Freight Operations study
I-64 WB MM 105 – 99

Matthew Shiley, PE
Regional Operations Director

March 30, 2017

Operations Problem

- I-64 Westbound
  - From MM 105 to MM 99
  - Weekday evening Peak hours
- Speed Differentials
  - Steep grades
  - Mix of passenger vehicles and freight traffic
- Lane Utilization
  - Driver behavior (lane changing, braking, small gaps)
  - Existing law for trucks & comb. vehicles traveling below posted speed limit
- Congestion
  - Reduced speeds
  - Reduced travel time

Approach

- Operational Analysis (2015-16)
  - Crashes
  - Grades
  - Traffic volume and mix
  - Speeds
  - Lane utilization
  - Truck climbing lane warrants evaluation (AASHTO)

- VISSIM Model (2016)
  - Model exiting traffic conditions
  - Evaluate potential solutions

Findings

- **Average Daily Traffic(ADT):** 18,700 vehicles (14% Trucks)
- **PM Peak Hour:** 5-6 PM (M-F)
  1,840 vehicles (9% Trucks)
- **Posted Speed Limit:** 65 MPH
- **85th percentile speed:** +71 MPH

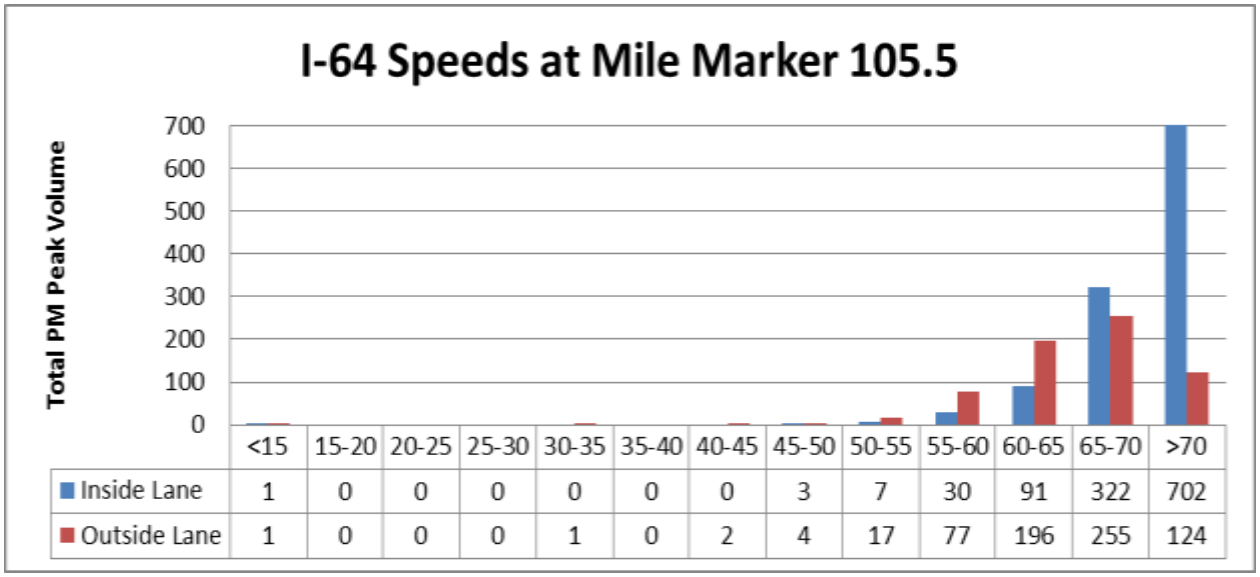
- **MM105.5 to 100.2**
  - Overall travel speeds decrease as vehicles travel uphill
- **MM104 (5-6PM)**
  - 73% (1,350) of vehicles are using the inside/left lane
- **MM 100.2**
  - 21% of vehicles traveling in the right/outer lane are traveling at speeds lower then 50 MPH

Findings

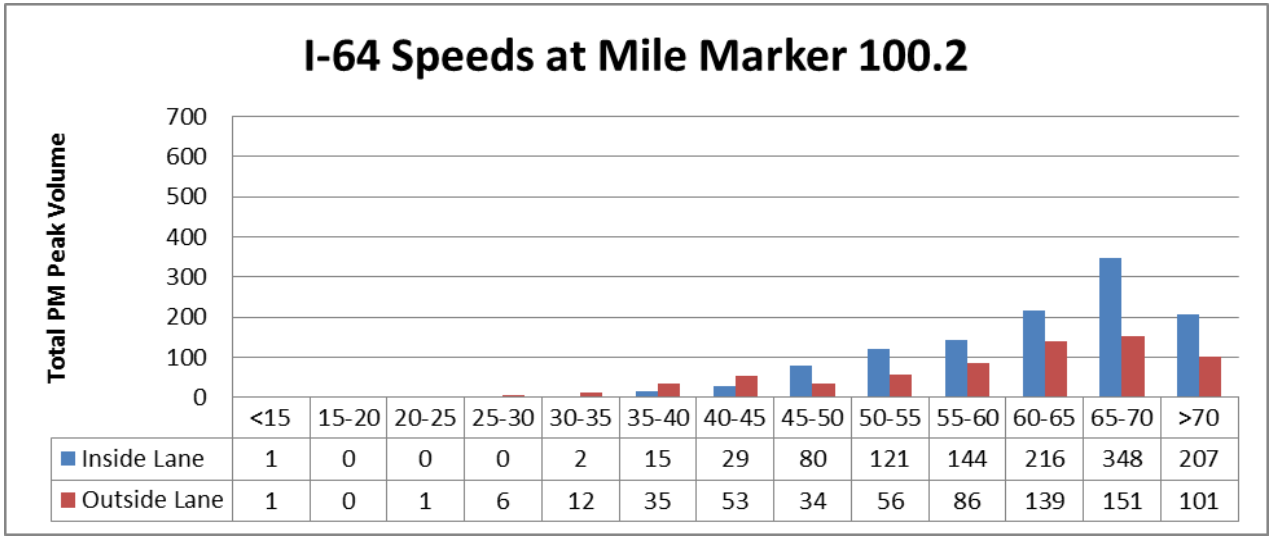
- **Consistent Pattern observed from data:**
  - **Non-Peak period—Truck Volume in left lane is lower than the truck volume in right lane**
  - **Peak Period (4:00-6:00 pm)---Truck volume in Left Lane exceeds the Right Lane truck volume**

- **Field Observations during PM peak period: Trucks that move to the left lane generally do so to overtake slow moving Trucks in the right lane**

Speed Comparison



	<15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	>70
Inside Lane	1	0	0	0	0	0	0	3	7	30	91	322	702
Outside Lane	1	0	0	0	1	0	2	4	17	77	196	255	124



	<15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	>70
Inside Lane	1	0	0	0	2	15	29	80	121	144	216	348	207
Outside Lane	1	0	1	6	12	35	53	34	56	86	139	151	101

5-Year Crash Analysis

- **I-64 WB - MM 104 – 99**
  - **76 total crashes from 2010 – 2014**
  - **52.05 crashes per 100 Million VMT**
    - +2.64% from Culpeper District Average
    - +20.28% from Staunton District Average
  - **No Fatal crashes**
  - **41% (31) Rear-End crashes (highest type)**
  - **(7) Non-rear end; attributed to speed differentials**

- **50% of all crashes Rear-end or speed related**

AASHTO Climbing Lane for Multi-Lane Highways

If ONE of the following principles is satisfied, *consideration* of a truck climbing lane IS WARRANTED:

Critical Length of Grade: Length of grade exceeds the critical length of grade.

✓ **Segment meets criteria**

Service Flow Volume: Service flow volume is greater than 1,000 vehicles per hour per lane(vphpl) but less then 1,700 vphpl.

✓ **Segment meets criteria**

Operational Assessment (Level of Service): Existing level of service exceeds LOS D and would be improved one grade level with the addition of a truck climbing lane.

X Segment does not meet criteria

Traffic Model Findings

- **100% Truck Restriction on Left Lane was modeled**
  - **Left Lane impacts: In the higher grades, average speed goes up in the left lane, compared to existing conditions; Speed difference is significant (5% increase), although less volume is processed.**
  - **Right Lane impacts: Speed difference is minimal over existing and more volume is processed**
- **Average speed (Trucks & Cars combined) slows down around 3:00 PM and starts increasing around 7:00 PM**

Potential Solutions and challenges

- **Interim Solutions: Upgrade existing signs and use Changeable Message Signs (CMS) to alert trucks to use the right lane**

- **Monitor & Evaluate effectiveness**

Static Signing: Completed 2016

CMS signs activated 3/23/17
(M-F; 3-7:00 PM)

- **CMS sign message at MM 102 & 104**
- **CMS sign at MM 110 displays travel time to I-81/Staunton**

Potential Solutions and challenges

- **Temporary Solution - FHWA Hard Shoulder Running**
  - **http://ops.fhwa.dot.gov/publications/fhwahop10023/chap4.htm**
  - **Approval must be obtained from FHWA for Hard Shoulder Running**
  - **Providing Refuge/Pull-offs for breakdowns needed**
  - **The intent is for these facilities to be temporary in nature and not a permanent solution for long-term capacity provision**
  - **Requires an ITS system to operate dynamically**
- **Construction of a westbound truck climbing lane.**
- **Funding**

QUESTIONS?