Evaluation of the “COMET” Incident Response Program

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Oregon Department of Transportation
Presentation Outline

• Research Objectives
• Incident Management in Portland
• Incident Data for the Region
• Incident Data in Interstate-5
• Estimation and Costs of Delay
• Conclusions
Research Objectives

Demonstrate the use and display of archived data from multiple sources as a tool for evaluation and monitoring of freeway operations.

Evaluate the effectiveness of the “COMET” incident response program in Portland, Oregon.

Develop tools to facilitate efficient deployment of resources and programs in other places.
What are Incidents?

- Crashes, breakdowns and other random events
- They contribute to more than half of the delay on our highways
- Lead to major road closures increase drivers’ exposure to hazardous conditions
- Cause secondary crashes
- Divert maintenance resources and reduce productivity
Benefits of Incident Response

• IR programs are the eyes and ears of highway system

• They are proven strategy for reducing duration of incidents. They reduce delay, fuel consumption, accident exposure, air pollution and environmental impacts

• Decrease emergency vehicle response times

• Improve safety for emergency and highway maintenance personnel

• Improve relations between the driving public and the local transportation agency
In the Portland metro area ODOT currently operates an extensive advanced traffic management system from the TMOC including:

- 60 CCTV cameras
- 16 variable message signs
- An extensive fiber optics communications system
- 90 ramp meters
- Approximately 400 inductive loop detectors
- Software archives of incident logs
- AVL Archives of COMET movements
Incident Response in Portland

The incident response program, known as “COMET”, began service in March 1997, and now covers the Portland metropolitan area nearly 24 hours a day with 11 specially equipped incident response vehicles.
Patrol Region
Incident Response in Portland

The vehicles are equipped with:

- Variable message sign
- Basic traffic control equipment
- Gasoline and automotive fluids
- Basic automotive tools
- Communications system
- Automatic Vehicle Location system
2001 Incident Data

- 70,976 incident records
- 21,708 unique records
- 6,334 Incidents on I-5
- Removal of 49,286 duplicate records
- 3,188 Crashes
- 11,078 Stalls
- 301 incidents
- 860 Crashes on I-5

3 week sample for delay estimation
Incident Frequency Map
Incidents

Incident Types

- Stall: 50%
- Debris: 16%
- Crash: 15%
- Tag & Tow: 11%
- Other: 7%
- Construction, Congestion & Other Closure: 1%

N=21,728

Lane Blocking Incidents

- 0 Lanes: 66%
- 1 Lane: 31%
- 2 Lanes: 2%
- 3, 4 or More: 1%

N=18,920
Incident Location

N=13,464

- Right Shoulder: 59%
- Right Lanes: 14%
- Left Lanes: 10%
- Left Shoulder: 6%
- Center Lanes: 4%
- All Lanes: 3%
- Gore Area: 3%
- Off Road: 1%
Crashes & Stalls

Account for 65% of incidents in the region

**Average Duration in Minutes**

- Crashes: 65 minutes
- Stalls: 47 minutes

**Average Number of Lanes Blocked**

- Crashes: 0.64
- Stalls: 0.31
Rainy Days and Crashes

- 1152 Crashes on Wet Days
- 1712 Crashes on Dry Days
- 113 Wet days
Crashes by Time of Day and Day of Week

Day of Week

Fridays had the highest crash frequency in 2001

Time of Day

The highest crash frequency was during the evening peak.
Ongoing Incidents - One Year

Average Ongoing Incidents by Day of Week vs. IR Vehicles

- Sunday
- Wednesday
- Saturday
- Monday
- Thursday
- Friday
- IR Vehicles Weekday
- IR Vehicles Weekend

Number of Incidents/IR Vehicles

Time

Portland State University
Incidents on I-5
-Jantzen Beach to Wilsonville-

Type
- Tag & Tow: 11%
- Debris: 12%
- Crash: 16%
- Stall: 61%

Location
- In-Lane: 32%
- Right Shoulder: 62%
- Left Shoulder: 6%
Crashes on I-5

**Day of Week**
Friday had the highest crash frequency in 2001

**Time of Day**
The evening peak period shows the highest frequency of crashes in 2001
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Cumulative Mean: 33

N=5,698
Typical Delay Curve

- Cumulative Vehicles
- Time

- Incident Occurs
- Verified
- Call Received
- IR Arrived
- Tow Truck Called
- Tow Truck Arrived
- Incident Cleared
- Incident Effects Cleared

- Actual Incident Duration
- Capacity Flow
- Demand Flow
- Incident Flow
- Clearance Time
- Total Delay
- Recovery

- Detection
- Response
- Incident Cleared
- Incident Effects Cleared

- Capacity Flow
- Total Delay
3 Week Incident Delay Estimation

Manually matched incidents to ATRs

Determined the capacity reduction using incident data and tables from the Highway Capacity Manual

Average flow data for the specific hour of the incident were drawn from the 2001 ATR database.

The result was 112,146 vehicle hours of delay during the 3 week period

Estimated cost of additional fuel consumption due to delay $145,789
Estimated cost of lost time due to delay $2,802,529
Total Estimated cost of delay for 3 weeks $2,948,319
Estimation of Annual Delay 2001
-Extrapolated from 3 week sample-

• Estimated vehicle hours of delay: 1,940,000
• Estimated cost of additional fuel consumption due to delay is: $2,522,000.
• Estimated cost of lost time due to delay is: $48,484,000.
• Total Estimated cost of Delay: $51,006,000.

• If each incident were to increase in duration by an average of 1 minute the costs of delay increase by $1,423,000.

• The cost to operate COMET for 1 year is about $750,000.

For COMET to be cost effective the duration of each incident needs to be reduced by an average of about 30 seconds.
Efficiency Curve

Average Reduction of Incident Duration in Minutes

Percentage of Incidents Assisted

Benefits are Greater than Costs

Costs are Greater than Benefits
Conclusions

• Comet is clearly beneficial. The responders only need to reduce the duration of each incident by just a few minutes to have a positive effect on the flow of traffic.

• It is impossible to measure and assign a dollar value to the numerous other environmental and public relations benefits of the program.

• Archived data is a rich and useful source of information.

• Ongoing improvements to database entry and dispatching need to be made as traffic volumes and patterns change.
Thank You

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