

Comprehensive Regional Goods Movement Plan and  
Implementation Strategy

# Updated Regional Rail Simulation Results



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# Agenda

- Previous studies
- Main line rail network, LA – Barstow/Indio
- Peak-day traffic levels – 2000, 2010 and forecast for 2035
- Routing alternatives
- Required trackage
- Estimated capital costs
- Recommendations



# Inland Empire Main Line Rail Study 2002

- Scope was LA – Colton Crossing
- Report prepared for SCAG by LAEDC made public on 12/19/2002
- Leachman & Associates LLC was subconsultant for rail capacity analysis (2001)
  - Document rail infrastructure and current traffic levels
  - Determine track capacity improvements required to accommodate 2010 and 2025 traffic forecasts at year 2000 level of dispatching delays



# Inland Empire Main Line Rail Study 2005

Report prepared for SCAG by Leachman & Associates made public on 6/30/2005:

- Scope extended LA – Barstow and LA – Indio
- Documented rail infrastructure and traffic forecasts
- Determined required trackage for Status Quo routing of trains in 2010 and 2025
- Developed alternative railroad operating strategies and determine required trackage for alternatives
- Estimated costs, traffic and emissions analysis of all alternatives
- Evaluated alternatives
- Presented results to RRs and public agencies

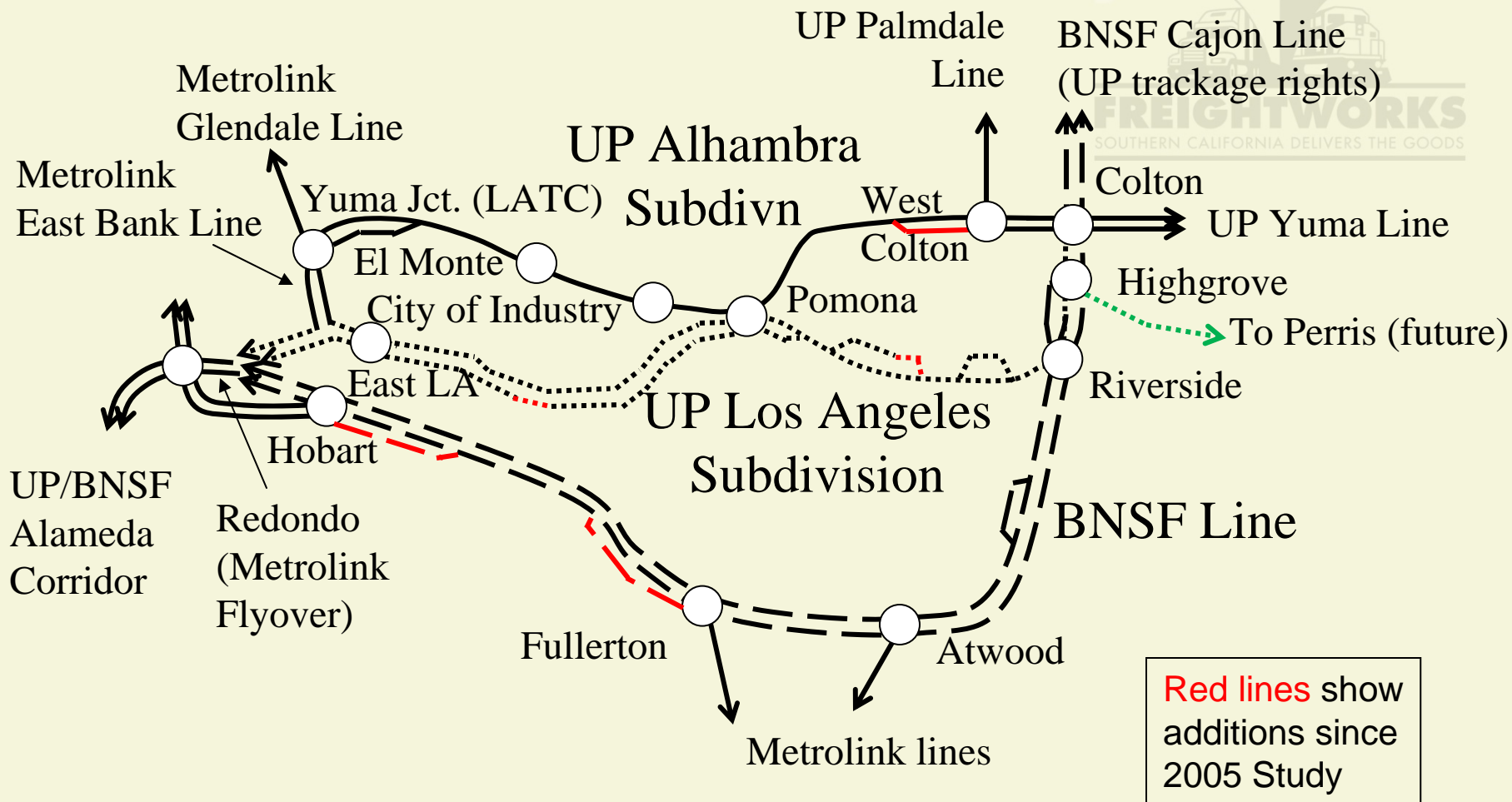


# 2010 Update

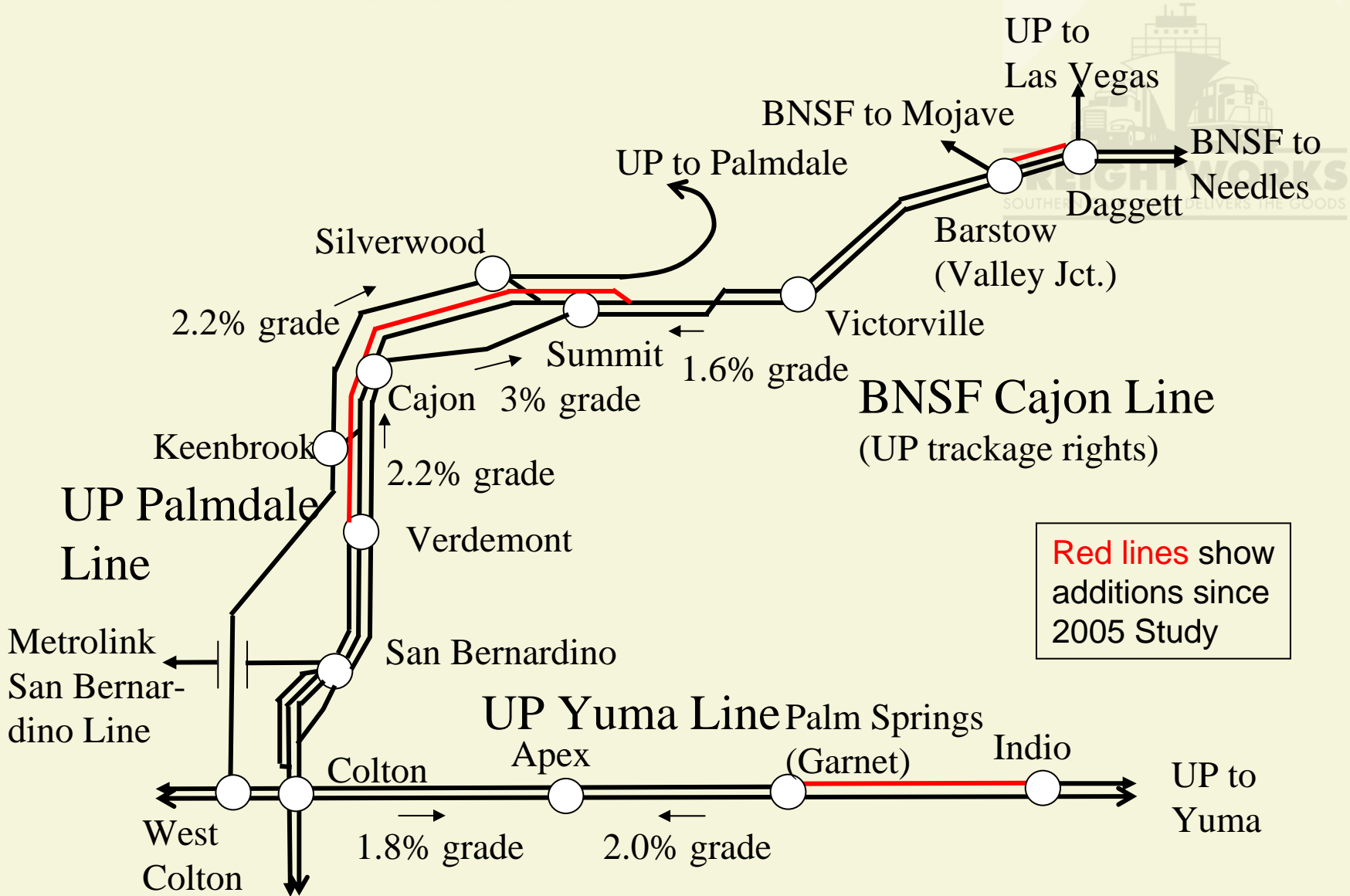
- Develop 2035 train forecasts consistent with Port forecasts, accounting for continuing evolution in intermodal technology and traffic
- Determine required trackage in 2035 for Status Quo routing and routing alternatives
- Update capital cost estimates
- Present results and prepare report



# The main line rail network



# The main line rail network (cont.)



# 2035 Rail Traffic Forecasts

- Consistent with 2035 POLA/POLB volume projections
  - Consultant's judgments concerning 2035 distribution of intermodal trains by length and type
- Assume very modest growth in non-intermodal freight train volumes from 2010 actual volumes
- 2020 Metrolink proposed service levels and 2010 Amtrak service levels





# Peak-Day Traffic Levels

(Status Quo Routing; MetroLink volumes in parentheses)

Line segment	Type	2000	2010	2035
BNSF Hobart – Fullerton	Psg	46(19)	54(28)	<b>77(51)</b>
	Frt	50	45	<b>90</b>
BNSF Atwood – Riverside	Psg	16(12)	26(24)	<b>42(40)</b>
	Frt	57	49	<b>99</b>
BNSF Riverside – Colton	Psg	11(9)	10(8)	<b>42(40)</b>
	Frt	92	67	<b>147</b>
BNSF/UP Cajon Pass	Psg	2(0)	2(0)	<b>2(0)</b>
	Frt	94	93	<b>147</b>

Note: A “peak day” experiences the 90<sup>th</sup> percentile of the distribution of daily train movements.

# Peak- Day Traffic Levels

(Status Quo Routing; MetroLink Volumes in parentheses)

Line segment	Type	2000	2010	2035
UP East LA – Pomona	Psg	14(12)	13(12)	<b>21(20)</b>
+ Yuma Jct. – Pomona	Frt	55	52	<b>98</b>
UP Pomona - Riverside	Psg	14(12)	13(12)	<b>21(20)</b>
+ Pomona – West Colton	Frt	59	51	<b>109</b>
UP Yuma Line (Colton – Indio)	Psg	2(0)	1(0)	<b>1(0)</b>
	Frt	42	45	<b>93</b>

# 2000 Forecasts vs. Actuals



- Forecasts were compared to actual movements over Cajon Pass:
  - March 22 – May 23, 2004 and July 8 -21, 2010 actual through train movements at Summit provided by BNSF
- 2004 Forecast (prepared in 2000) 99.5
- 2004 Actual 90<sup>th</sup> Percentile 100
- 2010 Actual 90<sup>th</sup> Percentile 71

# Why Have Freight Train Counts Dropped Since 2000?

- Railroads are running much longer trains
  - Distributed power, more double track
- Imports increasingly trans-loaded out of 40s into 53s
  - Reduces train count by 17% for a given train length
- Trailers replaced by double-stacks
  - Only UPS and LTL left in trailers
  - 2035 projection: no trailers
- Traffic not back up to 2006 peak



# Assumptions Underlying Forecasts

- 2035 Port TEU forecasts translated into trains as follows: 30% for marine container trains, 35% for domestic container trains, 10% for premium-service trains
- UP and BNSF intermodal market shares:
  - Each will have 50% shares of marine container and domestic container markets (excluding premium service)
  - BNSF will have a 75% share and UP will have a 25% share of the premium-service intermodal market
- 2035 train length assumptions:
  - Marine container trains 30% 8K, 40% 10K and 30% 12K
  - Domestic container trains 34% 10K and 66% 12K
  - Premium-service trains 30% 6K, 40% 8K and 30% 10K
  - Premium service exclusively in domestic containers by 2035
- UP intermodal trains 84% via Indio, 16% via Daggett



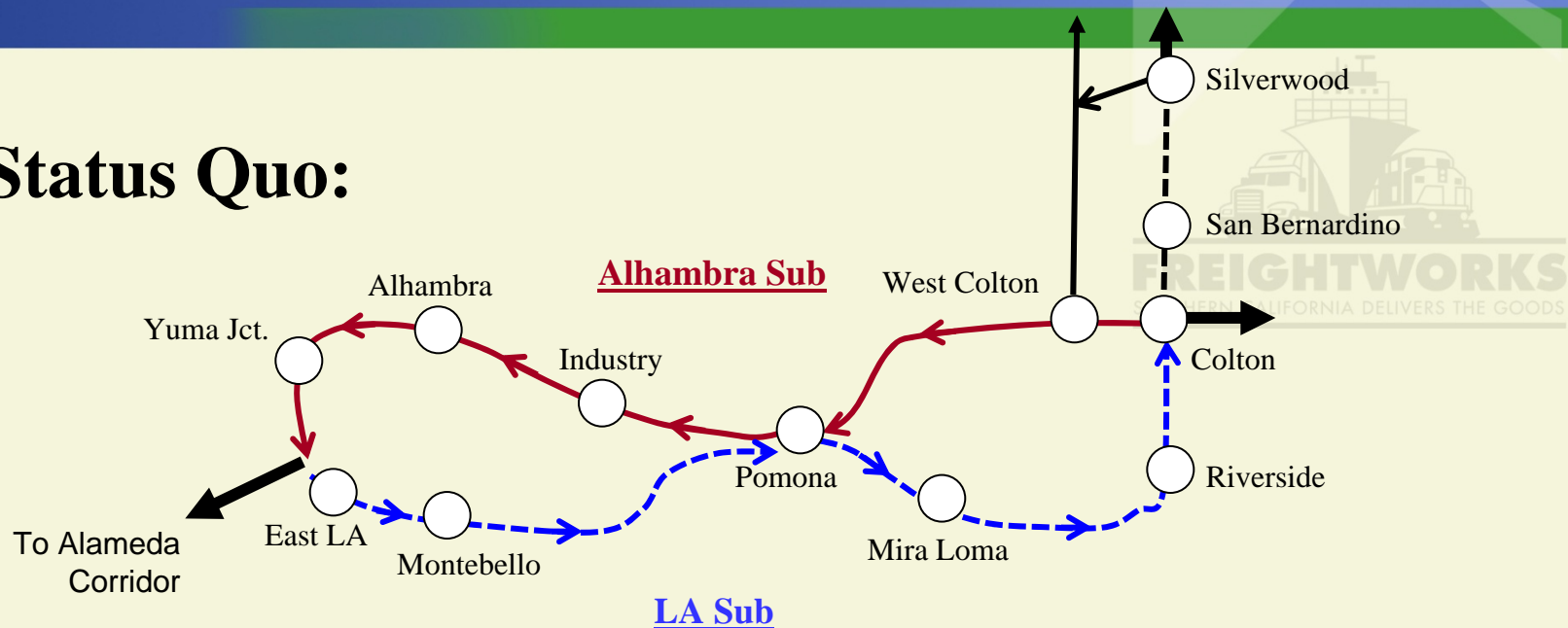
# Alternatives to Status Quo

Goals: Save capital, improve reliability, and reduce risk

- Reduce train count through the worst bottleneck (Riverside-Colton)
- Avoid the most costly line expansion (UP Pomona – Riverside line)
- Separate Metrolink from heavy UP freight traffic
- Route the freights where more environmentally-friendly (but sustain service to all rail terminals)

# UP Routing Alternatives

## Status Quo:

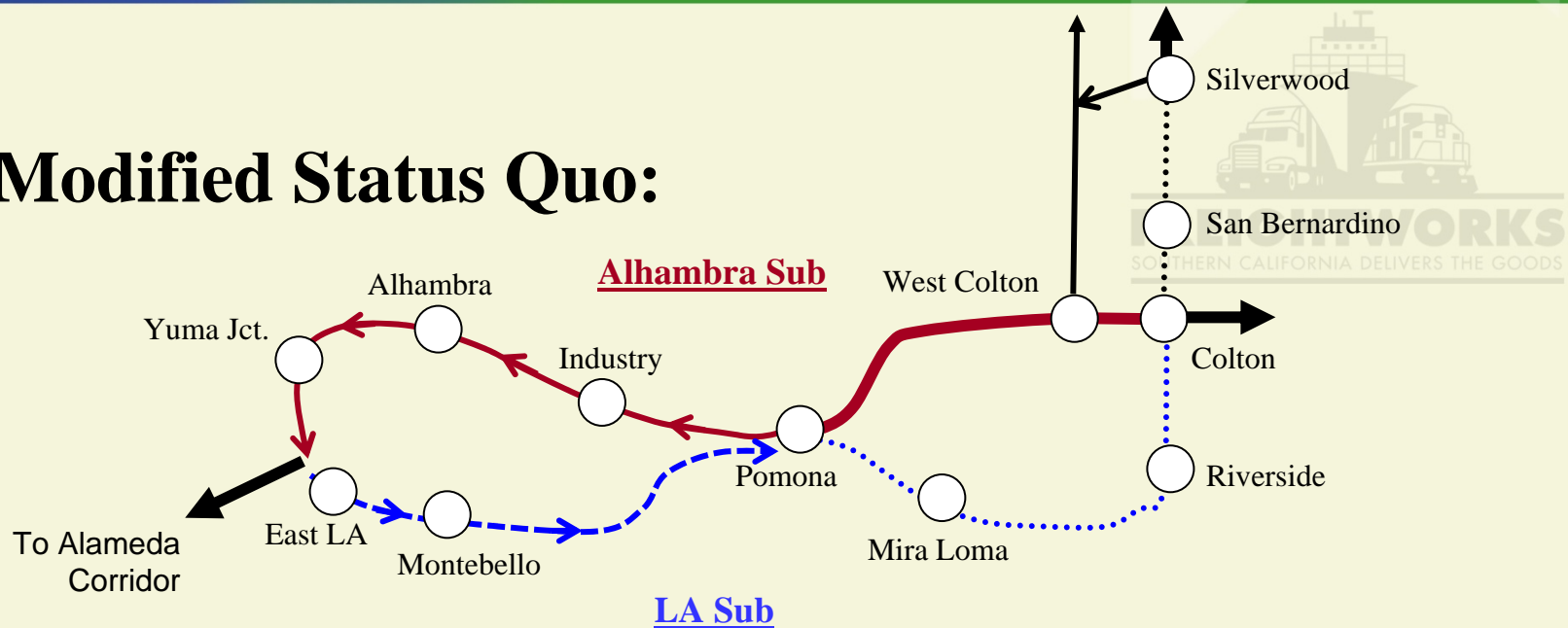


Between LA and Colton Crossing, **Alhambra Sub (WB)** and **Los Angeles Sub (EB)** used as a one-way loop for many but not all UP through trains. Limitations:

- All carload trains go to/from West Colton Yard on Alhambra Sub east of Pomona
- COI intermodal trains must operate on Alhambra Sub west of Pomona
- Mira Loma auto trains must operate on Los Angeles Sub east of Pomona
- As a result, about 26% of UP trains move against the current of traffic.

# UP Routing Alternatives

## Modified Status Quo:



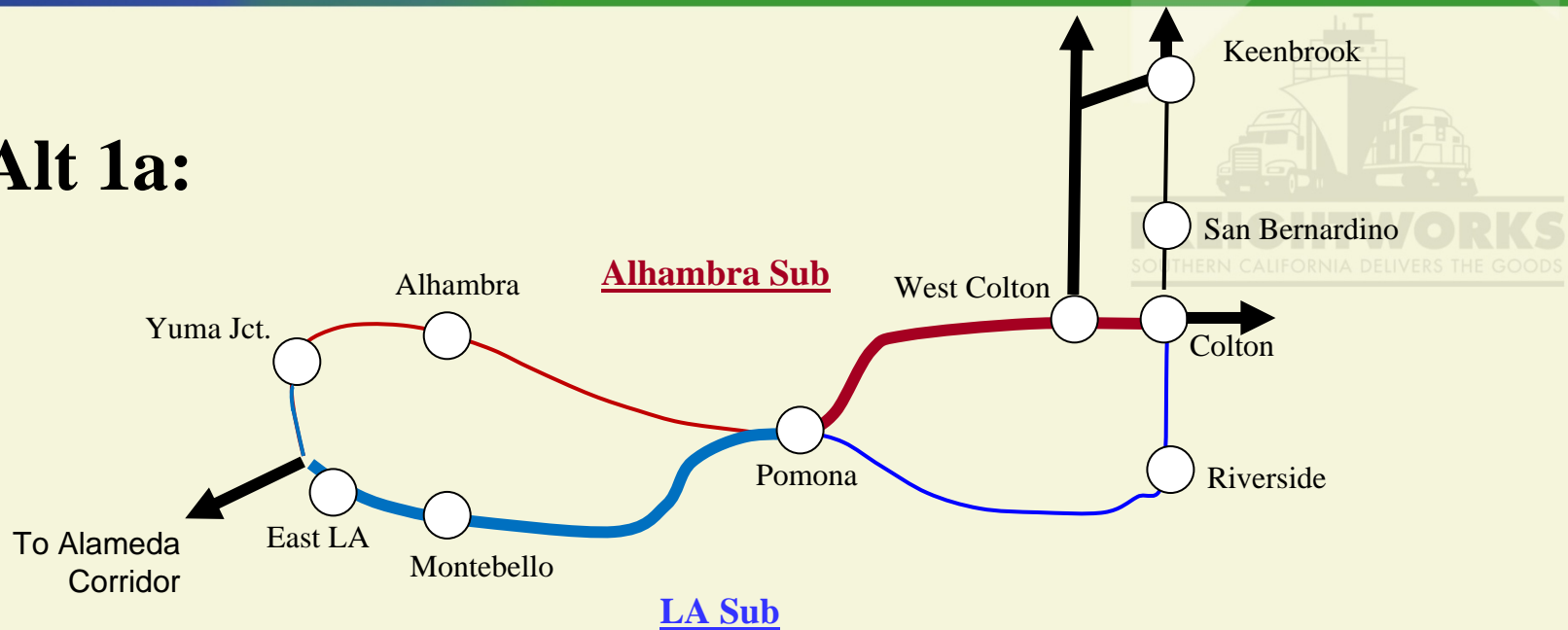
**One-way loop continues to be practiced west of Pomona, but UP through trains concentrated on **Alhambra Sub** east of Pomona.**

- Consistent with UP's stated plans to continue adding second main track to Alhambra Sub east of Pomona
- In 2035, shifts 41 UP trains per day out of Riverside to run through West Colton, avoiding BNSF trackage rights fees and costly improvements through Riverside



# UP Routing Alternatives

## Alt 1a:

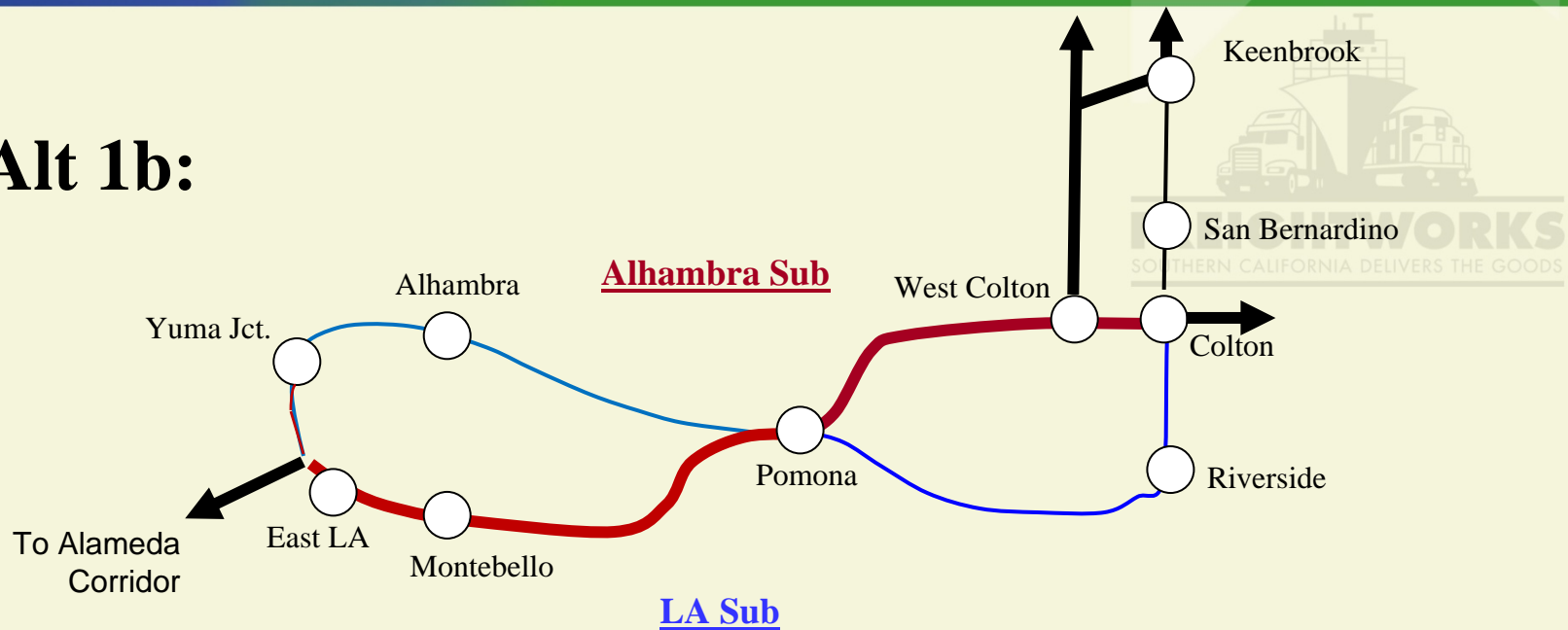


UP through trains concentrated on **Los Angeles Sub** west of Pomona and on **Alhambra Sub** east of Pomona

- ~92% routed via West Colton and ~84% routed via Montebello
- Fly-over at Pomona to mitigate Metrolink conflicts
- **Metrolink trains routed as in Status Quo**

# UP Routing Alternatives

## Alt 1b:

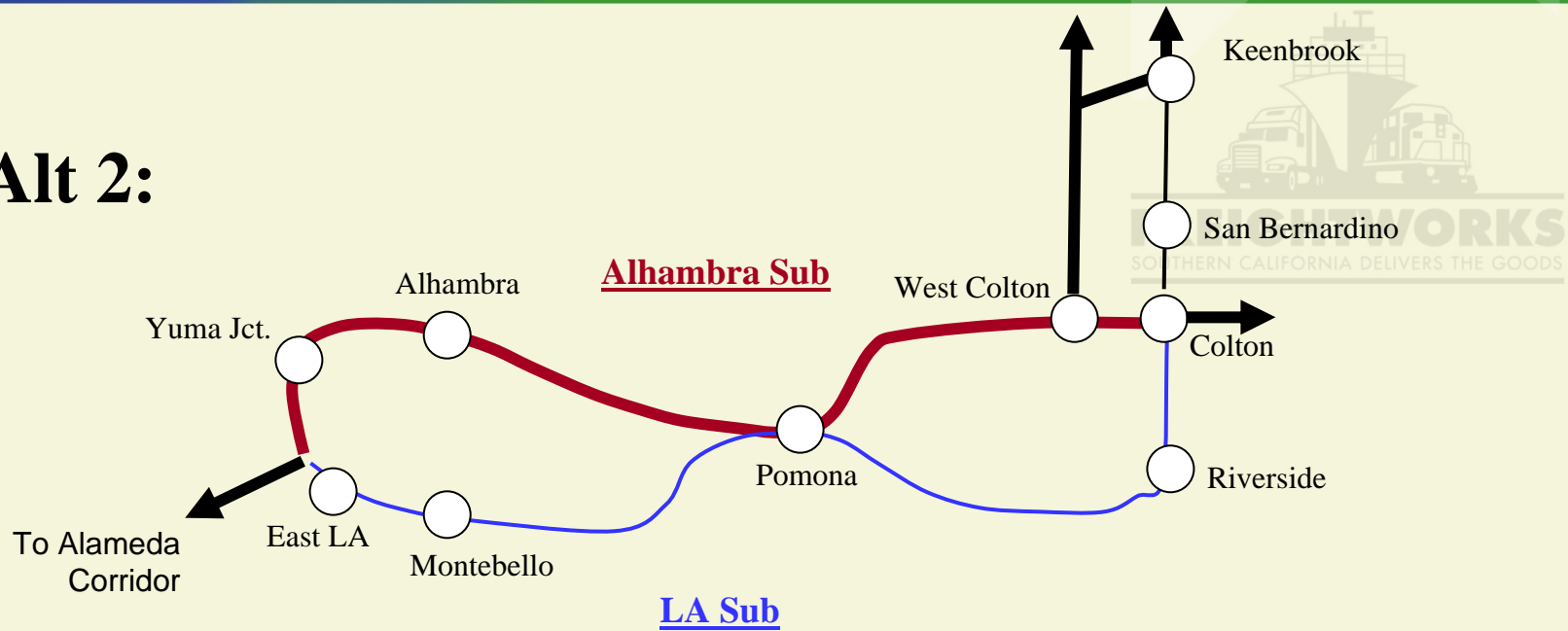


UP through trains concentrated on **Los Angeles Sub** west of Pomona and on **Alhambra Sub** east of Pomona

- ~92% routed via West Colton and ~89% routed via Montebello
- Fly-over at Pomona to mitigate Metrolink conflicts
- **West of Pomona, Metrolink re-routed via Alhambra Sub**

# UP Routing Alternatives

## Alt 2:



## UP through trains concentrated on **Alhambra Sub**

- ~92% routed via West Colton and 100% via Alhambra

# Alternatives to the Status Quo

- The alternatives to the Status Quo partially separate Passenger and UP through freight trains:

2035	Alham Sub		LA Sub		Alham Sub		LA Sub	
	W. Colton - Pomona		Riverside - Pomona		Pomona - Yuma Jct.		Pomona - East LA	
	Psgr	Frt	Psgr	Frt	Psgr	Frt	Psgr	Frt
S.Q.	1	61	20	50	1	55	20	44
ModS.Q.	1	102	20	9	1	55	20	44
Alt 1a	1	102	20	9	1	16	20	82
Alt 1b	1	102	20	9	21	11	0	87
Alt 2	1	102	20	9	1	98	20	0

(However, Alt 2 has 20 Psgr and 75 Frt Yuma Jct. – 9<sup>th</sup> St.)

# Alternatives to the Status Quo

- The alternatives to the Status Quo reduce the UP freight train counts through Riverside and San Bernardino as follows:

	Riverside		San Bernardino	
	2010	2035	2010	2035
Status Quo	67	147	58	119
Alternatives	49	106	55	109
Reduction	<b>18</b>	<b>41</b>	<b>3</b>	<b>10</b>

# Planning Track Capacity

- **Discrete-event computer simulations of main-line train operations were carried out.**
  - Statistics on transit times and delays were collected for 100 consecutive peak-days of train operations.
- **Statistics for the Year 2000 Base-Case define the dispatching delay goals to be achieved in the 2035 scenarios.**
- **Future scenarios were iteratively simulated with varying trackage configurations to determine trackage required to meet delay goals.**



# Accuracy of Simulations

- Actual transit times of BNSF Maersk stack trains were compared to simulation results
  - 23 trains April 15 – May 15, 2003, CP Sepulveda (AC Corridor) to Colton Crossing

	Avg.	Std. Dev.
• Actual	3 hrs, 26 mins	43 mins
• Simulated	3 hrs, 28 mins	51 mins

# Required Trackage – BNSF West of Colton

Line Segment	2010 Tracks	2035 Tracks	
		Status Quo	All Alternatives
BNSF Hobart – Fullerton	2-3	<b>4</b>	<b>4</b>
BNSF Fullerton – Atwood	2	<b>3</b>	<b>3</b>
BNSF Atwood – Riverside	2-3	<b>3</b>	<b>3</b>
West Riverside Jct.	At-grade	<b>Flying</b>	At-grade
BNSF Riverside – Colton	2-3	<b>4</b>	<b>3</b>
Colton Crossing	At-grade	<b>Separated</b>	<b>Separated</b>
BNSF Colton – San Bernardino	3-4	3-4	3-4



# Required Trackage per Scenario

## UP West of W. Colton

Line Segment	2010 Tracks	2035 Tracks				
		Status Quo	Modified Status Quo	Alternative 1a	Alternative 1b	Alternative 2
BNSF Colton – Riverside	2-3	<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
BNSF/UP West Riverside Jct.	At-grade	<b>Flying</b>	At-grade	At-grade	At-grade	At-grade
LA Sub Riverside – Pomona	1-2	<b>2</b>	1-2	1-2	1-2	1-2
LA Sub Pomona – East LA	2	2	2	<b>3</b>	2	2
Rancho (West Colton) Jct.	Partially flying	<b>Flying</b>	<b>Flying</b>	<b>Flying</b>	<b>Flying</b>	<b>Flying</b>
Alham. Sub West Colton – Pomona	1-2	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
Pomona Jct.	At-grade	At-grade	At-grade	<b>Fly-over</b>	<b>Fly-over</b>	At-grade
Alham. Sub Pomona – City of Industry	1-2	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
Alham. Sub City of Industry – Yuma Jct.	1-2	1-2	1-2	1-2	1-2	<b>2</b>

# Required Trackage – UP West of Colton (Alternative 2)

<b>Line segment</b>	<b>2010</b>	<b>2035</b>
Metrolink/UP East Bank Line:		
Yuma Jct. – Pasadena Jct.	1-2 tracks	<b>2</b>
Pasadena Jct. (Metrolink Xing)	At-grade	<b>Fly-over</b>
Pasadena Jct. – 9th St.	2 tracks	<b>3</b>
9 <sup>th</sup> St. Jct. – Redondo bridge	1 track	<b>2</b>



# Required Trackage – UP East and North of West Colton (All alternatives)

Line segment	2010	2035
UP West Colton – Colton	2 tracks	2
UP Colton Crossing	At grade	<b>Separated</b>
UP Yuma Line Colton – Indio	2 tracks	2
UP Palmdale Line West Colton – Keenbrook	1	<b>2</b>
UP Palmdale Line Keenbrook – Silverwood	1	1

Option: **Integrated  
with BNSF**



# Required Trackage – BNSF North of Colton

Line segment	2010	2035
BNSF San Berd. – Keenbrook	3 tracks	3
BNSF Verdemont - Keenbrook	3	3
BNSF/UP Keenbrook Conn.	One-way	<b>Universal</b>
BNSF/UP Keenbrook – Silverwood <b>if cooperation</b>	3, 1	<b>4 integrated</b>
BNSF/UP Keenbrook – Silverwood <b>if no cooperation</b>	3,1	<b>4,1 separate</b>
BNSF Silverwood - Martinez	3	<b>4</b>
BNSF Summit – Victorville Narrows	2	<b>4</b>
BNSF Victorville Narrows – Barstow	2	<b>3</b>



# Estimated Capital Costs

- 2001 unit costs for rail infrastructure were inflated to 2010 levels using the US Army Corps of Engineers' Inflation Index for Construction of Roads, Railroads and Bridges.
  - Costs grew 41% from 2001 to 2010 and 30% from 2004 to 2010
  - Equivalent CAGR from 2001 to 2010 was 3.9%



# Rail Infrastructure Unit Costs

(All figures in 2010 dollars)

## For new main-line track:

### Item

Roadbed

Drainage

Track

Signals

Utility relocation

Right of way, east and north of Colton

Right of way, west of Colton

### Subtotals:

Cost per track-mile, east and north of Colton

Cost per track-mile, west of Colton

### Exceptional items

Bridges

Power-switch crossovers

Exceptional earthmoving or property-taking

Separated crossings

Flying junctions

New Metrolink stations

### Cost per track-mile

\$196,200

\$42,300

\$1,043,300

\$1,409,800

\$704,900

\$166,800

\$3,528,100

\$3,563,400

\$6,924,700

### Unit cost

\$70,492 per track-foot

\$528,700 each

case-by-case basis

case-by-case basis

case-by-case basis

case-by-case basis



# 2035 Rail Infrastructure Costs

(Millions of 2010 \$)

East of Colton to Indio:

\$0

North of Colton to Barstow:

No cooperation UP with BNSF

\$970.5

Cooperation UP with BNSF

\$725.3

Colton Xing and west:

Status Quo

\$1,621.8

Modified Status Quo

\$1,220.9

Alt 1a

\$1,672.6

Alt 1b

\$1,306.8

Alt 2

\$1,457.9



# Rail Infrastructure Cost Deltas (M 2010 \$)

(Relative to Status Quo with No Cooperation)

- UP/BNSF cooperation to pair trackage Keenbrook – Silverwood \$245.1
- Modified Status Quo \$400.9
- Alternative 1a (\$50.8)
- Alternative 1b \$314.9
- Alternative 2 \$161.8





# Comments on Alternatives

- **Figures exclude costs for environmental and vehicular traffic mitigation measures.**
- **Cooperation on Cajon Pass is worth \$245 million (2010 dollars).**
- **Moving UP out of Riverside (except auto trains) is worth \$401 million (2010 dollars).**
- **Modified Status Quo is \$86 million cheaper than Alternative 1b (2010 dollars). However, Alt 1b separates UP freight traffic from Metrolink, removing considerable liability risk.**



# Comments on Alternatives (cont.)

- **The BNSF line has little or no room for growth beyond 2035.** Moreover, mixing heavy BNSF with heavy Metrolink operations represents a major liability risk.
- **If a horizon longer than 2035 were considered, or if the liability risk is to be reduced, it might be wiser to develop a joint UP/BNSF freight corridor via the UP LA Sub – Pomona – Alhambra Sub** accommodating a significant portion of the BNSF traffic.





# Questions and Comments?

For more information on **Comprehensive Regional Goods Movement Plan and Implementation Strategy**, please contact Annie Nam, [nam@scag.ca.gov](mailto:nam@scag.ca.gov).

Thank you!