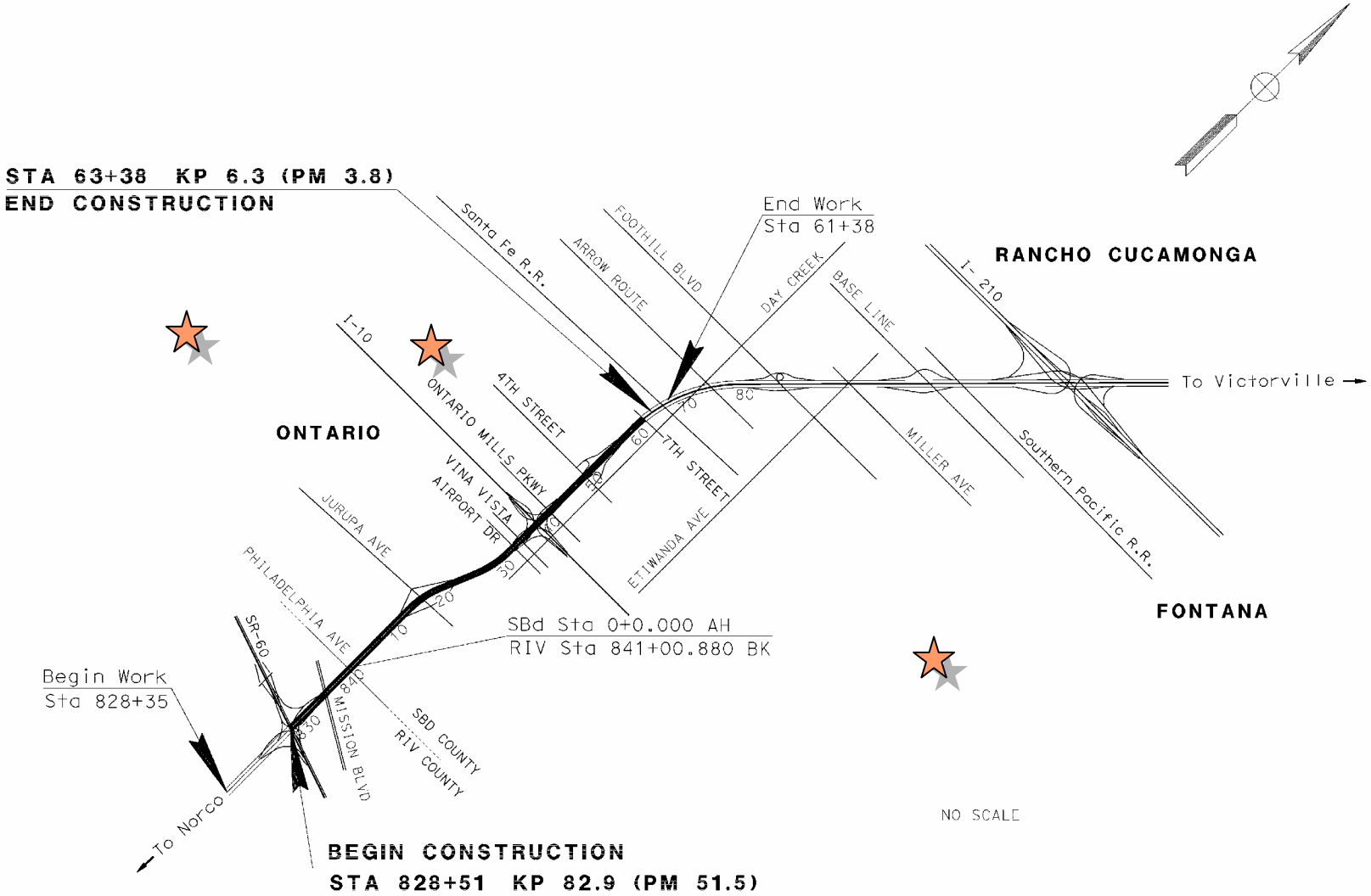
# Ontario Rehab Project

## EA 08-472211

Jonathan den Hartog
Syed Raza

Mit Jha

# Project Location

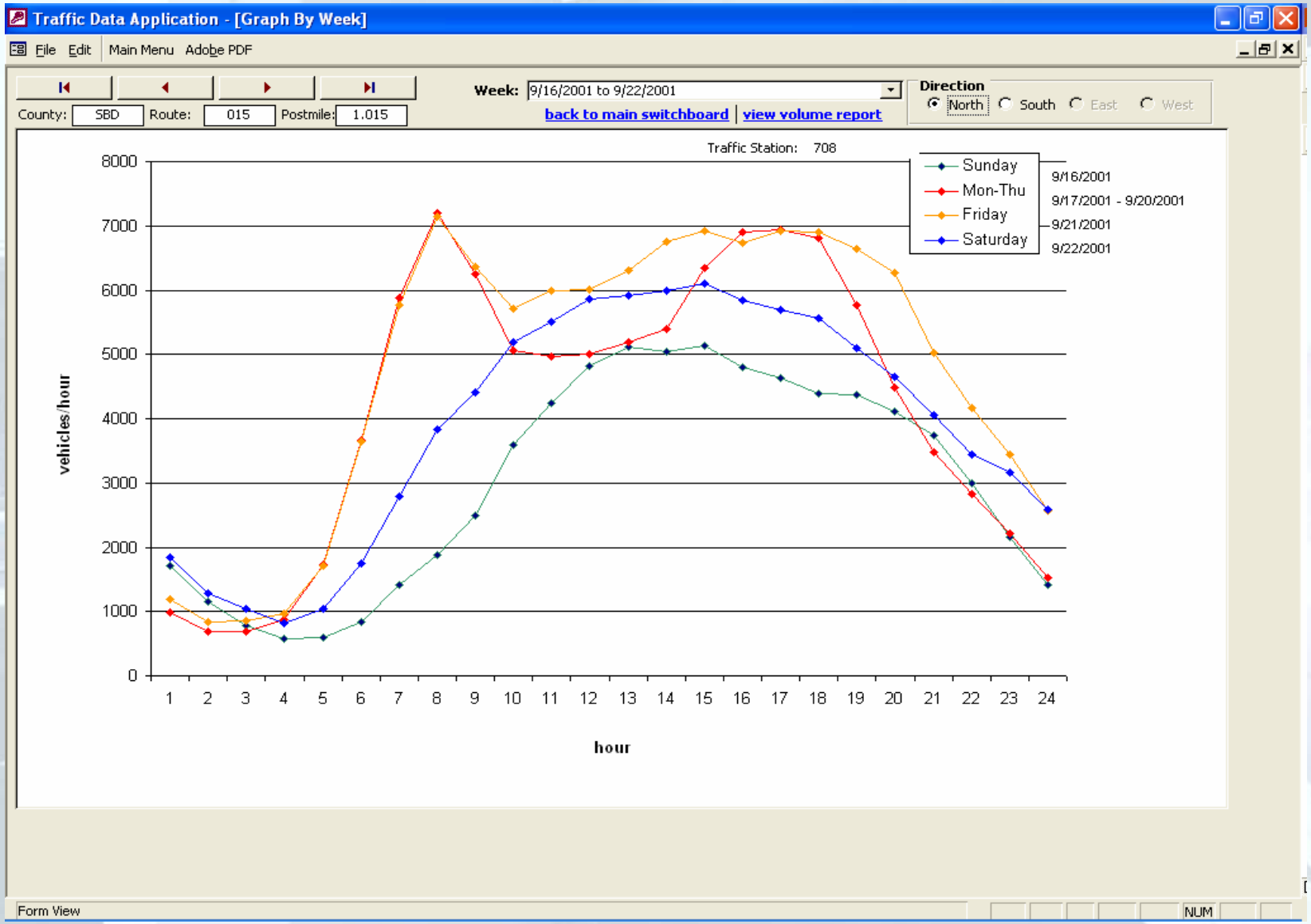


# Traffic Volumes

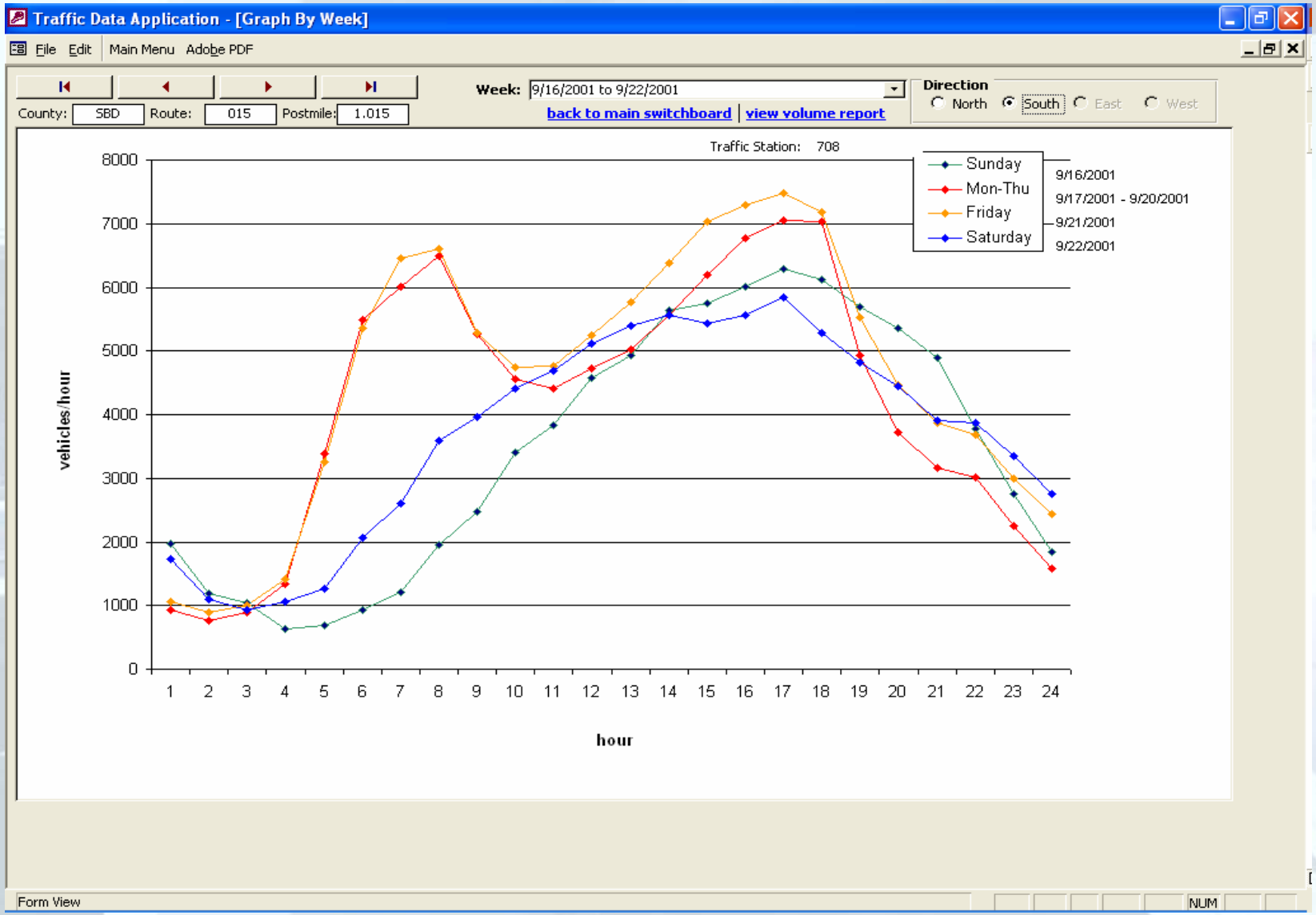
- 2003 ADT: 196,500
- 2013 ADT: 215,300
- Trucks: 6%

- About 15.5 miles of lane-replacement, along with about 546 random slabs.

# Traffic: Northbound



# Traffic: Southbound



# Directions Compared

## Traffic Volumes by Week

County: SBD Route: 015 Postmile: 1.015

California Department of Transportation
District 08

| Hour | NORTHBOUND Mon-Thu 9/17/2001 - 9/20/2001 | NORTHBOUND Friday 9/21/2001 | NORTHBOUND Saturday 9/22/2001 | NORTHBOUND Sunday 9/16/2001 | SOUTHBOUND Mon-Thu 9/17/2001 - 9/20/2001 | SOUTHBOUND Friday 9/21/2001 | SOUTHBOUND Saturday 9/22/2001 | SOUTHBOUND Sunday 9/16/2001 |
|---|---|---|---|---|---|---|---|---|
| 1 | 992 | 1195 | 1847 | 1704 | 929 | 1067 | 1731 | 1966 |
| 2 | 683 | 829 | 1291 | 1157 | 757 | 888 | 1089 | 1196 |
| 3 | 692 | 862 | 1037 | 786 | 900 | 1007 | 921 | 1033 |
| 4 | 877 | 961 | 823 | 568 | 1347 | 1423 | 1069 | 624 |
| 5 | 1731 | 1715 | 1035 | 597 | 3383 | 3257 | 1260 | 682 |
| 6 | 3669 | 3644 | 1757 | 846 | 5494 | 5367 | 2070 | 929 |
| 7 | 5880 | 5775 | 2788 | 1408 | 6000 | 6465 | 2602 | 1217 |
| 8 | 7196 | 7140 | 3840 | 1888 | 6485 | 6609 | 3598 | 1952 |
| 9 | 6246 | 6356 | 4404 | 2502 | 5264 | 5288 | 3960 | 2478 |
| 10 | 5067 | 5707 | 5183 | 3593 | 4553 | 4743 | 4407 | 3402 |
| 11 | 4970 | 5984 | 5514 | 4241 | 4402 | 4754 | 4687 | 3830 |
| 12 | 5006 | 6014 | 5860 | 4821 | 4724 | 5254 | 5118 | 4570 |
| 13 | 5192 | 6316 | 5913 | 5111 | 5026 | 5776 | 5400 | 4924 |
| 14 | 5394 | 6760 | 5998 | 5040 | 5557 | 6387 | 5567 | 5633 |
| 15 | 6346 | 6925 | 6095 | 5140 | 6196 | 7025 | 5440 | 5754 |
| 16 | 6908 | 6735 | 5838 | 4800 | 6766 | 7286 | 5571 | 6007 |
| 17 | 6948 | 6923 | 5692 | 4639 | 7057 | 7473 | 5835 | 6289 |
| 18 | 6804 | 6901 | 5570 | 4390 | 7025 | 7184 | 5287 | 6127 |
| 19 | 5766 | 6646 | 5089 | 4370 | 4937 | 5518 | 4819 | 5700 |
| 20 | 4479 | 6268 | 4656 | 4108 | 3724 | 4460 | 4446 | 5364 |
| 21 | 3475 | 5020 | 4064 | 3743 | 3165 | 3868 | 3900 | 4896 |
| 22 | 2837 | 4161 | 3441 | 2992 | 3023 | 3682 | 3869 | 3772 |
| 23 | 2207 | 3433 | 3171 | 2153 | 2257 | 3000 | 3350 | 2755 |
| 24 | 1521 | 2567 | 2590 | 1410 | 1588 | 2442 | 2756 | 1843 |
| TOTALS: | 100,884 | 114,837 | 93,496 | 72,007 | 100,557 | 110,213 | 88,752 | 82,943 |

0-1000 vehicles | 1001-3000 vehicles | 3001-4500 vehicles | more than 4500 vehicles

Note: Mon-Thu counts are the average count for those days.

Friday, March 16, 2007 report designed by Jonathan den Hartog Page 1 of 1

# Project Objectives

- Rehabilitate pavement with long-lasting concrete
- Minimize disruption to traffic and surrounding businesses

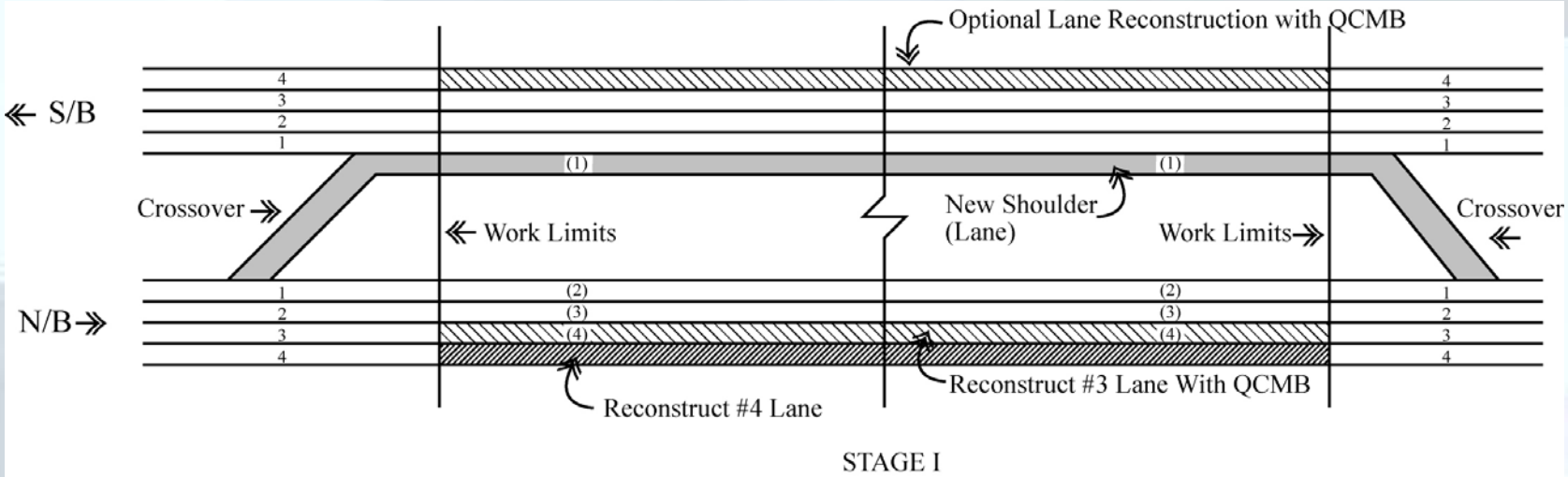
# Plan

- Performed a detailed analysis of various alternatives, from both a RUC and Construction Cost perspective
- Model the construction staging to determine the traffic impacts
  - Include analysis of local arterials

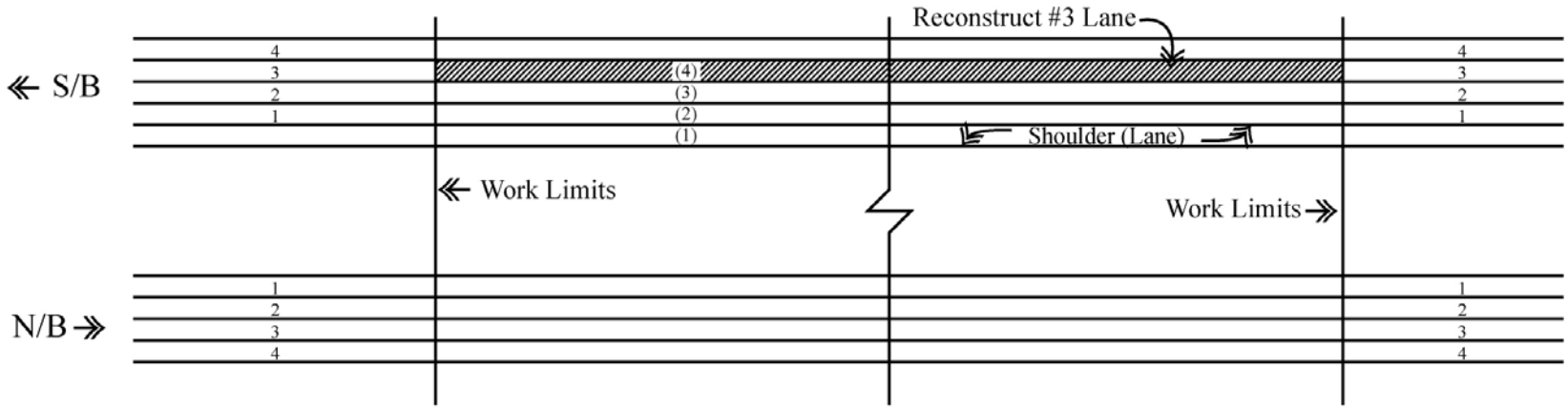
# Staging Alternatives

| ID | Scenario | Construction Window | Closure Scheme |
|---|---|---|---|
| 1 | Original | 55-hour Weekend + Weekdays | Median + Structure Widening |
| 2 | VA By-pass | 55-hour Weekend | Split Detour |
| 3 | Rapid Rehab 1 | 55-hour Weekend | Full closure<br>One roadbed |
| 4 | Rapid Rehab 2 | Progressive Continuous | Full closure<br>One roadbed |
| 5 | Traditional | 8-hour Nighttime | Partial closure |
| 6-1 | Long-life CSOL | 55-hour Weekend | Full closure<br>One roadbed |
| 6-2 | Traditional AC Overlay | 8-hour Nighttime | Partial closure |

# Alternative 2: VA-Bypass




STAGE I

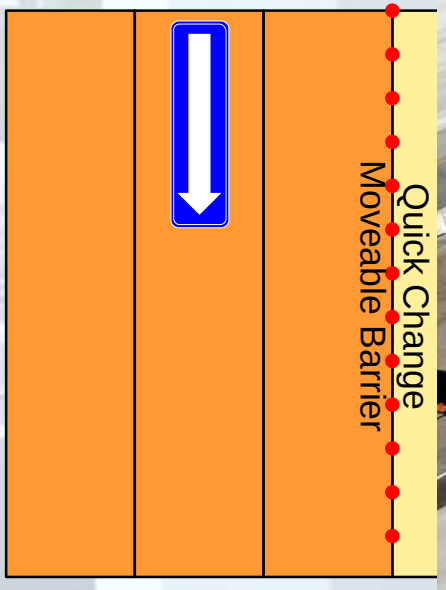


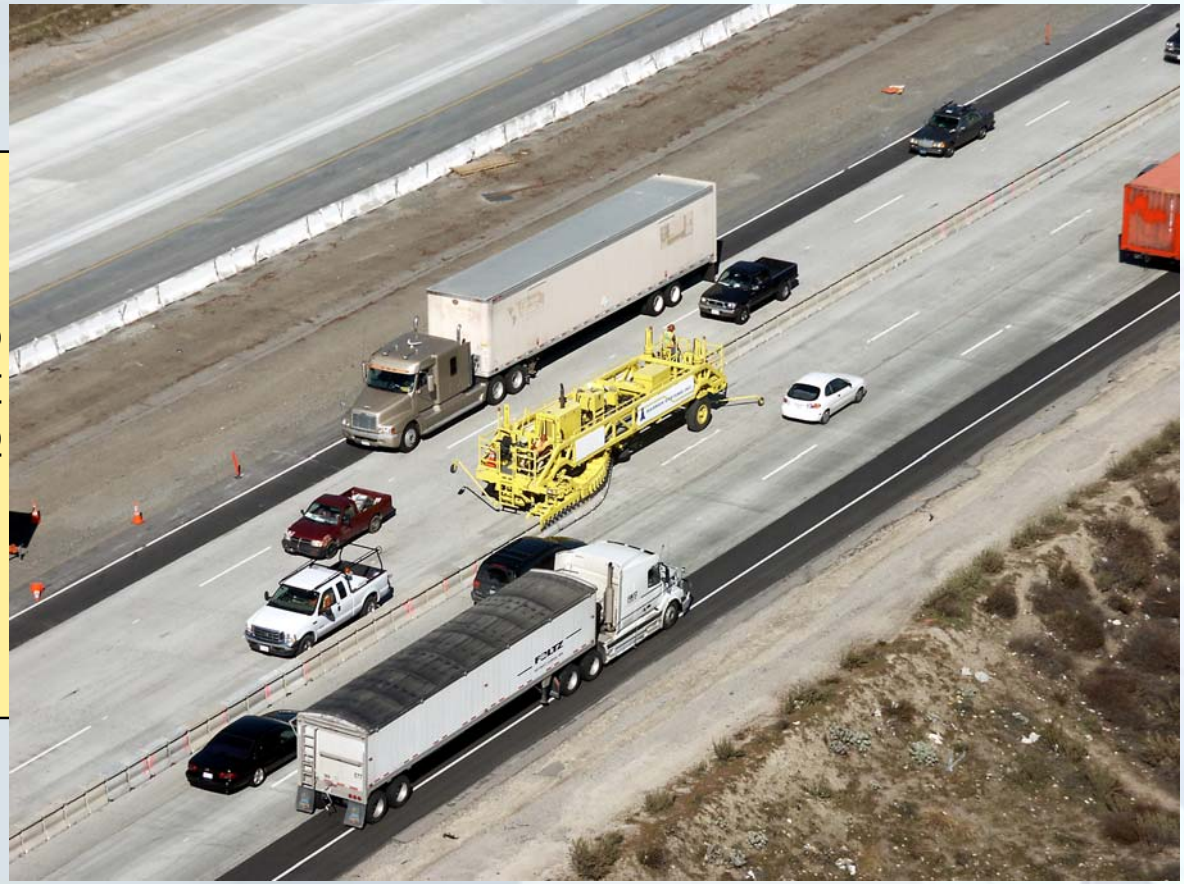

* #4 Lane and #3 Lane work can be done concurrently

STAGE II

# Alt 3,4: Rapid Rehab

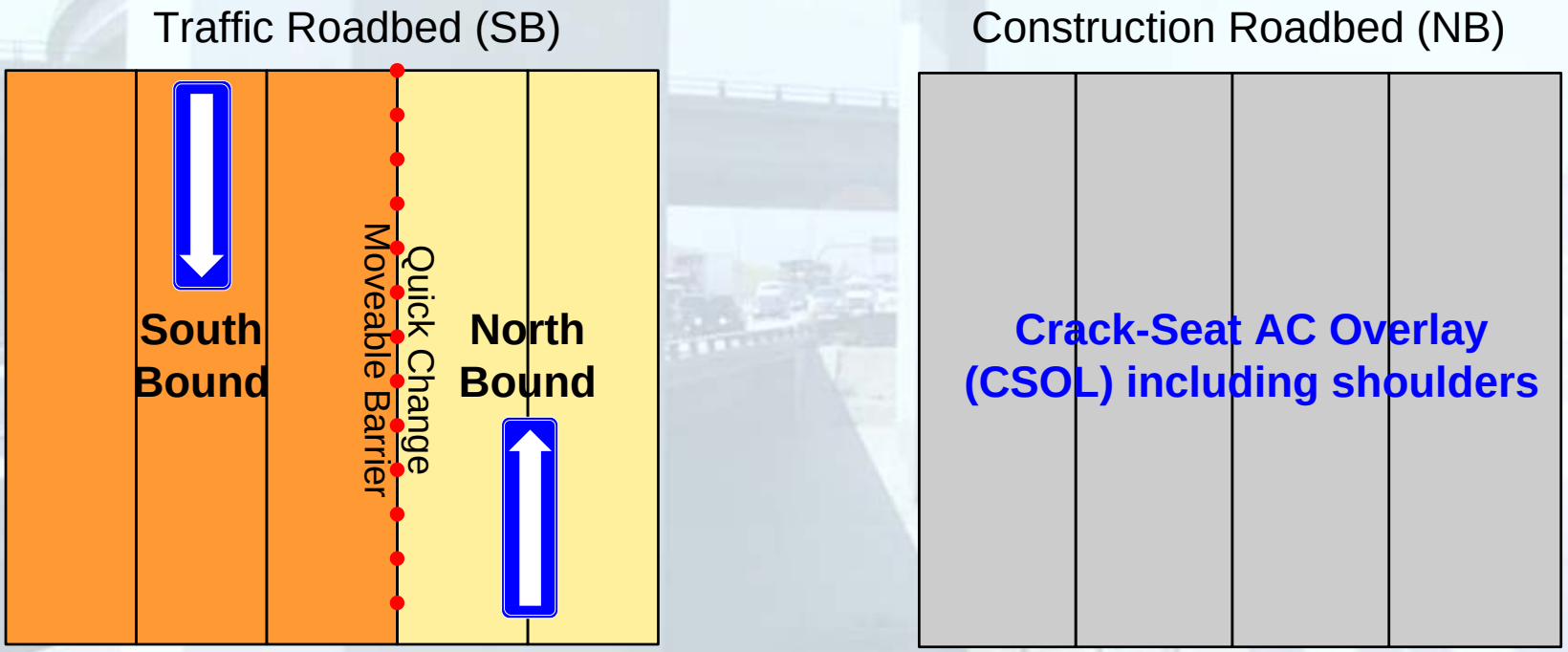
## 55-hour Weekend / Progressive Continuous



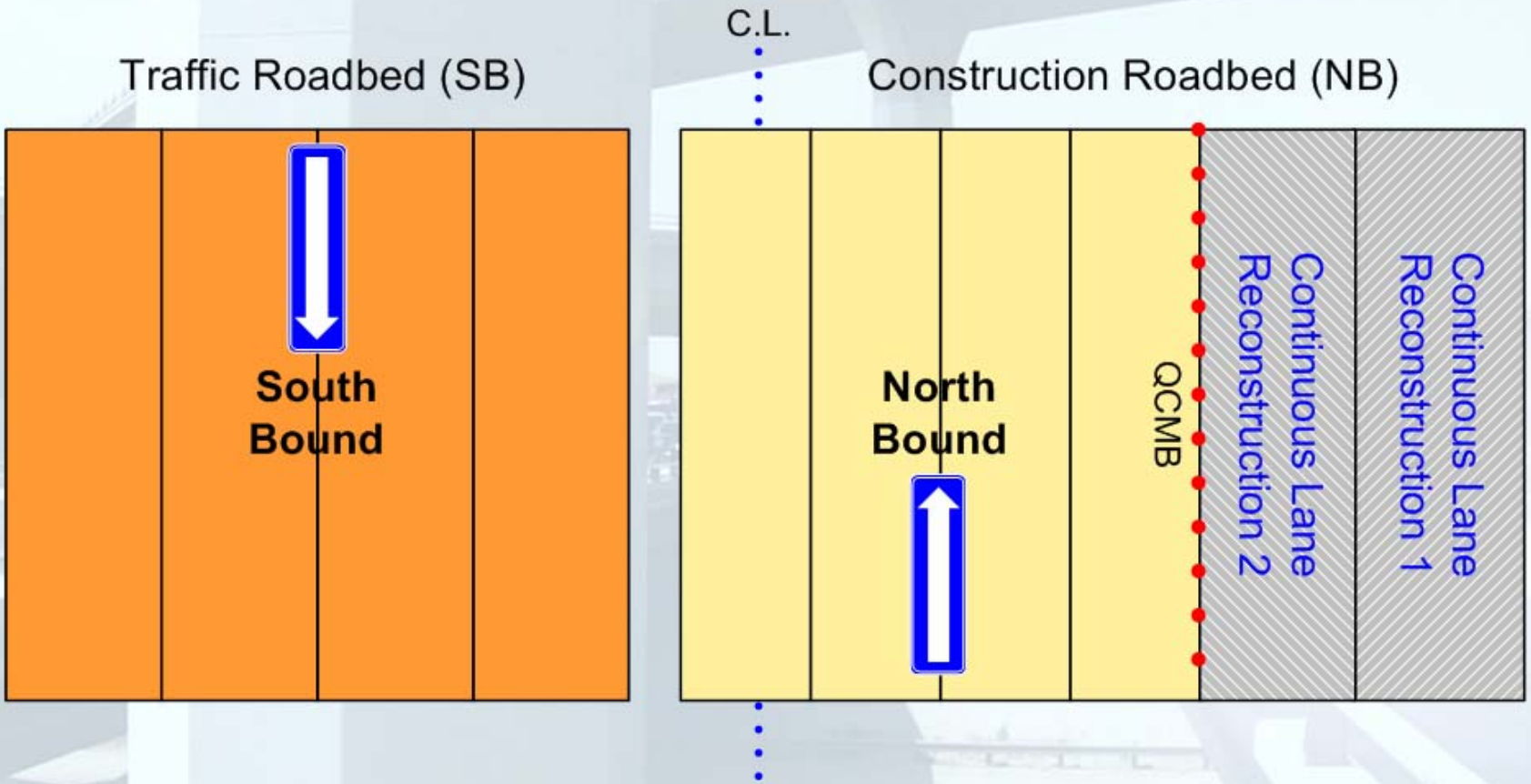



# Alt 6-1, 6-2: CSOL

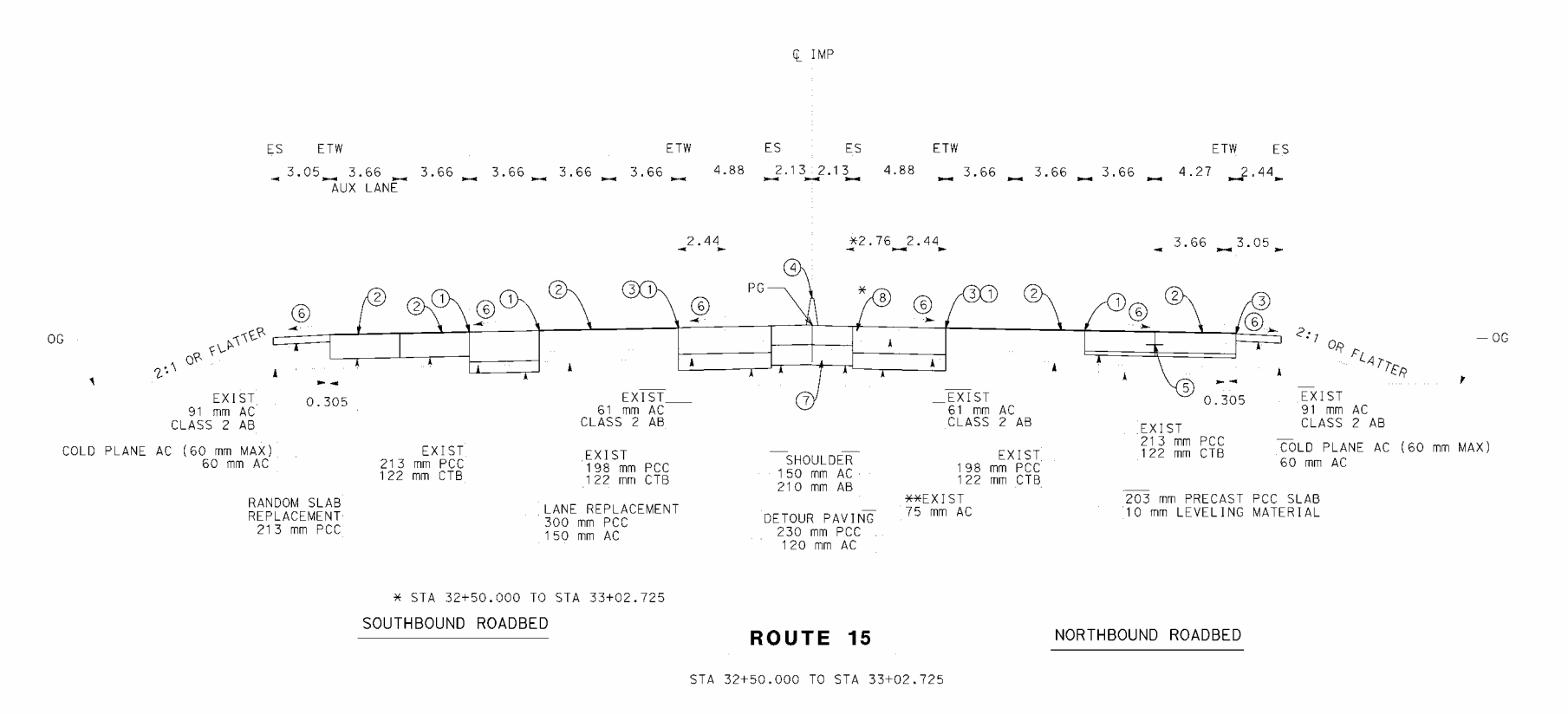
6-1: Long-life, 6-2: Traditional



# Alt 1: Original



# Alt 1: Cross-Section



# Schedule Comparison

| | Scenario | Number of Closures | Remarks | Ratio |
|---|---|---|---|---|
| 1 | Original (55-hour weekend + weekdays) | 35 weekends* | About 8 months | 100% |
| 2 | VA By-pass (55-hour weekend) | 46 weekends | SB median | 131% |
| 3 | Rapid Rehab 1 (55-hour weekend) | 35 weekends | About 8 months | 100% |
| 4 | Rapid Rehab 2 (Progressive Continuous) | 8 weeks | - | 33% |
| 5 | Traditional (8-hour nighttime) | 1,220 nights | About 5 years | About 500% |
| 6 - 1 | Long-life CSOL (55-hour weekend) | 20 weekends | About 6 months | 60% |
| 6-2 | Traditional AC Overlay (8-hour nighttime) | 350 nights | - | 43% |

# Cost Comparison

## RUC & Construction Costs

| Scenario | | Closure Duration | Traffic* | | Cost ($millions) | | Cost Ratio |
|---|---|---|---|---|---|---|---|
| | | | RUC ($M) | Delay (min) | Agency | Total** | |
| 1 | Original | 35 weekends | 3 | 16 | 78 | 79 | 100% |
| 3 | PCC 55-hour Weekend | 35 weekends | 119 | 363 | 83 | 123 | 156% |
| 4 | Progressive Continuous | 8 weeks | 123 | 363 | 77 | 118 | 149% |
| 5 | Traditional Nighttime | 1,220 nights | 133 | 22 | 88 | 133 | 168% |
| 6 | CSOL 55-hour weekend | 20 weekends | 69 | 363 | 60 | 83 | 105% |

* With 30% demand reduction except nighttime (10%)

** Total cost = (1/3 RUC) + (Agency Cost)

# Staging Plan

- Pave the median, widen undercrossings
- Shift southbound traffic two lanes over into the median.
- Rehab outside lanes outside weaving areas on weekdays
- Rehab ramps, connectors, weaving areas on 55-hour weekend closures
- Repeat for northbound side

# Staging Plan / Modeling Plan

- 26 Stages
- Up to 35 weekend closures
- Too costly and time-consuming to analyze all closures
- Choose ones with highest potential impact to traffic

# Dynameq

- Mesoscopic Model
- Equilibrium Based
- Useful for very large-scale applications

Advantages

- More detail than macroscopic
- Less work to set up than microscopic
- Faster model runs than microscopic

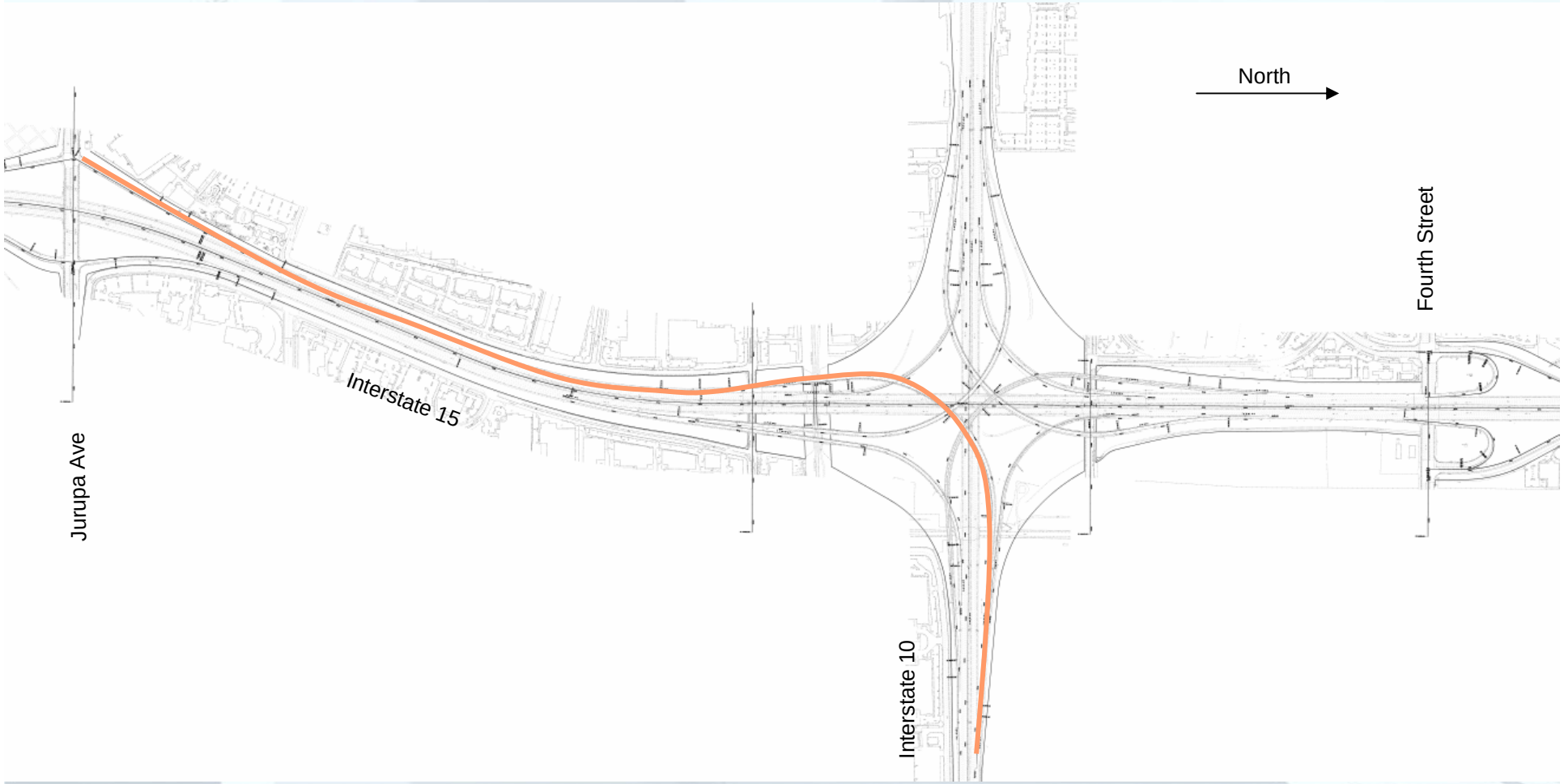
**http://www.inro.ca**

# Model Network

- Base model from SCAG
- Count data
- 67 Traffic Signals
- Lane-level Geometry

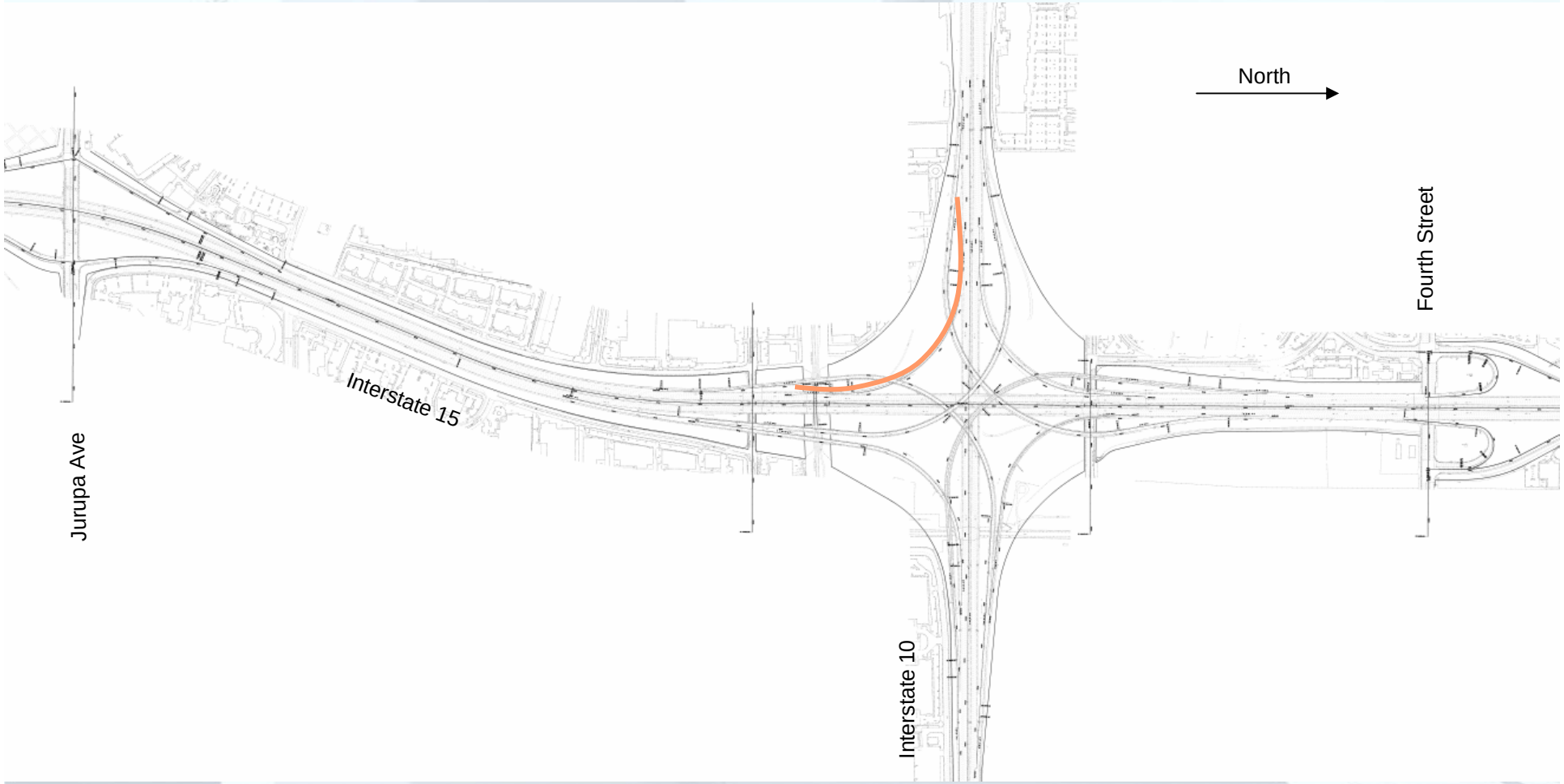
# Stages To Model - 1

## I-10W to I-15S and Jurupa SB offramp



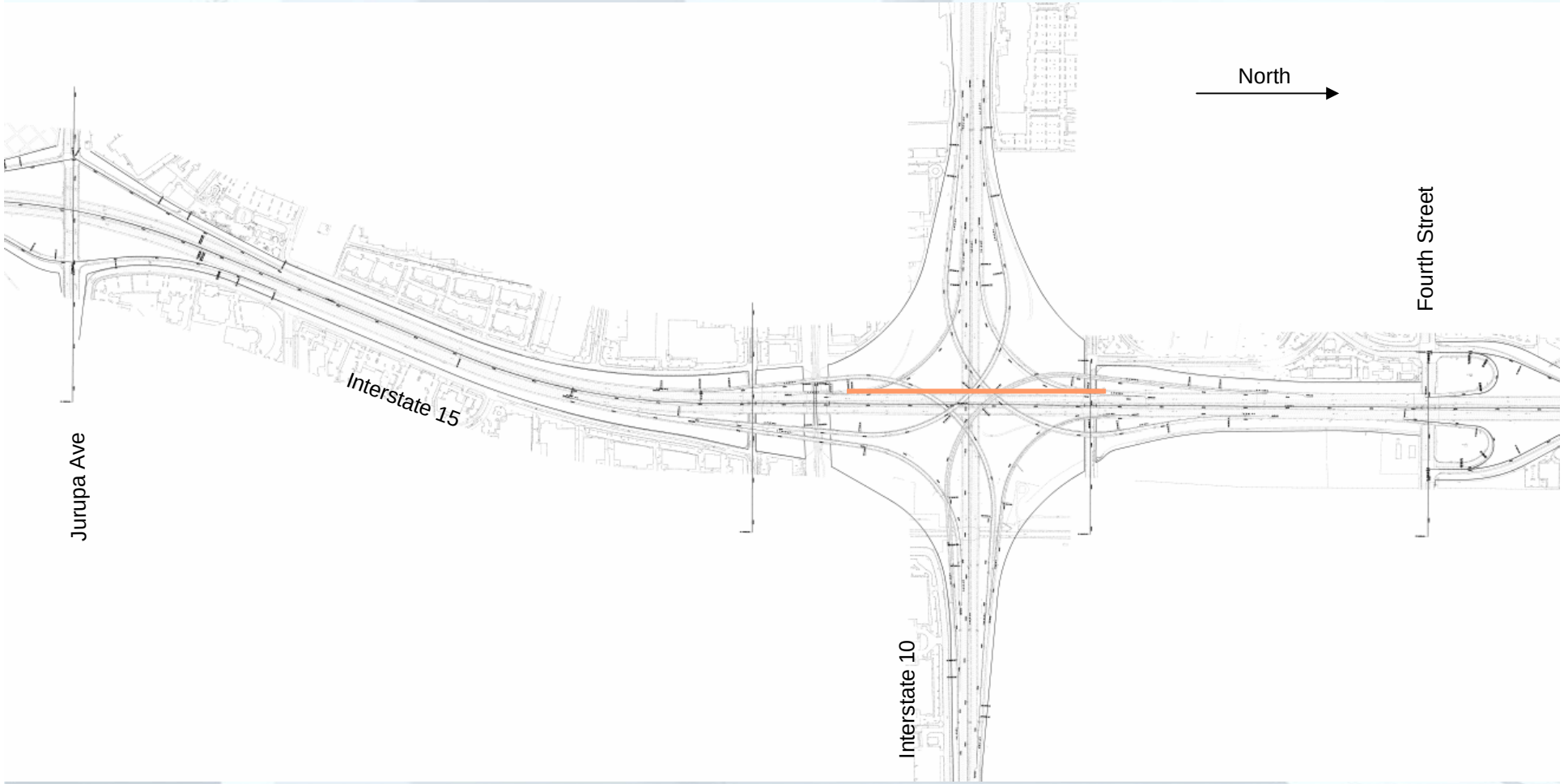
# Stages To Model - 2

## I-10E to I-15S



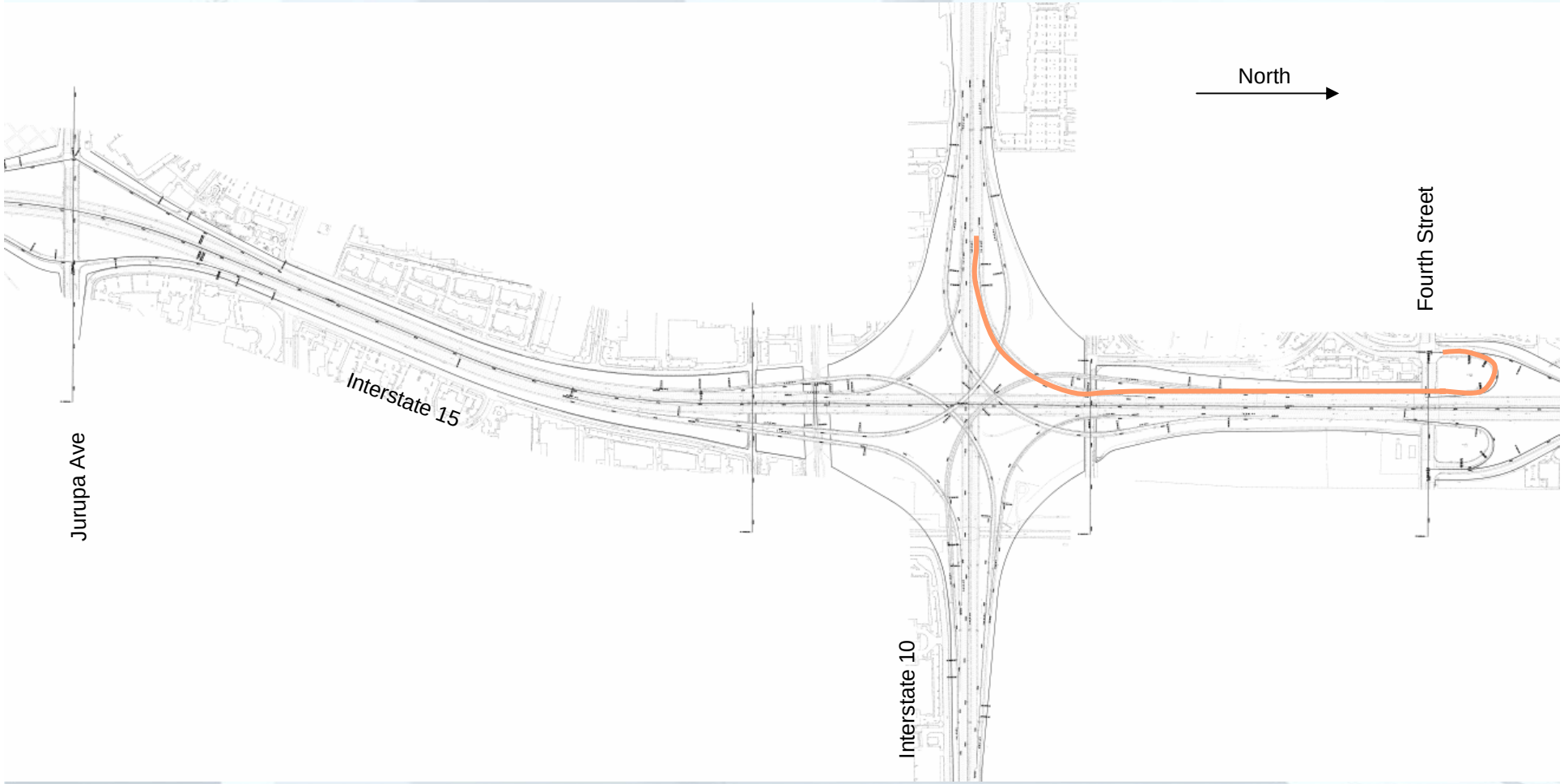
# Stages To Model - 3

## I-15S Reduced To 2 Lanes in IC



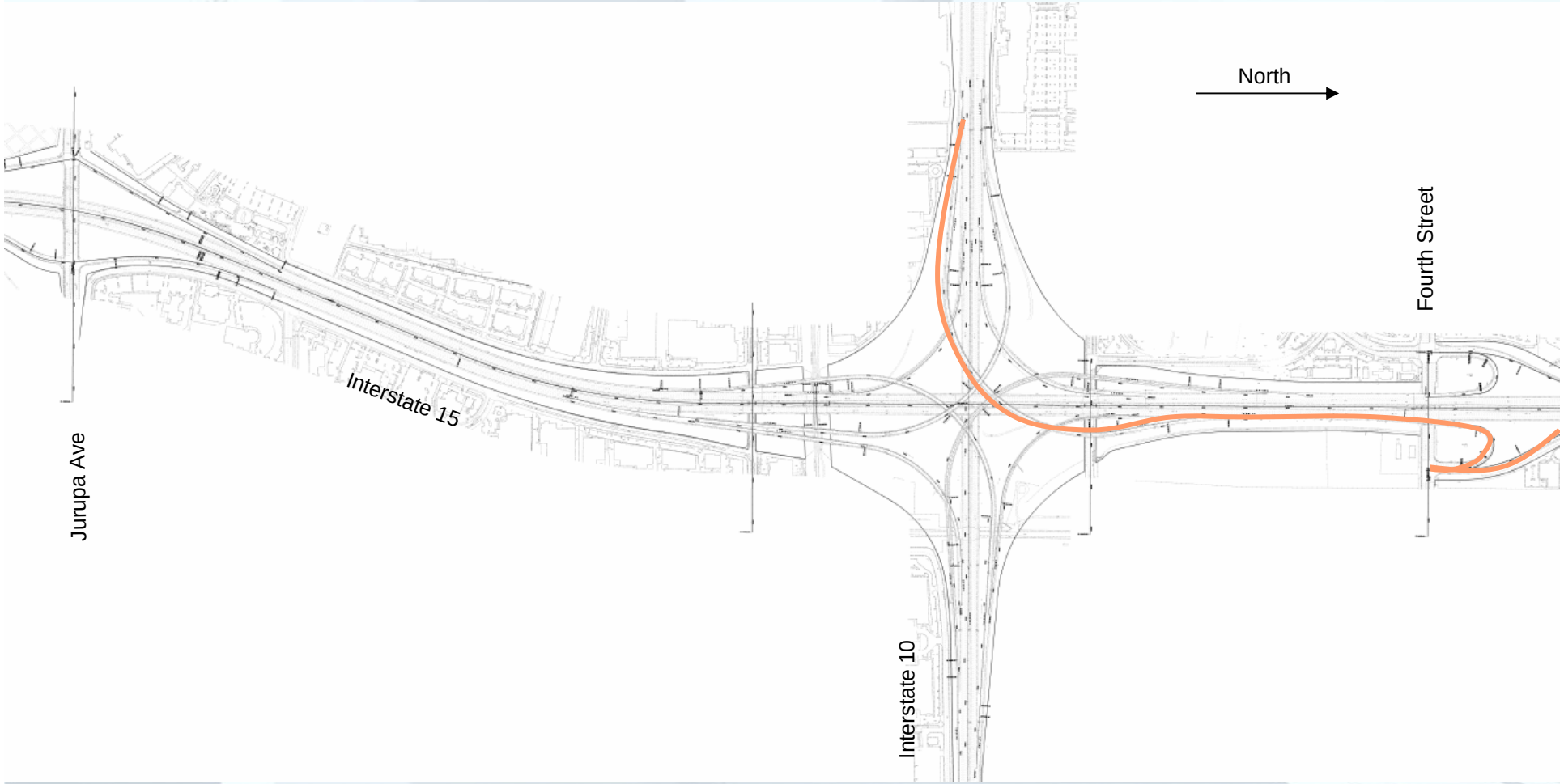
# Stages To Model - 4

## I-15S to I-10W and 4th Street Onramp



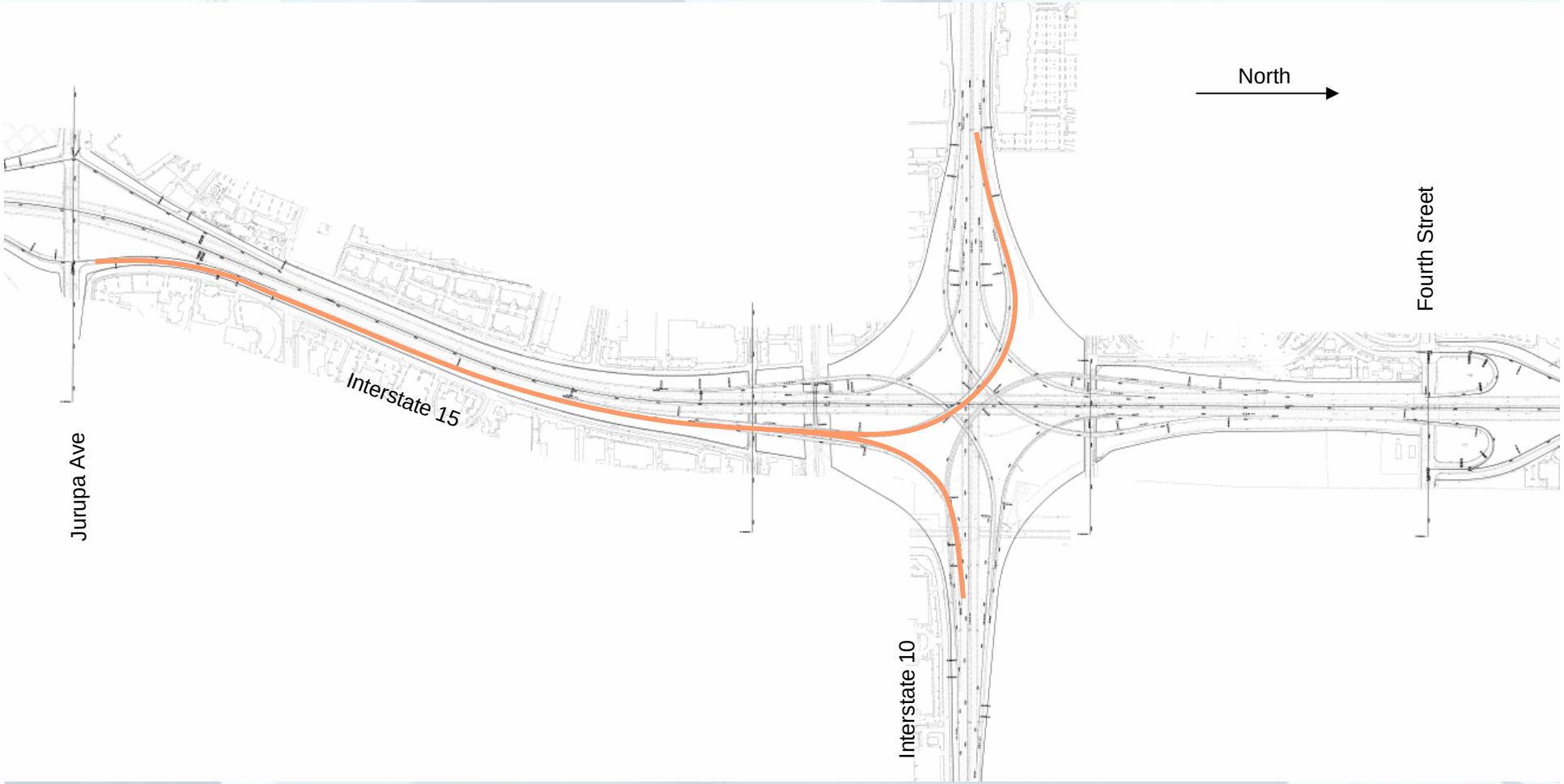
# Stages To Model - 5

## I-10E to I-15N And Both NB 4th Street Ramps



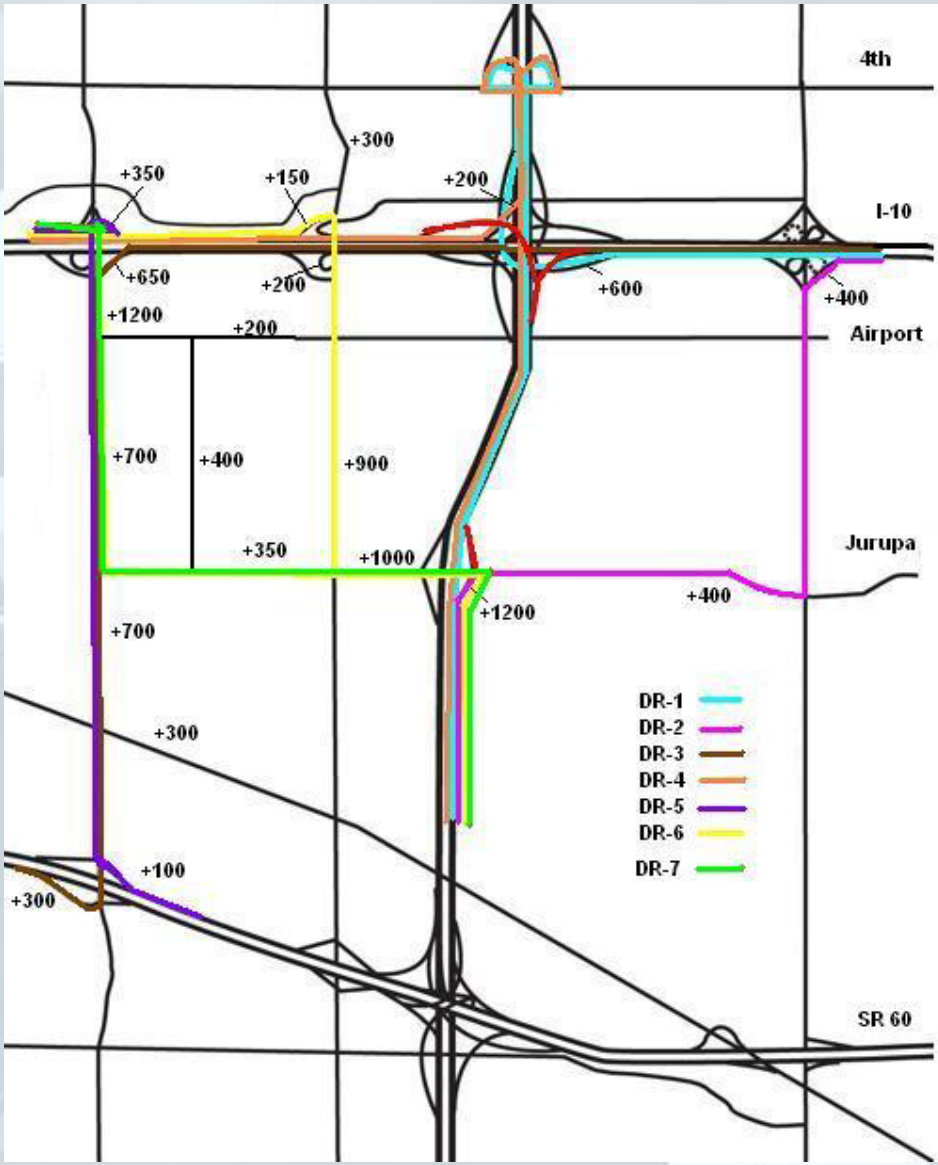
# Stages To Model - 6

## Jurupa Onramp and I-15 to I-10E & W

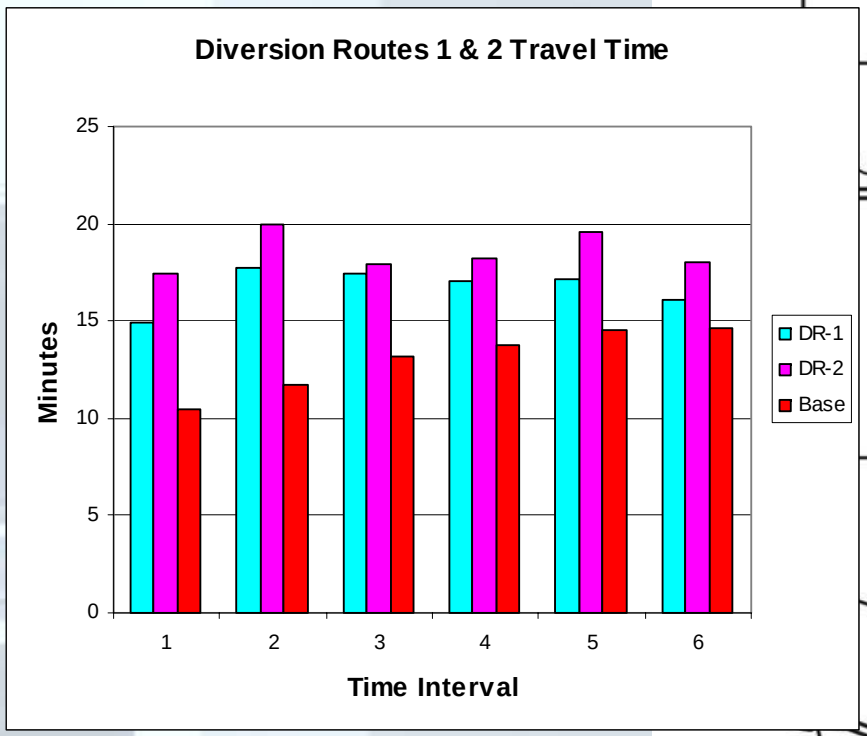


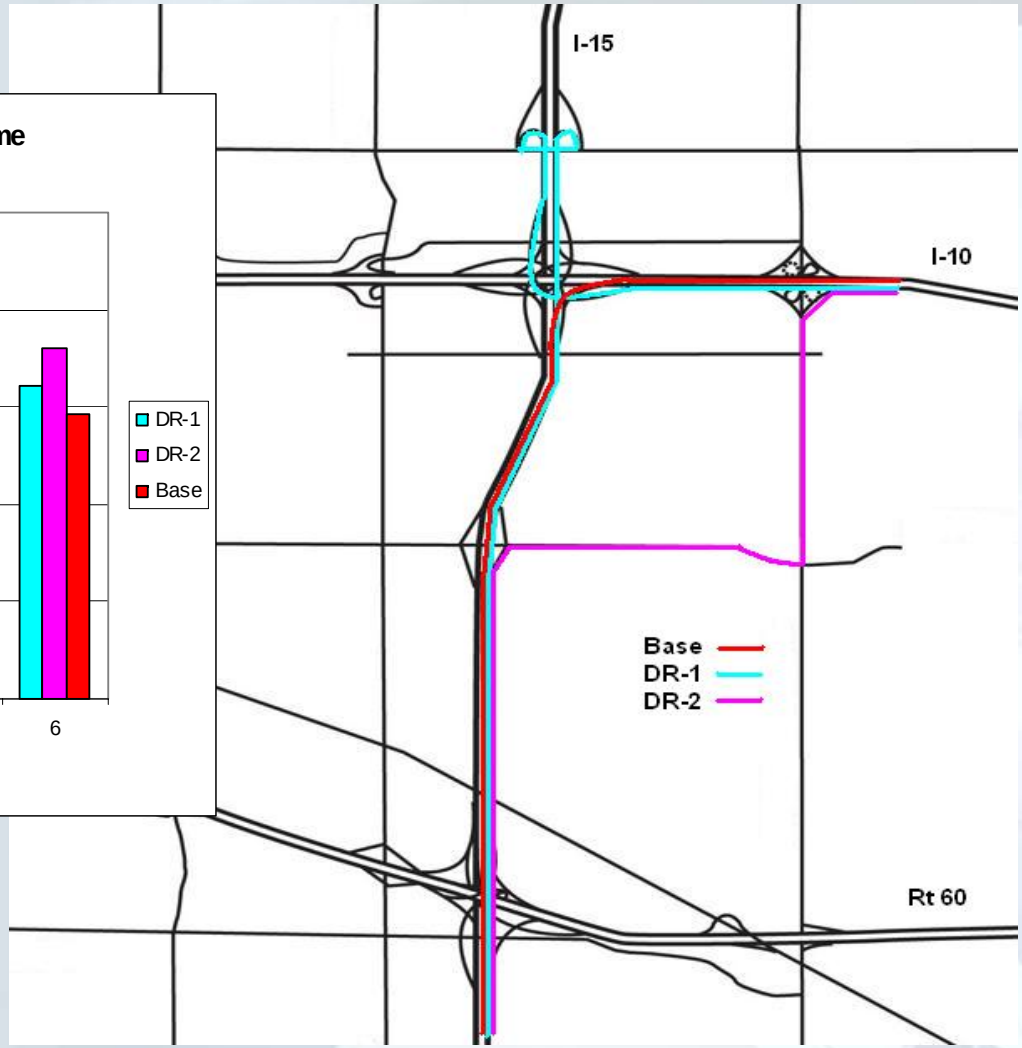
# Diversion Routes

- Travel times
- Delay
- Impacted Links
- Traffic Speed
- Impacted intersections

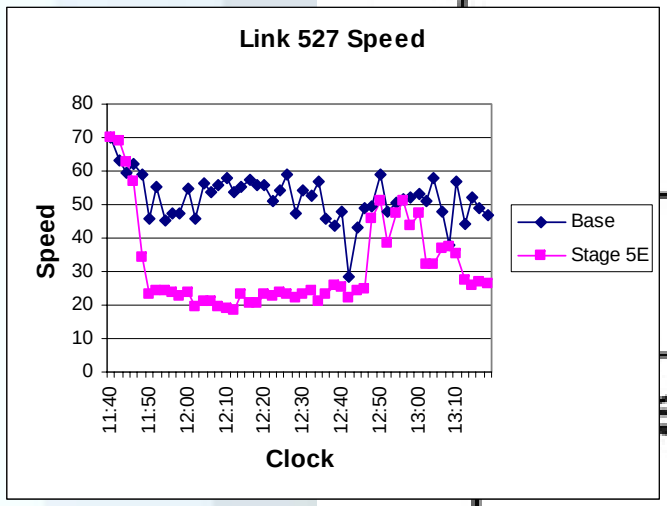


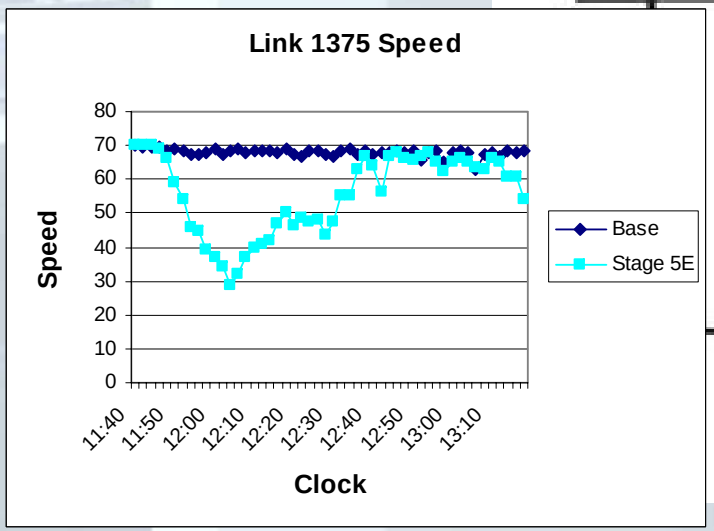
# Travel Times, Delay

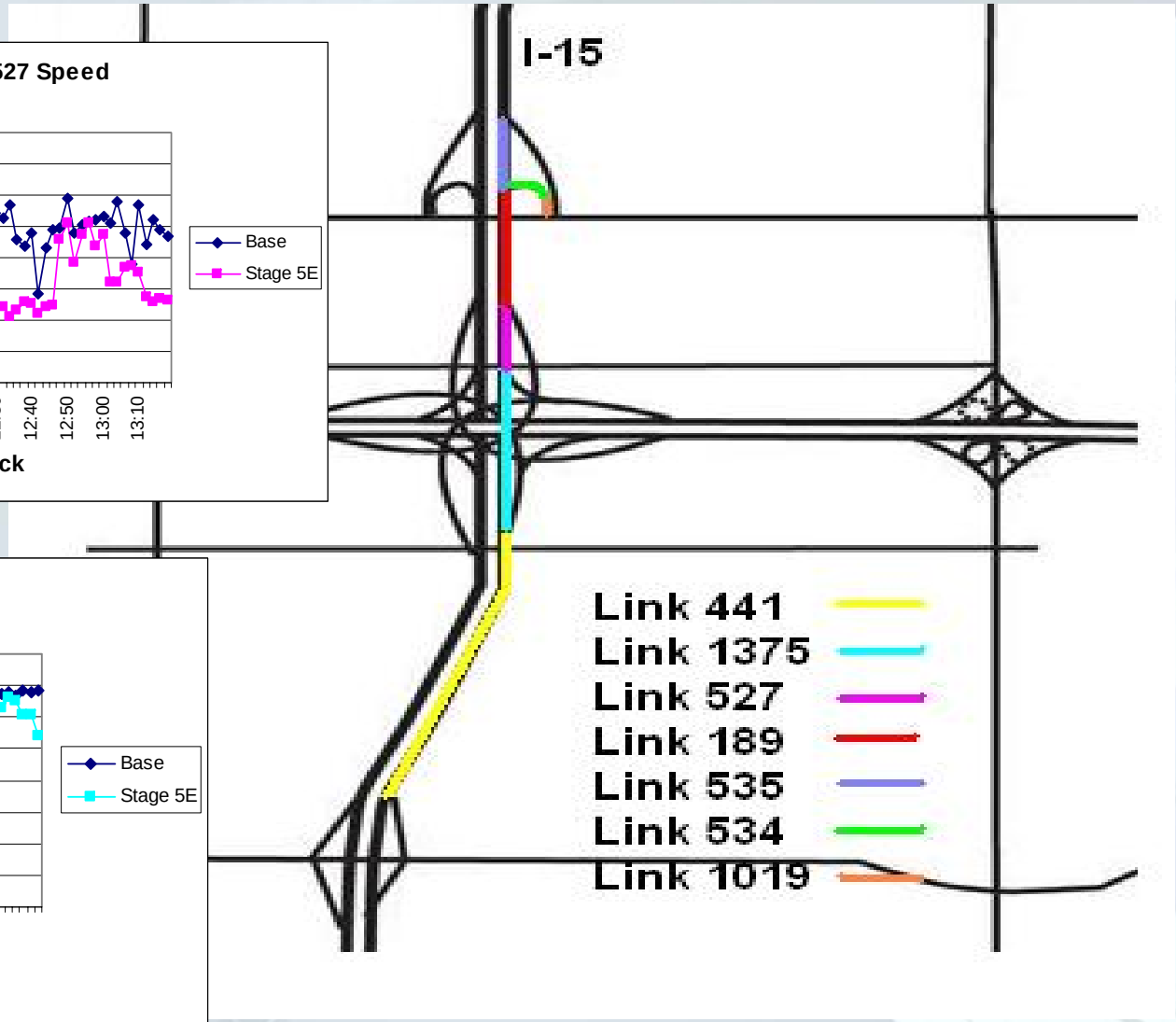


# Traffic Speed, Impacted Links



# Using The Model Results

- Plan detours
- Identify ‘problem’ intersections
- Plan additional measures
- Revise staging
- Compare results with observed during construction

# Questions

**Jonathan den Hartog**
Jonathan_C_den_Hartog@dot.ca.gov
(909) 388-7708

**Syed Raza**
Syed_Raza@dot.ca.gov