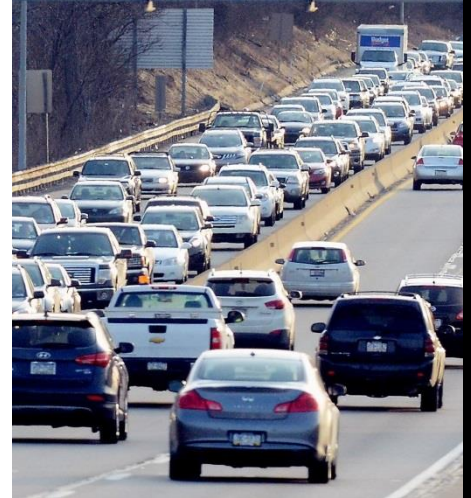




COBRA SINKS ITS TEETH INTO (BOTTLE)NECKS

Corridor Operations & Bottleneck
Reduction Assistance



PRESENTERS



David Millar

Traffic Engineering
Program Manager



Keith Borsheim

Transportation Planner



01 **Program Overview**

02 **Program Status**

03 **HDR Role**

04 **Projects**

05 **Takeaway**

A night landscape featuring a road with light trails from cars, silhouetted hills, and a sky with horizontal light trails in shades of blue and purple. The overall scene is dark with vibrant light trails.

01

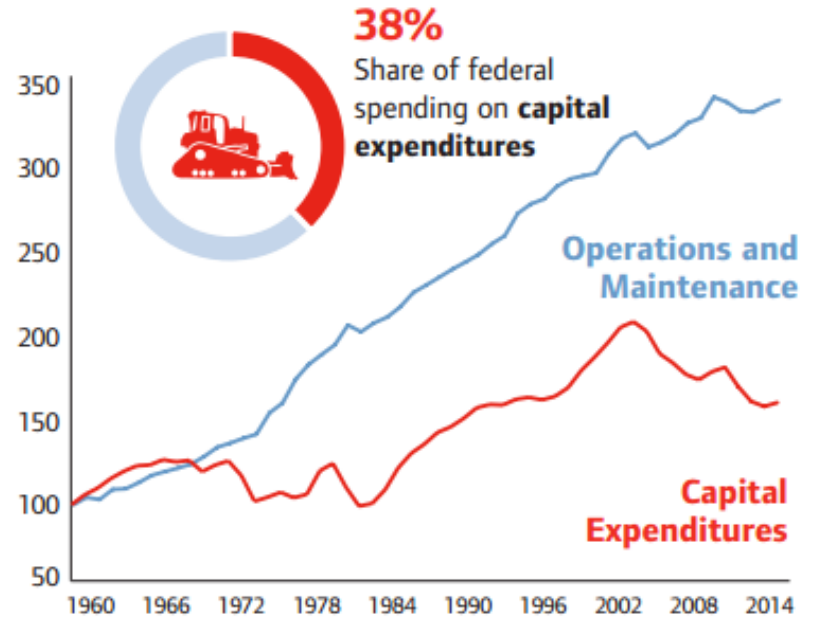
Program Overview

Program Overview

FIRST- WHAT IS TSMO?

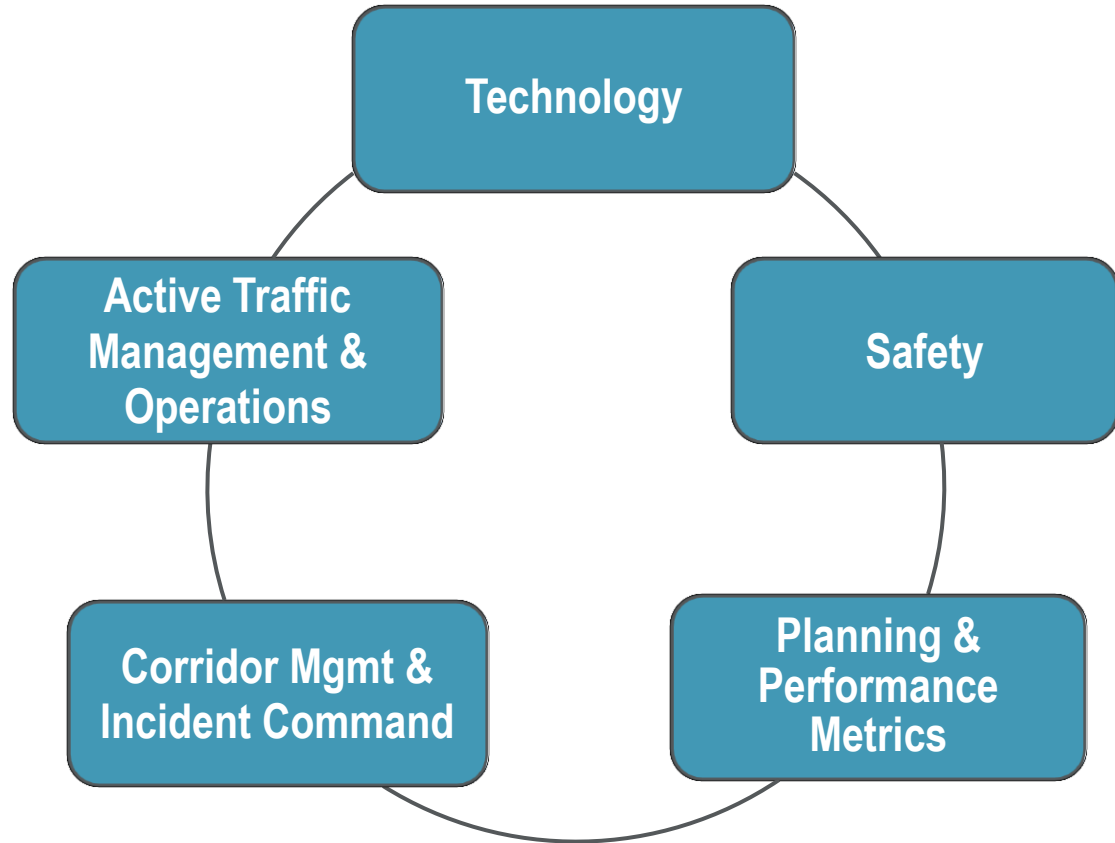
Transportation Systems
Management & Operations
CDOT Division – 2013
Moving from Design,
Build, Maintain Towards
Better Operations

Public Infrastructure Spending by Type, Index (1960 = 100)

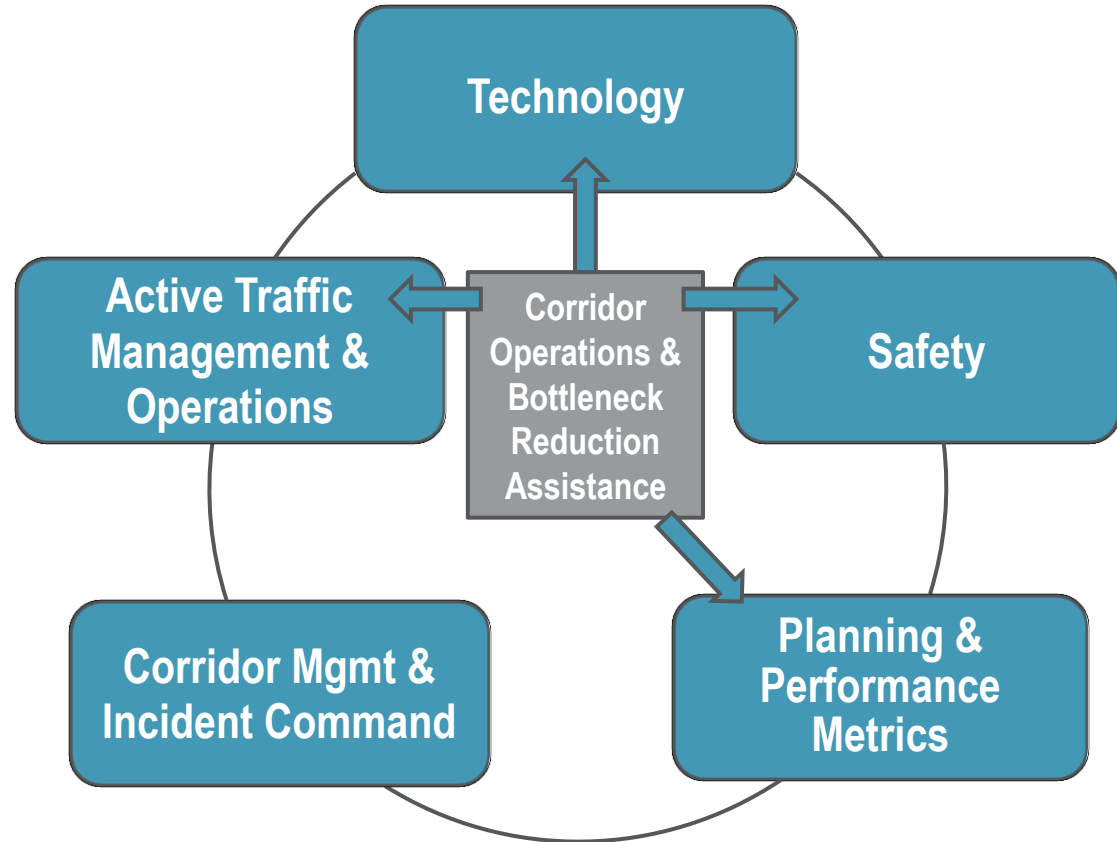


Source: Congressional Budget Office, "Public Spending on Transportation and Water Infrastructure, 1956 to 2014."

WHAT IS TSMO?



WHAT IS COBRA?



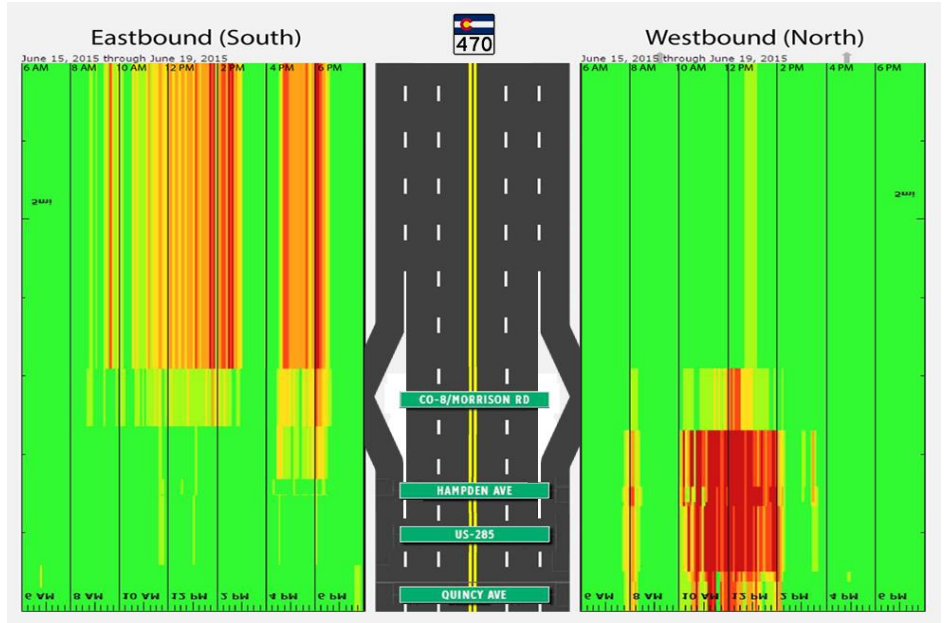
Program Overview

WHAT IS COBRA?

Corridor Operations



Localized Bottlenecks



Program Overview

COBRA?

Goals:

- Efficiency
- Reliability
- Accessibility
- Safety

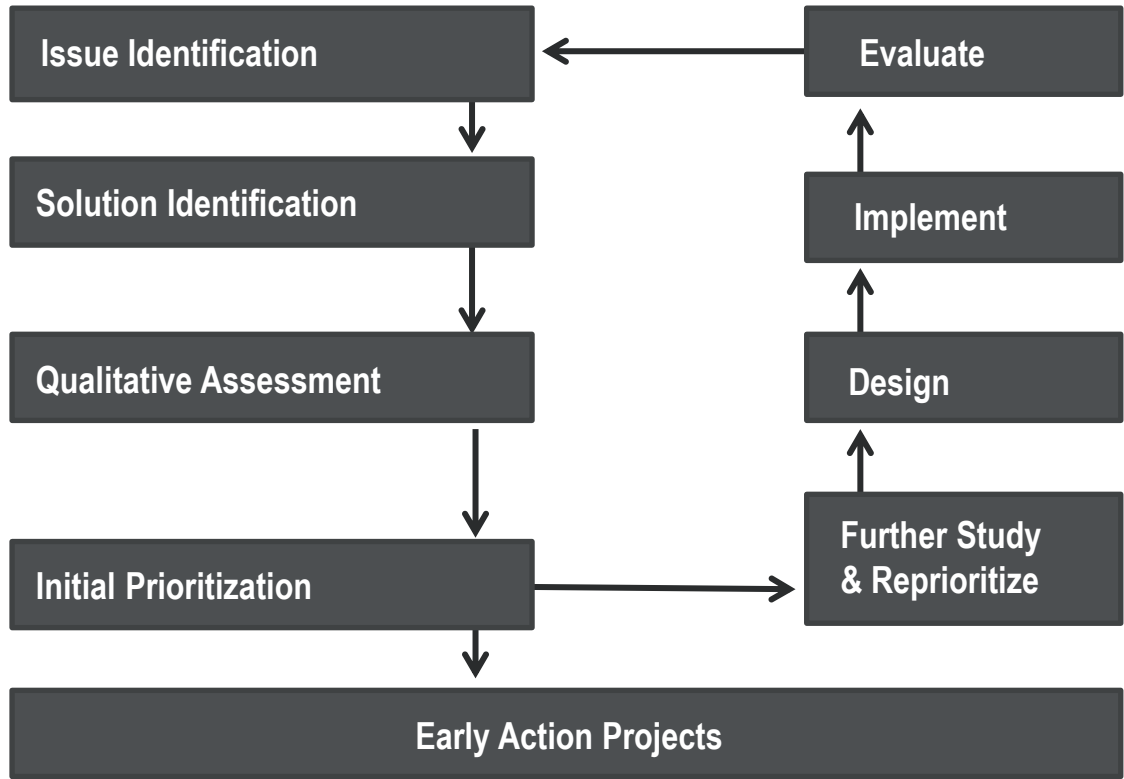


Reduce traffic delay through **cost-effective spot-location** bottleneck improvements and through policies that encourage innovative traffic solutions.

Program Overview

PROCESS

START



A night landscape featuring a road with light trails from cars, silhouetted hills, and a sky with wispy clouds. The scene is illuminated by a mix of natural twilight and artificial light trails.

02 Status

Status

Click on each CDOT region for additional status details

OVERALL STATUS

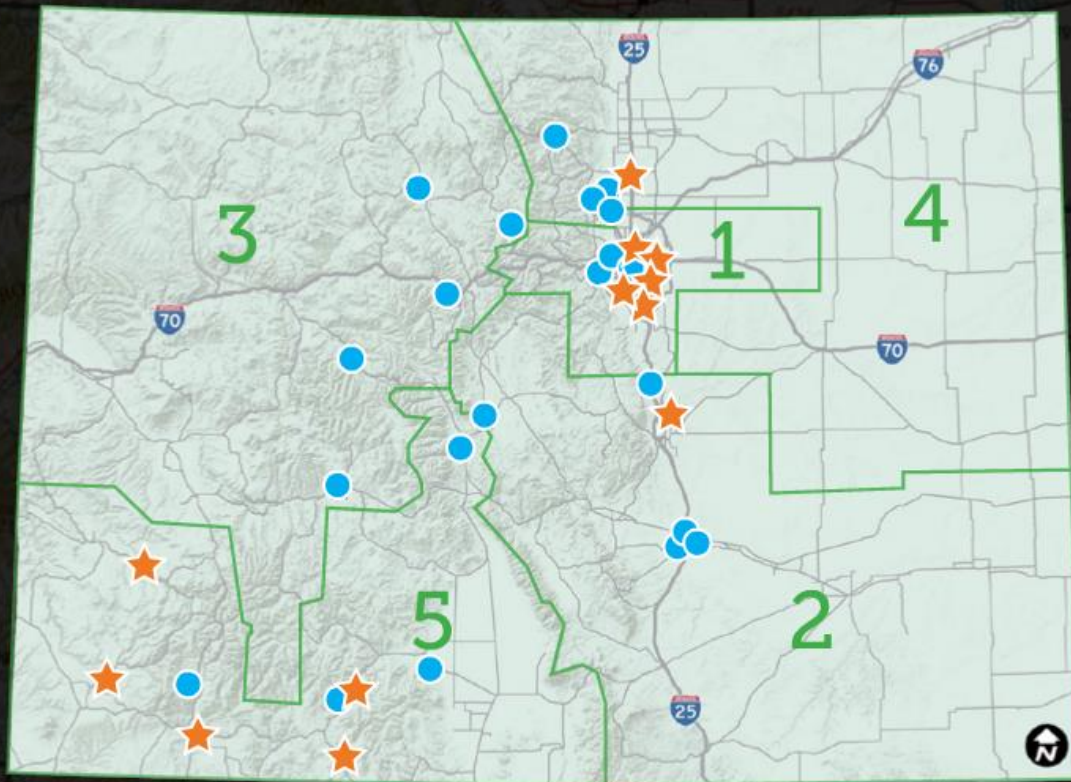
- ☑ 100+ Statewide Projects
- ☑ \$20K - \$20M each
- ☑ \$90M Program Potential
- ☑ 26 Active Projects
- ☑ 6 Consultant Teams



COBRA Project Completed by Regions



Active COBRA Studies/Designs

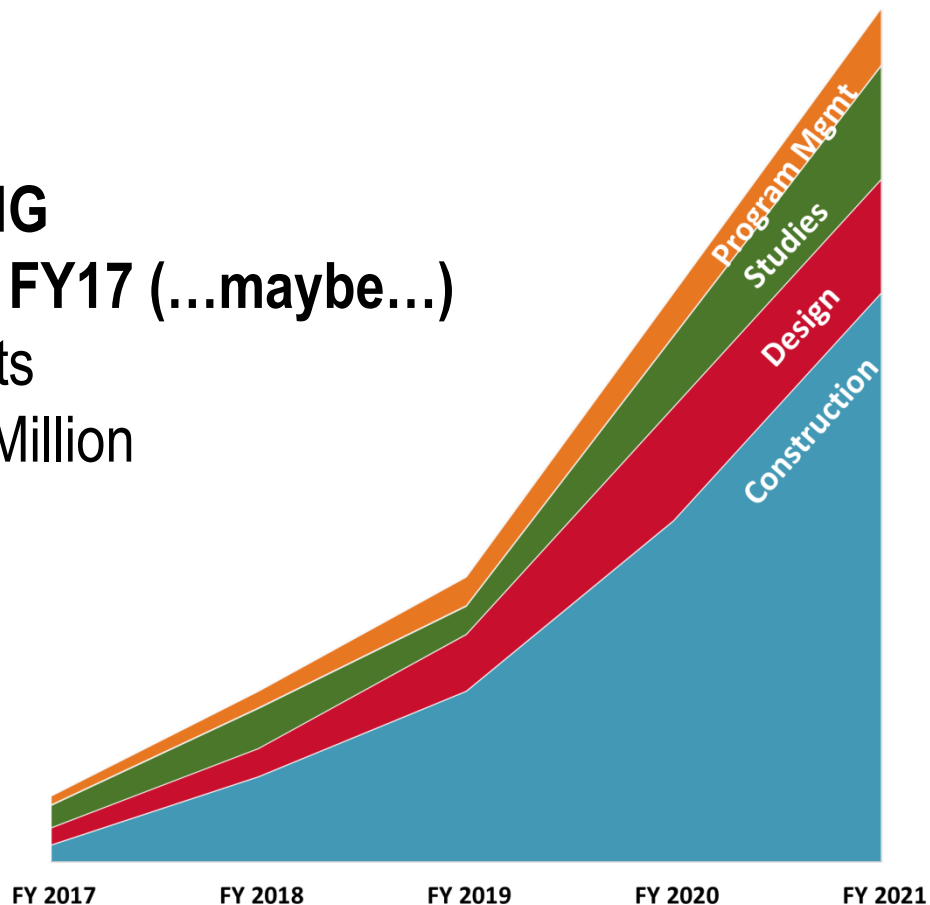


Status

FY17 – FUNDING

\$3.0 Million for FY17 (...maybe...)

Potential Projects
identified - \$90 Million



A night landscape featuring a road with light trails, hills, and a sky with light trails and red laser lines. The scene is dark, with the sky transitioning from deep blue to purple and pink. The road is illuminated by a bright light source, creating a long, horizontal light trail. The hills are silhouetted against the sky. The overall mood is serene and futuristic.

03 HDR Role

HDR Role


- CDOT established TSMO – 2013
- HDR was pushing operations innovation
 - Trusted Advisor through individual projects
 - Focus on spot locations/operations
 - I-70 Winter Operations Plan
- CDOT tasked HDR with Program Development & Management
 - 10 Task Orders - \$900,000 – 2-1/2 years
 - Oversight of 6 Consultant Teams

HDR Role

- Presentations & Trainings
 - FHWA workshops
 - ITE Conferences
 - CDOT Traffic Engineers
 - WASHTO Alaska 2017
 - Kansas DOT - TSMO Scan Tour



Program Management Individual Projects



COBRA PROGRAM – PLAN

COBRA PROGRAM OVERVIEW

The Corridor Operations and Bottleneck Reduction Assistance (COBRA) Program is intended to identify and implement operational improvements for state corridors to address both localized bottlenecks and other operational improvement opportunities. FHWA defines bottlenecks as:

"Localized sections of highway where traffic experiences reduced speeds and increased delays due to recurring operational conditions or nonrecurring traffic-influencing events."

The COBRA Program is not limited to bottlenecks, and could include any operational improvement strategy.

MISSION


Reduce traffic delay through cost-effective spot-location bottleneck improvements and through policies that encourage innovative traffic solutions.


GOALS, OBJECTIVES, AND PRIORITIES


These are program goals and objectives. These goals provide the framework for developing individual COBRA program goals.


The program management team performs a prioritization of projects based on the criteria established by the steering committee. The program management team scores each potential project from 1 to 5 (low to high potential) on a weighted system for its potential to address each of the goals. The weighting system is presented below.


Goal: Achieve Optimal System Efficiency – WEIGHT: 10	
Objectives	Minimize corridor delay experienced by automobile travelers. Maximize throughput on state routes. Maximize cost-effectiveness.
Goal: Achieve Optimal System Reliability – WEIGHT: 10	
Objectives	Achieve a Travel Time Index (TTI) consistent with statewide goal. Achieve a Planning Time Index (PTI) consistent with statewide goal. Reduce duration of congestion (time where v/c ratios are >1.0) in project areas.
Goal: Maintain System Accessibility – WEIGHT: 5	
Objectives	Maintain reasonable and efficient access to the system. Upgrade system accesses to meet Access Code requirements. Maintain operations at access, intersections, and ramps.
Goal: Maintain Existing Level of Safety – WEIGHT: 5	
Objectives	Maintain or improve LOS in project areas. Maintain or improve safety at intersections/interchanges.

















to identify, prioritize, study, design, and implement projects on a regular basis. The steering committee consists of the Director, Deputy Director, and the Director of Operations staff.

The steering committee is responsible for decision-making, COBRA funding for study, design, and construction.


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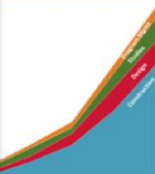
The steering committee is composed of the Director, Deputy Director, and the Director of Operations staff.



all project costs for all projects would be identified and utilized, if they were available. The steering committee would identify how each project gets handled case-by-case. Each region by region staff through the steering committee. The steering committee would identify how each project gets handled case-by-case. Each region by region staff through the steering committee.

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Item	Status	Construction Cost Estimate	B-C Ratio Estimate
1	Study Complete	\$200,000	30:1
2	Study Design Complete	\$25,000	15:1
3	Study Design Complete	\$425,000	--
4	Study in progress	\$890,000	--
5	Study in progress	\$100,000	8:1
6	Study Complete	\$75,000	20:1
7	Study in progress	\$200,000	15:1
8	Study Complete	\$150,000	--
9	Study Complete	\$35,000	--
10	Study Complete	\$75,000	20:1
11	Study Complete	\$125,000	1.5:1
12	Study Complete	\$125,000	1.5:1
13	Study in progress	\$100,000	--
14	Study Complete	\$425,000	--
15	Study Complete	\$25,000	49:1
16	Study Design Complete	\$300,000	8:1
17	Study Complete	\$200,000	--
18	Study Complete	\$235,000	--
19	Study Complete	\$100,000	10:1
20	Study Complete	\$300,000	75:1
21	Study in progress	\$175,000	--
22	Study Complete	\$575,000	--
23	Draft Complete	\$300,000	--
24	Study Submitted (FHWA)	\$3,000,000	--

Click on the PDF, and by clicking links

lowing tasks:

Tier II Projects (\$3.0M)

lowing tasks:

Tier II Projects (\$6.0M)

lowing tasks:

Tier II and III Projects (\$10.0M)

with project tier, priority, and

September 14, 2016

1

2

3

4

5

6

7

HDR Role

Program Management Individual Projects

Prioritization of Tier 1 Projects																										
Description				Plan	Goals						User Costs		Project Costs			Project Benefits			B:C Ratio			SME Delay Estimates				
Region	Facility	Issue	Mitigation	FY 2016 Plan	Efficiency	Reliability	Accessibility	Safety	Cost	Schedule	Total	2014 Annual User Costs in Area (INRIX; italics indicates SME estimate)	SME Estimate of User costs due to identified issue	SME Total Project Cost Estimates (Capital)			Lifecycle Benefits			Lifecycle Benefits to Cost Ratio			Project Life	SME Estimate of User Cost Delay Savings		
					Weights									Probability Percentiles			Probability Percentiles			Probability Percentiles						
					10	10	5	5	15	15				15th	50th	85th	15th	50th	85th	15th	50th	85th		Years	15th	50th
5	US 550 Durango to Trimble	Passing lane in NB direction only; limited SB passing opportunities	Reallocate passing lane for SB direction in selected locations	Study Design Construct	3	4	1	4	4	5	170	\$ 1,000,000	20.0%	\$ 40,000	\$ 50,000	\$ 75,000	\$ 150,000	\$ 450,000	\$ 1,050,000	6	9	14	15	5.00%	15.00%	35.00%
1	I-225 NB Off-Ramp at Parker Road	Heavy Right Turn Volume	TBD - potential for 4th right turn lane or other modifications	Study Design Construct	4	4	1	3	3	4	160	\$ 8,990,000	40.0%	\$ 160,000	\$ 200,000	\$ 750,000	\$ 270,000	\$ 3,775,000	\$ 8,090,000	7	19	28	15	0.50%	7.00%	15.00%
2	US 50 EB On-Ramp to I-25 SB (Pueblo)	Heavy Right Turn Volume	Re-stripe to double right turn	Study Design Construct	4	4	2	2	3	4	160	\$ 1,780,000	30.0%	\$ 100,000	\$ 125,000	\$ 200,000	\$ 800,000	\$ 2,005,000	\$ 4,005,000	11	16	23	15	10.00%	25.00%	50.00%
4	US 34 / US 36 (Moraine)	Pedestrian activity on south leg prevents FR-to-	TRD	Study Design	3	4	2	4	4	4	160	\$ 950,000	50.0%	\$ 40,000	\$ 100,000	\$ 100,000	\$ 355,000	\$ 715,000	\$ 2,850,000	1	7	18	15	5.00%	10.00%	40.00%



Identify bottleneck location, root cause, and potential solution(s) for 100+ Projects

HDR Role

Program Management Individual Projects

Prioritization of Tier 1 Projects																										
Description				Plan	Goals							User Costs		Project Costs			Project Benefits			B:C Ratio			SME Delay Estimates			
Region	Facility	Issue	Mitigation	FY 2016 Plan	Efficiency	Reliability	Accessibility	Safety	Cost	Schedule	Total	2014 Annual User Costs in Area (INRIX; italics indicates SME estimate)	SME Estimate of User costs due to identified issue	SME Total Project Cost Estimates (Capital)			Lifecycle Benefits			Lifecycle Benefits to Cost Ratio			Project Life	SME Estimate of User Cost Delay Savings		
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Qualitative Evaluation according to COBRA Program Goals

HDR Role

Program Management Individual Projects

Prioritization of Tier 1 Projects																										
Description				Plan	Goals						User Costs		Project Costs			Project Benefits			B:C Ratio			SME Delay Estimates				
Region	Facility	Issue	Mitigation	FY 2016 Plan	Efficiency	Reliability	Accessibility	Safety	Cost	Schedule	Total	2014 Annual User Costs in Area (INRIX; italics indicates SME estimate)	SME Estimate of User costs due to identified issue	SME Total Project Cost Estimates (Capital)			Lifecycle Benefits			Lifecycle Benefits to Cost Ratio			Project Life	SME Estimate of User Cost Delay Savings		
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SME Estimate of User Costs (delay) – Use Big Data

HDR Role

Program Management Individual Projects

Prioritization of Tier 1 Projects																										
Description				Plan	Goals						User Costs		Project Costs			Project Benefits			B:C Ratio			SME Delay Estimates				
Region	Facility	Issue	Mitigation	FY 2016 Plan	Efficiency	Reliability	Accessibility	Safety	Cost	Schedule	Total	2014 Annual User Costs in Area (INRIX; italics indicates SME estimate)	SME Estimate of User costs due to identified issue	SME Total Project Cost Estimates (Capital)			Lifecycle Benefits			Lifecycle Benefits to Cost Ratio			Project Life	SME Estimate of User Cost Delay Savings		
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SME Estimate of Range of Probable Construction Costs and Benefits

Program Management Individual Projects

Prioritization of Tier 1 Projects																										
Description				Plan	Goals						User Costs		Project Costs			Project Benefits			B:C Ratio			SME Delay Estimates				
Region	Facility	Issue	Mitigation	FY 2016 Plan	Efficiency	Reliability	Accessibility	Safety	Cost	Schedule	Total	2014 Annual User Costs in Area (INRIX; italics indicates SME estimate)	SME Estimate of User costs due to identified issue	Total Estimate	Project Capital	Lifecycle Benefits	Lifecycle Benefits to Cost Ratio			Project Life	SME Estimate of User Cost Delay Savings					
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Range (15%, 50%, 85%) of Probable Costs and Benefits

HDR Role

Program Management Individual Projects

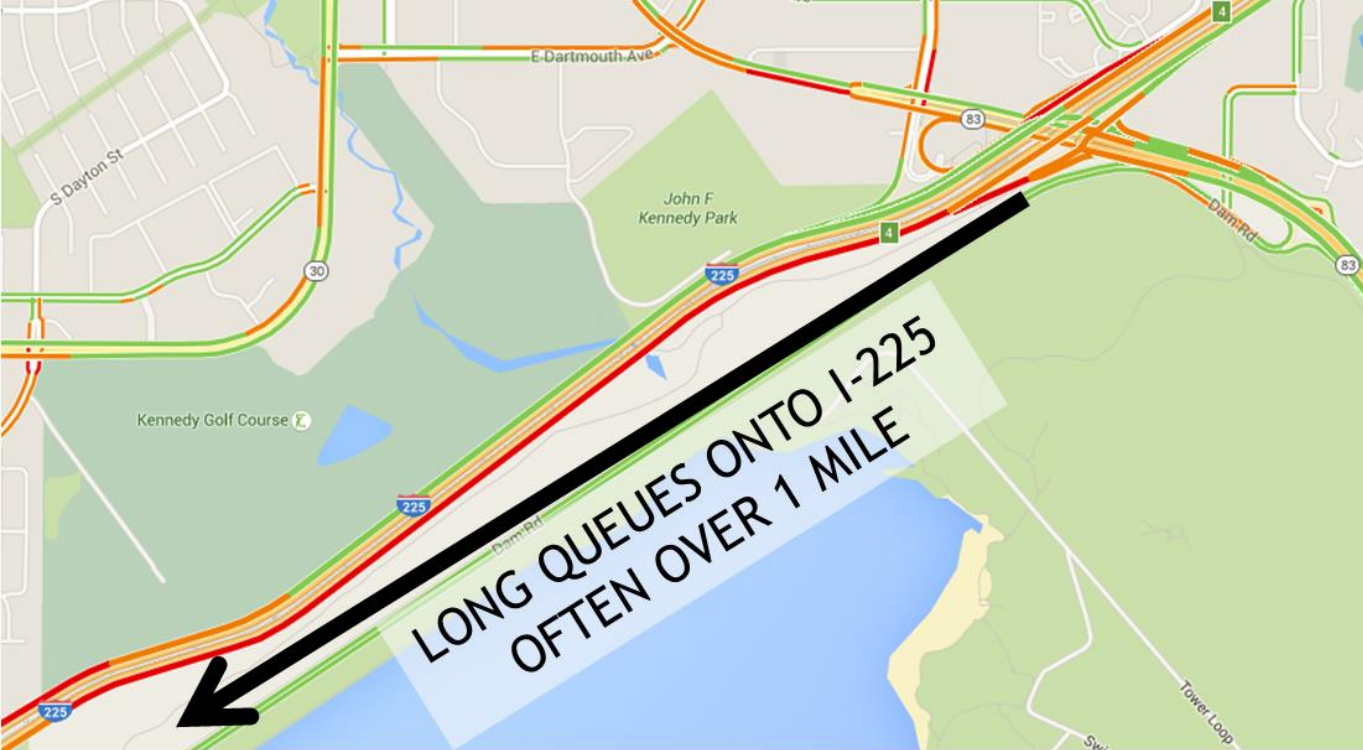
Prioritization of Tier 1 Projects																										
Description				Plan	Goals						User Costs		Project Costs			Project Benefits			B:C Ratio			SME Delay Estimates				
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Prioritize based on Benefit:Cost Ratio and Timeline to Implement

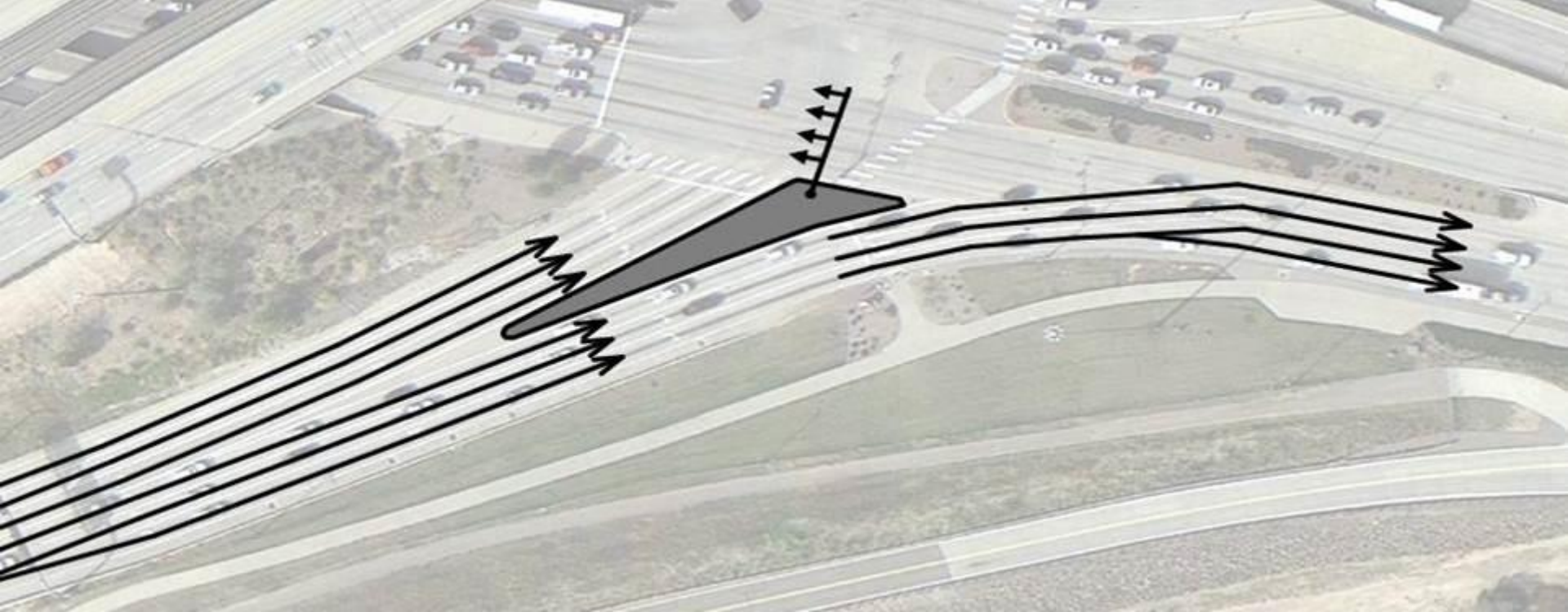
A night landscape featuring a road with light trails, hills, and a sky with light trails and clouds. The scene is dark, with the road and sky providing the primary light sources. The light trails are a mix of red and white, suggesting long-exposure photography of traffic. The hills are silhouetted against the dark sky, and the clouds are illuminated from below, creating a dramatic, layered effect. The overall mood is serene and mysterious.

04 Projects

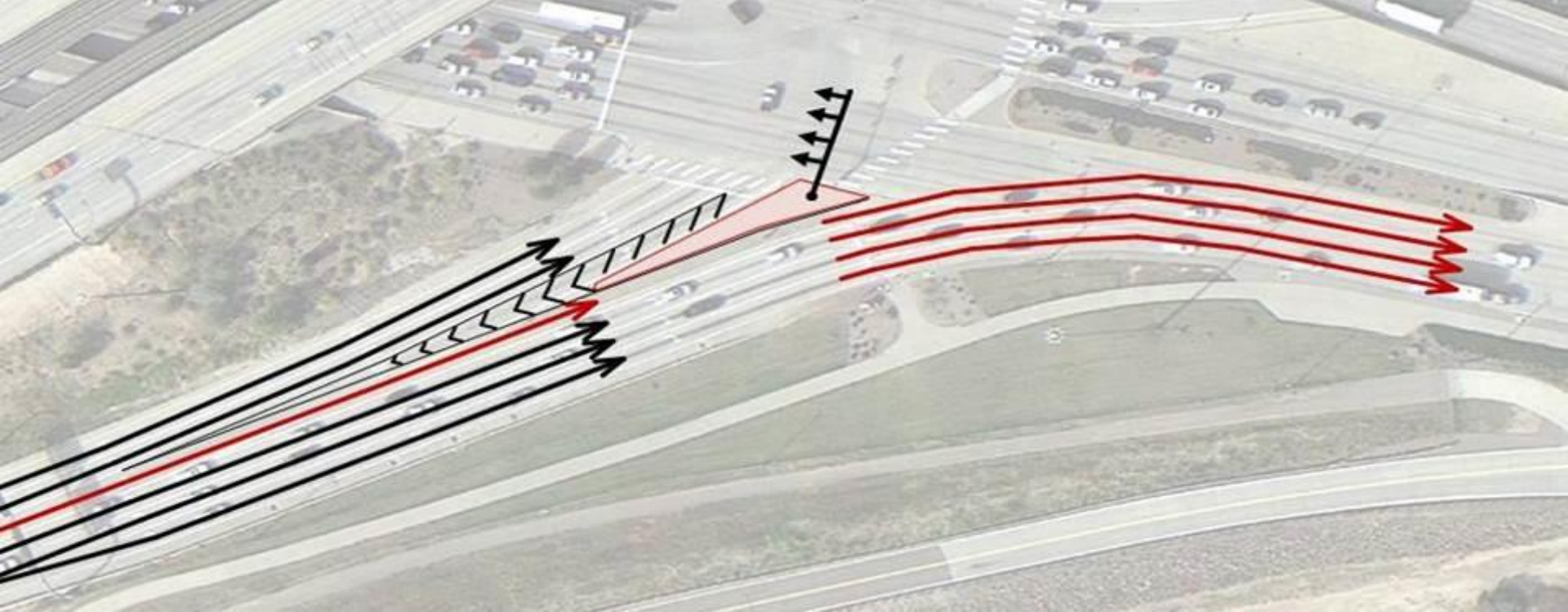


- Queues from ramp signal spill onto I-225
- Queues over a mile long
- \$6M/yr User Delay Costs

I-225 & Parker Road Aurora, CO



I-225 & Parker Road
Aurora, CO

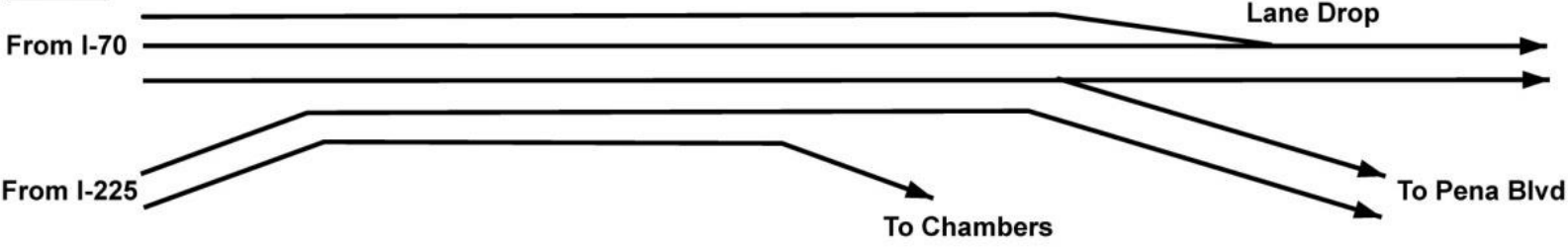


I-225 & Parker Road
Aurora, CO

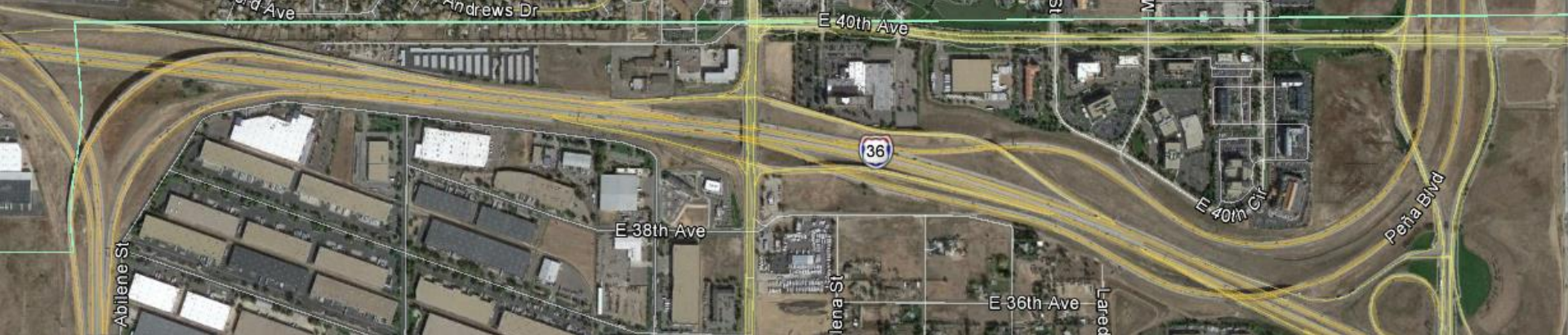
Cost: \$150K to \$200K
85% shorter queue
+\$1M User Delay Savings



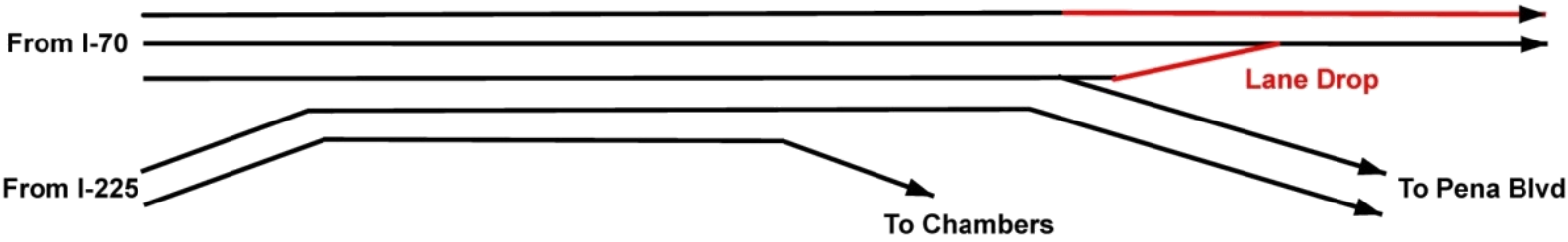
Before



I-70 & Pena Blvd
Denver, CO

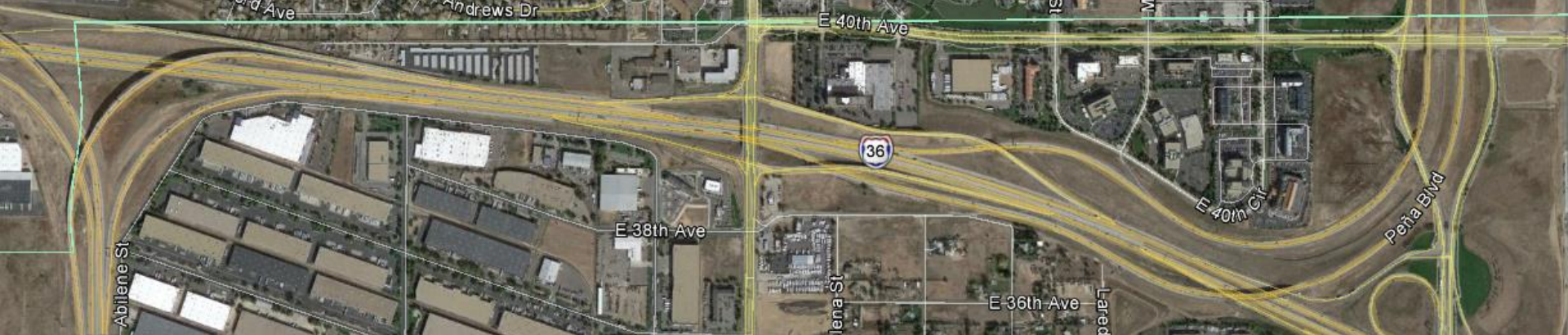


After

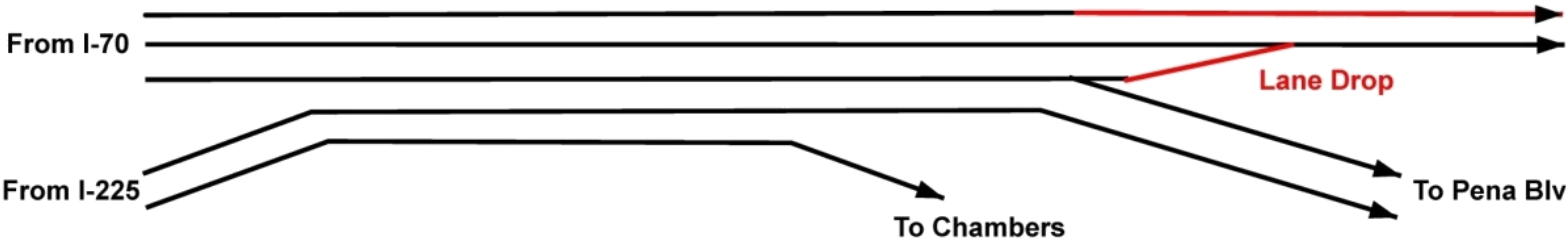


Signs & Stripes Only
Cost: \$60,000

I-70 & Pena Blvd
Denver, CO

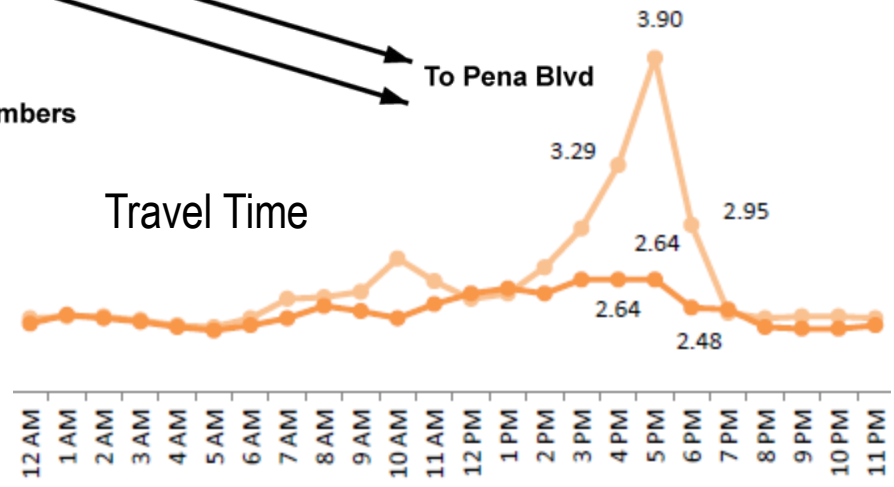


After



I-70 & Pena Blvd Denver, CO

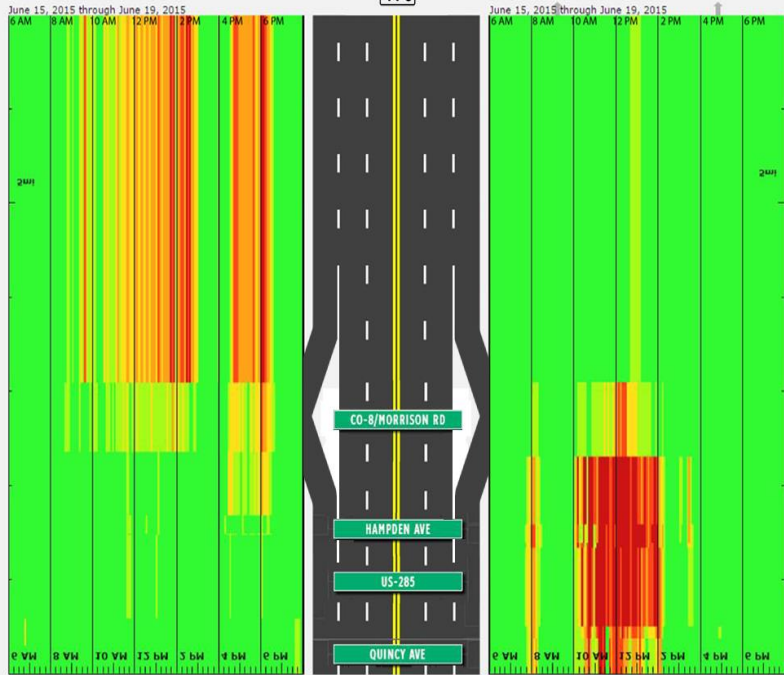
- January 2015 through June 2015
- January 2016 through June 2016



Eastbound (South)



Westbound (North)



- Classic Bottleneck
- Chance to restripe for \$5,000
- Failed to gain traction internally at CDOT

C-470 & Morrison Road Morrison, CO

A night landscape featuring a road with light trails, hills, and a sky with light trails and clouds. The scene is dark, with the road and sky providing the main visual elements. The light trails are a mix of red and white, suggesting long-exposure photography of traffic. The hills are silhouetted against the dark sky, and the clouds are illuminated with a soft, reddish-pink glow. The overall mood is serene and atmospheric.

05 Takeaway

Takeaway

- FHWA
- DOT's
- MPO's
- RTA's
- Still early in the game
- We are here for you
- Expertise is attainable



QUESTIONS

elevate

TRANSCON2017