Once a bright, spare room with white walls and traditional Spanish Revival architecture, the space now pulses with texture and tension. Crimson threads creep across ceilings, wrap around doorways and burst from alcoves in dense, knotted clusters. These are not your grandmother's doilies.

They are the work of Ashley V. Blalock, a San Diego-based fiber artist whose site-specific installation "Keeping Up Appearances" is now on view through Sept. 7. Using the traditional crochet doily as her primary sculptural form, Blalock reclaims the domestic and decorative object to explore themes of memory, family, materiality and discomfort.

Blalock says the doily was a natural starting point for her medium: "Crochet holds its shape once you block it. It's not like knitting — it's stiffer, stronger. Doilies were traditionally used to protect furniture, but now people don't use them anymore. We're not preserving heirloom furniture — we're assembling flat-pack IKEA."

The disappearance of the doily from everyday life, she says, speaks to a broader cultural shift: "I like old things. Things that last. These days, everything is made to fall apart. We throw it away. This work mourns that a little."

At Casa Romantica, her doilies have grown in scale



Ashley V. Blalock's Keeping Up Appearances transforms Casa Romantica's gallery with sprawling red crochet doilies, blending domestic tradition with bold, site-specific installation. On view through Sept. 7. Photo: Angélica Escobar

(Cont. on page 6)

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COASTAL RAIL RESILIENCY STUDY

WE WANT TO HEAR FROM YOU!

Join us at one of the upcoming Coastal Rail Resiliency Study Public Meetings to learn about updates and to provide input on the draft alternative concepts.

In-Person Public Meeting
Tuesday, July 15, 2025
5:00 p.m. – 6:30 p.m.
City of San Clemente City Hall
910 Calle Negocio
San Clemente, CA 92673

Virtual Public Meeting
Tuesday, July 29, 2025
5:00 p.m. – 6:30 p.m.
Register Here: bit.ly/CRRS-Jul29
Webinar ID: 876 4063 9878
Call-in: +1 (669) 900-6833

Spanish interpretation will be available at both meetings. Special accommodations and additional interpretation needs are available by emailing CRRS@octa.net. Requests must be made at least 72 hours in advance of a scheduled meeting.

Scan to sign up for updates!

octa.net/crrs



Appendix D. Expert Panel Workshop Summary Report

Expert Panel Workshop Summary Report

Prepared for: Orange County Transportation Authority (OCTA)
550 South Main Street
P.O. Box 14184
Orange, CA 92863-1584



Prepared by: Arellano Associates
5851 Pine Avenue, Suite A
Chino Hills, CA 91709



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Overview

Purpose of Expert Panel

The purpose of the Coastal Rail Resiliency Study (CRRS) expert panel session was to engage with academic and professional experts from various disciplines including coastal geomorphology, marine biology, geotechnical engineering, and coastal engineering and document their input regarding the CRRS. The panel experts were selected based on their previous work and knowledge of the various disciplines related to coastal challenges in the region. The CRRS is underway to assess a seven-mile stretch of the coastal rail line to minimize passenger rail service disruptions. The workshop occurred between December 3 and 4, 2024.

Desired Goals

The goal of the expert panel session was to elicit feedback from the group to identify any further measures needed to safeguard the south Orange County coastal rail line in place for the foreseeable future, which is estimated to be several decades out. Through informative presentations and collaborative discussions with academic and professional experts, the session sought to:

- Provide experts with a background and history of the rail line, previous emergencies that have led to passenger rail service disruptions, and the four reinforcement area projects to proactively protect the coastal rail line
- Provide an overview of the existing seven typical sections and concepts that are part of the short- to medium-term study
- Gather feedback on whether OCTA could have taken a different approach in addressing the previous emergencies; the initial assessment and short- to medium-term study
- Document expert feedback, questions, concerns, etc.

Panel Format

The expert panel was a two-day in-person session that consisted of presentations, discussions, and a site visit. Jeff Ball, the Chief Executive Officer of the Orange County Business Council (OCBC), served as the facilitator for the session to guide dialogue and create a collaborative discussion that led to meaningful and productive insights. During the two-day session, OCTA shared background information on OCTA's role in the LOSSAN corridor, past rail closures, and impacts and challenges of changing environmental conditions. OCTA also provided an overview of the CRRS multi-phased approach, reviewed the initial four reinforcement areas, and conducted a site visit to key locations – San Clemente State Beach, Casa Romantica, and Mariposa Point. In addition, OCTA discussed ongoing regional efforts, reviewed draft alternative concepts, and short- to medium-term solutions.

Materials

Panelists were provided with informational print materials including:

- Itinerary
- Factsheet
- Initial Assessment Technical Memo
- August 29, 2024 Staff report, presentation, and attachments to OCTA Board
- Copies of presentations
- Study area map handout
- Typical sections 1-7 handout

Panel Details

MEETING DETAILS	Holiday Inn Express, San Clemente, CA Tuesday, December 3, 2024 10:00 AM – 5:30 PM Wednesday, December 4, 2024 9:00 AM – 3:00 PM
Project Team	Six Presenters: Darrell E. Johnson, Rose Casey, Dan Phu, Rob Klovsky (HDR), Gheorghe Rosca (HDR), and Avi Shah (HDR) One Coastal Frontiers Representative: Russel Boudreau (Coastal Frontiers) Three Outreach Consultants: Maria Yañez-Forgash (AA), Nancy Verduzco (AA), and Keven Michel (AA) Three additional project staff in attendance
Moderator	Jeff Ball, OCBC
Panelists	<ul style="list-style-type: none">• Adam Young, Scripps Institution of Oceanography• Wenkai Qin, NV5• Lawrence Honma, Merkel & Associates• James Gingery, Keller West

Discussion

PREVIOUS EMERGENCY WORK

After learning about the previous emergency work, panelists were asked if OCTA should have done things differently with previous emergencies. See below for key takeaways.

A. Key Takeaways

- An observation from one of the panelists indicated the riprap at Cyprus Shore may function as a mini jetty and accumulate sand. There is no “one time fix” – maintenance and monitoring will likely be a part of any solution.
- Moving forward, OCTA should consider riprap greater than 6-ton in size, as this provides greater stability.
- The OCTA team indicated Cyprus Shore is the only known ancient landslide in the study area but will have an expert/certified geologist review stereoscopic photographs and old geologic maps. Consider a risk ranking system.

REINFORCEMENT AREAS

Panelists also had an opportunity to discuss the four reinforcement areas. Below is a summary of key takeaways.

A. Key Takeaways

- OCTA should assess the existing conditions to establish baseline biological resources conditions of the project area. These would include assessing the terrestrial and marine resources.

- OCTA should assess the baseline sand profile conditions and geotechnical risk factors with the bluffs.
- Consider modifying the armoring so that it would be covered with sand. This reaffirms OCTA's plan to place sand as a self-mitigating measure of the armoring actions.
- Panelist noted it is unusual to see such a wide variance in beach width in a small area.
- Panelists offered to conduct peer reviews of key studies.

SHORT- TO MEDIUM-TERM SOLUTIONS

OCTA conducted a robust discussion of the short- to medium-term concepts, which consist of a menu of bluffside, beachside, and rail concepts. These concepts were used to apply to each typical section throughout the seven-mile stretch of the study area. Below are key takeaways received during this discussion.

A. Key Takeaways

- OCTA consultant provided an overview of the short- and mid-term concepts, a panelist suggested that OCTA consider habitat friendly concrete blocks in the lower portions of the engineered revetment. The panelist noted the Port of San Diego had piloted this method and it was approved by Coastal Commission. OCTA should also consider sand dunes, where feasible.
- Consider out of kind fee contributions or contribute funding to other agencies' efforts to mitigate for potential impacts. OCTA should consider self-mitigating project features or components. This should be the theme for any of the proposed armoring actions that are part of this effort. Note, OCTA will be responsible for additional monitoring activities.
- A panelist suggested that OCTA consider opportunities to repurpose materials from the inland side of the rail line.
- The group engaged in a good discussion on the feasibility of grouting methods. It's important to keep in mind whatever solutions are being looked at, they would not impede groundwater movement/flow. The group agreed that horizontal drains are the most efficient dewatering method versus any vertical drainage system.
- A panelist suggested OCTA undertake a comprehensive biological and cultural assessment of the study area.
- Discussions ensued regarding the benefits of engineered revetment vs. seawall; the panelists recognized that seawalls have a smaller footprint but deeper foundation and reflect wave energy. Therefore, riprap may be easier to permit than seawalls. A panelist noted seawalls can be challenging with dewatering, concerned with existing materials (i.e., riprap) that would make constructing a seawall difficult.
- The group discussed the necessary height and challenges related to elevating the rail line.
- A panelist suggested that OCTA consider looking at a rail bridge concept, similar to what has been implemented in New South Wales, Australia ([Sea Cliff Bridge - Stanwell Park | VisitNSW.com](#)).
- A panelist inquired if there is a potential to include a trail on top of seawalls. Additional discussions ensued regarding integrating self-mitigating project components.
- OCTA should consider artificial reef, breakwater, and other sand retention measures. Reefs have co-benefits with wave dissipation.
- OCTA should put more emphasis on monitoring and having current data. This will help in understanding the baseline conditions and aid in comparing post-construction conditions, which

may be a requirement of the Coastal Commission. This data is needed for the bluffs which would include augmenting existing LiDAR data for certain areas of the bluff.

- There is no “one size fits all” solution and OCTA should consider sand retention features along with sand nourishment and sand dunes.
- Need to consider a program of solutions for each segment, clearly define who the lead is for those efforts as well as improvements that would be implemented/funded by others.
- OCTA should perform baseline biological resources survey on both land and offshore areas.

NEXT STEPS

Rose concluded the panel session by thanking panelists for their participation and insightful feedback. She summarized key points and shared next steps, including the following:

- OCTA will synthesize insights from the panelists.
- OCTA will look to augment how we evaluate the various concepts as they head into the evaluation process.
- OCTA will share the concepts with the Project Development Team, which is comprised of the cities of San Clemente, Dana Point, and San Juan Capistrano, County of Orange, State Parks, and others.
- OCTA will present these concepts to the OCTA Board early 2025 and then consider the general input in the process.
- OCTA will look into establishing a baseline for the biological resource conditions of the project area.
- OCTA will look into assessing the baseline sand profile conditions and geotechnical conditions of the bluffs.
- OCTA will have check-ins with the public as the study progresses.
- OCTA will follow up with panelists to see if they’re interested in doing a peer review of certain technical studies.



Appendix E. Detailed Scoring Sheet

Short Name	Concept Name	Rail Resilience & Reliability	Implement-ability & Construct-ability	Public Assets & Environmental	Cost	Alignment with Related Planned Projects	Concept Total Score (Weighted)	Rank
Rail-1	1 - Raised Track Embankment	16.5	9.6	14.4	11.2	12.0	64	3
Rail-2	2 - Alternative materials for critical railroad infrastructure to reduce lifecycle costs	25.5	30.0	24.0	17.6	12.0	109	1
Rail-3	3 - Ground improvement (track-bed stabilization)	30.0	21.6	17.3	20.8	12.0	102	2

Bluff-1	1 - Catchment walls (block slide debris)	30.0	26.4	18.7	17.6	9.6	102	1
Bluff-2	2 - Stabilization grading (buttress slide toe)	30.0	18.0	14.9	16.0	7.2	86	8
Bluff-3	3 - Tieback / soil nail / pin-pile walls (mitigate larger slides)	30.0	18.0	20.6	20.8	12.0	101	2
Bluff-4	4 - Ground improvement (bluff stabilization)	22.5	19.2	19.2	20.8	12.0	94	5
Bluff-5	5 - Surface matting & deep-rooted vegetation planting (reduce sediment erosion)	21.0	22.8	21.6	17.6	12.0	95	3
Bluff-6	6 - Drainage improvement via grading / detention basins / undertrack outlets	19.5	24.0	16.8	22.4	7.2	90	6
Bluff-7	7 - Deflection walls in tributaries (reduce flood and sedimentation flow rates)	16.5	21.6	18.7	17.6	9.6	84	9
Bluff-8	8 - Up-gradient cut-off drains (reduce source of water)	21.0	21.6	18.2	24.0	9.6	94	4
Bluff-9	9 - Hydraulugs (lower hydraulic pressure and slide potential)	27.0	14.4	16.8	20.8	7.2	86	7

Beach-1	1 - Beach nourishment with planned replenishment with No Shoreline protection structure	12.0	14.4	18.2	4.8	12.0	61	5
Beach-2.1	2.1 - One-time sand placement with shoreline protection structure (1 - Riprap)	21.0	15.6	14.9	9.6	7.2	68	3
Beach-2.2	2.2 - One-time sand placement with shoreline protection structure (2 - Engineered rock revetment)	22.5	9.6	14.9	11.2	7.2	65	4
Beach-2.3	2.3 - One-time sand placement with shoreline protection structure (3 - Vertical seawall)	22.5	14.4	14.9	11.2	7.2	70	2
Beach-2.4	2.4 - One-time sand placement with shoreline protection structure (4 - Combination of seawall and rock)	24.0	14.4	15.4	9.6	7.2	71	1
Beach-3	3 - One-time sand placement with sand retention measures (artificial reefs, breakwaters, jetties) & NO shoreline protection structure	15.0	8.4	13.0	4.8	7.2	48	11
Beach-4.1	4.1 - One-time sand placement with sand retention measures (artificial reefs, breakwaters, jetties) & shoreline protection structure (1 - Riprap)	21.0	7.2	15.4	3.2	7.2	54	8
Beach-4.2	4.2 - One-time sand placement with sand retention measures (artificial reefs, breakwaters, jetties) & shoreline protection structure (2 - Engineered rock revetment)	22.5	4.8	15.4	3.2	7.2	53	9
Beach-4.3	4.3 - One-time sand placement with sand retention measures (artificial reefs, breakwaters, jetties) & shoreline protection structure (3 - Vertical seawall)	22.5	8.4	14.9	3.2	7.2	56	7
Beach-4.4	4.4 - One-time sand placement with sand retention measures (artificial reefs, breakwaters, jetties) & shoreline protection structure (4 - Combination)	25.5	9.6	15.4	3.2	7.2	61	6
Beach-5	5 - Watershed modifications to increase beach sand supply (implemented by others)	7.5	9.6	8.6	14.4	12.0	52	10

Notes:

Beach-1: Assumed to be every five years and implemented by other agency outside of OCTA



Coastal Rail Resiliency Study Update



Coastal Rail Remediation Efforts

Emergency Rail Projects *past projects*

- **Cyprus Shore** (September 2022 – April 2023) Slope secured with ground anchors
- **Casa Romantica** (April 2023 – July 2023)
Temporary catchment wall built
- **Mariposa Point** (January 2024 – March 2024)
Temporary catchment wall built
- Remove temporary catchment walls at Casa Romantica and Mariposa Point when appropriate
- Mitigation discussion are ongoing for the Cyprus Shore

Coastal Rail Stabilization Priority Project *immediate needs*

- Four priority reinforcement areas identified as imminent threats
- Actions include armoring, catchment wall, trail restoration, and sand replenishment
- \$305 million in state and federal funds secured
- Accomplishments to date include riprap repair and sand placement in Areas 1-2, and catchment wall and trail restoration construction (60 percent complete) in Area 3
- Ongoing alternatives analysis and permitting in Area 4

Coastal Rail Resiliency Study *short- to mid-term solutions*

- Evaluate concepts to protect seven miles of coastal rail infrastructure with a 30-year design life
- Scoring and selection of short-listed concepts
- Two to four short-listed concepts per category (i.e., bluffside, rail, and beachside) carried forward into further design and future implementation

Coastal Rail Long-Term Solutions Study *long-term solutions*

- State-led study
- Develop options for long-term solutions including potential rail line relocation
- Create an action plan for key elements
- Partner with Los Angeles-San Diego-San Luis Obispo Rail Corridor Agency, state, and federal agencies
- Engage key stakeholders



Feasibility Study Overview

- Study Approach
- Alternative Concept Development
 - Rail Concepts (3) - improve structural stability of the track foundation and extend useful life of rail infrastructure
 - Bluffside Concepts (9) - prevent bluff erosion, sliding, and debris hazards originating east of the corridor from blocking the tracks
 - Beachside Concepts (11) - address coastal erosion, flooding, and wave overtopping hazards west of the corridor impacting track stability
- Screening and Evaluation Process
- Shortlisted Concepts
- Community, Environmental, and Recreational Considerations
- Funding Strategy and Federal Partnership Opportunities
- Next Steps



Community Input

Most Recent Public Meetings Held:

- October 28, 2025, virtual meeting via Zoom
- October 29, 2025, San Clemente City Hall
- Shared information regarding refined range of alternative concepts for the short- to mid-term with a 30-year design life
- Meeting notifications were distributed via newspaper ads, bilingual flyers, email blasts, project website updates, social media ads, social media posts, and press releases
- Public participants:
 - 48 (virtual)
 - 26 (in-person)

Community Comments on Short-listed Concepts:

- Strong support for sand nourishment and desire for recurring placement to be integrated into sand retention strategies
- Concern that shoreline protection structures will permanently eliminate sandy beaches
- Desire for more clarity on long-term planning and rail relocation

Action Taken to Respond to Comments:

- Provide additional conceptual design to public and include in the Draft Coastal Rail Resiliency Study (CRRS) report
- Provide public with information on next steps after CRRS completion



Alternative Concept Development Process

Ongoing Stakeholder Engagement

Purpose and Need

- Determine the problem to be solved
- Develop evaluation criteria to meet the project needs

Identifying Feasible Concepts by Category and Typical Section

1. Rail concepts
2. Bluffside concepts
3. Beachside concepts

Evaluate Concepts

- Score concepts based on evaluation criteria
- One to four short-listed concepts per category carried forward into further study

Results

- Further develop concepts to support implementation



Community input received



Future community input opportunities



We are here



Short-Listed Concepts

Two Rail Concepts Carried Forward:

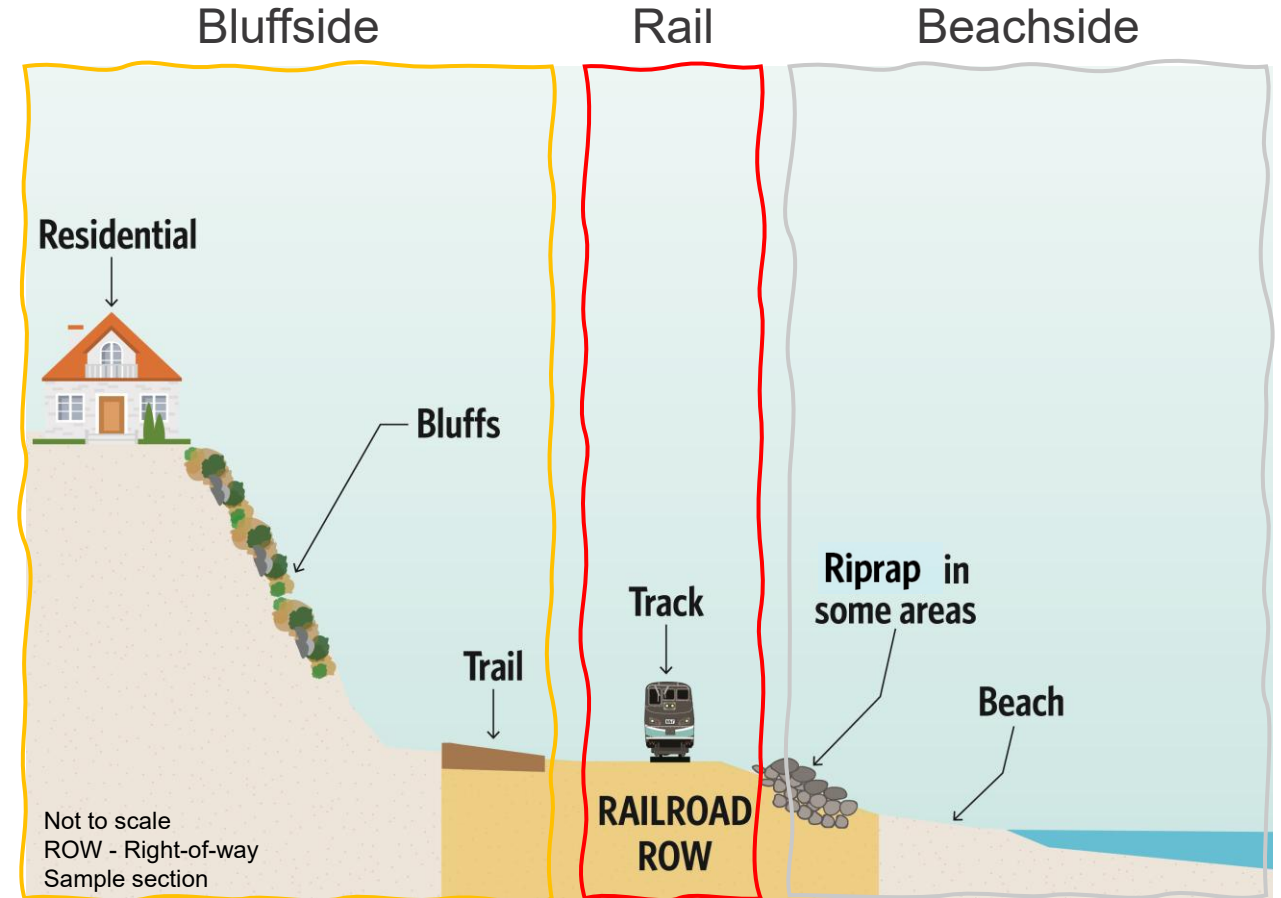
- Alternative materials for critical railroad infrastructure to reduce lifecycle costs
- Ground improvement

Two Bluffside Concepts Carried Forward:

- Catchment walls
- Tieback/soil nail/pin-pile walls

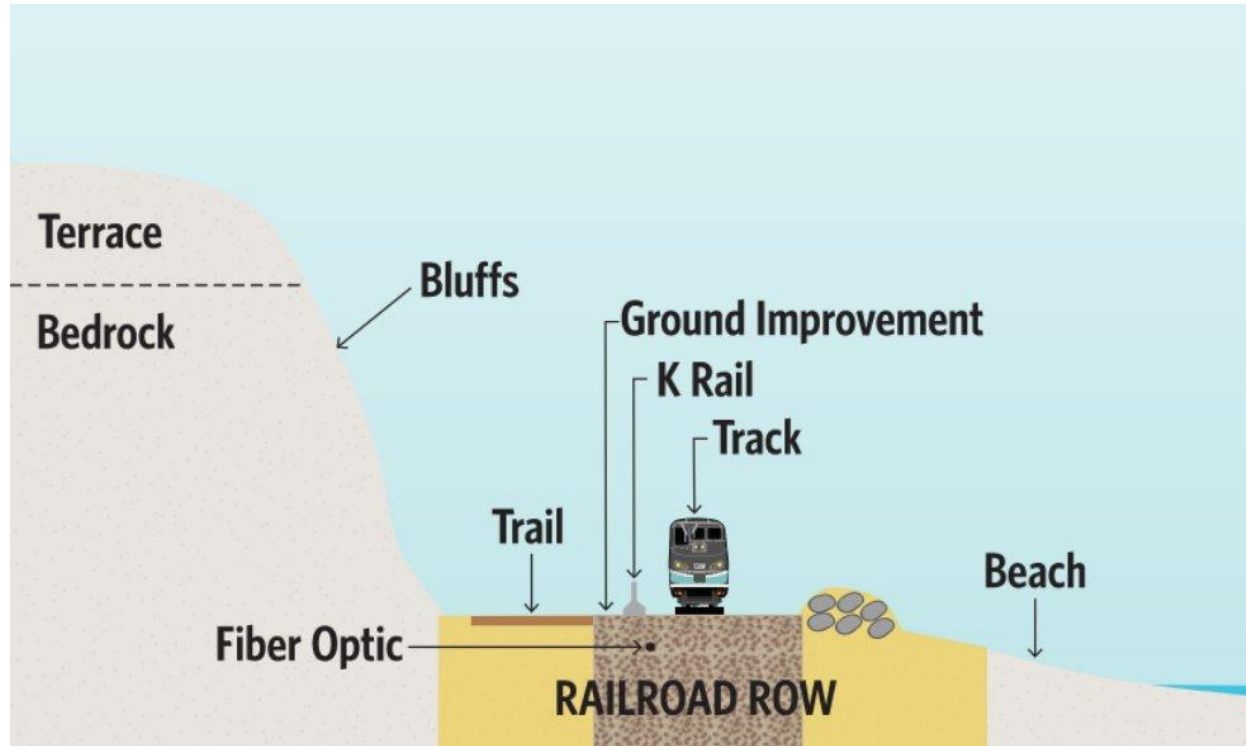
Four Beachside Concepts Carried Forward:

- One-time beach nourishment with shoreline protection structure:
 - Riprap
 - Engineered rock revetment
 - Seawall
 - Combination (seawall and rock)



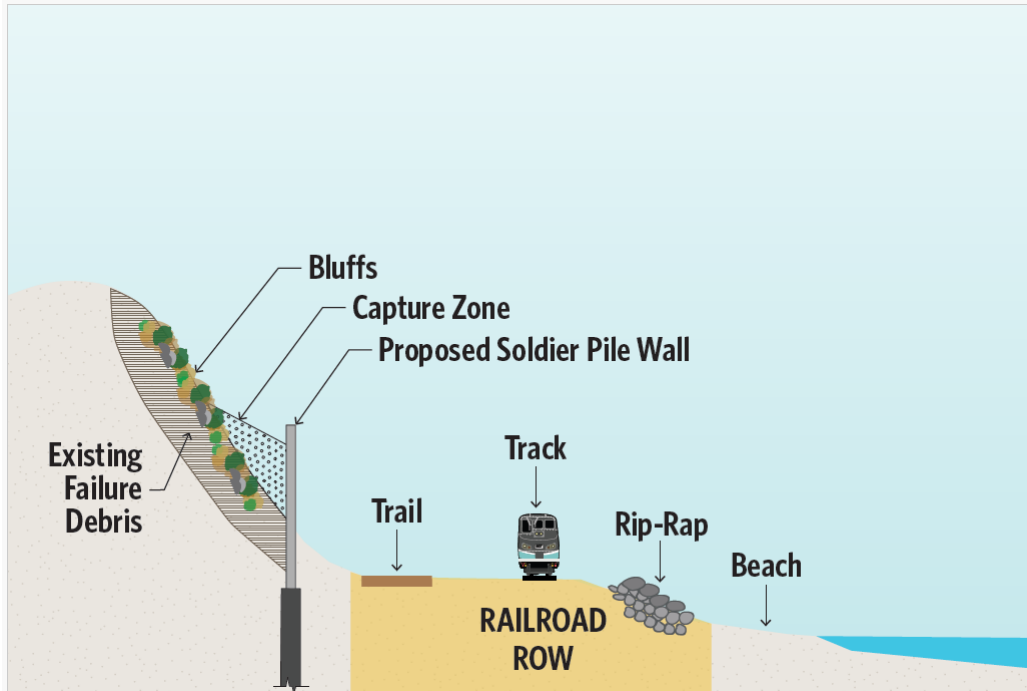


Short-Listed Rail Concepts

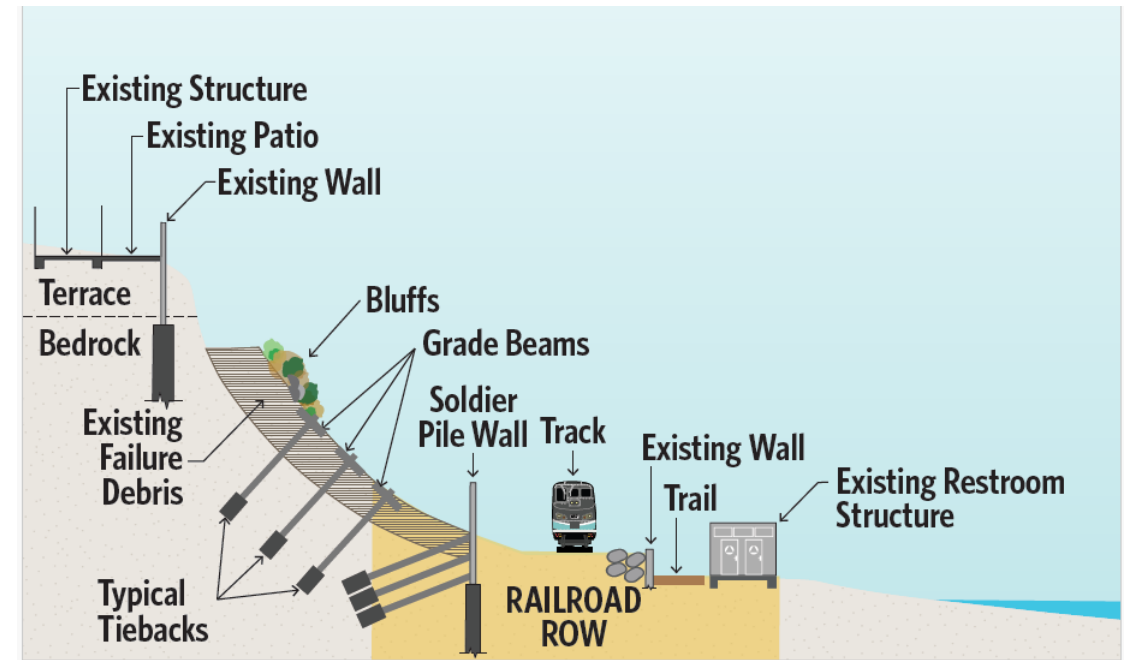


Ground Improvement

Short-Listed Bluffside Concepts



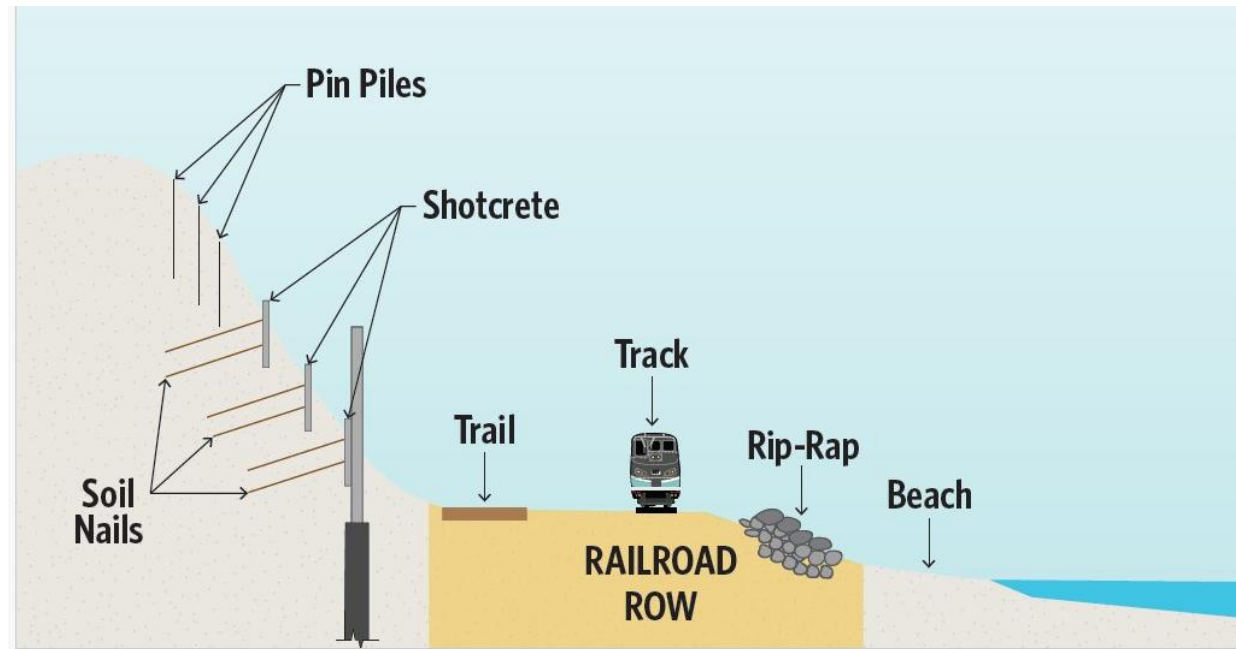
Catchment Wall



Tieback Wall



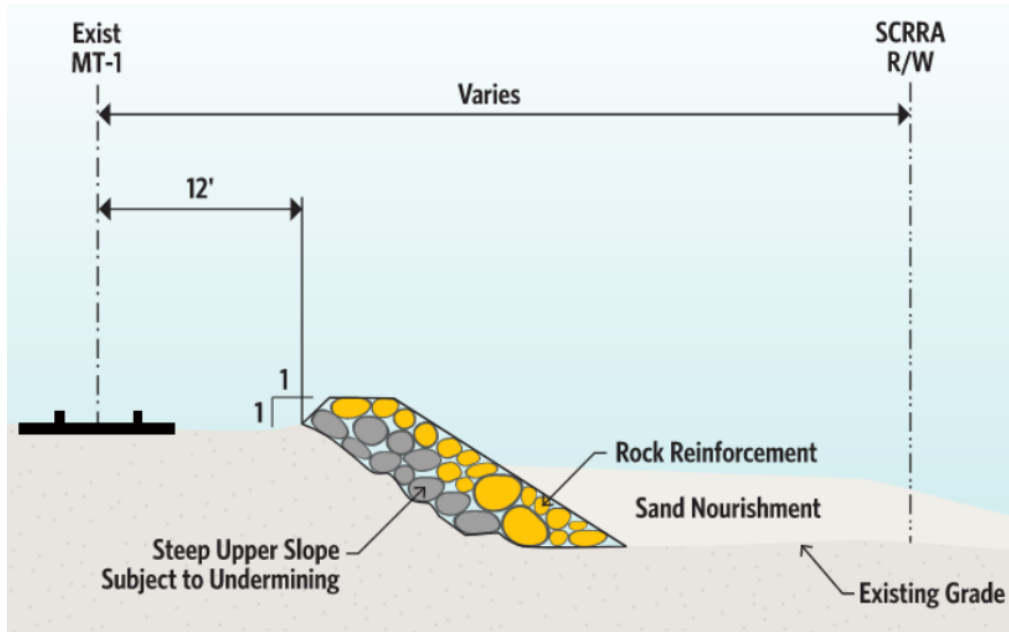
Short-Listed Bluffside Concepts (Cont.)



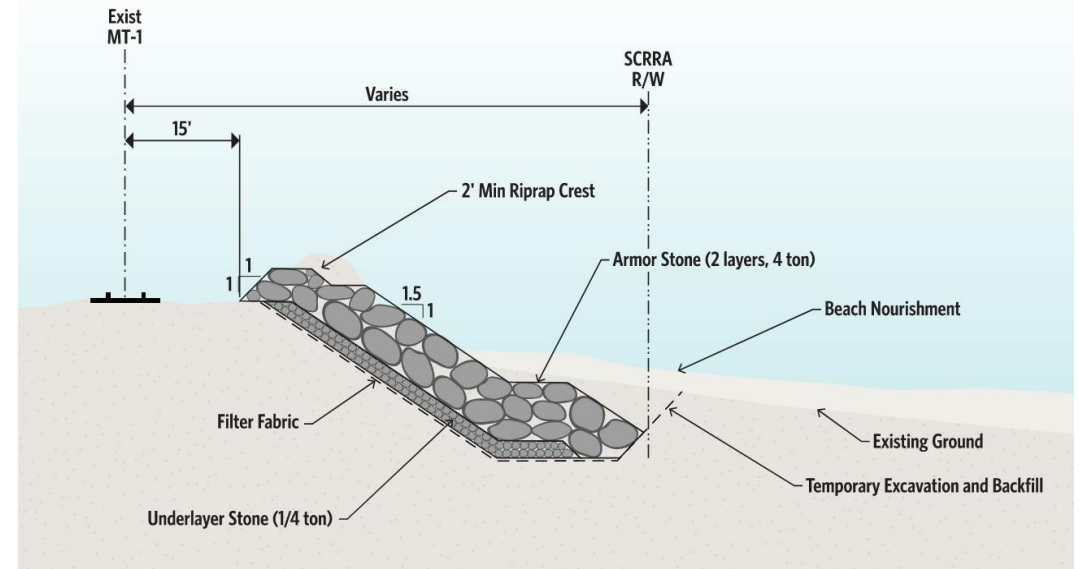
Soil Nail/Pin Pile Wall



Short-Listed Beachside Concepts



Riprap Repair Restoration

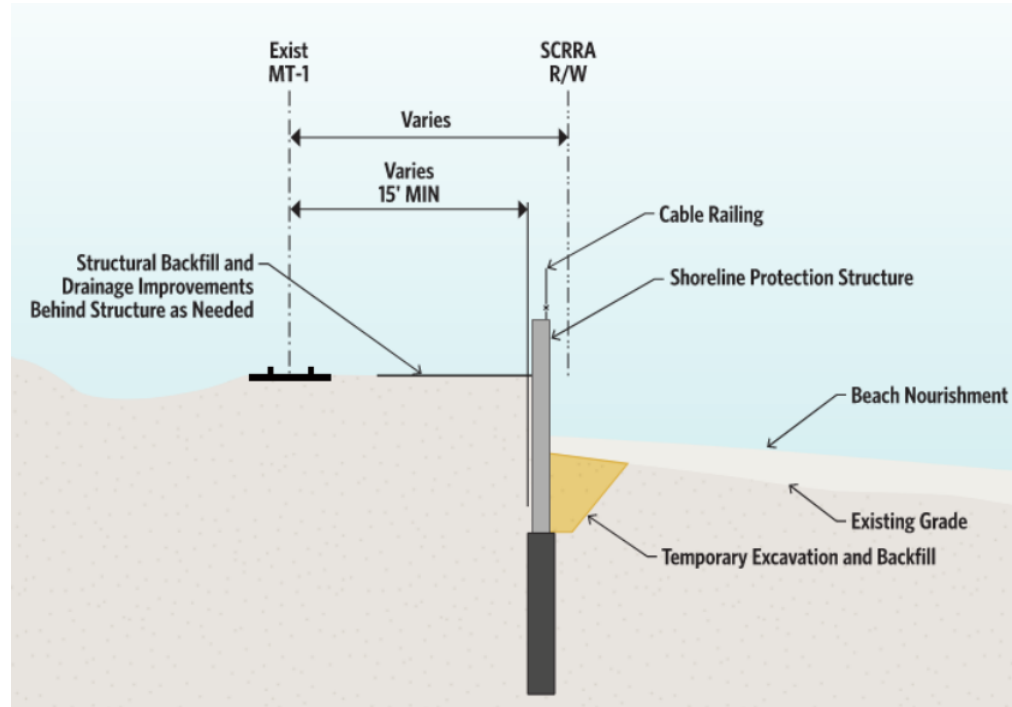


Engineered Revetment Shore Protection

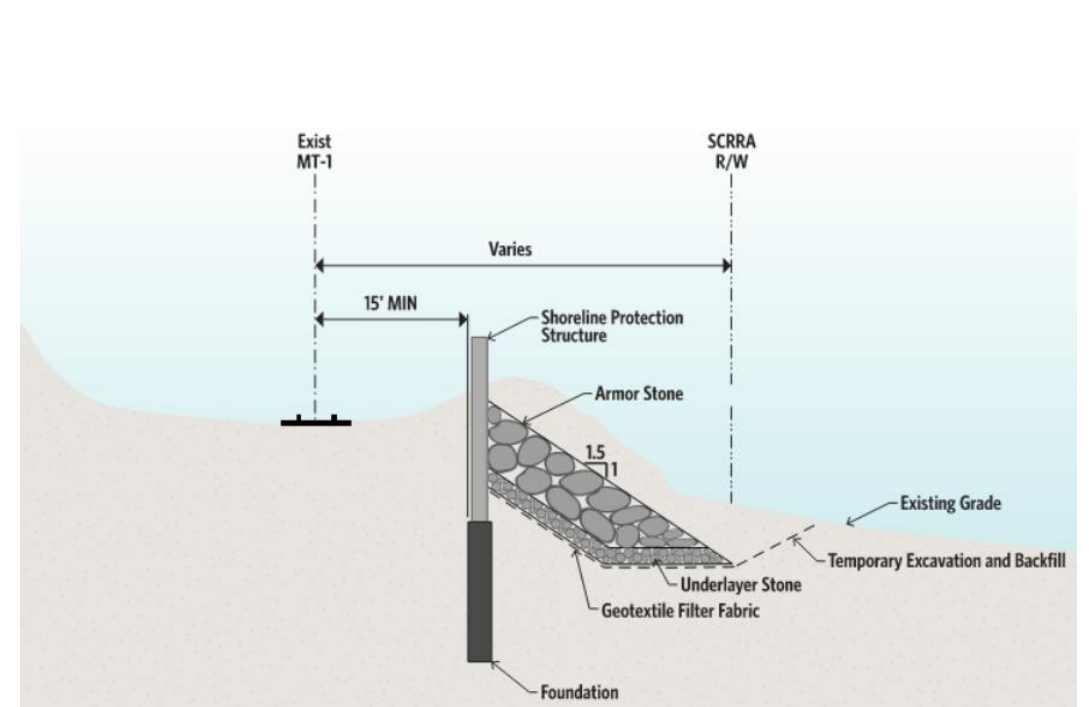
Min - Minimum
 MT – Metrolink Track 1
 R/W – Right-of-Way
 SCRRA – Southern California Regional Rail Authority



Short-Listed Beachside Concepts (Cont.)



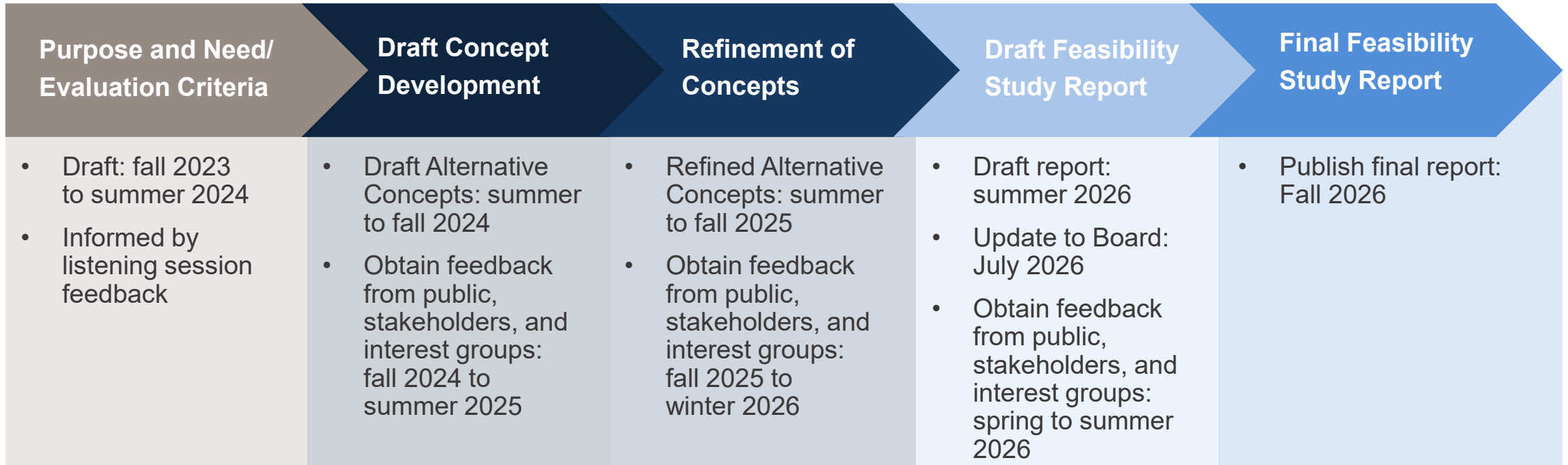
Seawall Shore Protection



Combination Seawall/Revetment Shore Protection



Coastal Rail Resiliency Study Schedule

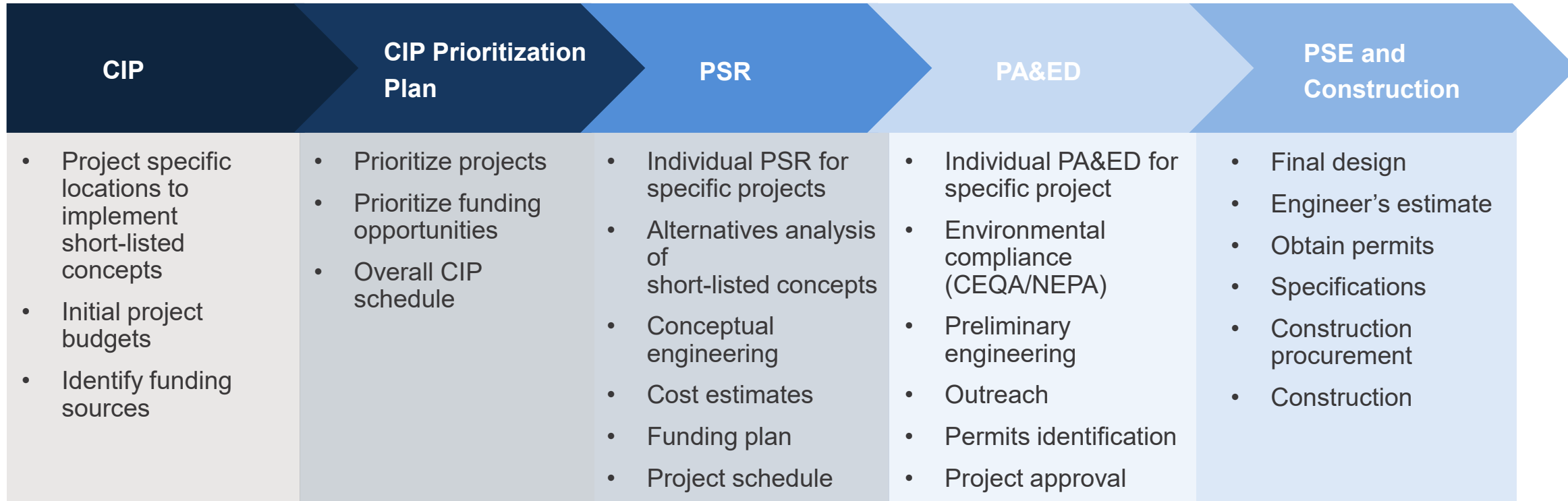


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Board - Board of Directors



Coastal Rail Resiliency Study Schedule (Cont.)



CEQA - California Environmental Quality Act
CIP - Create Capital Improvement Program
NEPA - National Environmental Policy Act
PA&ED - Project Approval and Environmental Document
PSE - Plans, Specifications and Estimates
PSR- Project Study Report



July 6, 2026

To: Regional Transportation Planning Committee

From: Darrell E. Johnson, Chief Executive Officer

Subject: Draft 2026 Long-Range Transportation Plan

A handwritten signature in blue ink, appearing to read "Darrell Johnson", is written over the "From:" line of the header.

Overview

The Long-Range Transportation Plan is a multi-year planning document, developed every four years to define the long-term vision for Orange County's transportation system and serve as input into the Southern California Association of Governments' Regional Transportation Plan. The Draft 2026 Long-Range Transportation Plan reflects the Orange County Transportation Authority's existing commitments, plans, and policies while also addressing forecasted transportation needs through 2050. Staff has prepared the draft Directions 2050 LRTP Executive Summary, an overview of the full study, and is seeking direction to continue development of the final plan.

Recommendation

Direct staff to incorporate input received through the public review period as appropriate and return with a draft Final 2026 Long-Range Transportation Plan for approval.

Background

The Long-Range Transportation Plan (LRTP) is a long-term planning document that evaluates anticipated travel demand and transportation needs in consideration of established priorities, policies, and emerging trends. The LRTP is updated every four years to reflect changing conditions and to support the Orange County Transportation Authority's (OCTA) input into the Southern California Association of Governments' Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS). Regionally significant transportation projects must be included in the RTP/SCS to advance through the project development process and remain eligible for state and federal funding.

Over the past year, several LRTP-related items have been presented to the OCTA Board of Directors (Board), including key challenges and goals, the draft

Preferred Plan framework, and preliminary performance results for various analysis scenarios. This technical work was complemented by an initial public outreach phase conducted in fall 2025. The concepts, analysis, and input received through these discussions and engagement efforts informed the development of the draft Directions 2050 LRTP Executive Summary (Attachment A).

Discussion

2050 No Build Scenario

The Draft 2026 LRTP evaluates 2050 travel conditions in consideration of forecasted demographic growth through the year 2050. Based on the Orange County Projection (OCP)-2022 prepared by the Center for Demographic Research at California State University, Fullerton, Orange County is projected to add approximately 95,000 residents, 140,000 households, and 180,000 jobs between 2024 and 2050. OCP-2022 was the latest approved socioeconomic dataset available when technical analysis for the Draft 2026 LRTP began.

Unlike previous LRTP cycles that focused heavily on accommodating rapid population growth and increasing travel demand, the Draft 2026 LRTP reflects a shift toward maintaining and optimizing the existing transportation system in response to slowing demographic growth and changing travel patterns. The projected slowdown in growth is driven by factors such as declining birth rates, an aging population, and out-migration. The draft OCP-2026, an updated dataset currently under development, suggests these demographic trends are expected to continue and may become more pronounced in future planning cycles.

To better understand the effects of these changing conditions, the Draft 2026 LRTP includes a 2050 No Build Scenario that applies the OCP-2022 socioeconomic forecast for 2050 to the existing transportation network while removing the benefits of programs that would conclude with the 2041 sunset of the Measure M2 (M2) one half-cent sales tax for transportation improvements in Orange County. This includes the operational benefits associated with signal synchronization, roadway maintenance, and Metrolink service, and other M2-supported programs such as community-based shuttles and mobility programs for seniors and person with disabilities. This scenario is used to evaluate how the transportation system would be expected to perform in 2050 without additional transportation investments.

As shown in Table 1, this scenario results in more driving, fewer transit trips, slower peak-period travel, and substantially more delays. Daily vehicle trips increase by about four percent, transit trips decline by about five percent, and vehicle miles traveled (VMT) increase by about nine percent. Peak-period speeds decrease across freeways, arterials, and managed lanes, while total

daily vehicle delay increases by nearly 40 percent. These results show that Orange County will need continued investment to maintain reliable mobility through 2050.

Table 1: Performance for 2024 Existing and 2050 No Build

Performance Measure (Daily)	2024 Existing	2050 No Build
Vehicle Trips	10,970,000	11,406,000
Transit Person Trips	97,700	92,500
Vehicle Hours of Delay	245,000	337,000
Delay as Percent of Travel Time	11%	13%
Freeway Peak Period Speed	48.7 mph	46.0 mph
Arterial Peak Period Speed	28.4 mph	23.2 mph
Managed Lane Peak Period Speed	57.4 mph	54.4 mph
VMT	76,300,000	83,300,000

mph – miles per hour

M2 Buildout

With approximately 15 years remaining before the sunset of M2 in 2041, OCTA will continue to deliver investments across all transportation modes while maintaining strong accountability and transparency. As such, an M2 Buildout Scenario was modeled to reflect the delivery of the M2 capital project commitments while illustrating the consequences of not sustaining the recurring M2-supported program through 2050. The M2 Buildout Scenario builds on the 2050 No Build Scenario and assumes that all committed M2 capital improvements are fully delivered by 2041, which include the freeway program, OC Streetcar, and continued investments in arterial capacity improvements.

As shown in the following table, delivery of the M2 capital projects results in measurable improvements to system performance when compared to the 2050 No Build Scenario, including reduced congestion, improved travel speeds, and increased transit ridership. These results demonstrate the long-term value of the M2 capital investments and OCTA’s continued commitment to delivering the promised transportation improvements.

However, this scenario also highlights the limitations of relying solely on capital investments. Even with the M2 capital projects fully implemented, arterial speeds remain noticeably slower and VMT remain substantially higher than existing conditions. These results reflect the importance of recurring M2-supported programs such as regional signal synchronization and roadway maintenance in

sustaining long-term mobility and system performance beyond 2041. These findings demonstrate that both capital investments and ongoing operational programs are needed to support the Draft 2026 L RTP goals.

Table 2: Performance for 2050 M2 Buildout

Performance Measure (Daily)	2024 Existing	2050 No Build	2050 M2 Buildout
Vehicle Trips	10,970,000	11,406,000	11,421,000
Transit Person Trips	97,700	92,500	95,000
Vehicle Hours of Delay	245,000	337,000	286,000
Delay as Percent of Travel Time	11%	13%	11%
Freeway Peak Period Speed	48.7 mph	46.0 mph	47.5 mph
Arterial Peak Period Speed	28.4 mph	23.2 mph	24.1 mph
Managed Lane Peak Period Speed	57.4 mph	54.4 mph	55.6 mph
VMT	76,300,000	83,300,000	84,500,000

Preferred Scenario

The recommended 2050 Preferred Scenario includes all M2 capital project commitments and continuation of key M2-funded operational programs, while also incorporating additional strategies and improvements identified through completed OCTA studies. These include recommendations from the OC Transit Vision, Transit Optimization Study, Freeway Chokepoint Study, Climate Adaptation and Sustainability Plan, Goods Movement Vision, Mobility Hubs Study, and other recent planning efforts. Together, these projects and programs are intended to improve multimodal mobility, optimize system performance, enhance resiliency, and better position Orange County to respond to changing travel patterns and long-term transportation needs.

The M2-funded programs continued in this scenario include programs that have become integral to Orange County’s transportation system, including signal synchronization, arterial pavement maintenance through the Local Fair Share Program, and transit programs such as Metrolink, community circulators, senior mobility programs, and safe transit stop improvements.

Key transit investments within the Preferred Scenario include prioritizing the transit opportunity corridors identified in the 2024 OC Transit Vision for enhanced service and operational improvements, including transit signal priority, queue jumps, and other transit travel time improvements. The scenario also expands

the countywide bikeway network through gap closure and active transportation enhancements identified in the 2019 OC Active and 2023 Bike Connectors Gap Closure Feasibility Study. Additional investments include freeway chokepoint improvements, mobility hubs, transportation systems management and operations strategies, coastal rail resiliency improvements, goods movement strategies, and climate adaptation initiatives. The scenario also assumes continued development of the regional managed lanes network consistent with current Caltrans planning efforts. Together, these projects and programs reflect a shift toward maintaining and optimizing the existing transportation system while preparing for long-term mobility and funding needs beyond the M2 horizon. Attachment B provides a summary of the recent plans and studies referenced in the development of the Draft 2026 LRTP.

As shown in Table 3, the 2050 Preferred Scenario demonstrates substantial performance improvements when compared to the 2050 No Build Scenario, reflecting the combined benefits of the proposed multimodal capacity investments and operational enhancements. The Preferred Scenario expands transit revenue service by over 50 percent, increases regional arterial roadway capacity by ten percent, and increases the countywide bikeway network by more than 60 percent, directly supporting the Draft 2026 LRTP goals of expanding multimodal capacity.

Compared to the No Build Scenario, the Preferred Scenario demonstrates a shift toward more balanced and multimodal travel patterns by reducing daily vehicle trips by approximately ten percent and increasing transit ridership by approximately 25 percent. The Preferred Scenario also supports the Draft 2026 LRTP goal of improving operations by reducing daily vehicle congestion by approximately 40 percent. Peak period speeds for freeway, arterial, and managed lanes all improve under the Preferred Scenario, with the most notable improvements on arterial roadways demonstrating direct benefit from signal synchronization, additional roadway capacity, and continued investment in pavement maintenance.

The Preferred Scenario advances the Draft 2026 LRTP goal of enhancing accessibility, as demonstrated by improved access to jobs, key destinations, and high-capacity transit services throughout Orange County. These outcomes reflect the combined benefits of expanded transit service, transit opportunity corridor investments, mobility hubs, and transportation demand management strategies.

The Preferred Scenario supports the Draft 2026 LRTP goal of strengthening system resiliency by focusing on maintaining and optimizing the existing transportation system. The Preferred Scenario reduces VMT through expanding multimodal travel options and improving system efficiency.

Table 3: System Performance for 2050 Preferred

Performance Measure (Daily)	2050 No Build	2050 Preferred	Change
Goal: Expand Multimodal Capacity			
Transit Revenue Hours	1,520,000	2,293,000	51%
High-Capacity Transit Revenue Hours	76,600	615,400	704%
Number of Bikeway Miles	1,293	2,087	61%
Number of Master Plan of Arterial Highways lane miles	6,464	7,099	10%
Goal: Improve Operations			
Vehicle Trips	11,406,000	10,227,000	-10%
Transit Person Trips	92,500	115,900	25%
Vehicle Hours of Delay	337,000	202,000	-40%
Delay as Percent of Travel Time	13%	9%	▼
Freeway Peak Period Speed (mph)	46.0	47.7	▲ 1.7
Arterial Peak Period Speed (mph)	23.2	28.8	▲ 5.6
Goal: Enhance Accessibility			
Jobs Accessible within 30 Minutes by Transit	66,700	89,600	34%
Key Destinations Accessible within 30 Minutes by Transit	64	84	31%
Households with Access to High-Capacity Transit Stops	52,700	177,400	237%
Percent of Households with Access to High-Capacity Transit Stops	4%	14%	▲
Goal: Strengthen System Resiliency			
VMT (million)	83.3	80.4	-3.5%
Greenhouse Gas Emissions (million pounds)	46.9	45.3	-3.0%
Arterial Pavement Condition Index	75.4	79.1	▲ 3.7

Overall, the analysis indicates that the Preferred Scenario improves system performance across all LRTP goals demonstrated by reduced congestion, increased transit ridership, expanded accessibility to jobs and key destinations, and strengthening the transportation system's ability to accommodate future

changes. Together, these results demonstrate that a balanced combination of capital investments, operational improvements, and multimodal strategies is necessary to maintain long-term mobility and system performance. The Preferred Scenario provides a practical approach for sustaining Orange County's transportation system through 2050.

Financial Analysis

Implementation of the full 2050 Preferred Scenario is projected to require approximately \$63.9 billion in transportation investments between 2025 and 2050. Based on current forecasts, transportation revenues over the same period are estimated at approximately \$58 billion, resulting in a funding shortfall of approximately \$5.9 billion. This shortfall is driven largely by the loss of local revenues due to the 2041 sunset of the M2 sales tax that would have otherwise generated approximately \$4.3 billion of transportation investment from 2041 to 2050.

While the Draft 2026 LRTP does not assume a specific funding solution to address the shortfall, the financial analysis helps quantify the magnitude of the long-term funding need and informs subsequent discussions on potential future funding strategies.

Short-Term Action Plan

A Short-Term Action Plan was prepared that identifies planning efforts intended to advance the strategies included in the Draft 2026 LRTP over the next several years. These efforts are designed to further refine the projects and programs proposed in the Preferred Scenario, respond to evolving transportation trends and policy requirements, and inform future LRTP updates. The recommended Short-Term Action Plan is included in the draft Directions 2050 LRTP Executive Summary.

Public Engagement

With Board direction, the Draft 2026 LRTP will be released for public review following Board review. To ensure broad reach and participation from across Orange County, OCTA will implement a combination of traditional and innovative outreach methods, providing the public an opportunity to learn about the Draft 2026 LRTP and share input on future transportation priorities. Engagement efforts will target the general public, stakeholders, community-based organizations, advisory groups, and city and elected officials.

Outreach tools will include social media, an online and paper survey, community webinar, pop-up events, roundtables for elected officials, city staff, and community leaders, and a telephone townhall. Survey and outreach materials will be available in multiple languages to help ensure participation from a diverse and representative audience.

Summary

The Draft 2026 LRTP has been developed and will be released for public review. The recommended Preferred Scenario successfully addresses the challenges and goals of the Draft 2026 LRTP, as well as stakeholder input received to date, as demonstrated through the forecasted system performance. With direction from the Board, a final Draft 2026 LRTP will be prepared that addresses input received during the public review period, as appropriate, and brought back to the Board before finalizing.

Attachments

- A. Directions 2050, Long Range Transportation Plan, Executive Summary, Draft, July 2026
- B. Draft 2026 Long-Range Transportation Plan Summary of Supporting Transportation Plans and Studies

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DIRECTIONS **2050**



LONG RANGE TRANSPORTATION PLAN
Sustainable, Equitable, and Innovative Transportation Solutions

EXECUTIVE SUMMARY *DRAFT*



JULY 2026



Introduction



L RTP Purpose

This Long-Range Transportation Plan (LRTP) looks out to the year 2050 to identify strategies that can address Orange County’s future transportation challenges. These strategies intend to improve mobility, protect transportation assets, and enhance the quality of life for all Orange County travelers.

The Orange County Transportation Authority (OCTA) prepares an LRTP every four years to provide input into the Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS) prepared by the Southern California Association of Governments (SCAG). Similar to the LRTP, SCAG’s RTP/SCS provides a system-level vision but at a regional scale, covering the counties of Orange, Los Angeles, Riverside, San Bernardino, Ventura, and Imperial. Projects must be included in an approved RTP/SCS to be programmed for state and federal funding through the Federal Transportation Improvement Program (FTIP) and to receive project-level approvals from state and federal agencies. This is a continuous planning process as shown in *Figure 1-1*.

The LRTP process provides the opportunity to respond to changing conditions and aligning policies, investments, and local and regional partnerships to meet Orange County’s evolving transportation needs.

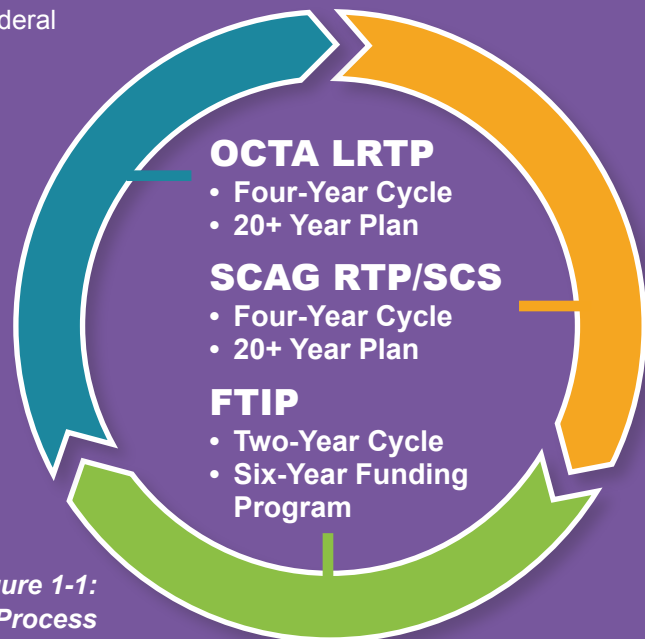


Figure 1-1:
Continuous Planning Process









Public Engagement

The LRTP is a countywide effort that reflects the diverse communities and travel needs across Orange County. To support inclusive and meaningful participation, OCTA implemented a broad public engagement approach designed to reach residents, stakeholders, partner agencies, and community-based organizations representing a wide range of perspectives, geographies, and mobility needs.

An initial phase of public outreach was conducted between September 11 and November 9, 2025, to build awareness of the LRTP and gather early input on transportation challenges, priorities, and long-term strategies. Accessibility was emphasized through a combination of engagement methods, including multilingual surveys, community events, public webinar, digital outreach, and targeted notifications. More than 1,800 multilingual surveys were collected, and more than 72,000 community members were reached via community events, public presentations, a community leaders roundtable, targeted stakeholder briefings, fliers, e-mails, and text notices.

Overall, public input highlighted concerns related to traffic congestion and expressed interest in expanding multimodal travel options and maintaining local transportation funding sources.

Key Survey Results:

 <p>40% of respondents wanted more bus routes, 37% wanted an expanded light rail network</p>	 <p>59% wanted reduced traffic on freeways to improve travel time and safety</p>	 <p>54% wanted mobility hubs that connect transit, shuttles, bike- and ride-shares</p>	 <p>50% wanted Bus Rapid Transit (BRT) services with dedicated lanes and fewer stops</p>	 <p>Nearly 50% of respondents wanted easier access to destinations like grocery shopping, entertainment areas, and schools</p>	 <p>70% wanted to continue the local transportation sales tax, and 60% wanted to charge fees for new developments to support transportation</p>
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Public input from this outreach effort informed the development of the LRTP goals and Preferred Scenario.



Planning for The Future

Measure M Program

The Measure M program, Orange County’s half-cent sales tax for transportation improvements, began collecting revenue in April 2011 following voter approval of the Measure M renewal in 2006 (M2). Building on the success of the original Measure M program, the renewal reflected voters’ confidence in OCTA’s ability to deliver promised transportation improvements. Now halfway through its 30-year lifespan, Measure M has generated nearly \$7.5 billion in transportation investments and leveraged state and federal funding to maximize local dollars. The program continues a legacy of investing in Orange County’s transportation network through improvements to freeways, streets, roads, and public transit, while supporting environmental programs that enhance and protect the region’s quality of life.

Freeways

More than half of the planned freeway improvements are complete, with additional projects underway to ease congestion and improve travel times. The Freeway Service Patrol has provided more than 889,000 assists, helping stranded drivers get safely back on the road.

Streets and Roads

More than \$1.3 billion has been invested in local streets in every city and the County, supporting road maintenance, pothole repairs, traffic signal synchronization and capacity improvements. These efforts have helped Orange County maintain the best pavement condition index in California, with a score of 79 compared to the statewide average of 65.

Transit

Measure M funds reduced bus fares and supported transit programs for seniors and people with disabilities, as well as community and special event shuttles. Funding also supports Metrolink rail service in Orange County, upgrades to stations, expanded transit connections, and it is helping bring the OC Streetcar into service.

Environment

Measure M is delivering significant environmental benefits:

- 1,300 acres of land preserved to protect sensitive habitats
- 350 acres restored to enhance ecosystems and support native plant and animal species
- More than 91.7 million gallons of trash removed from local waterways through environmental cleanup programs.



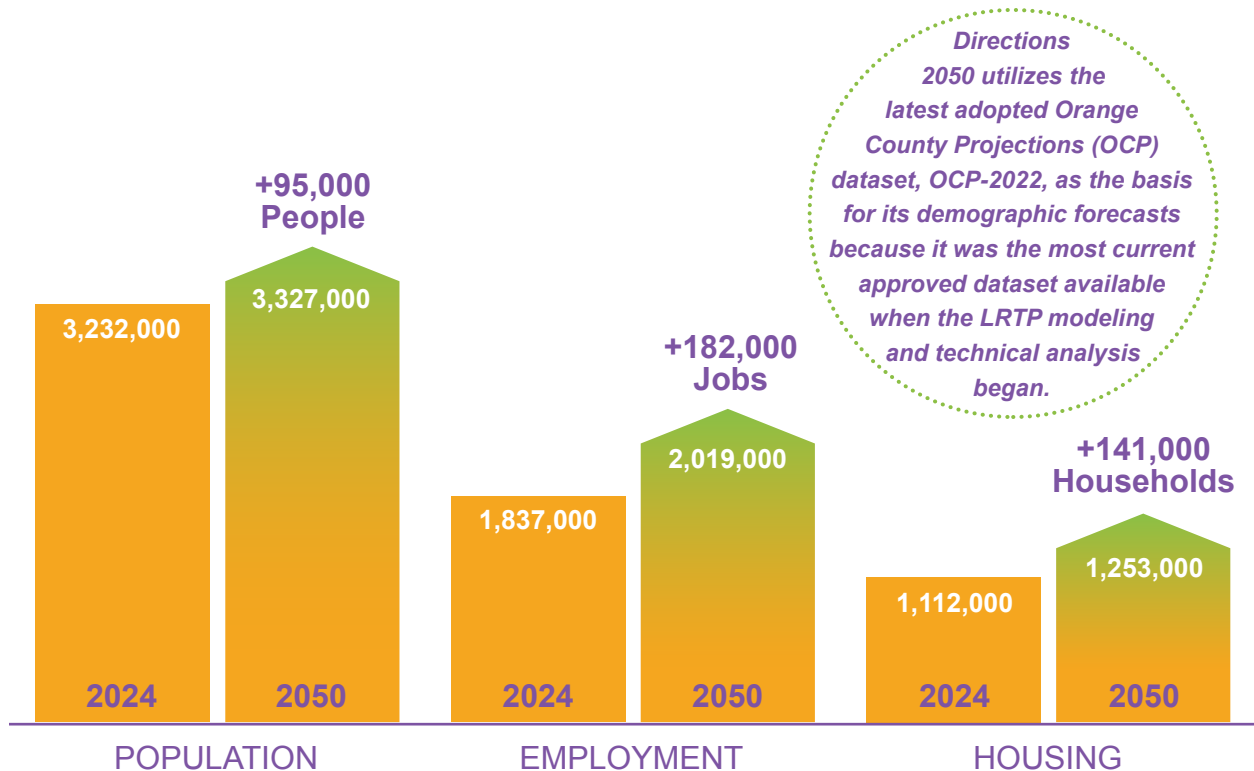
Measure M2 Sunset

With approximately 15 years remaining before the scheduled sunset of M2 in 2041, OCTA continues to deliver investments across all transportation modes while maintaining strong accountability and transparency. Many of the transportation programs currently supported by M2 have become integral parts of Orange County’s transportation system that travelers and local agencies have come to rely upon. Unless additional funding sources are identified, the expiration of M2 will result in the loss or reduction of programs such as community shuttles/circulators, signal synchronization, and roadway capacity improvements. Because the 2026 LRTP planning horizon is 2050, the anticipated loss of funding for these programs is a key consideration of the LRTP.



Population, Employment, and Housing Growth

Based on the socioeconomic forecasts developed by the Center for Demographic Research at California State University, Fullerton, Orange County's population is projected to increase by approximately three percent between 2024 and 2050, growing from 3.2 million to more than 3.3 million residents. There are slightly larger projected increases in housing and job growth in this period, with a 13% increase in households, and a 10% increase in jobs.



Directions 2050 utilizes the latest adopted Orange County Projections (OCP) dataset, OCP-2022, as the basis for its demographic forecasts because it was the most current approved dataset available when the LRTP modeling and technical analysis began.

Source: Orange County Projections 2022 by Center for Demographic Research California State University, Fullerton.

Demographic Shifts

Unlike previous LRTP cycles that focused on accommodating consistently positive demographic growth trends, this LRTP reflects a shift toward maintaining and optimizing the existing transportation system in response to slowing demographic growth and changing travel behaviors. The slowdown in demographic growth shown in OCP-2022 is largely driven by factors such as declining birth rates, increasing mortality in an aging population, and continued domestic out-migration.

An updated Orange County Projections dataset, OCP-2026, is currently under development and anticipated for adoption in late 2026, aligning with SCAG's 2028 RTP/SCS. Preliminary datasets indicate even slower growth than OCP-2022, but the OCP-2026 data will not be finalized in time to include in this LRTP.



2050 No Build Scenario

To assess future transportation needs, the 2050 No Build Scenario applies projected 2050 population, housing, and employment growth to today's transportation system.

The scenario assumes the existing 2024 transportation network remains largely unchanged through 2050 and reflects the anticipated expiration of M2 in 2041,

specifically the loss of recurring programs supported by M2, such as regional signal synchronization, Metrolink service support, arterial pavement maintenance, and other local mobility programs. This scenario provides a reference point for understanding how travel conditions may change if additional transportation investments are not made and key M2-supported programs are not continued beyond 2041.

Performance modeling indicates that, under this scenario, Orange County would experience increased congestion, slower travel speeds, and reduced transit ridership by 2050. Vehicle miles traveled (VMT) would also increase, suggesting greater environmental impacts. These results highlight the need for continued investment strategies that improve mobility, maintain system performance, and support long-term sustainability goals.

Performance Measures	2024 Existing	2050 No Build (% Δ to 2024 Existing)
Daily Person Trips (All Modes)	16,595,000	17,181,000 (↑ 3.5%)
Daily Vehicle Trips	10,970,000	11,406,000 (↑ 4%)
Daily Transit Person Trips	97,700	92,500 (↓ 5%)
Peak Period Freeway Speed (mph)	48.7	46.0 (↓ 2.7mph)
Peak Period Arterial Speed (mph)	28.4	23.2 (↓ 5.2mph)
Peak Period Managed Lane Speed (mph)	57.4	54.4 (↓ 3mph)
Daily Vehicle Hours of Delay (VHD)	245,100	337,100 (↑ 38%)
Delay as Percent of Travel Time	11%	13% (↑)
Daily Vehicle Miles Traveled (VMT) (in million VMT)	76.3	83.3 (↑ 9%)



Key Factors/Challenges

Through analysis of the 2050 No Build Scenario and public and stakeholder engagement, OCTA identified five key challenges expected to shape Orange County’s transportation system through 2050. These challenges highlight the changing conditions facing the region and informed the development of the L RTP goals.

Shifting Mobility Trends	Built-Out Roadways	Climate Risks and System Resiliency	Evolving Funding Landscape	Access to Economic Opportunities
<ul style="list-style-type: none"> • Post-pandemic travel behavior • Emerging technology • Freight and e-commerce growth 	<ul style="list-style-type: none"> • Slowing population growth • Limited right-of-way 	<ul style="list-style-type: none"> • Extreme weather events • VMT and GHG targets • High cost of zero-emission technology 	<ul style="list-style-type: none"> • High costs and changing legislation • M2 Sunset in 2041 	<ul style="list-style-type: none"> • Transit-dependent populations • First/last-mile connectivity gaps

While each challenge affects the transportation system in different ways, together they signal a shift in how Orange County must plan for the future.

Previous L RTP cycles focused heavily on accommodating rapid population growth and increasing travel demand. Although travel demand growth remains an important consideration, slowing population growth, changing travel behavior, and increasing fiscal and environmental constraints require a greater emphasis on maintaining and optimizing the existing transportation system. These challenges also highlight the growing importance of multimodal transportation options, operational improvements, system resiliency, and sustainable funding strategies. As a result, greater focus is placed on improving the performance of existing infrastructure, enhancing access to jobs and destinations, and ensuring that Orange County’s transportation system remains reliable and adaptable through 2050.



Goals and Performance Measures

Goals

In response to the challenges identified in the LRTP, the following four goals were established to guide how the performance of the LRTP will be evaluated.

Goal 1: Expand Multimodal Capacity

Providing a balanced transportation network that supports travel by transit, walking, biking, and driving. This goal focuses on expanding transportation options and improving connectivity across the county.

Goal 2: Improve Operations

Enhance the safety, efficiency, and reliability of the transportation system for people and goods. This goal focuses on optimizing the performance of existing infrastructure through operational improvements, technology, and strategic investments.

Goal 3: Enhance Accessibility

Improve access to jobs, services, and key destinations through convenient and affordable transportation options. This goal focuses on reducing barriers to mobility, strengthening first- and last-mile connections, and improving access for all users, particularly transit-dependent populations.

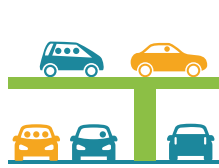
Goal 4: Strengthen System Resiliency

Develop a sustainable transportation system that can withstand climate risks, economic uncertainties, and other disruptions. This goal focuses on protecting transportation assets, maintaining system performance, and preparing for future disruptions.



2050 Preferred Scenario

The 2050 Preferred Scenario represents the package of projects, programs, and transportation service assumptions being evaluated through the LRTP. It builds on completed and ongoing OCTA planning efforts and tests how additional investments could improve mobility, support system reliability, expand travel options, and advance the LRTP goals through 2050. The scenario is organized into five strategic categories.



1

**Transit
System
Improvements**

2

**Roadway
System
Optimization**

3

**Enhanced
Active
Transportation**

4

**Mobility
Integration**

5

**Resilience
and System
Readiness**



1 Transit System Improvements

The Preferred Scenario builds on the near-term improvements identified in the Making Better Connections Plan by including additional transit service enhancements that improve bus travel times and advance corridor-based strategies identified in the 2024 OC Transit Vision and Transit Optimization Study. These efforts reflect this LRTP cycle’s focus on optimizing the existing bus transit network and improving the performance and competitiveness of transit service.

Consistent with the OC Transit Vision, the Preferred Scenario prioritizes Transit Opportunity Corridors, which are corridors with high ridership potential and opportunities for enhanced transit service and capital investment. Improvements may include increased service levels, dedicated lanes, queue-jump treatments, transit signal priority, and other investments that improve speed, reliability, and customer experience. The Preferred Scenario also includes projects that strengthen intermodal connectivity and enhance transit stops and stations.

The Preferred Scenario assumes continuation of several transit services and programs currently supported by M2, including Safe Transit Stops, OC Streetcar operations, and Metrolink service, recognizing their importance to long-term mobility in Orange County.



**OC Bus and
OC ACCESS**



**Transit
Opportunity
Corridors**



**Safe Transit
Stops**



OC Streetcar



**Transit Signal
Priority**



2 Roadway System Optimization

Roadway projects included in the Preferred Scenario focus on improving safety, reducing congestion, and optimizing the performance of the existing roadway network, with an emphasis on strategies that can be implemented within existing right-of-way. These investments support all roadway users, including personal vehicles, transit operations, goods movement, emergency response, and active transportation.

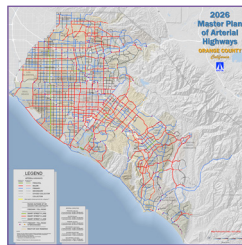
The Preferred Scenario assumes full implementation of the M2 freeway program and includes additional operational improvements informed by recent planning efforts, including the Freeway Chokepoint Study. These improvements focus on enhancing safety and traffic flow through strategies such as improved merge and weave areas, auxiliary lanes, and ramp modifications, rather than large-scale expansion of general-purpose roadway capacity.

The Preferred Scenario also retains key roadway programs currently supported by M2, including improvements to the Master Plan of Arterial Highways (MPAH) and regional traffic signal synchronization. These investments play an important role in improving connectivity, reducing delay, and maximizing the efficiency of the existing transportation system.

In addition, the Preferred Scenario advances transportation systems management and operations (TSMO) strategies, including intelligent transportation systems, connected vehicle technologies, and real-time traffic management. Consistent with Caltrans' long-range planning efforts, the scenario also assumes continued expansion and connectivity of the regional managed lane network to improve travel-time reliability and system efficiency.



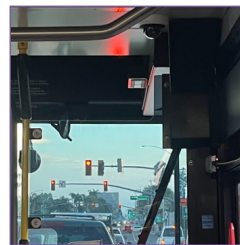
Address Freeway Hotspots



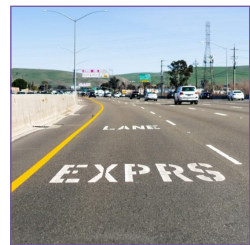
Regional Capacity Program



Signal Synchronization



Transportation Systems Management and Operation



Managed Lane System



3 Enhanced Active Transportation

Active transportation projects included in the Preferred Scenario focus on improving safety, connectivity, and accessibility for people walking and biking. These investments support everyday trips, supplement first- and last-mile access to transit, and provide additional travel options throughout Orange County. Projects in this category emphasize coordination and partnership with local jurisdictions to reflect community context and local priorities.

The Preferred Scenario builds upon initiatives carried forward from previous LRTP cycles, including gap closure in the countywide bikeway network, such as the OC Loop and OC Connect, and continued support for safety-focused programs including Safe Routes to School, Next Step, and bicycle safety education. These investments are intended to create a safer and more connected active transportation network while encouraging greater use of walking and bicycling.

The Preferred Scenario also incorporates findings from the ongoing Bikeways Connectivity Study, which identifies opportunities to implement complete streets improvements on segments of the Master Plan of Arterial Highways. Together, these projects support a more connected multimodal transportation system and expand access to destinations throughout the county.



Bicycle and Pedestrian Network



Gap Closure



Safety Programs



Complete Streets



4 Mobility Integration

The Mobility Integration strategy includes projects and programs that improve connections between travel modes and reduce barriers to multimodal travel. These strategies are intended to complement transit, improve mobility for transit-dependent populations, and provide more convenient transportation options throughout the county.

The Preferred Scenario retains several effective programs currently supported by M2, including community circulators and senior and disability mobility programs. Other travel demand management strategies, such as OC Vanpool and rideshare support continue to play an important role.

The Preferred Scenario also continues to advance a mobility hub network to make multimodal travel more convenient. Mobility hubs bring together transit, micromobility, rideshare, and traveler information services in a single location to support seamless transfers and improve access to key destinations. A Mobility Hub Concept of Operations is currently under development to guide future planning and implementation, with an initial focus on locations near regional transit corridors, major activity centers, and employment centers.



**Community
Circulators**



**Senior Mobility
Programs**



**Travel Demand
Management**



**Reduced or Fare-
Free Programs**



**Mobility Hubs
Network**



5 Resilience and System Readiness

The Resilience and System Readiness strategy focuses on maintaining and protecting transportation assets, preparing the system for climate-related risks, and ensuring Orange County’s transportation network can adapt to changing conditions. Projects in this category support long-term system reliability, sustainability, and continuity of service.

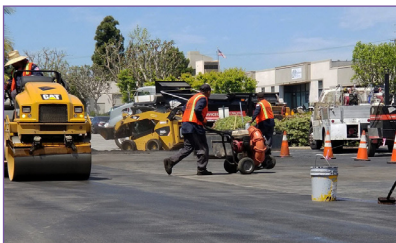
The Preferred Scenario builds on several ongoing initiatives, including OCTA’s transition to a zero-emission bus fleet and M2-supported programs that help maintain and preserve transportation infrastructure. These include local pavement maintenance support through the local fair share program, freeway environmental mitigation, and environmental cleanup programs that contribute to the long-term health and performance of the transportation system.

The Preferred Scenario also incorporates strategies identified in the 2024 Climate Adaptation and Sustainability Plan to address risks associated with extreme heat, flooding, wildfire, and other climate-related impacts. Additional investments include short- and mid-term improvements identified through the ongoing Coastal Rail Resiliency Study to help protect critical rail infrastructure and maintain reliable rail service.

Recommendations from the recently updated Goods Movement Vision are included to support the efficient movement of freight across highways, rail corridors, and local roadways while improving supply-chain reliability, reducing emissions, and strengthening Orange County’s long-term economic resiliency.



Environmental Programs



Local Pavement Maintenance



Zero-Emission Fleet



Climate Adaptation and Sustainability



Coastal Rail Stabilization



Goods Movement



Project List

Route/Mode	From	To	Description
Local Highway			
Various			Project O: Regional Capacity Program
Various			Project P: Regional Traffic Signal Synchronization Program
Various			OC Bikeways buildout
Various			Enhanced active transportation network
State Highway			
I-5	Alicia Parkway	El Toro Road	Project C: Add one (1) high-occupancy vehicle (HOV) lane in each direction; add auxiliary lanes as needed
I-5		El Toro Road	Project D: Improve access and merging in the vicinity of El Toro Road
I-5	SR-73	Oso Parkway	Project C/D: Add one (1) general purpose lane in each direction; add auxiliary lanes as needed and improve interchange at Avery Parkway
I-5	I-405	Yale	Project B (Segment 1): Add one (1) general purpose lane each direction; improve merging
I-5	Yale Avenue	SR-55	Project B (Segment 2): Add one (1) general purpose lane each direction; improve merging
I-5	Red Hill Avenue	Los Angeles County Line	Convert the existing HOV lane to an express lane, in each direction, between Red Hill Avenue and SR-55; convert two existing HOV lanes to express lanes, in each direction, between SR-55 and SR-57; convert the existing HOV lane to an express lane, in each direction, from SR-57 to the Orange/Los Angeles County Line; and construct an additional express lane, in each direction, between SR- 57 and SR-91.
I-5	Avenida Pico	San Diego County Line	Add 1 managed lane each direction
I-5	Barranca Parkway		Add southbound HOV on-ramp and northbound HOV off-ramp
SR-55	I-405	I-5	Project F: Add one (1) general purpose Lane and one (1) managed lane each direction and address chokepoints; add auxiliary lanes each direction between select on/off ramps and operations improvements
SR-55	I-5	SR-91	Project F: Add one (1) general purpose lane each direction and address chokepoints from I-5 to SR-22; and other operational improvements
SR-57	Orangewood Avenue	Katella Avenue	Project G: Add one (1) northbound general purpose lane
SR-57	Lambert Road	Los Angeles County Line	Project G: Add one (1) northbound truck climbing lane
SR-73	SR-133	Newport Coast Drive	Add one (1) toll lane in each direction (Catalina View)



Route/Mode	From	To	Description
State Highway (continued)			
SR-73	MacArthur Boulevard	I-405	Add one (1) managed lane each direction
SR-91	SR-55	Lakeview Avenue	Project I: Improve interchanges and merging; add and re-establish auxiliary lanes to several segments; install overhead signs at Post Mile (PM) R11.13 to PM R11.38 (Segment 1)
SR-91	La Palma Avenue	SR-55	Project I: Add one (1) eastbound general purpose lane from SR-55 to SR-57; Improve interchanges and merging from SR-55 to La Palma; add auxiliary lanes in some segments (Segment 2).
SR-91	Acacia Avenue	La Palma Avenue	Project I: Add one (1) westbound general purpose lane from the SR-91/SR-57 Connector to State College Blvd; improve interchanges and merging from La Palma Ave to Raymond Avenue; add auxiliary lanes in some segments (Segment 3).
SR-91	SR-241	SR-71	Project J: Add 6th eastbound general purpose lane
SR-91	Fairmont Boulevard		Construct overcrossing and SR-91 Interchange at Fairmont Boulevard
SR-91			Express Lanes operations
SR-241	SR-261	SR-91	Add Express direct connectors
SR-241	SR-133	North of SR-261	Add one (1) lane each direction (Loma Ridge)
I-405	I-5	SR-55	Project L: Add one (1) general purpose lane each direction and add southbound auxiliary lanes from SR-133 to Irvine Center Drive
I-405	I-605	SR-55	Express Lanes operations
I-605	Katella Avenue		Improve interchange
Various			Freeway chokepoint improvement projects (assumed locations): <ul style="list-style-type: none"> • I-5 northbound at SR-22/SR-57 off-ramps • SR-57 northbound at Ball Road • SR-57 northbound at SR-91 • SR-57 southbound at SR-90 • SR-57 southbound from Nutwood Avenue to Orangethorpe Avenue • SR-91 eastbound from Brookhurst Street to Raymond Avenue
Various			California Department of Transportation (Caltrans') conversion to Express/HOT 3+ network



Route/Mode	From	To	Description
Transit			
OC Bus			Comprehensive Business Plan Restored Services
OC Bus			Making Better Connections Plan
OC Bus			OC Transit Vision Transit Opportunity Corridors <ul style="list-style-type: none"> • Beach Boulevard • Garden Grove Boulevard – Chapman Avenue • Edinger Avenue • Main Street • Katella Avenue • La Palma Avenue – Lincoln Avenue • Warner Avenue • Harbor Boulevard • State College Boulevard – Bristol Street • Westminster Avenue – 17th Street
OC Bus			Transit Signal Priority
OC Streetcar	Santa Ana Regional Transportation Center	Harbor Boulevard	OC Streetcar
Metrolink			October 2024 Service: 58 weekday trains
Metrolink			Project R: Placentia Metrolink Station
LOSSAN			Grade separation at Ball Road, Grand Avenue, Main Street, and Orangethorpe Avenue
LOSSAN	Grand Avenue	Santiago Street	17th Street grade separation
LOSSAN	Santiago Street	I-5	Santa Ana Boulevard grade separation
LOSSAN	Howell Avenue	Katella Avenue	State College Boulevard grade separation
Others			
Countywide			OC Mobility Hubs Network
Countywide			Transportation demand management strategies (remote work, reduced transit fares, etc.)
Countywide			Transportation system management and operations strategies (enhanced signal synchronization, connected vehicles integration, integrated corridor management, etc.)

Acronyms:

I – Interstate

LOSSAN – The Los Angeles – San Diego – San Luis Obispo Rail Corridor Agency

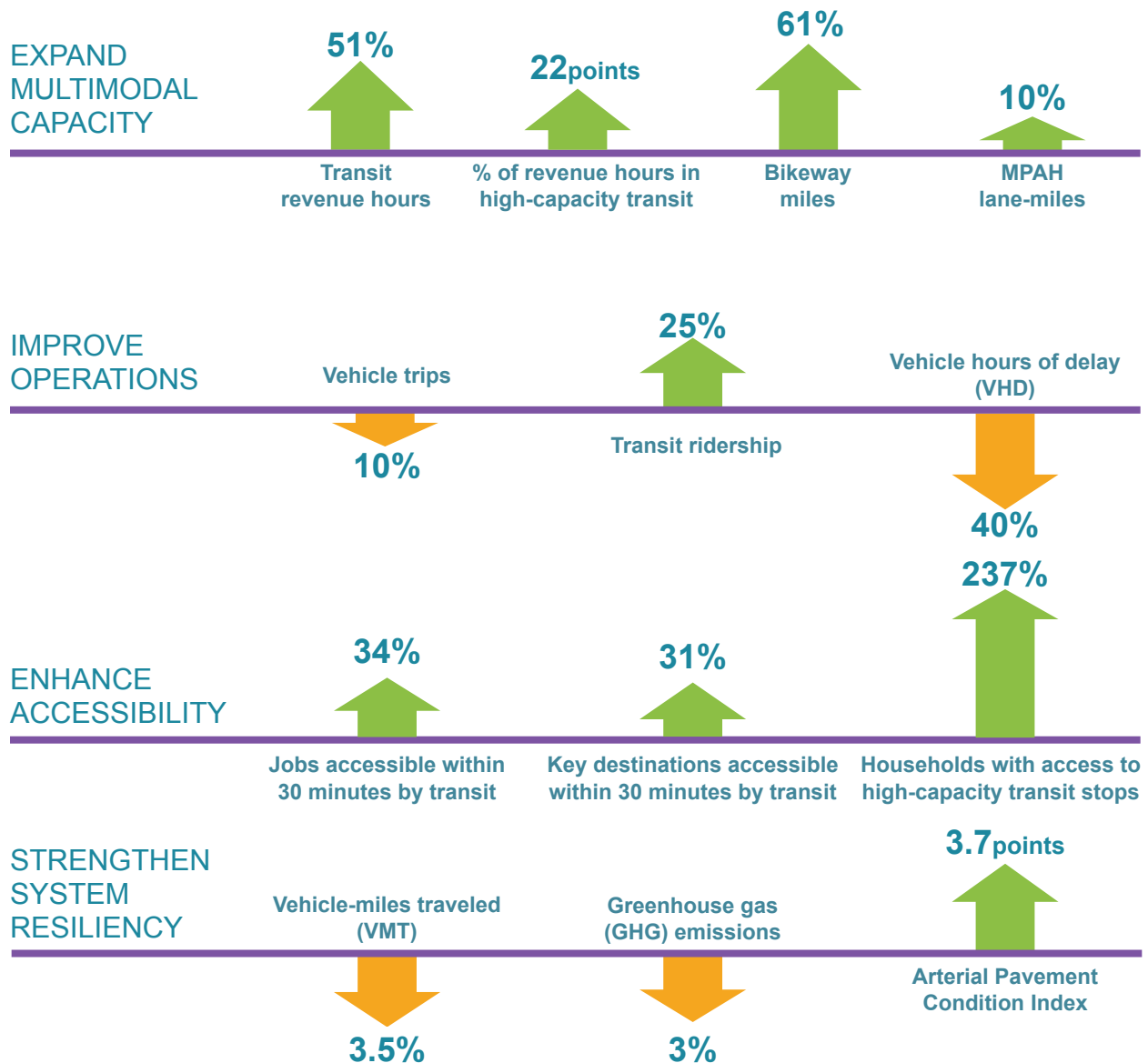
SR – State Route



System Performance

The Preferred Scenario represents a balanced set of transportation strategies designed to meet Orange County’s future mobility needs. A series of performance measures were analyzed to evaluate how well the Preferred Scenario projects and programs advance the LRTP goals. **The following graphics compare selected performance measures for the 2050 Preferred Scenario against the 2050 No Build Scenario.**

Overall, the modeling results indicate that the Preferred Scenario improves system performance across all LRTP goals by reducing congestion, increasing transit ridership and accessibility, expanding access to jobs and destinations, and strengthening the system’s ability to accommodate future growth. Together, these results demonstrate that a balanced combination of capital investments, operational improvements, and multimodal strategies is necessary to maintain long-term mobility and system performance.



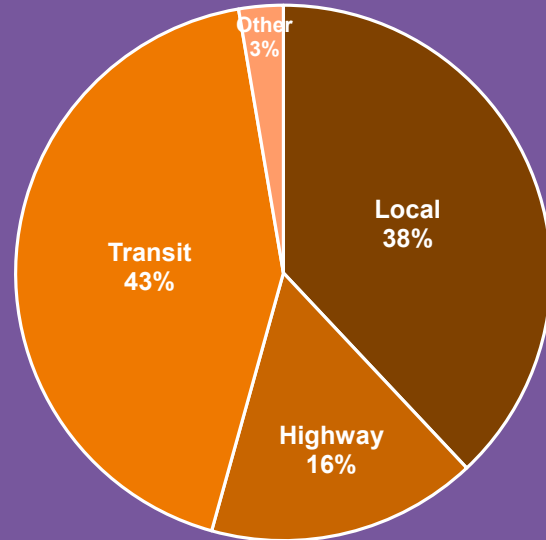


Financial Forecast

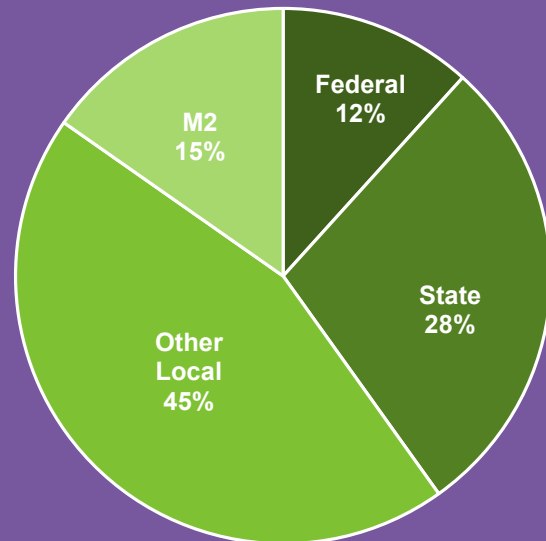
Implementation of the full 2050 Preferred Scenario is projected to require approximately **\$63.9 billion** in transportation investments between 2025 and 2050. As shown in the charts on the right, transit investments account for the largest share of expenditures, followed by local roadway, highway, and other transportation programs. Based on current forecasts, total transportation revenues over the same period are estimated at approximately **\$58 billion**, with funding expected from a combination of federal, state, M2, and other local sources.

The resulting funding shortfall of approximately \$5.9 billion is driven largely by the continuation of recurring programs currently supported by M2 beyond its scheduled sunset in 2041, as well as new investments needed to achieve the LRTP goals.

While the LRTP does not assume a specific funding solution to address this gap, the financial analysis helps quantify the magnitude of the long-term funding need and provides a basis for future discussions regarding funding strategies and revenue opportunities needed to sustain Orange County's transportation system through 2050.



Total Expenditures by Project Type: \$63.9 Billion



LRTP Funding by Source: \$58.0 Billion

Funding Shortfall:
\$5.9 Billion



Moving Forward

The LRTP is updated every four years to adapt to changing conditions and includes a Short-Term Action Plan that identifies planning efforts intended to advance the Preferred Scenario strategies over the next several years. These efforts are designed to further refine the Preferred Plan, respond to evolving transportation trends and policy requirements, and inform future LRTP updates.

Short-Term Action Plan

OCTA has identified several short-term planning activities that are outlined in the table below. These are intended to support the Preferred Scenario and development of future LRTPs.

Activity	Description
Orange County Planning Activities	
Active Transportation Plan	Establish framework to guide the development of infrastructure, programs, and policies for a countywide active transportation system and position the county to compete for future funding opportunities.
Complete Streets	Coordinate with local jurisdictions and establish a streamlined process to integrate active transportation projects on the Master Plan of Arterial Highways (MPAH).
Managed Lanes Network Study	Update the Express Lanes Network Study to reflect current operating conditions and future implementation strategies.
Street and Highway Strategic Plan	Evaluate countywide streets and highway needs and identify improvement strategies on regionally significant facilities.
Toll Roads Beyond 2050	Coordinate with Caltrans District 12 and TCA to plan for toll road improvements and operational approaches on the toll road corridors beyond 2050; including identifying traffic modeling approach for future transportation planning analyses.
Signal Synchronization	Support local initiatives to maintain signal synchronization corridors countywide and study opportunities for integrating advanced technologies.
Multimodal Corridor Study	Develop programming -level project initiation document to evaluate improvements along the non-tolled portion of the SR-73 and managed lane connectivity.
Freeway Chokepoints	Develop programming-level project initiation document to evaluate potential freeway chokepoint improvements.
Pacific Electric Right-of-Way (PE ROW) Planning	Explore opportunities to use former PE ROW to improve system efficiency and connectivity.



Activity	Description
Long-Term Transportation Funding Strategy	Develop and recommend strategies for securing funds for addressing transportation needs beyond the 2041 sunset of the M2 sales tax.
Equity Planning	Explore opportunities to improve equity-related analyses in OCTA planning processes.
Traffic Model Update	Update the Orange County Traffic Analysis Model (OCTAM) to incorporate the latest socioeconomic data.
Transportation Demand Management (TDM)	Advance TDM strategies to expand sustainable travel options and reduce reliance on single-occupancy vehicle trips.
Coordination with Local Partner Agencies	Continue dialogue with local jurisdictions – the California Department of Transportation (Caltrans) District 12, TCA, local transit operators, and other local agencies as needed to further intra-county connectivity.
Intelligent Transportation System (ITS) Planning	Advance prioritized ITS strategies and projects to align with state and federal guidance and improve system efficiency, safety, and coordination across the county.
Sustainable Transportation Strategies	Study potential for a mitigation program designed to offset vehicle miles traveled (VMT) induced by transportation and land-use projects within Orange County.
Adaptation and Sustainability Planning	Advance implementation of priority Climate Adaptation and Sustainability Plan measures and update action strategies.
Transit Vision Update	Update the long-term transit vision for Orange County.
Rail Strategic Plan	Develop a long-term rail vision for Orange County.
Asset Management	Monitor maintenance needs for existing and new facilities and equipment. Update fleet plans to address zero-emission bus requirements.
Short-Range Transit Plan	Develop a five-year transit plan including service update, performance, and policy analysis.
Transit Opportunity Corridor Study	Evaluate improvement opportunities on transit opportunity corridors identified in the 2024 Transit Vision.
Express Bus / Freeway BRT Study	Evaluate express bus and freeway BRT concepts on regionally significant corridors.
Transit Signal Priority Master Plan	Develop plan for short-term event-driven and long-term TSP improvements.
Coastal Rail Resiliency Study	Evaluate resiliency solutions for rail infrastructure along the county’s southern coast.
Transit Access and System Integration	Evaluate opportunities to improve transit access, strengthen connections between travel modes, and better integrate facilities and services to support increased ridership and system efficiency.
Regional Planning Activities	
2028 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)	Participate in the development of the 2028 RTP/SCS and initiate dialogue with SCAG and local jurisdictions.
Coordination with Regional Partner Agencies	Continue the dialogue with the Southern California Association of Governments (SCAG), San Diego Association of Governments (SANDAG), LA Metro, County Transportation Commissions, South Coast Air Quality Management District, Caltrans, and other regional agencies as needed to further inter-county connectivity.
Trade Corridors/Goods Movement	Advance a coordinated set of freight improvements, including truck routes, multimodal access, operational strategies, and funding priorities, through coordination with local and regional partners.



Activity	Description
SR-91 Express Lanes	Continue dialogue with RCTC and appropriate agencies to identify impacts to, and opportunities for, connectivity between the Los Angeles and Orange County transportation network.
2028 Olympics Service Plan	Develop a service plan for the transportation needs of the 2028 LA Olympics in coordination with regional and local partner agencies.
Southeast Gateway Line	Continue dialogue with LA Metro and appropriate agencies to identify impacts to, and opportunities for, connectivity between the Los Angeles and Orange County transportation network.
East Side Transit Corridor Phase 2	Continue dialogue with LA Metro and appropriate agencies to identify impacts and opportunities for connectivity with Orange County's transportation network.
San Diego's I-5 High Occupancy Toll Lane Project	Continue the dialogue with SANDAG and appropriate agencies to identify impacts and opportunities for connectivity with Orange County's transportation network.
Emerging Issues	
State and Federal Policy	Monitor State and federal legislation, regulations, and policies.
State and Federal Funding	Identify strategies and opportunities to access and leverage State and federal funding.
Connected Infrastructure Needs Assessment	Study infrastructure needs and identify opportunities to implement and/or complement emerging transportation technologies.
Monitor Technology	Monitor developing technologies and their potential impacts on transportation (e.g., autonomous mobility, connected vehicles, artificial intelligence, and air taxis).
Transportation Outreach and Education	
Active Transportation Safety	Implement safety and education campaign initiatives focused on multimodal safety awareness and behavior change.
Inclusive Public Engagement	Provide all members of the public with equal opportunities to provide input into OCTA planning efforts.
Transit Use and Trip Planning	Explore new approaches to increase the use of modes other than single-occupant vehicles, including enhanced transit and active transportation facilities, public education, and incentives.



DIRECTIONS 2050

LONG-RANGE TRANSPORTATION PLAN

Connecting Communities: Better Mobility for All

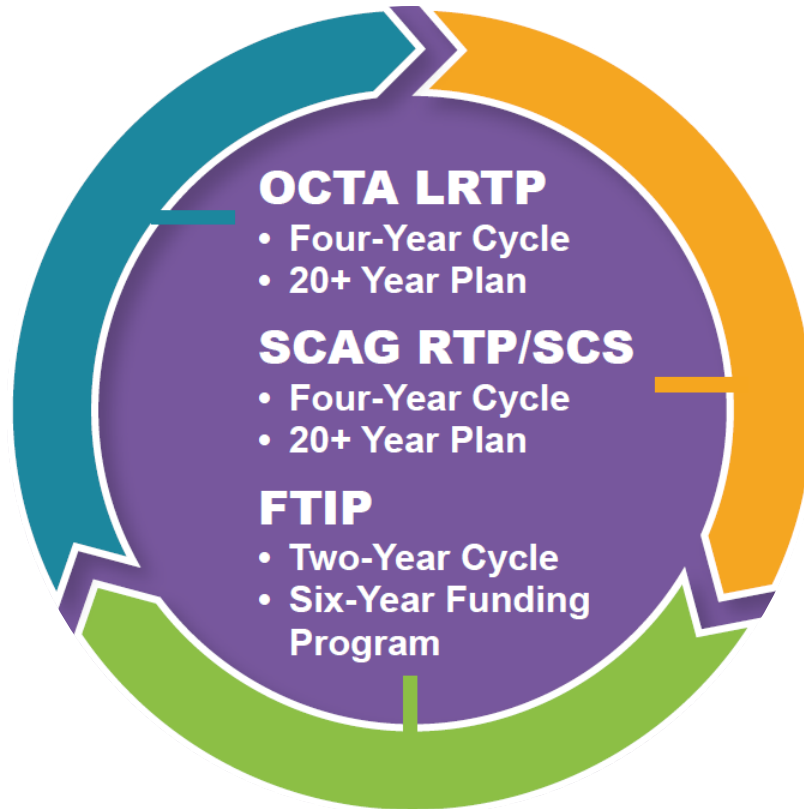


Draft 2026 Long-Range Transportation Plan





Long-Range Transportation Plan - Purpose



Develop a transportation blueprint for Orange County through 2050

- Assess OCTA's current plans and policies
- Evaluate future mobility needs
- Identify new initiatives and priorities
- Define projects in SCAG's RTP

FTIP – Federal Transportation Improvement Program
LRTP - Long-Range Transportation Plan
OCTA – Orange County Transportation Authority
RTP – Regional Transportation Plan
SCAG – Southern California Association of Governments
SCS – Sustainable Communities Strategies



Long-Range Transportation Plan Goals



Expand Multimodal Capacity

Continue to invest in an integrated transportation network that supports all modes



Improve Operations

Enhance safety, efficiency, and reliability for daily travel and goods movement



Enhance Accessibility

Improve access to jobs and key destinations through convenient and affordable options



Strengthen System Resiliency

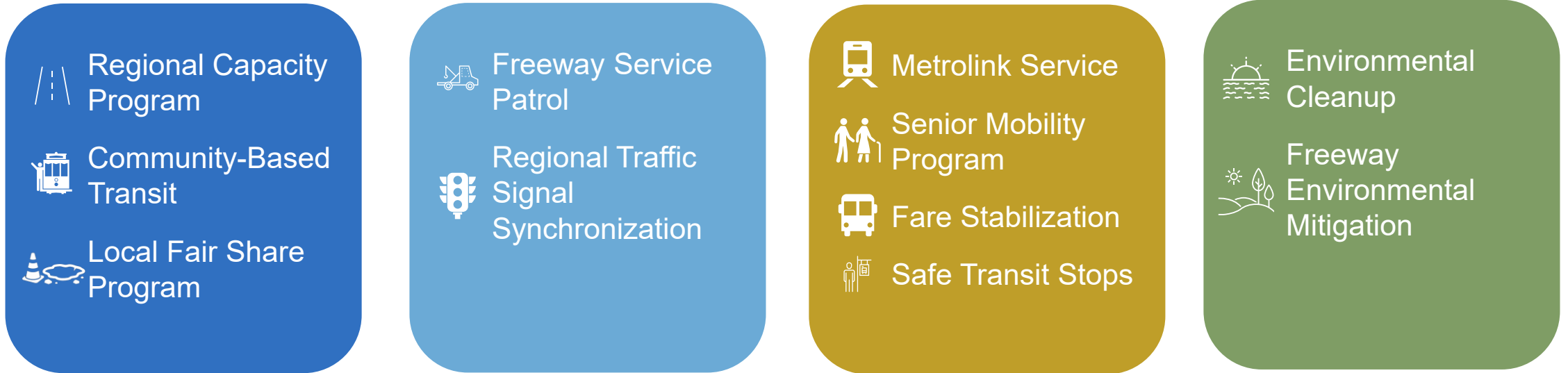
Develop a sustainable transportation system to withstand climate risks, economic uncertainties, and other disruptions

*The Draft LRTP goals were approved by OCTA Board on 9/8/2025.

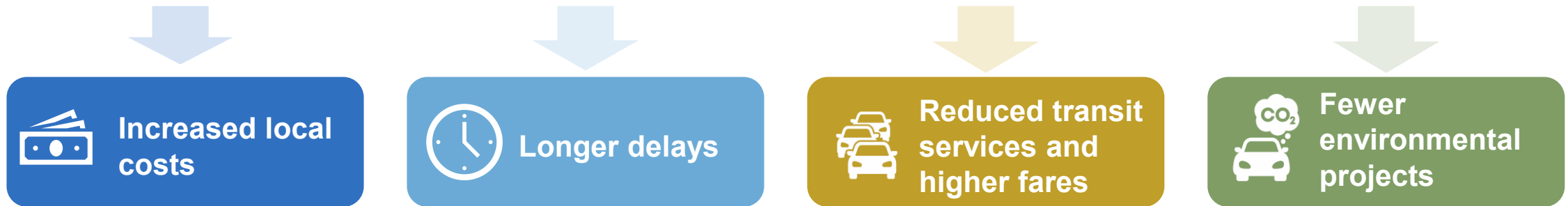


Measure M2 Sunset

Unfunded programs after 2041:

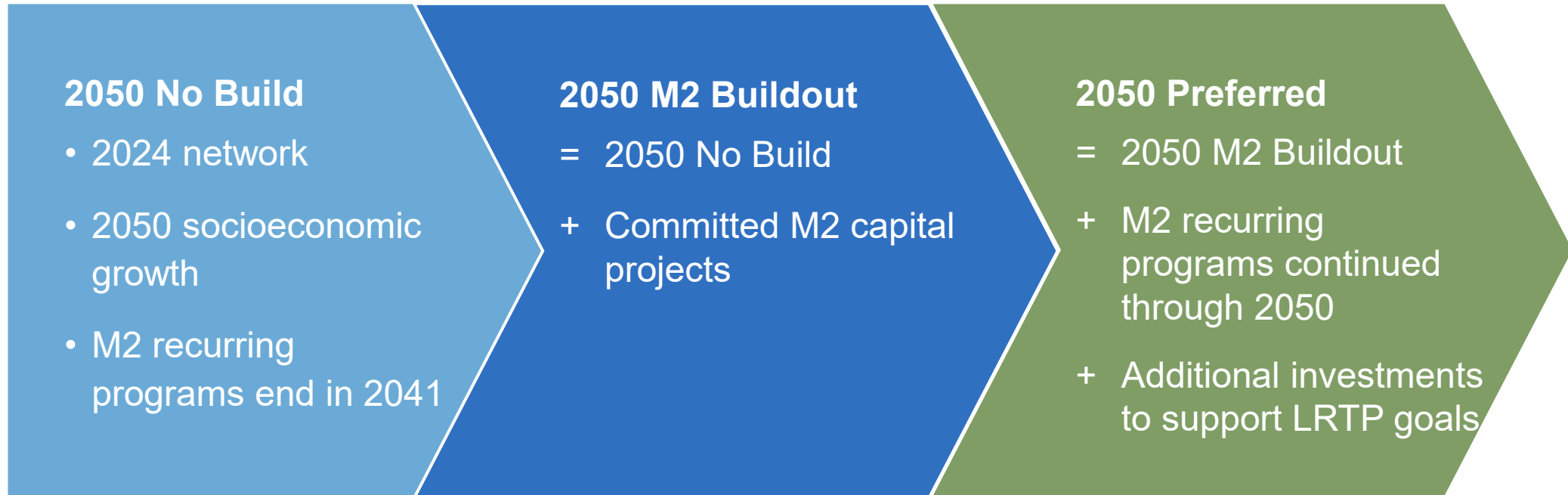


≈ **\$4.3 billion** of unfunded Measure M local transportation investment (2041-2050):





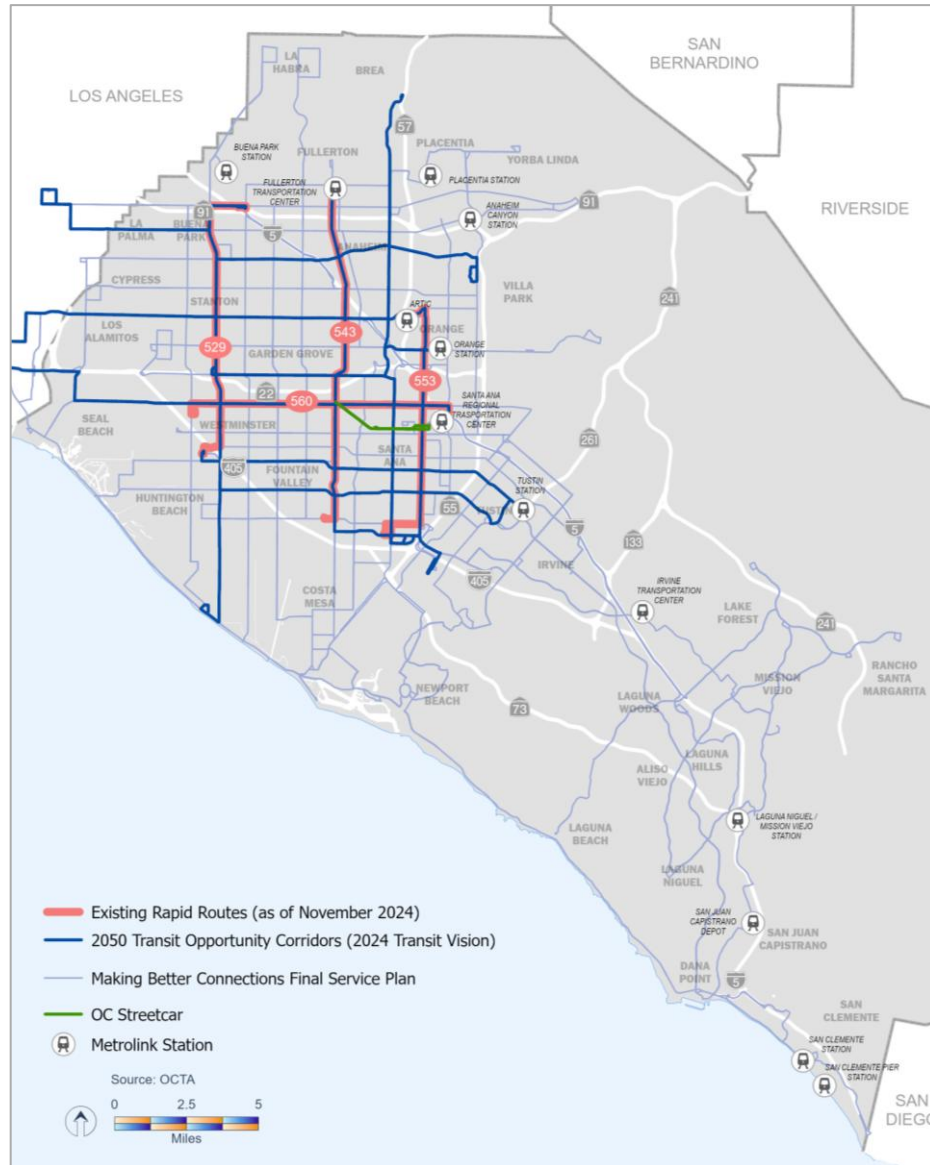
2050 Analysis Scenarios



M2 – Measure M2



2050 Preferred Scenario

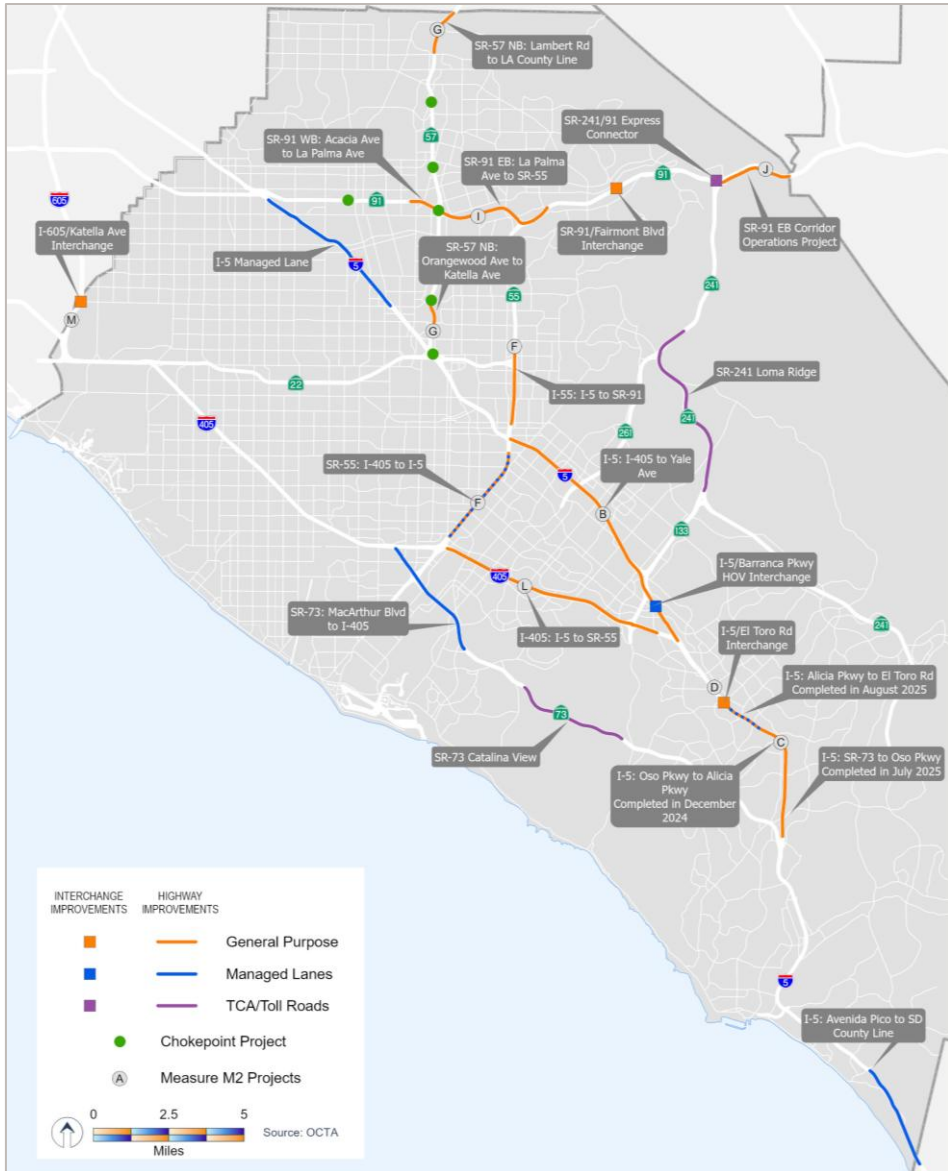


Transit System Improvements

- OC Bus and OC ACCESS
- Transit Opportunity Corridors
- OC Streetcar
- Metrolink Service
- Safe Transit Stops
- Transit Signal Priority



2050 Preferred Scenario (Cont.)



Roadway System Optimization

- M2 capital delivery
 - Freeway Program
 - Regional Capacity Program
- Signal synchronization
- Address freeway hotspots
- Transportation systems management and operation
- HOV conversion to express lanes

HOV – High-occupancy vehicle
 TCA – Transportation Corridor Agencies



2050 Preferred Scenario (Cont.)



Enhanced Active Transportation

- Bicycle and pedestrian network
- Gap closure
- Safety programs
- Complete streets



Mobility Integration

- Community circulators
- Senior mobility programs
- Travel demand management
- Reduced or fare-free programs
- Mobility hubs network



Resilience and System Readiness

- Environmental programs
- Arterial pavement maintenance
- Climate adaptation and sustainability
- Coastal rail stabilization
- Goods movement

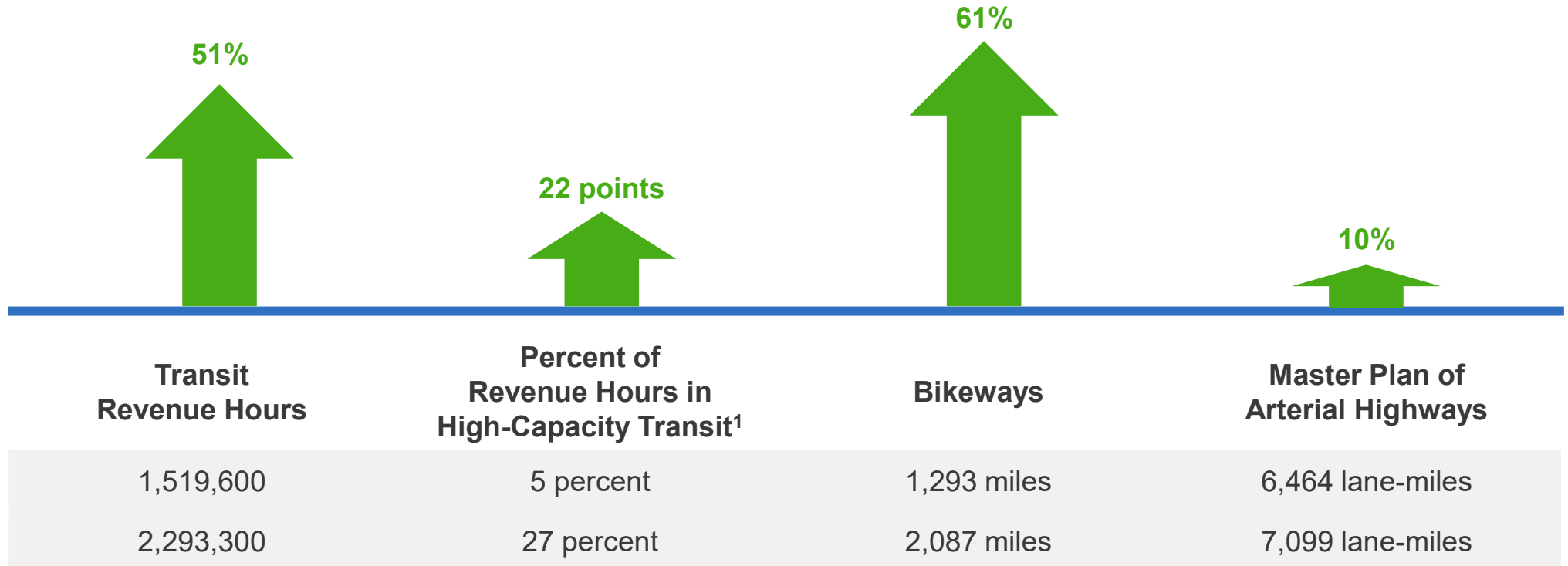


Achieving Long-Range Transportation Plan Goals



Expand Multimodal Capacity

Continue to invest in an integrated transportation network that supports all modes



¹Transit modes that can efficiently move large numbers of people quickly and reliably, as defined by 2024 OC Transit Vision. These modes typically include: bus rapid transit, light rail transit, OC Streetcar, and Rapid Bus.

% - percent

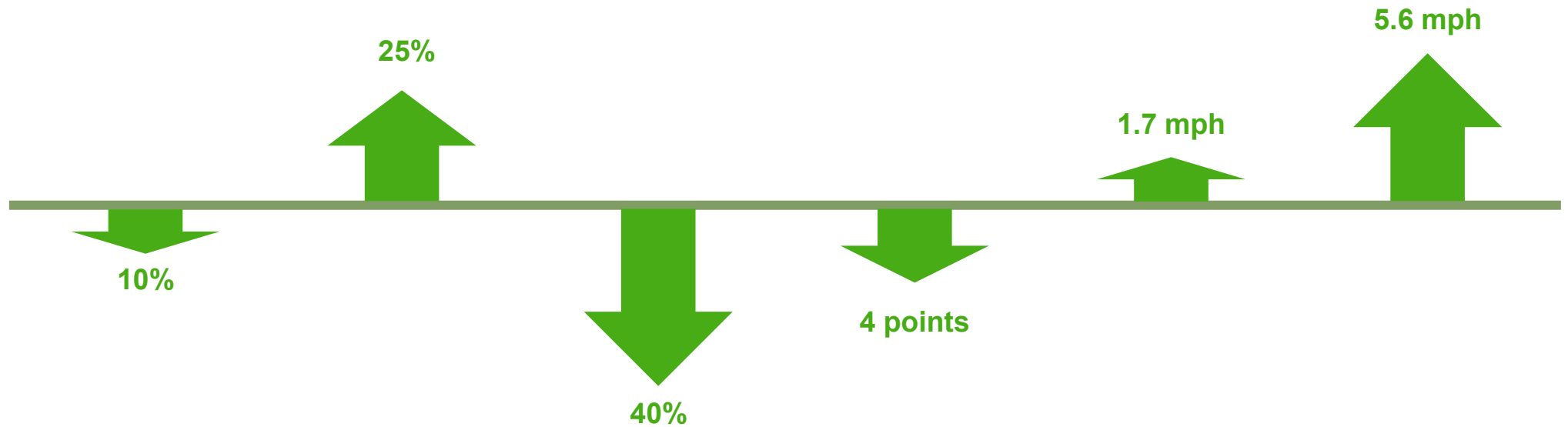


Achieving Long-Range Transportation Plan Goals (Cont.)



Improve Operations

Enhance safety, efficiency, and reliability for daily travel and goods movement



	Vehicle Trips	Transit Person Trips	Vehicle Hours of Delay	Delay as a Percent of Travel Time	Freeway Peak Period Speed	Arterial Peak Period Speed
2050 No Build	11,406,000	92,500	337,100	13 percent	46.0 mph	23.2 mph
2050 Preferred	10,227,000	115,900	202,100	9 percent	47.7 mph	28.8 mph

MPH = Miles per hour

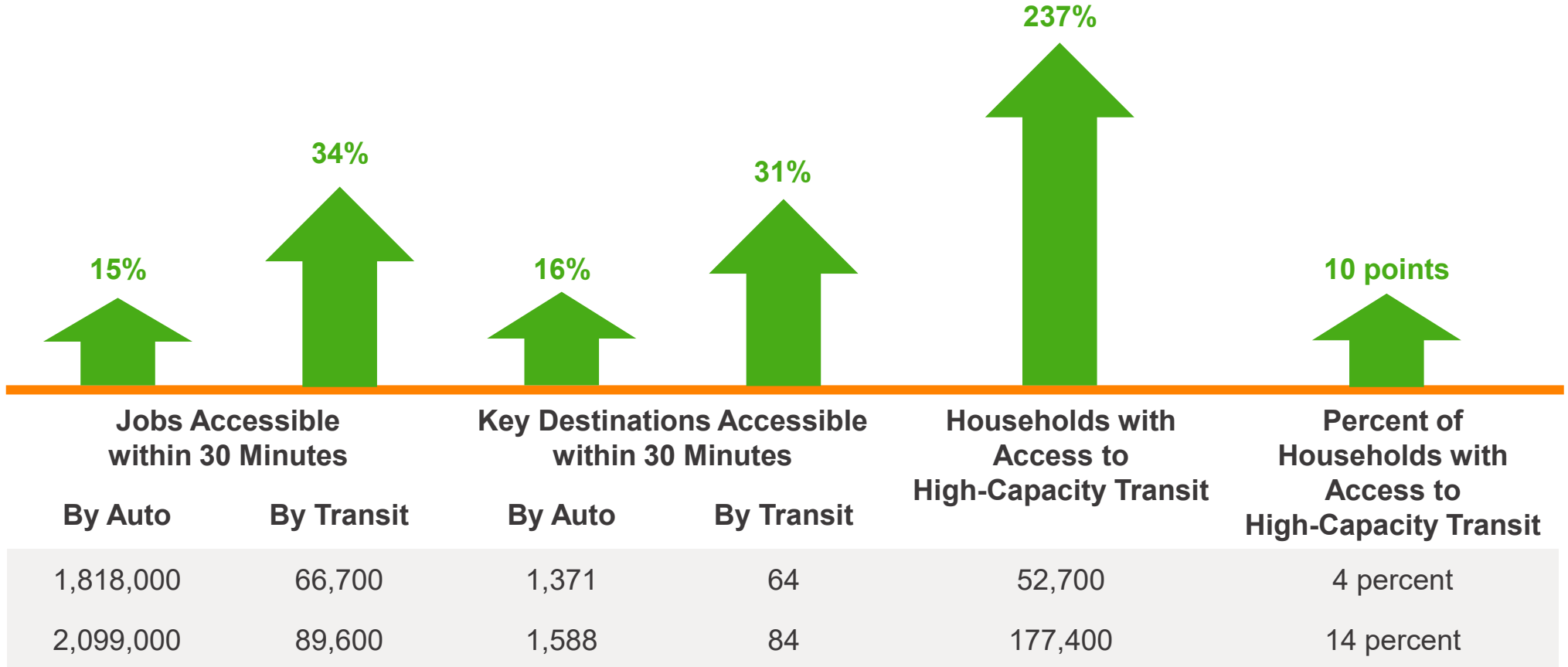


Achieving Long-Range Transportation Plan Goals (Cont.)



Enhance Accessibility

Improve access to jobs and key destinations through convenient and affordable options



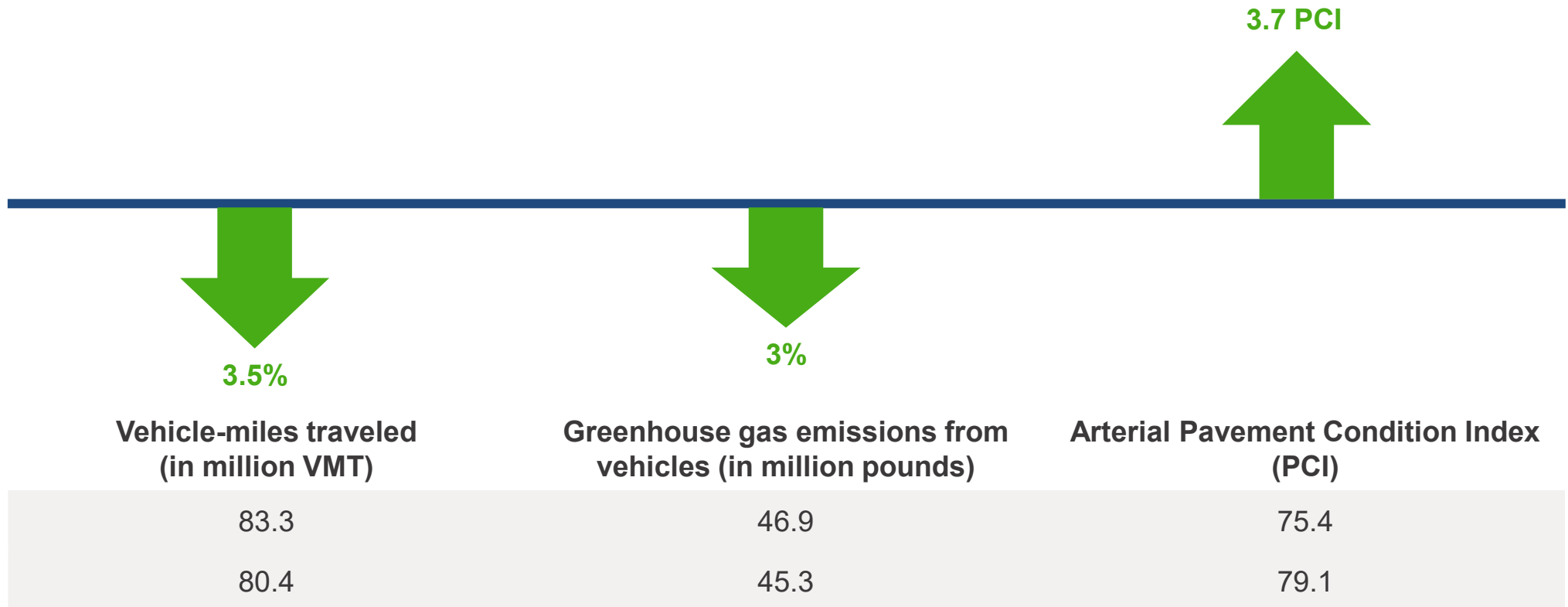


Achieving Long-Range Transportation Plan Goals (Cont.)



Strengthen System Resiliency

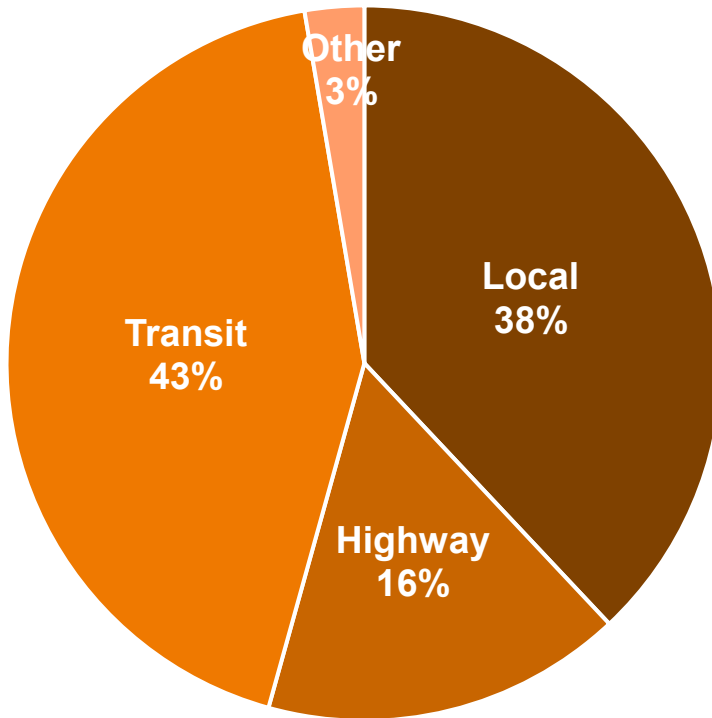
Develop a sustainable transportation system to withstand climate risks, economic uncertainties, and other disruptions



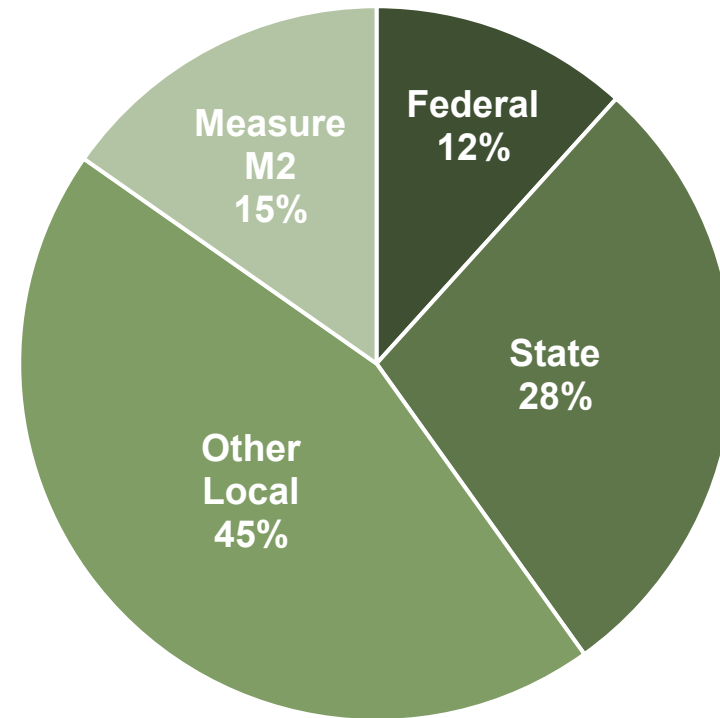


2050 Preferred Scenario Financial Forecast

Expenditures by Type
Total = \$63.9 billion



LRTP Funding by Source
Total = \$58.0 billion



2050 Preferred Scenario Funding Shortfall ~ \$5.9 Billion

(Includes **\$4.3 billion** in unfunded Measure M local transportation investment from 2041-2050)



Short-Term Action Plan

Orange County Planning Activities	Regional Planning Activities	Outreach and Education
Move OC: Active Transportation Plan	2028 RTP/SCS	Active Transportation Safety
Complete Streets	Coordination with Regional Partner Agencies	Transit Use and Trip Planning
Managed Lanes Network Study	Trade Corridors/Goods Movement	BRT – Bus rapid transit I-5 – Interstate 5 SR-91 – State Route 91
Street and Highway Strategic Plan	SR-91 Express Lanes	
Multimodal Corridor Study	2028 Olympics Service Plan	
Freeway Chokepoints Improvements	Southeast Gateway Line	
Pacific Electric Right-of-Way Planning	East Side Transit Corridor Phase 2	
Long-Term Transportation Funding Strategy	San Diego I-5 Managed Lane	
Transit Vision Update	Emerging Issues	
Short-Range Transit Plan	Monitor Technology	
Transit Opportunity Corridors	Connected Infrastructure Needs Assessment	
Express Bus/Freeway BRT Study	State and Federal Policy	
Transit Signal Priority Master Plan	State and Federal Funding	
Transit Access and System Integration		



Public Engagement

Host a webinar, telephone townhall, community leaders' roundtable, and stakeholder presentations

Engage the public at community events

Distribute multilingual online and print surveys

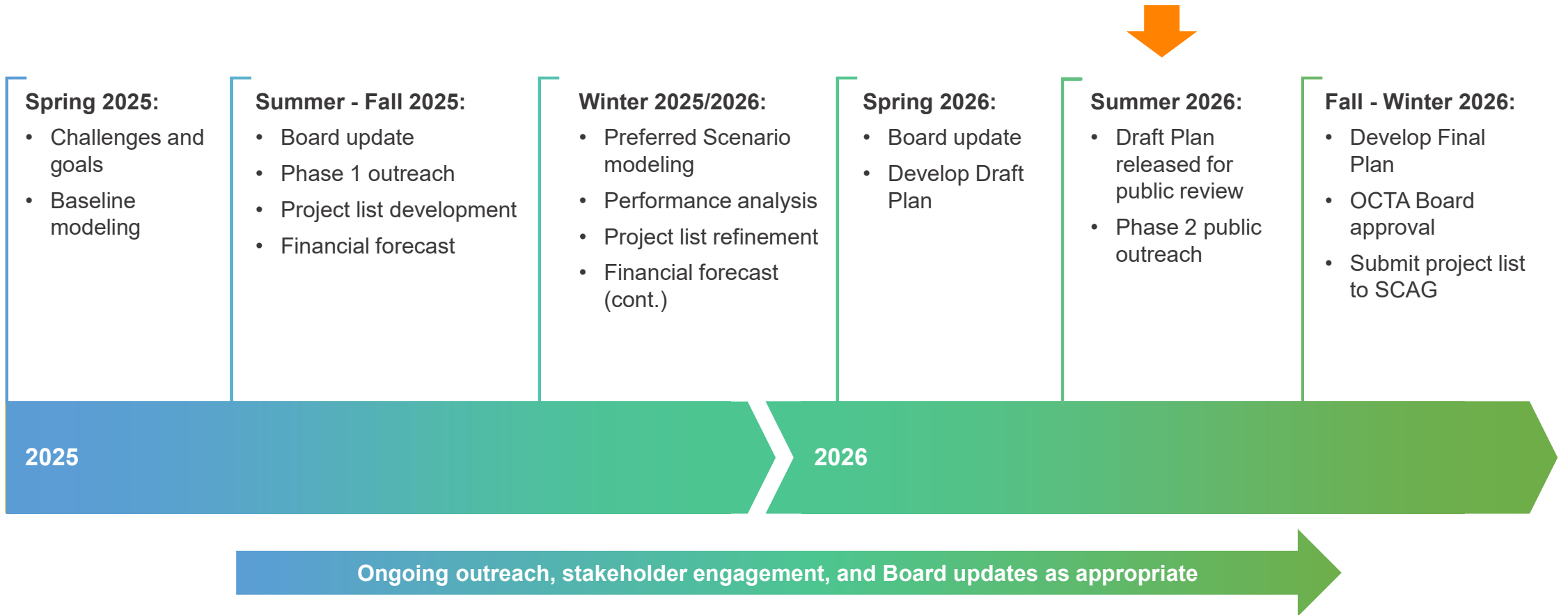
Deliver multilingual fliers to community centers, city halls, and libraries

Promote via multilingual print and radio ads, social media, texts, eblasts, and project video

The flyer is divided into two main sections. The top section is for a 'TELEPHONE TOWN HALL' on August 5, 2026, from 6 P.M. to 7 P.M. Below this is a 'JOIN THE CONVERSATION' section with phone numbers for English (1-888-400-1932), Spanish (1-888-400-9342), and Vietnamese (1-888-409-5380). It includes the OCTA logo, the website octa.net/LRTP, and an illustration of a diverse group of people. The bottom section is for a 'COMMUNITY WEBINAR' on August 26, 2026, from 6:00 to 7:00 P.M. It features a 'MAKE YOUR VOICE HEARD' call to action with a button that says 'Register Today at octa.net/LRTP' and a mouse cursor pointing to it. It also includes the OCTA logo and the same diverse group illustration.



Schedule and Milestones



Note: Schedule is estimated and subject to change

Draft 2026 Long-Range Transportation Plan Summary of Supporting Transportation Plans and Studies

Orange County Coastal Rail Resiliency Study (2026): A planning study that evaluates near-term strategies to protect the Los Angeles – San Diego – San Luis Obispo Rail Corridor from coastal erosion and other environmental hazards while maintaining safe and reliable passenger and freight rail service. The study also establishes a framework for future long-term solutions to improve the corridor's resilience.

Orange County Goods Movement Vision (2026): A countywide freight planning study that identifies current and future goods movement needs and establishes strategies to improve freight mobility, reliability, and last-mile connectivity. The study provides a framework for future freight policies, projects, and investments while strengthening Orange County's competitiveness for regional, state, and federal funding opportunities.

2024 OC Transit Vision (2025): A long-range plan that identifies strategies to improve and expand Orange County's transit system over the next 30 years. The plan establishes a framework for enhancing transit services, increasing ridership, and improving connectivity through near-, mid-, and long-term investments, including transit opportunity corridors and other service improvements.

Orange County Transportation Demand Management Plan (2025): A strategic plan that identifies programs and policies to reduce reliance on single-occupancy vehicle travel by expanding the use of transit, ridesharing, bicycling, walking, and other shared mobility options.

Climate Adaptation and Sustainability Plan (2024): A strategic framework that identifies opportunities to improve the resilience and sustainability of Orange County's transportation system by addressing climate-related risks and reducing environmental impacts. The plan builds upon the Orange County Transportation Authority's existing environmental initiatives and recommends adaptation and sustainability strategies to guide future transportation planning and investment.

Making Better Connections Study (2023): A comprehensive redesign of OCTA's bus network to better align transit service with changing travel patterns, customer needs, and post-pandemic travel behavior. The study recommends service improvements that increase efficiency, improve reliability, enhance connectivity, and position the transit system for future growth.

Orange County Bike Connectors Gap Closure Feasibility Study (2023): A study that identifies feasible projects to complete OC Loop's regional bikeway network by closing key gaps and improving connectivity between existing bicycle facilities. The study provides a framework for advancing regional bicycle corridors in partnership with local jurisdictions to improve access to transit, jobs, housing, and other destinations.

Orange County Mobility Hubs Strategy (2022): A countywide strategy that identifies locations with the greatest potential for mobility hubs and establishes a framework for planning and implementation. The strategy is intended to improve connections between transit and other travel options, reduce first- and last-mile barriers, and support more convenient multimodal travel throughout Orange County.

South Orange County Multimodal Transportation Study (2022): A long-range planning study that identifies multimodal transportation improvements and establishes a preferred strategy for addressing future mobility needs in south Orange County. The study provides a framework for future project development and supports regional transportation planning efforts.

Express Lanes Network Study (2020): The study evaluates the future development and phasing of Orange County's managed lane network in coordination with the California Department of Transportation's express lanes initiative. It establishes priorities for future managed lane implementation to improve travel time reliability, regional mobility, and operational performance.

OC Active (2019): Orange County's first countywide active transportation plan, establishing a framework for developing bicycle and pedestrian networks that improve safety, connectivity, and access throughout the County. The plan also serves as a foundation for local jurisdictions to compete for state Active Transportation Program funding to plan and implement bicycle and pedestrian projects.