Freeway Operations, Planning, Work Zones, Traffic Incident Management
Dennis O'Neil
Transportation Engineer
ODOT, District 12

October 26, 2016
Work Zone Traffic Management

- Capacity Analysis
- Permitted Lane Closure Map/Schedule
- Reducing Volume - soft closures
- Queue Warning System
GVV Bridge after Nov. 2016
Lane widths on 490 east

490 Eastbound

Over a mile segment
5 lanes on 490 East, no shoulders
490 east  5 lanes, no shoulders in action
Multiple Choice Question

When will Dennis Retire?

A. After his next bad day.
B. When is wife lets him.
C. Tomorrow.
D. Never.
E. T.B.D.
Freeway Operations

Safety, Mobility, Reliability

1. Travel time reliability  Management System
2. TSMO  (ITS)
3. Ramp Metering  8. Performance Based
4. Hard Shoulder  Practical Design
   Running
5. TIM
6. Work Zone Mgmt.
7. Freeway
8. Permits
9. Maintenance
10. Speed
11. Harmonization
Operations Planning

Look for opportunities within your system to smooth traffic flow.

Inexpensive, striping and signing
Adding pavement for a short section
90 west at McKinley Exit
Hard to merge on to 480 east from Grayton Rd.

1200'
480 East at Grayton Rd Entrance
Bottleneck

ADT East
68,000
Added about 1500' of pavement.

Broadway on ramp

Broadway Exit
Performance Based Practical Design (PBPD)

Project with no design exceptions
$16.3 M

PBPD Design exceptions
$4.5 M
I-90 West

InnerBelt Trench  5 days per week every week of the year
Mass. State Route 3, Pilgrims Hwy
Exit ramps

Drivers in breakdown lane drive over edge line

Exit ramp starting
At Exit Ramp, drive through the gore.
Seattle Washington  I-5
Work Zone Traffic Management

- Capacity Analysis
- Permitted Lane Closure Map/Schedule
- Reducing Volume - soft closures
- Queue Warning System
Innerbelt Bridge Replacement Project

I-90
Cleveland

ADT 140,000
Lane widths on 490 east

490 Eastbound


Over a mile segment
5 lanes on 490 East, no shoulders
490 east  5 lanes, no shoulders in action
### ODOT’s Lane Closure Queue Analysis Tool

**PROJECT INFORMATION**
- Date: 9/12/2015
- PCC: 99.748
- CRS: 7298
- Analyst: Devin SNL
- MCD scenario: Bridge Project Ramp bridge from 271 North to 80 West. Reduced to one lane.

**TRAFFIC VOLUME DATA**
- Type of volume data to be used for analysis:
  - Hourly

**For hourly based evaluation:**
1. Enter estimated annual volume (column A)
2. For AADT based evaluation:
   - Enter average annual daily traffic value

**PRE-LANE CLOSURE CONDITION**
- Number of lanes (one direction): 2
- Type of vehicles: Passenger car equivalent load truck or bus: 15
- Base lane speed (BFS): 75.4 mph
- Adjustment to lane speed: 0 mph
- Value of time (min R): 8
- Adjustment for lateral clearance, le: 0.6 mph
- Adjustment for ramp density: 12.729
- Lane density within lane: 2
- Use design adjustment
-示范基地 speed (DFS): 73.25 mph

**LANE CLOSURE CONDITION**
- 2005 HCM base travel capacity, PDL = (1600 + 1 + 0) x PDL_base
- Value density adjustment (0): -2
- Cancellation of lane capacity, U = 400 (column C)
- Number of lanes (one direction): No.
- Number of days (one direction): 2
- Adjustment for presence of on-ramps within lane (column F)

**QUEUE INFORMATION**
- Average minimum headway of passenger car in queue: 20
- Queue length highlighted based on PDL: 230 (DPL) vehicles
- $Q = 0.75$

**DETERMINISTIC QUEUE ANALYSIS**

<table>
<thead>
<tr>
<th>Time Interval</th>
<th>Demand</th>
<th>Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Queue - Upstream of work zone at the end of the time interval</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Size</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Na</td>
</tr>
<tr>
<td>6:00-7:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>7:00-8:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>8:00-9:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>9:00-10:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>10:00-11:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:00-12:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>12:00-13:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>13:00-14:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>14:00-15:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>15:00-16:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>16:00-17:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>17:00-18:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>18:00-19:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>19:00-20:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>20:00-21:00</td>
<td>4.9</td>
<td>0</td>
</tr>
<tr>
<td>21:00-22:00</td>
<td>4.9</td>
<td>0</td>
</tr>
</tbody>
</table>
271 over Wilson Mills

Bridge to be replaced

Bridge to be replaced
271 North with PM peak traffic volumes
Shift traffic from the Local Lanes to the express lanes

5400 v/h on express lanes.

1350 V/H/L

Drop a lane at Wilson Mills
## Major Tool for Freeway Operators: Permitted Lane Closure Schedule/Map

### Revision # 13

<table>
<thead>
<tr>
<th>Location</th>
<th>Direction</th>
<th>Lanes</th>
<th>Weekdays</th>
<th>Weekends</th>
</tr>
</thead>
<tbody>
<tr>
<td>County Line to Hilliard Entrance Ramp</td>
<td>East</td>
<td>3</td>
<td>9am - 4pm / 7pm - 6am</td>
<td>10pm - 6am</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7pm Fri - 6am Mon</td>
<td>11pm Fri - 8am Sat / 11pm Sat - 9am Sun / 10pm Sun - 6am Mon</td>
</tr>
<tr>
<td>Hilliard Exit Ramp to the County Line</td>
<td>West</td>
<td>3</td>
<td>9am - 3pm / 7pm - 6am</td>
<td>10pm - 6am</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8pm Fri - 6am Mon</td>
<td>11pm Fri - 8am Sat / 11pm Sat - 10am Sun / 10pm Sun - 6am Mon</td>
</tr>
<tr>
<td>*Hilliard Entrance Ramp to W 44 St exit ramp</td>
<td>East</td>
<td>4</td>
<td>9am - 6am (21 Hours)</td>
<td>10am - 2pm / 7pm - 6am</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9am Fri - 6am Mon</td>
<td>8pm Fri - 6am Mon</td>
</tr>
<tr>
<td>*W 44 St. entrance ramp to Hilliard Exit Ramp</td>
<td>West</td>
<td>4</td>
<td>7pm-3pm (20 Hours)</td>
<td>9am - 2pm / 8pm - 6am</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7pm Fri - 3pm Mon</td>
<td>8pm Fri - 6am Mon</td>
</tr>
<tr>
<td>W 44 St. exit ramp to 490/90 split</td>
<td>East</td>
<td>4</td>
<td>9am - 3pm / 6:30pm to 6am</td>
<td>7pm to 6am</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7pm Fri - 6am Mon</td>
<td>8pm Fri - noon Sat / 7pm Sat-noon Sun / 6pm Sun-6am Mon</td>
</tr>
<tr>
<td>490/90 merge to W 44 St. entrance ramp</td>
<td>West</td>
<td>4</td>
<td>9am - 2pm / 7pm-6am</td>
<td>8pm-6am</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8pm Fri - 6am Mon</td>
<td>8pm Fri - noon Sat / 7pm Sat-noon Sun / 6pm Sun-6am Mon</td>
</tr>
<tr>
<td>Ramp from I-90 E to I-90 NB @ I-490</td>
<td>East</td>
<td>2</td>
<td>10am - 2pm / 7pm - 6am</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8pm Fri - 6am Mon</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* add lanes, that make up the 5 lane sections (on ramp add lanes), can be closed at the same times for one and two lane closures.
Major Tool for Freeway Operators: Permitted Lane Closure Schedule/Map

**District 12 Permitted Lane Closures: IR-480**

- Route: IR-480
- NLFID: SCUYIR00480**C
- Begin_CTL: 21.68
- END_CTL: 23.24
- Location: Broadway Ramps to Camden
- Direction: East
- Lanes: 4
- Weekdays_1_Lane_Closed: 10am - 1pm, 7pm - 6am
- Weekdays_2_Lanes_Closed: 9pm - 6am
- Weekends_1_Lane_Closed: 7pm Fri - 6am Mon
- Weekends_2_Lanes_Closed: 9pm Fri - 10am Sat, 8pm Sat - 12pm Sun, 8pm Sun - 6am Mon
Permitted Lane Closures
 Uses

- Planners
- Designers
- Contractors
- ODOT Maintenance
- Permits
- Traffic Incident Management
Special Events

10,000 seating capacity

Holidays

Day after Thanksgiving. No two (2) lane closures from 6am to 6pm, this note overrides the permitted lane closure schedule closure times.

Shoulder Closures

When the weekend starts, 6pm Friday

When full closures and rolling road blocks are allowed

Ramps closure times
Soft Closure of a Freeway
Detour
Mainline
77S to 490

Close 77 South at 490
Soft Closure

All ramps open on 77 south

Work Area 77 South

Close 77 South at 490
Queue Warning System: by Ver-Mac/ JamLogic
Speed Information System Analysis Before/After

20% reduction in Rear End Accidents
Traffic Incident Management (TIM)

Exhibit 1. The Six Causes of Congestion and Delay

- Poor Signal Timing: 5%
- Special Events: 5%
- Work Zones: 15%
- Bottlenecks: 40%
- Bad Weather: 15%
- Traffic Incidents: 25%
Pre-qualified Towers
If lanes are opened within 90 minutes
Tower get $2500 from ODOT.
ODOT has paid out over $300,000 last year.
OHIO’S TRAFFIC INCIDENT MANAGEMENT PROGRAM
TIM: Traffic Incident Management

SAFE QUICK CLEARANCE OF INCIDENTS

Planed, coordinated, multidisciplinary process:
Training for safer, faster, stronger, more integrated incident response.

National Traffic Incident Management Responder Training Program (L12/L32A/L32B)
D-12 has trained 1169 Emergency Responders Since 2013:

Law Enforcement
Fire
Dispatch
Transportation
Towers.
ODOT D-12 TIM Program

TIM Committees:
- Cleveland Metro Area TIM Committee
- Lake County TIM Committee

After Action Incident Reviews

TIM MOU for Cities
- Agree on Best Practices

Monday morning after action review by email.

MARCS radio common channels
I-90 East between Eddy and Lake Shore

June 24, Friday, 2016

6 car accident with injuries.

Seal coat tanker, 1100 gallons over turned, spilled material across all 4 lanes of traffic.

Road Closed from 11:30 am to 7pm, 7.5 hours
Trafficback up at 1:38 pm; all traffic getting off at Eddy
2:15 pm decide to close 90 at E 72nd St.
Looking West from E 105 St.
Bleed traffic off the freeway: Only to be used when speeds are under 25 mph.
Traffic back up at Chester at 4:53 pm. Superior, St Clair were gridlocked.
Quick Clear

Good
- Command Established
- ODOT helped with clean up
- ODOT used DMS
- CPD/Brantenahl directing traffic at intersections
- bled traffic off at E 72 St. and Eddy
- Queue was cleared
- ODOT Contractor ground and striped pavement
- Opened 3 lanes

Improvements
- Press release should state exactly where the road is closed
- Freeway closed for 7,5 hours????
  - Clean up Company
  - ODOT resources: communication/ bring them out sooner.
MOU for Emergency Responders in D-12

Goals:

1. Safe, Quick, Clearance.
2. 90 minute clearance time for major incidents,
   a. Minor incidents, move off freeway as soon as possible.

Best Practices:

1. Scene Safety
   a. Make the scene safe for responders, victims and motorists.
   b. Lane plus 1, but open the plus 1 lane as soon as possible.

2. Mind the Queue
   a. Send officer to the back of the Queue, drop flares.

   a. Place EMERGENCY SCENE AHEAD signs, call ODOT Freeway Service Patrol, 216-584-2201.
1. For Commercial Trucks blocking use the ODOT T.R.I.P program
2. Relieve motorists stuck in the Queue.
3. Close freeways at freeways when possible.
   a. Make an action plan with all responders, including towing.
   b. Meet every 15 – 30 minutes, revise action plan if necessary.
5. Responders wear High Visibility Vests.
6. Notify the Coroner as soon as possible.
   a. Give directions on getting to the scene.
1. Park on one side of the Roadway to help with traffic flow.
2. If vehicles are off the roadway, perform recovery operations at off peak times.
3. Use Lake County TAC-8 for major incidents.
4. Notify ODOT if freeway is to be closed or lanes blocked, ODOT Traffic Management Center (TMC) 216-584-2201.
5. Utilize all resources for clean-up including ODOT.
   a. ODOT will call clean up company for chemical/fuel spills if owner/insurance cannot get a clean-up company there in a reasonable time.
6. The Ohio State Highway Patrol is available to provide any level of assistance up to and including on scene investigations and any subsequent follow up, free of charge.

Require National TIM Responder training for all responders. Free and provided by the Cleveland/Lake Metro Traffic Incident Management Committee
Deer/ Car Accident on 480N East over Northfield 6:45 am. 5-24-16. Right Lane blocked. Back up shown at 8:45am, No injuries. Cleared at 9:42am  2:57 min. to clear?

Monday Morning Accident Review: email/phone
Police Show up 7:24am. Not his jurisdiction
8:26 am Wrecker Shows up?
Police show up 8:34am
3rd LEO shows up 8:36am
Wrecker Leaves 8:51am
2nd Wrecker arrives: 9:08am
Scene Cleared: 9:42am
After Action Review

90 Closed after Police find Pipe Bomb, Sat. 9-26-2015

I-90 temporarily closed in Cleveland after pipe bomb discovery

![Image of police officers in protective gear inspecting a car]

[Caption: Police officers in protective gear inspecting a car for a pipe bomb]
Trapped for 2.5 hours
After Action Reviews.

Fatal Truck Accident 271 south at the entrance to the Express Lanes, 9-22-15
Closed from 9:30 am to 2:00 pm, Express Lanes remained closed until the next day
Trapped in the Queue
12-207 I-271 at White Rd - 9/22/2015 10:25:01 AM

Getting out of the Queue
Queue is emptied
The Shot out on 480 east by State, 10-15-15, 1:35pm to 5:28pm
TIM Working
Other After Action Reviews
Tomato Truck over turned.
Cement Tanker hits RR
Bridge overturned catches fire
Working Together: Tower pulling and ODOT pushing.
271 Beer Truck 9-26-14
Secondary Crashes
PROTECT THE QUEUE

TDOT Launches Campaign to Warn Drivers of Stopped or Slowly Moving Interstate Traffic
Secondary Crashes

- Studies prove that the likelihood of a secondary crash increases by 2.8 percent for each minute the primary incident continues to be a hazard.

- Secondary Crashes were reduced by 19% in Tennessee in a 6 month period.
Tennessee’s Protect the Queue Trucks
Minding the Queue,

Flare for added visibility
Other Tools used to Operate the Freeway System
ODOT Freeway Service Patrols
Run by Autobase.
6am to 6pm 5 days per week

800-884-4030  ODOT TMC
Road Crewzer w/ message board, No. 50
ODOT Traffic Management Center (TMC) in Columbus 24/7

800-884-4030
Buckeyetraffic.org or OHGO.com

Real time Speeds
Dynamic Message Sign (DMS)
Wrong Way Driver Warning Message – May 2011

Wrong Way Driver Reported---Use Extreme Caution

HWY 281NB at Nakoma
Special Event: Getting Ready

RNC 2016
CLEVELAND

WATCH NOW
ABOUT
GET THE APP

CONVENTION
CLEVELAND, OHIO
JULY 18 - 21
Getting Ready

1.5 years before

- Equipment request

Training

Planning

Meetings

- Coordination with the RNC Committee on Arrangements
- 360 busses every day in and out of town.
Prepared for the worst

- Sleeping Dragon
- Boxes of nails dumped from an overpass
- Abandoned Cars
- Loads dumped
- Protestors on freeways
RNC Week

- 2- 12 hours shifts
- Over 250 ODOT personnel on duty from District 12, 3 and 4.
Crews on Standby:
Real Time Video in ODOT PLOWS for the RNC, Coming to all ODOT Plows next couple of years
Proposed Snow Squall Warning
System Lake 90

I-90 Lake, Jan. 23, 2013
33 crashes
I-90 Lake Dec. 24, 2013, 21 crashes
I-90 Lake Feb. 10, 2016

30+ vehicles
Warning sign locations for Snow Squalls D 12 on I-90 in Lake County

Section prone to white outs
PREVENT REAR-ENDS!!!
When STOPPING OR SLOWING ON A FREEWAY
And LAST IN LINE?
TURN ON EMERGENCY FLASHERS
Thank You