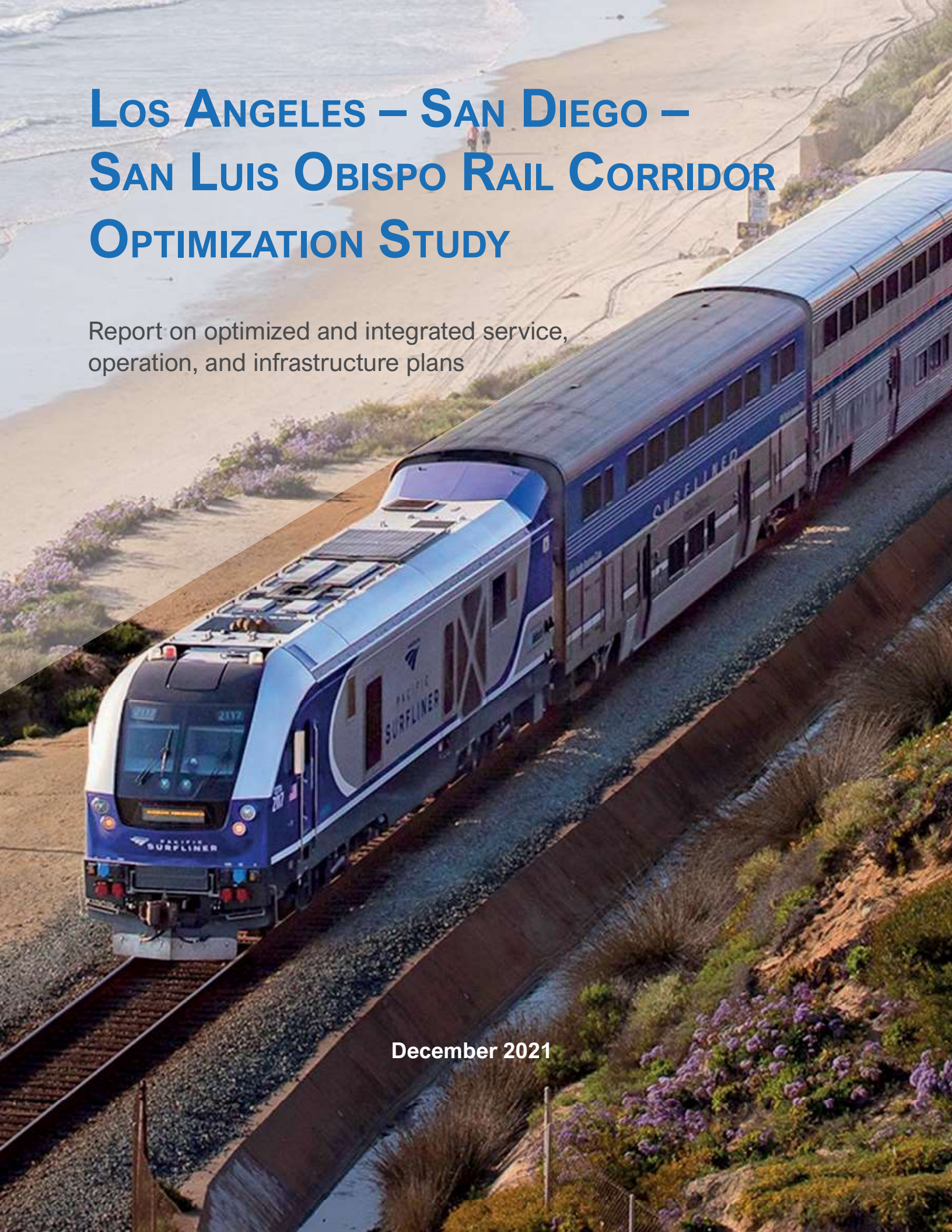
Los Angeles – San Diego – San Luis Obispo Rail Corridor Optimization Study

Report on optimized and integrated service, operation, and infrastructure plans



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Los Angeles – San Diego – San Luis Obispo Rail Corridor Optimization Study

Report on optimized and integrated service, operation, and infrastructure plans

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Parts

1 Summary 3

2 Technical overview 17

3 Optimized service, operating, and infrastructure plans 35

4 Appendix 97


SURFLINER

1 | Summary

Rail service benefits for all

The Los Angeles – San Diego – San Luis Obispo Rail Corridor Optimization Study (LOSSAN Study) provides the framework for delivering a premier, customer-focused, integrated rail system in Southern California to benefit passengers, operators,and funding agencies.

The LOSSAN Study integrates prior and ongoing planning initiatives along the entire LOSSAN Corridor to examine a set of optimized and integrated operating strategies to deliver planned levels of service.

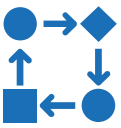
The LOSSAN Study sets out a strategic framework for service expansion over the next decade and provides clear recommendations on investment prioritization to implement state, regional and operator-specific service goals in an integrated manner.

The LOSSAN Study's recommendations were generated using a customer-focused planning approach that was iterative and collaborative. The LOSSAN Study is described through three planning scenarios (near-, mid-, and long-term), which detail service restructuring, investment prioritization, and a long-term strategy.

The LOSSAN Study uses the **Pulse** schedule framework set in the 2018 California State Rail Plan to establish service outcomes and to determine operating requirements. Pulse schedules offer benefits to all Corridor users.

Rail agencies are shifting to a passenger-centric planning approach:

Joint planning



Regular-repeating operations

All-day service

Slot based schedule design

Network connected

Scalable service delivery

Passengers will enjoy a connected network with all-day service that provides anywhere to anywhere travel every hour.

Operators can scale supply to match passenger demand with improved reliability and resource utilization through regular-repeating operating patterns.

Member agencies and funders will see better value for money for service quality improvements as capital investments are linked to clear service outcomes.

The LOSSAN Rail Corridor is set for transformation

Over the next decade, passenger rail service on the LOSSAN Rail Corridor will operate in an integrated manner by using coordinated schedules with seamless transfers between services.

The 351-mile Los Angeles – San Diego – San Luis Obispo (LOSSAN) Rail Corridor connects communities and economic centers across six counties along the coast in Southern California. The Corridor hosts both passenger and freight traffic, serving 8 million riders per year, and key ports and industries in Southern California.

Since the 1990s, the LOSSAN Rail Corridor has seen the expansion of intercity services, the successful start of commuter services, and growth in freight volumes. The Corridor remains a key asset: it supports mobility today, and has potential to improve the quality of life for Californians in the future. It will support frequent and convenient regional and statewide travel opportunities, provide integral transporation and connectivity for the 2028 Los Angeles Olympics, and provide a resilient transport system in the face of climate change.

Realizing the LOSSAN Rail Corridor's potential is not a given. It requires strong leadership, regional collaboration, and investment. The LOSSAN Study provides the implementation steps to secure the Corridor's future. Recommendations are based on the premise of pulse schedules that use hub-and-spoke service coordination and regularized operation to ensure capital investments are directly linked to customer benefits. This LOSSAN Study provides funding agencies and operators with a framework to deliver a premier, customer focused rail system on the Corridor.

The Pacific Surfliner runs the entire length of the corridor between San Luis Obispo and San Diego and serves key intercity markets in Southern California. The service is the busiest state-supported service, and the 2nd busiest intercity rail passenger corridor in United States with 2.7 million riders per year.*

Metrolink operated by the Southern California Regional Rail Authority (SCRRA) runs five lines that interface with the LOSSAN Rail Corridor: On the northern portion of the Corridor, the **Ventura County line** operates on the LOSSAN Corridor between East Ventura and Los Angeles Union Station, and the **Antelope Valley line** operates between Burbank Junction and Los Angeles Union Station. On the southern portion of the Corridor, the **Orange County line** operates on the LOSSAN Corridor between Los Angeles Union Station and Oceanside; the **Inland Empire-Orange County line** oper-

* LOSSAN, "LOSSAN Rail Corridor Agency Business Plan: FY 2019-20 to FY 2020-21" (LOSSAN, April 2019).

ates between Control Point (CP) Maple in the City of Orange and Oceanside; and the **91/Perris Valley line** operates between Los Angeles Union Station and Fullerton Junction. Metrolink's **San Bernardino** and **Riverside** lines also interface with the Corridor at Los Angeles Union Station.

North County Transit District (NCTD) operates the COASTER service on the LOSSAN corridor between Oceanside and San Diego, and the SPRINTER service that interfaces with the Corridor at Oceanside.

Freight services on the LOSSAN Rail Corridor are operated by the Union Pacific Railroad (UP) and the BNSF Railway Company (BNSF). The UP operates services on the Santa Barbara and Ventura County subdivision. The BNSF operates services on the San Bernardino subdivision, which forms a key part of its Southern Transcon Railroad, and on the Orange and San Diego Subdivisions to the Port of San Diego.

Customer-centric rail services will offer anywhere-to-anywhere connectivity

New schedules will deliver seamless connections between services. They are simple to market, attract diverse demand type and will increase ridership.

San Luis Obispo County	Passengers will have up to three roundtrips per day to and from San Luis Obispo County. New service plans will connect the County to all destinations on the LOSSAN Rail Corridor and on the wider Southern Californian rail network using timed transfers. San Luis Obispo will become a connection hub for rail, intercity bus and local transit to provide seamless travel between Southern California, the Central-Coast, the Central Valley, and the Bay Area.
Santa Barbara County	Passengers will have up to eight roundtrips per day to and from Santa Barbara through rail connections every two hours. Santa Barbara and Goleta will become connection hubs for rail, intercity buses and local transit, offering seamless transfers for regional and statewide journeys.
Ventura County	Pacific Surfliner and Ventura County line trains could provide rail connectivity at hourly intervals. Capital projects at Simi Valley and Oxnard will enable 30-minute rail from Ventura County to Los Angeles and further destinations across Southern California. Stations transform into connection hubs for rail and local transit, facilitating seamless transfers regional and local journeys.
Los Angeles County	Los Angeles Union Station can provide passengers with regional and statewide travel opportunities every 30 minutes. Regional services can run at 15-minute intervals throughout the majority of the Los Angeles metropolitan area.

San Bernardino County	Rail services will offer at-least half-hourly peak services and the potential for half-hourly connections to Los Angeles. Half-hourly peak and hourly off-peak connections to San Diego will be available through timed connections.
Riverside County	Rail services will offer passengers half-hourly peak and hourly off-peak connections to Los Angeles and to San Diego through timed connections.
Orange County	Passengers will have rail service to Los Angeles and San Diego every 30 minutes. In peak hours, rail services to Los Angeles can run every 15 minutes. New connection hubs at Orange, Santa Ana and Irvine will facilitate local, regional, and statewide journeys seamlessly through timed connections.
San Diego County	Passengers traveling north to Los Angeles, Orange County or the Inland Empire will have travel opportunities every 30-60 minutes. Rail services between Oceanside and San Diego will offer 15-minute frequencies in peak periods. Oceanside will become a key mobility hub and offer timed transfers between Pacific Surfliner, Metrolink and NCTD services at Oceanside in addition to local transit.
Statewide Integration	Proposed rail services will provide connections to the Central Valley and Northern California every two hours on the California Pulse network as described in the 2018 California State Rail Plan.

Simpler operations benefit all rail operators

Regular-repeating schedules provide operators with repetitive, consistent and scalable operations that lead to higher equipment and crew productivity.

Integration removes duplication. Operators no longer compete with each other, but instead form a strong cohesive set of passenger services that compete with the automobile. Higher service quality is provided with fewer trains, providing operators with an opportunity to expand their operations to additional hours of the day.

Operations utilize all-day service patterns and achieve higher equipment and crew productivity than peak-only service patterns. Equipment rotations and crew plans become easier to execute.

Services use a regular-interval frequency supply framework. Trains operate on half-hourly, hourly, and bi-hourly patterns.

- Departure times are consistent
- Train-meet locations around single-track sections are consistent
- Turn times are predictable
- Operators can ramp service up or down frequencies to match demand more easily

Standardized operations are easier to dispatch and provide operators with a framework to improve reliability and to develop disruption strategies.

- Rail operations repeat each hour with the same consistency
- Operators can develop scenario plans for disruption
- Delay root causes are easier to identify and solve against

Clarity for funding agencies ensures long-lasting investments

The LOSSAN Study's recommendations can be used by rail agencies in Southern California to prioritize capital investments for the next decade using service outcomes.

Capital investments are linked to explicit service outcomes bringing transparency to funding agencies. Investments can go beyond supporting single roundtrip initiatives to supporting operating structures: for example, a targeted investment will provide a reliable hourly service on a segment of the LOSSAN Rail Corridor.

Prioritized investments provide not only short-term solutions but scale to deliver strategic goals. They are identified on the basis that they will not become redundant with future service expansions. Investments will have a long-lasting impact on service quality.

Optimize the rail system in three steps

This framework is ready to guide implementation:
All it takes is collaboration and joint planning.

In the near-term, the LOSSAN Study provides quick-wins through service restructuring and fare integration.

Operators have a clear framework to improve train service using today's infrastructure and operating environment. Pulse schedules provide ramp-up options to rebuild service from reduced schedules caused by the COVID-19 pandemic with better connections and higher resource productivity.

In the mid-term, the LOSSAN Study recommends key projects to expand service and in-fill service gaps.

Operators and funders have a clear set of capital projects to fund and construct that deliver higher service frequency, reliability and connectivity.

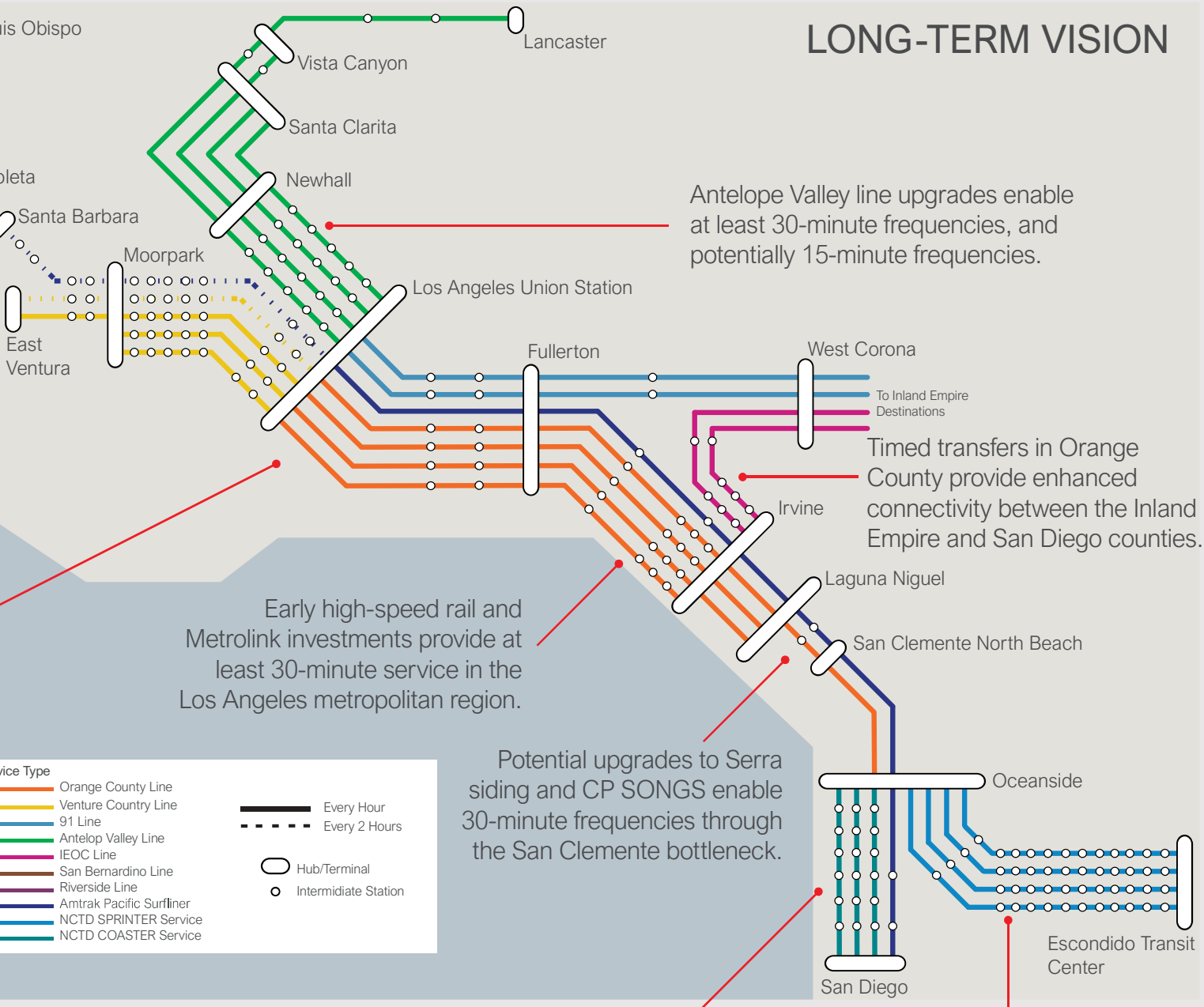
In the long-term, the LOSSAN Study maximizes service delivered through partner capital projects.

The LOSSAN Study provides a solution to achieve 2027 goals outlined in the 2018 State Rail Plan, support the 2028 Los Angeles Olympics, and ensure that the Rail Corridor meets future travel needs.

Targeted investments at sidings and upgraded CTC enable 8 roundtrips to Goleta, 3 roundtrips to San Luis Obispo, and protect freight services operated by the UP.

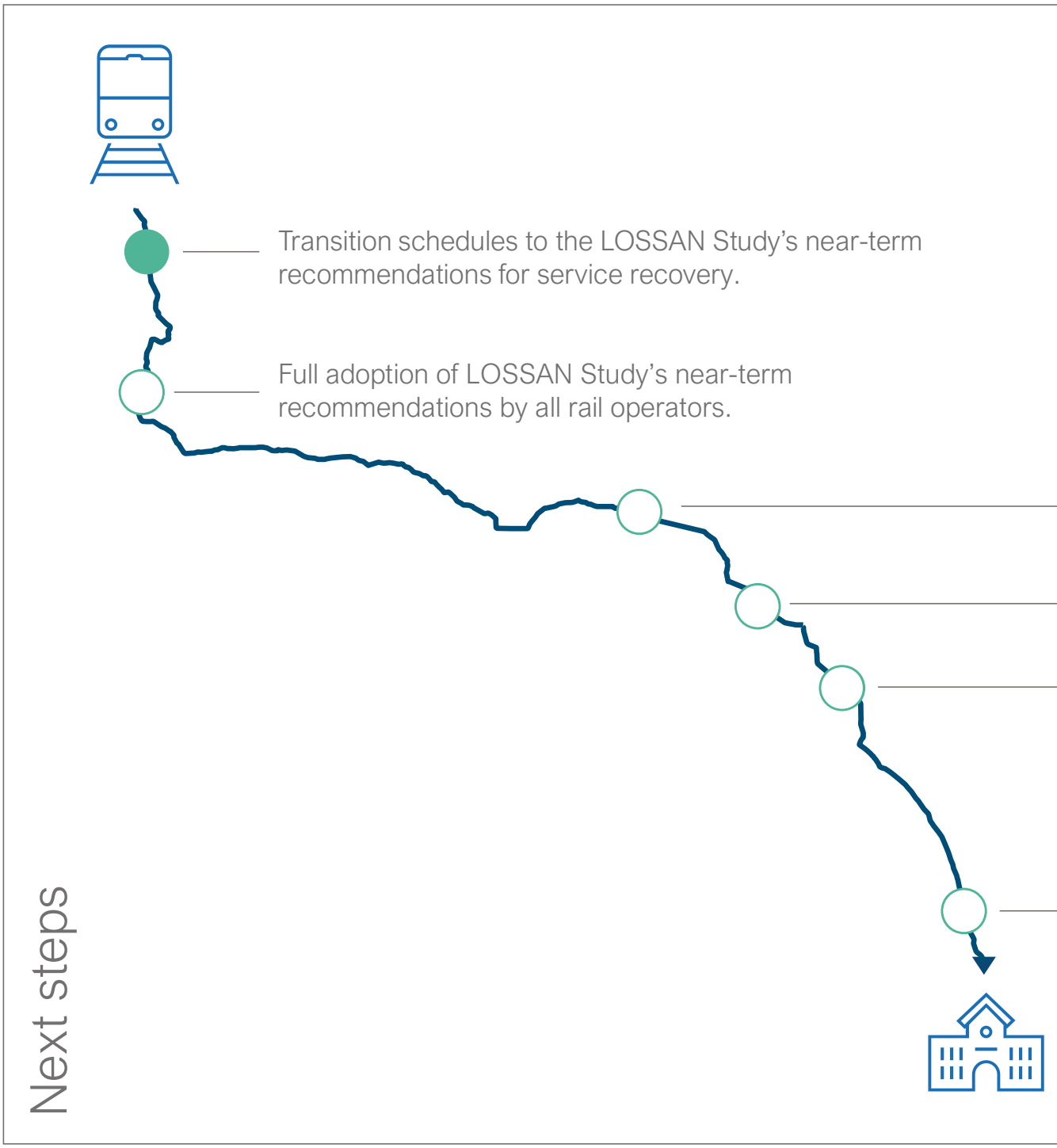
Targeted station investments at Oxnard and Simi Valley enable 30-minute passenger frequencies to Ventura County.

New through-tracks at Los Angeles improve connections and travel times across Southern California.


LONG-TERM VISION
is Obispo
Lancaster
Vista Canyon
Santa Clarita
oleta
Newhall
Santa Barbara
Moorpark
Los Angeles Union Station
East
Ventura
Fullerton
West Corona
To Inland Empire
Destinations
Antelope Valley line upgrades enable at least 30-minute frequencies, and potentially 15-minute frequencies.
Timed transfers in Orange County provide enhanced connectivity between the Inland Empire and San Diego counties.
Irvine
Laguna Niguel
San Clemente North Beach
Early high-speed rail and Metrolink investments provide at least 30-minute service in the Los Angeles metropolitan region.
Potential upgrades to Serra siding and CP SONGS enable 30-minute frequencies through the San Clemente bottleneck.
Oceanside
Escondido Transit Center
San Diego
SANDAG's Infrastructure Development Plan provides capacity for 3 COASTER and 1 Pacific Surfliner service per hour and direction.
SPRINTER double tracking provides service every 15-minutes.
vice Type
Orange County Line
Venture Country Line
91 Line
Antelop Valley Line
IEOC Line
San Bernardino Line
Riverside Line
Amtrak Pacific Surfliner
NCTD SPRINTER Service
NCTD COASTER Service
Every Hour
Every 2 Hours
Hub/Terminal
Intermidiate Station

We can start today!

Recommendations are ready to be implemented in the next timetable cycle.



Advance prioritized projects.

Los Angeles Union Station Link US Phase A is completed:
Implement the LOSSAN Study's mid-term recommendations.

2028: Los Angeles Olympics.

Advance recommended projects:
Implement the LOSSAN Study's long-term recommendations.

2 | Technical Overview

Passenger rail is transforming Southern California

The Los Angeles – San Diego – San Luis Obispo (LOSSAN) Rail Corridor is complex: it is owned by multiple infrastructure owners and hosts several passenger and freight operators. The drive for rail integration has been a long-standing goal for the LOSSAN Rail Corridor Agency (LOSSAN Agency), corridor rail operators, and the State of California.[1]

In 2018, The California Department of Transportation (Caltrans) published its State Rail Plan (2018 California State Rail Plan) and set out a network vision for passenger rail to aspire to by 2022, 2027 and 2040: Passenger rail will operate on pulse schedules and provide connections at key transfer locations to facilitate anywhere to anywhere connectivity across the State. The LOSSAN Rail Corridor acts as a keystone for the passenger rail network in Southern California.

The LOSSAN Rail Corridor has been the focus of many planning efforts, which have identified capital projects and operating recommendations. Previous planning efforts have usually focused on a particular section of the corridor. The LOSSAN Agency and its partners identified the need for a service optimization study to establish a two-, five-, and ten- year strategy to bring together prior efforts under an integrated plan to enable service expansions.

Pulse schedules deliver cohesive service and operations plans

Prior studies developed service outcomes through train-per-day metrics, and detailed results with representative tabular timetables. This study provides an additional framework – pulse schedules – to establish comprehensive operating requirements, detailing exactly how all services can be structured.

Pulse schedules represent uniform symmetric train service patterns that repeat throughout the day on regular, recurring time intervals: e.g., 15-, 30- or 60-minute frequencies. The operating patterns are used to specify infrastructure. A 15-minute frequency may be appropriate for peak hours but can be scaled to 30- or 60-minute frequencies during off-peak hours. Pulse schedules enable operators to "activate" the number of train paths in an established pattern that are needed to address the demand. If only an hourly frequency is required during off-peak periods, operators can simply use a subset of the train paths without weakening systemwide connectivity (connections remain valid at transfer nodes), or by causing inconsistent equipment and crew requirements as these scale with the frequencies.

This regularity allows for timed transfers between services at hub stations where a transfer is required to complete a trip. Networkwide connections at transfer hubs are guar-

1 Refer to the LOSSAN Optimization Study's "Report on Prior Work Efforts, Corridor Conditions, 2019/20 Schedules, and Constraints and Opportunities for Future Development"

anteed through a systemwide symmetry minute. The symmetry minute indicates a point in a journey when a train service meets its counterpart on the same line. This feature allows for two possibilities:

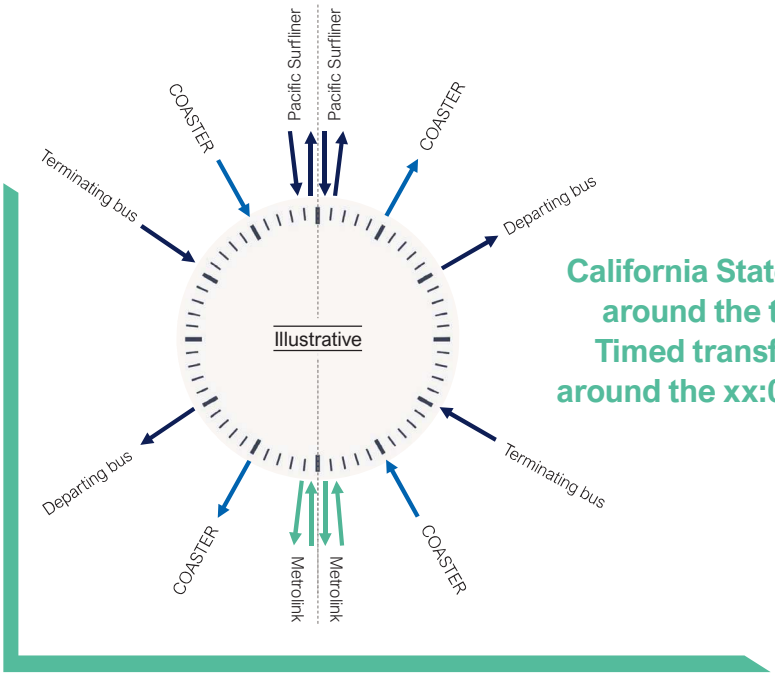
- If trains serve a station at this point, further services can connect to widen service via a timed connection.
- If trains are passing each other on a single-track mainline, a pin-point infrastructure investment can be built to support a designed train meet every time the trains operate.

Rail service goals drive and prioritize capital projects

The LOSSAN Rail Corridor Optimization Study (LOSSAN Study) answers the State's network visions for 2022 and 2027 set out in the 2018 California State Rail Plan and sets recommendations on investment prioritization to deliver State and operator-specific service goals in an integrated manner.

The LOSSAN Study integrates prior and concurrent planning initiatives along the entire LOSSAN Rail Corridor into a complete set of optimized and integrated operating strategies to deliver planned levels of service.

This report provides agencies in Southern California with a complete framework detailing service concepts, potential operating plans, and capital requirements to grow service over the next decade collaboratively.



California State has set symmetry minutes around the top and bottom of the hour – Timed transfers between services occur around the xx:00 and xx:30-minute marks.[2]

2 Caltrans. "2018 California State Rail Plan," September 2018. p 102

Recommendations were generated using a service-driven planning approach

This LOSSAN Study is a key output in answering how the LOSSAN Rail Corridor can meet growth goals set in the 2018 California State Rail Plan, the LOSSAN Agency's Business plan, Metrolink's Southern California Optimized Rail Expansion (SCORE) program and NCTD's strategic documents. It documents the operating framework and capital investment program required to deliver enhanced rail service over the next decade.

The LOSSAN Study followed three principles:

- Results were developed in a collaborative and iterative manner with LOSSAN Rail Corridor stakeholders to ensure that the plans accounted for all needs to the best extent possible.
- The pulse schedule framework set in the 2018 California State Rail Plan was used as a basis to establish service concepts and to determine operating requirements.
- The LOSSAN Rail Corridor was planned through three planning horizons, near-, mid-, and long-term. The near-term horizon concentrates on restructuring passenger rail services under current operating conditions to deliver LOSSAN Agency, partner agency and 2018 California State Rail plan service goals set for 2022. The mid-term horizon recommends a prioritized set of projects to in-fill service gaps and maximize service delivery as the first through-tracks at Los Angeles Union Station become available. The long-term plan details the level of service that could operate in an integrated manner through the identified investment projects from all agencies on the LOSSAN Rail Corridor.

Recommendations were developed through collaborative and iterative planning

The LOSSAN Study was developed through a collaborative and iterative planning approach with partner agencies. A three-tier structure for stakeholder partnership was established to oversee and produce the study.

- A bi-weekly technical meeting group was established to ensure close coordination and oversight of consultant activities. These meetings focused on technical details relating to service goals, operating parameters, and capital project requirements.
- An operator stakeholder working group was held quarterly, comprising representatives from the LOSSAN Agency, Amtrak, BNSF, Metrolink, NCTD, UP, and Caltrans. This operator stakeholder working group evaluated service plans and operating strategies, and provided feedback to ensure that the LOSSAN Study's outputs either reflected or were complementary to their organizational goals. Where operator requirements were not able to be accommodated due to conflicting requirements,

options and trade-offs were developed for service concepts and infrastructure needs, which were presented to the group as choices to be further examined. In addition, individual meetings were setup on an ad-hoc basis to ensure that a mechanism was in place to share informal or sensitive feedback.

- External stakeholder engagement was also carried out to provide members of the LOSSAN Agency's Technical Advisory Committee (TAC) briefings of interim results and progress reports.

Details on stakeholder workshops and feedback are in the Appendix.

Recommendations use pulse schedules to prioritize projects

The LOSSAN Study presents recommendations that benefit passengers, operators, and agencies responsible for infrastructure.

Passengers benefit from a timetable that is repetitive: caters to diverse travel needs, allows easy trip planning and provides seamless travel by ensuring that connections between trains can be made throughout the day, with minimal transfer times.

Operators benefit by providing service that can connect more destinations through timed transfers. This is similar to the way airlines use hubs to allow smaller communities more frequent access to destinations than would otherwise be possible, and at a lower cost.

Agencies responsible for Infrastructure benefit by having certainty over the operating pattern, which allows cost savings to be realized. Infrastructure improvements can be reduced to targeted locations that are necessary to reliably operate the timetable, or which deliver tangible service upgrades that benefit LOSSAN Rail Corridor users. For example, the capacity of a single-track can be maximized by placing a strategically located siding that matches the current or desired operating pattern, versus the cost of double tracking the entire corridor segment.

Pulse schedules are a proven success
Since the framework was launched by the 2018 California State Rail Plan, Californian intercity- and commuter-rail services are migrating to this type of operation.

In Spring 2018, Amtrak's San Joaquin service began operating on a two-hourly pulse schedule. The change in operation improved average all-station on-time performance by 17%.[3] The framework has also allowed the San Joaquin service to scale service to ridership fluctuations resulting from the COVID-19 pandemic.

On December 14, 2020, Caltrain implemented a 30-minute pulse schedule, which it can use to scale service as ridership recovers from the pandemic, and as it prepares for its electrification project.[4]

In 2021, the Capitol Corridor, operating between San Jose, Oakland, Sacramento, and Auburn, also switched to a pulse schedule to remain agile to the impacts from the COVID-19 pandemic; to increase fleet productivity; and to provide Statewide integration.[5]

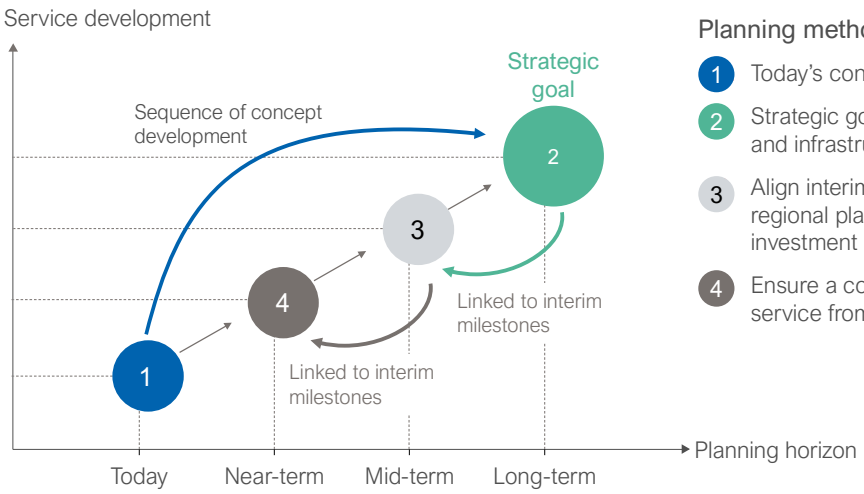
3 SJJPA January 24th 2020 Board meeting

4 https://www.caltrain.com/Assets/Assets/pdfs/CT_PrinterFriendlyTimetable_12-14-2020.pdf

5 https://images.capitolcorridor.org/wp-content/uploads/2021/03/Train_Schedules_3.29.2021-2.pdf

Recommendations scale towards a strategic goal through anchor projects

The LOSSAN Study used a planning methodology that established a robust understanding of the long-term service vision before pivoting to the development of a plan for implementing this vision. This method of planning ensured that the service plan scales over time towards that vision, protecting against redundant infrastructure or stranded investments.



Planning methodology

1. Today's conditions
2. Strategic goals for service, operation, and infrastructure plans
3. Align interim horizons with concurrent regional plans and set service and investment milestones
4. Ensure a cohesive roadmap to carry service from today to the long-term plan

The LOSSAN Optimization Study planning process

Planning Horizon	Objectives
Near-term	Establish repetitive pulse type services with timed connections using existing infrastructure and operating conditions.
Mid-term	Expand service quality and coverage through new fleet availability and feasible capital investments to deliver LOSSAN Agency Business Plan objectives and to complement partner agency goals.
Long-term and beyond	Provide high frequency, integrated services that align with the 2018 California State Rail Plan's 2027 planning horizon goals. Service increases leverage larger capital and fleet improvements.

LOSSAN planning horizons and high-level objectives

The LOSSAN Study's planning horizons, map how services on the LOSSAN Rail Corridor can integrate and optimize investments over the next decade. Global objectives for each planning horizon are summarized in the table above.

These planning horizons are described with illustrative dates of implementation, but these are not prescriptive as they depend on the completion timeline of capital projects. The objectives set out in the planning horizons are dependent on levels of investment through the completion of major projects such as Link Union Station (Link US) at Los Angeles Union Station.

Anchor projects: Major projects are referred to as anchor projects in this report. Service goals and investment recommendations for each planning horizon are dependent on the delivery of all anchor projects assumed to underpin the concept.

Prioritized project: Previously identified projects and projects under planning consideration by partner agencies are prioritized based on their service benefit. For example, the construction of a second platform in conjunction with a siding will allow service to increase from 60- to 30-minute frequencies.

The LOSSAN Study assumes new revenue and fare options will provide passengers with choices to select the best travel itinerary for their journey based on ticket and travel class types rather than on the operator.[6] Long-distance, intercity, and local services will coordinate to ensure that passengers boarding a local service can transfer to an intercity to travel efficiently to a more distant destination.

6 Refer to the LOSSAN Optimization Study's "Report on Cost and Revenue Options"

Recommendations are reported through three planning horizons

The near-term horizon focuses on restructuring services

The near-term planning horizon targets network development within the next one to two years. Many constraints that exist today on the LOSSAN Rail Corridor are assumed to remain during this period – for example, operating agreements, several capacity bottlenecks, and limited equipment availability.

Near-term planning efforts focus on restructuring existing passenger timetable structures into coordinated pulse schedules with timed connections. Services will run at regular intervals, though it is likely that service gaps will remain during some portions of the day.

The following service goals were set for the near-term planning horizon using those outlined in prior stakeholder reports and through feedback received from the LOSSAN Study's operator stakeholder working group:

- An hourly pattern for Pacific Surfliner services south of Los Angeles Union Station, and a two-hourly pattern for Pacific Surfliner services between Los Angeles Union Station and Goleta with a regular operating pattern north of Goleta.
- An hourly base pattern for Metrolink and COASTER services on all lines.
- Los Angeles Union Station service as a bottom of the hour (xx:30) connection node for Metrolink services.
- Metrolink Inland Empire-Orange County services to have timed-connections with trains serving San Diego County. Connections could be made at any station between Orange and Laguna Niguel.
- Oceanside to provide regular connections between all NCTD, Metrolink and Pacific Surfliner services.
- Trains operating on the same corridor and serving similar stations to be distributed across the hour to provide an even spread of coverage.
- Peak slots to be evenly distributed with the base pattern where possible.

The mid-term horizon increases service via pinpoint investments

The mid-term planning horizon targets network development within the next four to six years. Planning efforts focus on achieving full-day, repetitive and regular pulse schedules and fixing multi-hour service gaps in existing schedules through a prioritized subset of previously identified projects by partner agencies.

The mid-term horizon is also anchored around the assumption that the first phase of Link US at Los Angeles Union Station is complete. The station will have one set of run-

through tracks and operators will have increased rolling-stock availability to offer higher service levels.

The following service objectives were set for the mid-term planning horizon using goals outlined in stakeholder reports and through feedback received through the LOSSAN Study's technical working group:

- Hourly pattern for Pacific Surfliner services south of Los Angeles Union Station, two-hourly pattern for Pacific Surfliner services between Los Angeles Union Station and Goleta, regular pattern north of Goleta.
- Hourly base pattern for Metrolink and COASTER services on all lines.
- Peak overlays to form half-hourly overlays where possible.
- Los Angeles Union Station to provide service connections at the top and bottom of every hour.
- Metrolink Inland Empire-Orange County line to have timed-connections with trains serving San Diego County.
- Oceanside to provide regular connections between all NCTD, Metrolink and Pacific Surfliner services.
- Trains operating on the same corridor and serving similar stations to be distributed across the hour to provide an even spread of coverage.
- Runtimes and connections to be improved through new infrastructure and fleet.

The long-term horizon answers State Rail Plan and operator goals

The long-term planning horizon targets strategic network development. Its focus is to meet the following service objectives:

- Deliver on desire to implement an integrated network.
- Address the service goals outlined the 2018 California State Rail plan's interim planning horizon (2027).
- Leverage Metrolink's SCORE program, SANDAG's Infrastructure Development Plan, as well as early California High-Speed Rail investments.
- Help deliver the 2028 LA Olympics successfully.

The long-term planning horizon assumes streamlined service products that align towards the State Rail Plans vision and cater to many traveler needs: Metrolink, Pacific Surfliner and NCTD will run complementary and integrated services.

Recommendations in brief

The LOSSAN Study's results are reported by planning horizon for near-, mid- and long-term concepts. Results of each planning horizon are sectioned by service outcomes delivered to the passenger, operating requirements that operators need to work towards, and infrastructure requirements that agencies can use to target funding sources.

Service delivery for each planning horizon is dependent on the completion of the full set of recommended projects and agreement by the affected operators. Each planning horizon assumes that operational improvements and capital projects from the prior planning horizon are complete.

Infrastructure projects

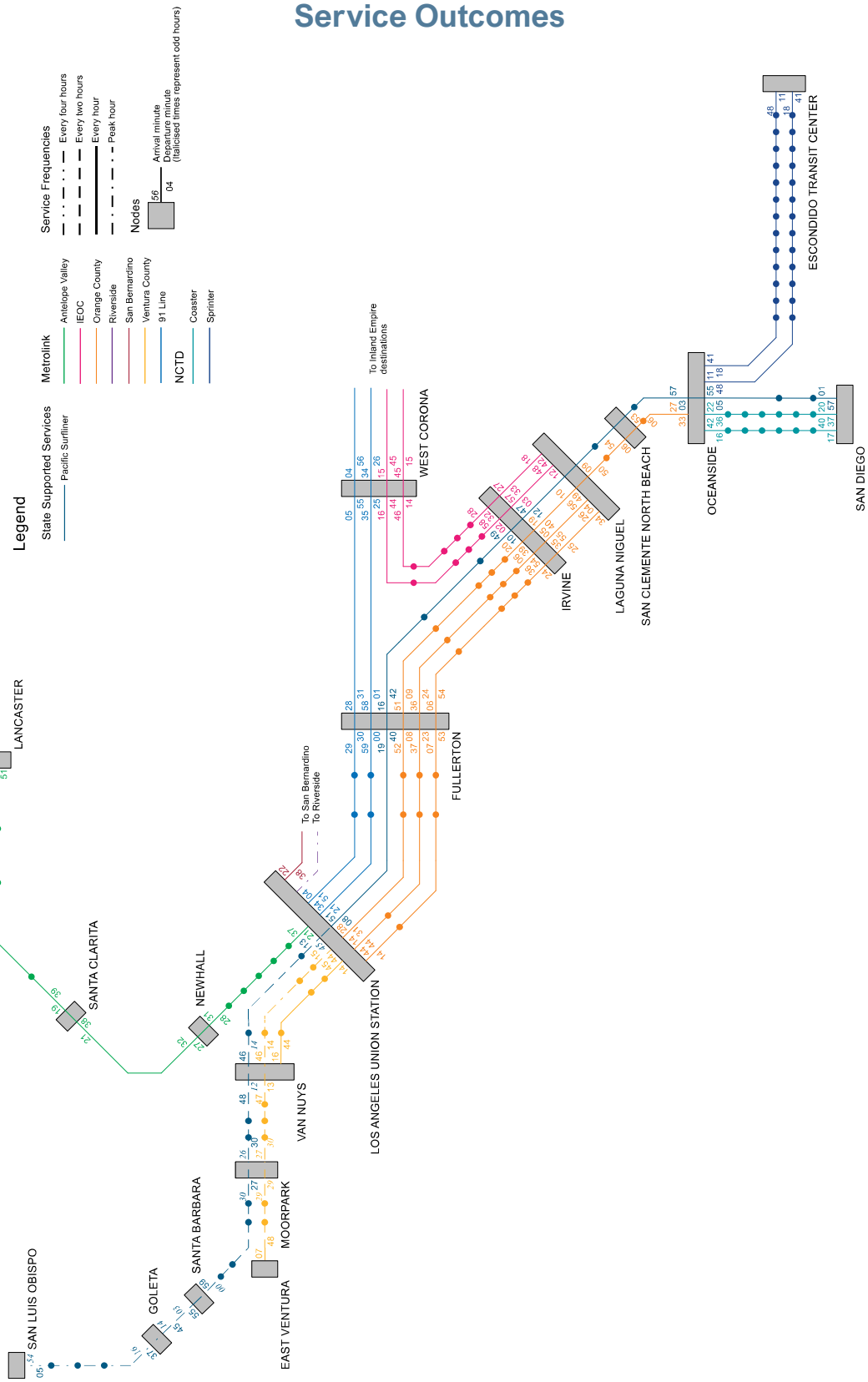
Near-term Projects
Completion of the third track as part of the Rosecrans-Marquardt grade separation project.
Completion of Anaheim Canyon double track project
Both platform edges at Camarillo station can be served
Completion of UPRR's upgrades to CTC on the Santa Barbara Subdivision and powering up of several sidings
Laguna Niguel to San Juan Capistrano Passing Siding Project

Operational requirements

Operating Parameter	Requirement
Schedule Margin	10% all lines
Dwell	Pacific Surfliner 2 minutes Metrolink 1 minute COASTER 1 minute
Meet locations	Honda siding Seacliff siding Moorpark station Chatsworth CP Maple Serra siding and CP SONGS CP Eastbrook and CP Shell CP Valley and CP Torrey CP Miramar
POWER & CONSIST CONFIGURATION	Pacific Surfliner – Charger + 6 cars Metrolink – EMD F125 + 6 cars COASTER – Charger + 5 cars

Near-term horizon

Service Outcomes



Mid-term horizon

Infrastructure projects

Mid-term Projects
Link US Phase A
San Bernardino Subdivision Corridor prioritized upgrades
Central Coast (San Luis Obispo) Layover Facility
Goleta Layover Facility Expansion
San Diego Layover and Maintenance Facility
Elimination of delay in block locations and all holdout rules[7,8]
Carpinteria Station Double Track and Second Platform
Seacliff Siding extension
Leesdale Siding extension and Oxnard Station second platform
Camarillo Station New Pedestrian Grade Separated Crossing
Simi Valley Double Track and Platform
Chatsworth Station and Signal Project
Burbank to Los Angeles Signal Respacing and Burbank Junction speed improvement
Orange-Olive Wye and CP Maple Improvements
San Juan Creek Bridge replacement
Serra Siding Extension
Extension of double track north of CP SONGS
Batiquitos Lagoon Double Track
San Dieguito Double Track
CP Miramar signal upgrade
San Diego Convention Center Station

Operational requirements

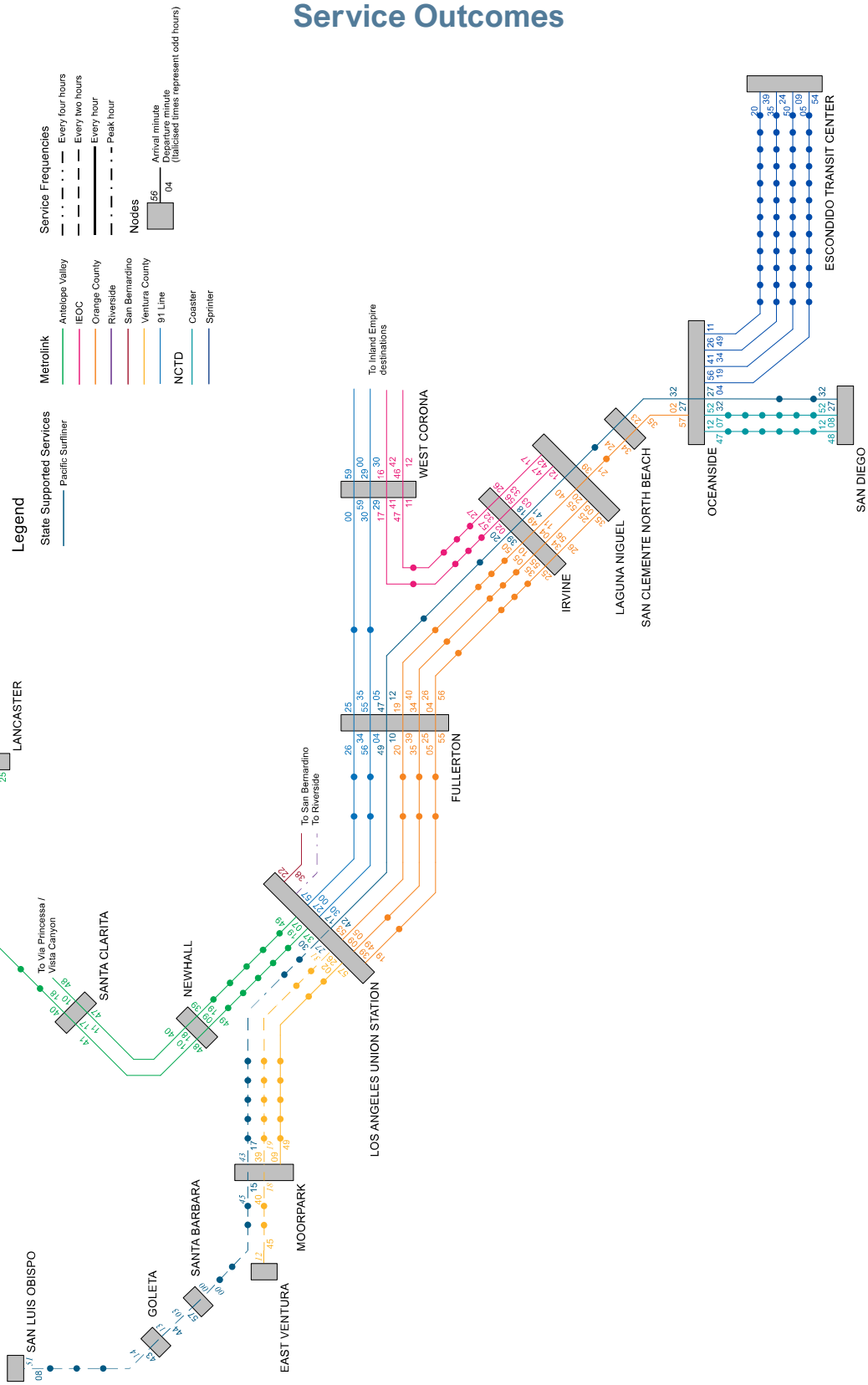
Operating Parameter	Requirement	
Schedule Margin	7% non-freight lines 10% lines shared with freight	
Dwell	Pacific Surfliner 2 minutes Metrolink 1 minute COASTER 1 minute	
Meet locations	Devon siding Concepcion sidings Leesdale siding Camarillo Station Moorpark Station Simi Valley Station Chatsworth Station Van Nuys Station	CP Maple Serra Sidings CP SONGS CP Del Mar CP Torrey CP Scripps CP Miramar
POWER & CONSIST CONFIGURATION	Pacific Surfliner – Charger + 6 cars Metrolink – EMD F125 + 6 cars COASTER – Charger + 5 cars	

Items listed in bold are anchor projects

7 Moorpark, Chatsworth Burbank, Glendale,

8 Refer to The Task 1 report

Service Outcomes



Infrastructure projects

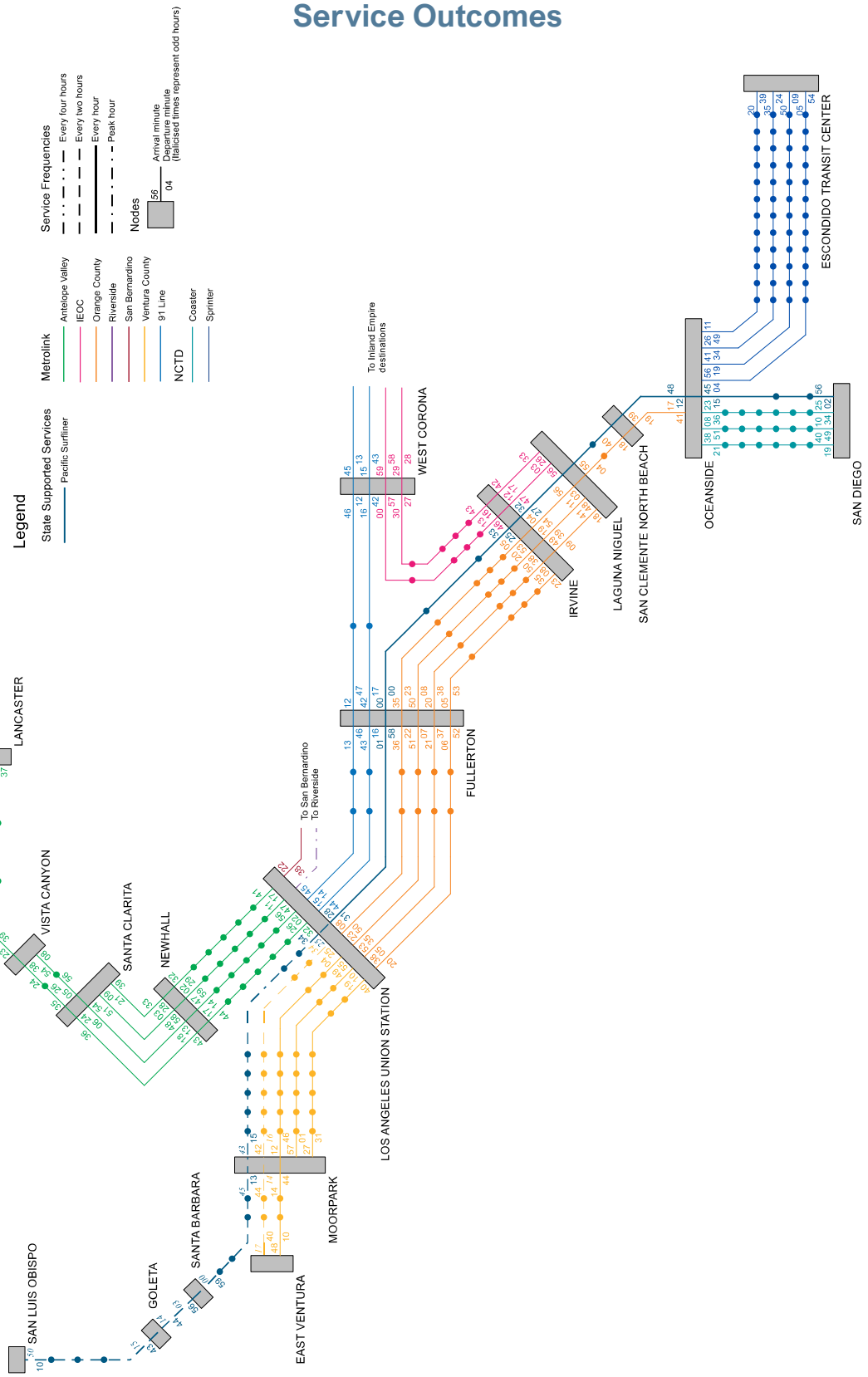
Long-term Projects
Link US Phase B
4-track San Bernardino Subdivision between Los Angeles and Fullerton
Ventura Station double track and siding extension
Leesdale Siding extension to Camarillo
Siding between tunnels 27 and 28
CP Raymer to CP Bernson Double Track
Third Track between Tustin area and Laguna Niguel Area
Irvine Station and Fourth Main Track
San Onofre to Pulgas Double Track Phase 1, Stage 2
Eastbrook to Shell Double Track (San Luis Rey River Bridge)
Carlsbad Village Double Track
La Costa to Swami Double Track
Sorrento to Miramar Phase 2

Operational requirements

Operating Parameter	Requirement
Schedule Margin	7% non-freight lines 10% lines shared with freight
Dwell	Pacific Surfliner 1.5 minutes Metrolink 1 minute COASTER 1 minute
Meet locations	Devon siding Concepcion sidings Moorpark Station Simi Valley Station Chatsworth Station CP Maple Serra Sidings CP SONGS CP Del Mar CP Torrey
POWER & CONSIST CONFIGURATION	Pacific Surfliner – Charger + 7 cars Metrolink – EMD F125 + 6 cars COASTER – Charger + 5 cars

Items listed in bold are anchor projects

Service Outcomes



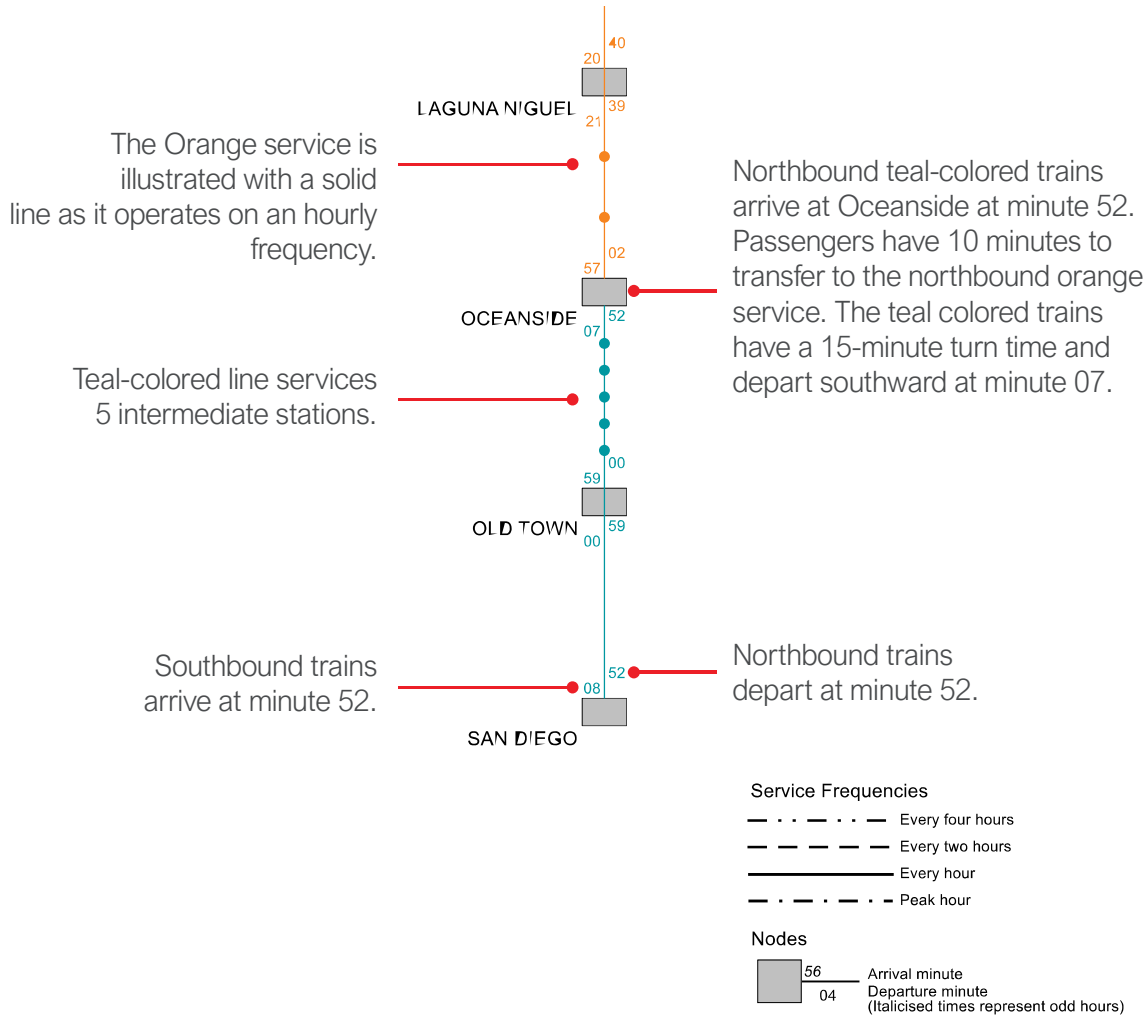

HONDA
Center

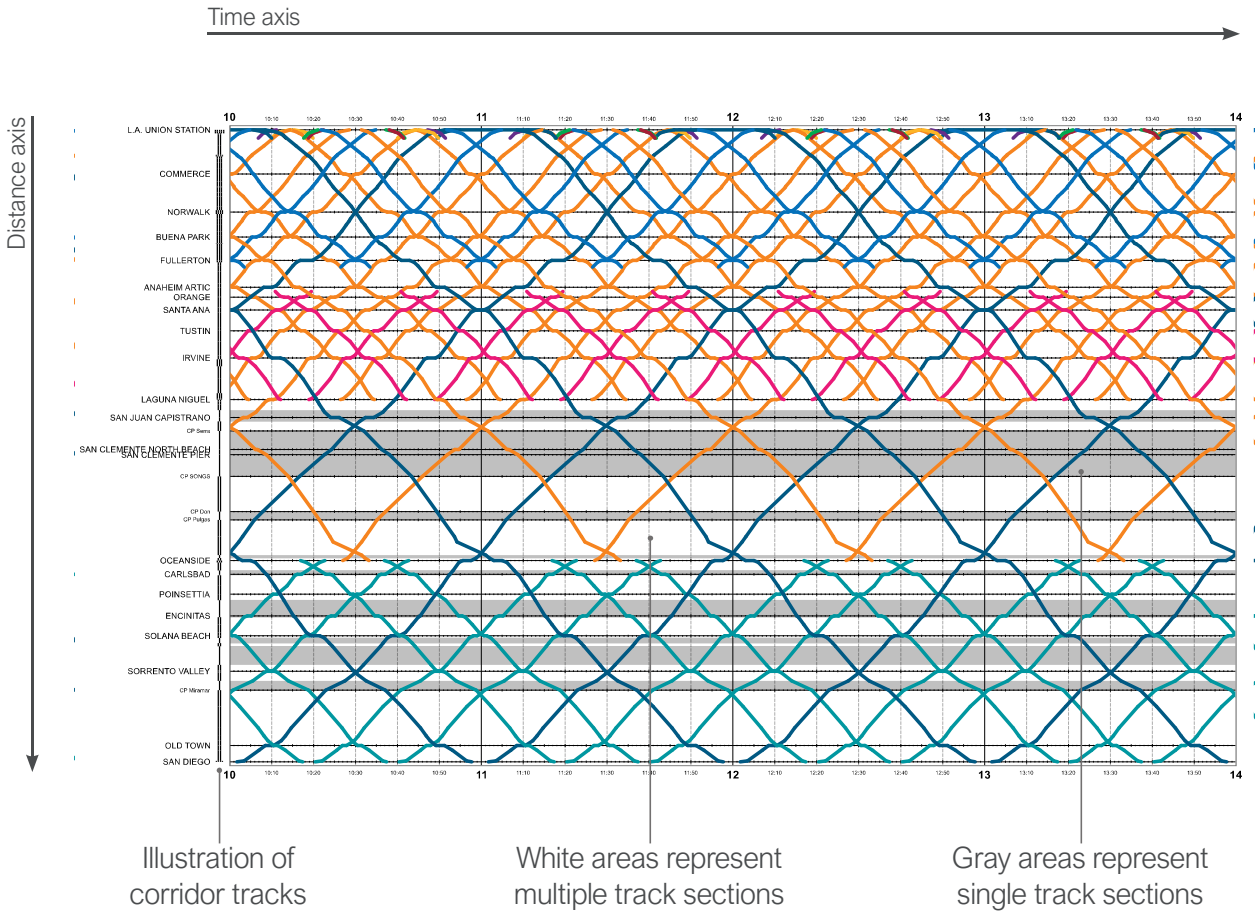
3 | Optimized service and operating plans

Reader's guide on the outputs of the study

The service, operation and infrastructure plans are designed to identify and specify the carrying capacity for the LOSSAN Rail Corridor in general time horizons. Service and operation concepts illustrate a four-hour operating window that acts as a template to guide timetabling for the entire day. The Timetables represent conceptual schedules, and operators will need to agree on which train slots to activate throughout the day to match supply to demand, and equipment and crewing needs. For implementation of any particular schedule, operators will need to agree on the operating concept, which train slots to activate throughout the day to match supply to demand, and equipment and crewing needs. (Definitions are listed in the appendix).

Reader's guide to netgraphs





State sponsored services — Pacific Surfliner

Metrolink services — Ventura County; Orange County; Antelope Valley; IEOC; 91 Line/Perris

NCTD services — COASTER; SPRINTER

Reader's guide to stringline charts

Near-term recommendations

The near-term planning horizon seeks to address the 2022 goals presented in the 2018 California State Rail Plan and LOSSAN Business Plan objectives to implement 14-round–trips between San Diego and Los Angeles, eight roundtrips between San Diego and Goleta, and three roundtrips between San Diego and San Luis Obispo for the Pacific Surfliner using present-day infrastructure and operating conditions (as of October 2020). This planning horizon also supports Metrolink and COASTER service level growth by providing a catalog of train slots that can be activated by the operator depending on market, and equipment and crewing availability.

The COVID-19 pandemic has had a major impact on ridership levels since March 2020. The near-term planning horizon provides a recovery framework for operators to use as ridership returns to the LOSSAN Rail Corridor. A Pacific Surfliner ramp-up strategy coordinated via Caltrans has already been completed using the LOSSAN Study operating framework detailed in this section. The LOSSAN Agency can continue to develop this strategy with Metrolink and NCTD to develop a coordinated action plan for rail service in Southern California.

Service outcomes

Pacific Surfliner

- Intercity passenger rail slots that can be used by the Pacific Surfliner are scheduled to operate on an hourly frequency between San Diego and Los Angeles.
- Intercity passenger rail slots north of Los Angeles to Goleta are scheduled on a two-hourly frequency, and to San Luis Obispo on a four-hourly frequency. The LOSSAN Agency, in coordination with Amtrak, Metrolink and UP will need to select the slots to activate to fill the trains desired for operation.

Amtrak Long Distance Services

- Amtrak's Coast Starlight service operates one roundtrip per day between Los Angeles Union Station and Seattle. The LOSSAN Study recommends that this service utilizes an intercity passenger rail slot that aligns with the pattern for Pacific Surfliner services.
- Amtrak's Southwest Chief service operates one roundtrip per day between Los Angeles Union Station and Chicago. This service is not explicitly planned in the LOSSAN Study. It can operate in a slot that aligns with the pattern for Pacific Surfliner services south of Los Angeles Union Station or utilize another slot that is agreed separately with the host railroads.

Antelope Valley Line

- Regional rail slots that can be used for commuter or intercity services are scheduled on an hour frequency between Vista Canyon and Los Angeles Union Station and service patterns are scheduled on a two-hourly frequency between Lancaster and Vista Canyon.
- Further peak-direction options are available for use and are detailed in the appendix.

Inland Empire-Orange County Line

- Regional rail slots that can be used for commuter or intercity services are scheduled on a 30-minute frequency between the Inland Empire and Laguna Niguel. (Refer to page 46 for operating alternatives to Oceanside).

Orange County Line

- Regional rail slots that can be used for commuter services are scheduled to support three trains per hour between Los Angeles Union Station and Laguna Niguel using 15-minute frequency intervals.
- Regional rail slots can operate on an hourly frequency between Laguna Niguel and Oceanside during peak hours. It is recommended that regional rail slot frequencies to Oceanside are reduced to two-hourly intervals during-off peak periods for timetable stability.

Riverside Line

- Service on this line was not explicitly modelled for this study.

San Bernardino Line

- Regional rail slots that can be used for commuter services were modelled to arrive at Los Angeles Union Station at xx:22 and depart at xx:38 to align with the existing and planned service as informed by Metrolink.

Ventura County Line

- Regional rail slots that can be used for commuter services are scheduled on a two-hourly frequency between Oxnard and Los Angeles Union Station. Peak-directional trains provide service from East Ventura (Refer to page 46). Regional rail and Intercity passenger rail slots provide a combined hourly service level.
- Regional rail slots that can be used for commuter services are scheduled on an hourly frequency between Los Angeles Union Station and Van Nuys (Refer to page 46 for a discussion on a Chatsworth alternative).

91/Perris Valley Line

- Regional rail slots that can be used for commuter or intercity services are scheduled on a 30-minute frequency between Los Angeles Union Station and Inland Empire.

Near-term

COASTER

- Regional rail slots that can be used for commuter or intercity services are scheduled on an hourly basis throughout the day.
- A peak overlay can also be scheduled to provide a 20-minute corridor frequency with the base regional rail and intercity passenger rail hourly slots.

SPRINTER

- Regional rail slots that can be used for commuter services are scheduled on a 30-minute frequency between the Oceanside and Escondido.

Freight services

- Freight capacity on the Santa Barbara Subdivision is programmed by UP. The LOSSAN Study coordinated with the UP to ensure that capital projects were aligned.
- Freight capacity on the San Bernardino Subdivision is being addressed through a concurrent planning study led by BNSF and Caltrans. The freight capacity study builds on the concepts developed in this LOSSAN Study.
- Freight capacity between CP Atwood and San Diego and investment recommendations are documented in BNSF's *San Diego Pathing Study* by BNSF. The freight capacity study was developed using the concepts detailed in this LOSSAN Study.[1]

Connectivity at key nodes

Santa Barbara / Goleta: intercity passenger rail slots are scheduled around the top of the hour (xx:00) at Santa Barbara every two hours, and are scheduled on a xx:15/xx:45 node at Goleta. Both nodes can be used as connection points for other operators to design connections around.

Los Angeles Union Station: Regional rail slots for commuter service are centered around both the top of the hour (xx:00) and bottom of the hour (xx:30) for connections between services. Intercity passenger rail slots are presented as centered around the top of the hour (xx:00) and provide connection opportunities to Amtrak Thruway buses and other regional rail services.

Santa Ana – Laguna Niguel: Inland Empire-Orange County (IEOC) line services interline with intercity passenger rail and regional rail slots along the LOSSAN rail corridor at minimum planned headways. Southbound IEOC line services and scheduled ahead of intercity passenger rail and regional rail slots operating from Los Angeles Union Station, whereas northbound slots follow these services. Passengers can continue their journey by alighting from the first train, and by waiting at the same platform 7.5 minutes for the onward connecting service. The transfer can be made at any station along the LOSSAN rail corridor between Santa Ana and Laguna Niguel.

1 BNSF, NCTD. "San Diego Pathing Study: Final Report" September 22, 2020.

Oceanside: Connection opportunities are constrained by single-track sections on either side of the station between CP Shell and CP Eastbrook. (Refer to page 46 for alternative operating strategies). Oceanside provides the following connection opportunities:

- One connection per hour between intercity passenger rail and regional rail scheduled services with a transfer time of 13 minutes.
- Two connections per hour between SPRINTER services and Orange County bound intercity passenger rail and regional rail services scheduled along the LOSSAN Rail Corridor with a transfer time of 16 minutes.
- One connection per hour between SPRINTER and COASTER services with a transfer time of five minutes.

Operating requirements

The near-term scenario assumes infrastructure and operating conditions on the LOSSAN Rail Corridor (as of October 2020). ***The LOSSAN Optimization Study Existing Conditions*** report (Existing conditions report) provides a full description of these conditions and should be consulted for further detail. The sections below list the operating requirements for the LOSSAN Study's near-term planning horizon.

Section running times

Section running times (Refer to the Appendix for definitions) were calculated in the LOSSAN Agency's Viriato server using the rolling-stock listed in the table below.[2] Section running times comprise technical calculated runtimes that are factored by 10%. Please refer to the LOSSAN Agency Viriato Server for a comprehensive listing of runtimes measured between control points and station nodes.

2 Timetables can also run using P42 locomotives for Pacific Surfliner services and F59s for Metrolink and NCTD services. Minor timetable revisions for production schedules would be necessary to account for slower runtimes to ensure that trains keep to schedule.

Near-term rolling-stock calculation assumptions

Service	Locomotive	Car
Pacific Surfliner	Siemens Charger	6 bi-level Surfliner cars
Metrolink Ventura County	EMD F125[3]	6 bi-level Rotem cars
Metrolink Antelope Valley	EMD F125[3]	6 bi-level Rotem cars
Metrolink Orange County	EMD F125[3]	6 bi-level Rotem cars
Metrolink 91/Perris Valley	EMD F125[3]	6 bi-level Rotem cars
Metrolink Inland Empire-Orange County	EMD F125[3]	6 bi-level Rotem cars
NCTD COASTER	Siemens Charger	5 bombardier bi-level cars

Dwell times

Minimum dwell times are based on the corridor conditions detailed in the Existing Conditions report. Some station dwells are longer than the minimum time to enable timetables to work in single-track sections. Dwell times can be read from the stringline charts listed in this document (pages 48-53).

Near-term minimum dwell values [minutes]

Service	Minimum dwell	Exception
Pacific Surfliner	2	Santa Barbara: 3 mins LA Union Station: 20 mins
Metrolink	1	–
NCTD COASTER	1	–

Double track locations where opposing trains may safely pass one-another

Refer to stringline charts on pages 48-53

Honda Siding: Passenger trains are timetabled to meet opposing passenger trains at Honda siding symmetrically around the bottom of the hour (minute xx:30) on odd hours. To ensure that this meet aligns with corridor-wide operations, trains are timetabled with the following considerations:

- Train movements have four-minute minimum separation times at CP North Honda and CP South Honda.
- Southbound trains have an 83-minute travel time (77 minutes of section running and six minutes of dwell) between San Luis Obispo and Honda siding to arrive at CP North Honda at minute xx:28.

3 Metrolink operates its service using EMD F125 "Spirit" locomotives. Vehicle technical specifications were not available at the time of writing and a Siemens Charger was used to generate plausible running times instead.

- Northbound trains depart Goleta at minute xx:16 in the previous even hour and have a total section running time of 70 minutes to reach Honda siding prior to minute xx:30.

Seacliff siding: Passenger trains are timetabled to meet opposing passenger trains at Seacliff siding symmetrically around minute the bottom of the hour (xx:30) on odd hours.

- Southbound trains depart Santa Barbara at xx:01 and have a section running time of 27 minutes to reach Seacliff siding at minute xx:28.
- Northbound trains depart Moorpark at minute xx:31 in the previous even hour and have a travel time of 55 minutes (inclusive of section running and dwell times).

Moorpark Station: Pacific Surfliner trains and Ventura County line trains meet at Moorpark. As the station has a holdout rule, trains have a dwell budget totaling four minutes in each direction to account for operational variations during the passenger exchange process.

Chatsworth Station: Pacific Surfliner trains and Ventura County line trains meet at Chatsworth. As the station has a holdout rule, trains have a dwell budget totaling 4 minutes in each direction to account for operational variations during the passenger exchange process.

CP Maple: Southbound IEOC trains cross northbound traffic flows on the Orange Subdivision at CP Maple. The operating plan is designed to ensure that a minimum separation time of 2.5 minutes between trains is observed, southbound IEOC trains are planned with a stationary meet with northbound services.

Serra Siding and CP SONGS: The single-track sections between Laguna Niguel and CP SONGS impose a major constraint on the LOSSAN Rail Corridor's timetable structure.[4] The Laguna Niguel – San Juan Capistrano siding project will partially relieve the bottleneck, however the 9.3-mile single-track section between Serra siding and CP SONGs will remain. Operations around a shortened bottleneck are detailed in the mid-term concept.

CP Serra and CP SONGs both have a minimum separation time of 2.5 minutes between trains, if the first train waits for the opposing train. To allow for 30-minute operating frequency, trains must operate through the section in 12.5 minutes. This zig-zag operation is unstable and should be restricted to one or two instances during peak times if necessary.

CP Eastbrook and CP Shell: The single-track section immediately north of Oceanside restricts the station's ability to allow simultaneous arrivals and departures. CP Shell and CP Eastbrook bound a single-track section and require separation times of 3.5 minutes and 3.0 minutes respectively. To provide timetable robustness, northbound services

4 Refer to the LOSSAN Study Existing Conditions report

depart Oceanside before the symmetry minute at the top and bottom of the hour (xx:00 and xx:30), and southbound services arrive after.

NCTD SPRINTER also operates using the top and bottom of the hour (xx:00 and xx:30) symmetry minutes and its connections to Orange County are diminished as main-line services are planned to depart before the symmetry minute. However, NCTD's SPRINTER operations could use xx:15 and xx:30 symmetry minutes. This would provide a connection time of ~15 minutes.

CP Valley and CP Torrey: Train movements are restricted by the Del Mar and Miramar single-track sections south of Oceanside. NCTD provided feedback that Del-Mar siding, a short siding located just south of Solana Beach, is not suitable for train meets, which limits train operations to 20-minute frequencies in each direction currently.

CP Miramar: Train meets can be scheduled around minutes xx:00, xx:20 and xx:40 at CP Miramar. The low line speeds, grade and current signal spacing require a four-minute separation time between trains for free flow movements, or two minutes if the northbound train waits at the signal for the southbound service. During peak-operations, NCTD's COASTER operations may need to account for a stationary meet at CP Miramar to enable 20-minute frequencies through the Del Mar and Miramar single track sections.

Turn times at terminal stations

Based on the service patterns developed for this LOSSAN Study, estimated turn times were calculated for each of the terminal stations based on assumed equipment cycles. These times are rounded down to the nearest five minutes. For turn times under 15 minutes, a precise value is given. It is important to note that assumed equipment cycles may change as a specific operating plan is developed for implementation.

San Luis Obispo:

- The near-term service pattern and assumed equipment cycles estimate a 65-minute turn time. This turn-time may change as it is subject to UP's agreement of proposed section running times.

Goleta:

- The near-term service pattern and assumed equipment cycles estimate terminating trains to have a 150-minute turn time.

Los Angeles Union Station:

- The near-term service pattern and assumed equipment cycles estimate:
  - Terminating Pacific Surfliner trains have a 75-minute turn time;
  - Continuing Pacific Surfliner trains have a 20-minute dwell;
  - Orange County line trains have a 15-minute turn time;
  - Ventura County line trains to Van Nuys have a 30-minute turn time, whereas trains to Ventura have a 90-minute turn time;
  - Antelope Valley line trains have a 15-minute turn time;
  - 91/Perris Valley line trains have a 15-minute turn time.

Laguna Niguel:

- The near-term service pattern and assumed equipment cycles estimate:
  - Orange County line trains turning for the reverse service have a 20-minute turn time;
  - Inland Empire-Orange County line trains turning for the reverse service have a seven-minute turn time, this becomes 35 minutes if hourly frequencies are used;
  - Alternatively, if Inland Empire-Orange County line trains turn for Orange County Line trains, the turn time is 15 minutes.

Oceanside:

- The near-term service pattern and assumed equipment cycles estimate:
  - Orange County line trains turn in 45 minutes;
  - COASTER trains turn on the pocket track in 14 minutes or 30 minutes.

San Diego:

- The near-term service pattern and assumed equipment cycles estimate:
  - COASTER trains turn in either 20 or 40 minutes;
  - Pacific Surfliner trains turn 60 minutes.

Infrastructure requirements

Anchor projects

The optimized service and operations plan assumed for the near-term service pattern used existing infrastructure conditions (October 2020), as well as some key projects under design or construction currently, such as:

- Completion of Anaheim Canyon station double track and platform project;
- Both platform edges at Camarillo station can be served.

Near-term opportunities, constraints, and alternative service options

The near-term service concept developed in this study provides a framework for operators to deliver and exceed the level of service operated in the October 2019 schedule using existing infrastructure. In the near-term, critical sections of single track on the LOSSAN Rail Corridor continue to limit the flexibility of schedule design, however regular service patterns with peak overlays are achievable.

During the workshops with the LOSSAN Rail Corridor operators, four topics were raised about the near-term concept: two in the LOSSAN North section (peak-service to Ventura County, train turns at Chatsworth) and two in the LOSSAN South Section (Inland Empire – Orange County Line service extensions to Oceanside), and connectivity at Oceanside.

During the study's development, the COVID-19 pandemic impacted ridership and operations. Together with Caltrans and the other Joint Powers Authorities, the LOSSAN Agency detailed a service ramp-up strategy to meet ridership and equipment availability criteria as service recovered.

LOSSAN North – Peak East Ventura services

The single platform at Oxnard station prevents passenger rail services from operating on hourly frequencies on the LOSSAN Rail Corridor through Ventura County.

However, the LOSSAN Rail Corridor can support peak-direction Metrolink services between East Ventura and Los Angeles. Morning peak-direction southbound Ventura County line services can operate from East Ventura before the first northbound Pacific Surfliner train operates through Oxnard station. Afternoon peak-direction northbound Ventura County line services can also operate after the last southbound Pacific Surfliner operates through the station. (Refer to the appendix for stringline chart examples).

LOSSAN North – Service extensions through short turns at Chatsworth

Hourly Ventura County line services that terminate at Van Nuys could extend to Chatsworth if five-minute turns are made possible. Otherwise, crossovers could be placed on the northern edge of Chatsworth station and Main 1 could then serve as a single-track mainline track, and Main 2 as a storage track for turning services. Alternatively, a pocket track could be built to store two trainsets for turning services.

LOSSAN South – Inland Empire-Orange County line services operate to Oceanside

- The near-term service concept does not preclude Inland Empire-Orange County. IEOC passengers would have the opportunity to transfer at Laguna Niguel and

Oceanside. The LOSSAN Rail Corridor's timetable structure is constrained by three primary factors;

1. the long section of single-track at San Clemente,
2. the complexity of the timetable structure associated with the wye in Orange County bound by the BNSF San Bernardino Subdivision (CP Fullerton Junction to CP Atwood), the Metrolink Olive Subdivision (CP Atwood to CP Maple), and the Metrolink Orange Subdivision (CP Maple to CP Fullerton Junction), and
3. by further single-track sections on the LOSSAN North Corridor.

Inland Empire-Orange County line trains can serve Oceanside through two options:

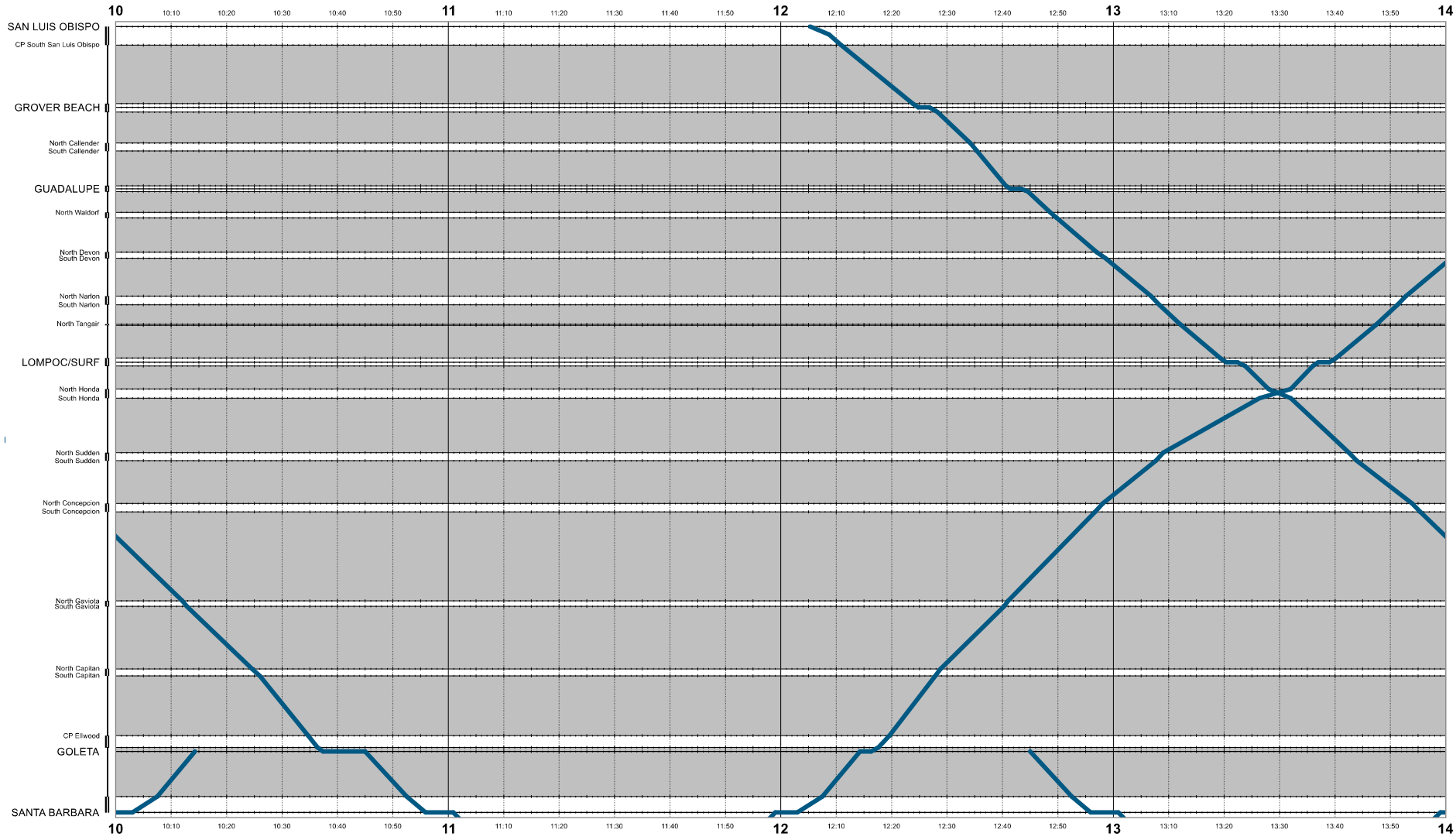
- Inland Empire-Orange County line trains can operate with an extended dwell at Laguna Niguel and align with the slot identified for the Orange County line service between Laguna Niguel and Oceanside.
- The LOSSAN South Corridor can operate on an alternative timetable that prioritizes direct connections between the Inland Empire and San Diego County via the Inland Empire-Orange County line. Passenger services operate four trains per hour on a 15-minute frequency framework through Orange County. Pacific Surfliner and Inland Empire-Orange County line trains operate on hourly trains paths, which together create a 30-minute service to Oceanside. Orange County line services and 91/ Perris Valley trains also operate on 30-minute frequencies and run at a 15-minute offset from Pacific Surfliner and Inland Empire-Orange County line trains. 91/ Perris Valley line services could operate as an express service between Los Angeles Union Station and Fullerton as passengers could access stations at Commerce, Norwalk, and Buena Park by transferring at Fullerton on to the Orange County line service. (Refer to the appendix for stringline charts).

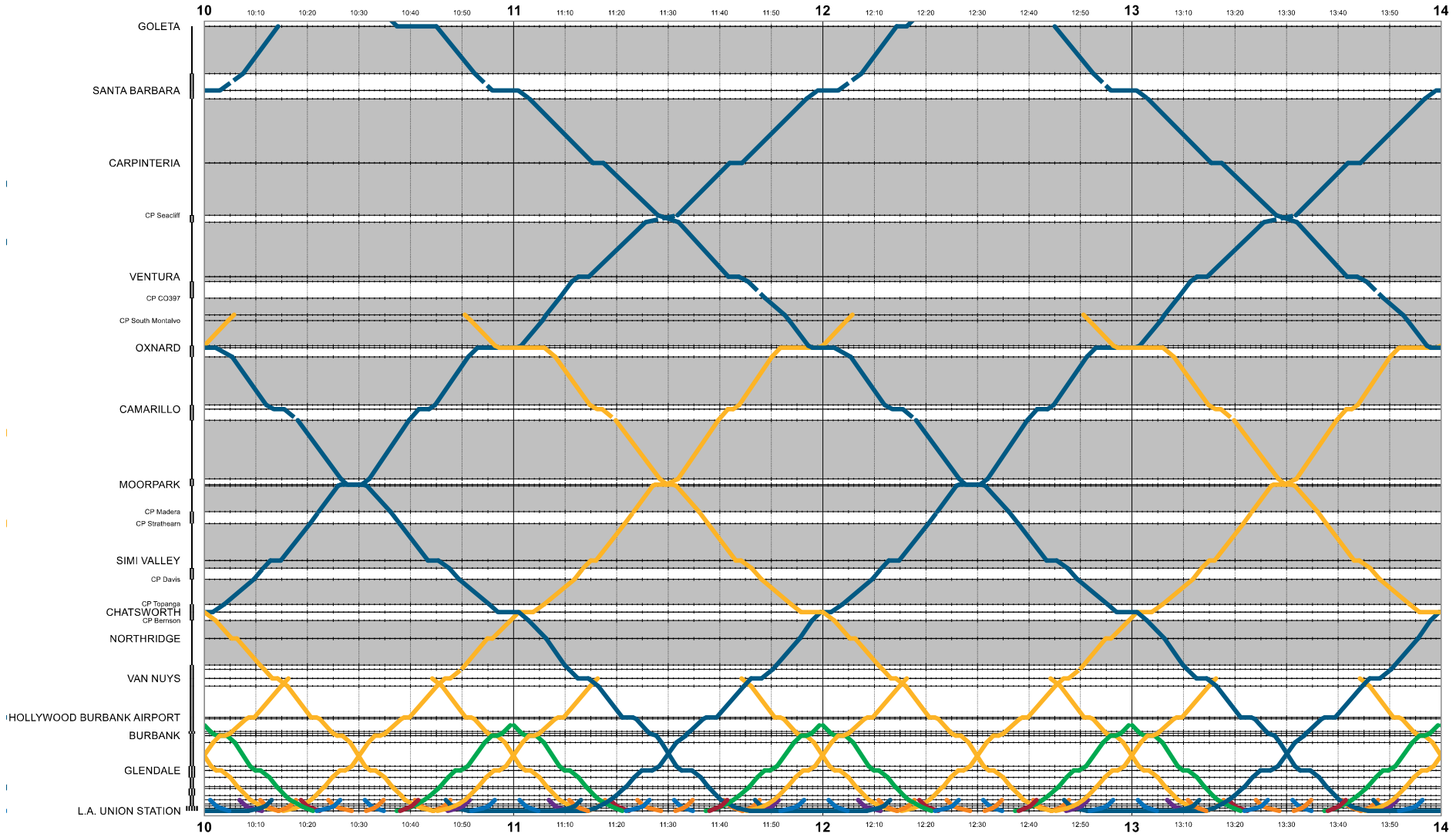
LOSSAN South – Connections at Oceanside

The near-term service pattern sets train operations to run regularly at 30-minute or hourly frequencies. However, single-track sections on the San Diego Subdivision limit train frequencies to a 20-minute operating pattern. Oceanside was identified as a key connection node between services but the mismatch between the available 20-minute and 30-minute operating patterns allows only a subset of trains to have optimal connections. Train frequencies on the San Diego Subdivision can only be switched to a 15-minute or 30-minute pattern once both the San Dieguito and Miramar bottlenecks are resolved. Nevertheless, the near-term service pattern provides at least hourly connectivity between services and improves upon the LOSSAN Rail Corridor's existing service.

San Luis Obispo—Santa Barbara

Near-term



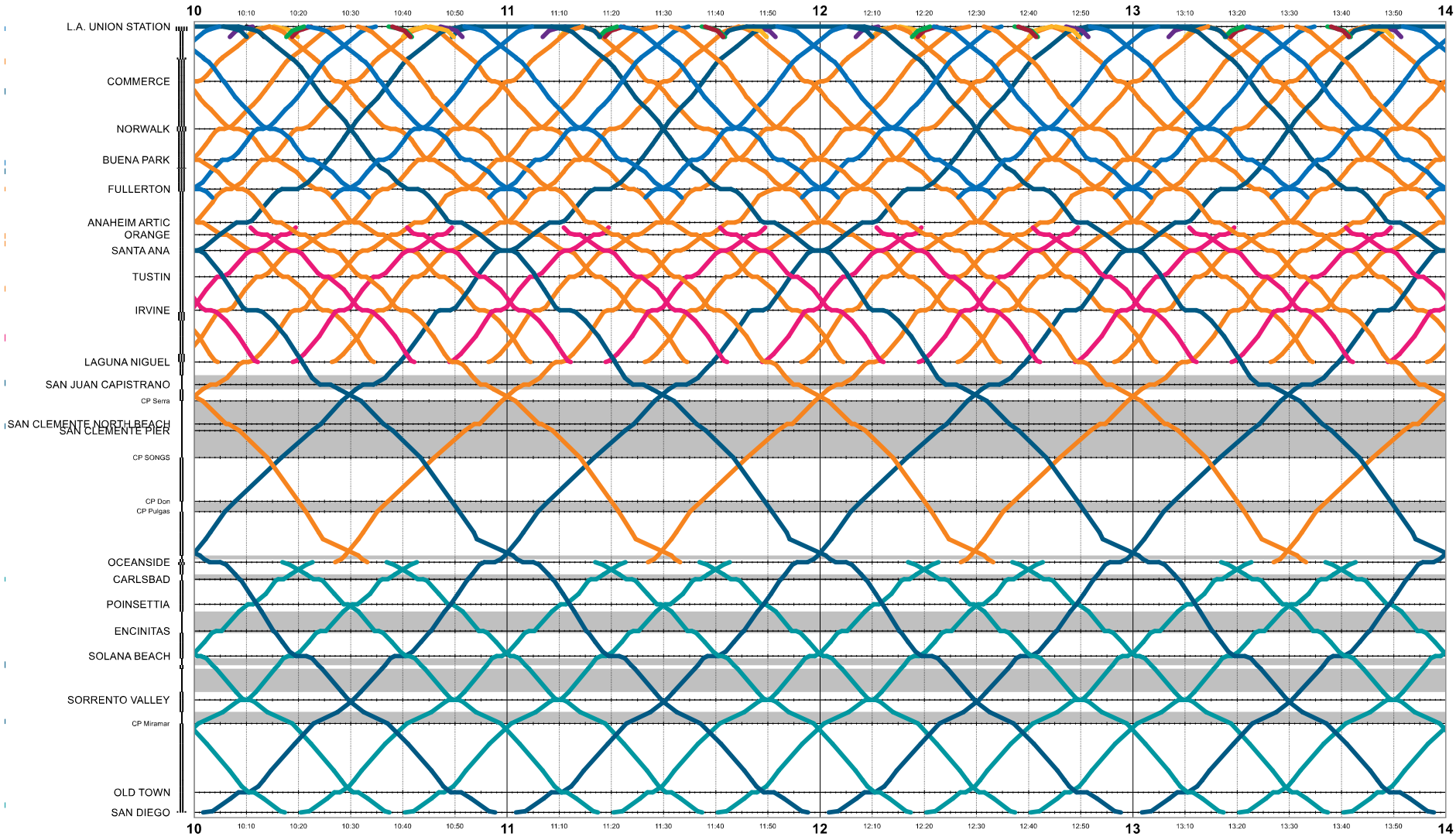


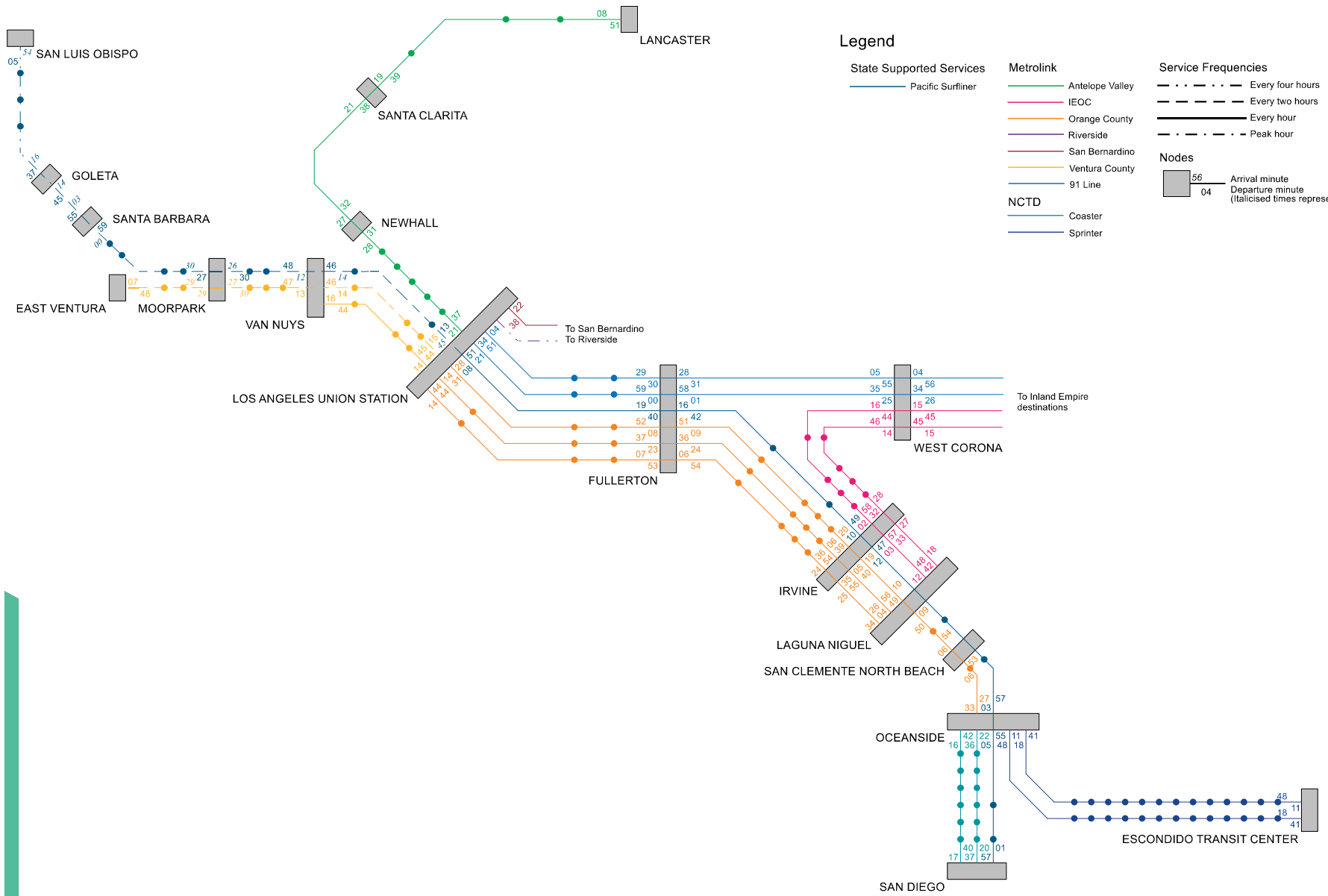
Goleta—Los Angeles Union Station

Near-term

Los Angeles Union Station—San Diego

Near-term




SAN LUIS OBISPO
GOLETA
SANTA BARBARA
EAST VENTURA
MOORPARK
VAN NUYS
LANCASTER
SANTA CLARITA
NEWHALL
LOS ANGELES UNION STATION
To San Bernardino
To Riverside
FULLERTON
WEST CORONA
To Inland Empire destinations
IRVINE
LAGUNA NIGUEL
SAN CLEMENTE NORTH BEACH
OCEANSIDE
ESCONDIDO TRANSIT CENTER
SAN DIEGO
Legend
State Supported Services
Pacific Surfliner
Metrolink
Antelope Valley
IEOC
Orange County
Riverside
San Bernardino
Ventura County
91 Line
NCTD
Coaster
Sprinter
Service Frequencies
Every four hours
Every two hours
Every hour
Peak hour
Nodes
56
04
Arrival minute
Departure minute
(Italicised times represent odd hours)

Near-term

Mid-term recommendations

The mid-term planning horizon provides an interim service plan that provides full-day service on the LOSSAN Rail Corridor. This planning horizon develops the restructured operating plan – established in the near term – and recommends prioritized "pin-point" capital investments that bring either tangible service increases or enable services to run in a more reliable manner.

The mid-term planning horizon is centered around the assumption that the first set of run-through tracks at Los Angeles Union Station are complete. The planning horizon also assumes increased equipment availability and new maintenance and storage facilities at San Diego, Goleta, and San Luis Obispo, which will enable at least 15 roundtrips between Los Angeles and San Diego, and potentially a two-hourly Pacific Surfliner service between Los Angeles Union Station and Goleta.[5]

The stringline diagrams and sample schedules presented later in this section represent one version of a potential ultimate schedule in the medium term. Phase in of service levels would need to be subject to detailed analysis and discussions between operators at each schedule cycle.

Service outcomes

Pacific Surfliner

- Intercity passenger rail slots that can be used by the Pacific Surfliner are scheduled to operate on an hourly frequency between San Diego and Los Angeles Union Station.
- Intercity passenger rail slots north of Los Angeles Union Station to Goleta and San Luis Obispo are scheduled on a two-hourly frequency. The LOSSAN Agency, Amtrak, Metrolink and UP can select which slots to activate to fill the train counts available for operation.[6]

Amtrak Long Distance Services

- Amtrak's Coast Starlight service operates one roundtrip per day between Los Angeles Union Station and Seattle. The LOSSAN Study recommends that this service utilizes an intercity passenger rail slot that aligns with the pattern for Pacific Surfliner services.
- Amtrak's Southwest Chief service operates one roundtrip per day between Los Angeles Union Station and Chicago. This service is not explicitly planned in the LOSSAN Study. It can operate in a slot that aligns with the pattern for Pacific Surfliner services

5 Actual train frequencies are subject to agreement with the UP

6 Total number of trains operating north of San Luis Obispo will be determined by shared-use agreements between UP and LOSSAN.

south of Los Angeles or utilize another slot that is agreed separately with the host railroads.

Antelope Valley Line

- Regional rail slots that can be used for commuter or intercity services are scheduled on a 30-minute frequency between Santa Clarita and Los Angeles Union Station and on an hourly frequency between Santa Clarita and Lancaster.
- The LOSSAN Study reflects the proposed capital recommendations detailed in the Los Angeles Metropolitan Transportation Authority's (LA Metro) technical study.[7]

Inland Empire-Orange County Line

- Regional rail slots that can be used for commuter or intercity services are scheduled on a 30-minute frequency between the Inland Empire and Laguna Niguel. (Refer to page 46 for alternative operating options to Oceanside)

Orange County Line

- Regional rail slots that can be used for commuter services are scheduled to support three trains per hour between Los Angeles Union Station and Laguna Niguel using 15-minute frequency intervals.
- Regional rail slots that can be used for commuter services can operate on an hourly frequency between Laguna Niguel and Oceanside.

Riverside Line

- Service on this line was not explicitly modelled for this study.

San Bernardino Line

- Regional rail slots that can be used for commuter services were modelled to arrive at Los Angeles Union Station at xx:22 and depart at xx:38 to align with the existing and planned service as informed by Metrolink.

Ventura County Line

- Regional rail slots that can be used for commuter services are scheduled on an hourly frequency between Los Angeles Union Station and Moorpark. An additional regional rail slot can run every 2 hours bi-directionally between Los Angeles and East Ventura with bi-hourly intercity slots. Together, regional, and intercity slots provide 30-minute frequencies between Los Angeles Union Station and Moorpark, and hourly frequencies to Oxnard.

7 Metro. "Antelope Valley Line Study: Final Report," October 22, 2019.

91/Perris Valley Line

- Regional rail slots that can be used for commuter or intercity services are scheduled operate on a 30-minute frequency between Los Angeles Union Station and the Inland Empire.

COASTER

- Regional rail slots that can be used for commuter services are scheduled to support two trains per hour between Oceanside and San Diego using a 20-minute frequency interval. The third frequency is occupied by the intercity rail service.

SPRINTER

- Regional rail slots that can be used for commuter services are scheduled on a 15-minute frequency between the Oceanside and Escondido.[8]

Freight services

- Freight capacity on the Santa Barbara Subdivision is programmed by UP. The LOSSAN Study coordinated with the UP to ensure that capital projects were aligned.
- Freight capacity on the San Bernardino Subdivision is being addressed through a concurrent planning study led by BNSF and Caltrans. This study builds on the concepts developed in the LOSSAN Study.
- Freight capacity between CP Atwood and San Diego and investment recommendations are documented in BNSF's *San Diego Pathing Study*. The freight capacity study was developed using the concepts detailed in this LOSSAN Study.[9]

Connectivity at key nodes

Santa Barbara / Goleta: intercity passenger rail slots are scheduled around the top of the hour (xx:00) at Santa Barbara and around a xx:15/xx:45 node at Goleta every two hours. Both nodes can be used as connection points for other operators to design connections around.

Camarillo: Intercity and regional rail slots for commuter service are centered around the top and bottom of the hour (xx:00 and xx:30) and provide a 30-minute frequency framework for other transit services.

Moorpark: Intercity and regional rail slots for commuter service are centered around xx:15 and xx:45 and provide a 30-minute frequency framework for other transit services.

Simi Valley: Intercity and regional rail slots for commuter service are centered around xx:00 and xx:30 and provide a 30-minute frequency framework for other transit services.

8 Subject to completion of capital projects outlined in NCTD's "Analysis on increased SPRINTER service frequencies" report. May 20th, 2020

9 BNSF, NCTD. "San Diego Pathing Study: Final Report" September 22, 2020.

Chatsworth: Intercity and regional rail slots for commuter service are centered around xx:15 and xx:45 and provide a 30-minute frequency framework for other transit services.

Los Angeles Union Station: Intercity and regional rail slots for commuter service are centered around the bottom of the hour (xx:30) for connections. Additional connectivity around xx:00 is possible for services operating at 30-minute frequencies.[10]

Santa Ana – Laguna Niguel: Inland Empire Orange County (IEOC) line services interline with intercity passenger rail and regional rail slots along the LOSSAN rail corridor at minimum planned headways. Southbound IEOC line services and scheduled ahead of intercity passenger rail and regional rail slots operating from Los Angeles Union Station, whereas northbound slots follow these services. Passengers can continue their journey by alighting from the first train and waiting at the same platform 7.5 minutes for the onward connecting service. The transfer can be made at any station along the LOSSAN rail corridor between Santa Ana and Laguna Niguel.

Oceanside: Connections opportunities are constrained by single-track sections on either side of the station between. (Refer to page 68 for alternative operating strategies).

- One connection per hour between intercity passenger rail and regional rail scheduled services with a transfer time of 20 minutes.
- One connection per hour between regional rail scheduled services with a transfer time of 10 minutes.
- Two connections per hour between SPRINTER services and Orange County bound intercity passenger rail and regional rail services scheduled along the LOSSAN rail corridor with a transfer time of six minutes.
- Two connections per hour between SPRINTER and COASTER services with transfer times of 11 and 13 minutes.

10 Pacfic Surfliner connects at minute xx:30 on through tracks resulting Link US

Operating requirements

The mid-term scenario recommends targeted capital and operational improvements to lift the level of service quality on the corridor. Operations assume that hold-out rules and delay-in-block timing delays are addressed to enable a tighter operating margin for rail services.

Section running times

Section running times were calculated in the LOSSAN Agency's Viriato server using the rolling-stock listed in the table below. Section running times comprise technical calculated runtimes that are factored by 7%. A minimum pad of 10% runtime is used on the UP Santa Barbara Subdivision north of Goleta. Please refer to the LOSSAN Agency Viriato Server for a comprehensive listing of runtimes measured between control points and station nodes.

Mid-term rolling-stock calculation assumptions

Service	Locomotive	Car
Pacific Surfliner	Siemens Charger	6 bi-level Surfliner cars
Metrolink Ventura County	EMD F125[11]	6 bi-level Rotem cars
Metrolink Antelope Valley	EMD F125[11]	6 bi-level Rotem cars
Metrolink Orange County	EMD F125[11]	6 bi-level Rotem cars
Metrolink 91/Perris Valley	EMD F125[11]	6 bi-level Rotem cars
Metrolink Inland Empire-Orange County	EMD F125[11]	6 bi-level Rotem cars
NCTD COASTER	Siemens Charger	5 bombardier bi-level cars

Dwell times

Dwell times can be read from the stringline charts listed in this document.

Mid-term minimum dwell values [minutes]

Service	Minimum dwell	Exception
Pacific Surfliner	1.5	Santa Barbara: 3 mins LA Union Station: 10 mins
Metrolink	1.0	LA Union Station: 3 mins
NCTD COASTER	1.0	NCTD reported that 0.5-minute dwells were possible if required

Meet locations

Refer to stringline charts on pages 70-75

11 Metrolink operates its service using EMD F125 "Spirit" locomotives. Vehicle technical specifications were not available at the time of writing and a Siemens Charger was used to generate plausible running times instead.

Devon and Concepcion sidings: Passenger trains are timetabled to meet opposing passenger trains symmetrically around the top of the hour (xx:00) at Devon siding (odd hours) and at Concepcion siding (even hours). To ensure that these meets align with LOSSAN Rail Corridor-wide operations, trains are timetabled with the following considerations:

- Train movements have four-minute minimum separation times at CP North Devon and CP South Devon.
- Southbound trains have a 50-minute travel time (47 minutes of section running and three minutes of dwell) between San Luis Obispo and Devon siding to arrive at CP North Devon at minute xx:28. Northbound and southbound trains have a total travel time of 56 minutes (54-minute section running time and 2-minute dwell) between Devon and Concepcion siding. Four minutes of schedule time is applied at both sidings to accommodate operations for train meets.
- Northbound and southbound trains have a section running time of 41 minutes between Concepcion siding and Goleta to ensure that siding meets are centered around the top of the hour (xx:00).

If trains operate using a four-hourly pattern schedule, constraints still apply at the siding used for train meets: meets should occur around the top of the hour (xx:00).

Leesdale siding and Camarillo Station: Passenger trains are timetabled to meet opposing passenger trains symmetrically around the top of the hour (xx:00) at either Camarillo (Intercity slots) or on Leesdale siding (bi-directional regional rail slots). Leesdale siding enables at least hourly service between Moorpark and East Ventura. Intercity service is planned with two-minute dwells, which precludes its ability to meet on Leesdale siding. Regional rail slots available for Metrolink enable train meets on Leesdale siding.

Van Nuys – Chatsworth – Simi Valley – Moorpark Stations: Passenger trains are scheduled with 13- and 14-minute section running times between stations to enable station meets with opposing passenger trains symmetrically around minutes xx:00 and xx:30, or xx:15 and xx:45.

CP Maple: Inland Empire-Orange County line service has operational buffer scheduled at CP Maple to enable the converging services to synchronize with mainline operations.

Serra Siding and CP SONGS: Passenger trains are timetabled around the single-track section at San Clemente. Potential siding extensions at Serra and CP SONGS, reduce the single-track section running time to eight minutes (non-stop service) or 10 minutes (one-stop service). Opposing trains have five-minute separation times on either side of the single-track section to allow the switch to reset and to accommodate minor operating variations. Trains can operate bi-directionally in 30-minute intervals.

CP Del Mar – CP Torrey and CP Scripps – CP Miramar: Train movements are primarily restricted by the Del Mar and Miramar single-track sections south of Oceans-

ide. The San Dieguito double-track project reduces the section of single track, enabling 20-minute frequencies and freight movements to operate south of Oceanside.

Turn times at terminal stations

Based on the service patterns developed for this study, estimated turn times were calculated for each of the terminal stations based on assumes equipment cycles. These times are rounded down to the nearest five minutes. For turn times under 15 minutes, a precise value is given. It is important to note that these turnaround times are based on assumed equipment cycles, which may change as a specific operating plan is developed for implementation.

San Luis Obispo:

- The mid-term service pattern and assumed equipment cycles estimate a 15-minute turn time. This turn-time is dependent on the final operating pattern. It may change as it is subject to UP's agreement of proposed section running times.

Goleta:

- The mid-term service pattern and assumed equipment cycles estimate that terminating trains have an 85-minute turn time.

East Ventura:

- The mid-term service pattern and assumed equipment cycles estimate that terminating trains have a 95-minute turn time.

Moorpark:

- The mid-term service pattern and assumed equipment cycles estimate that terminating trains have a 40-minute turn time.

Los Angeles Union Station:

- The mid-term service pattern and assumed equipment cycles estimate that terminating intercity trains have an 85-minute turn time.

Laguna Niguel:

- The mid-term service pattern and assumed equipment cycles estimate:
  - Orange County line trains turning for the reverse service have a 20-minute turn time;
  - Inland Empire-Orange County line trains turning for the reverse service have a 7-minute turn time, this becomes 35 if hourly frequencies are used;
  - Alternatively, if Inland Empire-Orange County line trains turn for Orange County Line trains, the turn time is 15 minutes.

Oceanside:

- The mid-term service pattern and assumed equipment cycles estimate:
  - Orange County trains turn in five minutes or in 60 minutes (Refer to page 68 for a discussion on further measures);
  - COASTER trains turn on the pocket track in 14 minutes or 30 minutes.

San Diego:

- The mid-term service pattern and assumed equipment cycles estimate:
  - COASTER trains turn in 20 minutes;
  - Pacific Surfliner trains turn 60 minutes.

Infrastructure requirements

Anchor projects

Project Name	Project Description and reasons for requirement	Subdivision & Mile Post
Link US Phase A	One platform island will connect to two through-tracks on a viaduct over the US-101 freeway. The project also includes the upgrade of rail control systems to enable short train headway times. This project enables Metrolink and Pacific Surfliner trains to operate through the station without turn vehicle sets.	River, 0
San Bernardino Subdivision prioritized upgrades	Analysis of investments necessary to support passenger and freight services is being detailed through BNSF's *San Bernardino Pathing Study*. The mid-term assumes Stage 5 improvements are complete, which includes sidings for meets and 4 track sections between CP Soto and Fullerton, provides further train paths for passenger rail.	San Bernardino, 157.5 to 158.7

Mid-term

Recommended prioritized projects

Project Name	Project Description and reasons for requirement	Subdivision & Mile Post
San Luis Obispo (Central Coast) Layover	Expand / relocate layover facility. Facility to store three trainsets with capacity for minor maintenance and car wash.	Santa Barbara 248.7
Goleta Layover Expansion	Expand existing layover facility by 900 feet to hold 1-2 additional trains. Overnight storage allows service to begin/end in Goleta.	Santa Barbara 358.2
San Diego Layover and Maintenance Facility	New layover and maintenance facility in San Diego County. Alleviate capacity problems at the San Diego Santa Fe Depot and allow maintenance tasks to be carried out in San Diego.	San Diego TBC
Install CTC and upgrade non-powered switches	Install CTC along 105 miles of track in Santa Barbara and San Luis Obispo counties. 15 power switches will be installed at 8 sidings. Enable train meets to be scheduled at more locations, which increases line capacity and enables a further roundtrip.	Santa Barbara 355.7–251.5
Elimination of delay in block locations and track speed upgrades[12]	Elimination of delay in block locations between Santa Barbara and Camarillo. Increase line speeds to achieve travel times of 56 minutes between CP South Santa Barbara and CP Camarillo. Project ensures trains operate on a 2-hourly pattern, with meets at Santa Barbara and Camarillo.	Santa Barbara, 248.7–413.1
Carpinteria Station Double Track and Second Platform	Construct siding and second platform configured to allow two trains in the station simultaneously. Provides a passing location for out of slot passenger and freight trains and improves corridor resilience. In the long-term, all stations on the LOSSAN Rail Corridor should have two platforms and no hold-out rule.	Santa Barbara, 337.8
Seacliff Siding	Upgrade and extend siding to improve passenger and freight train meets. Increase timetable resilience by shortening single track territory.	Santa Barbara, 385.30–387.00

12 Refer to The Task 1 report

Project Name	Project Description and reasons for requirement	Subdivision & Mile Post
Leesdale siding extension and Oxnard Second Platform	The extension of Leesdale siding between CO402 at MP 409.1 and CP O406 at MO 405.6 enables passenger services to operate at 60-minute frequencies to Oxnard and eliminate a complicated 3 step meet. If funding becomes available, the construction of a second platform face at Oxnard in the midterm, (prioritized in the long term) will further the capacity improvements and operational efficiencies from the extension of the Leesdale siding. Alternatively, a travel time reduction plan between Simi Valley and Oxnard could delay the need for Leesdale siding. Northbound trains pass CP Sequoia at minute xx:31 and CP O406 at xx:58. Southbound trains pass CP O406 at minute xx:02 and CP Sequoia at xx:29. Section travel times (section running time and dwell) need to be 27 minutes. This could be achievable by raising line speeds to 79mph and by upgrading siding speeds and turnouts at Camarillo and the proposed Simi Valley station double track project to match the mainline. A second platform face at Oxnard station would be required.	Santa Barbara, 403–409
Camarillo Station Pedestrian Grade Separated Crossing	Construct a pedestrian undercrossing and other station improvements in Ventura County. The project will be constructed by the City of Camarillo. Improve pedestrian access to the second platform for regular usage.	Montalvo 413.1
Moorpark holdout rule elimination	Grade separate access to second platform and update signal system to enable simultaneous use of platforms. Added operating time to account for holdout rules can be removed, passenger trains can operate at 30-minute frequencies through Moorpark station.	

Mid-term

Project Name	Project Description and reasons for requirement	Subdivision & Mile Post
Simi Valley Double Track and Platform	Completion of double track between CP Sequoia and CP Arroyo, modifications to four at-grade crossings, and a second platform at Simi Valley with grade separated access. Enables 30-minute passenger frequencies through Simi Valley to at least Moorpark. It is recommended that the double track is extended a further 0.9 miles to CP Santa Susana to enable potential 15-minute passenger frequencies to operate on the single-track section between CP Davis and CP Topanga.	Ventura, 432.8–440.8
Eliminate of holdout rules	Eliminate holdout rules at, Glendale, Burbank, Burbank-Hollywood Airport and Sorrento Valley. Elimination of holdout rules allows simultaneous use of all platforms. In single track sections, frequencies can be improved by scheduling train meets at stations.	–
Chatsworth Station and Signal Project	Upgrade pedestrian crossing and system controls. Eliminate the hold-out rule to enable simultaneous use of platforms.	Ventura 444.37–446.72
Burbank Junction Speed Improvements	Upgrade turnouts and add a crossover at Control Point Olive to allow diverging moves from both main tracks to Brighton Siding. Supports 30-minute service on the Antelope Valley line.	Ventura, 462.38 Valley, 11.1
Burbank to Los Angeles Signal Respacing	Communication and signal application program changes; signal block respacing; addition of intermediate signals. Supports 5-minute headways on the Valley Subdivision and enables high through-put of trains.	Valley, 4.8–11.38
Orange-Olive Wye and CP Maple Improvements	Upgrade the junction with an additional turnout as recommended in Metrolink's SCORE program to remove "single-track" operations on M1. Project will reduce junction separation times as required by the operating plan.	Orange, 172.2
San Juan Creek Bridge replacement	Replace the existing 100-year-old railroad bridge over San Juan Creek in San Juan Capistrano. Existing bridge foundation does not meet design and load standards. The new bridge will be built on the western side of the existing bridge to minimize interruption to passenger and freight train services and will conform to load and storm standards.	Orange, 197.87

Project Name	Project Description and reasons for requirement	Subdivision & Mile Post
Potential Serra Siding Extension	Extend Serra siding to CP Capistrano and CP Beach. Reduces the bottleneck at San Clemente to 6.7 miles and travel times through the section reduce to under 10 minutes enabling 2 trains per hour and direction to operate.	Orange, 197.4–201.0
Potential SONGS Siding Extension	Relocate CP SONGS to the County line at MP 207.7. The project provides 1.55 miles of new siding track and replaces bridges. This project (together with the Serra siding extension) reduces the bottleneck at San Clemente to allow 30-minute headways. The shortened bottleneck also has freight benefits as detailed in the "*San Diego Pathing Study*" by NCTD and BNSF.[13]	San Diego, 207.7–209.25
Batiquitos Lagoon Double Track	Extend double-track section from CP Ponto to CP La Costa at MP 235.4. This project can be deferred to projects associated with the long-term horizon if Pacific Surfliner and NCTD COASTER services can reduce dwells reliably to 0.5 minutes and 1.5 minutes, respectively. The project provides schedule resilience if a train is running out of slot.	San Diego, 234.5–237.2
San Dieguito Double Track	2.1 miles of second main track and San Dieguito bridge replacement between CP Valley and CP Del Mar. This project reduces the effective single-track section along the Del Mar bluffs, enabling 3 trains per hour and direction to operate. The project enables freight to operate with passenger traffic during off peak hours.[13] [14]	San Diego, 242.2–243.3
CP Miramar signal upgrade	Four minutes of junction separation times at CP Miramar are currently needed to allow opposing trains to cross as speed. Rail control systems at this location should be upgraded to support at least 2.5-minute separation times. This project provides schedule resilience if a train is running out of slot.	San Diego, 252.9
San Diego Convention Center Station	New station at San Diego Convention Center. TBD regular revenue service or special event only. Enables COASTER service extension south of San Diego Santa Fe Depot.	San Diego, 268.77–268.78

13 BNSF, NCTD. "San Diego Pathing Study: Final Report" September 22, 2020

14 Refer to Task 1 Report

Mid-term opportunities, constraints, and alternative service options

The mid-term planning horizon is anchored around the first set of run-through tracks at Los Angeles Union Station. The run-through tracks will bind operations north and south of Los Angeles Union Station as trains will no longer need to turn at the station. The run-through tracks will reduce journey times by 10-15 minutes for Pacific Surfliner services.

On LOSSAN North, Pacific Surfliner and Ventura County line services share the same train path in alternating hours. Together, with shortened dwells at Los Angeles Union Station, the operating pattern on LOSSAN South shifts by 30 minutes.

Dwell time performance

Dwell times in the mid-term planning horizon are shortened from 2.0 minutes to 1.5 minutes for Pacific Surfliner services. This assumption sets an operating goal for Amtrak to work towards in preparation of launching the mid-term operating concept.

Pacific Surfliner dwell shortening is required to homogenize operating characteristics between Metrolink services and Pacific Surfliner services, and to enable higher-frequency and regular train operations on single sections of track.

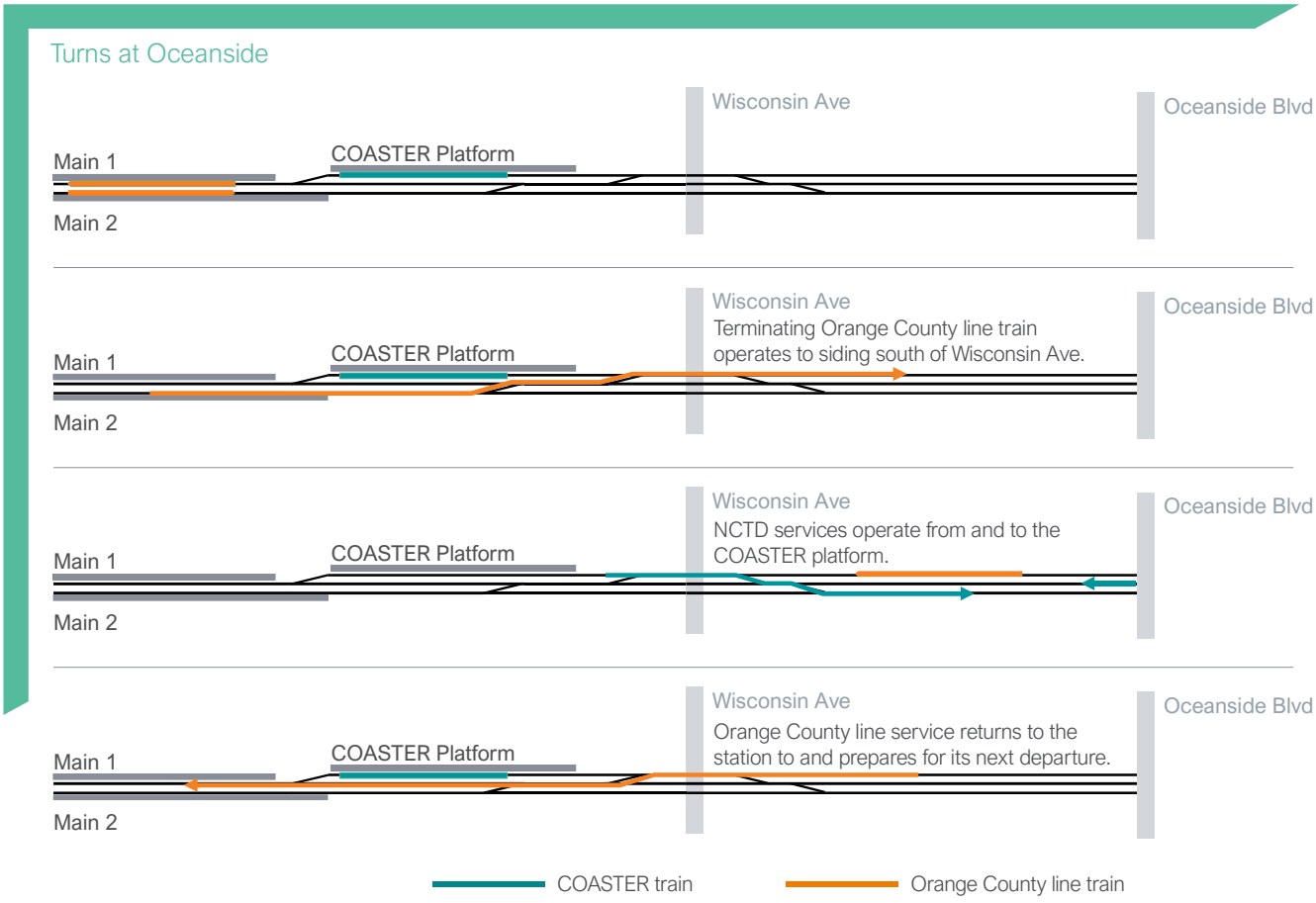
This is particularly important on the single-track sections between Santa Barbara and Chatsworth, and south of Oceanside, where trains are scheduled to meet at stations. The successful implementation of dwell shortening may enable capital improvements (e.g., Leesdale siding, Batiquitos Lagoon) projects to be deprioritized from mid-term to the long-term planning horizon.

Link US Phase A through tracks

The through-tracks at Los Angeles Union Station should be used for through-service to maximize capacity utilization. Metrolink services on LOSSAN North (Ventura County and Antelope Valley lines) can be connected to LOSSAN South services (Orange County and 91/Perris Valley Line services). Similarly, only Pacific Surfliner services that run through Los Angeles Union station should occupy the through tracks. Terminating services should be designed to use the existing alignment and terminal platforms.

Oceanside turns

If a regular, hourly Metrolink service to Oceanside is established in the mid-term, trains may need to stage on the siding between Wisconsin Avenue and Oceanside Boulevard to enable COASTER and Pacific Surfliner trains to operate. There are two alternative solutions if this not feasible.



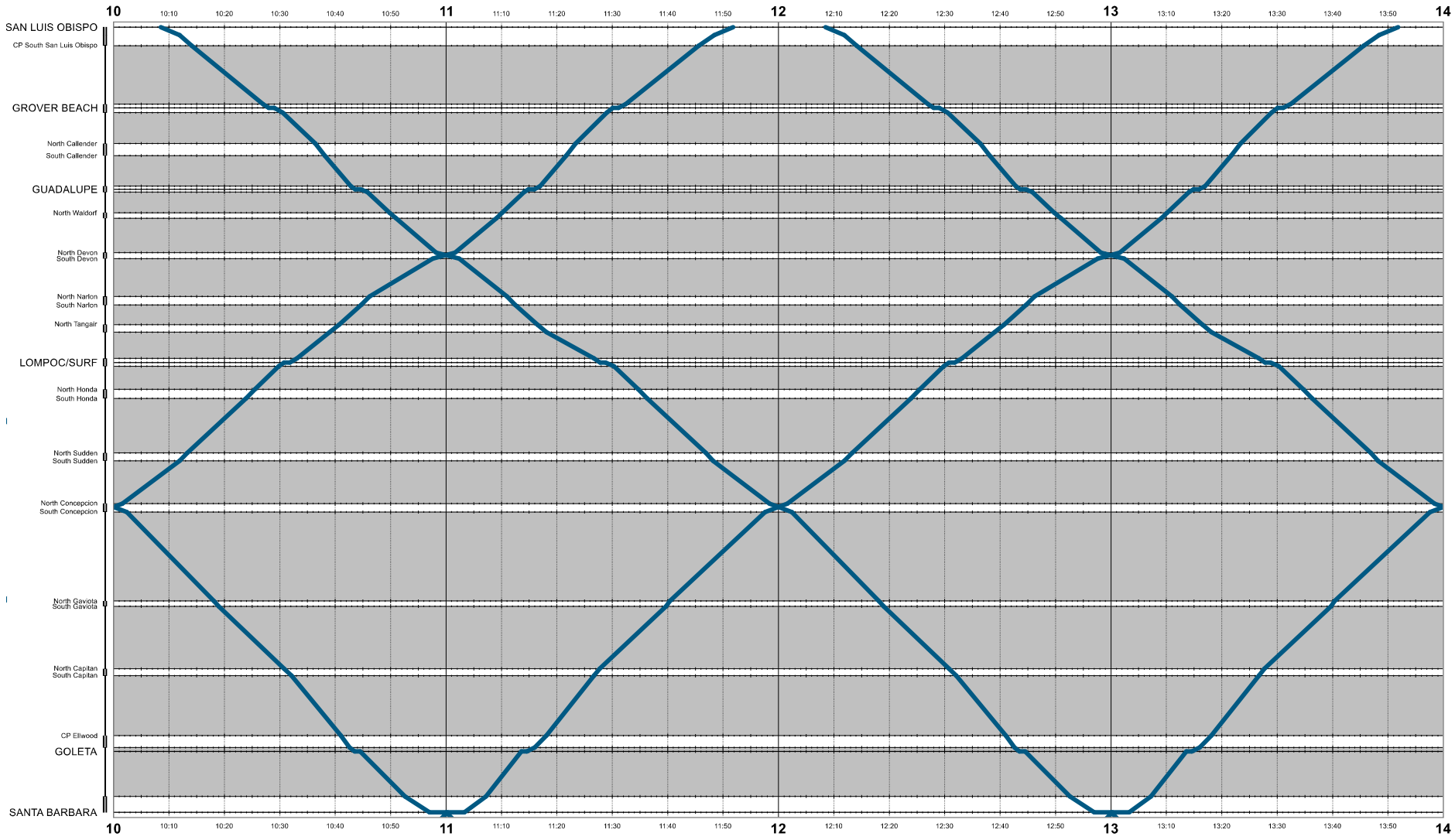
- Metrolink trains could turn on either Main 1 or Main 2, if the section of track between CP SONGS and Oceanside is upgrade to FRA Track Class 6 to allow 110 mph running.[15] FRA Track Class 6 could yield approximately two minutes of section running time savings between CP SONGS and Oceanside in each direction. Travel time savings would enable 10-minute turns, which would save an equipment set.
- Alternatively, the LOSSAN Rail Corridor's operating pattern can be shifted by 15 minutes, however this will impact the prioritization of projects on LOSSAN North and will require:
  - Two platform station at Grover Beach with no holdout rule
  - Two platform station at Ventura with no holdout rule
  - Leesdale Siding extension at Camarillo, rather than from Oxnard
  - In addition, freight concepts detailed in BNSF's *San Diego Pathing Study* would need to be re-adjusted to fit with the pattern.

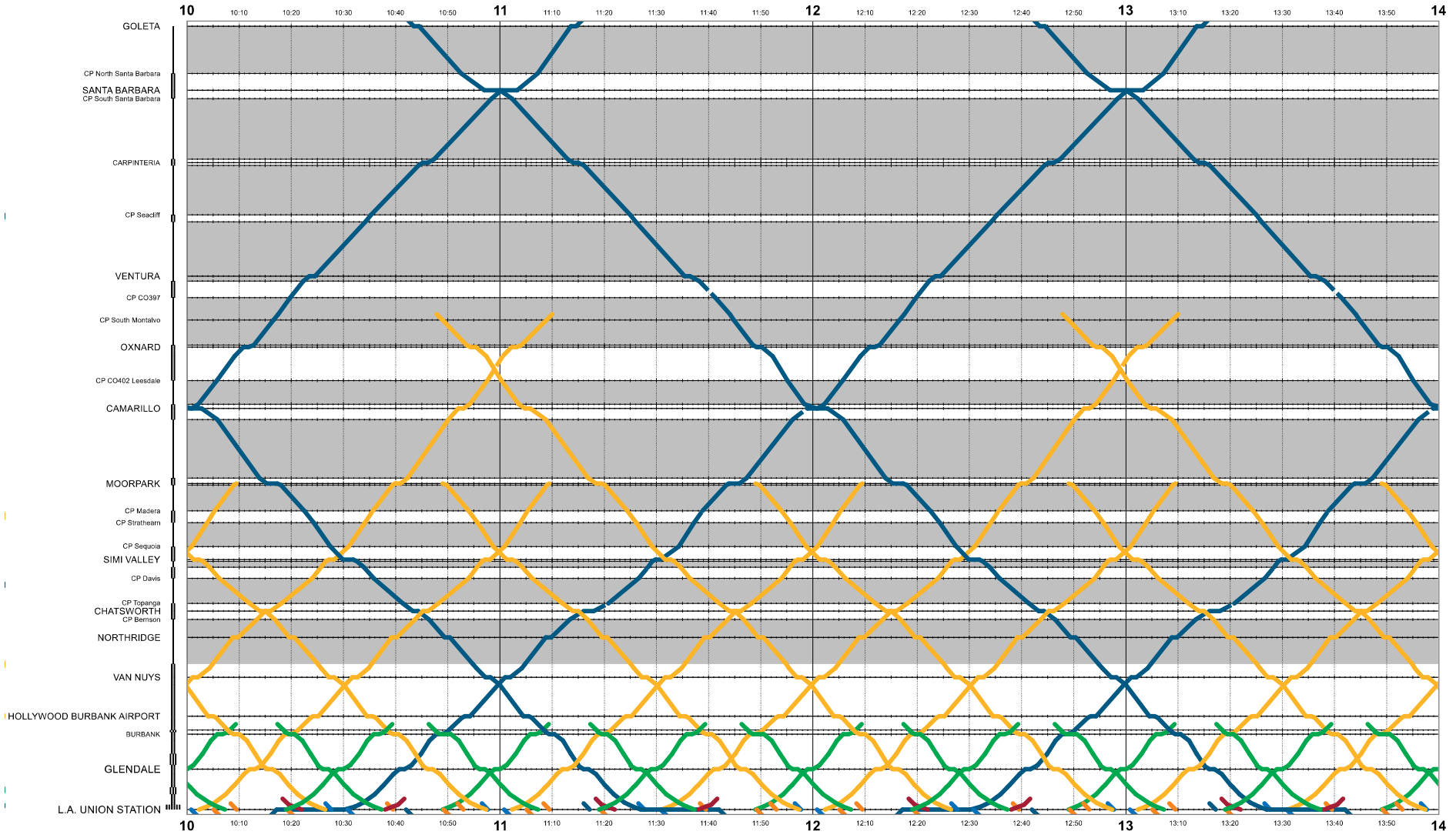
Refer to the appendix for alternative stringline charts.

15 49 CFR 213.9 – Maximum allowable operating speeds for freight and passenger

San Luis Obispo—Santa Barbara

Mid-term



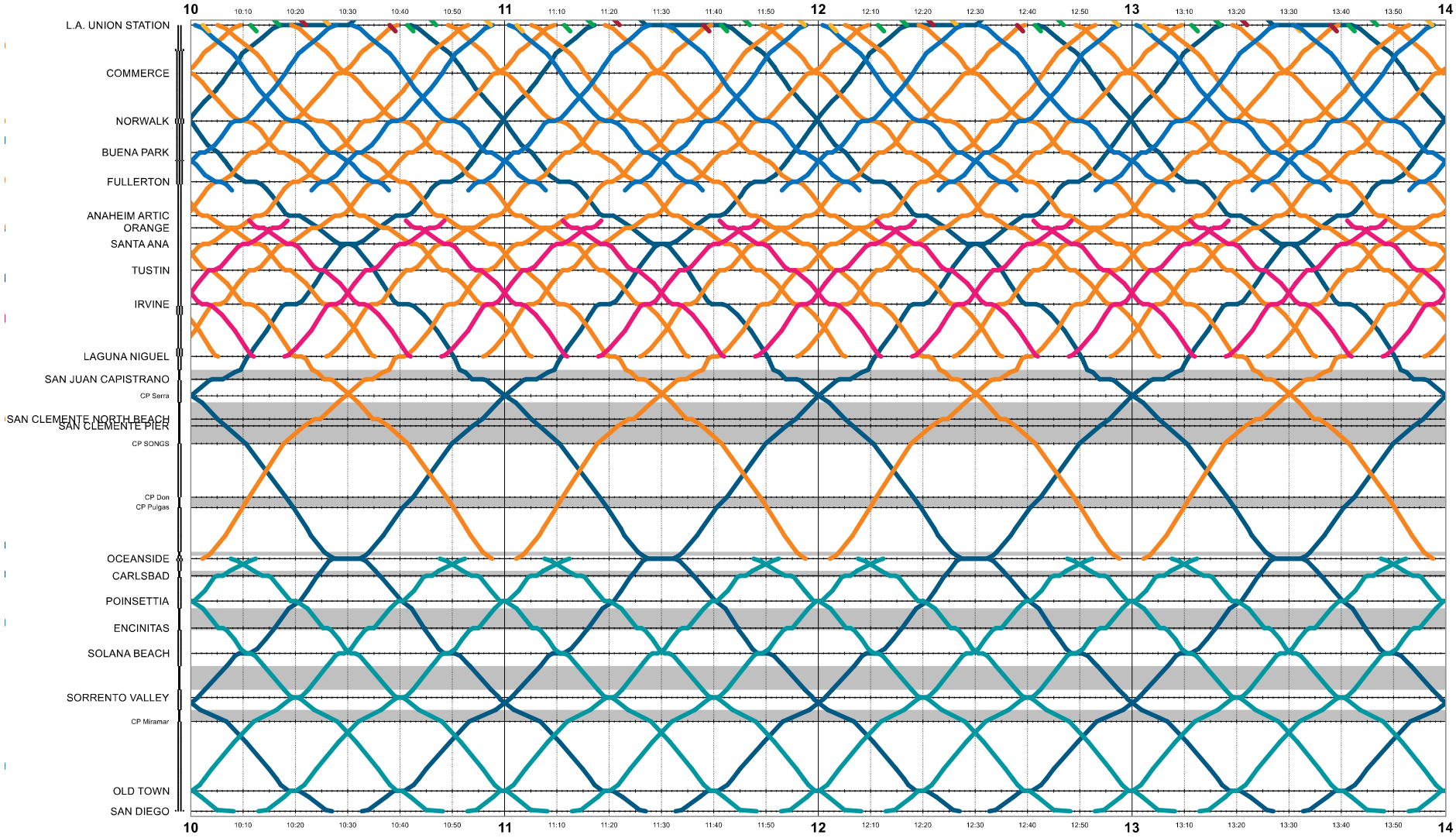


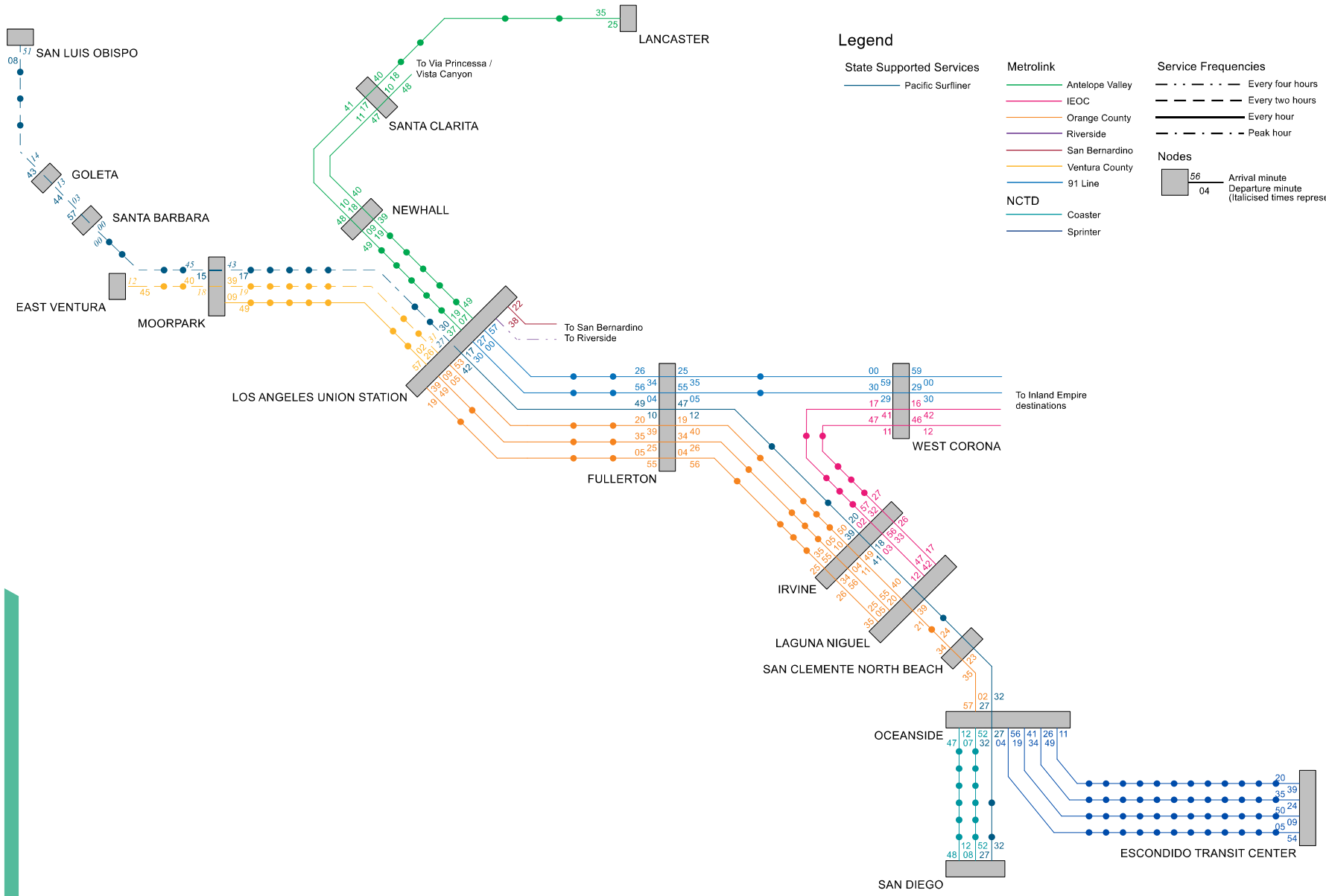
Goleta—Los Angeles Union Station

Mid-term

Los Angeles Union Station—San Diego

Mid-term




SAN LUIS OBISPO
GOLETA
SANTA BARBARA
EAST VENTURA
MOORPARK
LANCASTER
To Via Princessa / Vista Canyon
SANTA CLARITA
NEWHALL
To San Bernardino
To Riverside
LOS ANGELES UNION STATION
FULLERTON
To Inland Empire destinations
WEST CORONA
IRVINE
LAGUNA NIGUEL
SAN CLEMENTE NORTH BEACH
OCEANSIDE
ESCONDIDO TRANSIT CENTER
SAN DIEGO
Legend
State Supported Services
Pacific Surfliner
Metrolink
Antelope Valley
IEOC
Orange County
Riverside
San Bernardino
Ventura County
91 Line
NCTD
Coaster
Sprinter
Service Frequencies
Every four hours
Every two hours
Every hour
Peak hour
Nodes
56
04
Arrival minute
Departure minute
(Italicised times represent odd hours)

Mid-term

Long-term recommendations

The long-term planning horizon answers 2018 California State Rail Plan's 2027 planning horizon goals. Pacific Surfliner trains can operate at least 16-roundtrips between Los Angeles and San Diego, and two-hourly service north of Los Angeles Union Station.[16] Metrolink services operate can operate at 30-minute frequencies and some lines have the potential to operate at 15-minute frequencies. NCTD COASTER services operate three trains per hour using a 15-minute pattern with the Pacific Surfliner.

The long-term planning horizon outlines the maximum service that could be delivered once capital projects identified in regional plans are complete. Service and operating plans are centered around the assumption that there are four platform edges serving the run-through tracks at Los Angeles Union Station, and on the completion of the following regional plans: Metrolink SCORE Program, early California High-Speed Rail investments on the BNSF San Bernardino Subdivision, and SANDAG's LOSSAN Rail Corridor Infrastructure Development Plan.

The capital infrastructure described for the Long-Term Recommendations are not funded yet and implementation time frames may thus extend years beyond a horizon year of 2027. This suggests that service may get phased in over an extended period of time as capital investments get completed and as demand builds.

The stringline diagrams and sample schedules presented later in this section represent one version of a potential ultimate schedule in the long term. Phase in of service levels would need to be subject to detailed analysis and discussions between operators at each schedule cycle.

Service outcomes

Pacific Surfliner:

- Intercity passenger rail slots that can be used by the Pacific Surfliner are scheduled to operate on an hourly frequency between San Diego and Los Angeles Union Station.
- Intercity passenger rail slots extend north of Los Angeles Union Station to Goleta or San Luis Obispo on a 2-hourly frequency. The LOSSAN Agency, Amtrak and UP can select the slots to activate to fill the train counts available for operation.[17]

Amtrak Long Distance Services

- Amtrak's Coast Starlight service operates one roundtrip per day between Los Angeles Union Station and Seattle. The LOSSAN Study recommends that this service utilizes an intercity passenger rail slot that aligns with the pattern for Pacific Surfliner services.

16 Actual train frequencies are subject to agreement with the UP.

17 Total number of trains operating north of San Luis Obispo will be determined by shared-use agreements between UPRR and LOSSAN.

- Amtrak's Southwest Chief service operates one roundtrip per day between Los Angeles Union Station and Chicago. This service is not explicitly planned in the LOSSAN Study. It can operate in a slot that aligns with the pattern for Pacific Surfliner services south of Los Angeles Union Station or utilize another slot that is agreed separately with the host railroads.

Antelope Valley Line

- Regional rail slots that can be used for commuter or intercity services are scheduled on a 15-minute frequency between Santa Clarita and Los Angeles, on a 30-minute frequency between Santa Clarita and Vista Canyon, and on an hourly frequency between Vista Canyon and Lancaster.

Inland Empire-Orange County Line

- Regional rail slots that can be used for commuter or intercity services are scheduled on a 30-minute frequency between the Inland Empire and Laguna Niguel.

Orange County Line

- Regional rail slots that can be used for commuter or intercity services are scheduled on 15-minute frequency between Los Angeles Union Station and Irvine. Three trains per hour and direction can operate between Irvine and Laguna Niguel, one train can operate between Laguna Niguel and Oceanside at hourly frequencies.

Riverside Line

- Service on this line was not explicitly modelled for this LOSSAN Study.

San Bernardino Line

- Regional rail slots that can be used for commuter services were modelled to arrive at Los Angeles Union Station at xx:22 and depart at xx:38 to align with the existing and planned service as informed by Metrolink.

Ventura County Line

- Regional rail slots that can be used for commuter services are scheduled on a 15-minute frequency between Los Angeles Union Station and Chatsworth. If LOSSAN Rail Corridor improvements are made between Chatsworth and Simi-Valley, 15-minute frequencies can extend to Moorpark. Together, regional, and intercity slots provide 30-minute frequencies to Oxnard Station.

91/Perris Valley Line

- Regional rail slots that can be used for commuter or intercity services are scheduled operate on a 30-minute frequency between Los Angeles Union Station and the Inland Empire.

COASTER

- Regional rail slots that can be used for commuter or intercity services are scheduled to support three trains per hour and direction on a 15-minute frequency with Pacific Surfliner trains.

SPRINTER

- Regional rail slots that can be used for commuter services are scheduled on a 15-minute frequency between the Oceanside and Escondido.[18]

Freight services

- Freight capacity on the Santa Barbara Subdivision is programmed by UP. The LOSSAN Study coordinated with the UP to ensure that capital projects were aligned.
- Freight capacity on the San Bernardino Subdivision is being addressed through a concurrent planning study led by BNSF and Caltrans. This study builds on the concepts developed in this LOSSAN Study.
- Freight capacity between CP Atwood and San Diego and investment recommendations are documented in BNSF's *San Diego Pathing Study*. The freight capacity study was developed using the concepts detailed in this LOSSAN Study.[19]

Connectivity at key nodes

Santa Barbara / Goleta: intercity passenger rail slots are scheduled around the top of the hour (xx:00) at Santa Barbara every two hours, trains operate on a xx:15/xx:45 node at Goleta. Both nodes can be used as connection points for other operators to design connections around.

Camarillo: Intercity and regional rail slots for commuter service are centered around the top and bottom of the hour (xx:00 and xx:30) and provide a 30-minute frequency framework for other transit services.

Moorpark, Simi Valley and Chatsworth: Intercity and regional rail slots for commuter service are centered around xx:00, xx:15, xx:30 and xx:45 and provide a 15-minute frequency framework for other transit services.

Los Angeles: Intercity and regional rail slots for commuter service are centered around xx:30 for connections. (Refer to the appendix for alternative concepts).

Santa Ana – Laguna Niguel: Inland Empire Orange County (IEOC) line services interline with intercity passenger rail and regional rail slots along the LOSSAN rail corridor at minimum planned headways. Southbound IEOC line services and scheduled ahead of intercity passenger rail and regional rail slots operating from Los Angeles Union Station, whereas northbound slots follow these services. Passengers can continue their journey by alighting from the first train, and by waiting at the same platform 7.5 minutes for the onward connecting service. The transfer can be made at any station along the LOSSAN rail corridor between Santa Ana and Laguna Niguel.

Oceanside: Intercity and regional rail slots for commuter service are scheduled around minutes xx:00, xx:15, xx:30 and xx:45. (Ref. to p. 87 for alternative operating strategies).

18 Subject to completion of capital projects outlined in NCTD's "Analysis on increased SPRINTER service frequencies" report. May 20th, 2020

19 BNSF, NCTD. "San Diego Pathing Study: Final Report" September 22, 2020.

- One connection per hour between Pacific Surfliner and COASTER services with a transfer time of nine minutes. An alternative possibility is a connection between the IEOC line and Coaster services.
- One connection per hour between Orange County line and COASTER services with a transfer time of 10 minutes.
- Two connections per hour between SPRINTER services and Orange County bound Pacific Surfliner or Metrolink services with a transfer time of six minutes.
- Three connections per hour between SPRINTER and COASTER services with a transfer time of 10 minutes.
- One connection per hour between SPRINTER and southbound Pacific Surfliner services with a transfer time of 10 minutes.

Operating requirements

The long-term scenario builds on the targeted capital and operational improvements in the mid-term horizon and utilizes the identified capital projects to maximize service (Refer to page 85).

Section running times

Section running times were calculated in the LOSSAN Agency's Viriato server using the rolling-stock listed in the table below. Section running times comprise technical calculated runtimes that are factored by 7%. A minimum pad of 10% runtime is used on the UP Santa Barbara Subdivision North of Goleta. Please refer to the LOSSAN Agency Viriato Server for a comprehensive listing of runtimes measured between control points and station nodes.

Long-term rolling-stock calculation assumptions

Service	Locomotive	Car
Pacific Surfliner	Siemens Charger	6 bi-level Surfliner cars
Metrolink Ventura County	EMD F125[20]	6 bi-level Rotem cars
Metrolink Antelope Valley	EMD F125[20]	6 bi-level Rotem cars
Metrolink Orange County	EMD F125[20]	6 bi-level Rotem cars
Metrolink 91/Perris Valley	EMD F125[20]	6 bi-level Rotem cars
Metrolink Inland Empire-Orange County	EMD F125[20]	6 bi-level Rotem cars
NCTD COASTER	Siemens Charger	5 bombardier bi-level cars

Dwell times

Dwell times can be read from the stringline charts listed in this document.

20 Metrolink operates its service using EMD F125 "Spirit" locomotives. Vehicle technical specifications were not available at the time of writing and a Siemens Charger was used to generate plausible running times instead.

Long-term minimum dwell values [minutes]

Service	Minimum dwell	Exception
Pacific Surfliner	1.5	Santa Barbara: 3 mins LA Union Station: 5 mins
Metrolink	1.0	LA Union Station: 3 mins
NCTD COASTER	1.0	NCTD reported 0.5-minute dwells were possible if the schedule required it

Meet locations

Refer to stringline charts on pages 88-93

Devon and Concepcion sidings: Passenger trains are timetabled to meet opposing passenger trains symmetrically around the top of the hour (xx:00) at Devon siding (odd hours) and at Concepcion siding (even hours). To ensure that these meets align with LOSSAN Rail Corridor-wide operations, trains are timetabled with the following considerations:

- Train movements have four-minute minimum separation times at CP North Devon and CP South Devon.
- Southbound trains have a 50-minute travel time (47 minutes of section running and three minutes of dwell) between San Luis Obispo and Devon siding to arrive at CP North Devon at minute xx:28. North- and southbound trains have a total travel time of 56 minutes (54-minute section running time and 2 two-minute dwell) between Devon and Concepcion siding. four minutes of schedule time is applied at both sidings to accommodate operations for train meets.
- North- and southbound trains have a section running time of 41 minutes between Concepcion siding and Goleta to ensure that siding meets are centered around the top of the hour (xx:00), and trains service a potential connection at Goleta station at minutes xx:15/xx:45.

If trains operate using a four-hourly pattern schedule, constraints still apply at the siding used for train meets: meets should occur around the top of the hour (xx:00).

Chatsworth – Simi Valley – Moorpark Stations: Passenger trains are scheduled with 13- and 14-minute section running times between stations to station meets with opposing passenger trains symmetrically around either minutes xx:00, xx:15 xx:30 or xx:45. Trains can operate at 15-minute intervals if a passing track is built between CP Davis and CP Topanga.

CP Maple: Inland Empire-Orange County Line service have an operational buffer scheduled at CP Maple to enable the converging services to sync with mainline operations.

Serra Siding and CP SONGS: Passenger trains are timetabled around the single-track section at San Clemente. Potential siding extensions at Serra and CP SONGS reduce the single-track section running times to eight-minutes (non-stop service) or 10 minutes (one-stop service). Opposing trains have 5-minute separation times on either side of the single-track section to allow the switch to reset and or to accommodate minor operating variations. Trains can operate bi-directionally in 30-minunte intervals.

CP Del Mar and CP Torrey: Train movements are restricted by the Del Mar single-track south of Oceanside. The San Dieguito and Sorrento to Miramar Phase 2 projects reduce the length of single-track and enable 15-minute frequencies and freight movements to operate.

Turn times at terminal stations

Based on the service patterns developed for this study, estimated turn times were calculated for each of the terminal stations based on assumes equipment cycles. These times are rounded down to the nearest five minutes. For turn times under 15 minutes, a precise value is given. It is important to note that these turnaround times are based on assumed equipment cycles, which may change as a specific operating plan is developed for implementation.

San Luis Obispo:

- The long-term service pattern and assumed equipment cycles estimate a 20-minute turn time. This turn-time is dependent on the final operating pattern. It may change as it is subject to UP's agreement of proposed section running times.

Goleta:

- The long-term service pattern and assumed equipment cycles estimate that trains have an 80-minute turn time.

East Ventura:

- The long-term service pattern and assumed equipment cycles estimate that trains have a 20-minute turn time.

Moorpark:

- The long-term service pattern and assumed equipment cycles estimate that trains have a five-minute turn time or 30 minutes.

Los Angeles:

- The long-term service pattern and assumed equipment cycles estimate that intercity trains have a 60-minute turn time.

Long-term

Irvine

- The long-term service pattern and assumed equipment cycles estimate that terminating regional trains have a 12-minute turn time.

Laguna Niguel:

- The long-term service pattern and assumed equipment cycles estimate:
  - Orange County Line trains turning for the reverse service have a 23-minute turn time;
  - Inland Empire-Orange County Line trains turning for the reverse service direction have a 6-minute turn time, this becomes 35 if hourly frequencies are used;
  - Alternatively, if Inland Empire-Orange County line trains turn for Orange County Line trains, the turn time is 15 minutes.

Oceanside:

- The long-term service pattern and assumed equipment cycles estimate:
  - Orange County trains turn in 20 minutes;
  - COASTER trains turn on the pocket track in 14 minutes or 30 minutes.

San Diego:

- The long-term service pattern and assumed equipment cycles estimate:
  - COASTER trains turn in 20 minutes;
  - Pacific Surfliner trains turn 60 minutes.

Infrastructure requirements

Anchor projects

Project Name	Project Description and reasons for requirement	Subdivision & Mile Post
Link Union Station (Link US) Phase B	Completion of 4 run-through tracks at Los Angeles Union Station.	River, 0
4-track San Bernardino Subdivision	A detailed analysis of investments necessary to support passenger and freight services is being detailed through BNSF's "*San Bernardino Pathing Study*." Construction of a 4th main-track and remodeling of stations and junctions to separate freight and passenger flows for increased frequencies.	San Bernardino, 162.5–165.3, 45.7–36.0

Long term projects

Project Name	Project Description and reasons for requirement	Subdivision & Mile Post
Ventura Station double track and siding extension	Add a second platform to Ventura station to enable 30-minute passenger frequencies.	Santa Barbara, 394.1–404.0
Leesdale Siding extension to Camarillo	Double track the corridor between Oxnard and Camarillo to enable 30-minute passenger frequencies to Ventura.	Santa Barbara, 412.5–405.6
Ortega Siding	Upgrade the siding to increase timetable resilience by shortening single track territory with a meet location between Carpinteria and Santa Barbara Stations.	Santa Barbara, 372.0–374.0
Siding between tunnels 27 and 28	Build siding to enable dynamic train meets for 15-minute frequencies through the Chatsworth tunnels.	Ventura, 443.24 – 443.8
CP Raymer to CP Bernson Double Track	Add 6.4 miles of second mainline track between CP Raymer and CP Bernson to complete a continuous double track corridor. Enables 15-minute passenger frequencies to Chatworth.	Ventura, 446.7–453.1
Third Track between Tustin area and Laguna Niguel Area	13-miles of a third main within the existing double track guideway. The span of the project will be between Red Hill Avenue in the City of Tustin to La Paz Road in the City of Mission Viejo. Modifications to existing grade crossings and turnouts will be required.	Orange, 177.9–190.3
Irvine Station and Fourth Main Track	Four main tracks from CP Tinkham to CP Bake, two center platforms at Irvine Station with pedestrian underpass, 4th main track enables cross platform transfers between different services.	Orange, 184.0–186.9

Project Name	Project Description and reasons for requirement	Subdivision & Mile Post
San Onofre to Pulgas Double Track Phase 1, Stage 2	Construction of a 1.6-mile segment of second main track (MP 216.5 to MP 218.1) and bridges at MP 217.3 and MP 218.0. Supports higher line speeds.	San Diego, 212.3–218.1
Eastbrook to Shell Double Track (San Luis Rey River Bridge)	Complete the second main track between CP Eastbrook and CP Shell, and replacement the San Luis Rey River Bridge to remove the single-track section at Oceanside. Enables improved connections.	San Diego, 225.3–225.9
Carlsbad Village Double Track	Construction of second main track between CP Longboard to CP Carl in Carlsbad. Includes new bridge over Buena Vista Lagoon. Enables 15-minute frequencies south of Oceanside.	San Diego, 228.5–229.5
La Costa to Swami Double Track	Double tracking of Encinitas station removal of single-track section. Enables 15-minute frequencies south of Oceanside.	San Diego, 235.1–238.0
Sorrento to Miramar Phase 2	Construction of second main track and curve realignment from temporary CP Scripps to CP Miramar. Enables 15-minute frequencies south of Oceanside.	San Diego, 241.0–253.0

Long-term opportunities, constraints, and alternative service options

The long-term concept sees completion of projects that enable rail service to operate at 30- and 15-minute frequencies. In operator stakeholder workshops, Metrolink requested that an alternative concept, which shifted operations by 30 minutes, should also be explored.

On the LOSSAN South Corridor two corridor constraints at San Clemente and Del Mar remain, limiting service frequency increases.

Long-term concept – shifted

The long-term operating concept can be systematically shifted by 15 minutes. This shift sets different turn requirements at Oceanside for Metrolink services and sets up an alternative connection hub between services at Los Angeles. The concept may also reduce

the need for the full build of the Leesdale siding project. Capital investment can be focused on building two-track station at Oxnard with grade separated access to the two platform edges. (Refer to the appendix for further details).

Irvine station and fourth main track

Upgrades to Irvine station and the construction of the fourth main track are only necessary if an additional Orange County line frequency that terminates at Irvine is desired. The location of the four-track station does not enable intercity services to overtake regional ones. Proposed Intercity and regional rail slots are too similar in operating performance, in part due to the constraints at the San Clemente single track section, which dictate the operating structure of services.

San Clemente

The single track at San Clemente limits rail frequencies to 30-minute headways and may prevent both freight and passenger services from operating their desired long-term frequencies. Potential solutions to the San Clemente bottleneck are presented in BNSF's *San Diego Pathing Study*.

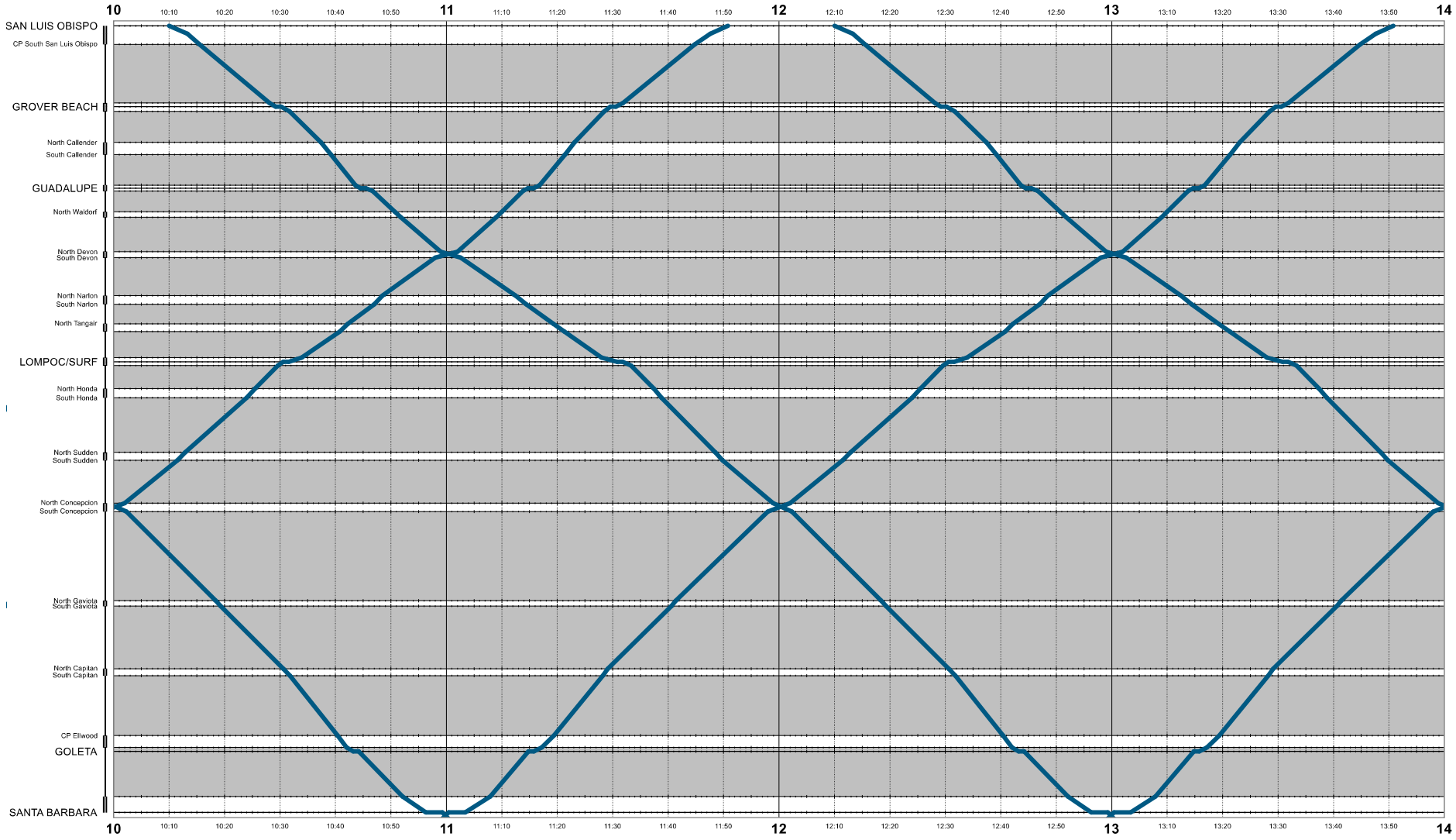
Del Mar

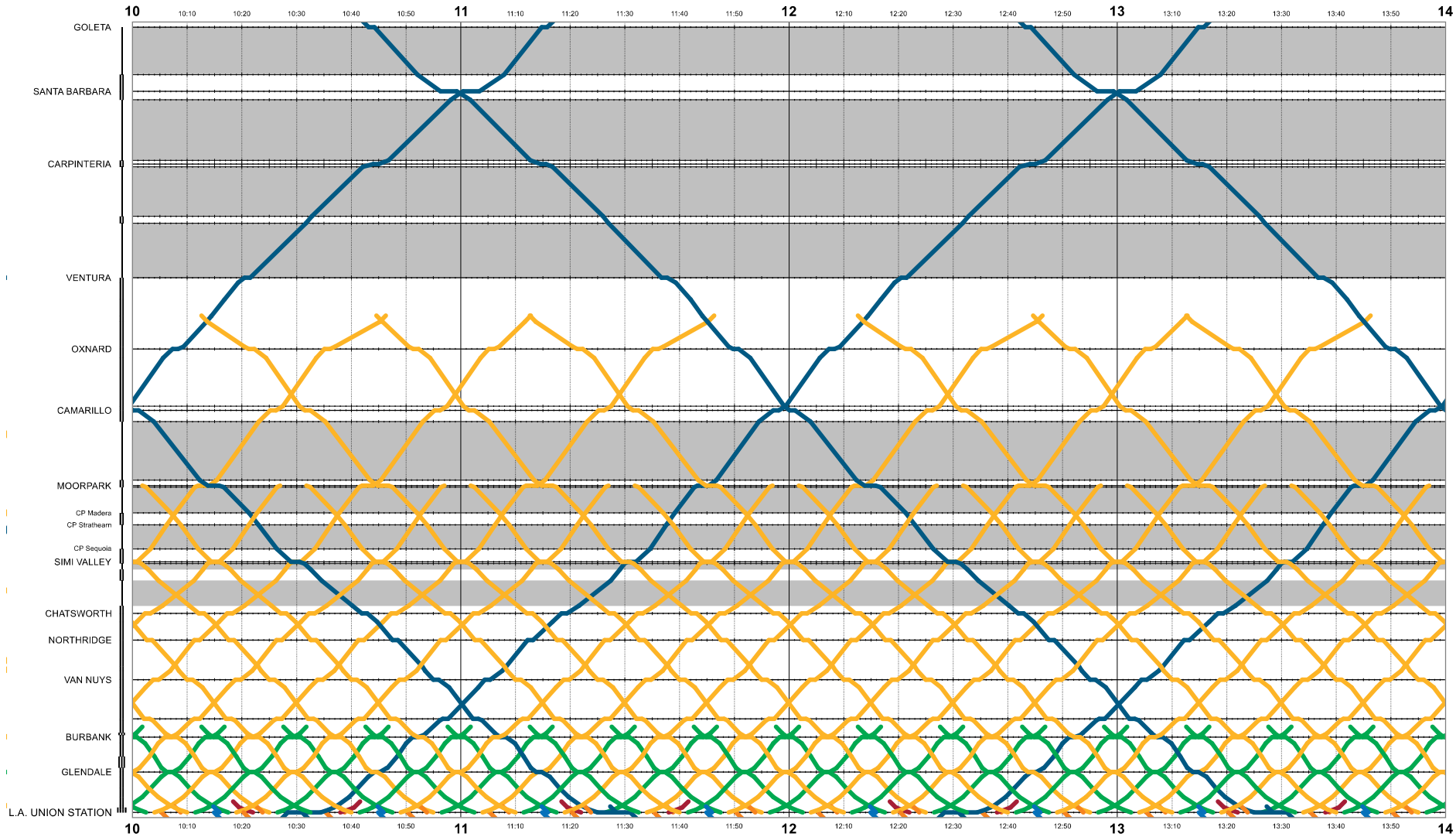
The Del Mar Bluffs are under threat from erosion and continual stabilization projects are underway to secure their future. Recently, SANDAG has started a study to review alternative tunnel alignments that by-pass this section of the LOSSAN Rail Corridor.

A LOSSAN South Corridor with both constraints removed, could unlock more ambitious service goals that have been proposed in prior reports, namely high frequency services and faster journey times between Los Angeles Union Station and San Diego.

San Luis Obispo—Santa Barbara

Long-term



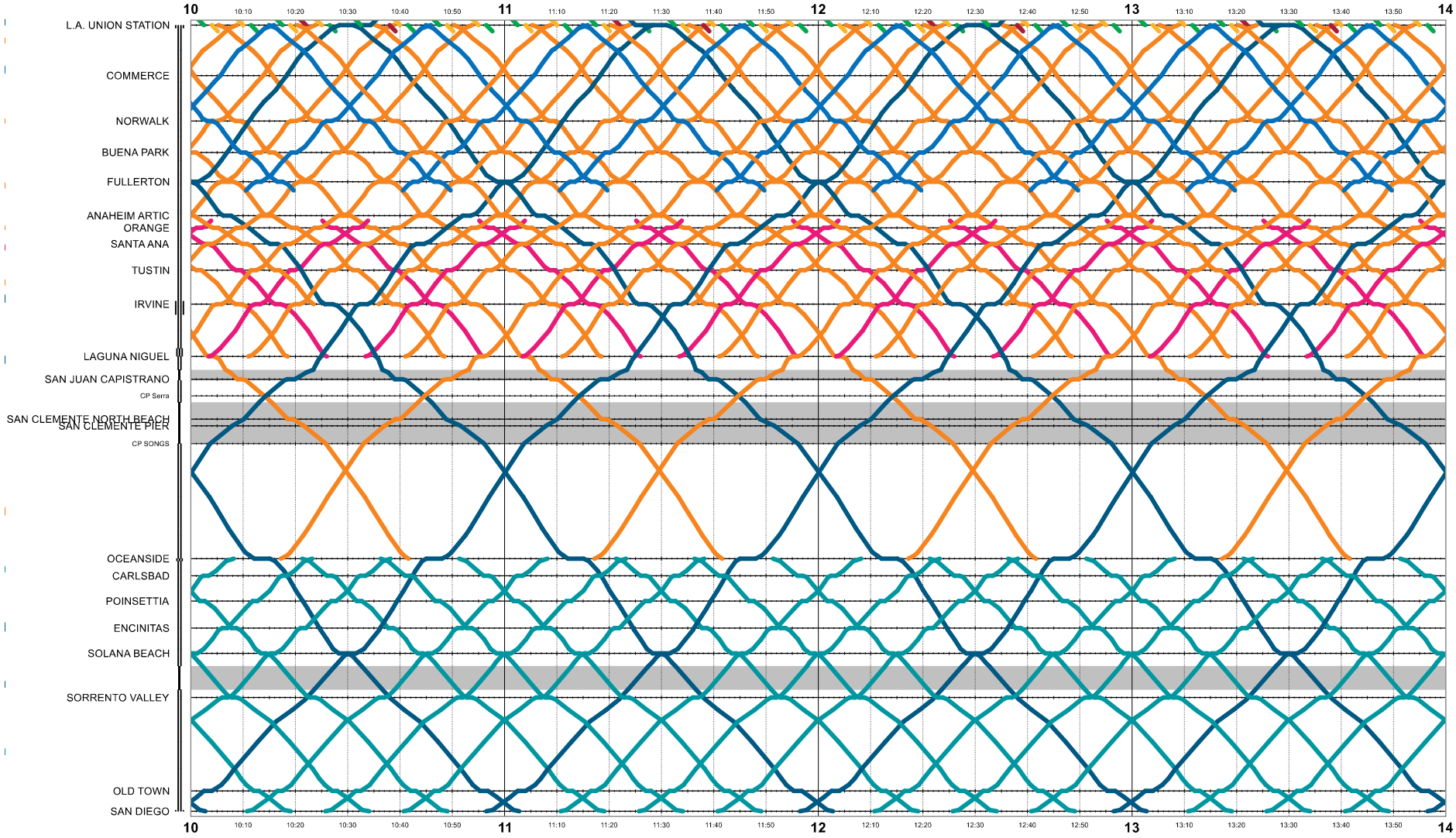


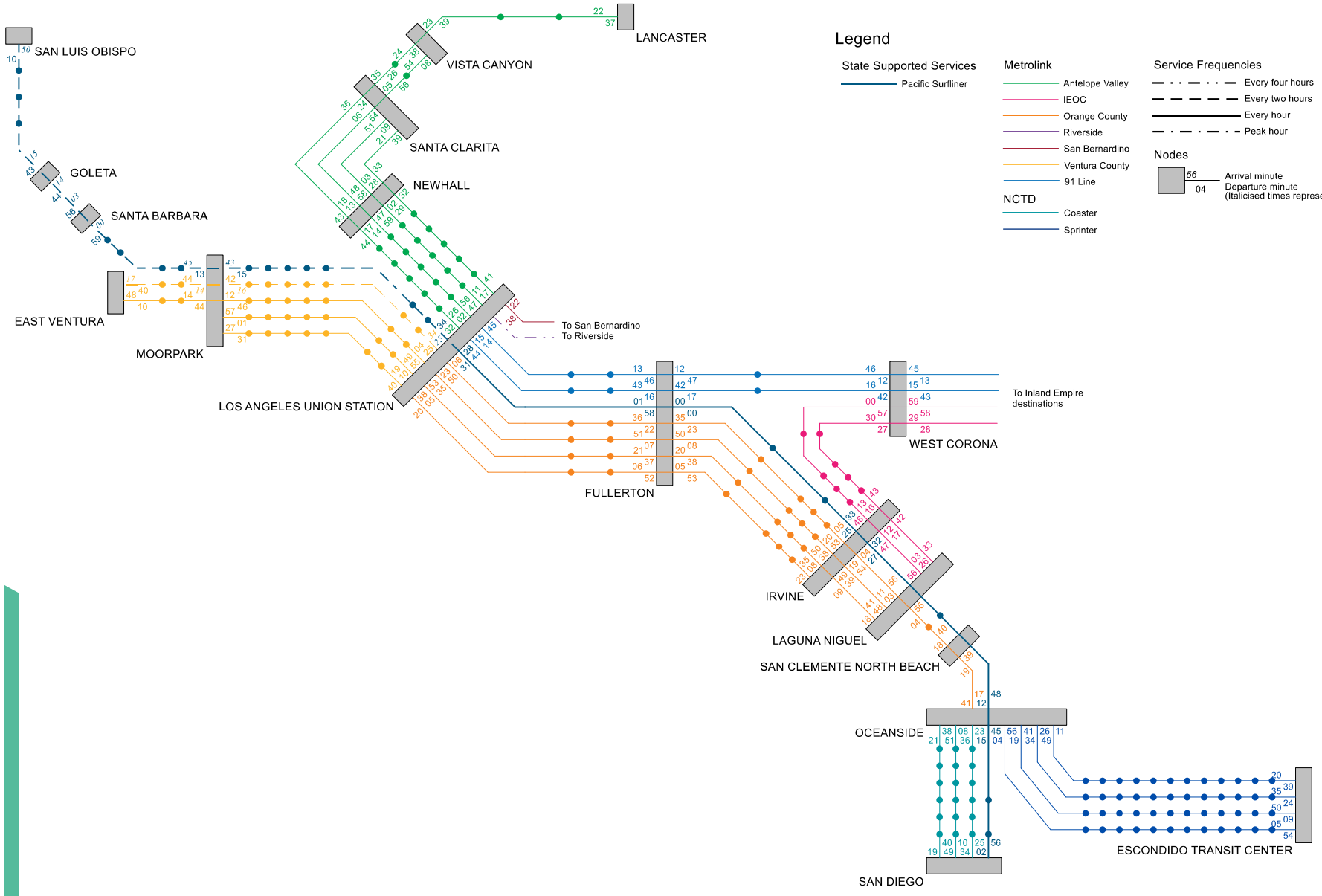
Goleta—Los Angeles Union Station

Long-term

Los Angeles Union Station—San Diego

Long-term




SAN LUIS OBISPO
GOLETA
SANTA BARBARA
EAST VENTURA
MOORPARK
LANCASTER
VISTA CANYON
SANTA CLARITA
NEWHALL
LOS ANGELES UNION STATION
To San Bernardino
To Riverside
FULLERTON
To Inland Empire destinations
WEST CORONA
IRVINE
LAGUNA NIGUEL
SAN CLEMENTE NORTH BEACH
OCEANSIDE
SAN DIEGO
ESCONDIDO TRANSIT CENTER
Legend
State Supported Services
Pacific Surfliner
Metrolink
Antelope Valley
IEOC
Orange County
Riverside
San Bernardino
Ventura County
91 Line
NCTD
Coaster
Sprinter
Service Frequencies
Every four hours
Every two hours
Every hour
Peak hour
Nodes
56
04
Arrival minute
Departure minute
(Italicised times represent odd hours)

Long-term

4 | Appendix

Definitions

Netgraph

A netgraph is a schematic representation of a rail network: it is like a service line map but includes operational information for planners. A single line represents each service (and the corresponding journey in the reverse direction) connecting the stations it passes through on its trip, with the arrival and departure times for each station indicated. The cyclical aspect of the timetable means that a whole day of train repeating train service can be covered by one line on the diagram. The connection times between services can be read at key stations.

Stringline chart

A stringline chart is a time-distance diagram that depicts train operations. Stringline charts are a key tool in determining how trains interact on a corridor. Stringline charts are also used to identify infrastructure constraints and rolling stock requirements.

Section Running Times

A section running time (SRT) is the time taken for a train service type to traverse a network link between to network nodes (Control Points or Stations). It represents the optimal operating time on the link.

SRTs are calculated using Viriato's running time calculator. SRTs account for direction of travel, authorized track running speeds and the operating performance of the rolling-stock. SRTs also account for operating factors such as permissive moves, slow speed junctions and crossovers. The SRT includes a percentage uplift to account for minor operating deviations that occur in day-to-day-operations.

Headways

The planning headway is the minimum planned time interval between two successive train schedules at a specific timing point on the same line in the same direction, such that the second train can meet its SRT.

Separation times

Train separation time is the minimum permissible time interval between two trains that are performing conflicting moves at a timing point, such that the second train can meet its SRT. The separation time accounts for (1) the time taken between the front of the first train passing the timing point and its rear clearing the relevant track circuit or axle

counter. (2) The time taken for the route and the signals to clear for the second train (3) the time taken between the second train sighting the relevant signal, such that it can meet its SRT, and its front passing the timing point

Anchor project

An anchor project refers to a capital improvement that underpins a timetable concept structure, and which must be completed before the timetable can be operationalized.

Service pattern

Train services are described by service patterns – 15-, 30-, 60- or 120-minute frequencies. When planning a production timetable, operators, can select which train slots from the pattern to operate in any given hour. In an off-peak hour, one train slot in the pattern may be used every hour, or every two hours; in a peak-hour all train slots in the peak direction may be activated. The final production schedule and selection of train slots will depend on operator requirements, contractual train counts in shared-use agreements, and equipment availability and characteristics of particular crew and equipment cycles.

Tabular timetables

Tabular timetables are shown for an illustrative four-hour period. They represent available train slots for all service patterns for each planning horizon. The associated stringline diagrams that follow show the feasibility and requirements of each alternative operating strategy.

Near-term

Southbound

Train type	AM (PS)	SCRRA (OC)	SCRRA (VC)	SCRRA (AV)	SCRRA (91L)	SCRRA (IEOC)	NCTD (COAST ER)	NCTD (COAST ER)	SCRRA (OC)	SCRRA (OC)	SCRRA (VC)	SCRRA (91L)	SCRRA (IEOC)	AM (PS)	SCRRA (OC)	SCRRA (VC)	SCRRA (AV)	SCRRA (91L)	SCRRA (IEOC)	NCTD (COAST ER)	NCTD (COAST ER)	SCRRA (OC)	SCRRA (OC)	SCI (9
SAN LUIS OBISPO	4:01																							
GROVER BEACH	4:24																							
GUADALUPE	4:41																							
LOMPOC/SURF	5:22																							
GOLETA	6:45																							
SANTA BARBARA	7:00																							
CARPINTERIA	7:17																							
VENTURA	7:43																							
OXNARD	8:02										9:06													
CAMARILLO	8:15										9:17													
MOORPARK	8:30										9:30													
SIMI VALLEY	8:45										9:44													
CHATSWORTH	9:01										10:00													
VAN NUYS	9:14		9:44								10:14				10:44									
HOLLYWOOD BURBANK AIRPORT	9:23		9:51								10:21				10:51									
GLENDALE	9:34		10:03	10:10							10:33				11:03	11:10								
L.A. UNION STATION	o 9:45		10:17	10:21							10:47				11:17	11:21								
L.A. UNION STATION	10:08	10:14			10:21				10:31	10:44		10:51		11:08	11:14			11:21				11:31	11:44	
NORWALK	|	10:38			10:45				10:53	11:08		11:15		|	11:38			11:45				11:53	12:08	
BUENA PARK	|	10:46			10:52				11:01	11:16		11:22		|	11:46			11:52				12:01	12:16	12:
FULLERTON	10:42	10:54			11:01				11:09	11:24		11:31		11:42	11:54			12:01				12:09	12:24	1
ANAHEIM ARTIC	10:51	11:01							11:16	11:31				11:51	12:01							12:16	12:31	
ORANGE	|	11:06					11:14		11:21	11:36			11:44	|	12:06				12:14			12:21	12:36	
SANTA ANA	11:00	11:11					11:19		11:26	11:41			11:49	12:00	12:11				12:19			12:26	12:41	
TUSTIN	|	11:18					11:25		11:33	11:48			11:55	|	12:18				12:25			12:33	12:48	
IRVINE	11:12	11:25					11:33		11:40	11:55			12:03	12:12	12:25				12:33			12:40	12:55	
LAGUNA NIGUEL	|	o 11:34					o 11:49		11:50	o 12:04			o 12:19	|	o 12:34				o 12:49			12:50	o 13:04	
SAN JUAN CAPISTRANO	11:26								11:55					12:26								12:55		
SAN CLEMENTE NORTH BEACH	|							12:06					|								13:06		
SAN CLEMENTE PIER	|							|					|								|	
OCEANSIDE	o 12:03								12:42					13:03								13:42		
OCEANSIDE	12:05						12:16	12:36						13:05						13:16	13:36			
CARLSBAD	|						12:23	12:43					|						13:23	13:43			
POINSETTIA	|						12:29	12:49					|						13:29	13:49			
ENCINITAS	|						12:35	12:55					|						13:35	13:55			
SOLANA BEACH	12:21						12:41	13:01						13:21						13:41	14:01			
SORRENTO VALLEY	|						12:50	13:10					|						13:50	14:10			
OLD TOWN	12:51						13:11	13:31						13:51						14:11	14:31			
SAN DIEGO	o 12:57						13:17	13:37						13:57						14:17	14:37			

Northbound

Train type	AM (PS)	NCTD (COAST R)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	SCRRA (OC)	NCTD (COAST R)	SCRRA (IEOC)	SCRRA (AV)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	AM (PS)	NCTD (COAST R)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (OC)	SCRRA (OC)	NCTD (COAST R)	SCRRA (IEOC)	SCRRA (AV)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	AM (PS)	NCTD (COAST R)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	SCRRA (OC)	NCTD (COAST R)	SCRRA (IEOC)	SCRRA (AV)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	AM (PS)
SAN DIEGO	7:01	7:20					7:40						8:01	8:20					8:40						9:01	9:20					9:40						10:0
OLD TOWN	7:10	7:27					7:47						8:10	8:27					8:47						9:10	9:27					9:47						10:1
SORRENTO VALLEY	|	7:49					8:09						|	8:49					9:09						|	9:49					10:09						|
SOLANA BEACH	7:40	7:59					8:19						8:40	8:59					9:19						9:40	9:59					10:19						10:4
ENCINITAS	|	8:05					8:25						|	9:05					9:25						|	10:05					10:25						|
POINSETTIA	|	8:11					8:31						|	9:11					9:31						|	10:11					10:31						|
CARLSBAD	|	8:17					8:37						|	9:17					9:37						|	10:17					10:37						|
OCEANSIDE	o 7:55	8:22					8:42						8:55	9:22					9:42						9:55	10:22					10:42						10:5
OCEANSIDE	7:57					8:27							8:57					9:27							9:57					10:27							10:5
SAN CLEMENTE PIER	|					|						|					|						|					|						|
SAN CLEMENTE NORTH BEACH	|					8:54						|					9:54						|					10:54						|
SAN JUAN CAPISTRANO	8:34					9:04							9:34					10:04							10:34					11:04							11:3
LAGUNA NIGUEL	|		8:48		8:56	9:10		9:18				9:26	|		9:48		9:56	10:10		10:18				10:26	|		10:48		10:56	11:10		11:18				11:26	|
IRVINE	8:49		8:58		9:06	9:20		9:28				9:36	9:49		9:58		10:06	10:20		10:28				10:36	10:49		10:58		11:06	11:20		11:28				11:36	11:4
TUSTIN	|		9:05		9:12	9:26		9:35				9:42	|		10:05		10:12	10:26		10:35				10:42	|		11:05		11:12	11:26		11:35				11:42	|
SANTA ANA	9:00		9:12		9:19	9:33		9:42				9:49	10:00		10:12		10:19	10:33		10:42				10:49	11:00		11:12		11:19	11:33		11:42				11:49	12:0
ORANGE	|		9:17		9:25	9:38		9:47				9:55	|		10:17		10:25	10:38		10:47				10:55	|		11:17		11:25	11:38		11:47				11:55	|
ANAHEIM ARTIC	9:10				9:29	9:43						9:59	10:10				10:29	10:43						10:59	11:10				11:29	11:43						11:59	12:1
FULLERTON	9:19			9:29	9:37	9:52				9:59		10:07	10:19			10:29	10:37	10:52				10:59		11:07	11:19			11:29	11:37	11:52				11:59		12:07	12:1
BUENA PARK	|			9:36	9:43	9:59				10:06		10:13	|			10:36	10:43	10:59				11:06		11:13	|			11:36	11:43	11:59				12:06		12:13	|
NORWALK	|			9:43	9:50	10:05				10:13		10:20	|			10:43	10:50	11:05				11:13		11:20	|			11:43	11:50	12:05				12:13		12:20	|
CP Soto	|		|		|	|			|		|	|		|	|				|		|	|		|					|		|	|		|	|
L.A. UNION STATION	o 9:51		10:10		10:19	10:28				10:40		10:49	10:51			11:10	11:19	11:28				11:40		11:49	11:51			12:10	12:19	12:28				12:40		12:49	12:5
L.A. UNION STATION				10:15				10:37		10:45		11:13								11:37		11:45						12:15				12:37		12:45			13:1
GLENDALE				10:27				10:49		10:57		11:26								11:49		11:57						12:27				12:49		12:57			13:2
HOLLYWOOD BURBANK AIRPORT				10:39						11:09		11:39										12:09						12:39						13:09			13:3
VAN NUYS				10:47						11:16		11:48										12:16						12:47						13:16			13:4
CHATSWORTH				11:03								12:01																13:03									14:0
SIMI VALLEY				11:16								12:14																13:16									14:1
MOORPARK				11:29								12:30																13:29									14:3
CAMARILLO				11:42								12:43																13:42									14:4
OXNARD				11:51								13:00																13:51									15:0
VENTURA												13:14																									15:1
CARPINTERIA												13:44																									15:4
SANTA BARBARA												14:03																									16:0
GOLETA	o											14:14																									16:1
GOLETA																																					16:1
LOMPOC/SURF																																					17:3
GUADALUPE																																					18:1
GROVER BEACH																																					18:3
SAN LUIS OBISPO	o																																				18:5

Illustrative

SCRRA (91L)	SCRRA (IEOC)	AM (PS)	SCRRA (OC)	SCRRA (VC)	SCRRA (AV)	SCRRA (91L)	SCRRA (IEOC)	NCTD (COAST ER)	NCTD (COAST ER)	SCRRA (OC)	SCRRA (OC)	SCRRA (VC)	SCRRA (91L)	SCRRA (IEOC)	AM (PS)	SCRRA (OC)	SCRRA (VC)	SCRRA (AV)	SCRRA (91L)	SCRRA (IEOC)	NCTD (COAST ER)	NCTD (COAST ER)	SCRRA (OC)	SCRRA (OC)	SCRRA (91L)	SCRRA (IEOC)	AM (PS)
																											8:01
																											8:24
																											8:41
		8:45																									9:22
		9:00																									10:45
		9:17																									11:00
		9:43																									11:17
		10:02																									11:43
		10:15										11:06															12:02
		10:30										11:17															12:15
		10:45										11:30															12:30
		11:01										11:44															12:45
		11:14		11:44								12:00					12:44										13:01
		11:23		11:51								12:14					12:51										13:14
		11:34		12:03	12:10							12:21					13:03	13:10									13:23
		11:45		12:17	12:21							12:33					13:17	13:21									13:34
11:51		12:08	12:14			12:21				12:31	12:44	12:47															13:45
12:15		|	12:38			12:45				12:53	13:08		12:51		13:08				13:21				13:31	13:44	13:51		14:08
12:22		|	12:46			12:52				13:01	13:16		13:15		|	13:14			13:45				13:53	14:08	14:15		|
12:31		12:42	12:54			13:01				13:09	13:24		13:22		13:42	13:38			13:52				14:01	14:16	14:22		
		12:51	13:01							13:16	13:31		13:31		13:51	13:46			14:01				14:09	14:24	14:31		14:42
	12:44	|	13:06				13:14			13:21	13:36			13:44	|	13:54							14:16	14:31			14:51
	12:49	13:00	13:11				13:19			13:26	13:41			13:49	14:00	14:01				14:14			14:21	14:36		14:44	|
	12:55	|	13:18				13:25			13:33	13:48			13:55	|	14:11				14:19			14:26	14:41		14:49	15:00
	13:03	13:12	13:25				13:33			13:40	13:55			14:03	14:12	14:18				14:25			14:33	14:48		14:55	|
	o 13:19	|	o 13:34				o 13:49			13:50	o 14:04			o 14:19	|	14:25				14:33			14:40	14:55		15:03	15:12
		13:26								13:55					14:26	o 14:34				o 14:49			14:50	o 15:04		o 15:19	|
		|								14:06					|								14:55				15:26
		|							|														15:06				|
		14:03								14:42					15:03								15:42				16:03
		14:05						14:16	14:36						15:05						15:16	15:36					16:05
		|					14:23	14:43							|					15:23	15:43					|
		|					14:29	14:49							|					15:29	15:49					|
		|					14:35	14:55							|					15:35	15:55					|
		14:21						14:41	15:01						15:21						15:41	16:01					16:21
		|					14:50	15:10							|					15:50	16:10					|
		14:51						15:11	15:31						15:51						16:11	16:31					16:51
		14:57						15:17	15:37						15:57						16:17	16:37					16:57

M (S)	NCTD (COAST STER)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (OC)	SCRRA (OC)	NCTD (COAST STER)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (OC)	SCRRA (OC)	SCRRA (AV)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	AM (PS)	NCTD (COAST STER)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (OC)	SCRRA (OC)	SCRRA (OC)	NCTD (COAST STER)	SCRRA (IEOC)	SCRRA (AV)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	AM (PS)	NCTD (COAST STER)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (OC)	SCRRA (OC)	SCRRA (OC)	NCTD (COAST STER)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (OC)	AM (PS)
1	10:20			10:40					11:01	11:20				11:40					12:01	12:20				12:40					13:01	13:20				13:40					14:01
0	10:27			10:47					11:10	11:27				11:47					12:10	12:27				12:47					13:10	13:27				13:47					14:10
	10:49			11:09					|	11:49				12:09					|	12:49				13:09					|	13:49				14:09					|
0	10:59			11:19					11:40	11:59				12:19					12:40	12:59				13:19					13:40	13:59				14:19					14:40
	11:05			11:25					|	12:05				12:25					|	13:05				13:25					|	14:05				14:25					|
	11:11			11:31					|	12:11				12:31					|	13:11				13:31					|	14:11				14:31					|
5	11:22			11:42					11:55	12:22				12:42					12:55	13:22				13:42					13:55	14:22				14:42					14:55
7			11:27						11:57					12:27					12:57					13:27					13:57					14:27					14:57
			|					|					|					|				|					|				|					|
			11:54						|					12:54					|					13:54					|					14:54					|
4			12:04						12:34					13:04					13:34					14:04					14:34					15:04					15:34
9		11:48	11:56	12:10	12:18			12:26	|		12:48			12:56	13:10		13:18		13:26	|		13:48			13:56	14:10		14:18		14:26	|		14:48			14:56	15:10		15:18		15:26	|
		11:58	12:06	12:20	12:28			12:36	12:49		12:58			13:06	13:20		13:28		13:36	13:49		13:58			14:06	14:20		14:28		14:36	14:49		14:58			15:06	15:20		15:28		15:36	15:49
		12:05	12:12	12:26	12:35			12:42	|		13:05			13:12	13:26		13:35		13:42	|		14:05			14:12	14:26		14:35		14:42	|		15:05			15:12	15:26		15:35		15:42	|
0		12:12	12:19	12:33	12:42			12:49	13:00		13:12			13:19	13:33		13:42		13:49	14:00		14:12			14:19	14:33		14:42		14:49	15:00		15:12			15:19	15:33		15:42		15:49	16:00
		12:17	12:25	12:38	12:47			12:55	|		13:17			13:25	13:38		13:47		13:55	|		14:17			14:25	14:38		14:47		14:55	|		15:17			15:25	15:38		15:47		15:55	|
0			12:29	12:43				12:59	13:10					13:29	13:43				13:59	14:10					14:29	14:43				14:59	15:10					15:29	15:43				15:59	16:10
9		12:29	12:37	12:52			12:59	13:07	13:19				13:29	13:37	13:52			13:59	14:07	14:19				14:29	14:37	14:52			14:59	15:07	15:19				15:29	15:37	15:52			15:59	16:07	16:19
		12:36	12:43	12:59			13:06	13:13	|				13:36	13:43	13:59			14:06	14:13	|				14:36	14:43	14:59			15:06	15:13	|				15:36	15:43	15:59			16:06	16:13	|
		12:43	12:50	13:05			13:13	13:20	|				13:43	13:50	14:05			14:13	14:20	|				14:43	14:50	15:05			15:13	15:20	|				15:43	15:50	16:05			16:13	16:20	|
1			13:10	13:19	13:28			13:40	13:49	13:51				14:10	14:19	14:28			14:40	14:49	14:51				15:10	15:19	15:28			15:40	15:49	15:51				16:10	16:19	16:28			16:40	16:49	16:51
3						13:37	13:45							14:15				14:37	14:45	15:13							15:37	15:45													17:13
6						13:49	13:57							14:27				14:49	14:57	15:26							15:49	15:57													17:26
9							14:09							14:39					15:09	15:39								16:09													17:39
8							14:16							14:47					15:16	15:48								16:16													17:48
1														15:03						16:01																				18:01
4														15:16						16:14																				18:14
0														15:29						16:30																				18:30
3														15:42						16:43																				18:43
0														15:51						17:00																				19:00
4																				17:14																				19:14
4																				17:44																				19:44
3																				18:03																				20:03
4																				18:14																				20:14
6																																								20:16
9																																								21:39
7																																								22:17
3																																								22:33
4																																								22:54

Mid-term

Southbound

Train type		AM (PS)	SCRRA (AV)	SCRRA (OC)	SCRRA (VC)	SCRRA (91L)	SCRRA (IEOC)	NCTD (COASTER)	SCRRA (OC)	SCRRA (AV)	SCRRA (OC)	SCRRA (91L)	SCRRA (IEOC)	NCTD (COASTER)	AM (PS)	SCRRA (AV)	SCRRA (OC)	SCRRA (VC)	SCRRA (91L)	SCRRA (IEOC)	NCTD (COASTER)	SCRRA (OC)	SCRRA (AV)	SCRRA (OC)	SCRRA (VC)	SCRRA (91L)
SAN LUIS OBISPO															6:08											
GROVER BEACH															6:29											
GUADALUPE															6:44											
LOMPOC/SURF															7:28											
GOLETA															8:44											
SANTA BARBARA															9:00											
CARPINTERIA															9:15											
VENTURA															9:36											
OXNARD															9:50									10:55		
CAMARILLO															10:02									11:05		
MOORPARK					9:49										10:17			10:49						11:19		
SIMI VALLEY					10:02										10:31			11:02						11:32		
CHATSWORTH					10:15										10:44			11:15						11:45		
NORTHRIDGE					10:20										10:50			11:20						11:50		
VAN NUYS					10:28										10:58			11:28						11:57		
HOLLYWOOD BURBANK AIRPORT					10:35										11:05			11:35						12:05		
BURBANK			10:20		10:40					10:50					11:10	11:20		11:40				11:50		12:10	
GLENDALE			10:27		10:47					10:57					11:17	11:27		11:47				11:57		12:16	
LOS ANGELES UNION STATION	o		10:37		10:57					11:07					11:27	11:37		11:57				12:07		12:26	
LOS ANGELES UNION STATION		10:42		10:49		11:00			11:05		11:19	11:30			11:42		11:49		12:00			12:05		12:19		12:3
COMMERCE		|		11:00		|		|		11:30	|			|		12:00		|			|	12:30		|	
NORWALK		|		11:10		11:20		11:25			11:40	11:50			|		12:10		12:20			12:25		12:40		12:5
BUENA PARK		|		11:17		11:27		11:32			11:47	11:57			|		12:17		12:27			12:32		12:47		12:5
FULLERTON		11:12		11:26		11:35			11:40			11:56	12:05			12:12		12:26		12:35			12:40		12:56		13:0
ANAHEIM ARTIC		11:20		11:33					11:48			12:03				12:20		12:33					12:48		13:03		
ORANGE		|		11:37			11:43	11:52			12:07		12:13			|		12:37			12:43		12:52		13:07		
SANTA ANA		11:30		11:43			11:49	11:58			12:13		12:19			12:30		12:43			12:49		12:58		13:13		
TUSTIN		|		11:49			11:55	12:04			12:19		12:25			|		12:49			12:55		13:04		13:19		
IRVINE		11:41		11:56			12:03	12:11			12:26		12:33			12:41		12:56			13:03		13:11		13:26		
LAGUNA NIGUEL		|		o 12:05			o 12:19	12:21			o 12:35		o 12:49			|		o 13:05			o 13:19		13:21		o 13:35		
SAN JUAN CAPISTRANO		11:55							12:26							12:55								13:26				
SAN CLEMENTE NORTH BEACH		|						12:35							|								13:35				
SAN CLEMENTE PIER		|						|							|								|			
OCEANSIDE	o	12:27							13:06							13:27								14:06				
OCEANSIDE		12:32						12:47						13:07	13:32						13:47							
CARLSBAD		|					12:54						13:14	|					13:54							
POINSETTIA		|					13:00						13:20	|					14:00							
ENCINITAS		|					13:06						13:26	|					14:06							
SOLANA BEACH		12:50						13:11						13:31	13:50						14:11							
SORRENTO VALLEY		|					13:20						13:40	|					14:20							
OLD TOWN		13:20						13:40						14:00	14:20						14:40							
SAN DIEGO	o	13:27						13:48						14:08	14:27						14:48							

Northbound

Train type		AM (PS)	NCTD (COASTER)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (OC)	SCRRA (AV)	SCRRA (OC)	NCTD (COASTER)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	SCRRA (AV)	AM (PS)	NCTD (COASTER)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	SCRRA (AV)	SCRRA (OC)	NCTD (COASTER)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (VC)	SC
SAN DIEGO		7:32	7:52						8:12						8:32	8:52							9:12				
OLD TOWN		7:40	8:00						8:20						8:40	9:00							9:20				
SORRENTO VALLEY		|	8:20					8:40						|	9:20							9:40				
SOLANA BEACH		8:11	8:29						8:49						9:11	9:29							9:49				
ENCINITAS		|	8:35					8:55						|	9:35							9:55				
POINSETTIA		|	8:40					9:00						|	9:40							10:00				
CARLSBAD		|	8:46					9:06						|	9:46							10:06				
OCEANSIDE	o	8:27	8:52						9:12						9:27	9:52							10:12				
OCEANSIDE		8:32						9:02							9:32							10:02					
SAN CLEMENTE PIER		|					|							|							|				
SAN CLEMENTE NORTH BEACH		|					9:24							|							10:24					
SAN JUAN CAPISTRANO		9:06						9:34							10:06							10:34					
LAGUNA NIGUEL		|		9:17		9:25	9:40		9:47		9:55			|		10:17			10:25	10:40		10:47				1
IRVINE		9:20		9:27		9:35	9:50		9:57		10:05				10:20		10:27			10:35	10:50		10:57				1
TUSTIN		|		9:34		9:42	9:56		10:04		10:12				|		10:34			10:42	10:56		11:04				1
SANTA ANA		9:31		9:41		9:48	10:03		10:11		10:18				10:31		10:41			10:48	11:03		11:11				1
ORANGE		|		9:46		9:54	10:08		10:16		10:24				|		10:46			10:54	11:08		11:16				1
ANAHEIM ARTIC		9:41					9:58	10:13			10:28				10:41					10:58	11:13						1
FULLERTON		9:49				9:56	10:05	10:20			10:35				10:49				10:56	11:05	11:20			11:26			1
BUENA PARK		|			10:02	10:12	10:27			10:42				|				11:02	11:12	11:27			11:32			1
NORWALK		|			10:09	10:19	10:34			10:49				|				11:09	11:19	11:34			11:39			1
COMMERCE		|			|	10:28	|			10:58				|				|	11:28	|						1
LOS ANGELES UNION STATION	o	10:17				10:27	10:39	10:53			10:57		11:09		11:17					11:27	11:39	11:53			11:57			1
LOS ANGELES UNION STATION		10:30					10:49					11:02		11:19						11:31	11:49				12:02		
GLENDALE		10:41					10:59					11:13		11:29						11:42	11:59				12:13		
BURBANK		10:48					11:06					11:19		11:36						11:48	12:06				12:19		
HOLLYWOOD BURBANK AIRPORT		10:54										11:25								11:54					12:25		
VAN NUYS		11:02										11:32								12:02					12:32		
NORTHRIDGE		11:09										11:40								12:09					12:40		
CHATSWORTH		11:18										11:46								12:16					12:46		
SIMI VALLEY		11:30										11:58								12:28					12:58		
MOORPARK		11:45										o 12:09								12:40					o 13:09		
CAMARILLO		12:00																		12:53							
OXNARD		12:11																		13:03							
VENTURA		12:24																									
CARPINTERIA		12:46																									
SANTA BARBARA	o	13:00																									
SANTA BARBARA		13:03																									
GOLETA		13:14																									
LOMPOC/SURF		14:31																									
GUADALUPE		15:15																									
GROVER BEACH		15:31																									
SAN LUIS OBISPO	o	15:51																									

Illustrative

SCRRA (IEOC)	NCTD (COASTER)	AM (PS)	SCRRA (AV)	SCRRA (OC)	SCRRA (VC)	SCRRA (91L)	SCRRA (IEOC)	NCTD (COASTER)	SCRRA (OC)	SCRRA (AV)	SCRRA (OC)	SCRRA (91L)	SCRRA (IEOC)	NCTD (COASTER)	AM (PS)	SCRRA (AV)	SCRRA (OC)	SCRRA (VC)	SCRRA (91L)	SCRRA (IEOC)	NCTD (COASTER)	SCRRA (OC)	SCRRA (AV)	SCRRA (OC)	SCRRA (VC)	SCRRA (91L)	SCRRA (IEOC)	AM (PS)
															8:08													
															8:29													
															8:44													
															9:28													
															10:44													
															11:00													
															11:15													
															11:36													
															11:50													
															12:02													
					11:49										12:17			12:49										
					12:02										12:31			13:02										
					12:15										12:44			13:15										
					12:20										12:50			13:20										
					12:28										12:58			13:28										
					12:35										13:05			13:35										
			12:20		12:40					12:50					13:10	13:20		13:40					13:50			12:55		
			12:27		12:47					12:57					13:17	13:27		13:47					13:57			13:05		
			12:37		12:57					13:07					13:27	13:37		13:57					14:07			13:19		
0		12:42		12:49		13:00			13:05		13:19	13:30			13:42		13:49		14:00			14:05		14:19		14:30		14:42
		|		13:00		|		|		13:30	|			|		14:00		|			14:25		14:30		|		|
0		|		13:10		13:20			13:25		13:40	13:50			|		14:10		14:20			14:25		14:40		14:50		|
7		|		13:17		13:27			13:32		13:47	13:57			|		14:17		14:27			14:32		14:47		14:57		|
5		13:12		13:26		13:35			13:40		13:56	14:05			14:12		14:26		14:35			14:40		14:56		15:05		15:12
		13:20		13:33					13:48		14:03				14:20		14:33					14:48		15:03				15:20
13:13		|		13:37			13:43		13:52		14:07		14:13		|		14:37			14:43		14:52		15:07			15:13	|
13:19		13:30		13:43			13:49		13:58		14:13		14:19		14:30		14:43			14:49		14:58		15:13			15:19	15:30
13:25		|		13:49			13:55		14:04		14:19		14:25		|		14:49			14:55		15:04		15:19			15:25	|
13:33		13:41		13:56			14:03		14:11		14:26		14:33		14:41		14:56			15:03		15:11		15:26			15:33	15:41
o 13:49		|		o 14:05			o 14:19		14:21		o 14:35		o 14:49		|		o 15:05			o 15:19		15:21		o 15:35			o 15:49	|
		13:55							14:26						14:55							15:26						15:55
		|							14:35						|						15:35						|
		|							|					|						|						|
		14:27							15:06						15:27							16:06						16:27
	14:07	14:32						14:47					15:07		15:32						15:47						16:32	
	14:14	|						14:54					15:14		|					15:54						|	
	14:20	|						15:00					15:20		|					16:00						|	
	14:26	|						15:06					15:26		|					16:06						|	
	14:31	14:50						15:11					15:31		15:50						16:11						16:50	
	14:40	|						15:20					15:40		|					16:20						|	
	15:00	15:20						15:40					16:00		16:20						16:40						17:20	
	15:08	15:27						15:48					16:08		16:27						16:48						17:27	

RRA C)	SCRRA (AV)	AM (PS)	NCTD (COASTER R)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (OC)	SCRRA (AV)	SCRRA (OC)	NCTD (COASTER R)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	SCRRA (AV)	AM (PS)	NCTD (COASTER R)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	SCRRA (AV)	SCRRA (OC)	NCTD (COASTER R)	SCRRA (IEOC)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	SCRRA (AV)	AM (PS)
		9:32	9:52						10:12						10:32	10:52							11:12						11:32
		9:40	10:00						10:20						10:40	11:00							11:20						11:40
		|	10:20						10:40						|	11:20							11:40						|
		10:11	10:29						10:49						11:11	11:29							11:49						12:11
		|	10:35						10:55						|	11:35							11:55						|
		|	10:40						11:00						|	11:40							12:00						|
		|	10:46						11:06						|	11:46							12:06						|
		10:27	10:52						11:12						11:27	11:52							12:12						12:27
		10:32						11:02							11:32							12:02							12:32
		|						|						|							|						|
		|						11:24							|						12:24							|
		11:06							11:34						12:06							12:34							13:06
0:55		|		11:17		11:25		11:40		11:47			11:55		|		12:17		12:25			12:40		12:47		12:55			|
1:05		11:20		11:27		11:35		11:50		11:57			12:05		12:20		12:27		12:35			12:50		12:57		13:05			13:20
1:12		|		11:34		11:42		11:56		12:04			12:12		|		12:34		12:42			12:56		13:04		13:12			|
1:18		11:31		11:41		11:48		12:03		12:11			12:18		12:31		12:41		12:48			13:03		13:11		13:18			13:31
1:24		|		11:46		11:54		12:08		12:16			12:24		|		12:46		12:54			13:08		13:16		13:24			|
1:28		11:41				11:58		12:13					12:28		12:41				12:58			13:13				13:28			13:41
1:35		11:49			11:56	12:05		12:20			12:26		12:35		12:49			12:56	13:05			13:20			13:26	13:35			13:49
1:42		|		12:02	12:12		12:27			12:32		12:42		|			13:02	13:12			13:27			13:32	13:42			|
1:49		|		12:09	12:19		12:34			12:39		12:49		|			13:09	13:19			13:34			13:39	13:49			|
1:58		|		|	12:28		|			|		12:58		|			|	13:28			|			|	13:58		|
2:09		12:17		12:27		12:39		12:53			12:57		13:09		13:17			13:27		13:39			13:53			13:57	14:09			14:17
	12:19	12:30					12:49					13:02		13:19						13:31		13:49					14:02	14:19	14:30
	12:29	12:41					12:59					13:13		13:29						13:42		13:59					14:13	14:29	14:41
	12:36	12:48					13:06					13:19		13:36						13:48		14:06					14:19	14:36	14:48
		12:54										13:25								13:54							14:25		14:54
		13:02										13:32								14:02							14:32		15:02
		13:09										13:40								14:09							14:40		15:09
		13:18										13:46								14:16							14:46		15:18
		13:30										13:58								14:28							14:58		15:30
		13:45										o 14:09								14:40							o 15:09		15:45
		14:00																		14:53									16:00
		14:11																		15:03									16:11
		14:24																											16:24
		14:46																											16:46
		15:00																											17:00
		15:03																											17:03
		15:14																											17:14
		16:31																											18:31
		17:15																											19:15
		17:31																											19:31
		17:51																											19:51

Long-term

Southbound

Train type	AM (PS)	SCRRA (AV)	SCRRA (OC)	SCRRA (VC)	SCRRA (91L)	SCRRA (AV)	SCRRA (IEOC)	NCTD (COASTER)	NCTD (COASTER)	SCRRA (OC)	SCRRA (VC)	SCRRA (AV)	SCRRA (OC)	SCRRA (VC)	SCRRA (91L)	SCRRA (AV)	SCRRA (IEOC)	SCRRA (OC)
SAN LUIS OBISPO																		
GROVER BEACH																		
GUADALUPE																		
LOMPOC/SURF																		
GOLETA																		
SANTA BARBARA																		
CARPINTERIA																		
VENTURA																		
OXNARD											9:22							
CAMARILLO											9:32							
MOORPARK				9:31							9:46			10:01				
SIMI VALLEY				9:45							10:00			10:15				
CHATSWORTH				9:58							10:13			10:28				
NORTHRIDGE				10:03							10:18			10:33				
VAN NUYS				10:11							10:26			10:41				
HOLLYWOOD BURBANK AIRPORT				10:18							10:33			10:48				
BURBANK		10:15		10:23		10:30					10:38	10:45		10:53		11:00		
GLENDALE		10:22		10:29		10:37					10:44	10:52		10:59		11:07		
LOS ANGELES UNION STATION	o	10:32		10:40		10:47					10:55	11:02		11:10		11:17		
LOS ANGELES UNION STATION		10:31		10:35	10:44					10:50			11:05		11:14			11:20
COMMERCE		|		|	|					|		|		|			|
NORWALK		|		10:54	11:04				11:09			11:24		11:34			11:39
BUENA PARK		|		11:01	11:10				11:16			11:31		11:40			11:46
FULLERTON		11:00		11:08	11:17					11:23			11:38		11:47			11:53
ANAHEIM ARTIC		11:07		11:15						11:30			11:45					12:00
ORANGE		|		11:20			11:27		11:35			11:50				11:57		12:05
SANTA ANA		11:16		11:25				11:33		11:40			11:55				12:03	12:10
TUSTIN		|		11:32			11:39		11:47			12:02				12:09		12:17
IRVINE		11:27		11:39				11:47		11:54			12:09				12:17	o 12:23
LAGUNA NIGUEL		|		o 11:48			o 11:56		12:04			o 12:18				o 12:26	
SAN JUAN CAPISTRANO		11:40								12:09								
SAN CLEMENTE NORTH BEACH		|							12:19								
SAN CLEMENTE PIER		|							|							
OCEANSIDE	o	12:12								12:41								
OCEANSIDE		12:15						12:21	12:36									
CARLSBAD		|					12:27	12:42									
POINSETTIA		|					12:32	12:47									
ENCINITAS		|					12:38	12:53									
SOLANA BEACH		12:29						12:44	12:59									
SORRENTO VALLEY		|					12:53	13:08									
OLD TOWN		12:56						13:13	13:28									
SAN DIEGO	o	13:02						13:19	13:34									

Northbound

Train type	AM (PS)	NCTD (COASTER)	SCRRA (OC)	SCRRA (IEOC)	SCRRA (AV)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	SCRRA (AV)	SCRRA (VC)	SCRRA (OC)	NCTD (COASTER)	NCTD (COASTER)	SCRRA (IEOC)	SCRRA (AV)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)
SAN DIEGO	7:56	8:10										8:25	8:40					
OLD TOWN	8:04	8:17										8:32	8:47					
SORRENTO VALLEY	|	8:37										8:52	9:07					
SOLANA BEACH	8:31	8:46										9:01	9:16					
ENCINITAS	|	8:52										9:07	9:22					
POINSETTIA	|	8:57										9:12	9:27					
CARLSBAD	|	9:03										9:18	9:33					
OCEANSIDE	o 8:45	9:08										9:23	9:38					
OCEANSIDE	8:48										9:17							
SAN CLEMENTE PIER	|									|							
SAN CLEMENTE NORTH BEACH	|									9:40							
SAN JUAN CAPISTRANO	9:19										9:49							
LAGUNA NIGUEL	|		9:33				9:41			9:56			10:03				10:11
IRVINE	9:33		9:35	9:43				9:50			10:05			10:13				10:20
TUSTIN	|		9:42	9:49				9:57			10:12			10:19				10:27
SANTA ANA	9:44		9:49	9:56				10:04			10:19			10:26				10:34
ORANGE	|		9:54	10:02				10:09			10:24			10:32				10:39
ANAHEIM ARTIC	9:53		9:59					10:14			10:29							10:44
FULLERTON	10:01		10:06			10:13		10:21			10:36					10:43		10:51
BUENA PARK	|		10:13			10:20		10:28			10:43					10:50		10:58
NORWALK	|		10:20			10:26		10:35			10:50					10:56		11:05
LOS ANGELES UNION STATION	o 10:28		10:38			10:45		10:53			11:08					11:15		11:23
LOS ANGELES UNION STATION	10:34				10:41		10:49		10:56	11:04					11:11		11:19	
GLENDALE	10:45				10:52		11:00		11:07	11:15					11:22		11:30	
BURBANK	10:52				10:59		11:06		11:14	11:21					11:29		11:36	
HOLLYWOOD BURBANK AIRPORT	10:57						11:12			11:27							11:42	
VAN NUYS	11:05						11:19			11:34							11:49	
NORTHRIDGE	11:13						11:27			11:42							11:57	
CHATSWORTH	11:19						11:33			11:48							12:03	
SIMI VALLEY	11:32						11:45			12:00							12:15	
MOORPARK	11:45						o 11:57			12:14							o 12:27	
CAMARILLO	11:58									12:26								
OXNARD	12:08									12:36								
VENTURA	12:21																	
CARPINTERIA	12:45																	
SANTA BARBARA	o 13:00																	
SANTA BARBARA	13:03																	
GOLETA	13:15																	
LOMPOC/SURF	14:31																	
GUADALUPE	15:15																	
GROVER BEACH	15:30																	
SAN LUIS OBISPO	o 15:50																	

Illustrative

NCTD (COASTER)	AM (PS)	SCRRA (AV)	SCRRA (OC)	SCRRA (VC)	SCRRA (91L)	SCRRA (AV)	SCRRA (IEOC)	NCTD (COASTER)	NCTD (COASTER)	SCRRA (OC)	SCRRA (VC)	SCRRA (AV)	SCRRA (OC)	SCRRA (VC)	SCRRA (91L)	SCRRA (AV)	SCRRA (IEOC)	SCRRA (OC)	SCRRA (VC)	NCTD (COASTER)	AM (PS)
	6:10																				
	6:30																				
	6:45																				
	7:31																				
	8:44																				
	8:59																				
	9:15																				
	9:37																				
	9:50										10:22								10:52		
	10:01										10:32								11:02		
	10:15			10:31							10:46			11:01					11:16		
	10:30			10:45							11:00			11:15					11:30		
	10:42			10:58							11:13			11:28					11:43		
	10:48			11:03							11:18			11:33					11:48		
	10:56			11:11							11:26			11:41					11:56		
	11:03			11:18							11:33			11:48					12:03		
	11:08	11:15		11:23		11:30					11:38	11:45		11:53		12:00			12:08		
	11:14	11:22		11:29		11:37					11:44	11:52		11:59		12:07			12:14		
	11:25	11:32		11:40		11:47					11:55	12:02		12:10		12:17			12:25		
	11:31		11:35		11:44					11:50			12:05		12:14			12:20			12:31
	|		|		|				|			|		|			|			|
	|		11:54		12:04					12:09			12:24		12:34			12:39			|
	|		12:01		12:10					12:16			12:31		12:40			12:46			|
	12:00		12:08		12:17					12:23			12:38		12:47			12:53			13:00
	12:07		12:15							12:30			12:45					13:00			13:07
	|		12:20				12:27			12:35			12:50				12:57	13:05			|
	12:16		12:25				12:33			12:40			12:55				13:03	13:10			13:16
	|		12:32				12:39			12:47			13:02				13:09	13:17			|
	12:27		12:39				12:47			12:54			13:09				13:17	o 13:23			13:27
	|		o 12:48				o 12:56			13:04			o 13:18				o 13:26				|
	12:40									13:09											13:40
	|									13:19											|
	|									|											|
	13:12										13:41											14:12
12:51	13:15							13:21	13:36											13:51		14:15
12:57	|							13:27	13:42										13:57		|
13:02	|							13:32	13:47										14:02		|
13:08	|							13:38	13:53										14:08		|
13:14	13:29							13:44	13:59											14:14		14:29
13:23	|							13:53	14:08											14:23		|
13:43	13:56							14:13	14:28											14:43		14:56
13:49	14:02							14:19	14:34											14:49		15:02

SCRRA (AV)	AM (PS)	NCTD (COASTER)	SCRRA (VC)	SCRRA (OC)	SCRRA (IEOC)	SCRRA (AV)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	SCRRA (AV)	SCRRA (VC)	SCRRA (OC)	NCTD (COASTER)	NCTD (COASTER)	SCRRA (IEOC)	SCRRA (AV)	SCRRA (91L)	SCRRA (VC)	SCRRA (OC)	SCRRA (AV)	AM (PS)
	8:56	9:10											9:25	9:40							9:56
	9:04	9:17											9:32	9:47							10:04
	|	9:37											9:52	10:07							|
	9:31	9:46											10:01	10:16							10:31
	|	9:52											10:07	10:22							|
	|	9:57											10:12	10:27							|
	|	10:03											10:18	10:33							|
	9:45	10:08											10:23	10:38							10:45
	9:48										10:17										10:48
	|										|										|
	|										10:40											|
	10:19				10:33				10:41		10:49											11:19
	|			10:35	10:43				10:50		10:56				11:03				11:11			|
	10:33			10:42	10:49				10:57		11:05				11:13				11:20			11:33
	|			10:49	10:56				11:04		11:12				11:19				11:27			|
	10:44			10:54	11:02				11:09		11:19				11:26				11:34			11:44
	|			10:59					11:14		11:24				11:32				11:39			|
	10:53			11:06			11:13		11:21		11:29								11:44			11:53
	11:01			11:13			11:20		11:28		11:36						11:43		11:51			12:01
	|			11:20			11:26		11:35		11:43						11:50		11:58			|
	11:28			11:38			11:45		11:53		11:50						11:56		12:05			|
											12:08						12:15		12:23			12:28
11:26			11:34			11:41		11:49		11:56	12:04					12:11		12:19		12:26		12:34
11:37			11:45			11:52		12:00		12:07	12:15					12:22		12:30		12:37		12:45
11:44			11:51			11:59		12:06		12:14	12:21					12:29		12:36		12:44		12:52
			11:57					12:12			12:27							12:42				12:57
			12:04					12:19			12:34							12:49				13:05
			12:12					12:27			12:42							12:57				13:13
			12:18					12:33			12:48							13:03				13:19
			12:30					12:45			13:00							13:15				13:32
			12:44					o 12:57			13:14							o 13:27				13:45
			12:56								13:26											13:58
			13:06								13:36											14:08
																						14:21
																						14:45
																						15:00
																						15:03
																						15:15
																						16:31
																						17:15
																						17:30
																						17:50

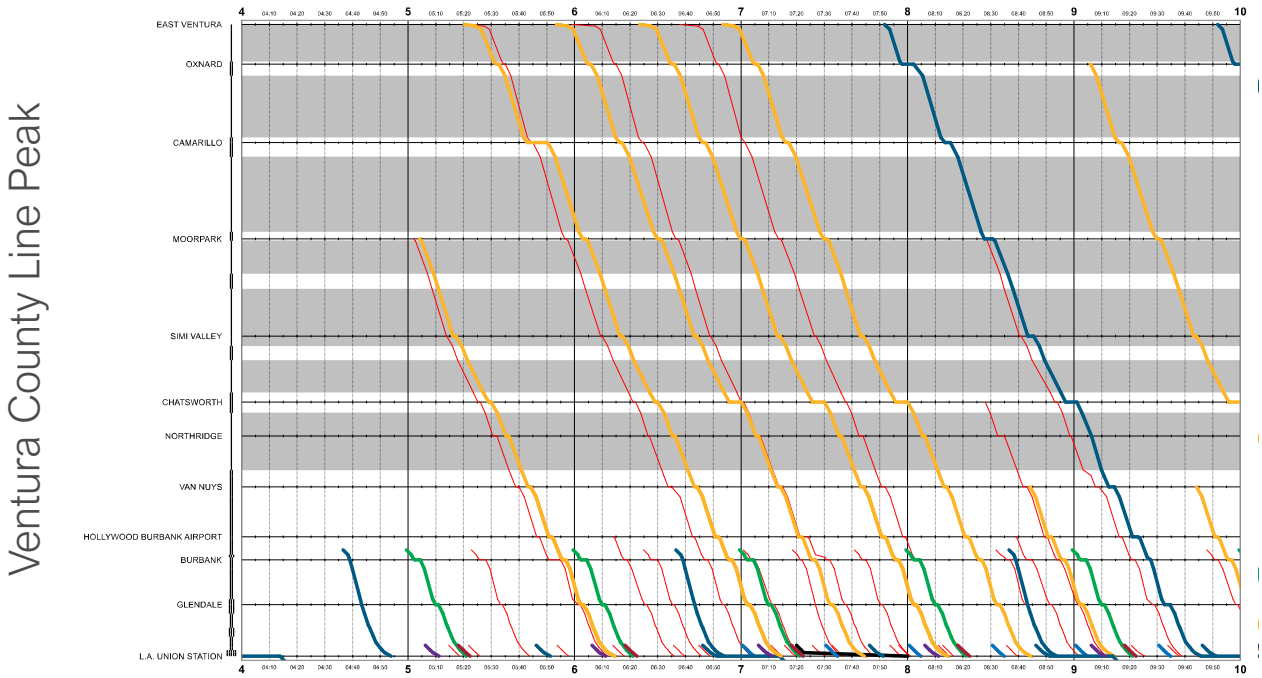
Alternative operating strategies

In the course of technical working group meetings, alternative operating strategies were requested by operators to illustrate how the LOSSAN Study and operating plan framework could accommodate further requirements – e.g. peak-flows, or timetable structures to facilitate different connections at Los Angeles Union Station.

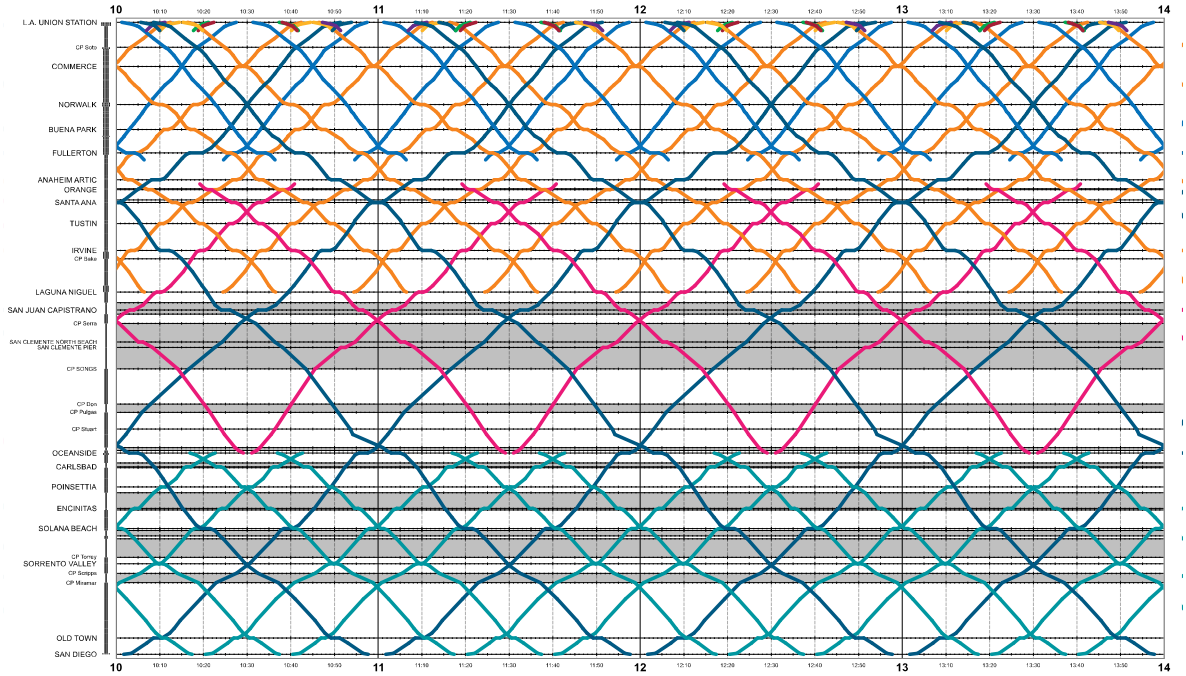
In the sections below, the following examples are provided:

- Near-term peak Ventura County line trains from/to East Ventura
- Near-term Inland Empire-Orange County line trains extend to Oceanside
- Near-term LOSSAN South Corridor peak services example
- Mid-term concept shifted to provide Metrolink connections around the bottom of the hour (xx:30) at Los Angeles Union Station[1]
- Long-term concept shifted to provide Metrolink connections around the bottom of the hour (xx:30) at Los Angeles Union Station.[1]

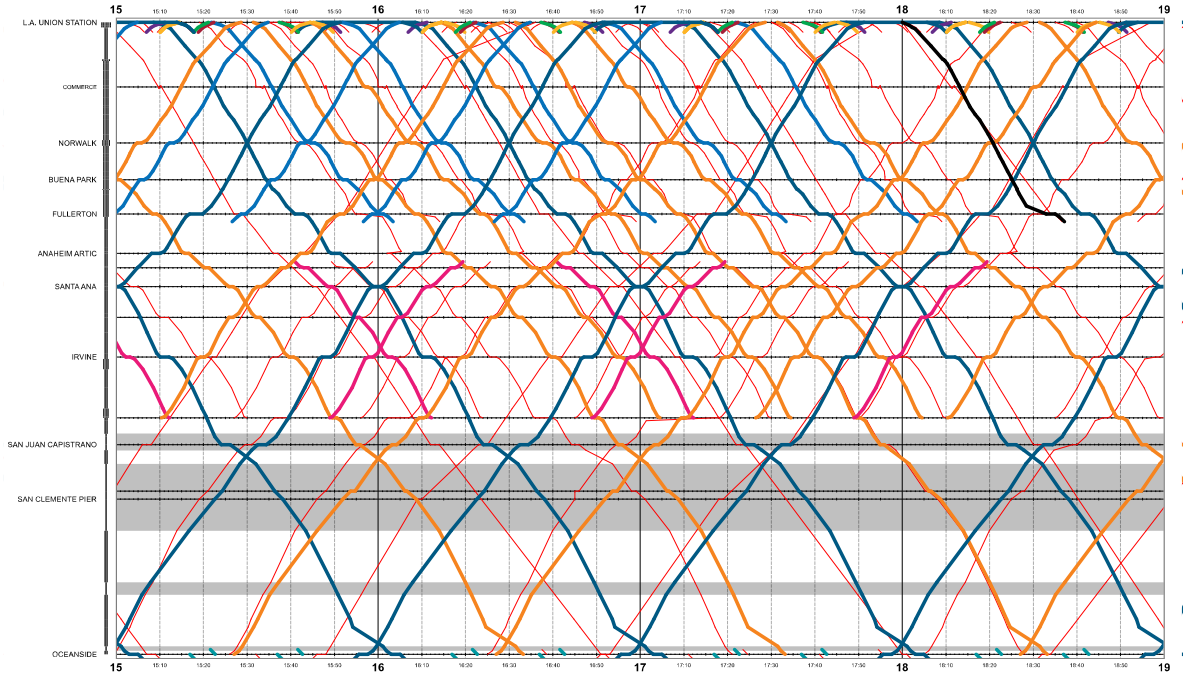
Near-term



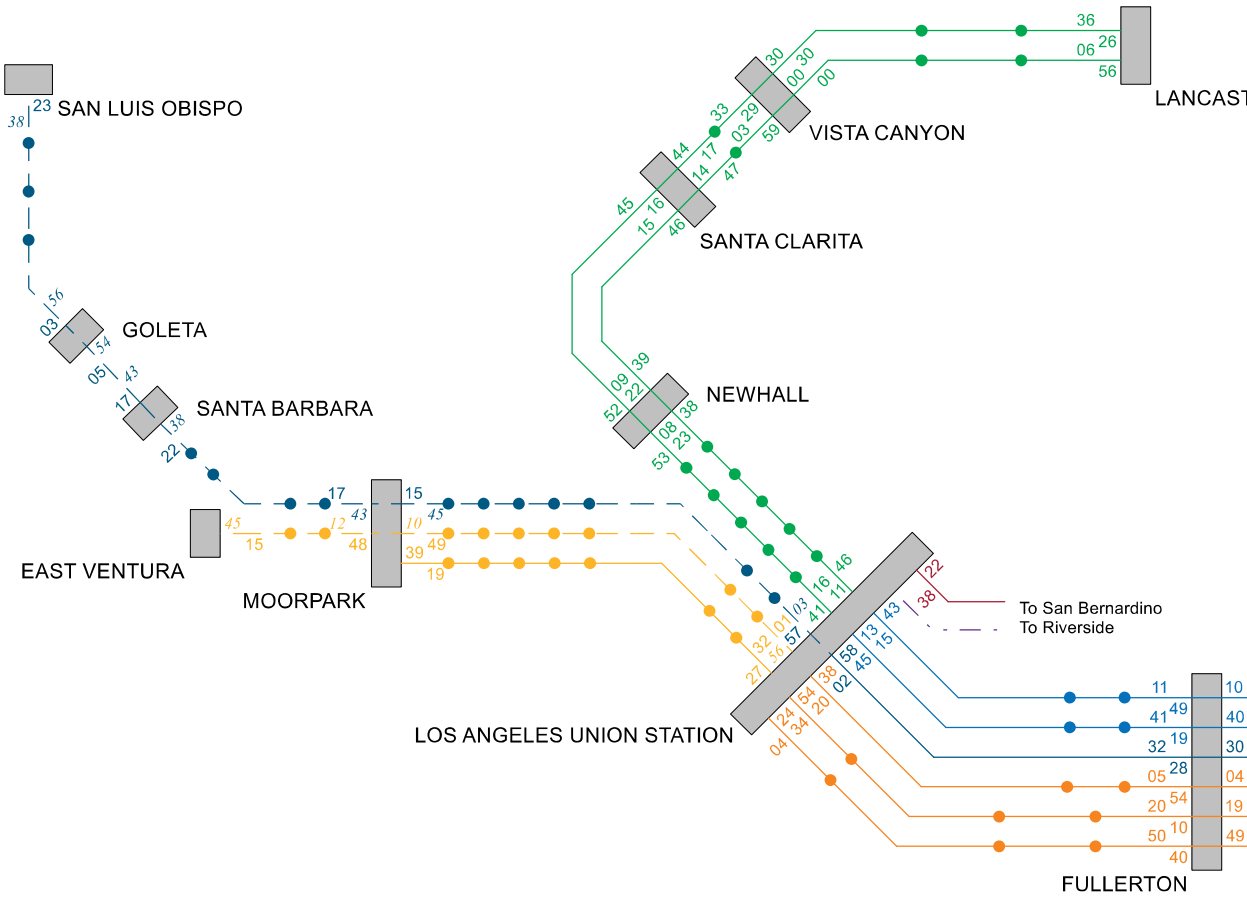
1 These concepts are compatible with the results of the BNSF and NCTD San Diego Pathing Study, though train paths would need to be updated to match the alternate operating structure.



IEOC alternative to Oceanside



evening peak example



Mid-term – shifted 15 minutes

The LOSSAN Rail Corridor's operating pattern can be shifted by 15 minutes; however, this will impact the prioritization of projects on LOSSAN North. The following adjustments to the project list will be required.

- Two platform station at Grover Beach with no holdout rule
- Two platform station at Ventura with no holdout rule
- Leesdale Siding extension at Camarillo, rather than at Oxnard

TER

Legend

State Supported Services
- Capitol Corridor
- Pacific Surfliner
- San Joaquin
- Thruway Bus

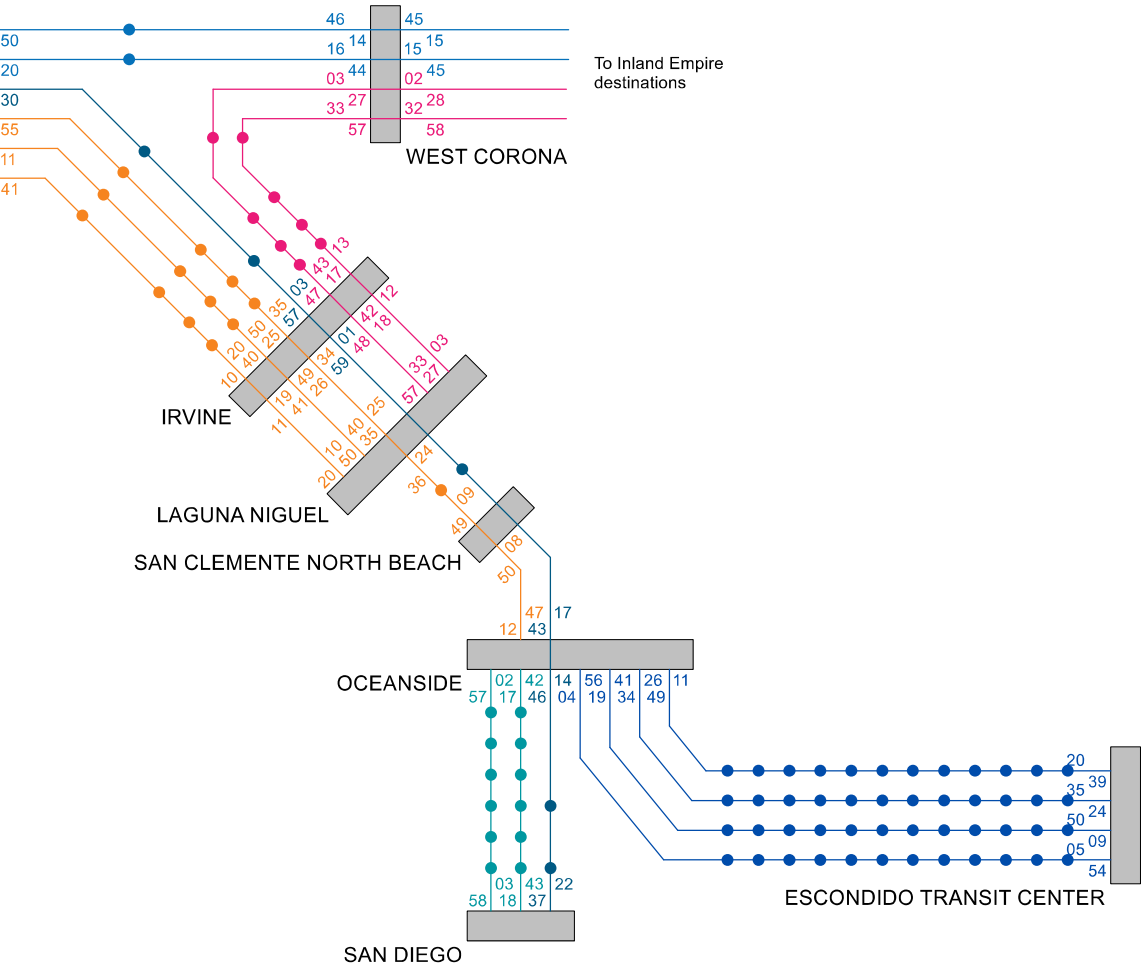
Metrolink
- Antelope Valley
- IEOC
- Orange County
- Riverside
- San Bernardino
- 91 Line

NCTD
- Coaster
- Sprinter

Service Frequencies
- Every four hours
- Every two hours
- Every hour
- Peak hour

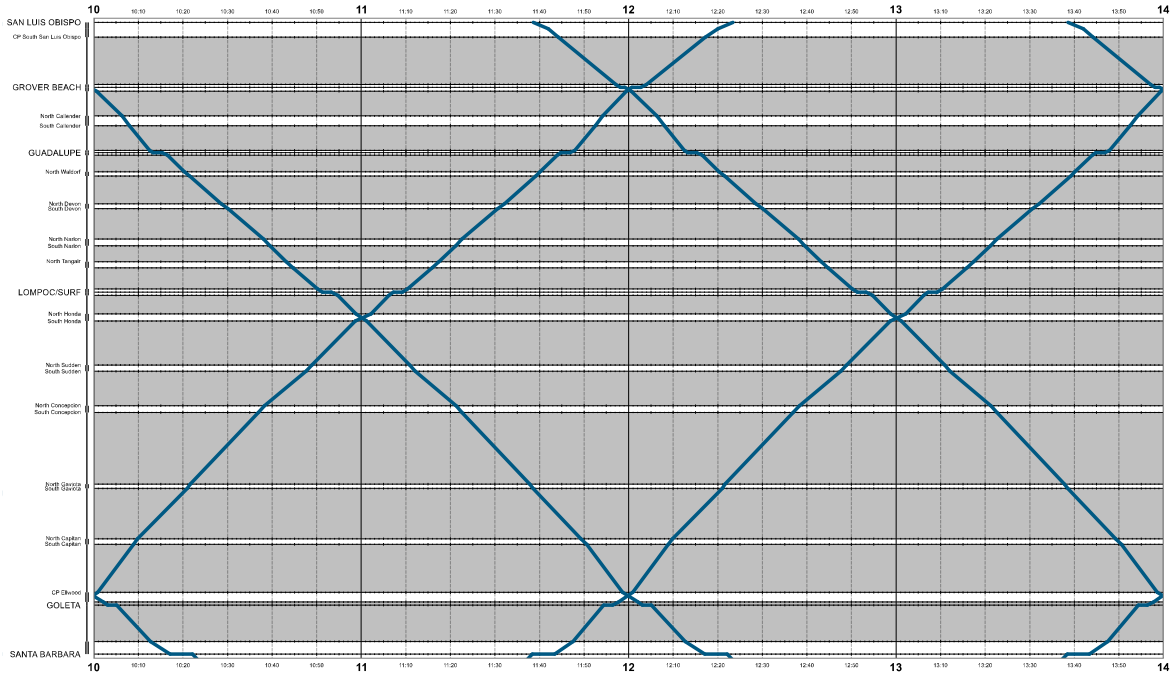
Nodes

56 / 04 — Arrival minute / Departure minute (Italicised times represent odd hours)

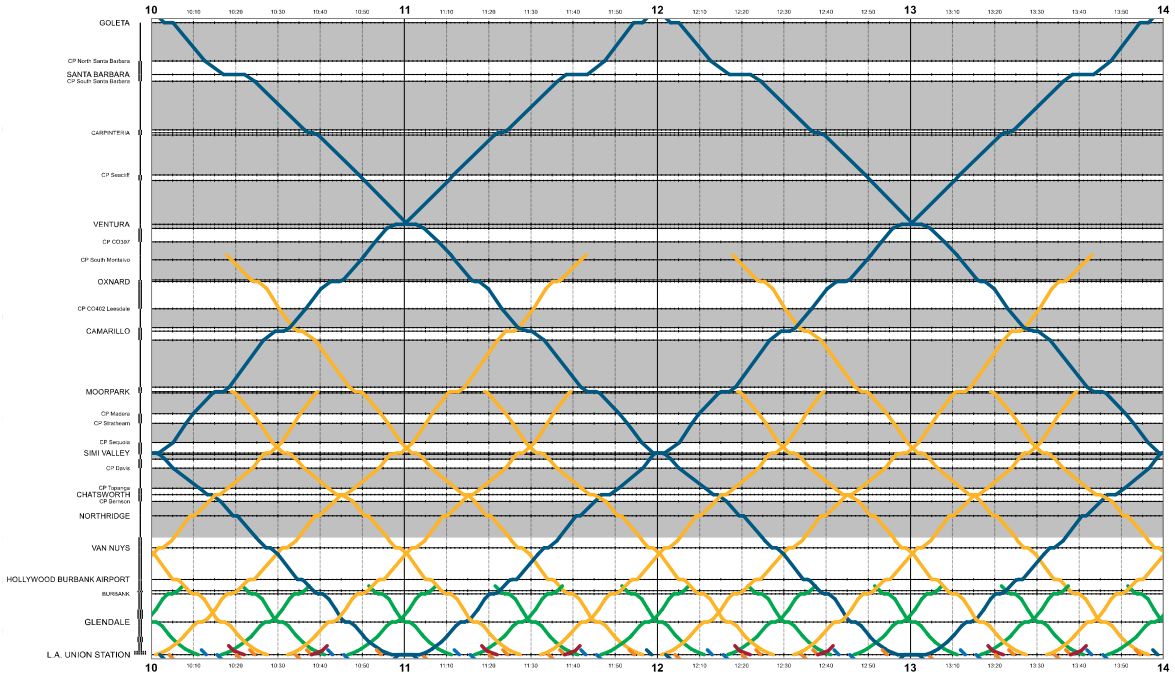


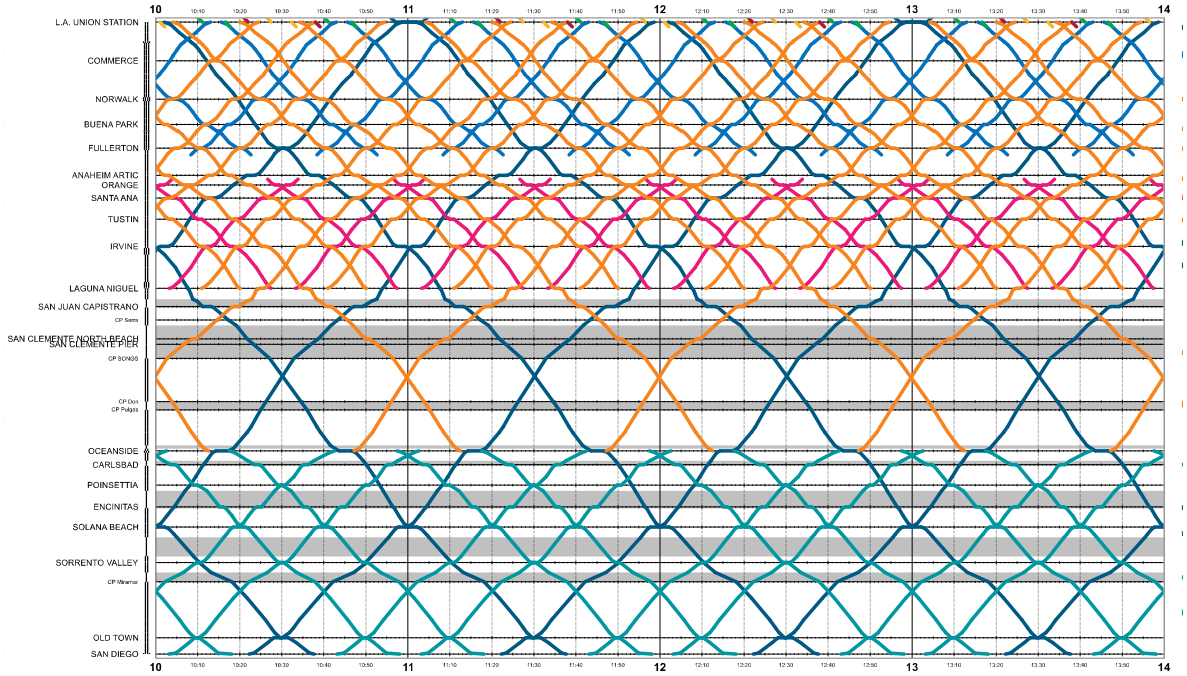
Mid-term – shifted 15 minutes

San Luis Obispo—Santa Barbara

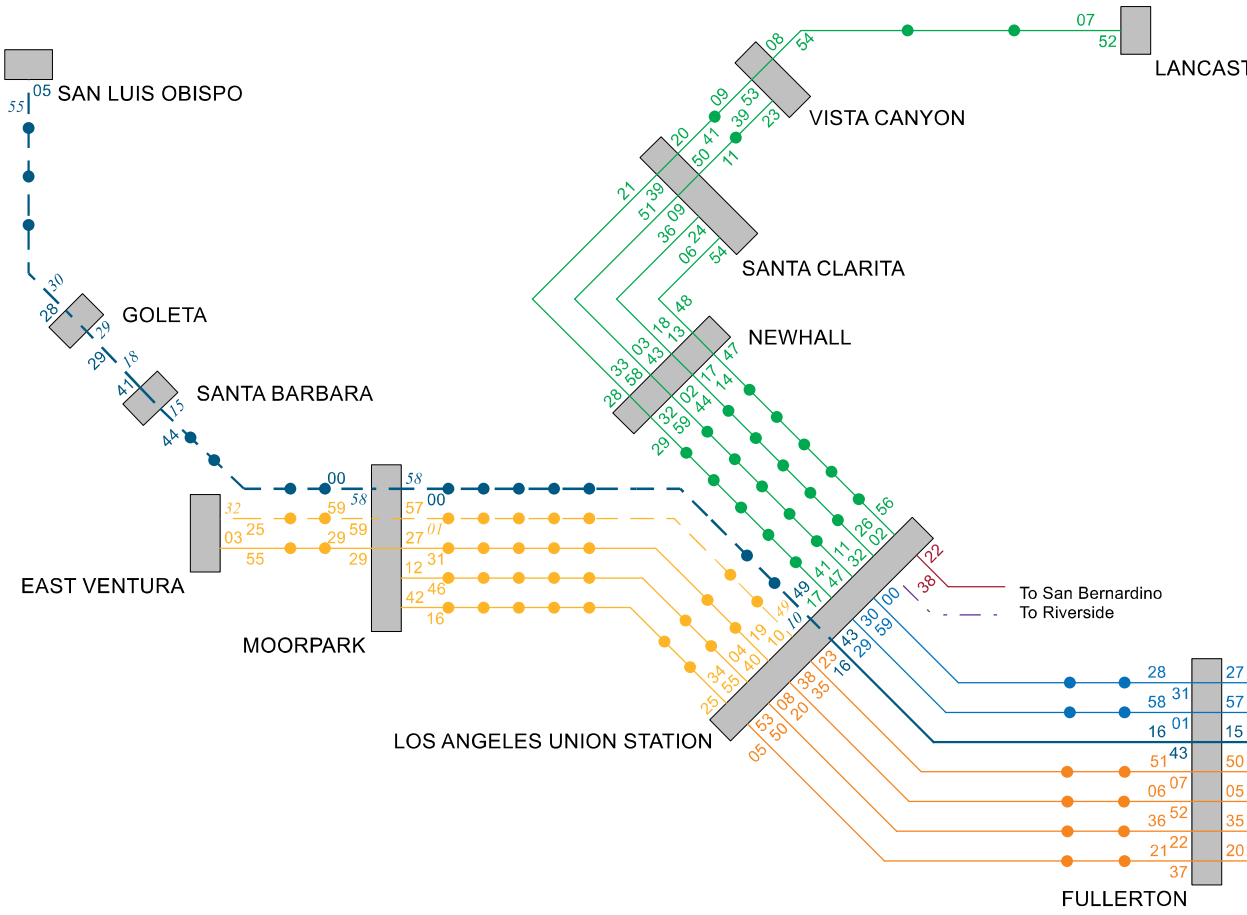


Goleta—Los Angeles Union Station





Los Angeles Union Station—San Diego



Long-term: – shifted 30 Minutes

TER

Legend

State Supported Services
- Capitol Corridor
- Pacific Surfliner
- San Joaquin
- Thruway Bus

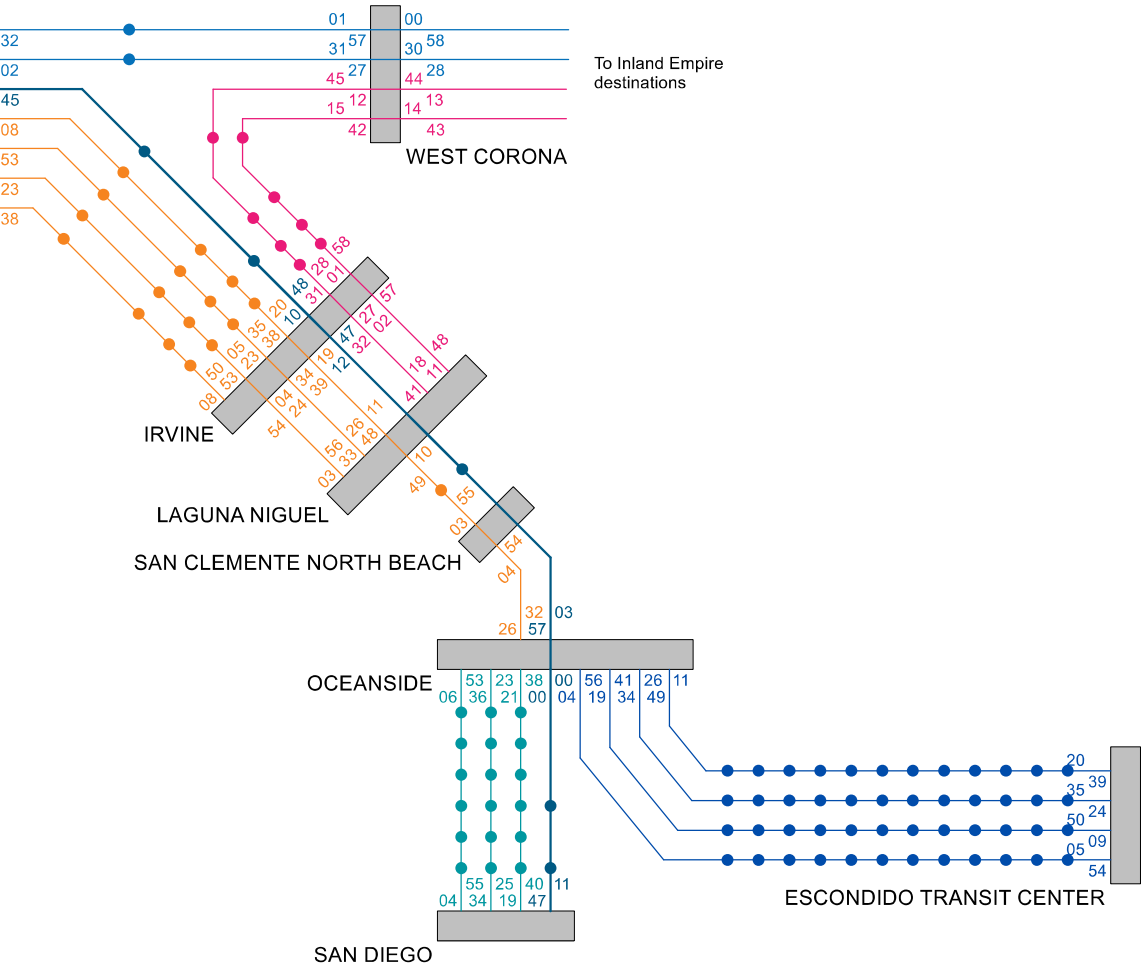
Metrolink
- Antelope Valley
- IEOC
- Orange County
- Riverside
- San Bernardino
- 91 Line

NCTD
- Coaster
- Sprinter

Service Frequencies
- Every four hours
- Every two hours
- Every hour
- Peak hour

Nodes

56 / 04 — Arrival minute / Departure minute (Italicised times represent odd hours)



Long-term: – shifted 30 Minutes

San Luis Obispo—Santa Barbara

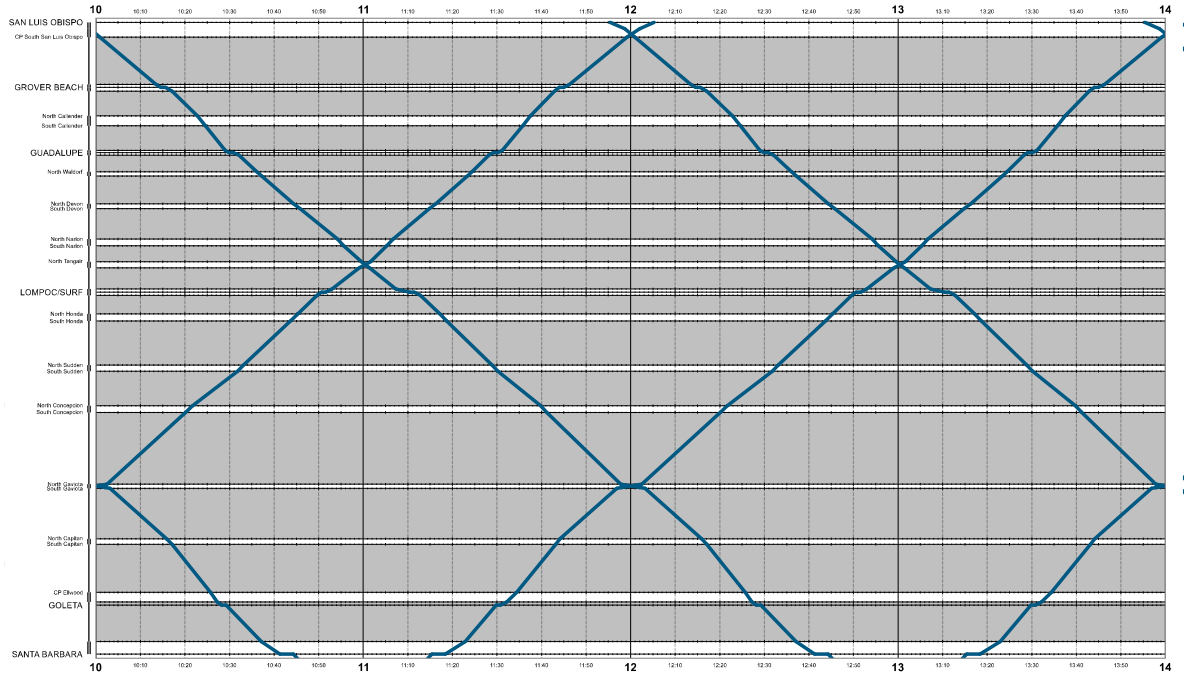
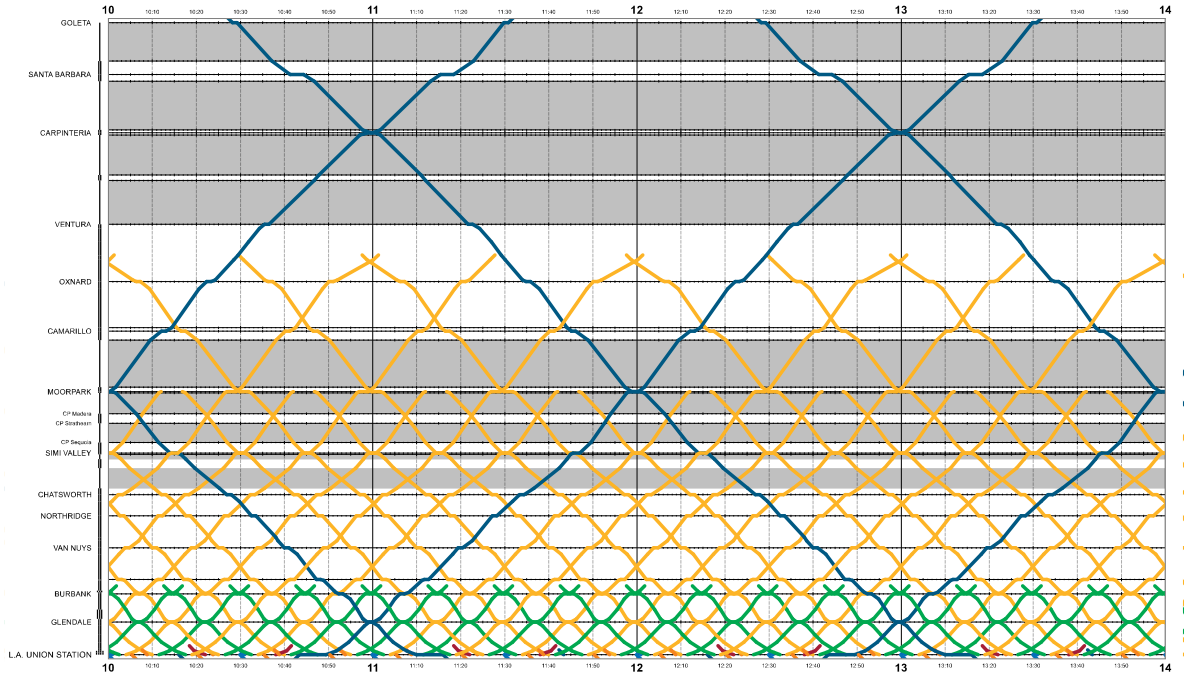
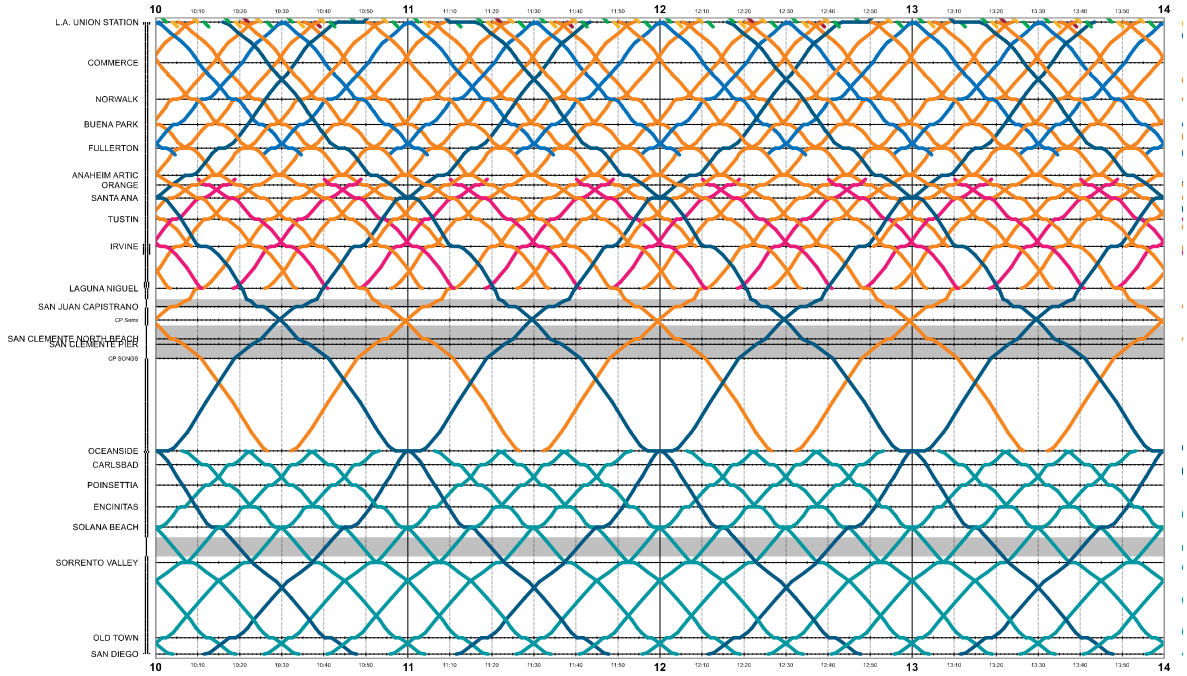


Figure 28 Long-term horizon – shifted 30 minutes – netgraph

Goleta—Los Angeles Union Station





Los Angeles Union Station—San Diego

List of existing capital improvement projects

Project Name	Subdivision & Mile Post	Project Type	Project Description
Link US Phase A	River, 0	Track, Signal, Station	Completion of viaduct over the US-101 freeway that accommodates run-through tracks and first run-through platform. Upgrade of track, signal and communication work in the throat area
Rosecrans/Marquardt Grade Separation	San Bernardino 157.8	Grade Separation	Grade separation project to permit the completion of a third mainline track
San Diego Layover and Maintenance Facility	San Diego TBD	Layover Facility	New layover and maintenance facility in San Diego County
San Luis Obispo (Central Coast) Layover	Santa Barbara 248.7	Layover Facility	Expand / relocate layover facility
Goleta Layover Expansion	Santa Barbara 358.2	Layover Facility	Expand existing layover facility by 900 feet to hold 1-2 additional trains
Install CTC and upgrade non-powered switches	Santa Barbara 355.7–251.5	Signal & Turnouts	Install CTC along 105 miles of track in Santa Barbara and San Luis Obispo counties. 15 power switches will be installed at 8 sidings
Carpinteria Station Double Track and Second Platform	Santa Barbara, 337.8	Station	Construct double track and second platform configured to allow two trains in the station simultaneously
Elimination of delay in block locations and track speed upgrades	Santa Barbara, 248.7–413.1	Signal	Elimination of delay in block locations between Santa Barbara and Camarillo
Camarillo Station Pedestrian Grade Separated Crossing	Montalvo 413.1	Station	Construct a pedestrian undercrossing and other station improvements in Ventura County. The project will be constructed by the City of Camarillo
Eliminate of holdout rules	-	Station	Eliminate holdout rules at Moorpark, Chatsworth, Glendale, Burbank, Burbank-Hollywood Airport, Poinsettia and Sorrento Valley
Chatsworth Station and Signal Project	Ventura 444.37–446.72	Station	Upgrade pedestrian crossing and system controls

Stated Project Benefits	Capital Estimate	Funding & Status	Source
Phase A allows two run-through tracks from platform 4 to the mainline tracks allowing services to be connected between corridors to the north and south of Union Station	$950,400,000	Scheduled for 2026 Funded through TIRCP, Measure R & M, SCRRA, CHSRA, Amtrak, State	FEIR, Metro Board Report October 16, 2019 Agenda Item 8
Enhance the safety by separating road and rail traffic flows; increase rail capacity through completion of the third main track	$155,300,000	Funded, 90% PS&E. Scheduled for 2023	April 26, 2019 SCRRA Board Agenda Packet – Item 18 – SCORE Program Update
Alleviate capacity problems at the San Diego Santa Fe Depot and allow maintenance tasks to be carried out in San Diego	$80,000,000	Site selection and conceptual design. Scheduled for 2027	Tech memos for the LOSSAN SD Layover and Maintenance Facility Site Study LOSSAN Business Plan, 2018 ITIP
Facility to store three trainsets with capacity for minor maintenance and car wash	$19,900,000	PAED. Scheduled for 2024	LOSSAN Business Plan, 2018 ITIP
Overnight storage allows service to begin/end in Goleta	$10,222,000	PS&E, phase 1 funded by SRA and TIRCP. Scheduled for 2022	LOSSAN Business Plan
Increase operational flexibility and improve reliability and travel times	CTC: $22,500,000 Powered switches: $6,700,000	PS&E. Funded through TIRCP. Scheduled for 2023	Cost estimates from LOSSAN
Provides a passing location for out of slot passenger and freight trains and improves corridor resilience. In the long-term, all stations on the LOSSAN Rail Corridor should have two platforms and no hold-out rule	$31,938,000	Construction programmed; Funded by TIRCP, SRA.	LOSSAN Business Plan
Delay in block slows timetabled section running times by 3 minutes. To ensure trains operate on a 2-hourly pattern, with meets at Santa Barbara and Camarillo, 56-minute travel time is required	–	-	-
Improve pedestrian access to the second platform	$7,800,000	PS&E. Funded by TIRCP/Prop 1B/TDA. Scheduled for 2022	LOSSAN Business Plan
Enables simultaneous use of platforms. In single track sections, frequencies can be improved by scheduling train meets at stations	–	-	-
Eliminate the hold-out rule to enable simultaneous use of platforms	Alt 1: $20,798,240 Alt 2: $29,201,295	PAED, funded through TIRCP. Scheduled for 2023	SCORE Ventura Project Definition Report, July 2019

Project Name	Subdivision & Mile Post	Project Type	Project Description
Seacliff Siding	Santa Barbara, 385.30-387.00	Siding	Upgrade and extend siding to improve passenger and freight train meets
Leesdale siding extension and Oxnard second platform	Santa Barbara, 403–409	Siding, Station	Extension of Leesdale siding between CO402 at MP 409.1 and CP O406 at 405.6. The construction of a second platform face at Oxnard will further the capacity improvements and operational efficiencies gained from the extension of Leesdale siding.
Simi Valley Double Track and Platform	Ventura, 432.8–440.8	Station	Adds 2.15 miles of siding track between two new control points. Adds a side-platform and pedestrian grade separation to the Simi Valley Station. Modifications to four at-grade crossings. LOSSAN Study recommends the completion of the Santa Susana extension
Burbank Junction Speed Improvements	Ventura, 462.38 Valley, 11.1	Track, Signal	Upgrade turnouts and add a crossover at Control Point Olive to allow diverging moves from both main tracks to Brighton Siding.
Burbank to Los Angeles Signal Respacing	Valley, 4.8-11.38	Signal	Communication and signal application program changes; signal block respacing; addition of intermediate signals.
Orange-Olive Wye and CP Maple Improvements	Orange, 172.2	Track, Signal	Upgrade and reconfigure the junction at CP Maple
Laguna Niguel to San Juan Capistrano Passing Siding Project	Orange 193.9–195.7	Track	Extends the double track to a new CP Trabuco
San Juan Creek Bridge replacement	Orange, 197.87	Track, Structures	Replace the existing 100-year-old railroad bridge over San Juan Creek in San Juan Capistrano. The new bridge will be built on the western side of the existing bridge to minimize interruption to passenger and freight train services
Serra Siding Extension	Orange, 197.4–201.0	Track	Extend Serra siding to CP Capistrano and CP Beach

Stated Project Benefits	Capital Estimate	Funding & Status	Source
Increase timetable resilience by shortening single track territory	$26,000,000	On hold/ Funds unallocated from TIRCP, SRA	LOSSAN Business Plan
Enables 30-minute passenger frequencies to Oxnard	Siding Alt 1: $22,563,459.14 Siding Alt 2: $33,707,233.34 Station Preferred Alt: $105,206,485.85	On hold/ Funds unallocated from TIRCP/Prop 1B/SRA	Leesdale Siding Extension PSR Oxnard-Leesdale Improvements PSR
Enables 30-minute passenger frequencies through Simi Valley to at least Moorpark	Alt 1: $75,000,000 Alt 2: $88,200,000 Santa Susana: $26,500,000	PAED, TIRCP funding. Scheduled for 2023	SCORE Ventura Project Definition Report, July 2019
Supports 30-minute service on the Antelope Valley Line	Alt 1: $8,219,352 Alt 2: $28,599,409	PAED, TIRCP funding. Scheduled for 2023	SCORE Ventura Project Definition Report, July 2019
Supports 5-minute headways on the Valley line	Alt 1: $446,459 Alt 2: $4,750,592	PAED, TIRCP funding. Scheduled for 2023	SCORE Ventura Project Definition Report, July 2019
Flexibility and redundancy for service by providing a direct route to Anaheim for Inland Empire-Orange County line trains. Can also serve as a bypass to allow trains to be rerouted in cases of accidents or planned track outages. Removes effective single-track section	$32,635,000	Metrolink planning for funding, 2028	April 26, 2019 SCRRA Board Agenda Packet – Item 18 – SCORE Program Update
Allows opposing trains to pass at speed and reduces the locations of single track enabling a more reliable rail service.	$36,360,000	In construction. Scheduled for 2021	Metrolink Capital Funding Program Report (June 2019) & OCTA website
Existing bridge foundation does not meet design and load standards. The new bridge will conform to load and storm standards	$38,333,000	Final Design, R/W Acquisition, Environmental Clearance. Scheduled for 2024	Metrolink Capital Funding Program Report (June 2019) http://sanjuancapistrano.org/Departments/Public-Works/Temporary-Bike-Path-Detours
Reduces the bottleneck at San Clemente to 6.7 miles and travel times through the section reduce to under 10 minutes enabling 2 trains per hour and direction to operate	North: $10,760,400 South: $26,158,000	Project is at 30% design. Scheduled 2023	OCTA Development of Rail Capital Improvement Program (2018) SCORE Project Definition Report – Orange Corridor, June 28, 2019

Project Name	Subdivision & Mile Post	Project Type	Project Description
SONGS Siding Extension	San Diego, 207.7–209.25	Track	The proposed project provides 1.55 miles of new siding track and replaces bridges.
Batiquitos Lagoon Double Track	San Diego, 234.5–237.2	Track	Adds .8 miles of second main track from CP Ponto to MP 235.2 and includes replacement of Batiquitos Lagoon Bridge.
San Dieguito Double Track and Platform – the Del Mar Fairgrounds Special Events Platform	San Diego, 242.2–243.3	Track	2.1 miles of second main track and San Dieguito bridge replacement for north of CP Valley (MP 242.2) to CP Del Mar (MP 243.9).
CP Miramar signal upgrade	San Diego, 252.9	Signal	4-minutes of junction separation times at CP Miramar are currently needed to allow opposing trains to cross as speed. Rail control systems at this location should be upgraded to support at least 2.5-minute separation times.
San Diego Convention Center Station	San Diego, 268.77–268.78	Station	New station platform at San Diego Convention Center.
Link US Phase B	River, 0	Station	Completion of through tracks at Los Angeles Union Station
LA-SB Dedicated Passenger Corridor	San Bernardino, 162.5–165.3, 45.7–36.0	Track, Signal, Station	Construction of a 4th main-track and remodeling of stations and junctions
Ventura Station double track and siding extension	Santa Barbara, 394.1–404.0	Station, Track	Add a second platform to Ventura County station
Leesdale Siding extension to Camarillo	Santa Barbara, 412.5–405.6	Track	Double track the corridor between Oxnard and Camarillo Station
Ortega Siding	Santa Barbara, 372.0–374.0	Siding	Upgrade the siding as a new 2-mile double-ended controlled siding

Stated Project Benefits	Capital Estimate	Funding & Status	Source
This project (together with the Serra siding extension) reduces the bottleneck at San Clemente to allow 30-minute headways. The shortened bottleneck also has freight benefits as detailed in the "*San Diego Pathing Study*" by NCTD and BNSF	Alt 1: $53,322,000 Alt 2: $73,503,000	5% conceptual design complete, Dec 2024	SCORE Project Definition Report – Orange Corridor, June 28, 2020 SANDAG – LOSSAN CORRIDOR Quarterly Program Status Report No. 80, January 2019 – March 2019
Reduces single track section at Encinitas and increases timetable robustness for 20-minute train frequencies	$69,600,000	Funded through final design. Scheduled for 2025	SANDAG – LOSSAN CORRIDOR Quarterly Program Status Report No. 80, January 2019 – March 2019
This project reduces the effective single-track section along the Del Mar bluffs, enabling 3 trains per hour and direction to operate. The project enables freight to operate with passenger traffic during off peak hours.	$177,700,000 (inclusive of station	Funded through final design – no construction funding. 2025	SANDAG – LOSSAN CORRIDOR Quarterly Program Status Report No. 80, January 2019 – March 2019
This project provides schedule resilience if a train is running out of slot.	–	-	SANDAG – LOSSAN CORRIDOR Quarterly Program Status Report No. 80, January 2019 – March 2019
Enables COASTER service extension	$50,500,000	-	-
Full build out of LA Union Station with 10 run-through tracks (4 HSR, 6 Regional, Intercity)	$1,150,000,000	Not funded, Scheduled for 2031	
Separation of freight and passenger flows to enable increased frequencies to operate	$3,174,600,000	Metrolink planning for funding Scheduled for 2023	
Enables 30-minute passenger frequencies to Ventura County Station	–	-	-
Enables 30-minute passenger frequencies to Ventura County Station	–	-	-
Increase timetable resilience by shortening single track territory. trains can meet and pass between the Carpinteria & Santa Barbara	$26,000,000	Project on hold/ Funds unallocated from TIRCP, SRA	-

Project Name	Subdivision & Mile Post	Project Type	Project Description
Rice Avenue Grade Separation	Montalvo	Grade Separation	Grade separate the corridor at Coast Main Line at Rice Avenue
CP Raymer to CP Bernson Double Track	Ventura, 446.7–453.1	Track	Add 6.4 miles of second mainline track between CP Raymer and CP Bernson to complete a continuous double track corridor.
Signal Respacing: La Palma to College	Orange, 167.3–169.8	Signal	Respacing of intermediate signals
Signal Respacing CP Avery to CP Songs	Orange, 199.5–209.18	Signal	Alternative 1: Remove 2 intermediate signals and add 6 new intermediate signals. Alternative 2: Remove 2 intermediate signals and add 7 new intermediate signals.
Eastbrook to Shell Double Track (San Luis Rey River Bridge)	San Diego, 225.3–225.9	Track	Complete the second main track between CP Eastbrook and CP Shell, and replacement the San Luis Rey River Bridge
Carlsbad Village Double Track	San Diego, 228.5–229.5	Track	Construction of second main track between CP Longboard to CP Carl in Carlsbad. Includes new bridge over Buena Vista Lagoon.
La Costa to Swami Double Track	San Diego, 235.1–238.0	Track	Double tracking of Encinitas station removal of single-track section
Sorrento to Miramar Phase 2	San Diego, 241.0–253.0	Track	Construction of second main track & curve realignment from CP Scripps to CP Miramar.
San Onofre to Pulgas Double Track Phase 1, Stage 2	San Diego, 212.3–218.1	Track	Stage 2 of this project includes the construction of a 1.6-mile segment of second main track (MP 216.5 to MP 218.1) and bridges at MP 217.3 and MP 218.0.
Signal Respacing: Maple to Solow	Orange 172.4–192.2	Signal	Respace existing intermediate signals

Stated Project Benefits	Capital Estimate	Funding & Status	Source
Enhance safety	$79,192,000	PS&E, Potential funding through SB1 SCCP and/or Trade Corridor Enhancement Program. Scheduled for 2023	-
Enable 15-minute passenger frequencies to Chatsworth	$60,820,000	Funds have been unallocated from STIP/ Prop 1B	LOSSAN Corridorwide Strategic Plan
Allows 90 mph passenger operating speeds, reducing travel time.	$4,900,000	Metrolink planning for funding, 2023	April 26, 2019 SCRRA Board Agenda Packet – Item 18 – SCORE Program Update
Respacing the intermediate signals allows for express train operations and higher passenger operating speeds up to 90 mph. The signal improvements ultimately reduce travel time and increase on time performance.	Alt 1: $4,849,000 Alt 2: $5,295,000	Currently developing the 30% design for this project. SCRRA will provide updated info once updated plans and estimates are available, March 2022	SCORE Project Definition Report – Orange Corridor, June 28, 2019
Improve connections at Oceanside	$58,700,000	Funded through final design/environmental. Scheduled for 2030	SANDAG – LOSSAN CORRIDOR Quarterly Program Status Report No. 80, January 2019 – March 2019
Enables 15-minute frequencies south of Oceanside	$62,200,000	In initial design/ permitting. Funded through initial design. 2030	SANDAG – LOSSAN CORRIDOR Quarterly Program Status Report No. 80, January 2019 – March 2019
Enables 15-minute frequencies south of Oceanside	$87,000,000	TBD	-
	$136,400,000	In final design. Funded through final design.	-
1.6 mi of additional double track and replacement of Bridges 217.3 and 218.0.	$30,000,000	In design/permitting. Funded programmed (not yet allocated by CTC) thru construction 2025	SANDAG – LOSSAN CORRIDOR Quarterly Program Status Report No. 80, January 2019 – March 2019
Allows 90 mph passenger operating speeds, reducing travel time.	$4,900,000	Metrolink planning for funding, scheduled for 2030	April 26, 2019 SCRRA Board Agenda Packet – Item 18 – SCORE Program Update

Project Name	Subdivision & Mile Post	Project Type	Project Description
Third Track between Tustin area and Laguna Niguel Area	Orange, 177.9–190.3	Track	13-miles of a third main within the existing double track guideway. The span of the project will be between Red Hill Avenue in the City of Tustin to La Paz Road in the City of Mission Viejo. Modifications to existing grade crossings and turnouts will be required. (The project may not be as long depending on (a) signal system capabilities and (b) the specific operating schedule proposed in the future)
Orange County Maintenance Facility -	Orange, 183.3–184.2	Facility	New maintenance facility in Irvine, required prior to increasing services on OC and IE-OC Lines
Irvine Station and Fourth Main Track	Orange, 184.0–186.9	Track, Station	Four main tracks from CP Tinkham to CP Bake, two center platforms at Irvine Station with pedestrian underpass,

Stated Project Benefits	Capital Estimate	Funding & Status	Source
Allows for significant track capacity and provide additional time slots for a greater range of service patterns	$52,700,000	Metrolink planning for funding	Appendix C-3: SCORE Preliminary Study Report (January 12, 2018) April 26, 2019 SCRRA Board Agenda Packet – Item 18 – SCORE Program Update Metrolink list of SCORE Projects Not Yet Funded
-	$164,041,000	Begin 30% Design Environmental Documentation in Q1 2020. scheduled for 2023-2028	Metrolink FY2019-20 Proposed Budget Metrolink list of SCORE Projects Not Yet Funded
4th main track enables cross platform transfers between different services	Alt 1A: $183,882,000 Alt 1B: $86,488,000 Alt 2: $205,399,000	5% Design and Preliminary Environment Assessment Scheduled completion 2023-2025	SCORE Project Definition Report – Orange Corridor, June 28, 2019


METROLINK

Summary of stakeholder meetings

Operator meetings	
May 6, 2019	Initial coordination meeting with Amtrak
May 8, 2019	Initial coordination meeting with Metrolink
Jun 6, 2019	**General kick-off meeting**
Oct 10, 2019	Coordination meeting with Union Pacific
Oct 31, 2019	Coordination meeting with BNSF
Nov 25, 2019	Coordination meeting NCTD
Dec 5, 2019	Coordination meeting Metrolink
Dec 9, 2019	Coordination meeting NCTD
Dec 10, 2019	**1st operator stakeholder workshop**
Dec 19, 2019	Coordination meeting NCTD
Dec 20, 2019	Coordination meeting with Union Pacific
Mar 9, 2020	Coordination meeting NCTD
Mar 10, 2020	Coordination meeting Metrolink
Mar 16, 2020	Coordination meeting with BNSF
Apr 20, 2020	**2nd operator stakeholder workshop**
May 11, 2020	Coordination meeting with BNSF
May 20, 2020	Coordination meeting Metrolink
Jun 2, 2020	Coordination meeting CALSTA
Jun 9, 2020	Coordination meeting Metrolink
Jul 27, 2020	Coordination meeting Metrolink
Aug 11, 2020	Coordination meeting with Union Pacific
Sep 30, 2020	**3rd operator stakeholder workshop**

TAC meetings	
Nov 7, 2019	LOSSAN TAC briefing for south and central regions
Nov 25, 2019	LOSSAN TAC briefing for south central region
Dec 2, 2019	LOSSAN TAC briefing for northern region
Feb 3, 2020	LOSSAN TAC meeting and presentation
Sep 3, 2020	LOSSAN TAC meeting and presentation

Other meetings	
Jan 10, 2020	Coordination meeting with Caltrans
Feb 20, 2020	NCTD board meeting presentation
Jul 15, 2020	Presentation to LOSSAN San Diego Region Working Group
Sep 10, 2020	Briefing to SBCAG as part of the integration study
Sep 21, 2020	Coordination meeting with Caltrans
Sep 22, 2020	Briefing to SLOCOG as part of the Central Coast study

Stakeholder feedback

#	Organi-zation	Concept	Technical dimension	Comment
1	UP	Near-term	Operations	Pulse at 2-hr frequency will require additional infrastructure (beyond the "current infrastructure assumed"). Also, the slots shown will need to account for UP traffic & maintenance-of-way (i.e., not every slot will have a train operating in it). Also, slots are assumed to mostly during the daytime operation (i.e., not 24 hours).
2	UP	Long-term	Infrastructure	Infrastructure section, there are statements which appear to be assumptions (which is fine) but need to be clarified as such since there are ongoing renewal projects. The last statement "Corridor is in a State of Good Repair" is too generic and is a statement of contemporary fact (i.e., there are no permanent slow orders due to regular maintenance of track).
3	UP	Long-term	Operations	Assume that the stringline shown is for example – 2-hr slot plan is OK, but actual operation will need to account for other activities (see comment #1).
4	UP	Long-term	Service/ Operations	30-minute frequency shown will require full double track from Ventura-Moorpark.
5	UP	Mid-term	Operations	Solutions listed – the decreased runtime will likely require a combination of measures.
6	UP	Near-term	Service/ Operations	Stringline shows regular "2-step" meets at Oxnard each hour (even in near-term). Siding will not always be available to make these programmed meets; Metrolink Ventura County service does not currently have a service agreement to accommodate this frequency. Additional frequency will require additional infrastructure and/or schedule adjustments.
7	Caltrans	-	-	Is there an option for the public to provide feedback prior to finalizing?
8	Caltrans	Near-term	Service/ Operations	Caltrans would like to see consideration of alternating of the hourly San Diego – LA trips between Goleta (every 2hrs.) and Newhall – Santa Clarita (every 2hrs.) with direct 2hr frequency Pacific Surfliner service from Santa Clarita to San Diego. Thus, Pacific Surfliner would be hourly from Burbank Jct south to San Diego. This would also the 2-hr pulse schedule of the San Joaquin bus to meet the Pacific Surfliner at Santa Clarita, and thus the buses would not have to travel through the heaviest trafficked part of their route to LA, greatly increasing reliability and OTP, and all through passengers would have less bus time, more train time, and no need to transfer again in LA. Surfliner could also act as Metrolink train on this line.
9	Caltrans	Long-term	Service/ Operations	Would like to see a list of these projects/programs. For example: 1)- Santa Barbara Subdivision upgrades, then the list of projects. Are these expanded on slide 11?

Response
Slots show templated operations only. Final operating plan will respect MoW and train count agreements.
Agreed, further detail is provided in the report.
Slots show templated operations only. Final operating plan will respect MoW and train count agreements
Full double track between Ventura-Camarillo is reflected in the Long-term concept. Full double track may be required to support further growth.
This is described in the final report.
Leesdale siding is recommended in the mid-term concept. In the near-term, Metrolink Ventura County line trains serve East Ventura in the peak periods. Stringline charts have been updated to reflect this.
Report will not be released for public comment prior to finalization.
LOSSAN has not taken formal action on service expansion outside the corridor. Metro through the AVL has identified ways to operate a limited express.
Final report will expand on this.

#	Organi-zation	Concept	Technical dimension	Comment
10	Caltrans	Long-term	Infrastructure	Is this the complete list of projects needed for the long-term? What about rail cars? Any other projects? Are these included or considered to meet the mid-term and long-term goals and service levels? Is a prioritized version of Capital projects available from Page 11, to show what needs to be built, at what cost, for what year, to meet what stage of the program?
11	Caltrans	Long-term	Infrastructure	"Double Track North of Chatsworth Required" – is this for select sections – or include the tunnels? This is a mountainous, tunneled area – among the most difficult on the line. If the tunnels are to be double tracked, this will be an extremely expensive project.
12	Caltrans	Mid-term	Service/ Infrastructure	Slide states "Prioritize key projects from Metrolink SCORE and SANDAG's Infrastructure Development Plan". Can you please provide a list of these projects for these two plans?
13	Caltrans	Mid- & Long-term	Infrastructure	Slide lists 8 key priority projects for mid-term. Are these the projects referred to in slide 15? Are these all that are needed to achieve mid-term goals?
14	Caltrans	Mid- & Long-term	Infrastructure	Projects show up in both the mid- and long-term list. Why the duplication? For example: Serra siding extensions and CP SONGS, Double track Oxnard Station, Simi Valley Station double track, etc. Would we just list the projects that need to be completed by x date to achieve the near-term, then the projects needed by x date for long-term. Some projects
15	Caltrans	Mid-term	Operations	Page 14 & page 20- has consideration been given to running PS express Irvine-LA (with 2-3 stops) with timed transfer to a Metrolink local at Irvine (NB example) where people could transfer to Metrolink to make all local stops? – and reverse SB?
16	Caltrans	Long-term	-	PS and IE trains seem to run almost on top of each other at some times – is that the most efficient way to run the service?
17	Caltrans	Mid-term	Operations/ Infrastructure	Can cost and effectiveness comparisons be made for optional "OR" projects?
18	Caltrans	Near-& Mid-term	Service/ Operations	Will stopping pattern of Coast Starlight be altered so it can operate smoothly in the passenger slot?
19	Caltrans	Long-term	Service/ Operations	20-minute Coaster spacing – does this work with timing for tying in local transit from Oceanside to San Diego? Such as Sprinter on 15-min slots; Also makes for odd through-Oceanside connection pattern between commuter services. Would 30-min spacing work and be frequent enough for demand, especially short term?
20	Caltrans	Mid-term	Service/ Operations	Were through Metrolink and Coaster sets considered (through Oceanside), and why not in final plan?
21	Caltrans	-	-	Would be helpful to show transfer times in examples shown.
22	Caltrans	Long-term	-	Note for intercity able to replace local to Newhall – would be good to consider for mid- or short-term as well; Caltrans priority for interstate connectivity.

Response
Detailed crewing and equipment planning would be reviewed in a subsequent step.
These projects are clarified in the report.
Final report will expand on this.
Projects listed in the mid-term all need to be completed before service can be raised. Some phasing on the north and south portions of the corridor may be possible.
Each planning horizon builds, and expands on the projects recommended from the previous.
While express services were considered, the ability to maintain a pattern was not feasible due to low connectivity and integration options, and limitations through San Clemente and Del Mar.
PS and IEOC interline with each other. Irvine Station is assumed to be 4-tracked.
This could be looked at in a downstream study once the service plans are vetted and agreed upon.
It was not assumed but stopping pattern changes would be at the discrection of Amtrak. Uniform stopping patterns are advantageous to the operating plan.
Single-track sections constrain operations and the frequency of train operations. Connections are provided at Oceanside within the constraints of the timetable.
The slots allow for through operations if it is desired by Metrolink and NCTD.
This is detailed in the netgraphs and service outcomes section.
This is detailed in the netgraphs and service outcomes section.

#	Organi-zation	Concept	Technical dimension	Comment
23	NCTD	-	-	Typo – change "Sorrento to Miramar Phase" to "Sorrento to Miramar Phase II".
24	NCTD	-	-	The proposed San Clemente double tracking is essential for these items to be achieved. What is the current status of that effort?
25	NCTD	-	-	References reducing dwell time at ENC, SOL and SOR by .5 minutes. Clarify who this applies to? COASTER currently only has .5-minute stops at all stations except origin/destination. If assumption was that current COASTER dwell times are longer, then does that affect validity of data regarding travel time savings? Under Solution #2, BL and CP Longboard to Carl involve a trench in Carlsbad.
26	NCTD	-	-	Regarding "pulse" schedules is this intended to include other services like and bus and SPRINTER (for NCTD)?
27	NCTD	-	-	Regarding static meets, this assumes all trains are running on-time, what is the impact if trains are late? Is it realistic to assume on time performance necessary to support the static meets?
28	NCTD	-	-	Will there be an MOU amongst the operators to solidify commitment to the services and projects outlined in the LOSSAN Optimization Study? NCTD particularly concerned about identifying funding for larger projects.
29	SCRRA	Long-term	-	Please see our comment letter for general comments. Our comments in this log will focus on technical comments or comments on specific parts of the presentation.
30	SCRRA	Long-term	Operations/ Infrastructure	"Corridor supports 3-minute train separation times where necessary" is aggressive. Signal system upgrades would be required to allow this 3-minute headway, such as HRCTC which is still in development. By 3-minute separations, do you mean consistent 3-minute service headways? Or signal headway capabilities (e.g., "a following train can get as close as 3 minutes from a preceding train, if needed"). Please specify. If you are referring to consistent service headways: without crossing upgrades, which are not identified in the document, this would result in passenger trains disrupting roadway traffic across the corridor. This could result in more vehicles running crossings and vehicle strikes if no remediations are made prior. 3-minute service headways are generally reserved in closed-corridor type situations i.e., subway. Any disruptions with a 3-minute service headway will automatically result in a large cascade effect across the corridor.
31	SCRRA	Long-term	-	"Operations assume 1.5-minute dwells for Surfliner trains" – where did this number come from, or what assumption is this made on? Is there data to support this? Current equipment and operations would suggest longer stops on these services – does the study propose strategies for reducing Surfliner dwells?
32	SCRRA	Long-term	Operations	10-minute turns at Chatsworth are not currently viable without two engineers on board the train due to current PTC requirements.

Response
Thank you, this will be corrected.
The San Clemente bottleneck is addressed as priority through the BNSF pathing study.
We will update the assumptions.
The pulse provides a predictable for rail for each transit agency to plan their bus services around. It is compatible with 15-minute SPRINTER concepts.
Trains have a 10% runtime reserve to account for minor discrepancies. Delay scenarios can be tested in a downstream effort.
This will be decided amongst operators in a separate effort.
-
We will clarify this in the report, the latter statement “a following train can get as close as 3 minutes from a preceding train, if needed” is correct.
This is consistent with CSRP and LOSSAN Strategic plan. The value is also set as a target to aim for. If the dwell time cannot be shortened, other measures may be necessary instead.
The value is also set as a target to aim for. If the turn time cannot be shortened, other measures may be necessary instead. In the long-term a third track could be built instead.

#	Organi-zation	Concept	Technical dimension	Comment
33	SCRRA	Near-term	Service/ Operations	It appears that Metrolink trains on this schedule take a 10-12-minute dwell at Oxnard on a consistent basis; trains then take another 5–7-minute dwell at Chatsworth and Moorpark, this doesn't seem to be passenger friendly and we don't support its inclusion in the base pattern.
34	SCRRA	Near-term	Service/ Operations	This is a good point; we can adjust in the near term to align with future goals of Metrolink & LOSSAN with minimal impact to customer.
35	SCRRA	-	-	Please make edits to Slide 7 in the presentation as noted in our letter on Pages 1 and 2. Please see the letter for details.
36	SCRRA	Long-term	Infrastructure	SCRRA is in negotiation with UP and BNSF and cannot agree to projects listed on their subdivisions outside of the context of those negotiations. SCRRA, for instance, does not agree with BNSF's representations around the thresholds of service which might necessitate 4 tracks from Hobart to Fullerton.
37	SCRRA	Long-term	Service/ Operations	We encourage you to shift the pattern by 30-minutes so that all Metrolink lines have an hourly slot that arrive at LA Union Station shortly before the 30-minute mark and depart after the 30-minute mark, to facilitate transfers between Metrolink lines and best serve our core commuter market. We do not support a service pattern that disconnects the pulse on our lines on the LOSSAN corridor from our other lines.
38	SCRRA	Long-term	Service	It is hard to tell from this level of detail, but it seems like travel times are reduced on the VC Line. Is this due to infrastructure improvements, fleet improvements, service assumptions, or something else / some combination thereof?
39	SCRRA	Long-term	Service	Discontinuance of the IEOC Line to Oceanside would need in-depth discussion by the principal stakeholders and cannot be assumed at this point. Please describe how existing IEOC Line service levels to Oceanside could be sustained (e.g., exceptions to proposed pattern) – at least with written narrative.
40	SCRRA	Long-term	Service/ Operations	Please elaborate on run-through operations or opportunities at Link-US.
41	SCRRA	Mid-term	Infrastructure	This scenario seems to largely map to currently funded projects (e.g., TIRCP 2018 and 2020), but some projects listed are not funded (e.g., Moorpark or CP Songs).
42	SCRRA	Mid-term	Service/ Operations	have an hourly slot that arrive at LA Union Station shortly before the 30-minute mark and depart after the 30-minute mark, to facilitate transfers between Metrolink lines and best serve our core commuter market. We do not support a service pattern that disconnects the pulse on our lines on the LOSSAN corridor from our other lines.

Response
Oxnard's single platform limits the performance of the corridor. Alternative concepts that avoid a long dwell at Oxnard are detailed in the appendix.
Thank you.
-
A 4-track rail corridor is consistent with assumptions defined in the State Rail Plan and full long-term service. This assumption was also established in the kick-off workshop as an anchor project. Adjustment to service levels is possible if 4th track is not available.
Alternative strategies are detailed in the report.
Travel times are shortened by fleet improvement and dwell shortening. These are pre-production schedules, and not all pad is added.
Final report expands on this and shows how the IEOC can also continue south.
Final report will expand on this platform occupation.
There projects would be necessary to support the concept.
Travel time savings resulting from LinkUS cause this. An alternative concept that retains the 30-minute mark is in the appendix.

#	Organi-zation	Concept	Technical dimension	Comment
43	SCRRA	Mid-term	Service	This seems to allocate to the 91/PV Line the time slots left unused by the other lines, but which may not align with the "pulse" timed transfers advocated by this study. The 91/PV Line must be fairly treated in proposals that advance. In particular – the 91/PV Line should also arrive in LA before the :00 and :30 mark and depart after the :00 and :30 mark.
44	SCRRA	-	Service/ Operations	We need to check to see how this compares with our planned improvements on the AV Line (TIRCP 2020 funded improvements). It is hard to see details on the AV Line on this slide.
45	SCRRA	Near-term	-	It is hard to tell from this level of detail, but it seems like travel times are reduced on the VC Line. Is this so? If so, how is this improvement achieved (e.g., different fleet assumption?)?
46	SCRRA	Near-term	Service/ Operations	There will likely need to be extensive deviation from this pattern during commuter periods to accommodate existing peak Metrolink levels of service. This will require extensive investigation if these concepts advance towards implementation. As mentioned in the letter -- developing full-day schedules is an important next step.
47	SCRRA	Near-term	Service	Fare compatibility and revenue and cost sharing need to also be addressed – e.g., reinvent Rail-2-Rail.
48	SCRRA	Near-term	Service/ Operations	There seems to be longer travel times assumed for the Antelope Valley Line. Was time added to accommodate the Surfliner slot to Santa Clarita shown on the netgraph? Please remove this as it needs to be discussed by the principal stakeholders first.
49	SCRRA	Near-term	Service/ Operations	In the presentation, it was verbally suggested by the consultant that the short-term infrastructure could not reliably support two-trains-per-hour across the San Clemente bottleneck all day. It was further suggested that the Surfliner could operate hourly bidirectionally and that Metrolink could limit its operations. The Pacific Surfliner does not get priority across this bottleneck – we need to continue to share the burden of the constraint.

Response
Operations have been updated to reflect the comment. However, operations are constrained by LOSSAN North single-track sections, San Clemente, Del Mar and the single track sections on the line to Perris.
Concept reflects planned improvements on the AV line.
Operation assumes an F125 locomotive. The concepts do not include additional elements such as end loaded recovery.
Further pathing opportunities are available; however, these would need to be coordinated with all operators.
This is addressed in a separate report.
Runtimes were calculated to support the desired level of service on the AV line using the infrastructure constraints.
This issue should be minimized due to trains operating at different times of the day, however further discussion and coordination is needed to define how best to mutually address this bottleneck in the near-term.