



Optimizing Express Lane Operations

TRB International Managed Lanes Conference
Session #6
May 5, 2016

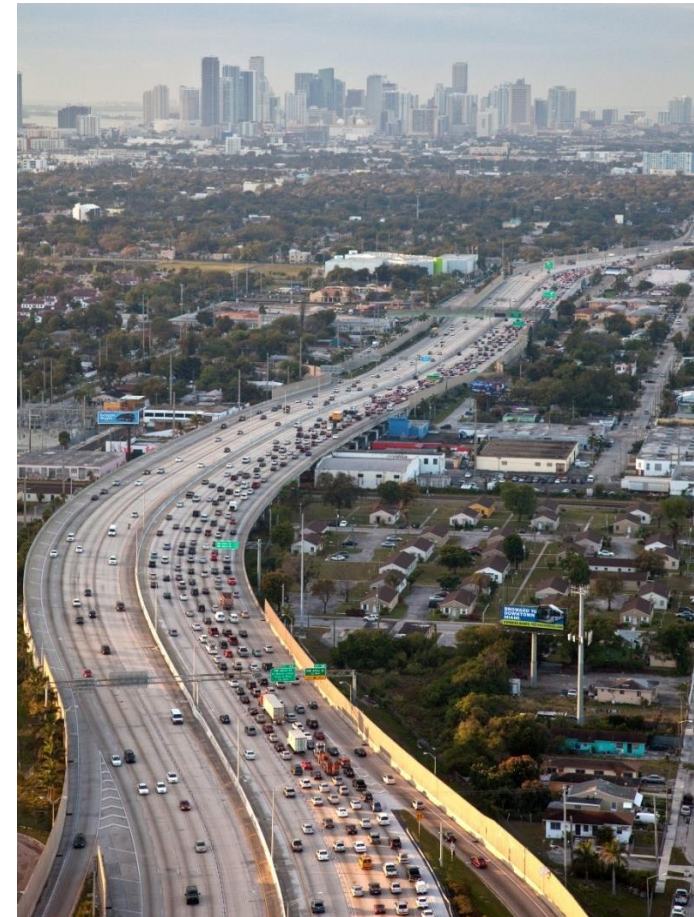
Charles Robbins, PE



Agenda



- Background
- Dynamic Pricing Overview
- Approach to Analysis
- History of Adjustments
- Sample Analysis

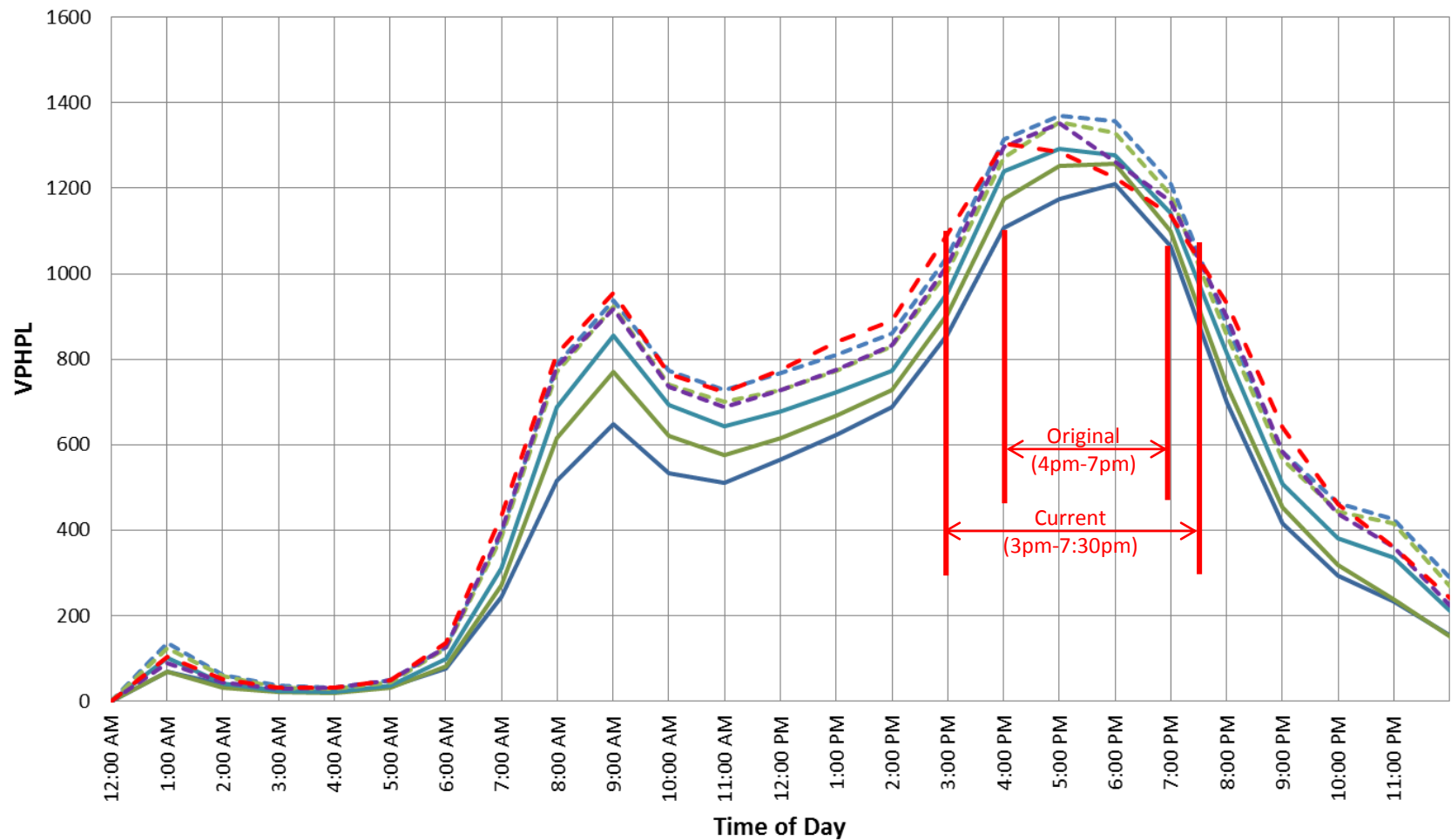


*I-95 Southbound heading towards
Downtown Miami during AM Peak Period*

Background – Growing Demand



95 Express Northbound - Average Weekday Hourly Traffic (by FY)



— FY 2008-2009 — FY 2009-2010 — FY 2010-2011 - - - FY 2011-2012 - - - FY 2012-2013 - - - FY 2013-2014 - - - FY 2014-2015

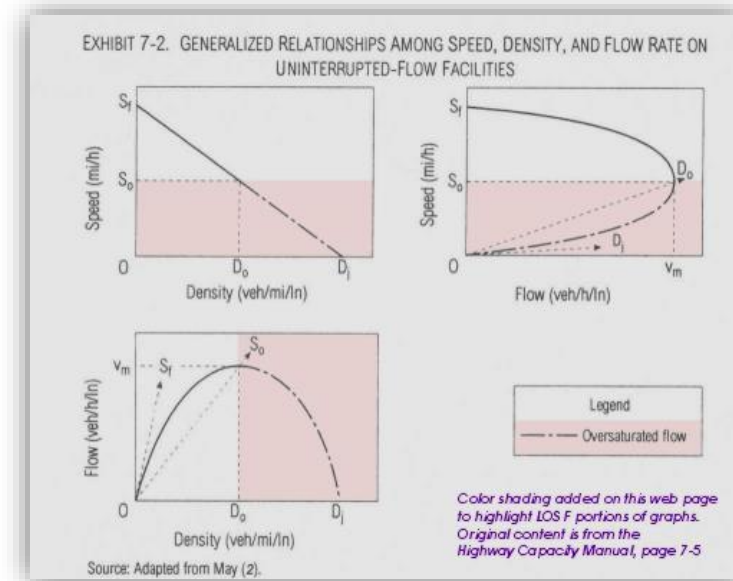
Background - Trends



- Demand > Capacity
 - Events
 - Congestion
- Toll Tolerance
 - First Opened = \$3.50
 - Currently = \$8.50, outside peak period
 - Many Still Willing to Pay \$10.50
 - Manage 10-25% Demand

Dynamic Pricing Overview

- Algorithm Concepts
 - Configurable parameters
 - Updated Every 15 minutes
 - Looks at Express Lane only
 - Traffic Density-Based
- Goals
 - Maximize Throughput
 - Not Revenue
 - Trip Reliability
 - Speeds > 45 MPH
 - 90% of the Time (Peak Period)



Traffic density provides the relationship among speed, volume and level of service

Dynamic Pricing Overview



- Algorithm Parameters
 - Delta Tables
 - Rate of Change
 - Level of Service (LOS) Tables
 - Price Check
 - Select Detectors for Calculation
 - Detector Accuracy Monitored
 - Average of Selected Detectors
 - Performance Factor
 - More Responsive to Events
 - Speed Threshold

Delta Table				
Traffic Density	Δ Traffic Density			
	1	2	3	4
27	\$0.50	\$0.75	\$1.00	\$1.25
28	\$0.50	\$0.75	\$1.00	\$1.25
29	\$0.50	\$0.75	\$1.00	\$1.25
30	\$0.50	\$0.75	\$1.00	\$1.25
31	\$0.50	\$0.75	\$1.00	\$1.25
32	\$0.50	\$0.75	\$1.00	\$1.25

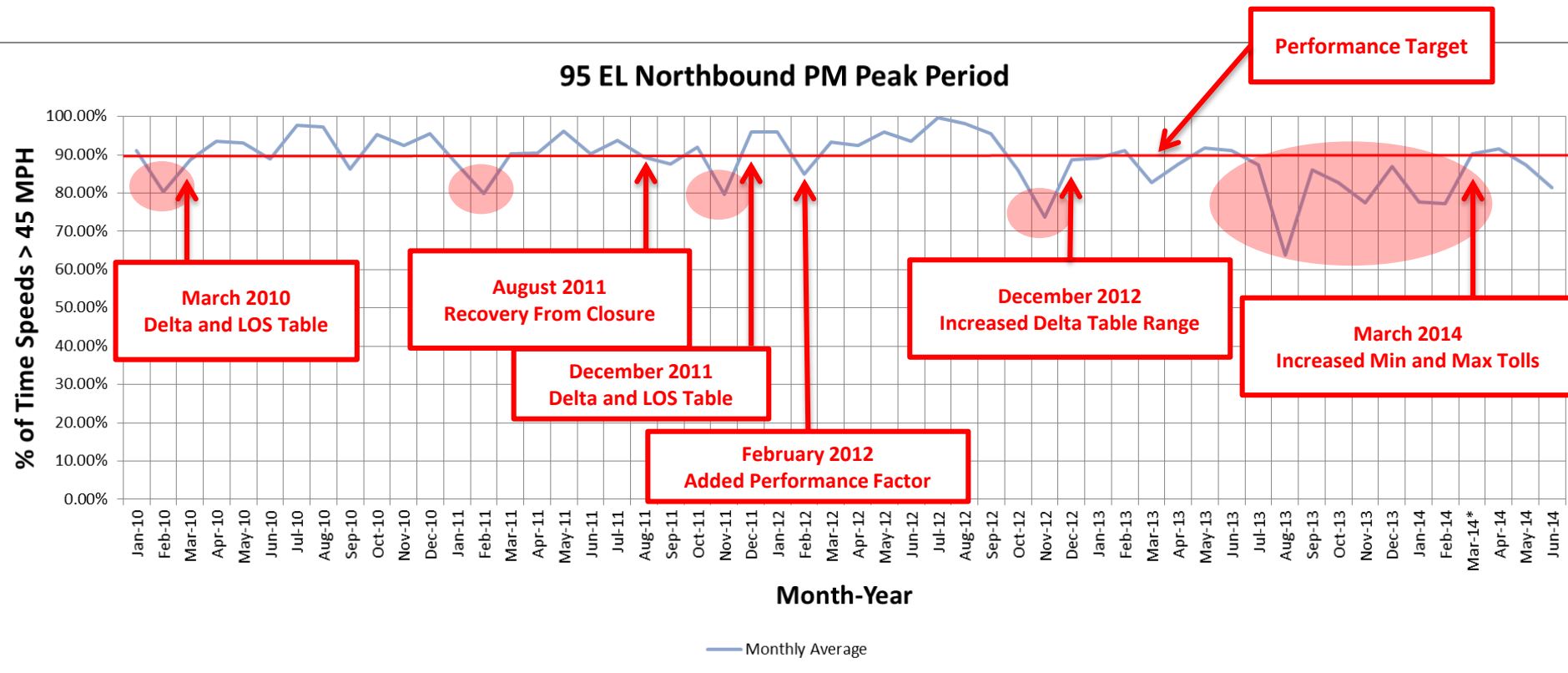
LOS Table			
Level of Service	Traffic Density	Toll Rate	
		Min	Max
A	0 – 11	\$0.50	\$0.50
B	>11 – 18	\$0.50	\$1.50
C	>18 – 26	\$1.50	\$8.50
D	>26 – 35	\$8.50	\$10.50
E	>35 – 45	\$9.50	\$10.50
F	>45	\$10.50	\$10.50

Approach to Analysis



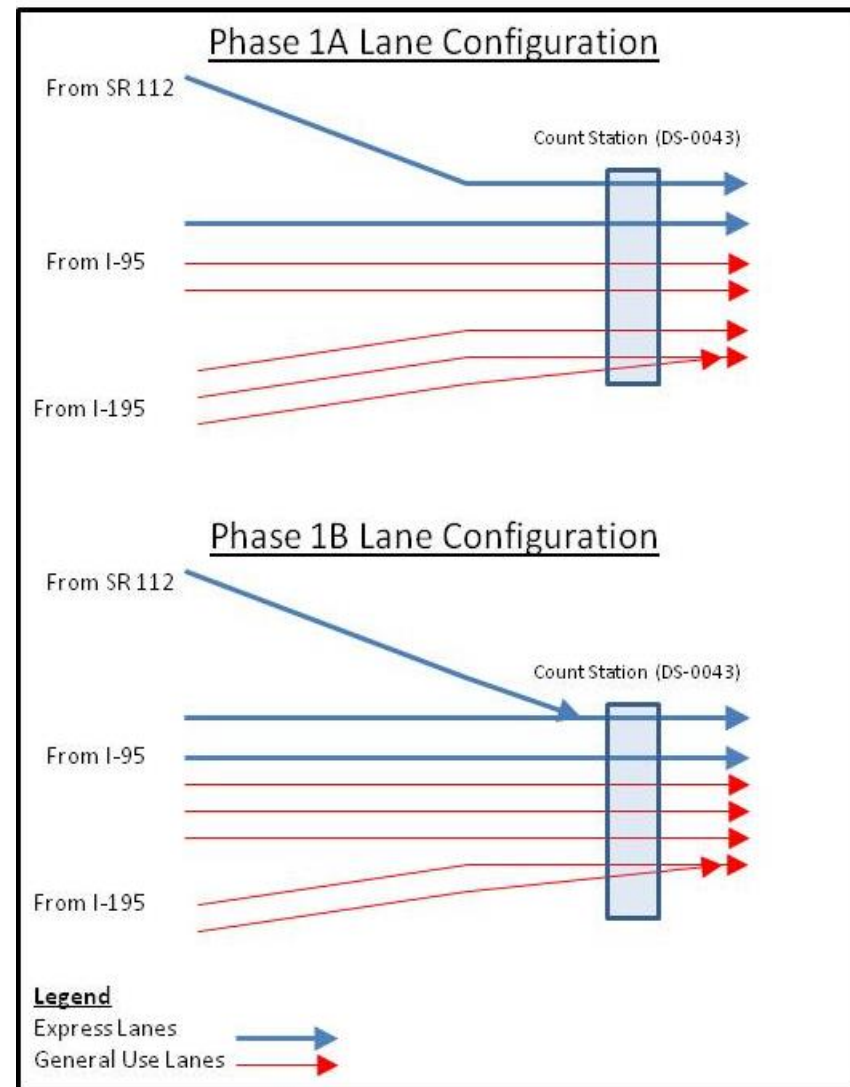
- Monitor Performance Daily/Weekly/Monthly
 - Statewide Express Lanes Software Reports
- Identify Issues
 - Increase Demand vs. Reduced Capacity
 - Events vs. Enforcement
- Select Sample Days
- Identify Toll Tolerance
 - Entering Volume vs. Tolls
- Speed-TD Relationship
- Iterative Approach to Adjustments
 - LOS Tables, Delta Tables, Performance Factor

History of Adjustments



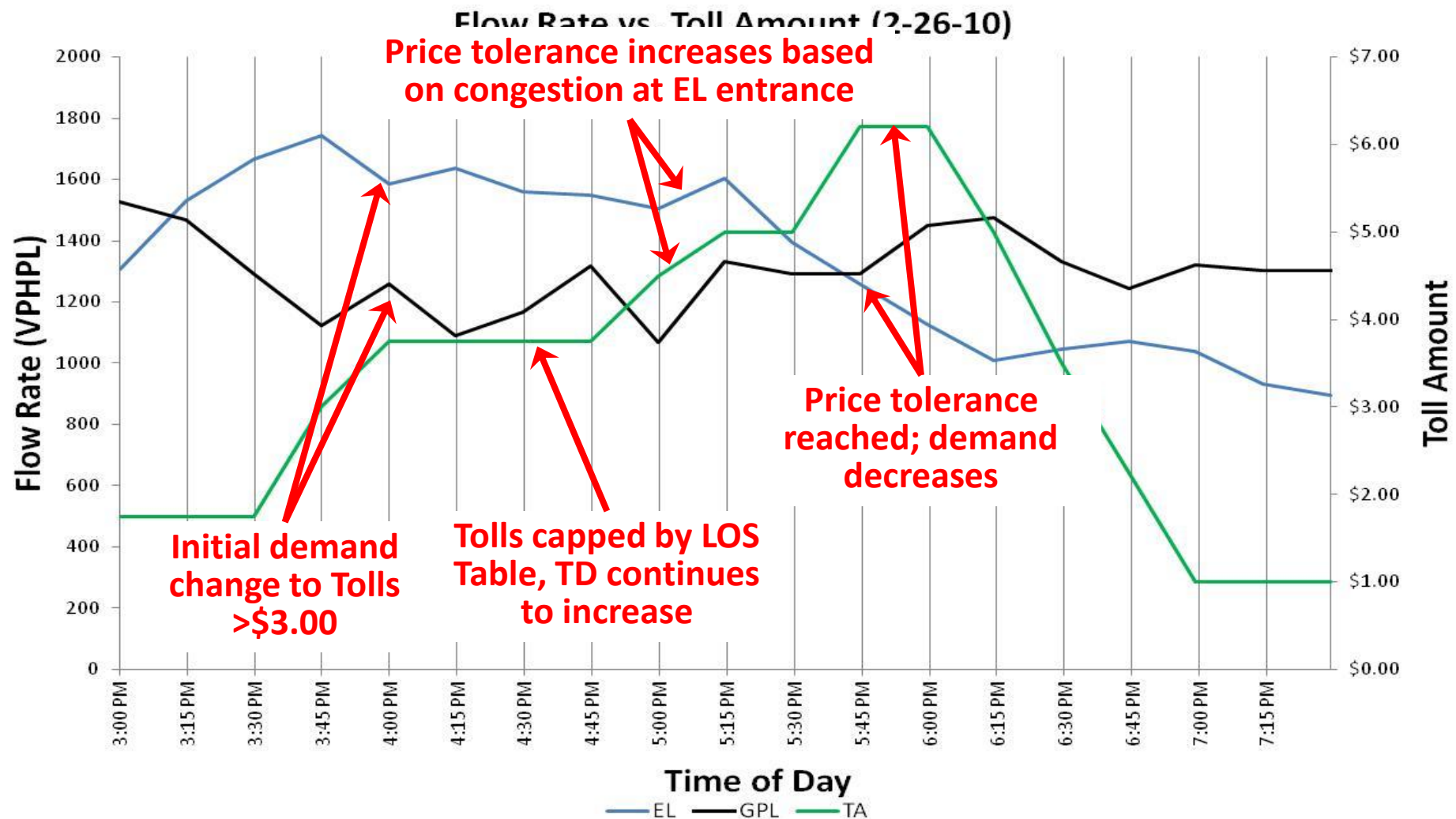
Sample Analysis – Case #1

- Phase 1B Impact
 - Increased Max Peak Hour Flow at Ingress
 - No Increased Capacity at Egress
 - Reduced % speeds > 45 MPH to 80% during PM Peak Period



Parameter Adjustments – Case #1

Before Delta and LOS Adjustments (Phase 1B)

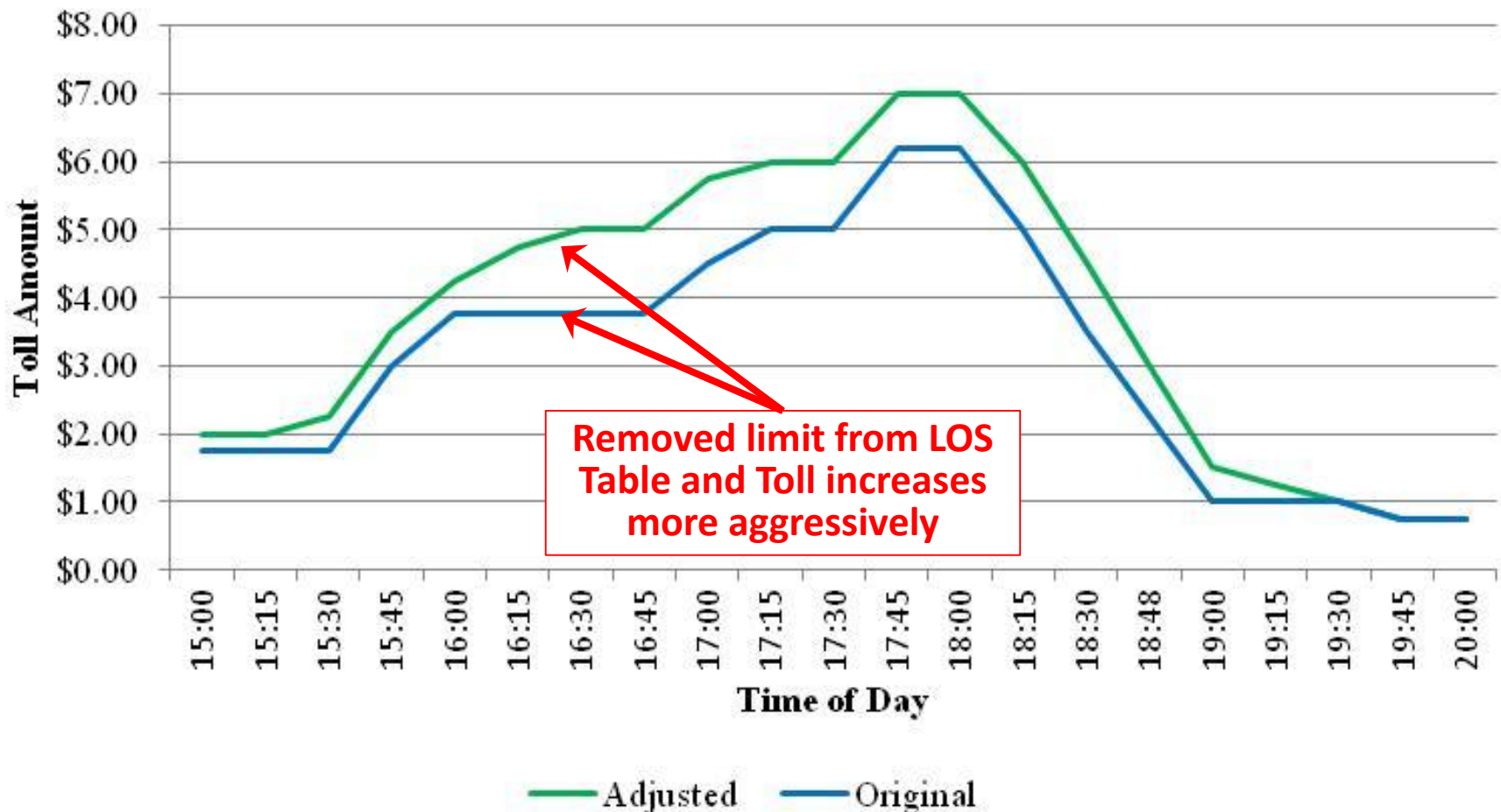


Parameter Adjustments – Case #1

After Delta and LOS Adjustments (Phase 1B)

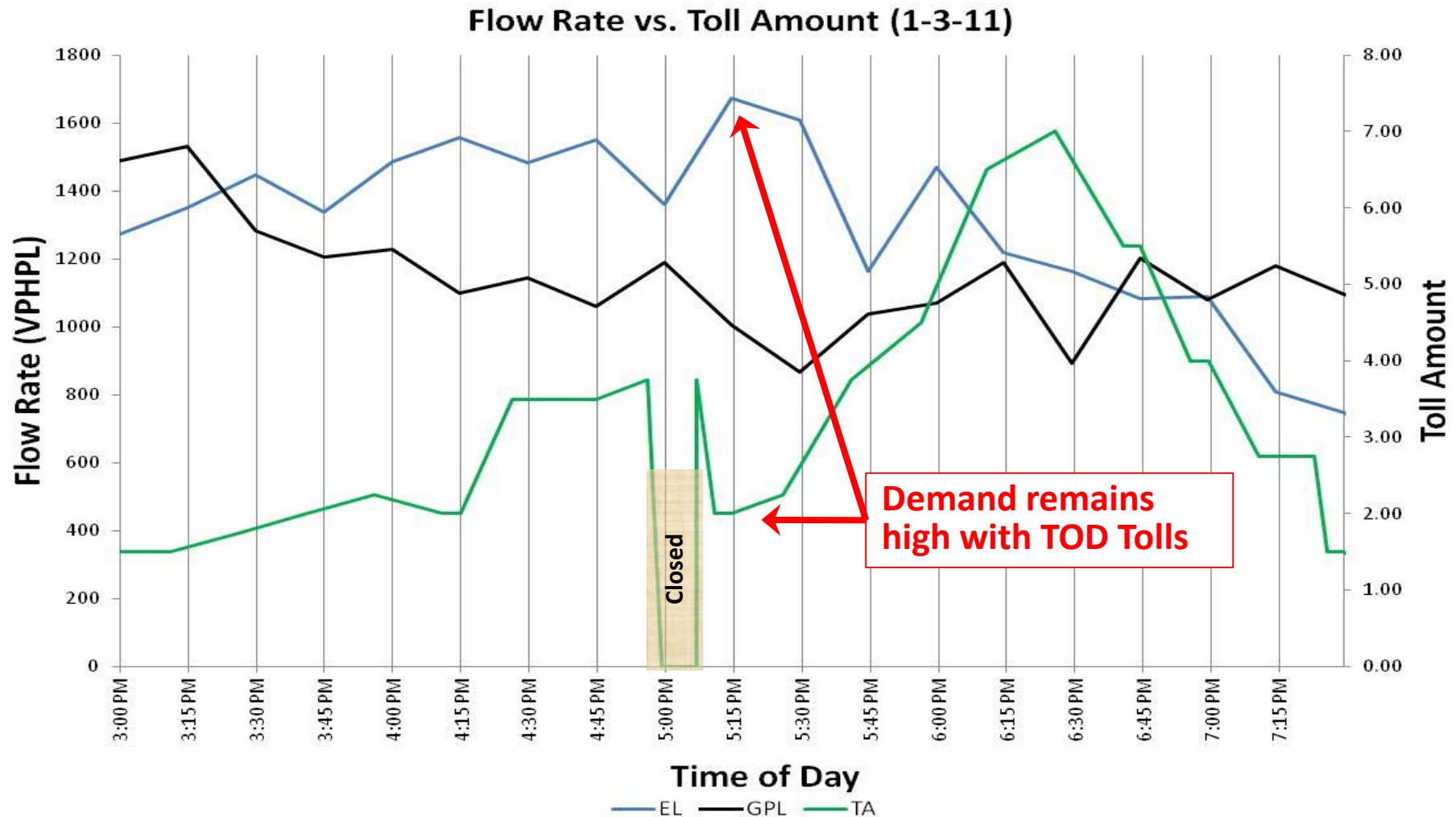


Original vs. Adjusted Parameters



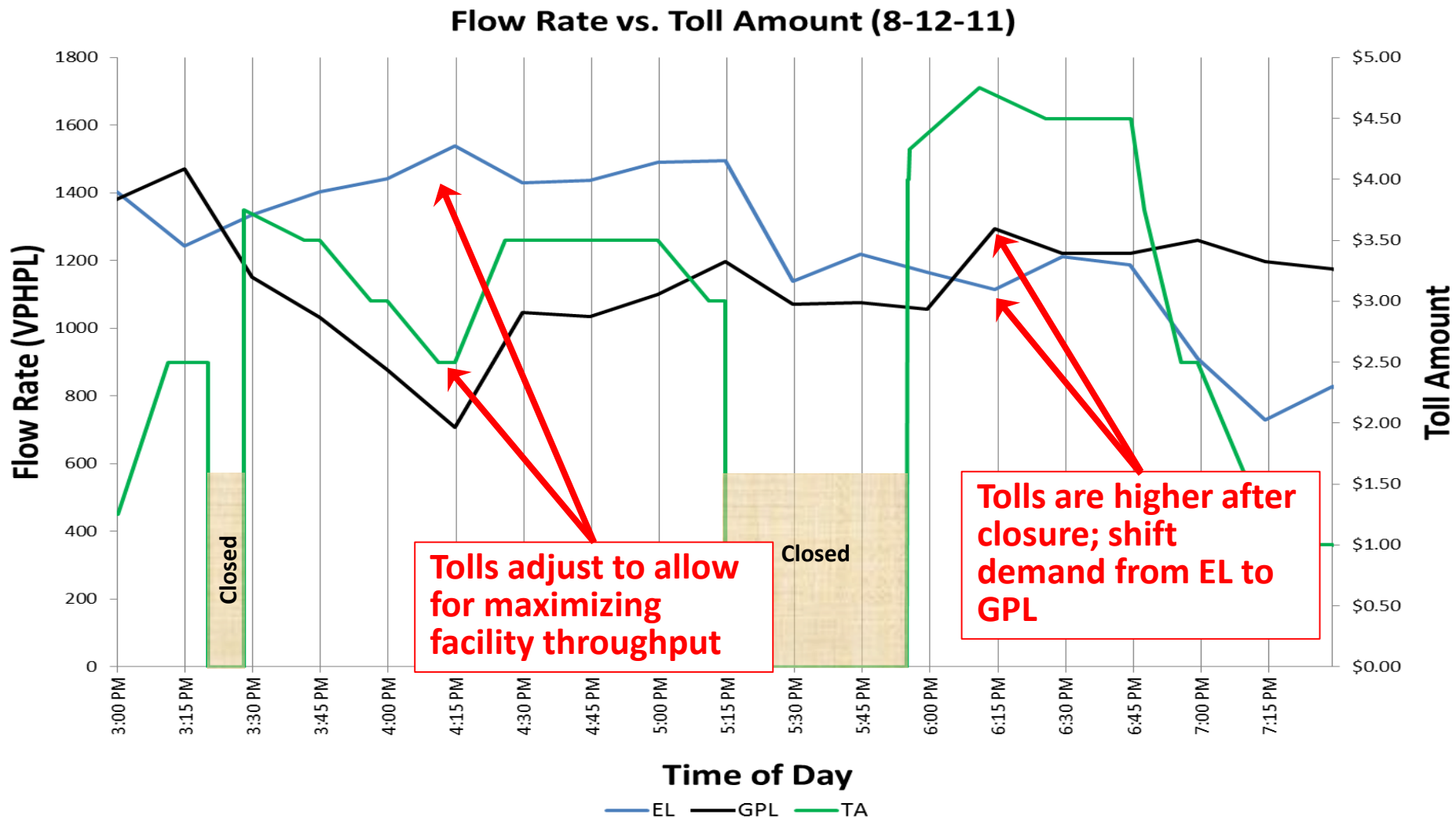
Parameter Adjustments – Case #2

Before Recovery From Closure



Parameter Adjustments – Case #2

After Recovery From Closure



Questions?



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