San Diego Pathing Study

Final Report

September 22, 2020

BNSF

NORTH COUNTY TRANSIT DISTRICT

The San Diego Pathing Study provides new opportunities to expand freight and passenger services through targeted investments

The vision: Manage freight and passenger service needs under a single operating plan that aligns with 2018 California State Rail Plan goals

The challenge: Existing plans focus on individual operating needs and provide insufficient detail on how infrastructure projects should be prioritized

The idea: Use a holistic planning approach that consolidates all freight and passenger service needs

The result: An operations plan that provides additional capacity for freight and passenger services through pin-point, targeted infrastructure investments

Next steps: Build on the study to develop detailed and coordinated operating plans that operators will support

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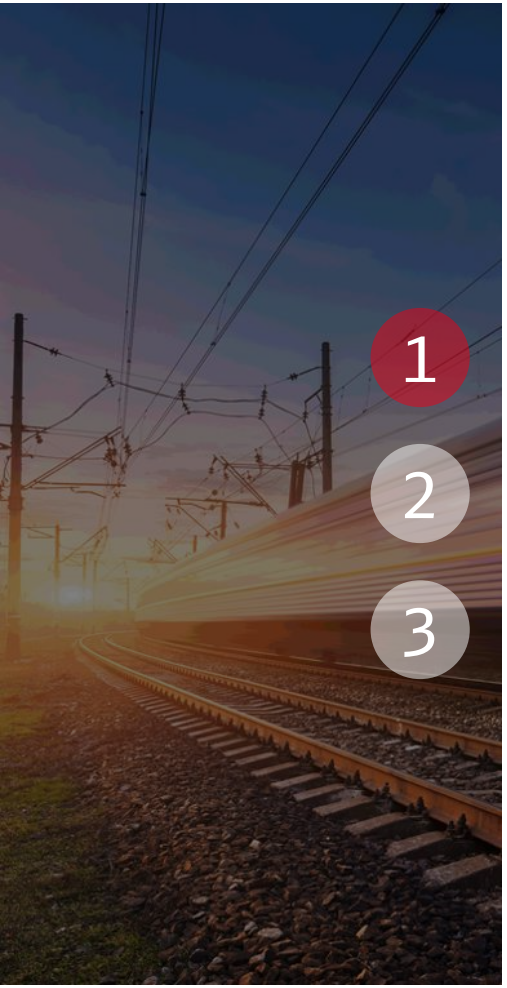
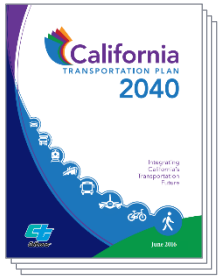


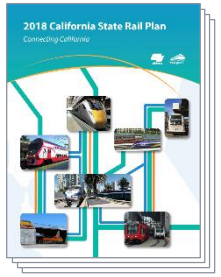
The vision: Manage freight and passenger service needs under a single operating plan that aligns with 2018 California State Rail Plan goals

Vision for rail in California

California will have a premier, customer-focused, integrated rail system that successfully moves people and products while enhancing economic growth and quality of life.

– 2018 State Rail Plan –





Goals for San Diego pathing study on the LOSSAN Rail Corridor

- Provide 8 freight paths per direction between CP Atwood and the Port of San Diego during off-peak passenger hours
- Extend COASTER services south to a new station at the Convention Center in San Diego
- Extend Pacific Surfliner services south to a new maintenance facility in San Diego's National City

The challenge: Existing plans focus on individual operating needs and provide insufficient detail on infrastructure project prioritization

Illustrative

Which consolidated set of infra-structure projects are needed?

- BNSF TAMT expansion
- COASTER extension
- Amtrak Maintenance facility
- Metrolink SCORE
- SANDAG Infrastructure Development Plan

How should schedules be developed?

Risk: Not all corridor needs are addressed

- Metrolink
- Pacific Surfliner
- BNSF
- NCTD

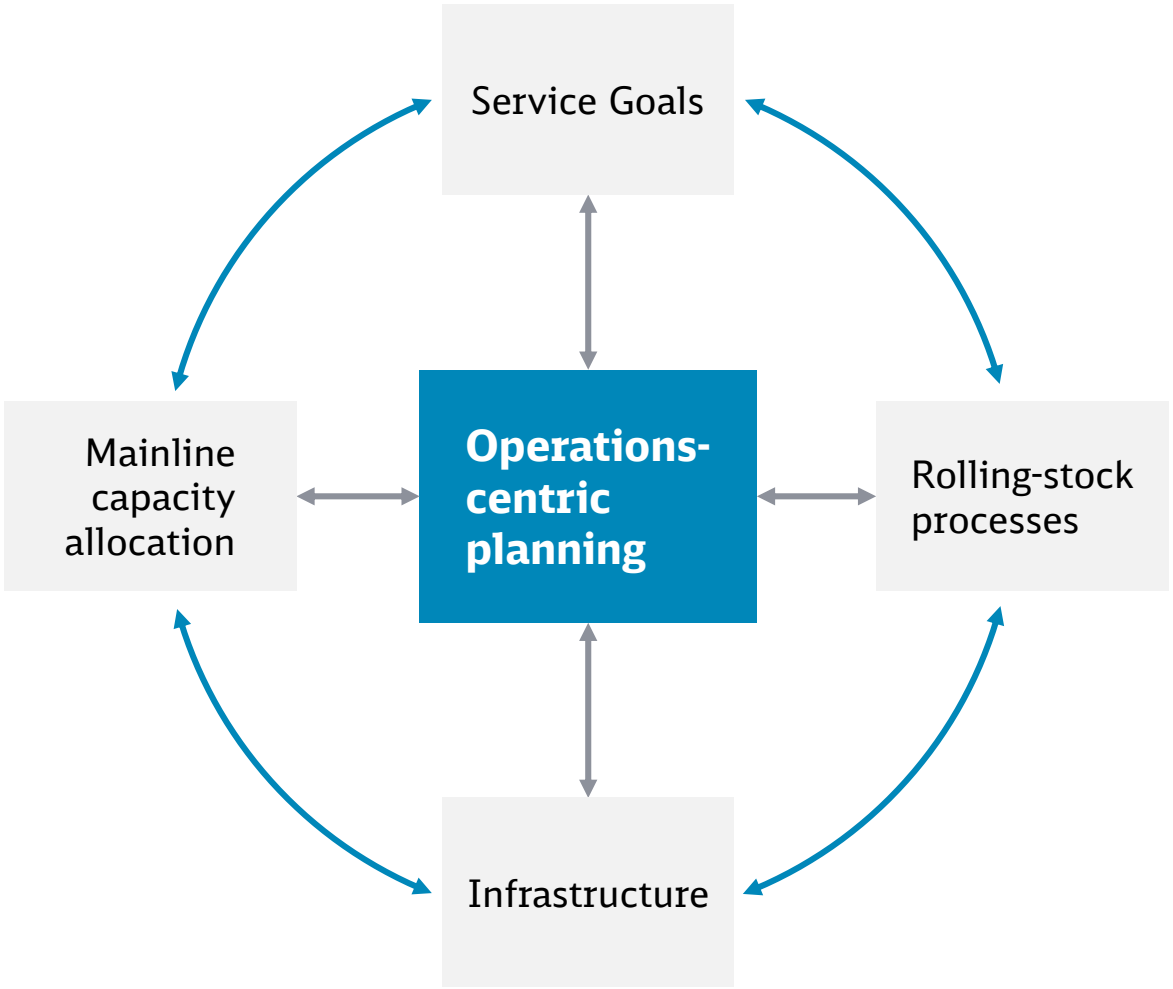
Opportunity: The LOSSAN Optimization study provides a passenger framework for project prioritization

Planning constraints

- Agency based planning dominates the corridor
- Freight not considered at the outset
- Freight service is on-demand Passenger service is cyclic
- Frequent schedule changes are made on the corridor
- Current conditions lead to uncertain incremental growth

A holistic planning approach needed to answer passenger and freight objectives

The idea: Use a holistic planning approach that consolidates all freight and passenger service needs



Why plan through the operations?

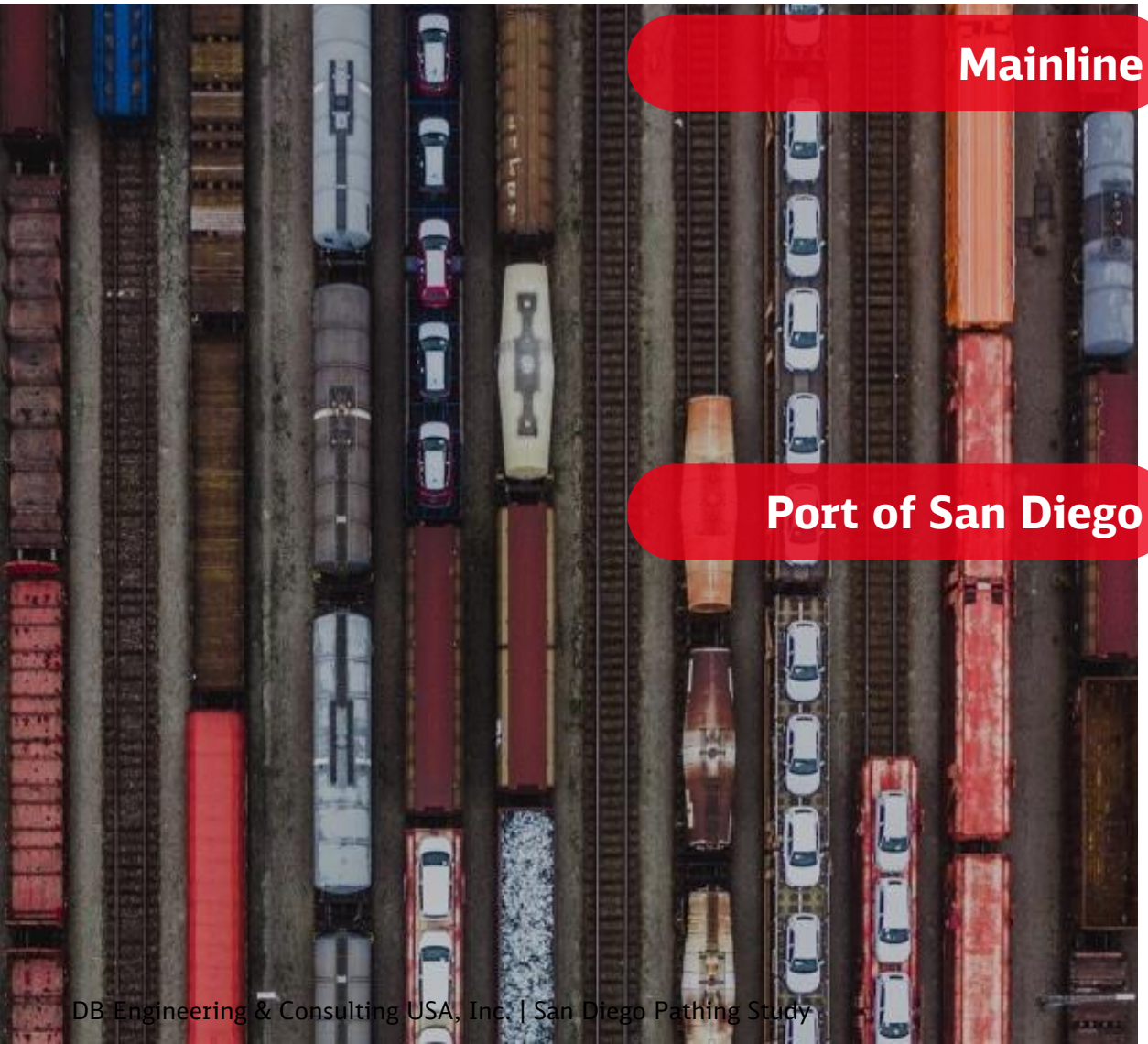
- Operations-centric planning allows the interdependencies between service, operations, and infrastructure to be visualized
- The visualization of these interdependencies enables the rail system to be optimized by balancing rolling stock, infrastructure or operational measures
- Strategic pin-pointed infrastructure investments are easier to identify and are developed through rounds of iteration
- Iterative analysis enables project details to be developed step-by-step

The result: An operations plan that provides additional capacity for freight & passenger services through pin-point, targeted infrastructure investments

		Near-term	Mid-term	Long-term
Service	Freight	– 3 freight slots per day[1]	– 5 freight slots per day[1]	– 8 freight slots per day[1]
	Passenger	– LOSSAN Optimization near-term recommendations	– LOSSAN recommendations – COASTER extension to the Convention Center	– LOSSAN recommendations[2] – Extension to National City
Operations		– Freight trains stage on the mainline between CP Stuart and CP Mesa[3]	– Freight trains stage on the mainline between CP Stuart and CP Mesa[3]	– Support of 5-minute separation times – Staging at CP Trabuco, CP Stuart and CP Mesa[3]
Infrastructure		– Completion of Laguna Niguel – San Juan Capistrano siding project	– CP SONGS relocation & San Dieguito project prioritization – Signaling and track upgrades – Convention Center station and pocket track	– LOSSAN recommendations[4] – Shortened single-track section at San Clemente – Port infrastructure upgrades to National City[5]

(1) During passenger off-peak hours (2) Assumes extending Serra siding to San Clemente North Beach Station (3) Additional staging measures are detailed in the appendix
(4) A new staging location at CP Cudahy may be necessary (5) Includes extended leads and bypass track

Next steps: Build on the study to develop detailed and coordinated operating plans that operators will support



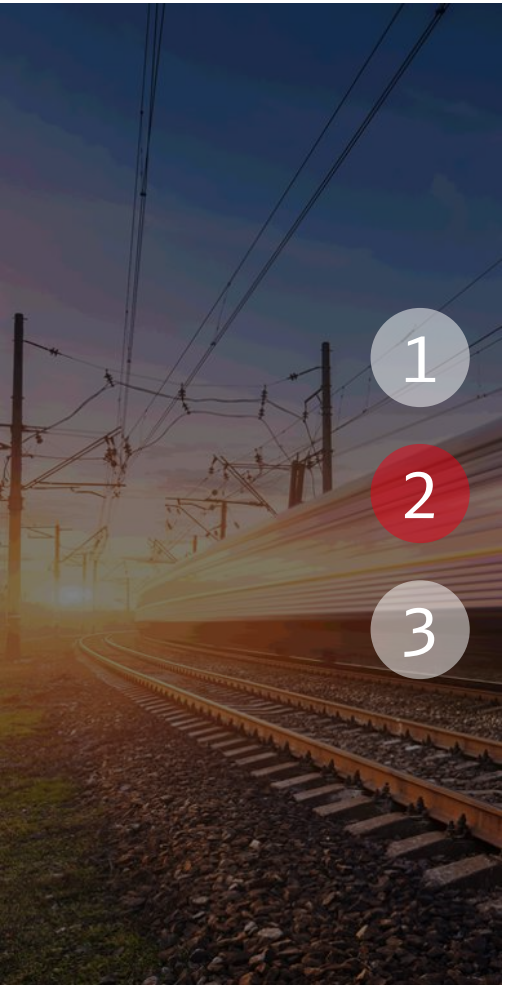
Mainline

- Introduce new processes to improve institutional planning and timetable coordination to enable the recommended framework for operations
- Secure funding for identified priority projects
- Develop detailed operating concepts that can be used as production schedules

Port of San Diego

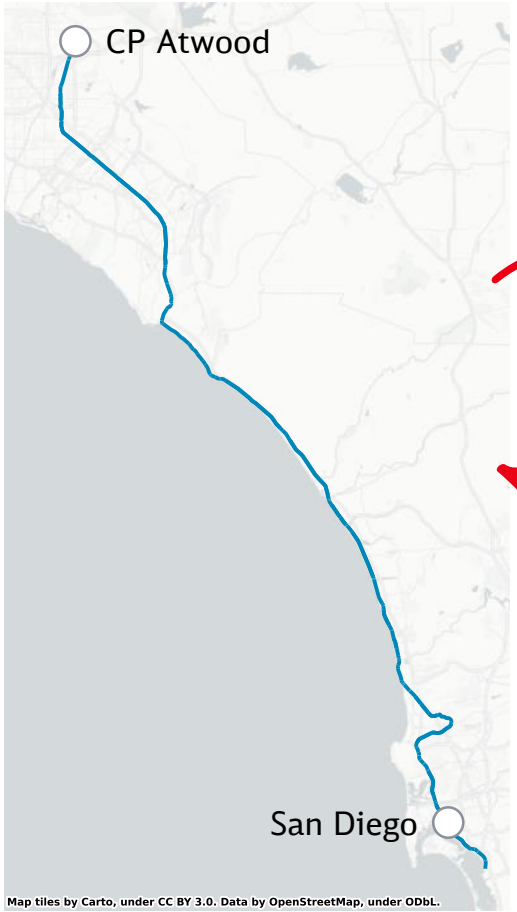
- Analyze whether Port facilities can handle higher levels of freight traffic (8 trains per day)
- Determine how impacts to 22nd Street Yard operations can be mitigated
- Review whether infrastructure investments support 2018 State Rail Plan goals for service extension to the border
- Upgrade infrastructure south of the Santa Fe Depot to FRA track Class 3 to support mixed traffic service

Contents



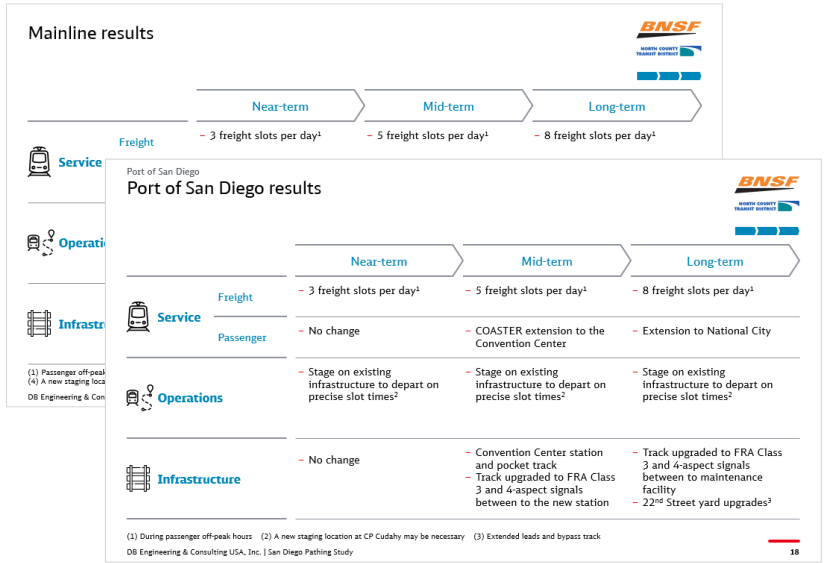
This technical summary is structured into two parts: Mainline and Port of San Diego analyses. These components are linked by train staging on the corridor

Mainline



Train Staging

Port of San Diego



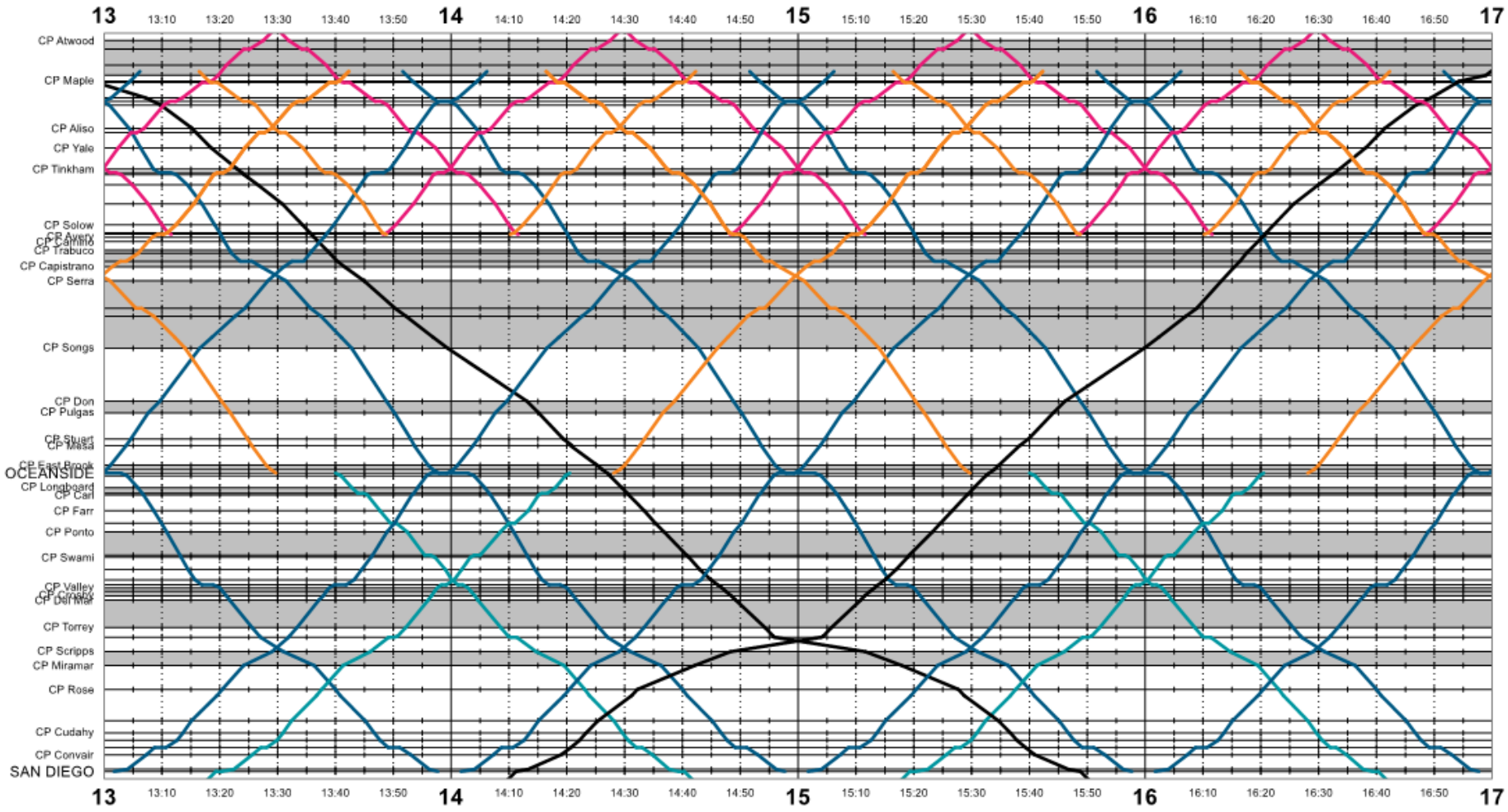
Mainline results

		Near-term	Mid-term	Long-term
Service	Freight	– 3 freight slots per day[1]	– 5 freight slots per day[1]	– 8 freight slots per day[1]
	Passenger	– LOSSAN Optimization near-term recommendations	– LOSSAN Optimization mid-term recommendations	– LOSSAN Optimization long-term recommendations[2]
Operations		– Freight trains stage on the mainline between CP Stuart and CP Mesa[3]	– Freight trains stage on the mainline between CP Stuart and CP Mesa[3]	– Support of 5-minute separation times – Staging at CP Trabuco, CP Stuart and CP Mesa[3]
Infrastructure		– Completion of Laguna Niguel – San Juan Capistrano siding project	– Relocation of CP SONGS to MP 207 – Completion of San Dieguito – Upgrade of signaling and control	– LOSSAN Optimization study's long-term projects[4] – Shortened single-track section at San Clemente

(1) Passenger off-peak hours (2) Assumes extending Serra siding to San Clemente North Beach Station (3) Additional staging measures are detailed in the appendix
(4) A new staging location at CP Cudahy may be necessary

In the near-term, passenger restructuring through the LOSSAN Optimization study allows 3 freight trains per direction to operate during off-peak hours

Planning Horizon



Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Freight

Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

Service

- 3 freight slots could operate in the off-peak period
- COASTER and Orange County line trains run every 120 minutes if freight trains operate
- Pacific Surfliner runs every hour

Operations

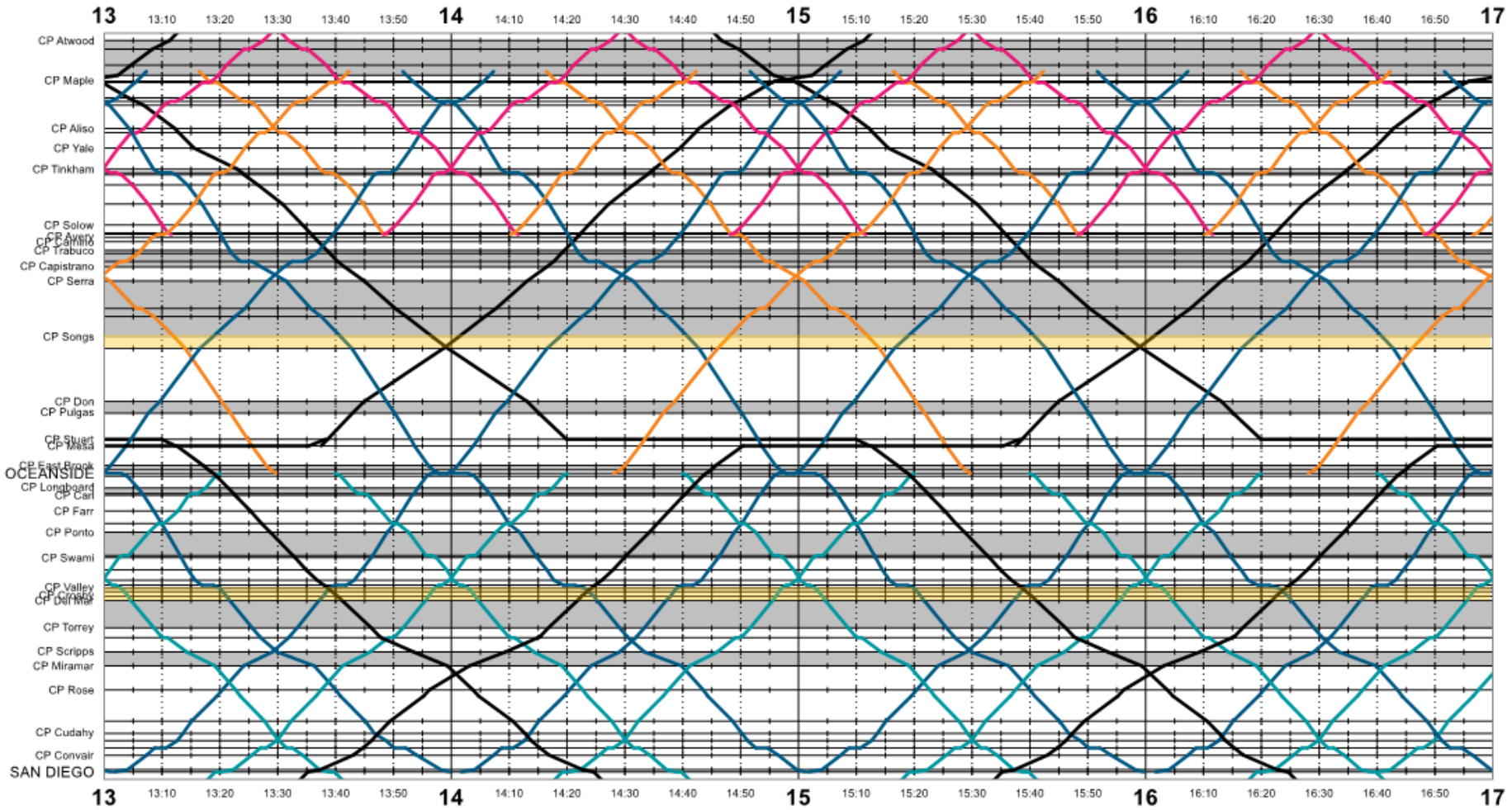
- No special moves required

Infrastructure

- The Laguna Niguel – San Juan Capistrano siding project enables the Orange County Line to run at 120-minute intervals if freight operates

In the mid-term, the relocation of CP SONGS and the construction of San Dieguito enables 5 freight trains per direction and hour during off-peak hours

Planning Horizon



Service

- 5 freight slots could operate in the off-peak period
- 2 TPDPH operate through the San Clemente bottleneck
- Robust passenger peak operations through Del Mar or off-peak passenger and freight

Operations

- Freight trains stage on the mainline between CP Stuart and CP Mesa section

See train staging and timetable sections in the appendix

Infrastructure

- CP SONGS relocation to MP 207.7
- The San Dieguito double-track project[1] shortens the single-track section near Del Mar

See alternative concepts in the appendix

Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Freight — Proposed project

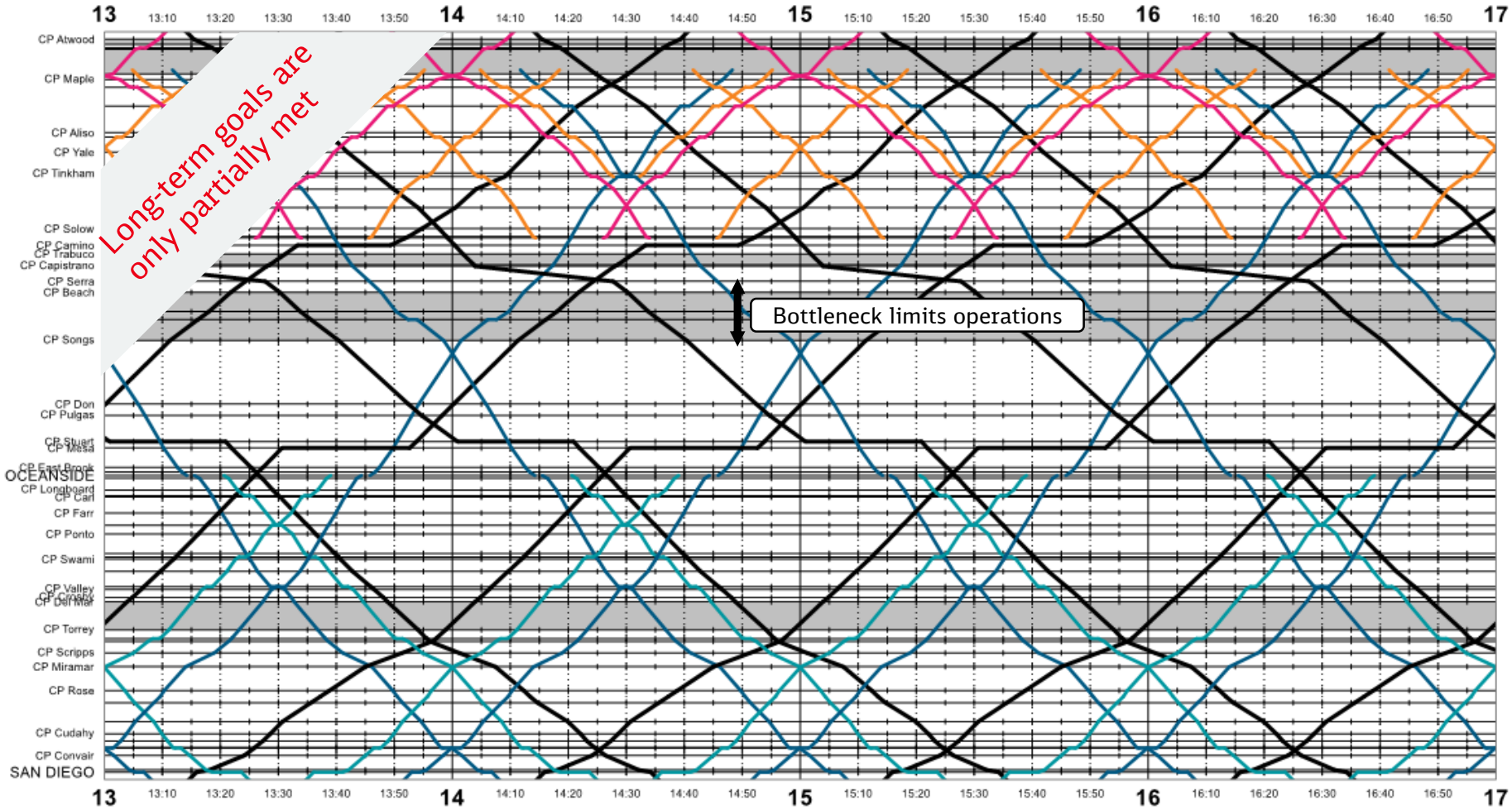
Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

(1) Assumes double track CP Valley to CP Crosby

In the long-term, freight and passenger service goals will only be partially fulfilled if the bottleneck at San Clemente is left unresolved

Planning Horizon



Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Freight

Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

Service

- **The San Clemente bottleneck limits train movements to 2 TPHPD: a trade-off arises between either 8 freight slots or increased passenger service in off-peak hours**

Focus on next page

Operations

- Southbound and northbound freight trains stage between CP Stuart and CP Mesa for ~20 minutes[2]

See train staging and timetable sections in the appendix

Infrastructure

- LOSSAN Corridor coastal improvement are complete[1]
- Track, turnout & signal upgraded to enable 5-min. train headways[2]
- Line speeds upon approach to San Diego are raised to 40 mph

(1) As detailed in SANDAG's Infrastructure Development Plan & Metrolink's SCORE program

(2) Refer to the appendix

San Clemente is a key bottleneck on the corridor that limits both freight and passenger service expansion

The San Clemente bottleneck

Situation

- The San Clemente bottleneck is the corridor's longest section of single-track
- It stretches 9 miles from Capistrano Beach to San Onofre and takes 15 minutes to traverse

Problem

- The bottleneck determines capacity for the entire LOSSAN South corridor
- Left unchanged, tradeoffs between strategic passenger and freight objectives are necessary

Potential solutions

- **Recommended:** Extend Serra siding to San Clemente North Beach and double track the station
- **Not recommended:** Double track the southern section from San Clemente to CP SONGS or realign the corridor on to a new right-of-way

Impact

- The capacity on the section could grow from 3 to 8 trains per hour[1]
- This aligns with the rest of the corridor's capacity and enables the 2018 California State Rail Plan's 2040 goals

(1) Upgrade of San Clemente North Beach station in addition to Metrolink's SCORE projects

Extending Serra siding and double tracking San Clemente North Beach station enables higher train throughput

Serra siding is extended to San Clemente North Beach station

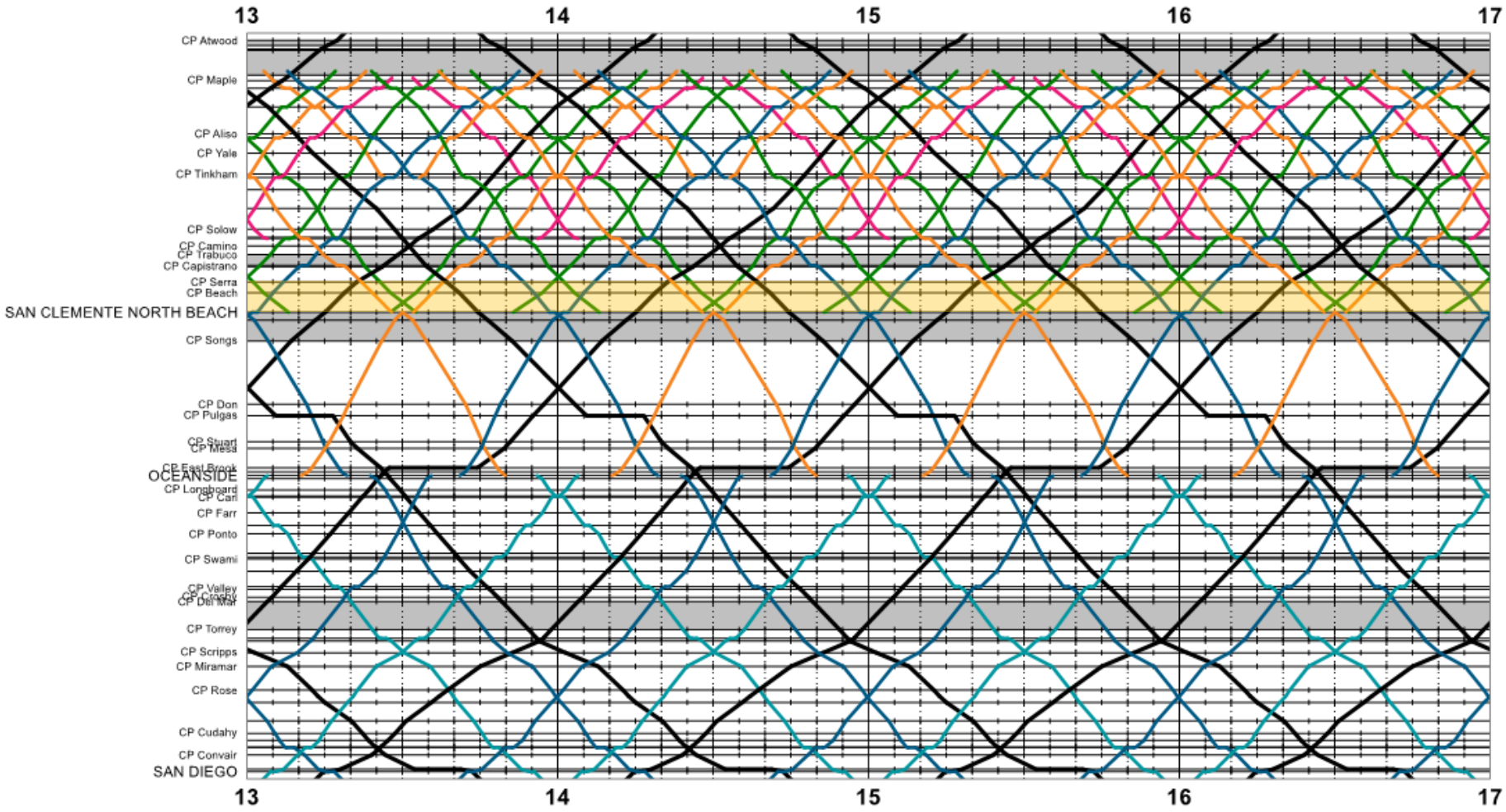
San Clemente becomes an island platform

Corridor remains single track south of the station

Image: Bing Maps

The corridor can support long-term passenger and freight service goals if the bottleneck at San Clemente is shortened

Planning Horizon



Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Freight — Other potential slots — Proposed project

Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

Service

- Reducing the San Clemente bottleneck enables the further restructuring of services:
  Off-peak: 1 freight & 4 passenger
  Peak: 8 passenger (not depicted)

Operations

- Southbound freight trains stage between CP Don and CP Pulgas for 10 minutes,
- Northbound freight trains stage between CP Eastbrook and CP Mesa for 18 minutes

Infrastructure

- Extend Serra siding to San Clemente North Beach station and double-track the station in addition to earlier corridor infrastructure recommendations

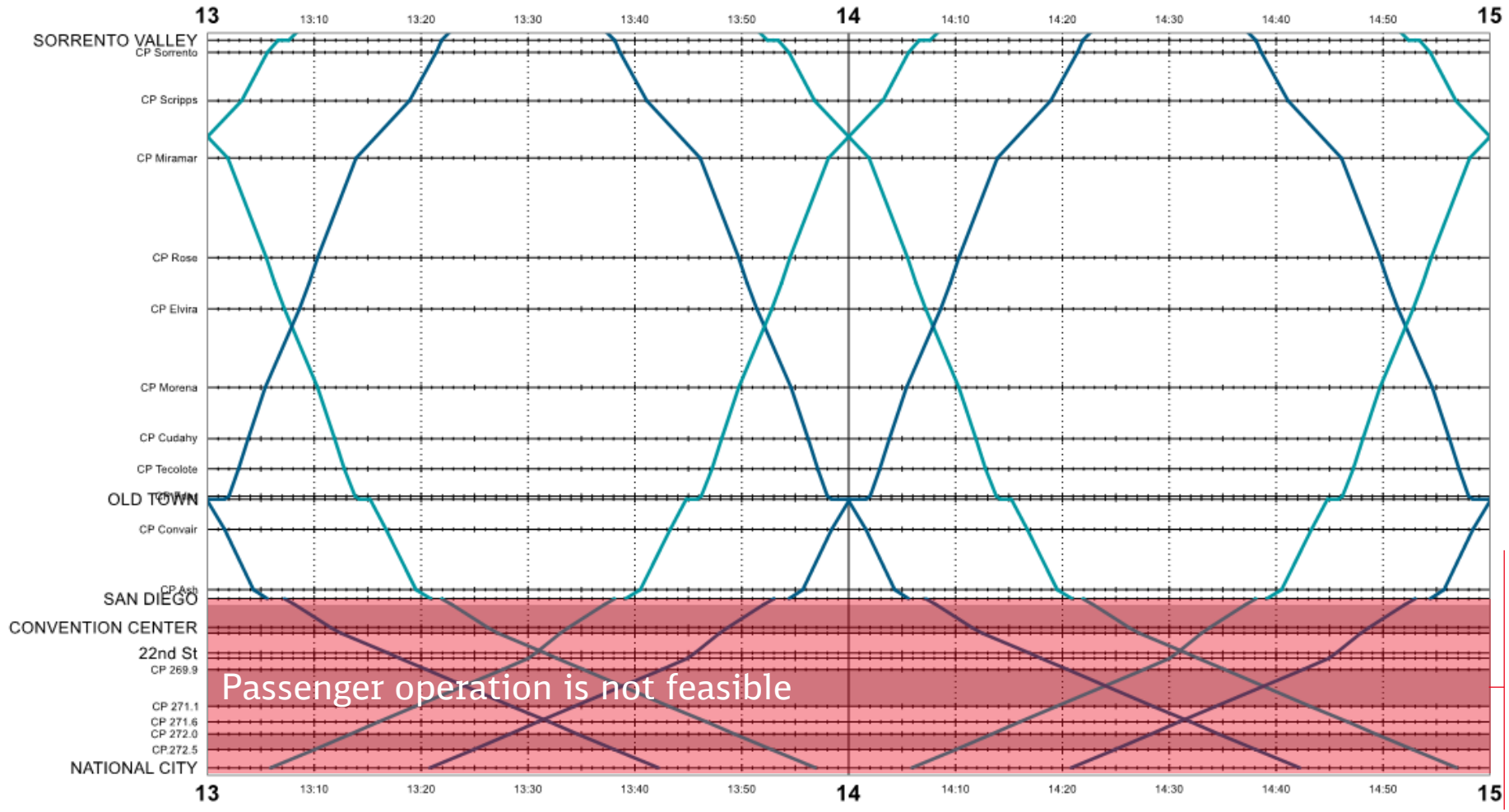
Port of San Diego results

		Near-term	Mid-term	Long-term
Service	Freight	– 3 freight slots per day[1]	– 5 freight slots per day[1]	– 8 freight slots per day[1]
	Passenger	– No change	– COASTER extension to the Convention Center	– Extension to National City
Operations		– Stage on existing infrastructure to depart on precise slot times[2]	– Stage on existing infrastructure to depart on precise slot times[2]	– Stage on existing infrastructure to depart on precise slot times[2]
Infrastructure		– No change	– Convention Center station and pocket track – Track upgraded to FRA Class 3 and 4-aspect signals between to the new station	– Track upgraded to FRA Class 3 and 4-aspect signals between to maintenance facility – 22nd Street yard upgrades[3]

(1) During passenger off-peak hours (2) A new staging location at CP Cudahy may be necessary (3) Extended leads and bypass track

Current infrastructure supports only 10 mph line running, which is unsuitable for passenger and increased freight flows

Planning Horizon



Service

- No change to service

Operations

- No change to operations

Infrastructure

- **Track class and the signaling system limits operations to 10 mph: It is unsuitable for mixed passenger and freight operations**

Focus on next page

Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Freight — Proposed project — 10 mph speed limit

Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

To increase the corridor's capacity towards the port of San Diego, targeted infrastructure investments are needed

The Port of San Diego's Tenth Avenue Marine Terminal

DB Engineering & Consulting USA, Inc. | San Diego Partners Study

Situation

- The Port is home to nearly 800 businesses. It is also the principal homeport of the Pacific Fleet
- Passenger services terminate at San Diego and there is no passenger rail service south to National City

Problem

- Current rail infrastructure cannot support freight growth and passenger expansion plans
- Idling trains at the Santa Fe Depot impacts the community and constrain through-capacity

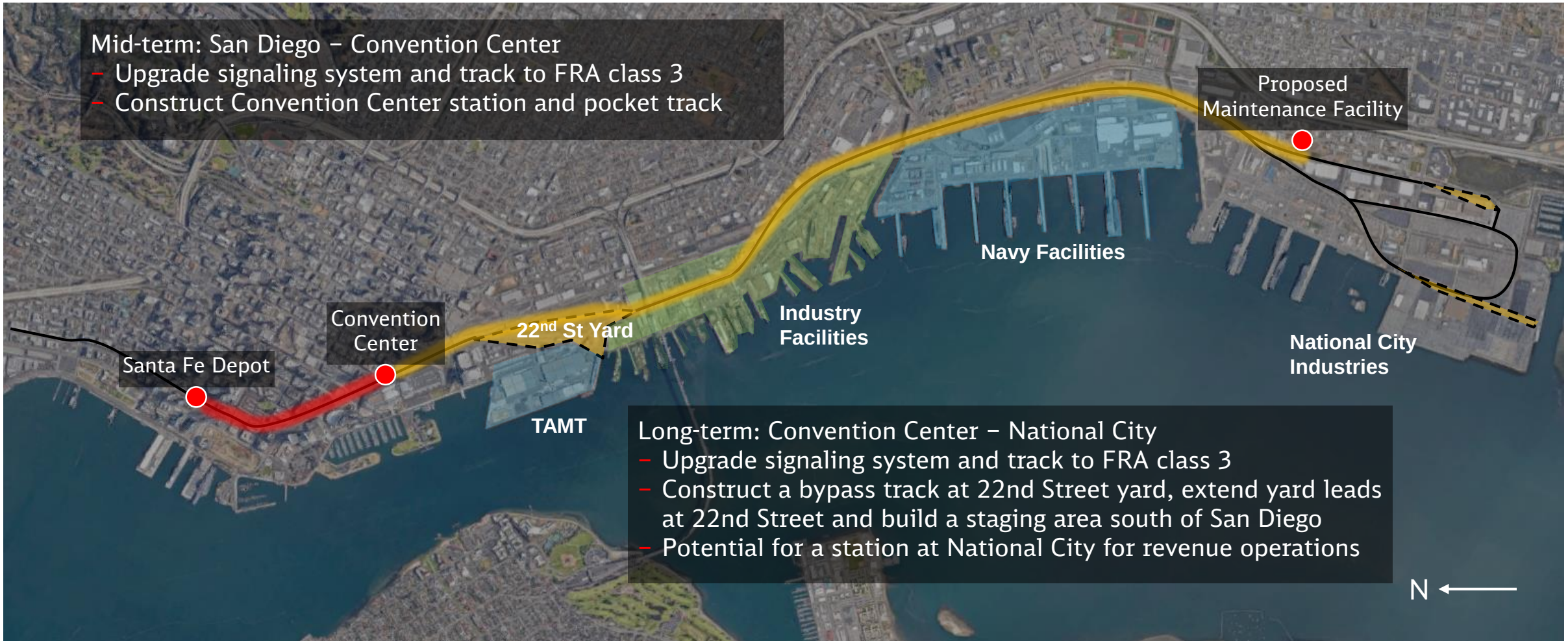
Potential solutions

- **Recommended:** Upgrade track for freight & passenger service, build the Convention Center station and new maintenance facility at National City
- **Further work:** Understand whether corridor re-alignment or yard reconfiguration is needed for increased freight operations

Impact

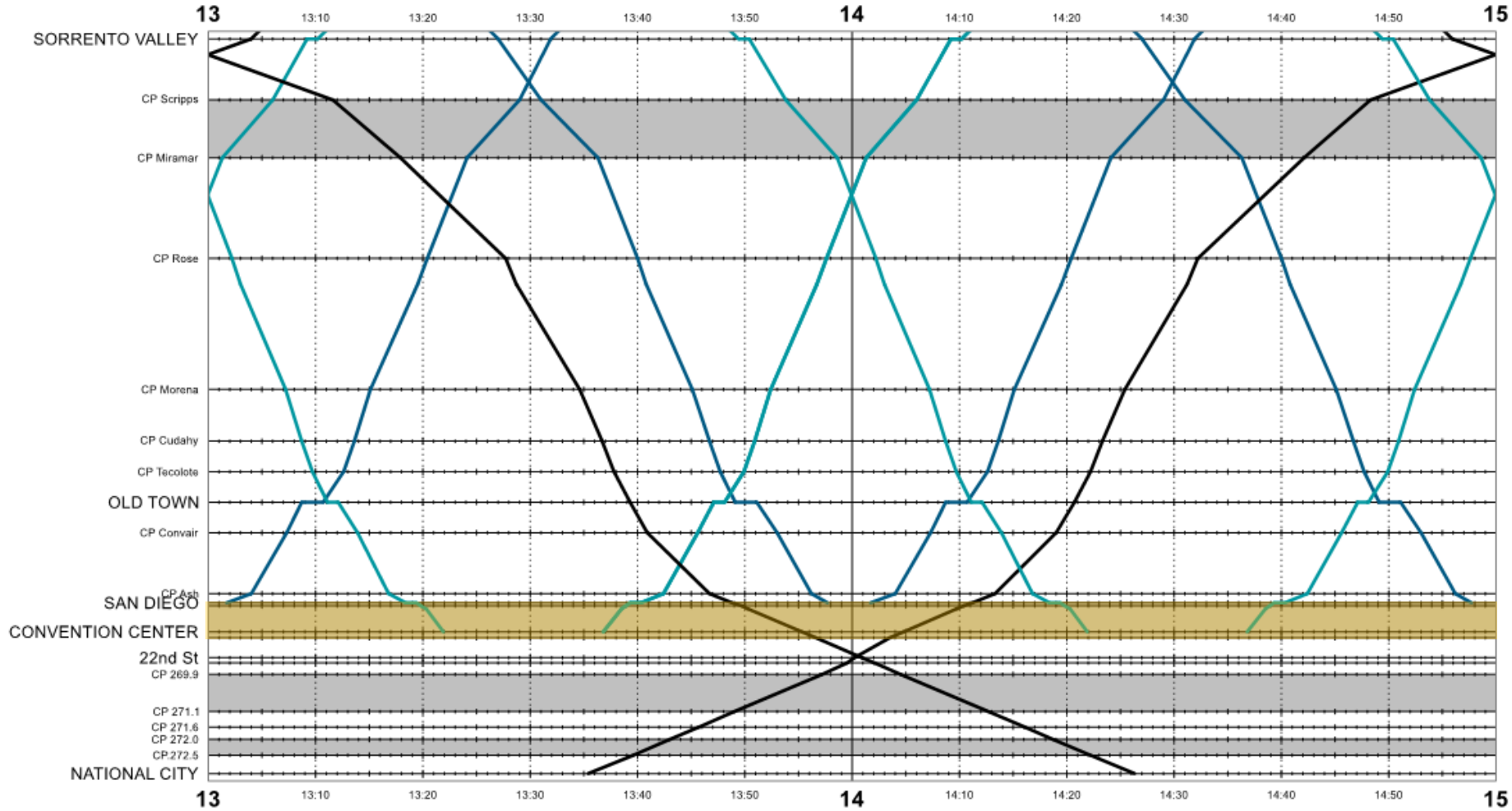
- Enables freight growth to the port
- Passenger service extends south to the Convention Center and a new National City maintenance facility
- Enables 2018 California State Rail Plan 2040 goals to extend rail to the border

Any passenger extension south of San Diego Santa Fe Depot will require track class and signal upgrades



Upgrading the track to FRA Class 3 between San Diego and the Convention Center in the mid-term enables NCTD COASTER service extension

Planning Horizon



Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Freight — Proposed project

Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

Service

- COASTER extension to the Convention Center (hourly service is depicted, though peak conditions could support 30-minute frequencies)

Operations

- COASTER services turn in 16 minutes at the Convention Center[1]
- Increased carload may necessitate a bypass track at 22nd Street yard to avoid disrupting yard switching moves

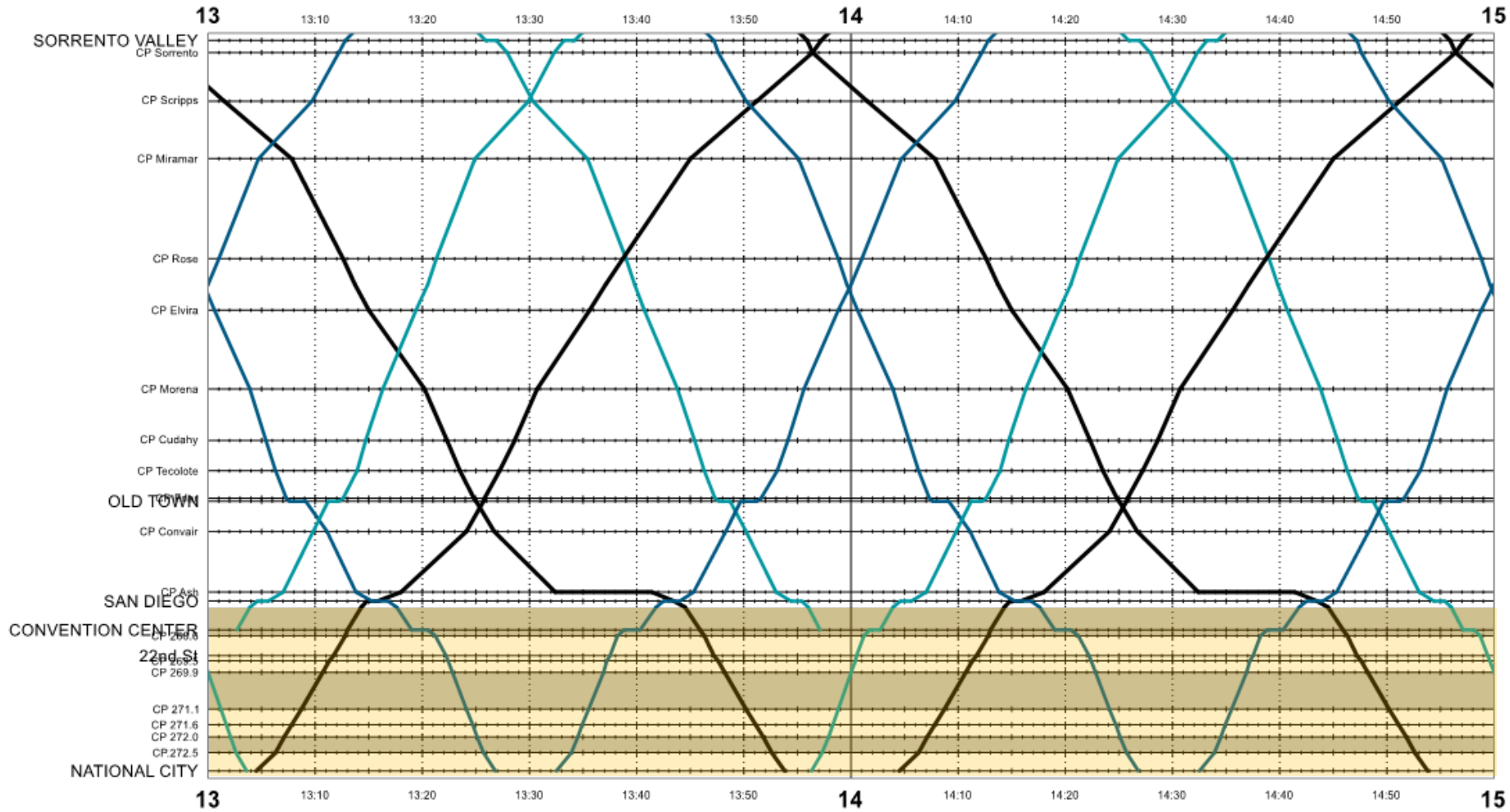
Infrastructure

- Track and signals between Convention Center and San Diego Depot to be upgraded to FRA Class 3 for passenger operations.
- The Convention Center platform should have a pocket track to turn COASTER services and allow for freight passage[1]

(1) A second pocket track would be required if 16-minute equipment turns were not possible

In the long-term, the mainline may need to be relocated at 22nd Street yard to support increased operations

Planning Horizon



Service

- Passenger trains can access the proposed maintenance facility at National City
- The corridor supports 8 freight slots to National City during the passenger off-peak period

Operations

- Slotted departures require a staging area between 22nd Street and National City to accommodate variable port operations and structured mainline operations

Infrastructure

- A bypass track at 22nd Street Yard,
- Upgraded track to FRA Class 3 and upgraded signaling to 4-aspect
- Extended freight leads to minimize mainline occupation

Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Freight — Proposed project

Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

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Train staging

Tabular timetable templates

2019 OS data on the San Diego Subdivision was reviewed to determine how freight train operations should be modeled on the corridor

The table depicts the observed trains recorded in OS data between Jan 1, 2019 and Jan 1, 2020[1]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Sum
Lite Engines												1	1
High Priority Manifest	40	39	34	39	47	37	46	45	48	45	43	45	508
Normal Priority Manifest	2	1											3
Officer Specials					2								2
Road Switcher Service				1			1						2
Intermodal Double Stack Service							14	27	24	24	22	22	133
Unit Train		2					5	10	3				20
Automotive	45	43	49	50	51	49	39	28	24	22	21	22	443

95% of the observed trains were either High Priority Manifest, intermodal double stack or automotive[1].

The emergence of intermodal double stack service is linked to the reclassification of automotive symbols.

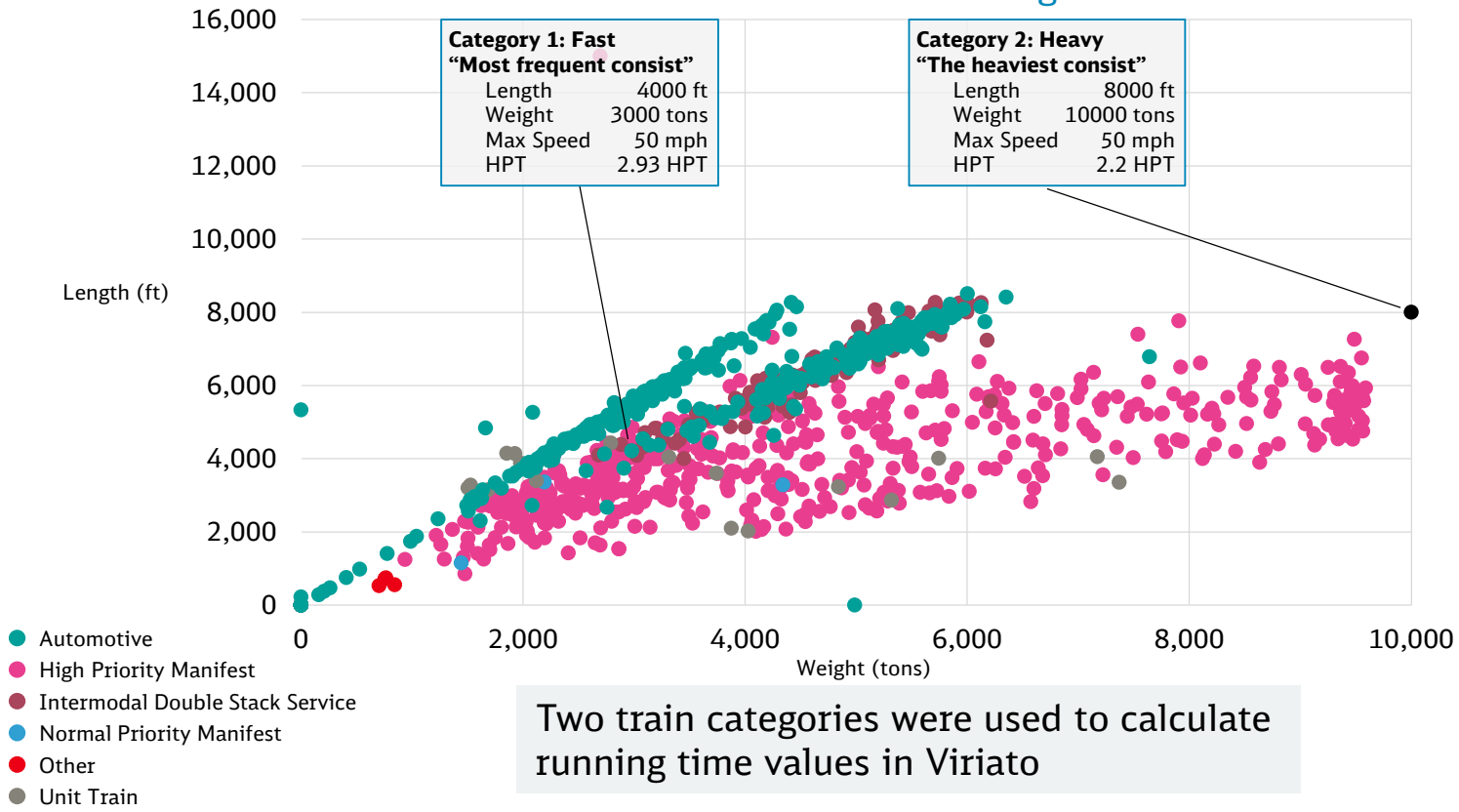
1 Local train movement and yard build movements were excluded

Three metrics were extracted from the data and two train categories were initially trialed to represent train performance characteristics

Corridor timetable rules restrict train lengths to a maximum of 5500 ft.[1]

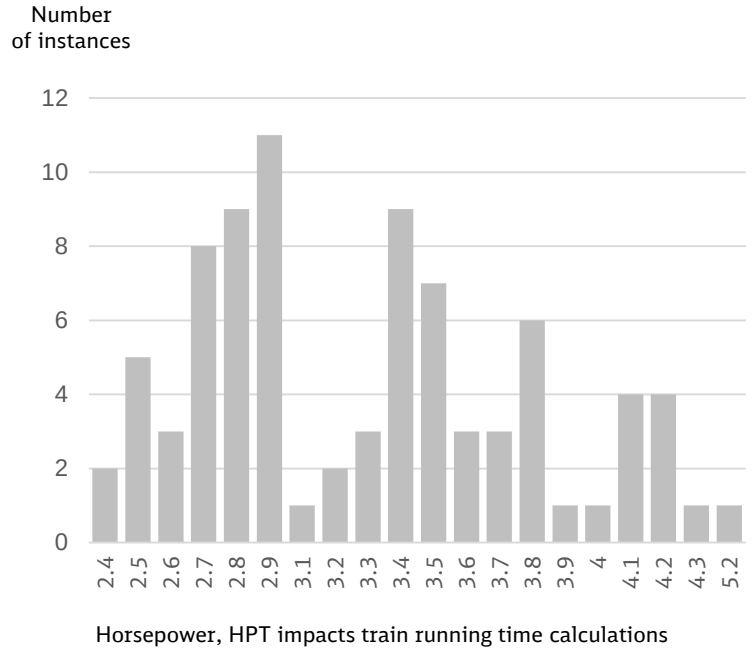
Length, ft - determines minimum train spacing

Weight, tons - impacts train running time calculations



Two train categories were used to calculate running time values in Viriato

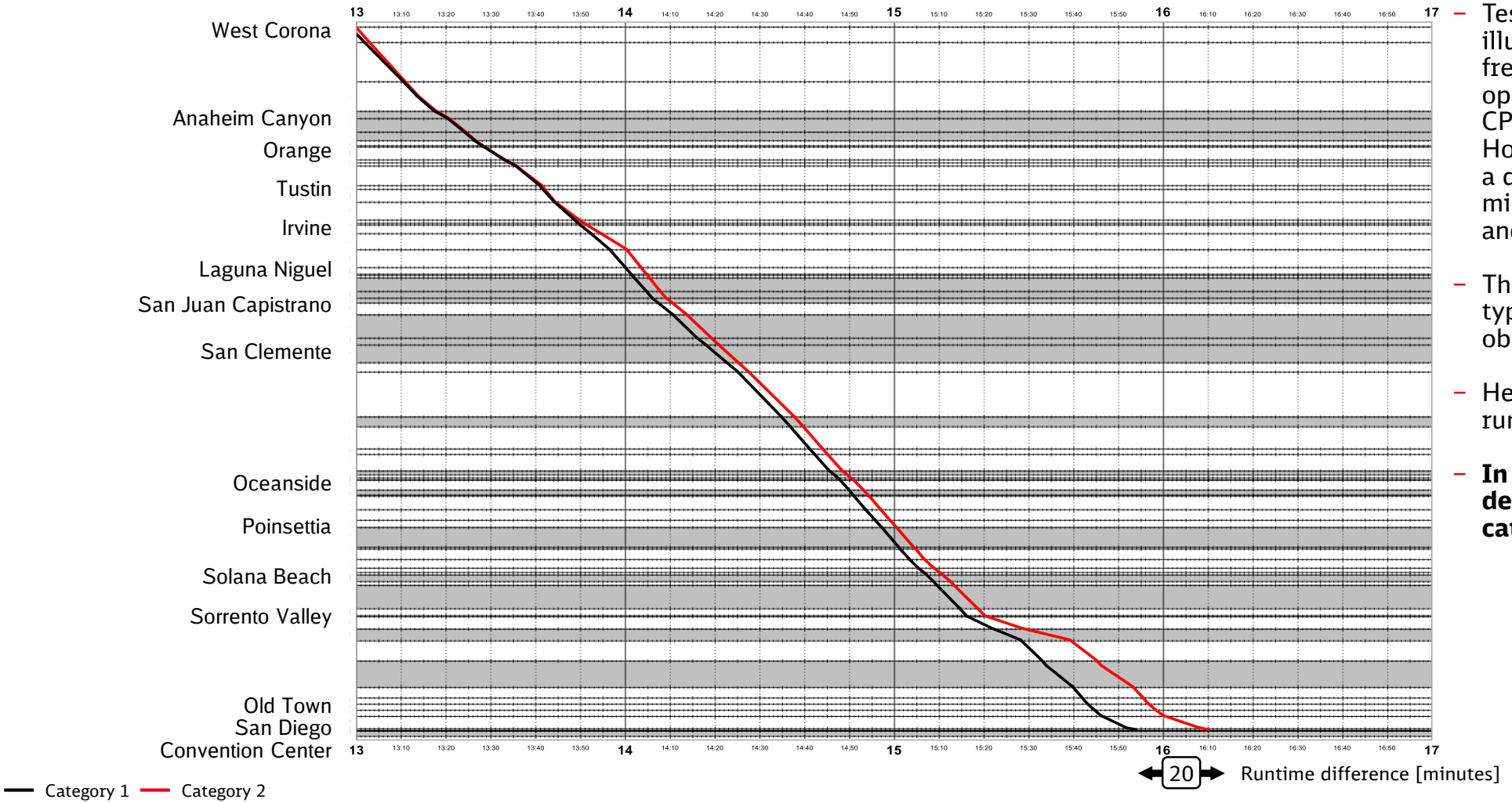
Observed HPT ratios for the consists that approximate 3000 ton and 4000 ft



Observed HPT ratios were used to determine how many locomotives were to be modelled with Category 1 and 2 consists

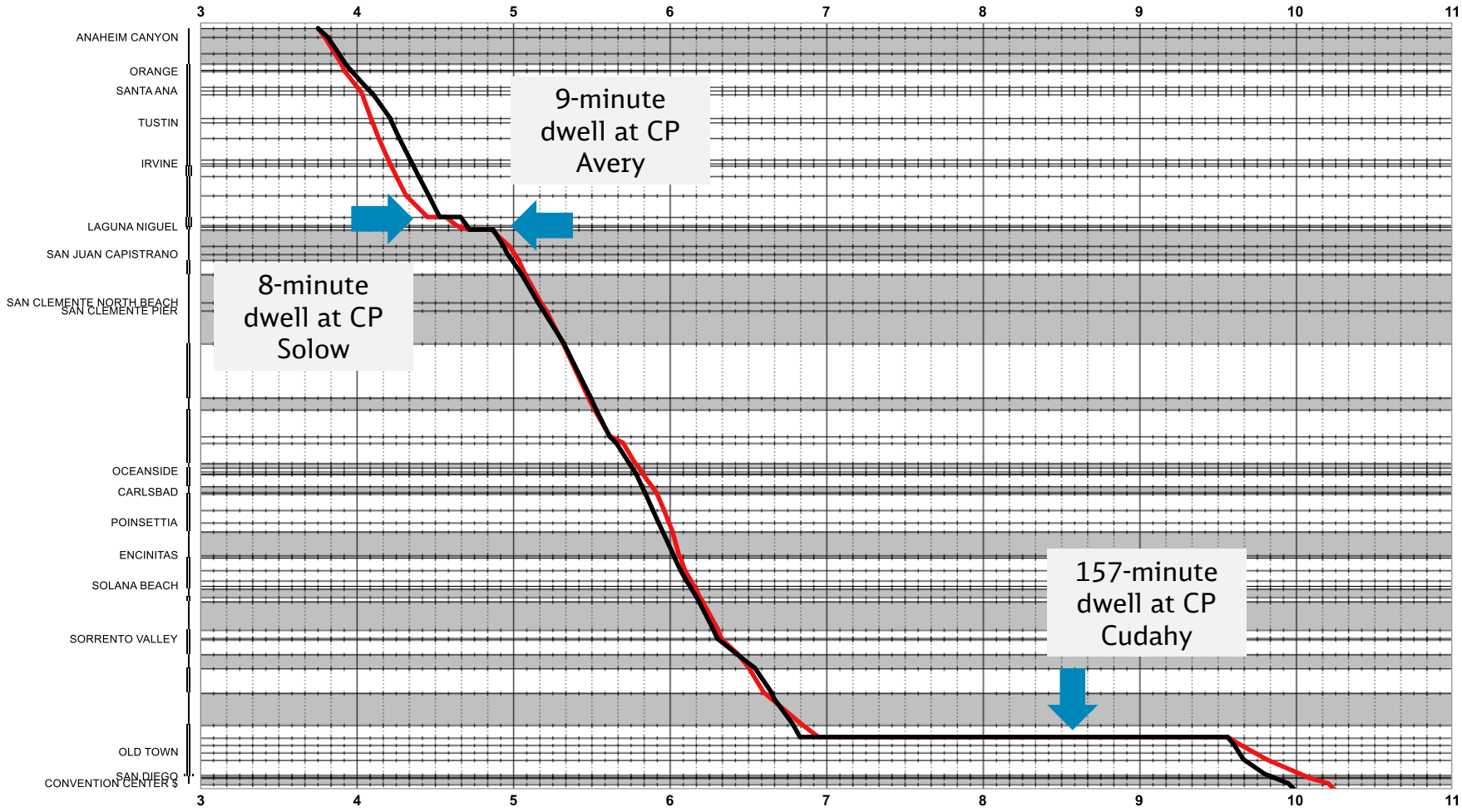
(1) Between 0830 and 1500. Prior approval from the San Diego Subdivision Dispatcher is needed for trains exceeding this length

Freight paths were modelled using Category 1: “Most frequent consist” parameters



- Test train runs in Viriato illustrated that Category 1 and 2 freight trains have near identical operating characteristics between CP Atwood and Sorrento Valley. However, the Miramar hill causes a differential in runtime (~20 minutes) between Sorrento Valley and San Diego.
- The heavy train category is not typical. It accounts for 20% of the observed traffic in 2019
- Heavy trains are recommended to run at night.
- **In this study, train slots will be designed using fast freight train category runtimes (Category 1).**

Comparisons between event recorder data and the Viriato model demonstrated that planning parameters were more conservative than observed operations



Viriato Model — Observed BNSF 7745

Observed data

- BNSF 7745 dwelled at CP Avery and CP Solow to wait for the opposing passenger train movement
- BNSF 7745 dwelled at CP Cudahy to wait for the 22nd street yard permission to receive the train for processing

Modeled train

- The Viriato train was modelled using consist data in the table below with 10% linear runtime reserve.[1]

Parameter	Assumption/Description
Train ID	BNSF 7745 V-PHXSDG4-11A
Date	2020-02-12
Recording Origin	CP Atwood
Recording Destination	San Diego
Direction	East
Train Configuration	3 conv
Actual HPT	3.5
Loads/Empties/Total Cars	0/71/71
Tons-Cars Only, tons	3735
Total Length, feet	6879
TOB	52.6

(1) 10% pad added to the technical runtime

Modeled and observed train runs had similar performance characteristics. The model train generally exhibited more conservative speeds

Speed-distance comparison - CP Atwood to 22nd Street

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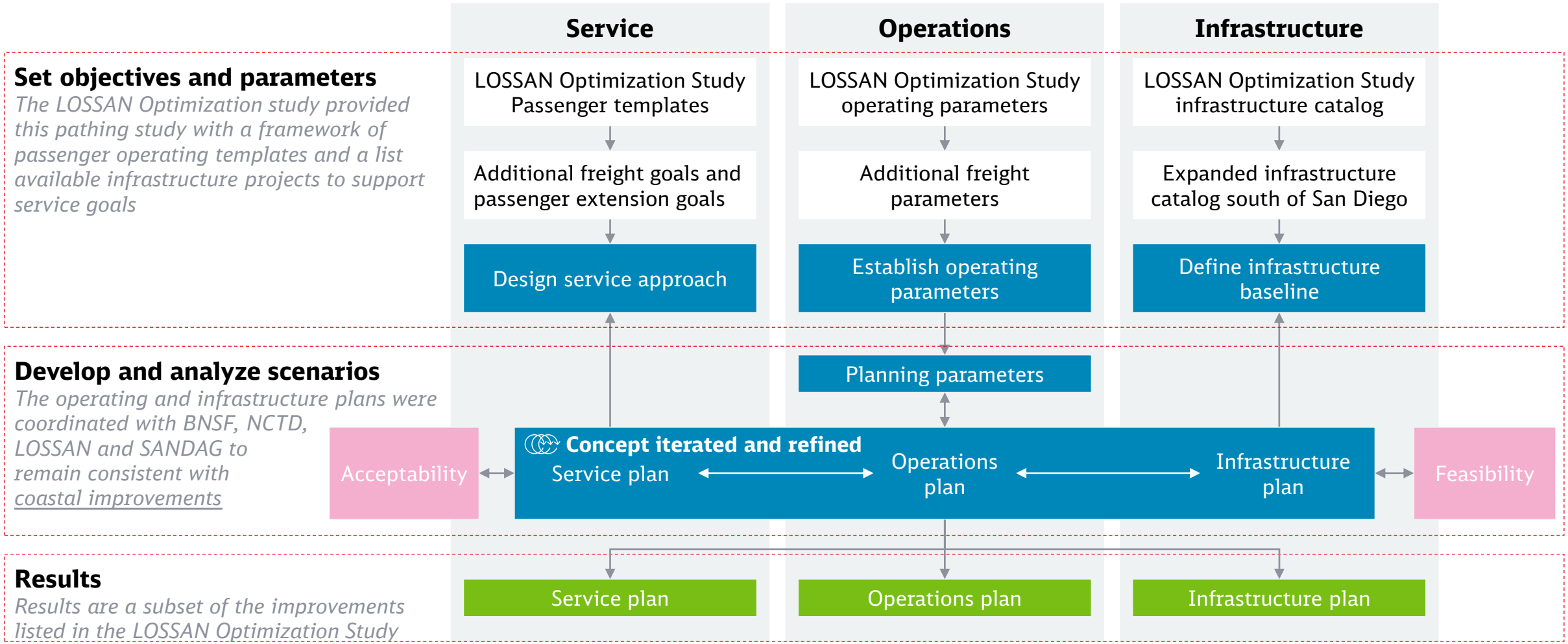
Tabular timetable templates

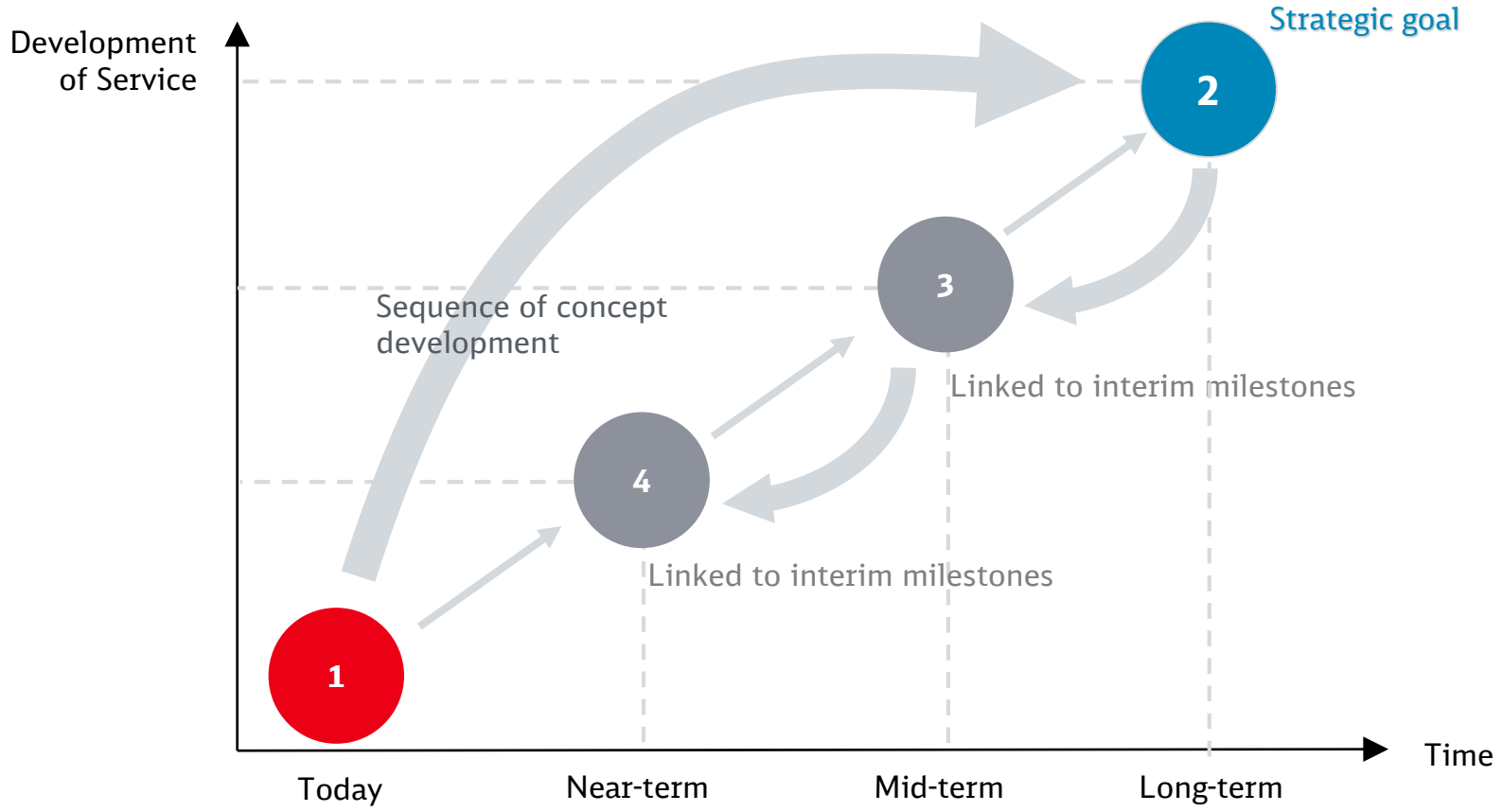
The San Diego Pathing study adopted an operations-centric approach to consider all elements of the railroad



Service, operations and infrastructure plans were generated iteratively for each planning horizon to group and prioritize projects by service outcomes

Planning methodology

1. Develop freight paths to detail carrying capacity on today's corridor
2. Develop strategic corridor service and operation plans, and dimension necessary infrastructure requirements
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



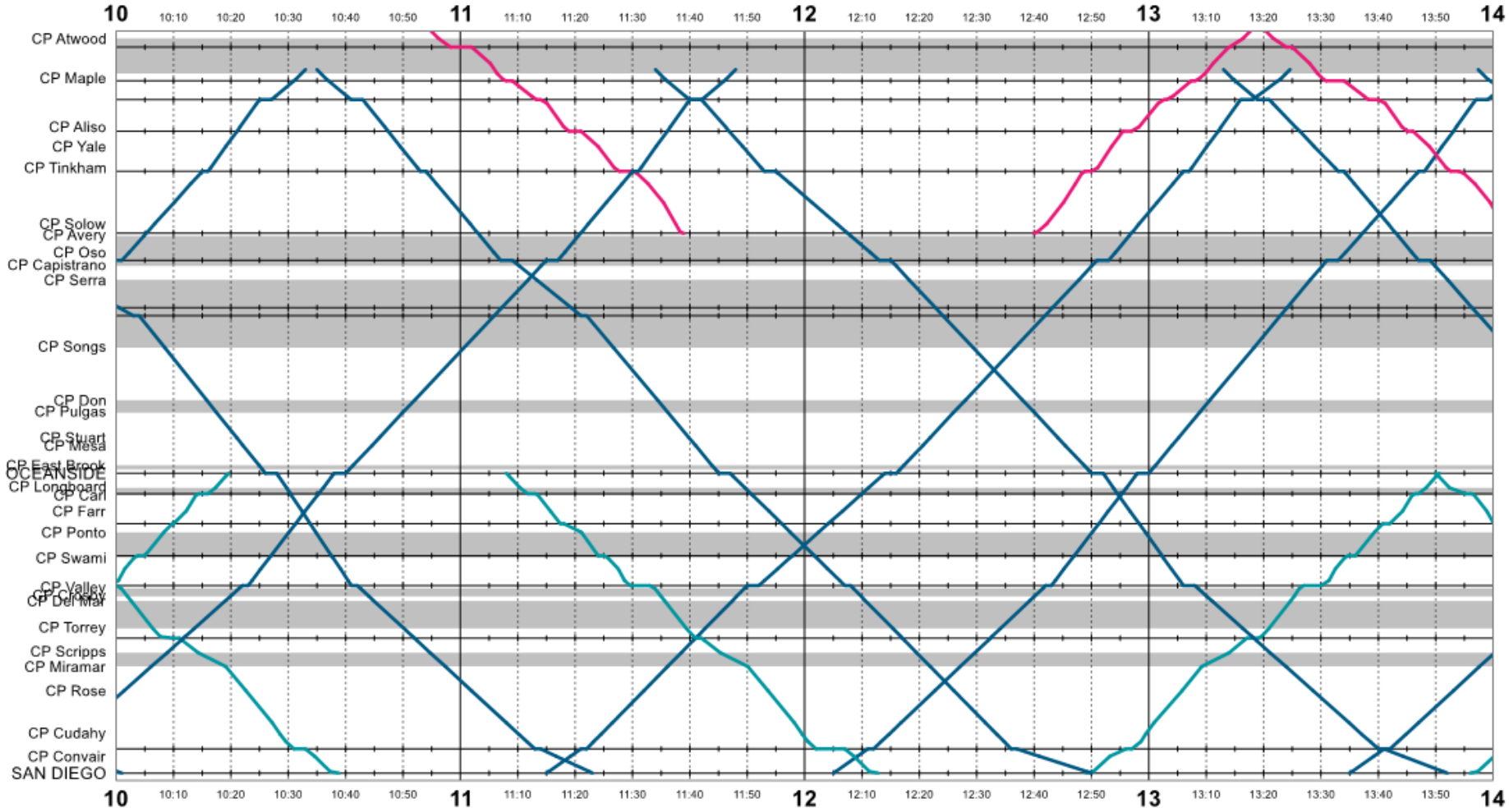
Base planning parameters were adopted from the LOSSAN Optimization Study; additional parameters were generated with BNSF and NCTD

Theme	Parameter	Near-term	Mid-Term	Long-Term
Service 	Freight Objectives	At least 2 slots to the Port of San Diego during passenger off-peak hours[1]	At least 2 slots to the Port of San Diego during passenger operating hours[1]	8 slots to the Port of San Diego during passenger operating hours[1]
	Passenger Objectives	LOSSAN Optimization near-term operating template	LOSSAN Optimization mid-term operating template COASTER extension to the convention center	LOSSAN Optimization long-term operating template Passenger extensions to the convention center/ National City
Operations 	Signaling assumption	4- Aspect Signaling System	4- Aspect Signaling System	4- Aspect Signaling System
	Passenger operating assumptions	Planning parameters developed for the 2019 Fall and 2020 Spring schedules.	Planning parameters adopted from the LOSSAN Optimization study's mid-term horizon	Planning parameters adopted from the LOSSAN Optimization study's long-term horizon
	Freight operating assumptions	Train[2]: 4000-ft, 3000-ton, 2.93 HPT 10-minute headway and 5-minute separation	Train[2]: 4000-ft, 3000-ton, 2.93 HPT 10-minute headway and 5-minute separation	Train[2]: 4000-ft, 3000-ton, 2.93 HPT 10-minute headway and 5-minute separation
Infra-structure 	Anchor projects	Completion of the Laguna Niguel to San Juan Capistrano Passing Siding project	Completion of the Anaheim Canyon Station project and the Laguna Niguel to San Juan Capistrano Passing Siding project	Completion of all LOSSAN Rail Corridor projects and Metrolink SCORE projects used in the LOSSAN Optimization study
	Additional pool projects	-	Projects identified in the 2020 LOSSAN Business Plan and prioritized through the LOSSAN Optimization Study	Enhancements at San Clemente

1 (0900 – 1600 and 2000 – 0000) 2 Used for train running time calculations in Viriato

The Fall 2019 schedule does not offer pre-planned freight paths during passenger off-peak hours

Planning Horizon



Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Freight — Proposed project

Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

Service

- The Fall 2019 schedule does not provide pre-planned freight slots during passenger off-peak hours

Operations

- Current operations assumed

Infrastructure

- Current infrastructure assumed

Headway assumptions

	Headway, min	Separation, min	
		Dynamic	Static
CP Maple	7.3	4.9	3.6
CP Avery	5.5	4.5	3.2
CP Capistrano	6.3	4.7	3.4
CP Serra	6.3	4.7	3.4
CP Songs	5.5	4.5	3.2
CP Don	5.5	4.5	3.2
CP Pulgas	5.5	4.5	3.2
CP East Brook	5.5	4.5	3.2
CP Shell	5.5	4.5	3.2
CP Longboard	5.5	4.5	3.2
CP Carl	5.5	4.5	3.2
CP Ponto	5.5	4.5	3.2
CP Swami	5.5	4.5	3.2
CP Cardiff	5.5	4.5	3.2
CP Valley	5.5	4.5	3.2
CP Crosby	10.9	5.6	4.4
CP Del Mar	10.9	5.6	4.4
CP Torrey	5.5	4.5	3.2
CP Scripps	10.9	5.6	4.4
CP Miramar	8.7	5.2	3.9

Headways

- Defined as the minimum time between following train movements. The value is measured in minutes and set for sections between control points
- Headway times were estimated for 4000ft/3000ton 2.93 HPT category trains at Control Points along the corridor
- Estimates are based on theoretical 4-aspect signal blocks
- Static and dynamic separation times were estimated using safe breaking distance, switch reset and clearing time assumptions
- Reasonable values were selected based on the conservative values marked in red
  - Headway parameter used 10 minutes
  - Separation parameter used 5 minutes

Separation times

- Dynamic: defined as the minimum time necessary to separate conflicting train movements without trains decelerating
- Static: defined as the minimum time necessary to separate conflicting train movements if one train is stopped for the other

Signals and train control systems to support 10 minute headways and 5 minute separations.

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Two mid-term infrastructure prioritization scenarios and three long-term operating concepts were also provided to BNSF, NCTD and SANDAG

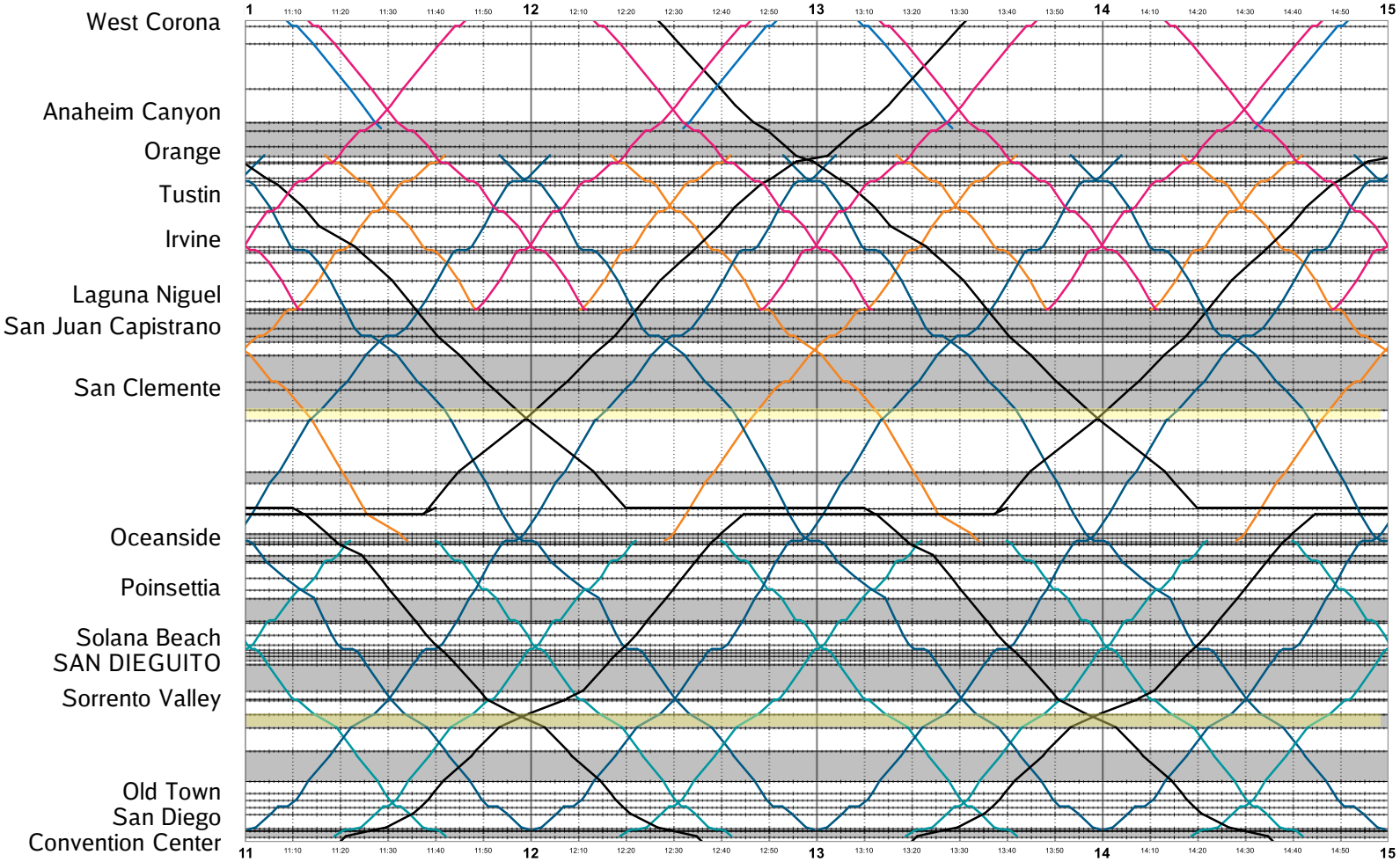
Alternative prioritization approaches

Mid-term	M1	Retain passenger templates	– Prioritize Scripps to Miramar Project or Batiquitos project – Retain freight goals
	M2	Restructure passenger templates	– Passenger service goals are retained with reduced connectivity – No passenger off-peak to peak transition, i.e. different peak and off-peak COASTER template – Inconsistent passenger service North of OSD and suboptimal San Clemente utilization – Preserved Freight Goals
	L1	Heavy freight concept	– Long-term concept illustration of how heavy (>5500ft) freight train slots could function with a shortened San Clemente bottleneck
Long-term	L2	Bunched freight	– Bunched freight template offers one freight slot per hour per direction with two departure windows on a shortened San Clemente bottleneck
	L3	Banded freight	– Hourly banded freight template offers one freight slot per hour per direction with opportunity to depart within a 10-minute window on a shortened San Clemente bottleneck

Mid-term passenger and freight goals can be achieved by prioritizing the Sorrento to Miramar Phase 2 infrastructure project

M1 M2 L1 L2 L3

Planning Horizon



Service

- 5 freight slots could operate in the off-peak period
- 2 TPDPH operate through the San Clemente bottleneck

Operations

- Freight trains need to stage on the mainline between CP Stuart and CP Mesa
- Operating parameters are based on current-day LOSSAN Corridor planning parameters

Infrastructure

- Completion of Sorrento to Miramar Phase 2 section as an alternative to the San Dieguito project
- Relocation of CP SONGS to MP 207

Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Freight — Proposed project

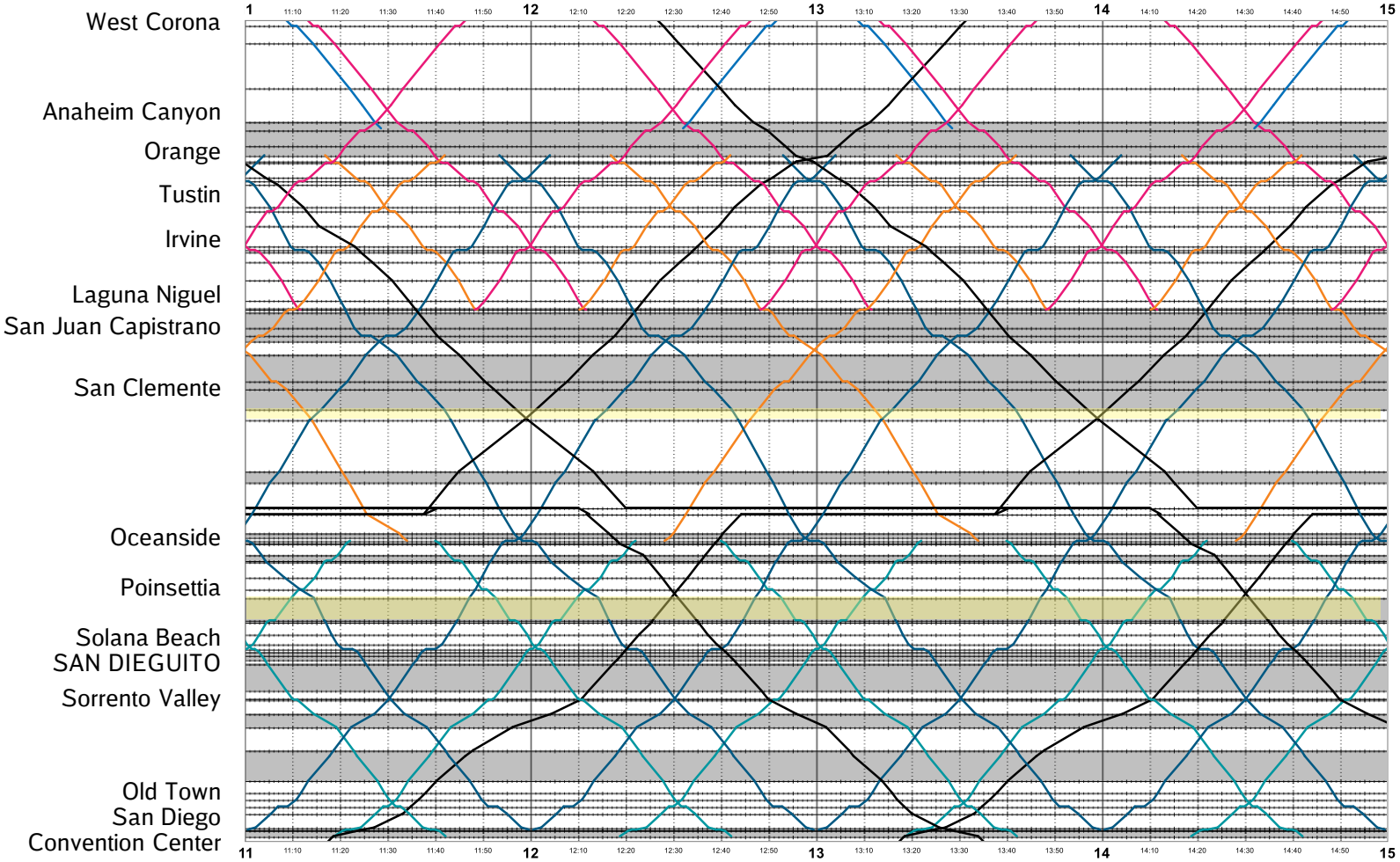
Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

Mid-term passenger and freight goals can be achieved by prioritizing the Batiquitos Lagoon project; though freight would stage for longer periods

M1 M2 L1 L2 L3

Planning Horizon



Service

- 5 freight slots could operate in the off-peak period
- 2 TPDPH operate through the San Clemente bottleneck

Operations

- Freight trains need to stage on the mainline between CP Stuart and CP Mesa
- Operating parameters are based on current-day LOSSAN Corridor planning parameters

Infrastructure

- Completion of Batiquitos as an alternative to the San Dieguito project
- Relocation of CP SONGS to MP 207

Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Freight — Proposed project

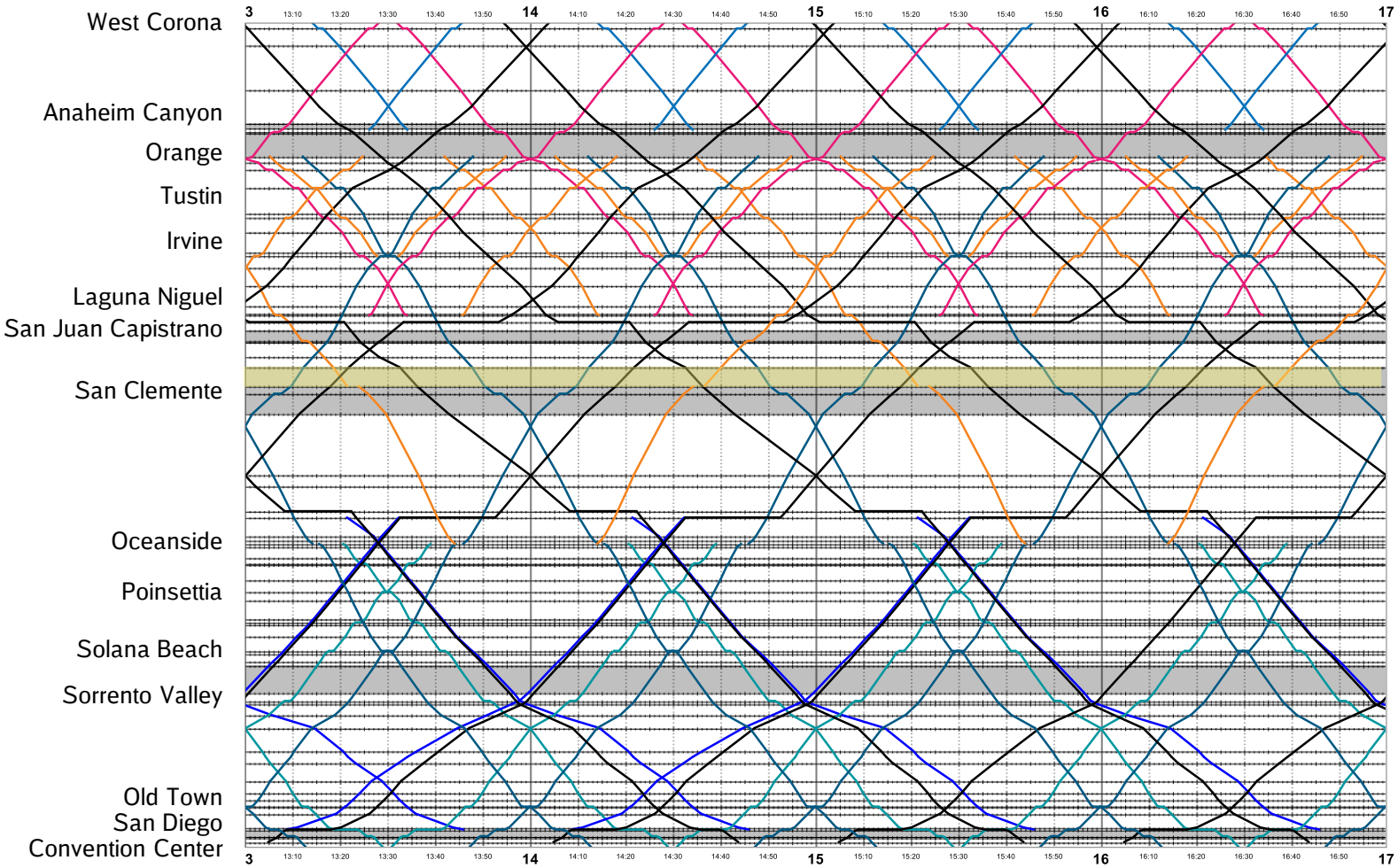
Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

Shortening the San Clemente bottleneck enables 3 train paths per hour per direction before timetable restructuring and enables longer freight trains

M1 M2 **L1** L2 L3

Planning Horizon



Service

- 8 freight slots could operate between in the off-peak period
- 3 TPDPH operate through the San Clemente bottleneck

Operations

- Heavy and Fast slots have near identical operating characteristics between CP Atwood and Sorrento Valley. There is a differential in runtime (~20 minutes) between Sorrento valley and San Diego.

Infrastructure

- LOSSAN Corridor projects are complete
- Track, turnout and signal upgrades to enable 5-minute train headways
- Line speeds upon approach to San Diego are raised to 40 mph
- Serra siding extended to San Clemente

Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Fast freight — Heavy freight — Proposed project

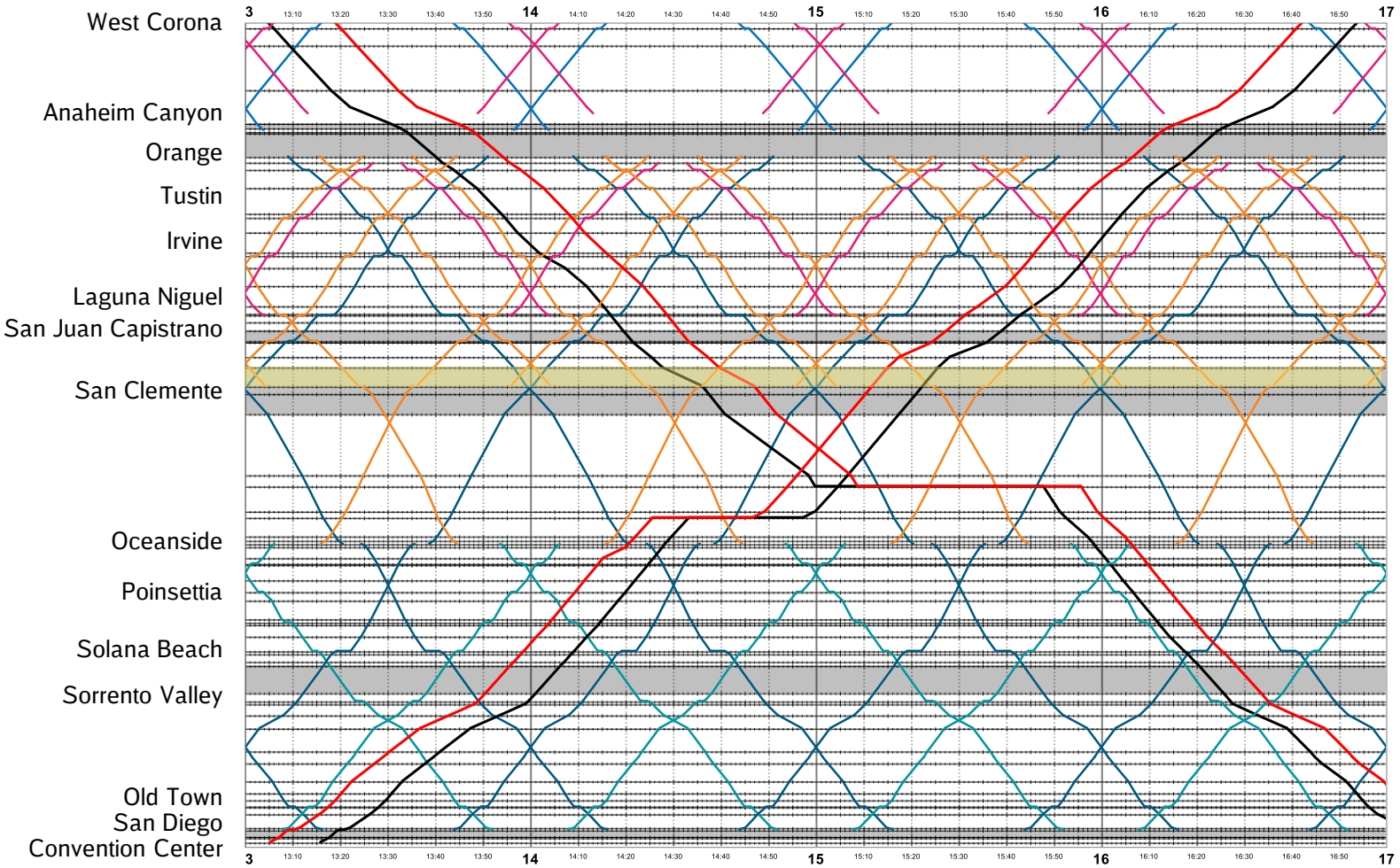
Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

Shortening the San Clemente bottleneck enables bunched freight pathing options

M1 M2 L1 **L2** L3

Planning Horizon



Service

- 8 freight slots could operate between in the off-peak period
- 3 TPDPH operate through the San Clemente bottleneck

Operations

- There are two 2 freight slots PHPD through San Clemente Bottleneck 10 minutes apart. Only one of the slots would have to be chosen to operate, otherwise the usage of both slots (red and black) leads to the conflicts among freight services.

Infrastructure

- LOSSAN Corridor projects are complete
- Track, turnout and signal upgrades to enable 5-minute train headways
- Line speeds upon approach to San Diego are raised to 40 mph
- Serra siding extended to San Clemente

Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Freight 1 — Freight 2 — Proposed project

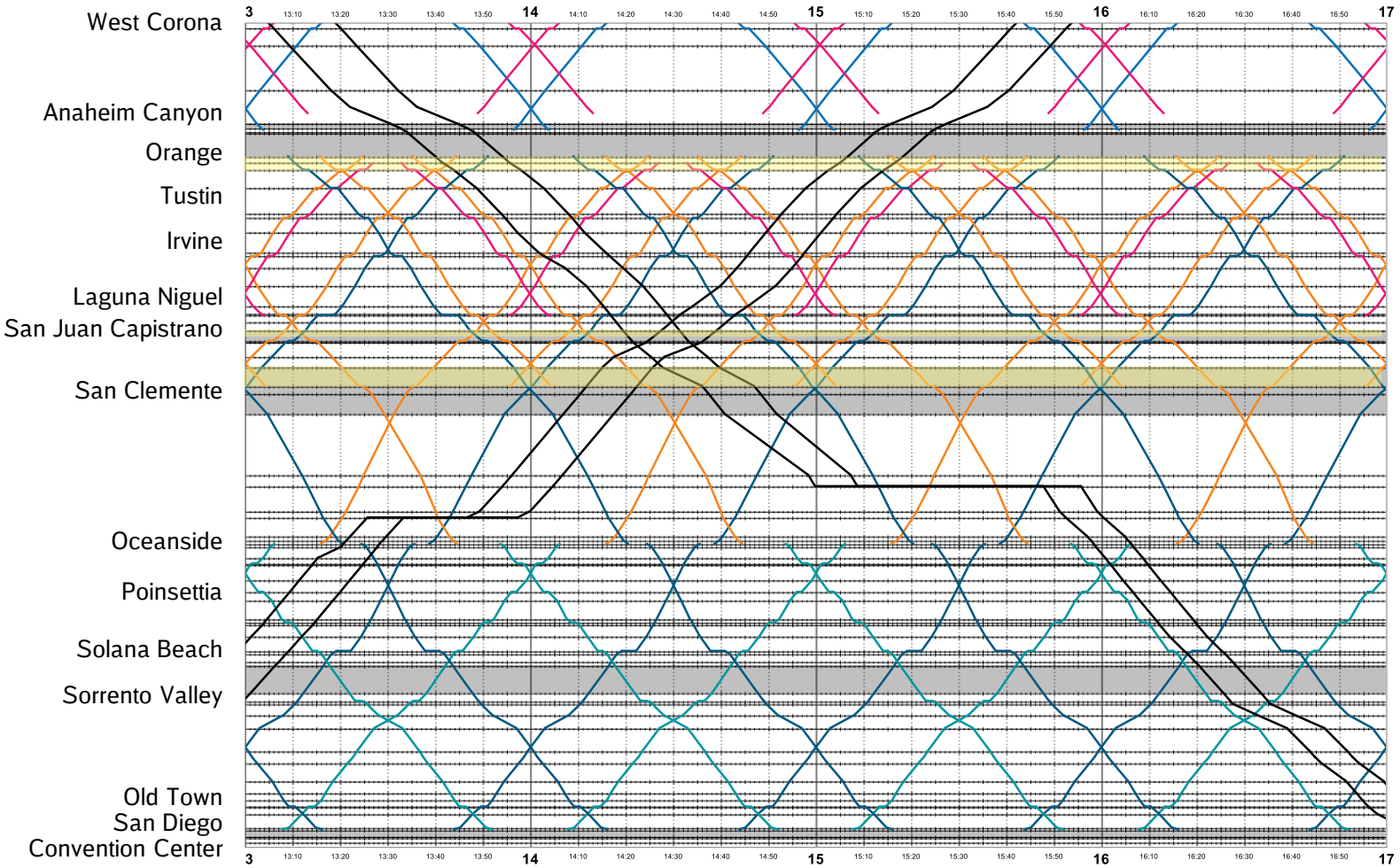
Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

Shortening the San Clemente bottleneck and double tracking CP Trabuco to CP Capistrano enables banded freight pathing

M1 M2 L1 L2 L3

Planning Horizon



Service

- 8 freight slots could operate between in the off-peak period
- 3 TPDPH operate through the San Clemente bottleneck

Operations

- Timetable restructuring around the shortened San Clemente bottleneck would yield up to 1 banded slot for freight services and 3 slots for passenger services.
- Authority to depart must be given between any two given times.

Infrastructure

- CP Maple Junction requires a re-design to support operations
- CP Trabuco – CP Capistrano doubled track
- Track, turnout and signal upgrades to enable 5-min. train headways
- Serra siding extension to San Clemente North Beach station

Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Fast freight — Proposed project

Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

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Operations analysis in the San Diego Port area reviewed mainline, station and yard components

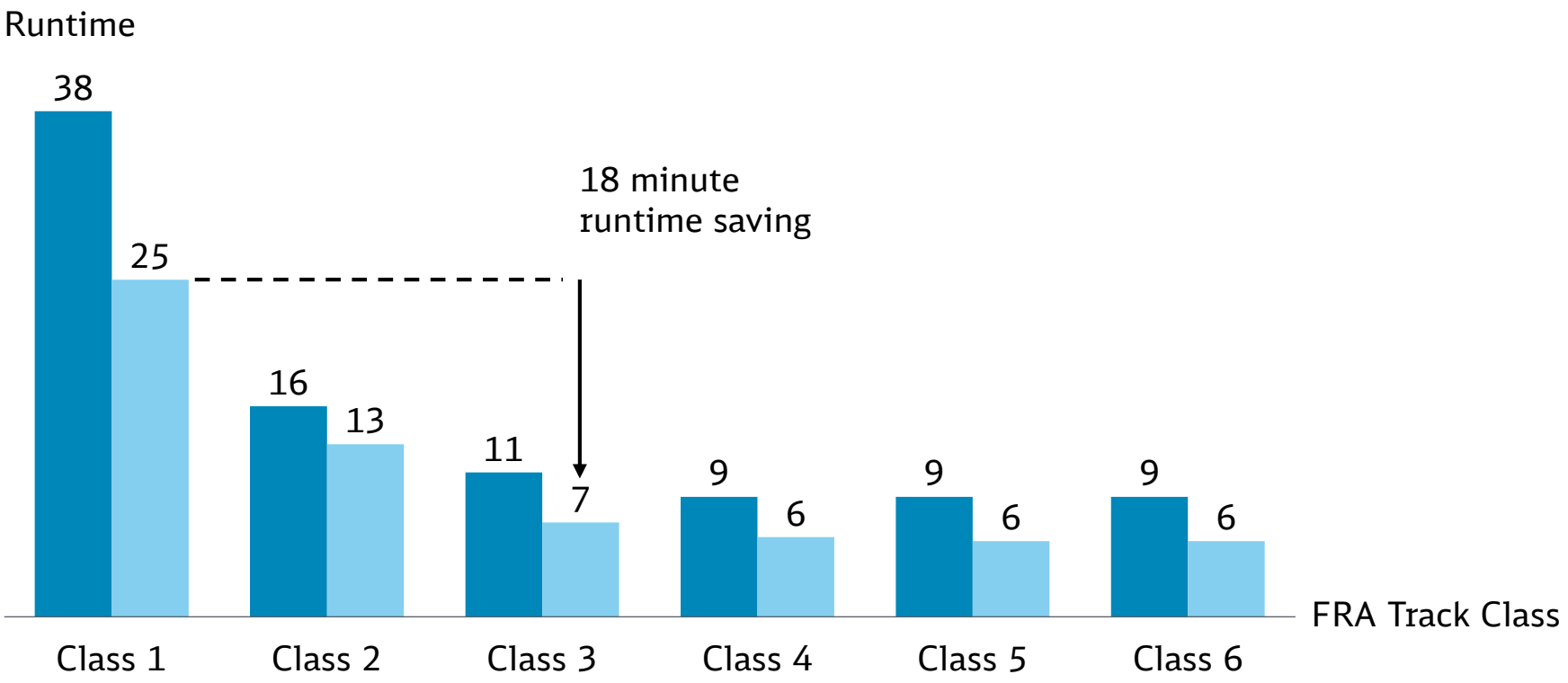
Port of San Diego

Mainline Track

Components reviewed	Key Themes
Mainline track	– Track class requirements to support mixed traffic operations
Convention Center Station	– Station impact on freight – Recommended station configuration – Pocket track requirements
22nd Street Yard and Port facilities	– Mainline location – Yard leads – Carload capacity and handling facilities

The track south of San Diego is unsuitable for passenger operations – it is too slow. The track class should be raised from FRA class 1 to class 3

Viriato technical runtime comparison (San Diego - National City)[1]



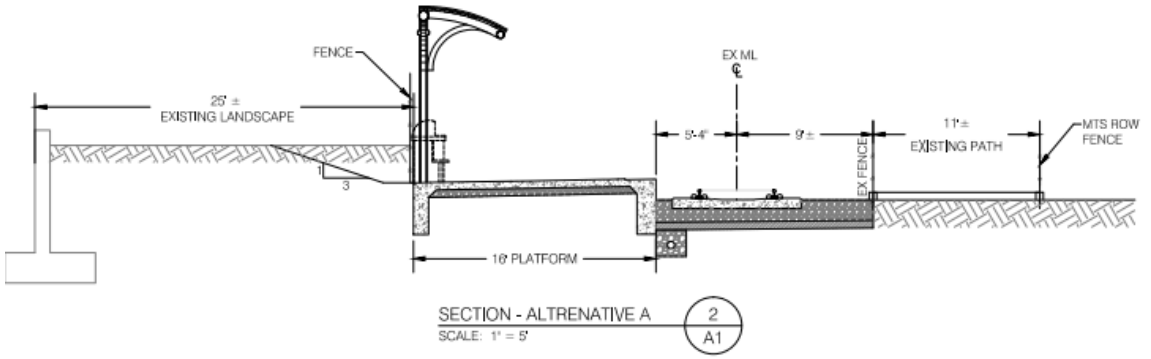
Increasing the track class beyond class 4 yields diminishing speed improvements

Freight Passenger

1 The illustrated runtimes do not account for speed restrictions over switches etc. (The subdivision's existing turnouts to require 10 mph)

NCTD COASTER service extension to Convention Center needs a bypass track to accommodate freight movements

- The proposed location of the Convention Center is between 1st Avenue and 5th Avenue
- The BNSF line is single track at this location and a siding is needed to support both freight and passenger operations
- Alternative C is the only alternative in the NCTD Convention Center Study that allows through movement between 22nd Street Yard and the Santa Fe Depot, however it blocks yard switching south of 5th Avenue



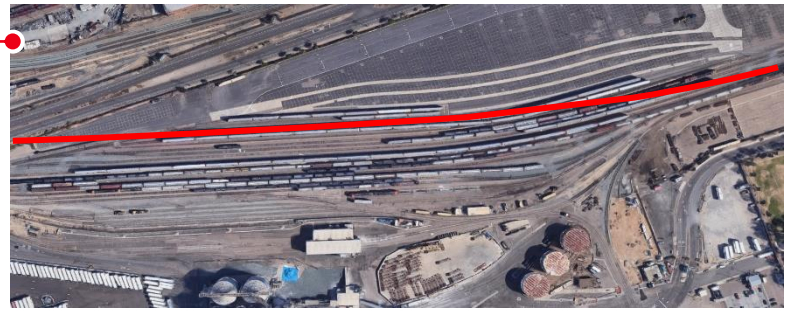
Disadvantages	Alt A	Alt. B	Alt. C	Alt. D
Platform Constrained to 14' and Shared with Existing Walkway	No	Yes	No	No
Platform Constrained to 12' Width	No	No	Yes	No
Impacts Convention Center/Linear Park Landscaping	Yes	No	No	No
Requires Track Construction	No	No	Yes	
Requires 2nd Track Grade Crossing at 5th Street	No	No	Yes	No
Requires Retaining Wall	Yes	No	No	No
Blocks North/South Freight Traffic	Yes	Yes	No	Since
Blocks BNSF Yard Switching South of 5th Avenue	No	No	Yes	No

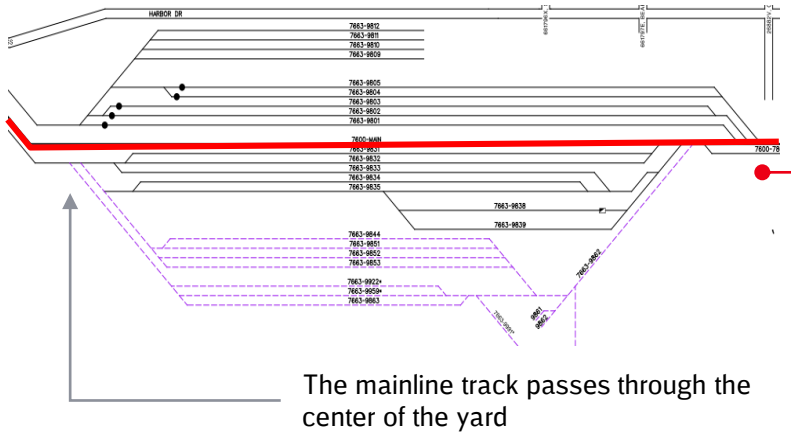
Source: RailPros COASTER Convention Center Analysis

Expanding Freight and Passenger services south of the Santa Fe Depot requires capital improvement projects

Passenger challenges

- There is only one mainline available track through 22nd Yard and it divides the yard in two sections.
- Passenger traffic south of the Santa Fe Depot risks interrupting the switching movements from one part of the yard to another if freight trains are broken up or combined
- There are several lead-to-mainline connections: freight trains will need additional time to clear the main
- Extending passenger operations south of Santa Fe Depot will require longer yard leads to reduce mainline occupation time
- The yard prevents mainline trains from running through it and a bypass track would be needed.





Freight challenges

- BNSF San Diego facilities currently process 2-3 trains per day. BNSF staff reported that it is unlikely that 22nd Street and National City can process more traffic, unless upgrades are made to extend storage capacity.
  - Existing yard leads at 22nd Street are too short to support the proposed freight traffic density.
  - Leads must be extended to allow for a single double-over when building trains.
  - Longer leads are required to maintain fast build times[1]
- The long-term concept enables 8 freight slots per day per direction to Port of San Diego
- If BNSF utilizes all long-term slots (8) to the Port, then port storage capacity becomes an issue. For example:
  - If 70-80 cars per train are assumed, then the port will need to process 500-600 cars.
  - If a 72-hour handling time is assumed, then facilities will need capacity to store 1500-1800 cars

(1) Findings are consistent with the Tenth Avenue Marine Terminal study
Source: Google Maps, BNSF Track Charts

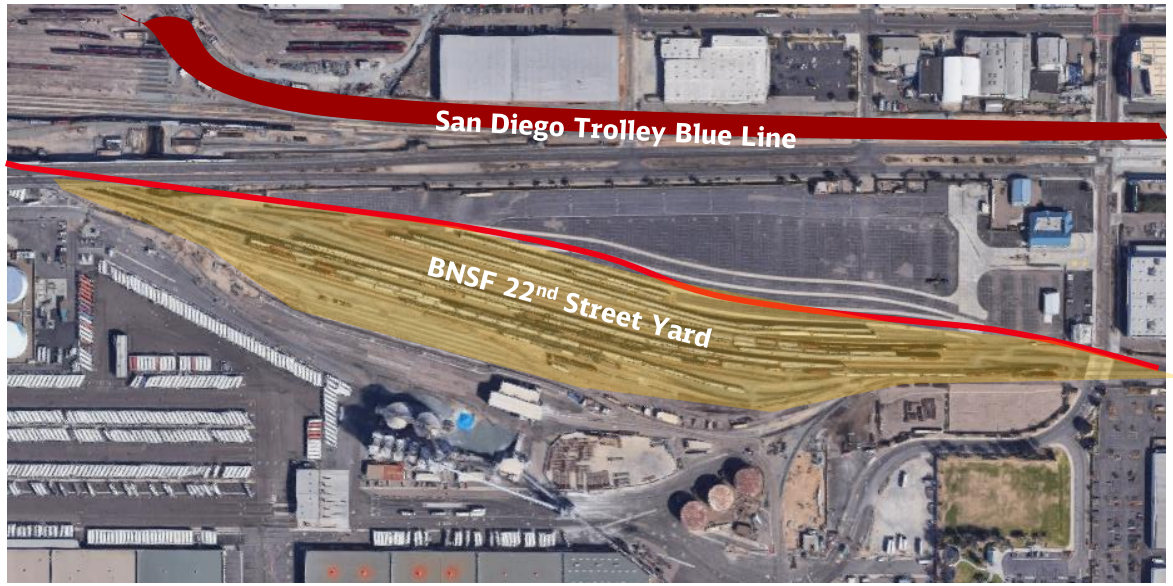
A bypass track needs to be built at 22nd Street yard to mitigate mainline and yard disruption in the yard

Option 1: 22nd Street bypass Track

- Passenger services to utilize a bypass track which would route through BNSF ROW
- The bypass track would diverge from the north lead and merge with the Main track around Cesar Chavez Parkway
- There is a single-track section south of the yard that serves industries and has several industry spurs. This section needs to be two-tracked to support freight local moves and passenger operations

Option 2: San Diego Trolley bypass track

- The Blue Line is operated by San Diego Trolley
- The bypass track would pass through the yard onto the Blue Line
- A separate study to illustrate the feasibility of building separate tracks along Blue Line for heavy rail passenger services would be required

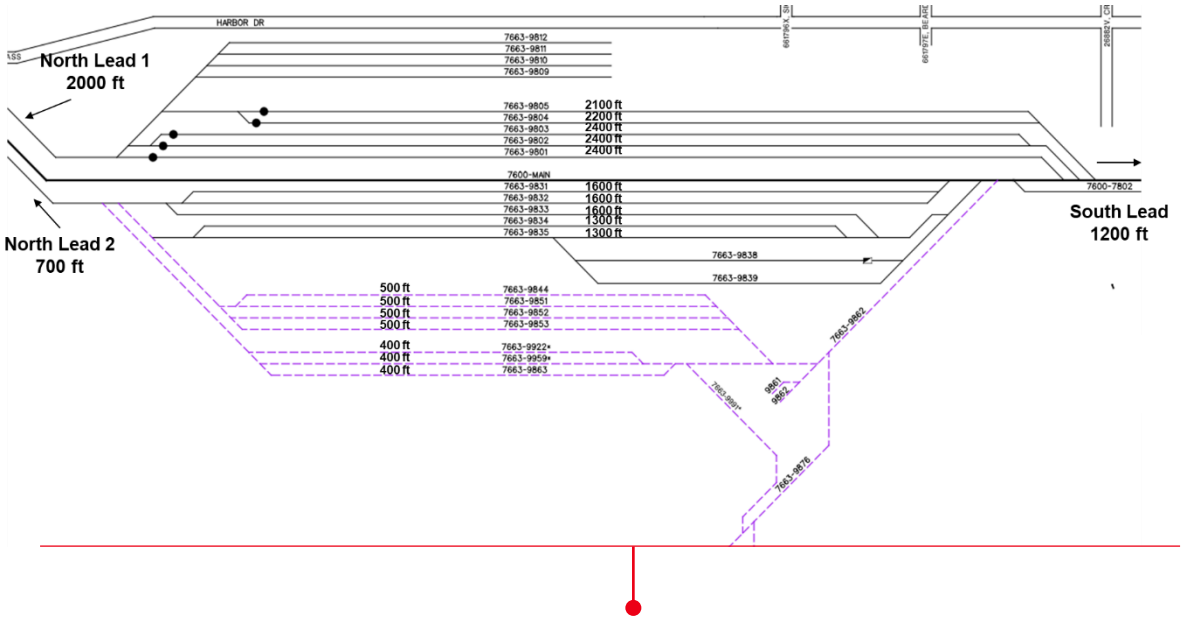


22nd Street Yard — San Diego Trolley bypass track — 22nd Street bypass track

Image source: Google maps

22nd Street Yard leads need to be elongated to improve build times

- The current length of 22nd Street yard's existing main switching lead limits longer car blocks from using the facility in a single movement without blocking turnouts in the terminal or leaving the cars partially on the main line
- A longer main lead would allow for longer car blocks and increase pick up and setout efficiency
- Existing north and south leads at 22nd Street Yard need to be increased (see the graphic)



- North Lead 1 & 2 and South Lead need be long enough to allow a single double-over to combine longest yard track + another adjacent track:
  [300 ft +/-, 4 locomotive units] + buffer [150 ft +/-] + length of a longest yard track
- For example: Existing North Lead 1 is 2000 ft and the longest yard is 2400 ft, which is insufficient for efficient train build process

Source: San Diego Subdivision Track charts

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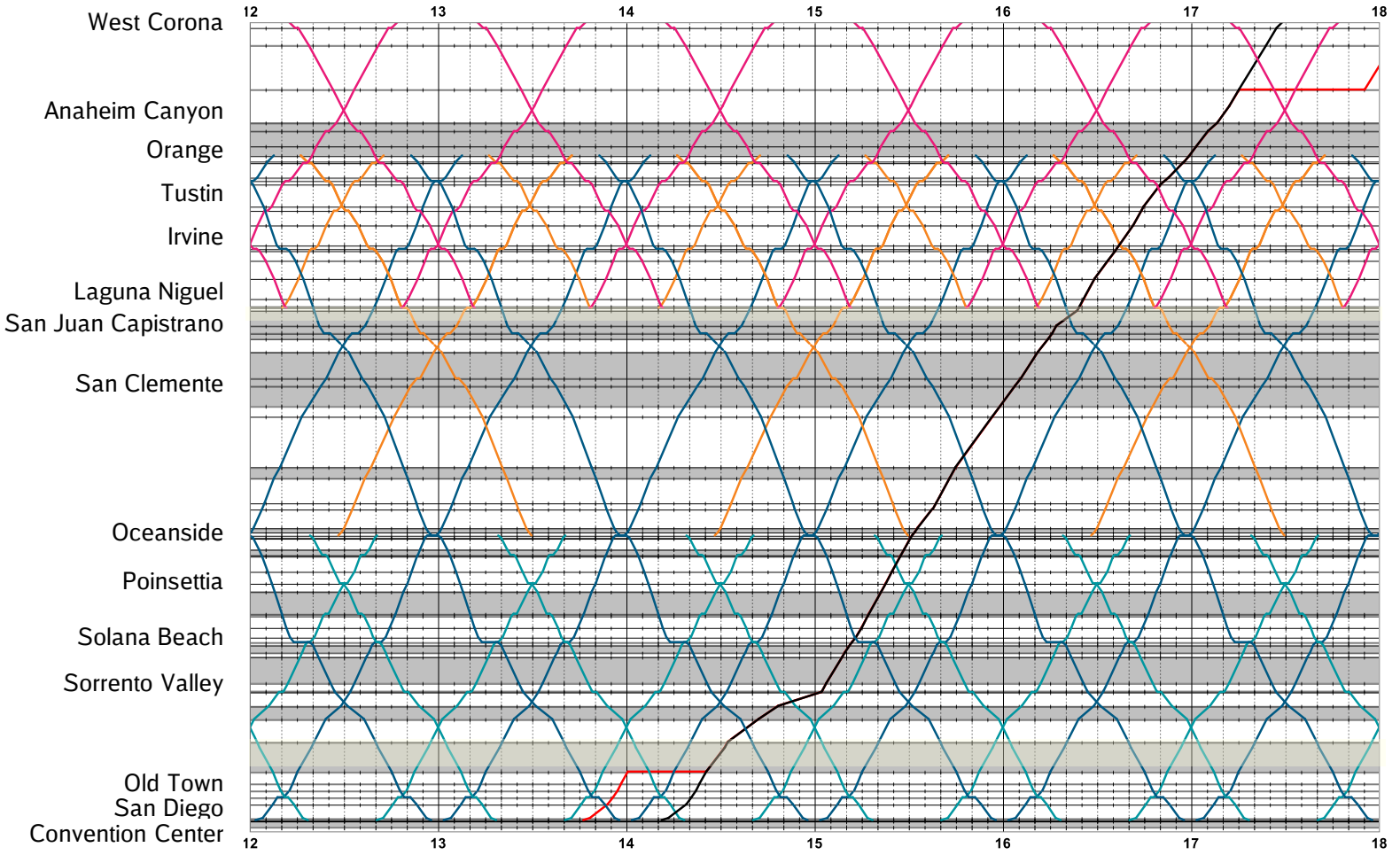
Freight train staging links variable port operations with slotted LOSSAN Corridor schedules

1. CP Esperanza /CP Prado Dam
2. CP Solow - CP Trabuco
3. CP Stuart - CP Mesa
4. CP Cudahy

- Access to mainline slots on the San Diego subdivision are set by the framework of the timetable, however freight train build time is variable
- A train may be ready to depart before its intended operating slot and it should depart the lead immediately regardless of its assigned mainline slot time to relieve leads for the next train
- Staging locations are required to hold freight trains until the next corridor freight slot is available
- The study has identified four locations to stage train on the mainline to ensure smooth flow of operations

After the building process is complete, the train must depart to its assigned staging area immediately to relieve leads at the yard



Staging example (as depicted)

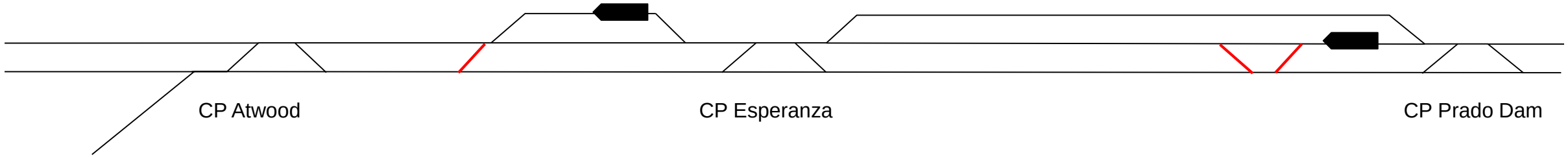
- The northbound freight train is built ahead of its departure slot and leaves 22nd Street Yard 25 minutes early (red line) at 13:45
- The train dwells for 25 minutes at the CP Cudahy staging area until it syncs with its assigned slot (black line) at 14:25
- The train exits the San Diego Subdivision at 17:30, however the San Bernardino Subdivision is not ready to receive the train yet for another 40 minutes
- The train dwells for 40 minute and waits for its slot at CP Esperanza staging area at 17:55

Service Type — Pacific Surfliner — Orange County — IEOC — COASTER — Freight — Proposed project

Off-Peak Period 09:00 - 15:00 20:00 – 00:00

Freight Train Parameters Length: 4000 ft Weight: 3000 tons Max Speed: 50 mph HPT:2.93 HPT

Trains from Barstow that are not able to make their San Diego slot could stage near CP Esperanza or CP Prado Dam



CP Esperanza Staging Area

- Existing staging near CP Esperanza could provide a temporary staging solution for the freight services if upgraded.
- No. 20 turnouts, signals and upgraded track are recommended to activate the storage area near CP Esperanza
- Additional crossovers allow for San Bernardino bound trains to access the siding.
- Trains arrive from San Bernardino Sub and await the authority to enter San Diego Sub or vice versa.
- Staging does not impact 91 Perris Line and IEOC movements for Near-term, mid-term and Long-term scenarios.
- Further review would be necessary to understand potential impacts to freight flows on the San Bernardino Subdivision.

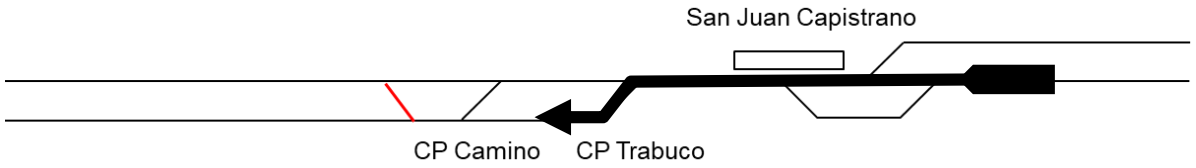
CP Prado Dam Staging Area

- Existing staging near CP Prado Dam could provide temporary staging solution for the freight services.
- Crossovers are recommended to enable other traffic to flow and allow a 5500 ft train to stage (minimum).
- Train to arrive from San Bernardino Sub and await the authority to enter San Diego Sub or vice versa
- Staging does not impact 91 Perris Line and IEOC movements for Near-term, mid-term and Long-term scenarios.
- Further review would be necessary to understand potential impacts to freight flows on the San Bernardino Subdivision.

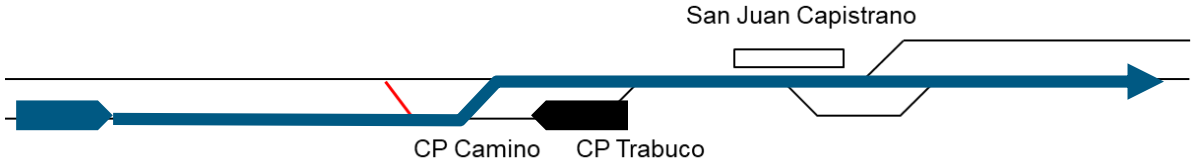
BNSF - Freight — Crossover upgrade required

The CP Trabuco - CP Camino[1] corridor move is required for freight pathing in the long-term concepts

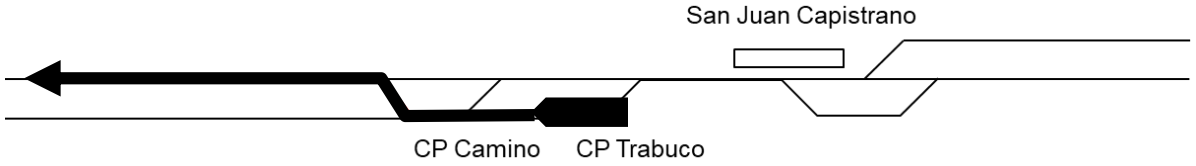
Move required for the long-term concept without shortening the bottleneck at San Clemente



- Northbound freight train to diverge on Main 1 and stage between CP Camino and CP Trabuco.



- The freight train dwells at the sidings for 15 minutes before continuing to allow southbound passenger services to pass



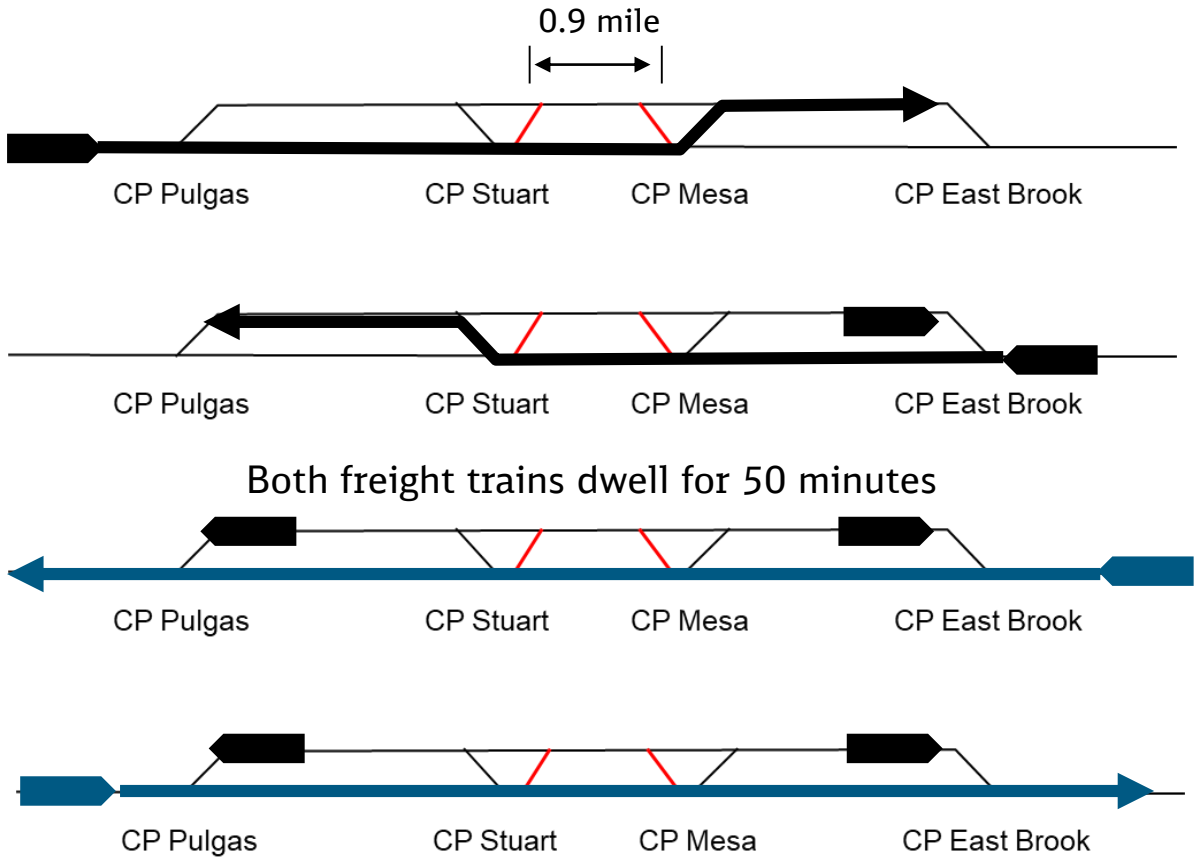
- Additional crossovers installed north of CP Camino allow the freight train to merge with northbound traffic flow.

Surfliner - Passenger BNSF - Freight Crossover upgrade required

(1) Infrastructure is based on the 2019 SCORE PDR documents for the Orange subdivision. Information also available in the Caltrans track schematics

The CP Stuart – CP Mesa corridor moves are required for freight pathing in near-term, mid-term and long-term concepts

This corridor move is required for the long-term concept[1]



Southbound freight train diverges onto M1 and stages between CP Mesa and CP East Brook.

Northbound freight train diverges on M1 and stages between CP Pulgas and CP Stuart

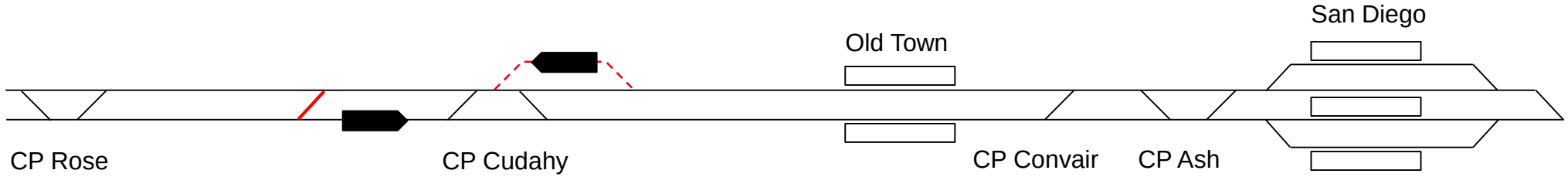
Pacific Surfliner service runs hourly between CP Shell and CP Don using the mainline as a single-track section

Additional crossovers may be required at CP Stuart and CP Mesa to allow for passenger train meets if trains run out of slot

Surfliner - Passenger BNSF - Freight Upgraded crossovers provide passenger services with a two-track section to meet if they run out of slot

(1) Complexity of the move should be discussed with operating staff to determine whether further measures are needed to support it

Utilizing the mainline or constructing a siding at CP Cudahy will enable the freight trains to enter and exit Port of San Diego on assigned slots



Staging on the mainline at CP Cudahy option

- Main 2 could be used to provide temporary staging solution for the freight services as Pacific Surfliner and COASTER operations run using single-track operations for near-term, mid-term and Long-term scenarios.
- The southbound freight train would dwell directly north of CP Cudahy (see graphic above). This movement requires an additional crossover (No 20) to be installed for diverging passenger moves north of CP Cudahy to shorten single-track operations and allow 5500 ft trains to stage.

New siding at CP Cudahy option

- To avoid single track operations, a new siding could be constructed north of Tecolote Creek to avoid bridge construction
- The siding should be long enough to allow 5500 ft trains to stage. Visual inspection of satellite imagery indicates that there is sufficient ROW
- Northbound train to make a diverging move near to the decommissioned CP Tecolote and southbound train to diverge at CP Cudahy

BNSF - Freight — Crossover upgrade required - - Proposed siding track

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Near-term: Southbound operating guidelines

Planning Horizon

Train number	Activity	Slot 1	Slot 3	Slot 5	Instructions
BARSTOW	Departure				
CP San Bernardino	Passing	7:47	11:47	18:47	
WEST CORONA	Passing	8:28	12:28	19:28	
CP Atwood	Passing	8:47	12:47	19:47	
CP Katella	Passing	8:54	12:54	19:54	Northbound freight path passed CP 5 minutes after
CP Oso	Passing	9:39	13:39	20:39	Surfliner passed CP 5 minutes prior
CP Capistrano	Passing	9:41	13:41	20:41	
CP Serra	Passing	9:44	13:44	20:44	
CP Songs	Passing	9:59	13:59	20:59	
CP Don	Passing	10:13	14:13	21:13	Surfliner passed CP 5 minutes prior
CP Pulgas	Passing	10:15	14:15	21:15	
CP East Brook	Passing	10:25	14:25	21:25	
CP Shell	Passing	10:26	14:26	21:26	Metrolink passed CP 5 minutes after
OCEANSIDE	Passing	10:27	14:27	21:27	
CP Longboard	Passing	10:29	14:29	21:29	
CP Carl	Passing	10:30	14:30	21:30	
CP Ponto	Passing	10:36	14:36	21:36	
CP Swami	Passing	10:41	14:41	21:41	Surfliner passed CP 5 minutes prior
CP Valley	Passing	10:46	14:46	21:46	
CP Scripps	Passing	11:11	15:11	22:11	
CP Miramar	Passing	11:17	15:17	22:17	Surfliner passed CP 5 minutes prior
SAN DIEGO	Passing	11:48	15:48	22:48	
CONVENTION CENTER	Passing	11:55	15:55	22:55	
22nd St	Passing	12:00	16:00	23:00	
NATIONAL CITY	Arrival	12:26	16:26	23:26	

Freight slots shown above are illustrative: slot times may shift depending on passenger peak train movements. Freight services may have more slots than shown.

Near-term: Northbound operating guidelines

Planning Horizon

Train number	Activity	Slot 2	Slot 4	Slot 6	Instructions
NATIONAL CITY	Departure	9:35	13:35	20:35	
22nd St	Passing	10:00	14:00	21:00	
CONVENTION CENTER	Passing	10:04	14:04	21:04	
SAN DIEGO	Passing	10:11	14:11	21:11	
CP Miramar	Passing	10:42	14:42	21:42	Surfliner 5 minutes prior
CP Scripps	Passing	10:48	14:48	21:48	
CP Valley	Passing	11:13	15:13	22:13	
CP Swami	Passing	11:18	15:18	22:18	Surfliner 5 minutes prior
CP Ponto	Passing	11:23	15:23	22:23	
CP Carl	Passing	11:29	15:29	22:29	
CP Longboard	Passing	11:30	15:30	22:30	
OCEANSIDE	Passing	11:33	15:33	22:33	
CP Shell	Passing	11:33	15:33	22:33	Metrolink 5 minutes prior
CP East Brook	Passing	11:34	15:34	22:34	
CP Pulgas	Passing	11:44	15:44	22:44	
CP Don	Passing	11:46	15:46	22:46	Surfliner 5 minutes after
CP Songs	Passing	12:00	16:00	23:00	
CP Serra	Passing	12:15	16:15	23:15	
CP Capistrano	Passing	12:18	16:18	23:18	
CP Oso	Passing	12:21	16:21	23:21	Surfliner 5 minutes after
CP Katella	Passing	12:59	16:59	23:59	Southbound freight path 5 minutes prior
CP Atwood	Passing	13:08	17:08	0:08	
WEST CORONA	Passing	13:27	17:27	0:27	
CP San Bernardino	Passing	14:08	18:08	1:08	
BARSTOW	Arrival				

Freight slots shown above are illustrative: slot times may shift depending on passenger peak train movements. Freight services may have more slots than shown.

Mid-term: Southbound operating guidelines

Planning Horizon

Train number	Activity	Slot 1	Slot 3	Slot 5	Slot 7	Slot 9	Instructions
BARSTOW	Departure						
CP San Bernardino	Passing	7:46	9:46	11:46	18:46	20:46	
WEST CORONA	Passing	8:27	10:27	12:27	19:27	21:27	
CP Atwood	Passing	8:46	10:46	12:46	19:46	21:46	
CP Maple	Passing	8:59	10:59	12:59	19:59	21:59	
CP Oso	Passing	9:39	11:39	13:39	20:39	22:39	Surfliner passed CP 5 minutes prior
CP Capistrano	Passing	9:41	11:41	13:41	20:41	22:41	
CP Serra	Passing	9:44	11:44	13:44	20:44	22:44	
CP Songs	Passing	9:56	11:56	13:56	20:56	22:56	Northbound freight path passed CP 5 minutes after
CP Don	Passing	10:13	12:13	14:13	21:13	23:13	Surfliner passed CP 5 minutes prior
CP Pulgas	Passing	10:15	12:15	14:15	21:15	23:15	
CP Stuart	Arrival	10:19	12:19	14:19	21:19	23:19	50-minute dwell
CP Stuart	Departure	11:09	13:09	15:09	22:09	0:09	
CP East Brook	Passing	11:17	13:17	15:17	22:17	0:17	
CP Longboard	Passing	11:21	13:21	15:21	22:21	0:21	Coaster passed CP 5 minutes prior
CP Ponto	Passing	11:28	13:28	15:28	22:28	0:28	
CP Swami	Passing	11:33	13:33	15:33	22:33	0:33	
CP Del Mar	Passing	11:41	13:41	15:41	22:41	0:41	Surfliner passed CP 5 minutes prior
CP Torrey	Passing	11:46	13:46	15:46	22:46	0:46	
CP Scripps	Passing	11:53	13:53	15:53	22:53	0:53	
CP Miramar	Passing	11:59	13:59	15:59	22:59	0:59	Northbound freight path passed CP 5 minutes after
SAN DIEGO	Passing	12:24	14:24	16:24	23:24	1:24	
CONVENTION CENTER	Passing	12:30	14:30	16:30	23:30	1:30	
22nd St	Passing	12:36	14:36	16:36	23:36	1:36	
NATIONAL CITY	Arrival	13:01	15:01	17:01	0:01	2:01	

Freight slots shown above are illustrative: slot times may shift depending on passenger peak train movements. Freight services may have more slots than shown.

Mid-term: Northbound operating guidelines

Planning Horizon

Train number	Activity	Slot 2	Slot 4	Slot 6	Slot 8	Slot 10	Instructions
NATIONAL CITY	Departure	8:59	10:59	12:59	19:59	21:59	
22nd St	Passing	9:24	11:24	13:24	20:24	22:24	
CONVENTION CENTER	Passing	9:28	11:28	13:28	20:28	22:28	
SAN DIEGO	Passing	9:35	11:35	13:35	20:35	22:35	
CP Miramar	Passing	10:03	12:03	14:03	21:03	23:03	Southbound freight path passed CP 5 minutes after
CP Scripps	Passing	10:09	12:09	14:09	21:09	23:09	Coaster passed CP 5 minutes after
CP Torrey	Passing	10:16	12:16	14:16	21:16	23:16	
CP Del Mar	Passing	10:21	12:21	14:21	21:21	23:21	Surfliner passed CP 5 minutes after
CP Swami	Passing	10:29	12:29	14:29	21:29	23:29	
CP Ponto	Passing	10:34	12:34	14:34	21:34	23:34	
CP Longboard	Passing	10:41	12:41	14:41	21:41	23:41	Coaster passed CP 5 minutes after
CP East Brook	Passing	10:45	12:45	14:45	21:45	23:45	
CP Mesa	Arrival	10:50	12:50	14:50	21:50	23:50	47-minute dwell
CP Mesa	Departure	11:37	13:37	15:37	22:37	0:37	
CP Pulgas	Passing	11:42	13:42	15:42	22:42	0:42	
CP Don	Passing	11:44	13:44	15:44	22:44	0:44	Surfliner passed CP 5 minutes after
CP Songs	Passing	12:01	14:01	16:01	23:01	1:01	Southbound freight path passed CP 5 minutes prior
CP Serra	Passing	12:13	14:13	16:13	23:13	1:13	
CP Capistrano	Passing	12:16	14:16	16:16	23:16	1:16	
CP Oso	Passing	12:19	14:19	16:19	23:19	1:19	Surfliner passed CP 5 minutes after
CP Maple	Passing	12:55	14:55	16:55	23:55	1:55	
CP Atwood	Passing	13:11	15:11	17:11	0:11	2:11	
WEST CORONA	Passing	13:30	15:30	17:30	0:30	2:30	
CP San Bernardino	Passing	14:11	16:11	18:11	1:11	3:11	
BARSTOW	Arrival						

Freight slots shown above are illustrative: slot times may shift depending on passenger peak train movements. Freight services may have more slots than shown.

Long-term Pre-San Clemente: Southbound operating guidelines

Planning Horizon

Train number	Activity	Slot 1	Slot 3	Slot 5	Slot 7	Slot 9	Slot 11	Slot 13	Slot 15	Instructions
BARSTOW	Departure									
CP San Bernardino	Passing	8:19	9:19	10:19	11:19	19:19	20:19	21:19	22:19	
WEST CORONA	Passing	9:00	10:00	11:00	12:00	20:00	21:00	22:00	23:00	
CP Atwood	Passing	9:19	10:19	11:19	12:19	20:19	21:19	22:19	23:19	
CP Maple	Passing	9:29	10:29	11:29	12:29	20:29	21:29	22:29	23:29	Metrolink passed CP 6 minutes prior
CP Camino	Arrival	10:05	11:05	12:05	13:05	21:05	22:05	23:05	0:05	15-minute dwell
CP Camino	Departure	10:20	11:20	12:20	13:20	21:20	22:20	23:20	0:20	
CP Trabuco	Passing	10:22	11:22	12:22	13:22	21:22	22:22	23:22	0:22	Surfliner passed CP 5 minutes prior
CP Beach	Passing	10:33	11:33	12:32	13:33	21:32	22:32	23:33	0:32	Northbound freight path passed CP 6 minutes prior
SAN CLEMENTE NORTH BEACH	Passing	10:37	11:37	12:36	13:37	21:36	22:36	23:37	0:36	Metrolink passed CP 6 minutes prior
CP Songs	Passing	10:44	11:44	12:42	13:44	21:42	22:42	23:44	0:42	
CP Stuart	Arrival	11:09	12:09	13:08	14:09	22:08	23:08	0:09	1:08	14-minute dwell and waits for the passage of southbound Pacific Surfliner
CP Stuart	Departure	11:23	12:23	13:22	14:23	22:22	23:22	0:23	1:22	
OCEANSIDE	Passing	11:29	12:29	13:28	14:29	22:28	23:28	0:29	1:28	
CP Del Mar	Passing	11:51	12:51	13:50	14:51	22:50	23:50	0:51	1:50	
CP Torrey	Passing	11:56	12:56	13:55	14:56	22:55	23:55	0:56	1:55	Northbound freight path passed CP 4 minutes after
SAN DIEGO	Passing	12:37	13:37	14:36	15:37	23:36	0:36	1:37	2:36	
22nd St	Passing	12:49	13:49	14:40	15:49	23:40	0:40	1:49	2:40	
NATIONAL CITY	Arrival	13:15	14:15	14:46	16:15	23:46	0:46	2:15	2:46	

Freight slots shown above are illustrative: slot times may shift depending on passenger peak train movements. Freight services may have more slots than shown.

Long-term Pre-San Clemente: Northbound operating guidelines

Planning Horizon

Train number	Activity	Slot 2	Slot 4	Slot 6	Slot 8	Slot 10	Slot 12	Slot 14	Slot 16	Instructions
NATIONAL CITY	Departure	10:04	11:04	12:04	13:04	19:04	20:04	21:04	22:04	
22nd St	Passing	10:11	11:11	12:11	13:11	19:11	20:11	21:11	22:11	
SAN DIEGO	Passing	10:17	11:17	12:17	13:17	19:17	20:17	21:17	22:17	
CP Torrey	Passing	11:00	12:00	13:00	14:00	20:00	21:00	22:00	23:00	Southbound freight path passed CP 5 minutes prior
CP Del Mar	Passing	11:06	12:06	13:06	14:06	20:06	21:06	22:06	23:06	
OCEANSIDE	Passing	11:28	12:28	13:28	14:28	20:28	21:28	22:28	23:28	
CP Mesa	Arrival	11:32	12:32	13:32	14:32	20:32	21:32	22:32	23:32	20-minute dwell and waits for the passage of northbound Surfliner
CP Mesa	Departure	11:52	12:52	13:52	14:52	20:52	21:52	22:52	23:52	
CP Songs	Passing	12:11	13:11	14:11	15:11	21:11	22:11	23:11	0:11	
SAN CLEMENTE NORTH BEACH	Passing	12:18	13:18	14:18	15:18	21:18	22:18	23:18	0:18	Metrolink passed CP 5 minutes after
CP Beach	Passing	12:21	13:21	14:21	15:21	21:21	22:21	23:21	0:21	
CP Trabuco	Passing	12:31	13:31	14:31	15:31	21:31	22:31	23:31	0:31	
CP Camino	Arrival	12:33	13:33	14:33	15:33	21:33	22:33	23:33	0:33	20-minute dwell
CP Camino	Departure	12:53	13:53	14:53	15:53	21:53	22:53	23:53	0:53	
CP Maple	Passing	13:32	14:32	15:32	16:32	22:32	23:32	0:32	1:32	
CP Atwood	Passing	13:43	14:43	15:43	16:43	22:43	23:43	0:43	1:43	
WEST CORONA	Passing	14:02	15:02	16:02	17:02	23:02	0:02	1:02	2:02	
CP San Bernardino	Passing	14:53	15:53	16:53	17:53	23:53	0:53	1:53	2:53	
BARSTOW	Arrival									

Freight slots shown above are illustrative: slot times may shift depending on passenger peak train movements. Freight services may have more slots than shown.