



# FINE TUNING THE 91 CORRIDOR

Western Riverside County Programs and Projects  
Committee Meeting  
February 26, 2018

*Michael Blomquist, Toll Program Director*

*Sheldon Mar, Consultant Project Manager*



# Today's Presentation

- Recap of decision criteria and Commission's toll rate policy
- 91 westbound at county line
  - Results of traffic operation analysis for seven options
- Results planned for the next WRCPP meeting

# RCTC's Toll Rate Policy

## Corridor Efficiency

Customer commute

Optimize vehicle throughput

Future corridor improvements

## Financial Commitments

Meet debt obligations

Sustain financial viability

Meet bond covenants

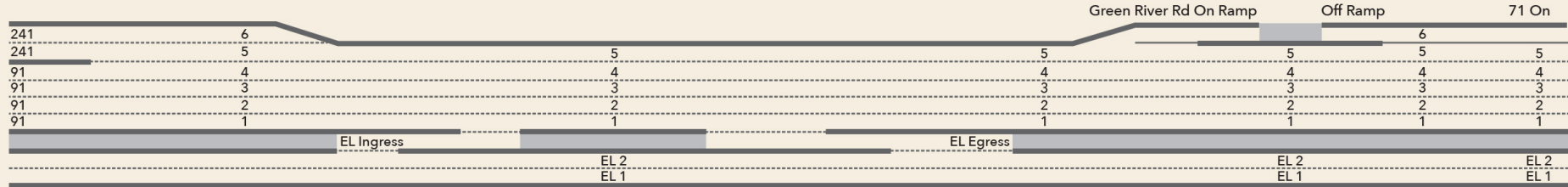
## Lane Access

Vehicle occupancy

Balance payers and carpoolers

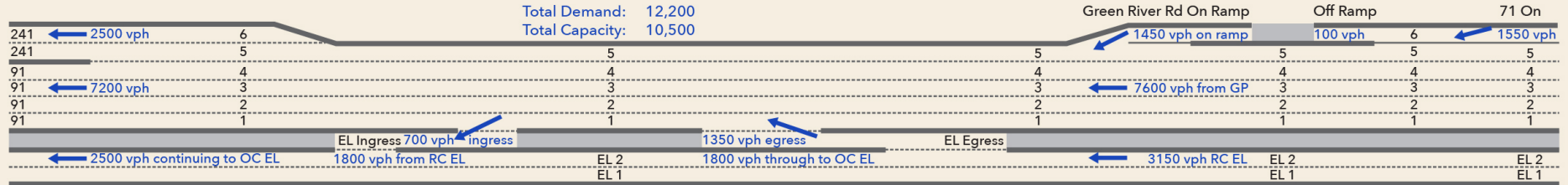
# The 91 at County Line

## Existing



# Current Traffic Counts

## Existing

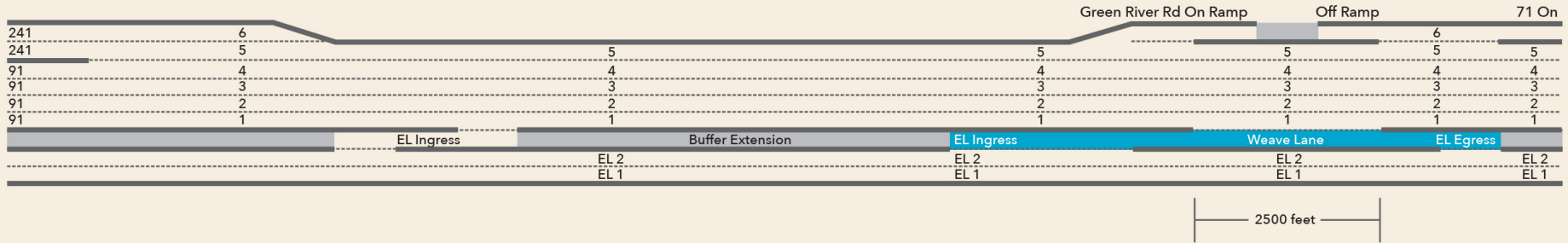




# Option 2

## Option 2

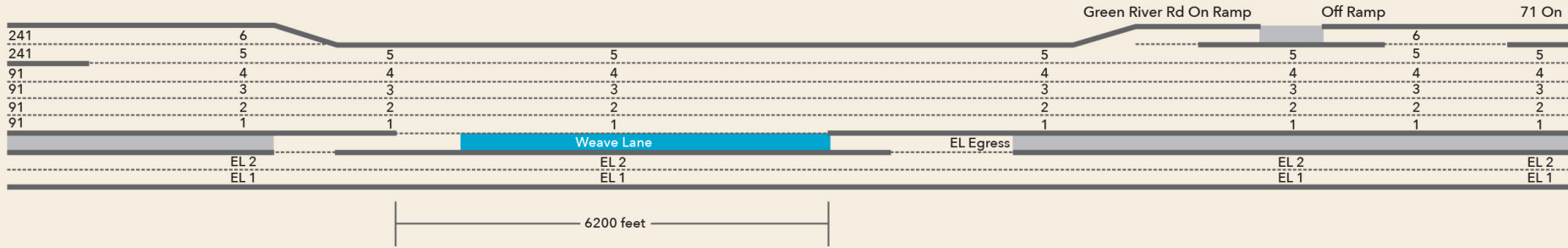
### Shift Express Lanes Access Lane



# Option 3

## Option 3

### Express Lanes Continuous Weave Lane

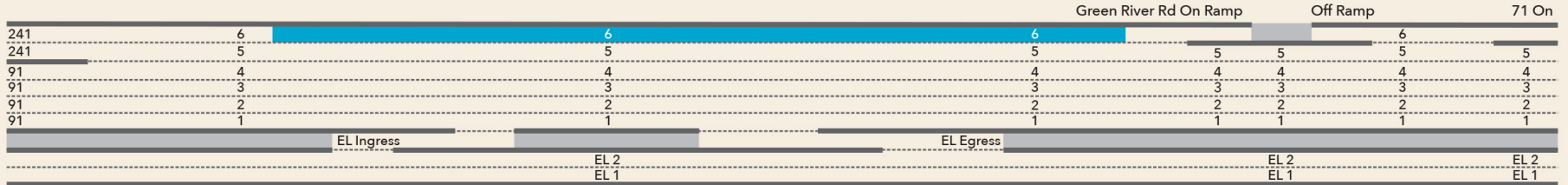




# Option 4

## Option 4

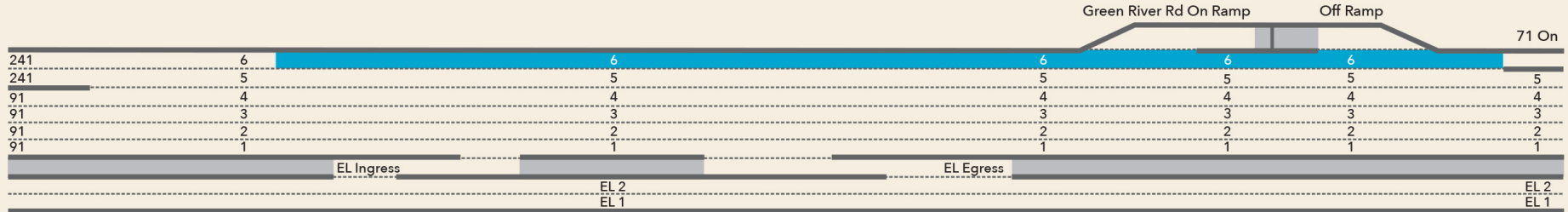
### 5+1 General Purpose to Green River On Ramp



# Option 5

## Option 5

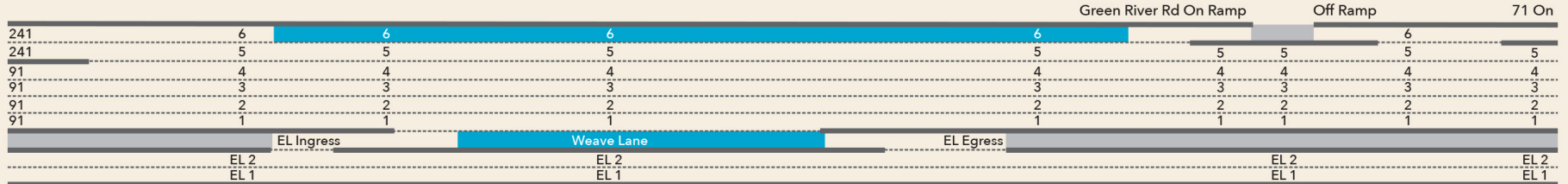
5+1 General Purpose to SR-71



# Option 6

## Option 6

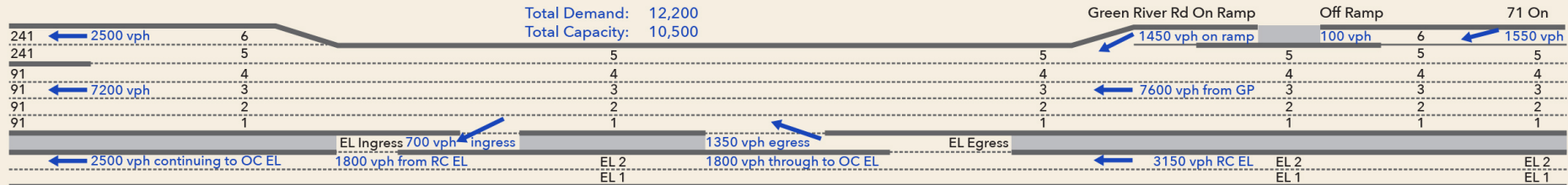
5+1 General Purpose Express Lanes to Green River On Ramp Combined with Continuous Weave Lane



# Modeling Assumptions

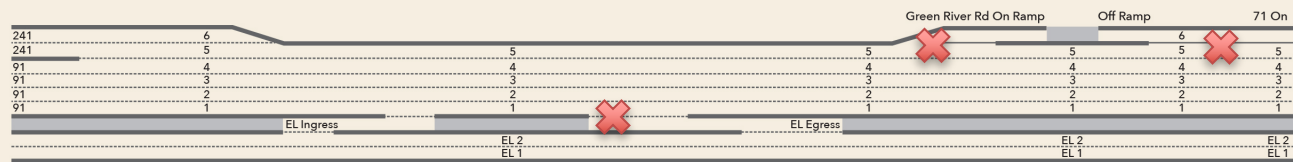
- Existing weekday morning modeled (Monday to Thursday)
- Volumes constant in all scenarios – same GP, same Express**
  - EL utilization: truly will re-balance if GP conditions improve
  - Corridor traffic: should expect an overall increase
  - Allows for an apples to apples view of all scenarios
- GP vehicles will use weave lanes if unrestricted

## Existing



# Westbound Traffic Flow Options

## Existing



- Option 1 improves GP lanes
- Degrades Express Lane
- Aux lane increases GP capacity
- New bottleneck at SR 241
- EL lanes become a "free for all"

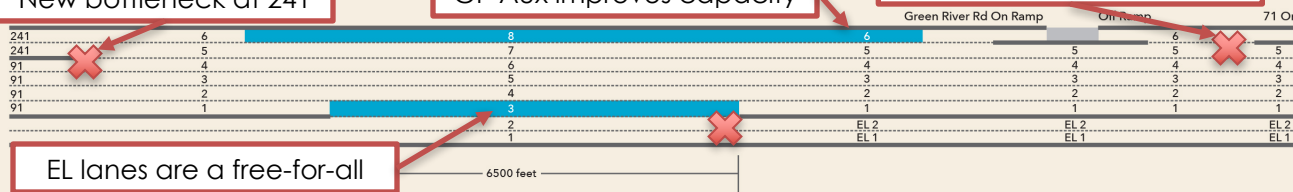
## Option 1

5+1 General Purpose, Remove Express Lanes Access Lane

New bottleneck at 241

GP Aux improves capacity

71 still a bottleneck

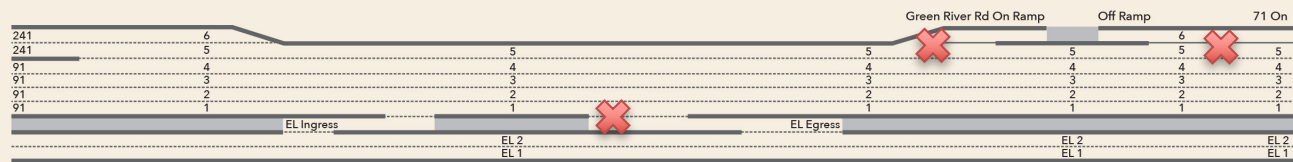


EL lanes are a free-for-all

Scenario	Global Throughput	GP Speed: I-15 to County Line	GP Speed: Green River Rd Ramp to 241	RC EL to OC EL	Duration of Congestion
Existing	10,600	16 mph	43 mph	59 mph	5 hours
Option 1	11,900	26 mph	22 mph	34 mph	2.5 hours

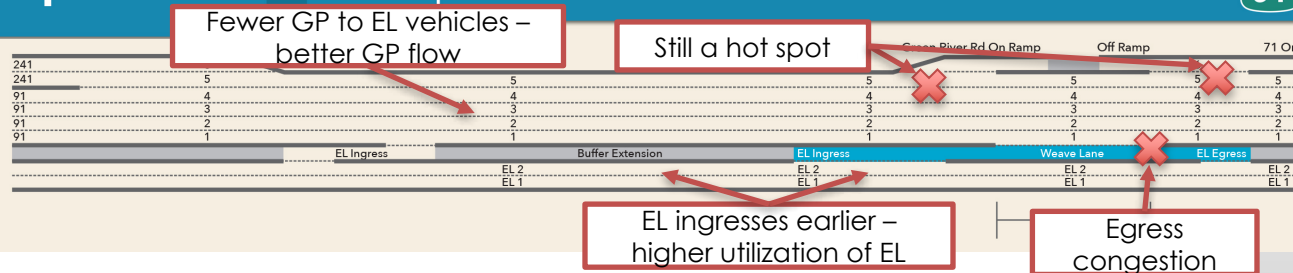
# Westbound Traffic Flow Options

## Existing



## Option 2

### Shift Express Lanes Access Lane

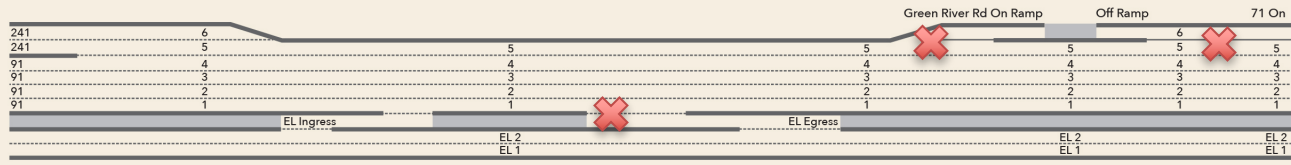


- Option 2 improves GP lanes – extra 500 vph of throughput
- Degrades Express Lane: EL egresses upstream of the bottleneck
- Limits EL egress capacity
- New bottleneck forms at SR 241

Scenario	Global Throughput	GP Speed: I-15 to County Line	GP Speed: Green River Rd Ramp to 241	RC EL to OC EL	Duration of Congestion
Existing	10,600	16 mph	43 mph	59 mph	5 hours
Option 2	11,100	15 mph	56 mph	59 mph	4.5 hours

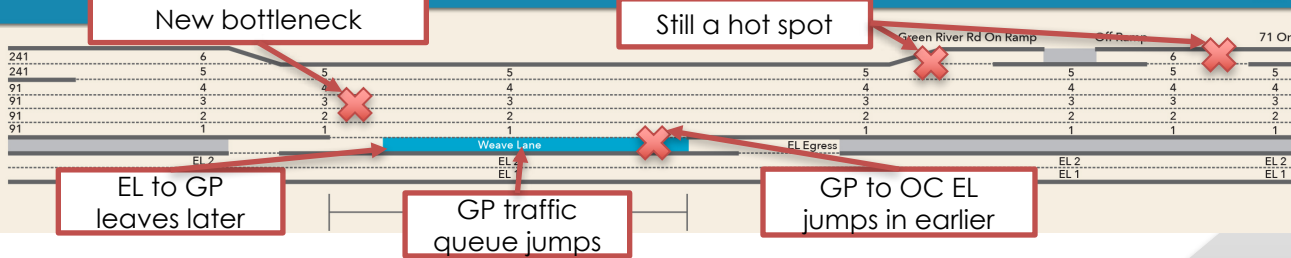
# Westbound Traffic Flow Options

## Existing



## Option 3

### Express Lanes Continuous Weave Lane

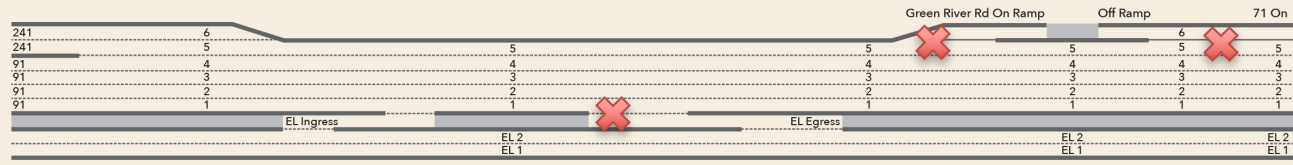


- Option 3 improves GP lanes
- Degrades Express Lane
- Allows earlier ingress, later egress, and GP queue jumpers = equity between GP and weave lane
- Limits EL egress capacity
- New bottleneck forms at EL Egress

Scenario	Global Throughput	GP Speed: I-15 to County Line	GP Speed: Green River Rd Ramp to 241	RC EL to OC EL	Duration of Congestion
Existing	10,600	16 mph	43 mph	59 mph	5 hours
Option 3	11,800	22 mph	52 mph	59 mph	3.5 hours

# Westbound Traffic Flow Options

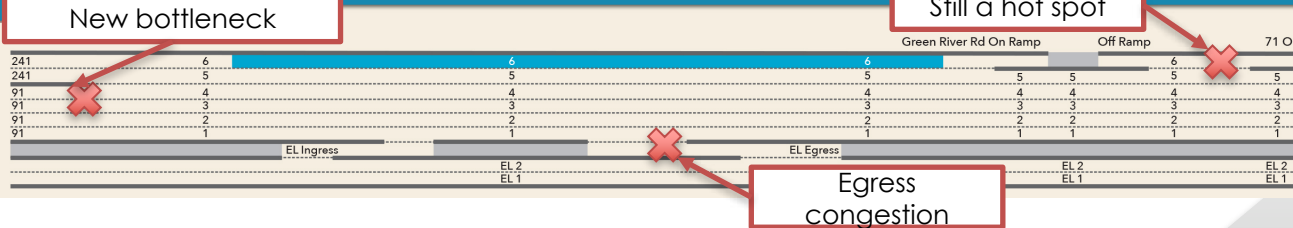
## Existing



- Option 4 improves GP capacity
- Maintains EL capacity
- New bottleneck forms at SR 241
- Overall duration of congestion reduced.

## Option 4

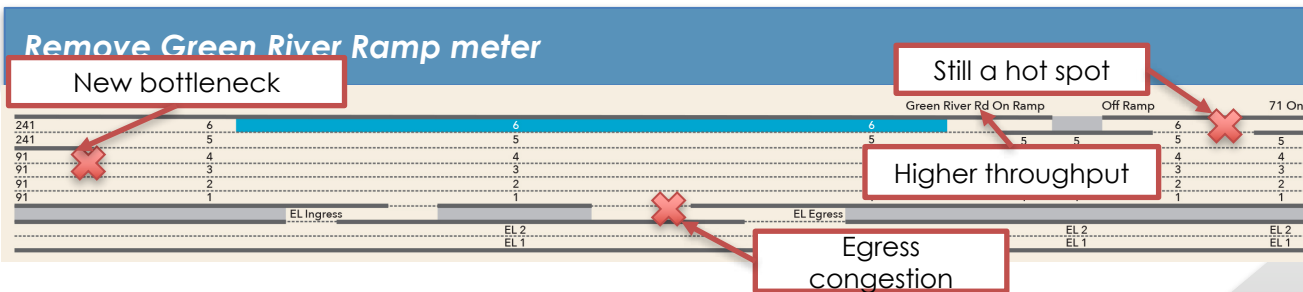
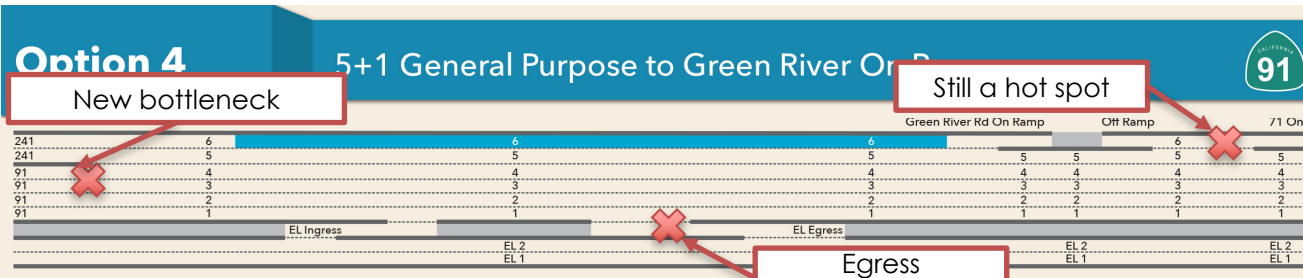
5+1 General Purpose to Green River On Ramp



Scenario	Global Throughput	GP Speed: I-15 to County Line	GP Speed: Green River Rd Ramp to 241	RC EL to OC EL	Duration of Congestion
Existing	10,600	16 mph	43 mph	59 mph	5 hours
Option 4	11,900	23 mph	23 mph	59 mph	2.5 hours



# Westbound Traffic Flow Options

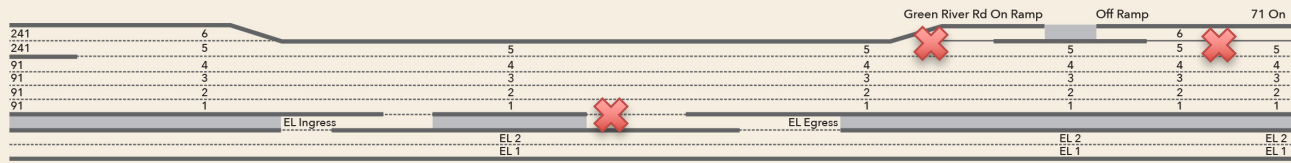


- Option 4b – removing ramp-meter at Green River Road improves ramp throughput
- Upstream GP overall slightly more congested.
- Other factors:
- Ramp merge – 3 to 2 to 1 lane.
- Benefits in other scenarios?

Scenario	Global Throughput	GP Speed: I-15 to County Line	GP Speed: Green River Rd Ramp to 241	RC EL to OC EL	Duration of Congestion
Option 4	11,900	23.4 mph	23 mph	59 mph	2.5 hours
Option 4b (No ramp meter)	12,000	22.7 mph	22 mph	59 mph	2.5 hours

# Westbound Traffic Flow Options

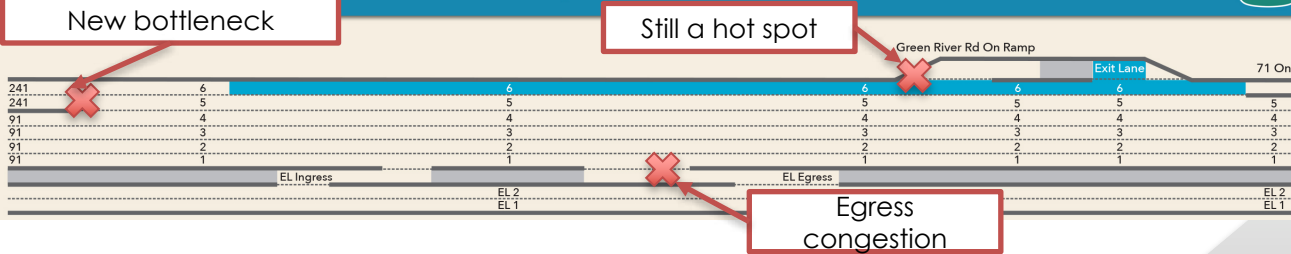
## Existing



- Similar to Option 4, slight overall improvement
- Clears overall congestion 15 minutes earlier

## Option 5

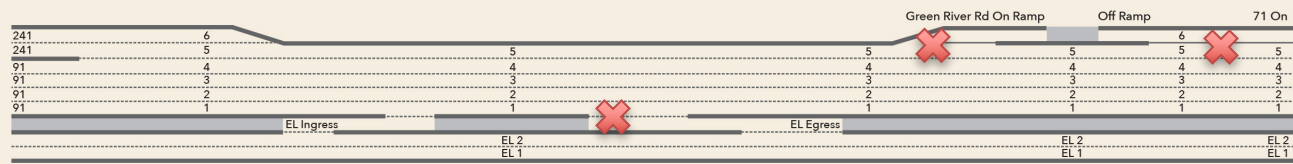
5+1 General Purpose to SR-71



Scenario	Global Throughput	GP Speed: I-15 to County Line	GP Speed: Green River Rd Ramp to 241	RC EL to OC EL	Duration of Congestion
Existing	10,600	16 mph	43 mph	59 mph	5 hours
Option 5	11,700	24 mph	20 mph	59 mph	2.5 hours

# Westbound Traffic Flow Options

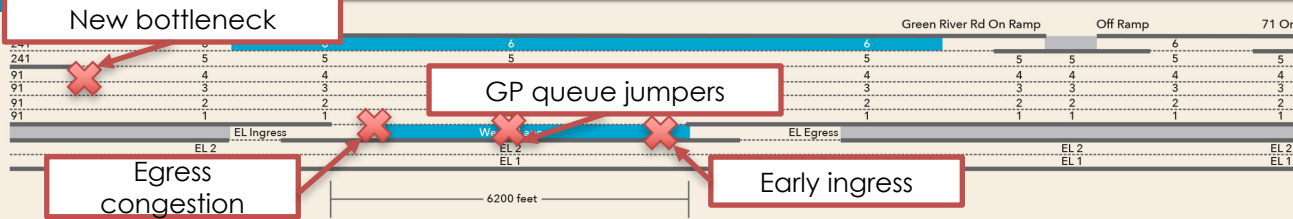
## Existing



- Option 6 improves GP lanes
- Degrades Express Lane

## Option 6

5+1 General Purpose Express Lanes to Green River On Ramp Combined with Continuous Weave Lane



Scenario	Global Throughput	GP Speed: I-15 to County Line	GP Speed: Green River Rd Ramp to 241	RC EL to OC EL	Duration of Congestion
Existing	10,600	16 mph	43 mph	59 mph	5 hours
Option 6	11,900	27 mph	21 mph	47 mph	2.5 hours

# “Heat Map” – Option 1

## Remove EL Ingress/Egress Lane – Unrestricted Weaving Area

EXISTING

	From		Approaching			County Line		County Line		County Line	w/o EL	e/o EL	Grn Riv	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
	From	To	w/o 241 Off	SR 241 Off	SR 241 Aux	241	e/o EL Ingress	West	Mid	East	Egress	Egress	Merge	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
GENERAL PURPOSE	4:30 AM	5:00 AM	58	59	61	61	56	61	62	53	36	35	17	24	16	30	61	61	61
	5:00 AM	5:30 AM	60	61	62	62	57	62	62	51	21	21	13	15	10	8	10	63	63
	5:30 AM	6:00 AM	62	62	60	62	59	62	63	50	18	16	12	13	9	8	8	64	64
	6:00 AM	6:30 AM	63	63	60	62	59	62	63	51	17	16	12	13	9	8	10	65	64
	6:30 AM	7:00 AM	63	63	58	62	59	62	63	53	15	15	11	12	8	7	62	66	64
	7:00 AM	7:30 AM	64	64	58	62	59	63	63	53	15	15	11	11	8	7	66	66	65
	7:30 AM	8:00 AM	65	63	57	62	60	63	63	54	15	15	11	11	8	7	66	66	65
	8:00 AM	8:30 AM	65	63	56	63	60	63	64	53	14	15	11	12	8	7	66	66	65
	8:30 AM	9:00 AM	65	62	49	59	58	63	63	53	15	15	12	12	8	8	65	65	64
9:00 AM	9:30 AM	65	62	46	60	57	62	63	53	16	15	11	11	8	11	65	65	64	
9:30 AM	10:00 AM	65	62	53	61	53	62	62	51	21	21	15	15	14	54	64	64	64	
EXPRESS LANE	4:30 AM	5:00 AM	61	61	60	61	60	60	61	61	61	61	59	59	59	59	59	58	56
	5:00 AM	5:30 AM	59	59	58	60	60	60	60	60	61	60	57	58	58	58	59	56	56
	5:30 AM	6:00 AM	60	60	60	61	60	60	61	61	62	59	57	58	58	58	59	56	56
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	6:30 AM	7:00 AM	61	61	61	62	61	61	62	62	62	33	53	58	58	58	58	56	56
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	7:30 AM	8:00 AM	62	62	62	63	62	62	63	63	63	14	17	39	56	58	58	56	56
	8:00 AM	8:30 AM	62	62	63	63	62	62	63	63	63	13	16	15	18	57	58	56	56
	8:30 AM	9:00 AM	61	61	62	62	61	61	62	62	63	15	17	16	16	39	58	57	56
9:00 AM	9:30 AM	61	61	61	62	61	61	62	62	62	24	27	38	46	59	59	58	56	
9:30 AM	10:00 AM	61	61	61	62	61	61	61	61	62	60	59	59	59	59	60	59	56	

Build Condition -- SR 91 Option 1 (GP Aux Lane, Remove EL Ingress/Egress Lane)

	From		Approaching			County Line		County Line		County Line	w/o EL	e/o EL	Grn Riv	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
	From	To	w/o 241 Off	SR 241 Off	SR 241 Aux	241	e/o EL Ingress	West	Mid	East	Egress	Egress	Merge	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
GENERAL PURPOSE	4:30 AM	5:00 AM	52	31	18	27	39	45	57	62	63	61	62	38	19	30	61	61	61
	5:00 AM	5:30 AM	51	33	15	16	16	18	18	21	33	42	46	43	16	13	21	64	63
	5:30 AM	6:00 AM	53	48	21	21	20	21	19	16	15	20	21	23	13	12	64	64	64
	6:00 AM	6:30 AM	58	57	23	21	21	22	20	17	17	24	22	26	13	21	65	65	64
	6:30 AM	7:00 AM	62	59	26	22	21	22	23	22	27	46	45	53	56	66	66	66	64
	7:00 AM	7:30 AM	64	58	44	46	47	56	62	64	64	66	65	65	66	66	66	66	65
	7:30 AM	8:00 AM	65	57	62	64	62	63	63	63	64	66	65	65	66	66	66	66	65
	8:00 AM	8:30 AM	65	53	62	64	62	63	63	63	64	66	64	65	66	66	66	66	65
	8:30 AM	9:00 AM	65	58	62	64	63	63	63	63	64	66	64	65	65	66	65	65	64
9:00 AM	9:30 AM	65	61	64	64	64	64	63	64	64	65	64	65	65	65	65	65	64	
9:30 AM	10:00 AM	65	63	64	64	64	64	63	64	64	65	64	64	64	65	64	64	64	
EXPRESS LANE	4:30 AM	5:00 AM	60	61	61	61	61	57	59	59	61	58	59	59	59	59	59	58	56
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	8:30 AM	9:00 AM	61	61	61	61	61	62	61	60	61	57	58	58	58	58	59	57	56
9:00 AM	9:30 AM	61	61	61	61	61	62	62	61	61	58	59	59	59	59	59	58	56	
9:30 AM	10:00 AM	61	61	61	61	62	62	61	61	61	58	59	59	59	59	60	59	56	

**Option 1:** Improves GP but degrades EL operations

# "Heat Map" – Option 2

Move EL Egress/Ingress to the east

EXISTING

GENERAL PURPOSE	From	To	w/o 241 Off	SR 241 Off	SR 241 Aux	Approaching 241	e/o EL Ing	County Line West	County Line Mid	County Line East	w/o EL Egress	e/o EL Egress	Grn Riv Merge	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
	4:30 AM	5:00 AM	58	59	61	61	56	61	62	53	36	35	17	24	16	30	61	61	61
5:00 AM	5:30 AM	60	61	62	62	57	62	62	51	21	21	13	15	10	8	10	63	63	
5:30 AM	6:00 AM	62	62	60	62	59	62	63	50	18	16	12	13	9	8	8	64	64	
6:00 AM	6:30 AM	63	63	60	62	59	62	63	51	17	16	12	13	9	8	10	65	64	
6:30 AM	7:00 AM	63	63	58	62	59	62	63	53	15	15	11	12	8	7	62	66	64	
7:00 AM	7:30 AM	64	64	58	62	59	63	63	53	15	15	11	11	8	7	66	66	65	
7:30 AM	8:00 AM	65	63	57	62	60	63	63	54	15	15	11	11	8	7	66	66	65	
8:00 AM	8:30 AM	65	63	56	63	60	63	64	53	14	15	11	12	8	7	66	66	65	
8:30 AM	9:00 AM	65	62	49	59	58	63	63	53	15	15	12	12	8	8	65	65	64	
9:00 AM	9:30 AM	65	62	46	60	57	62	63	53	16	15	11	11	8	11	65	65	64	
9:30 AM	10:00 AM	65	62	53	61	53	62	62	51	21	21	15	15	14	54	64	64	64	
EXPRESS LANE	4:30 AM	5:00 AM	61	61	60	61	60	61	61	61	61	59	59	59	59	59	58	56	
5:00 AM	5:30 AM	59	59	58	60	60	60	60	60	61	60	57	58	58	58	59	56	56	
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9:30 AM	10:00 AM	61	61	61	62	61	61	61	61	62	60	59	59	59	59	60	59	56	

Build Condition -- SR 91 Option 2 (Dual Ingress, Shift Egress to East)

GENERAL PURPOSE	From	To	w/o 241 Off	SR 241 Off	SR 241 Aux	Approaching 241	e/o EL Ing	County Line West	County Line Mid	County Line East	w/o EL Egress	e/o EL Egress	Grn Riv Merge	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
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5:00 AM	5:30 AM	59	60	61	62	61	62	62	62	62	62	56	17	16	10	8	9	61	63
5:30 AM	6:00 AM	61	61	59	62	61	62	62	62	62	62	56	17	14	9	9	8	39	64
6:00 AM	6:30 AM	62	62	58	61	61	62	62	62	62	62	56	18	14	9	9	8	41	64
6:30 AM	7:00 AM	63	63	53	61	61	62	62	62	62	62	56	17	15	9	9	29	66	64
7:00 AM	7:30 AM	64	63	52	61	62	62	62	62	62	62	56	17	15	9	8	66	66	65
7:30 AM	8:00 AM	65	63	45	65	54	62	63	63	62	56	17	15	10	9	66	66	65	
8:00 AM	8:30 AM	65	58	40	23	34	30	44	56	62	56	18	15	19	61	66	66	65	
8:30 AM	9:00 AM	65	58	40	22	27	21	21	24	31	33	24	61	65	66	65	65	64	
9:00 AM	9:30 AM	64	61	42	28	35	31	34	45	50	54	63	63	65	65	65	65	64	
9:30 AM	10:00 AM	65	63	60	63	63	63	63	63	63	63	64	62	64	65	64	64	64	
EXPRESS LANE	4:30 AM	5:00 AM	60	60	60	61	60	60	60	61	61	61	61	58	59	59	59	58	56
5:00 AM	5:30 AM	59	59	58	60	60	60	60	60	60	60	60	60	56	58	58	59	56	56
5:30 AM	6:00 AM	60	60	59	60	60	60	60	60	61	61	61	61	56	58	58	59	56	56
6:00 AM	6:30 AM	60	60	60	61	60	60	60	60	61	61	61	61	55	58	58	59	56	56
6:30 AM	7:00 AM	61	61	61	62	61	61	62	62	63	63	62	18	36	58	58	56	56	56
7:00 AM	7:30 AM	62	62	62	63	62	62	62	62	63	63	62	12	13	23	59	57	56	56
7:30 AM	8:00 AM	63	62	62	63	62	62	63	62	63	63	62	12	12	12	25	52	56	56
8:00 AM	8:30 AM	62	62	62	63	62	62	63	62	63	63	62	12	11	12	16	20	36	36
8:30 AM	9:00 AM	62	62	62	63	62	62	63	62	63	62	63	19	16	15	15	18	22	22
9:00 AM	9:30 AM	60	60	60	61	60	60	60	60	61	61	62	28	21	21	22	37	39	39
9:30 AM	10:00 AM	59	59	59	60	60	60	60	60	61	61	62	53	48	45	50	59	56	56

**Option 2:** Improves GP operations slightly, but degrades EL operations.

# "Heat Map" – Option 3

## Full length EL weave lane

### EXISTING

	From		Approaching				County Line		County Line			County Line				w/o EL		e/o EL	Grn Riv	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
			w/o 241 Off	SR 241 Off	SR 241 Aux	241	e/o EL Ingress	West	Mid	East	w/o Egress	e/o Egress	Merge	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main						
GENERAL PURPOSE	4:30 AM	5:00 AM	58	59	61	61	56	61	62	53	36	35	17	24	16	30	61	61	61						
	5:00 AM	5:30 AM	60	61	62	62	57	62	62	51	21	21	13	15	10	8	10	63	63						
	5:30 AM	6:00 AM	62	62	60	62	59	62	63	50	18	16	12	13	9	8	8	64	64						
	6:00 AM	6:30 AM	63	63	60	62	59	62	63	51	17	16	12	13	9	8	10	65	64						
	6:30 AM	7:00 AM	63	63	58	62	59	62	63	53	15	15	11	12	8	7	62	66	64						
	7:00 AM	7:30 AM	64	64	58	62	59	63	63	53	15	15	11	11	8	7	66	66	65						
	7:30 AM	8:00 AM	65	63	57	62	60	63	63	54	15	15	11	11	8	7	66	66	65						
	8:00 AM	8:30 AM	65	63	56	63	60	63	64	53	14	15	11	12	8	7	66	66	65						
	8:30 AM	9:00 AM	65	62	49	59	58	63	63	53	15	15	12	12	8	8	65	65	64						
9:00 AM	9:30 AM	65	62	46	60	57	62	63	53	16	15	11	11	8	11	65	65	64							
9:30 AM	10:00 AM	65	62	53	61	53	62	62	51	21	21	15	15	14	54	64	64	64							
EXPRESS LANE	4:30 AM	5:00 AM	61	61	60	61	60	60	61	61	61	61	59	59	59	59	59	58	56						
	5:00 AM	5:30 AM	59	59	58	60	60	60	60	61	61	60	57	58	58	58	59	56	56						
	5:30 AM	6:00 AM	60	60	60	61	60	60	61	61	62	59	57	58	58	58	59	56	56						
	6:00 AM	6:30 AM	60	60	60	61	60	60	61	61	62	58	56	58	58	58	59	56	56						
	6:30 AM	7:00 AM	61	61	61	62	61	61	62	62	62	33	53	58	58	58	58	56	56						
	7:00 AM	7:30 AM	62	62	62	63	62	62	62	62	63	20	32	58	58	58	59	57	56						
	7:30 AM	8:00 AM	62	62	62	63	62	62	63	63	63	14	17	39	58	58	58	56	56						
	8:00 AM	8:30 AM	62	62	63	63	62	62	63	63	63	13	16	15	18	57	58	56	56						
	8:30 AM	9:00 AM	61	61	62	62	61	61	62	62	63	15	17	16	16	39	58	57	56						
9:00 AM	9:30 AM	61	61	61	62	61	61	62	62	62	24	27	38	46	59	59	58	56							
9:30 AM	10:00 AM	61	61	61	62	61	61	61	61	62	60	59	59	59	59	60	59	56							

### Build Condition -- SR 91 Option 3 (Full Length EL Weaving Lane)

	From		Approaching				County Line		County Line			County Line				w/o EL		e/o EL	Grn Riv	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
			w/o 241 Off	SR 241 Off	SR 241 Aux	241	e/o EL Ingress	West	Mid	East	w/o Egress	e/o Egress	Merge	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main						
GENERAL PURPOSE	4:30 AM	5:00 AM	55	55	61	61	60	62	62	63	63	47	18	25	16	29	61	61	61						
	5:00 AM	5:30 AM	56	56	59	61	59	61	62	62	62	48	18	18	12	9	9	64	63						
	5:30 AM	6:00 AM	61	61	54	59	50	44	48	55	59	47	18	19	12	10	38	64	64						
	6:00 AM	6:30 AM	62	62	57	58	44	30	29	28	30	35	16	18	11	10	65	65	64						
	6:30 AM	7:00 AM	64	64	56	58	41	23	22	22	24	30	16	16	11	10	66	66	64						
	7:00 AM	7:30 AM	64	63	56	62	41	22	21	18	19	25	16	21	24	57	66	66	65						
	7:30 AM	8:00 AM	65	62	48	55	42	22	22	25	32	43	40	60	66	66	66	65							
	8:00 AM	8:30 AM	65	59	45	44	47	46	51	63	64	65	65	65	66	66	66	66	64						
	8:30 AM	9:00 AM	65	60	54	62	62	63	63	64	64	64	64	65	65	66	65	65	64						
9:00 AM	9:30 AM	64	62	57	63	64	63	63	63	64	64	64	65	65	65	65	65	64							
9:30 AM	10:00 AM	64	63	60	62	62	63	63	63	64	64	64	65	64	65	64	64	64							
EXPRESS LANE	4:30 AM	5:00 AM	60	61	60	62	60	60	61	61	61	61	58	59	59	59	59	58	56						
	5:00 AM	5:30 AM	60	60	60	60	60	60	60	61	61	60	56	58	58	58	58	56	56						
	5:30 AM	6:00 AM	60	60	60	62	60	60	61	61	61	57	55	58	58	58	59	56	56						
	6:00 AM	6:30 AM	61	61	60	62	61	61	61	62	62	30	42	57	58	58	59	56	56						
	6:30 AM	7:00 AM	61	61	61	62	61	61	62	63	63	11	18	25	36	54	58	56	56						
	7:00 AM	7:30 AM	62	62	62	63	62	62	62	63	63	6	9	14	15	21	38	54	56						
	7:30 AM	8:00 AM	62	62	62	63	62	62	63	63	63	12	11	9	10	12	19	24	35						
	8:00 AM	8:30 AM	62	62	62	62	62	62	63	63	63	30	20	17	17	16	14	20	18						
	8:30 AM	9:00 AM	62	62	62	62	62	62	63	63	63	33	22	18	19	20	20	34	26						
9:00 AM	9:30 AM	61	61	61	62	61	61	62	62	63	33	25	20	22	25	30	40	48							
9:30 AM	10:00 AM	59	60	59	62	60	60	60	61	61	51	43	38	41	42	51	58	56							

**Option 3: Improves GP operations but degrades EL late.**

# "Heat Map" – Option 4

## Add GP Green River to 241

### EXISTING

	From	To	Approaching			County Line	County Line	County Line	w/o EL	e/o EL	Grn Riv	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
			w/o 241 Off	SR 241 Off	SR 241 Aux	241	e/o EL Ingress	West	Mid	East	Egress						
GENERAL PURPOSE	4:30 AM	5:00 AM	58	59	61	61	56	61	53	36	35	17	24	16	30	61	61
	5:00 AM	5:30 AM	60	61	62	62	57	62	51	21	21	13	15	10	8	10	63
	5:30 AM	6:00 AM	62	62	60	62	59	62	50	18	16	12	13	9	8	8	64
	6:00 AM	6:30 AM	63	63	60	62	59	62	51	17	16	12	13	9	8	10	65
	6:30 AM	7:00 AM	63	63	58	62	59	62	53	15	15	11	12	8	7	62	66
	7:00 AM	7:30 AM	64	64	58	62	59	63	53	15	15	11	11	8	7	66	65
	7:30 AM	8:00 AM	65	63	57	62	60	63	54	15	15	11	11	8	7	66	65
	8:00 AM	8:30 AM	65	63	56	63	60	63	53	14	15	11	12	8	7	66	65
	8:30 AM	9:00 AM	65	62	49	59	58	63	53	15	15	12	12	8	8	65	65
9:00 AM	9:30 AM	65	62	46	60	57	62	53	16	15	11	11	8	11	65	65	
9:30 AM	10:00 AM	65	62	53	61	53	62	51	21	21	15	15	14	54	64	64	
EXPRESS LANE	4:30 AM	5:00 AM	61	61	60	61	60	61	61	61	61	59	59	59	59	58	56
	5:00 AM	5:30 AM	59	59	58	60	60	60	60	61	60	57	58	58	58	59	56
	5:30 AM	6:00 AM	60	60	60	61	60	61	61	62	59	57	58	58	58	59	56
	6:00 AM	6:30 AM	60	60	60	61	60	61	61	62	58	56	58	58	58	59	56
	6:30 AM	7:00 AM	61	61	61	62	61	61	62	62	33	53	58	58	58	58	56
	7:00 AM	7:30 AM	62	62	62	63	62	62	62	63	20	32	58	58	58	59	57
	7:30 AM	8:00 AM	62	62	62	63	62	62	63	63	14	17	39	56	58	58	56
	8:00 AM	8:30 AM	62	62	63	63	62	62	63	63	13	16	15	18	57	58	56
	8:30 AM	9:00 AM	61	61	62	62	61	61	62	62	15	17	16	16	39	58	57
9:00 AM	9:30 AM	61	61	61	62	61	61	62	62	24	27	38	46	59	59	58	
9:30 AM	10:00 AM	61	61	61	62	61	61	61	61	62	60	59	59	59	60	59	56

### Build Condition -- SR 91 Option 4 (Add GP Aux Lane GrnRiv-241, Maintain EL Egress Area)

	From	To	Approaching			County Line	County Line	County Line	w/o EL	e/o EL	Grn Riv	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
			w/o 241 Off	SR 241 Off	SR 241 Aux	241	e/o EL Ingress	West	Mid	East	Egress						
GENERAL PURPOSE	4:30 AM	5:00 AM	51	32	21	31	42	48	62	60	63	62	37	18	29	59	61
	5:00 AM	5:30 AM	49	31	16	16	15	18	23	26	28	38	42	43	16	12	15
	5:30 AM	6:00 AM	54	39	23	21	21	21	24	39	18	18	19	21	11	64	63
	6:00 AM	6:30 AM	55	49	27	22	22	41	57	51	18	18	20	25	12	10	65
	6:30 AM	7:00 AM	63	58	40	58	63	64	63	51	17	17	20	23	16	49	66
	7:00 AM	7:30 AM	64	51	53	63	63	64	64	56	39	42	44	65	66	66	66
	7:30 AM	8:00 AM	65	59	62	64	64	64	64	62	64	66	65	65	66	66	66
	8:00 AM	8:30 AM	65	50	61	64	64	64	64	63	64	66	64	65	66	66	66
	8:30 AM	9:00 AM	65	43	61	64	64	64	64	63	64	65	64	65	65	66	65
9:00 AM	9:30 AM	65	62	63	64	64	64	64	63	65	66	64	65	65	65	64	
9:30 AM	10:00 AM	65	63	64	64	64	65	64	64	65	65	64	64	65	64	65	
EXPRESS LANE	4:30 AM	5:00 AM	61	61	61	62	60	60	61	61	62	60	59	58	60	59	56
	5:00 AM	5:30 AM	61	61	61	62	60	60	61	61	61	59	56	58	58	59	56
	5:30 AM	6:00 AM	61	61	61	62	60	60	61	61	62	59	57	57	58	59	56
	6:00 AM	6:30 AM	61	61	61	62	60	60	61	61	62	57	57	58	58	59	56
	6:30 AM	7:00 AM	61	61	61	62	60	60	61	61	62	33	55	58	58	58	56
	7:00 AM	7:30 AM	62	62	62	63	62	62	62	62	63	21	27	58	58	58	56
	7:30 AM	8:00 AM	62	62	62	63	62	62	62	62	63	33	21	58	58	58	56
	8:00 AM	8:30 AM	62	62	62	63	62	62	62	62	63	32	24	58	58	58	56
	8:30 AM	9:00 AM	62	62	62	63	61	61	61	62	62	49	56	58	58	58	57
9:00 AM	9:30 AM	62	62	62	63	61	61	61	61	62	60	59	59	59	59	58	
9:30 AM	10:00 AM	61	61	61	62	61	61	61	61	61	62	60	59	59	59	59	56

**Option 4:** Improves GP operations. EL operations improve due to GP improvements; not an inherent EL improvement.

# “Heat Map” – Option 4b

## Add GP Green River to 241 + Remove Green River Road Ramp Meter

Build Condition -- SR 91 Option 4 (Add GP Aux Lane GrnRiv-241, Maintain EL Egress Area)

	From	To	Approaching										w/o EL		e/o EL		Grn Riv Merge	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
			w/o 241 Off	SR 241 Off	SR 241 Aux	241	e/o EL Ingress	County Line West	County Line Mid	County Line East	Egress	Egress											
GENERAL PURPOSE	4:30 AM	5:00 AM	51	32	21	31	42	48	62	60	63	62	62	37	18	29	59	61	61				
	5:00 AM	5:30 AM	49	31	16	16	15	18	23	26	28	38	42	43	16	12	15	63	63				
	5:30 AM	6:00 AM	54	39	23	21	21	21	24	39	18	18	19	21	11	11	64	64					
	6:00 AM	6:30 AM	55	49	27	22	22	41	57	51	18	18	20	25	12	10	65	65					
	6:30 AM	7:00 AM	63	58	40	58	63	64	63	51	17	17	20	23	16	49	66	66					
	7:00 AM	7:30 AM	64	51	53	63	63	64	64	56	39	42	44	65	66	66	66	64					
	7:30 AM	8:00 AM	65	59	62	64	64	64	64	62	64	66	65	65	66	66	66	65					
	8:00 AM	8:30 AM	65	50	61	64	64	64	64	63	64	66	65	66	66	66	66	65					
	8:30 AM	9:00 AM	65	43	61	64	64	64	64	63	64	65	64	65	65	66	65	64					
	9:00 AM	9:30 AM	65	62	63	64	64	64	64	63	65	66	64	65	65	65	65	65					
9:30 AM	10:00 AM	65	63	64	64	64	65	64	64	65	65	64	64	64	65	64	65						
EXPRESS LANE	4:30 AM	5:00 AM	61	61	61	62	60	60	61	61	62	60	59	58	60	59	60	58	56				
	5:00 AM	5:30 AM	59	60	60	61	60	60	61	61	61	59	56	58	58	58	59	56	56				
	5:30 AM	6:00 AM	60	60	60	62	61	61	61	61	62	59	57	57	58	59	57	56					
	6:00 AM	6:30 AM	61	60	61	62	61	61	61	61	62	57	57	58	58	58	59	56	56				
	6:30 AM	7:00 AM	61	61	62	63	61	61	61	61	62	33	55	58	58	58	58	56	56				
	7:00 AM	7:30 AM	62	62	62	63	62	62	62	62	63	21	27	58	58	58	58	56	56				
	7:30 AM	8:00 AM	62	62	62	63	62	62	62	62	63	33	21	58	58	58	58	56	56				
	8:00 AM	8:30 AM	61	62	62	63	62	62	62	62	63	32	24	58	58	58	58	57	56				
	8:30 AM	9:00 AM	61	61	62	63	61	61	62	62	62	49	56	58	58	58	58	57	55				
	9:00 AM	9:30 AM	62	62	63	63	61	61	61	61	62	60	59	59	59	59	59	59	56				
9:30 AM	10:00 AM	61	61	61	62	61	61	61	61	62	60	59	59	59	59	59	59	56					

Build Condition -- SR 91 Option 4b (remove Green River Road Ramp Meter)

	From	To	Approaching										w/o EL		e/o EL		Grn Riv Merge	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
			w/o 241 Off	SR 241 Off	SR 241 Aux	241	e/o EL Ingress	County Line West	County Line Mid	County Line East	Egress	Egress											
GENERAL PURPOSE	4:30 AM	5:00 AM	51	30	19	28	39	45	52	56	61	62	61	37	18	29	59	61	61				
	5:00 AM	5:30 AM	52	32	17	17	17	18	22	25	21	24	38	41	16	13	15	63	63				
	5:30 AM	6:00 AM	57	55	25	21	20	21	24	39	18	16	20	22	11	8	64	64					
	6:00 AM	6:30 AM	57	56	29	26	31	44	52	51	19	17	18	24	13	10	65	64					
	6:30 AM	7:00 AM	61	51	48	61	62	62	62	50	17	16	19	25	14	48	66	64					
	7:00 AM	7:30 AM	62	41	43	61	62	62	62	53	25	32	42	57	66	66	66	65					
	7:30 AM	8:00 AM	64	27	27	62	62	63	62	60	62	64	63	65	66	66	66	65					
	8:00 AM	8:30 AM	64	34	54	62	63	63	63	61	62	64	62	65	66	66	66	65					
	8:30 AM	9:00 AM	64	57	61	62	62	63	62	61	63	64	62	65	65	66	65	64					
	9:00 AM	9:30 AM	64	62	62	63	63	63	63	62	63	64	61	65	65	65	65	64					
9:30 AM	10:00 AM	64	61	62	63	63	63	63	62	63	64	61	65	65	65	64	65						
EXPRESS LANE	4:30 AM	5:00 AM	60	60	60	61	60	60	61	61	62	60	59	58	60	59	60	58	56				
	5:00 AM	5:30 AM	59	60	60	61	60	60	61	61	61	60	57	57	58	58	59	57	56				
	5:30 AM	6:00 AM	59	61	61	61	61	61	61	61	62	60	57	58	58	58	59	57	56				
	6:00 AM	6:30 AM	59	60	61	61	61	61	61	61	62	59	57	58	58	58	59	56	56				
	6:30 AM	7:00 AM	59	61	61	61	61	61	61	61	62	38	55	57	58	58	58	56	56				
	7:00 AM	7:30 AM	62	62	62	63	62	62	62	63	63	24	29	58	58	59	59	57	56				
	7:30 AM	8:00 AM	61	62	62	63	62	62	62	61	62	63	34	25	58	57	58	57	56				
	8:00 AM	8:30 AM	61	61	61	62	61	61	61	61	62	33	36	58	58	58	58	56	56				
	8:30 AM	9:00 AM	60	60	62	63	61	61	61	61	62	62	55	55	59	58	58	58	56				
	9:00 AM	9:30 AM	61	61	62	63	61	61	61	61	62	62	59	59	59	59	60	59	56				
9:30 AM	10:00 AM	61	61	61	62	60	60	61	61	62	60	59	59	59	59	59	60	59					

**Option 4b:** Worsens overall GP operations slightly (vs. Option 4)







# "Heat Map" – Option 6

## Add GP Green River to 241 + EL Weave Lane

### EXISTING

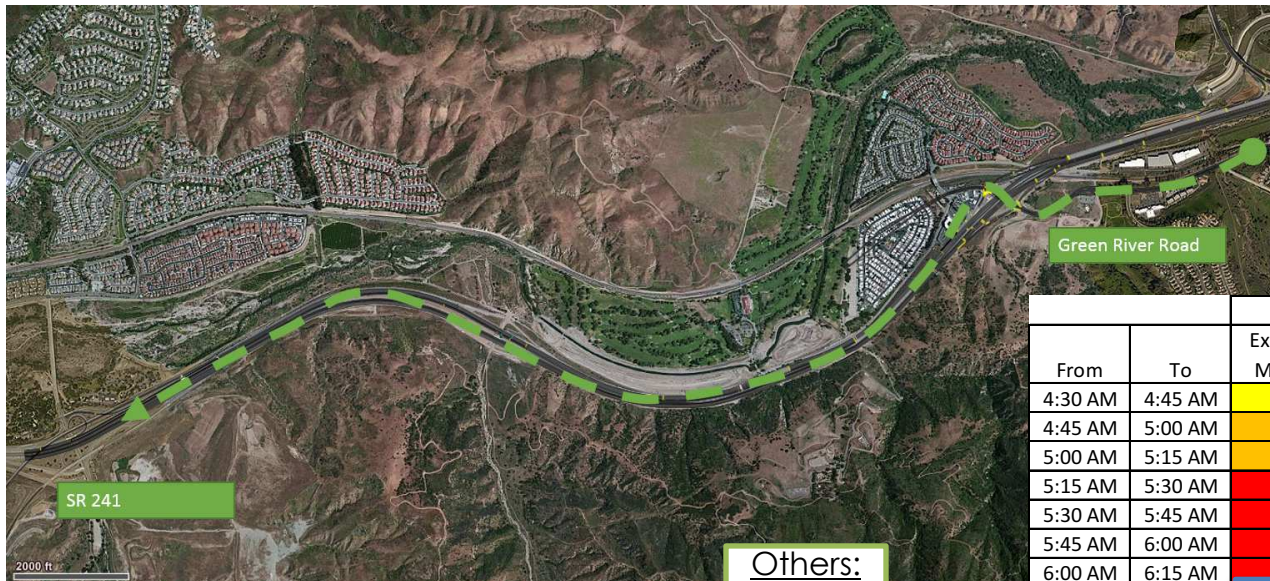
	From		Approaching				County Line		County Line	County Line	w/o EL	e/o EL	Grn Riv	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
			w/o 241 Off	SR 241 Off	SR 241 Aux	241	e/o EL Ingress	West	Mid	East	Egress	Egress	Merge						
GENERAL PURPOSE	4:30 AM	5:00 AM	58	59	61	61	56	61	62	53	36	35	17	24	16	30	61	61	61
	5:00 AM	5:30 AM	60	61	62	62	57	62	62	51	21	21	13	15	10	8	10	63	63
	5:30 AM	6:00 AM	62	62	60	62	59	62	63	50	18	16	12	13	9	8	8	64	64
	6:00 AM	6:30 AM	63	63	60	62	59	62	63	51	17	16	12	13	9	8	10	65	64
	6:30 AM	7:00 AM	63	63	58	62	59	62	63	53	15	15	11	12	8	7	62	66	64
	7:00 AM	7:30 AM	64	64	58	62	59	63	63	53	15	15	11	11	8	7	66	66	65
	7:30 AM	8:00 AM	65	63	57	62	60	63	63	54	15	15	11	11	8	7	66	66	65
	8:00 AM	8:30 AM	65	63	56	63	60	63	64	53	14	15	11	12	8	7	66	66	65
	8:30 AM	9:00 AM	65	62	49	59	58	63	63	53	15	15	12	12	8	8	65	65	64
9:00 AM	9:30 AM	65	62	46	60	57	62	63	53	16	15	11	11	8	11	65	65	64	
9:30 AM	10:00 AM	65	62	53	61	53	62	62	51	21	21	15	15	14	54	64	64	64	
EXPRESS LANE	4:30 AM	5:00 AM	61	61	60	61	60	60	61	61	61	61	59	59	59	59	59	58	56
	5:00 AM	5:30 AM	59	59	58	60	60	60	60	61	61	61	60	57	58	58	59	56	56
	5:30 AM	6:00 AM	60	60	60	61	60	60	61	61	62	62	59	57	58	58	59	56	56
	6:00 AM	6:30 AM	60	60	60	61	60	60	61	61	62	62	58	56	58	58	59	56	56
	6:30 AM	7:00 AM	61	61	61	62	61	61	62	62	62	62	33	53	58	58	58	56	56
	7:00 AM	7:30 AM	62	62	62	63	62	62	62	62	63	63	20	32	58	58	59	57	56
	7:30 AM	8:00 AM	62	62	62	63	62	62	63	63	63	63	14	17	56	58	58	56	56
	8:00 AM	8:30 AM	62	62	63	63	62	62	63	63	63	63	13	16	15	18	57	58	56
	8:30 AM	9:00 AM	61	61	62	62	61	61	62	62	63	63	15	17	16	16	39	58	57
9:00 AM	9:30 AM	61	61	61	62	61	61	62	62	62	62	24	27	38	46	59	59	56	
9:30 AM	10:00 AM	61	61	61	62	61	61	61	61	62	62	60	59	59	59	60	59	56	

### Build Condition -- Option 6 (5+1 GP, 2+1 EL) -- Combination of Options 3 and 4

	From		Approaching				County Line		County Line	County Line	w/o EL	e/o EL	Grn Riv	GrnRiv-71	SR 71	71-Serfas	Serfas-Maple	Maple-Lincoln	Lincoln-Main
			w/o 241 Off	SR 241 Off	SR 241 Aux	241	e/o EL Ingress	West	Mid	East	Egress	Egress	Merge						
GENERAL PURPOSE	4:30 AM	5:00 AM	52	31	18	28	39	44	57	62	63	63	62	38	19	30	61	61	61
	5:00 AM	5:30 AM	50	33	15	16	19	16	17	20	32	41	49	43	16	13	21	64	63
	5:30 AM	6:00 AM	51	45	21	21	26	19	18	20	16	18	20	27	14	12	64	64	64
	6:00 AM	6:30 AM	56	54	23	21	29	21	19	18	18	20	23	32	16	32	65	65	64
	6:30 AM	7:00 AM	62	60	27	24	34	26	31	38	43	48	52	64	66	66	66	66	64
	7:00 AM	7:30 AM	64	59	57	62	63	64	64	64	64	65	66	65	66	66	66	66	65
	7:30 AM	8:00 AM	65	57	62	64	63	64	64	64	64	65	66	65	66	66	66	66	65
	8:00 AM	8:30 AM	65	56	62	64	63	64	64	64	64	65	66	65	66	66	66	66	64
	8:30 AM	9:00 AM	64	49	61	63	63	64	64	64	64	64	66	64	65	66	65	65	64
9:00 AM	9:30 AM	64	53	62	63	63	64	64	64	63	64	65	64	65	65	65	65	64	
9:30 AM	10:00 AM	65	63	64	64	64	64	64	64	64	65	65	64	64	65	64	64	64	
EXPRESS LANE	4:30 AM	5:00 AM	60	61	61	62	60	60	61	61	61	61	58	59	59	59	59	58	56
	5:00 AM	5:30 AM	60	60	60	61	60	60	60	61	61	61	55	58	58	58	58	56	56
	5:30 AM	6:00 AM	62	62	63	62	62	62	62	63	63	63	7	12	36	44	58	56	56
	6:00 AM	6:30 AM	62	62	63	62	62	62	62	63	63	63	7	11	12	23	54	56	56
	6:30 AM	7:00 AM	62	62	63	62	62	62	62	62	63	63	19	17	14	13	17	38	54
	7:00 AM	7:30 AM	62	62	63	62	62	62	62	62	63	63	32	25	20	21	19	27	18
	7:30 AM	8:00 AM	62	62	63	62	62	62	62	62	63	63	31	22	19	20	21	23	21
	8:00 AM	8:30 AM	62	62	63	62	62	62	62	62	63	63	34	21	18	19	19	34	43
	8:30 AM	9:00 AM	61	61	61	62	61	61	61	61	62	62	33	24	19	19	20	22	46
9:00 AM	9:30 AM	60	61	62	60	60	60	60	61	61	62	34	30	24	28	41	58	57	56
9:30 AM	10:00 AM	60	61	61	62	61	61	61	61	61	61	60	57	59	59	60	59	56	

**Option 6:** Improves GP operations, but degrades EL operations.

# Speed from Green River Road to SR 91 at 241



Green River Rd O				
6	6			6
5	5			5
4	4	4	4	4
3	3	3	3	3
2	2	2	2	2
1	1	1	1	1
EL 2		EL Egress		EL 2
EL 1				EL 1

Others:  
30  
minutes

From	To	GP Speed (mph)		
		Existing Model	Option 4	Option 4b
4:30 AM	4:45 AM	37	35	41
4:45 AM	5:00 AM	34	26	29
5:00 AM	5:15 AM	28	20	22
5:15 AM	5:30 AM	18	13	16
5:30 AM	5:45 AM	13	11	14
5:45 AM	6:00 AM	11	10	12
6:00 AM	6:15 AM	9	9	12
6:15 AM	6:30 AM	8	8	12
6:30 AM	6:45 AM	8	8	13
6:45 AM	7:00 AM	8	8	14
7:00 AM	7:15 AM	7	7	15
7:15 AM	7:30 AM	7	8	15
7:30 AM	7:45 AM	7	7	20
7:45 AM	8:00 AM	7	8	27
8:00 AM	8:15 AM	8	8	40
8:15 AM	8:30 AM	8	8	50
8:30 AM	8:45 AM	9	9	50
8:45 AM	9:00 AM	10	10	51
9:00 AM	9:15 AM	11	12	53
9:15 AM	9:30 AM	14	15	53
9:30 AM	9:45 AM	24	28	52
9:45 AM	10:00 AM	42	52	53

Opt 4b:  
20  
minutes

- Option 4 (aux lane for on-ramp) without Green River Road ramp-meter
- Throughput and travel speed improves
- GP mainline slightly degraded

# Summary

Scenario	Impacts
Existing Model	Extensive queuing at County Line Heavy delays throughout AM peak period.
Option 1 (remove dedicated egress/ingress, <b>additional GP</b> Green River to 241)	Makes <b>EL significantly worse</b> Reduces GP congestion to 2.5 hours New bottleneck at 241
Option 2 (Move EL egress further east)	Increases global throughput slightly, 500 vph Makes <b>EL worse off</b> Reduces GP congestion to 4.5 hours Green River Road on ramp traffic is last bottleneck – improved.
Option 3 (EL Weave Lane)	Makes <b>EL significantly worse</b> due to spillback from egress. New bottleneck at end of weaving lane.
Option 4 ( <b>additional GP</b> between Green River and 241)	Improves GP significantly Improves EL but due to GP improvement (not inherently an EL improvement).
<ul style="list-style-type: none"> <li>Option 4b (remove Green River Road ramp meter)</li> </ul>	Improves Green River Road trip to SR 91. Assumes Option 4's additional lane between Green River and 241 GP lanes degraded slightly vs. Option 4 without meter. Safety considerations – ramp dropping from 3 down to 1 lane
Option 5 ( <b>additional GP</b> between 71 and 241)	Improves GP slightly more than Option 4 Improves EL but due to GP improvement (not inherently an EL improvement).
Option 6 (Opt 3+4, EL weave lane plus <b>additional GP</b> between Green River and 241)	Improves GP the most of all options. Makes <b>EL significantly worse</b> due to spillback from egress.

# Results Planned for Next Meeting

- Traffic operation analysis
  - I-15 northbound express lane entrance – two options
  - Existing condition at the 91 westbound at county line with ramp meters off at Green River Rd. on-ramp
- Toll revenue analysis
  - 91 westbound at the county line – options 1 and 4