Wrong-Way Driver: Challenges and Opportunities

Presented to: TexITE 2010 Winter Meeting

Yang Ouyang, P.E., PTOE
Traffic Operations Engineer
North Texas Tollway Authority

January 29, 2010

Agenda

• Introduction of NTTA System and WWD Issue
• The Challenges
• NTTA Task Force Findings and Recommendations
• Opportunities Ahead
• Where do we go from here
Introduction

- The NTTA Roadway System
  - Currently 90 center-line miles and growing
  - Mostly divided high-speed roadways:
    - majority of roadways have frontage roads;
    - no frontage road on DNT south of IH-635 and
      a few small sections along PGBT
  - There are a total of 282 ramps system wide:
    - entrance ramps – 147;
    - exit ramps – 135
    - toll plazas at about 1/3 of the ramps
Introduction

• Traffic Characteristics on NTTA Roadways
  – Major mobility provider for DFW area traveling public:
    - connecting growing suburbs and various businesses;
    - with predominant commuter travel patterns;
  – Steady traffic growth with many new roadway openings in the near future
  – High operating speeds on main lanes
  – Conversion from traditional toll plazas to all Electronic Toll Collection (ETC)
Introduction

- Safety Performance on NTTA Roadways
  - Overall crash rates on DNT and PGBT are lower than those on other Texas Interstate Highways:
    - State-wide crash rate on Interstate highways is 105 per 100 million VMT in 2008;
    - The crash rates on DNT and PGBT are 87 and 59 during the same period;
  - Crashes caused by Wrong Way Drivers account for a very small percentage of the overall accidents (0.6%)
  - There was a high frequency of Wrong Way incidents during the first half of 2009 (5 WWD in 6 accidents)
  - There were 2 more WWD crashes (non-life threatening) during the 2nd half of 2009
Accident
Harvest Hill Rd.
3:16 a.m.
Apr. 8, 2009
SB Driver U-turns
at Forest Lane
NB in SB lanes

Accident
Cotton Gin Rd.
12:28 a.m.
May 10, 2009

Entry Point
DNT Northern Terminus
U.S. 380 Intersection
SB in NB lanes
Major Accident
Walnut Hill Ln.
11:03 p.m.
Jun. 1, 2009

Possible Entry Points
1. Wycliff Exit Ramp
2. Oak Lawn Exit Ramp
3. Harry Hines Exit Ramp
4. IH35
   NB in SB lanes

Minor Accident 1st
Bordeaux Ave.
11:01 p.m.
Jun. 1, 2009

Driver continued North

Entry Point
NB Cotton Gin Exit Ramp
SB in NB lanes

Accident
Haverwood Ln.
1:43 a.m.
Jun. 21, 2009

Not to Scale
Summary of Wrong Way Crashes on NTTA Roadways - 2009

- Fatal Crash
- Non-fatal Crash
- Confirmed Entry Point
- Unconfirmed Entry Point

The Challenges

- Wrong way incidents could result in severe damage to the traveling public, often deadly
- It could happen at every decision point
- Researches by various agencies have indicated no one-size-fits-all solution
- Drivers are diverse and affected by many factors while driving
- One incident is too many
NTTA Task Force Key Findings

- Driver impairment is the overriding factor
  - All WWD crashes in 2008 & 2009 involved one or more intoxicated drivers
- 94% of NTTA WWD crashes from 2007 to 2009 occurred between 11:00 PM & 4:00 AM (15 of 16)
- No consistent correlation between WWD and a particular roadway section or configuration
- All countermeasures evaluated have limitations
- Worldwide long term problem

NTTA Task Force Findings

- The countermeasures that are currently in place on NTTA roadways meets or exceeds existing MUTCD standards
- All new countermeasures recently deployed exceed existing MUTCD standards
NTTA Task Force Recommendations

• Three-pronged approach to reduce WWD
  – Engineering
  – Enforcement
  – Education

• Continued assessment and deployment of feasible countermeasures:
  – 6 deployed immediately
  – 3 for pilot study to assess viability on NTTA System
  – 3 for further study
  – 1 emerging technology to monitor
  – 4 rejected

Countermeasures Assessed & Deployed

• Retro-reflective Tape and Wrong Way Arrows
Countermeasures Assessed & Deployed

- Retro-reflective Tape and Wrong Way Arrows – night time view

- Pavement marking modifications at cross streets to reduce driver confusion
Countermeasures Assessed & Deployed

- Roadway layout modifications to reduce opportunities for wrong way movement, such as median modifications, etc.

Countermeasures Pilot Test – LED Enhanced Regulatory Sign

- Increased sign visibility in low light areas
- Can run on a timer to activate and flash at night
- Flexibility of solar or electrical power
- Meets regulatory standards
- No special mounting hardware required
Countermeasures

Pilot Test – Detection using Smart Loops

- Technology currently used by the NTTA
- More reliable than other alternatives
- Not affected by inclement weather
- Test beds are readily available

Countermeasures

Assessed - Further Study

- Sign Assembly Modification – Lowered sign height or additional signs below current signs to reflect low beam headlights
  - effectiveness
  - new MUTCD recommendations
  - safety compliance
Countermeasures Assessed – Further Study

- Right Way Driver Warning Message using Dynamic Message or LED Signs
- Value and risk in providing driver information

Countermeasures Assessed – Further Study

- Video Detection
  - reliability in all weather conditions
  - sends alert to Command Center
  - communicates with other warning devices
Countermeasures Assessed – Monitor Progress

- **IntelliDrive (formerly Vehicle Infrastructure Integration - VII)**
  - Emerging technology being tested by FHWA
  - Onboard equipments in vehicle communicate with each other, handheld devices, and roadside infrastructures
  - Alert drivers of potential safety hazards and take actions

Countermeasures Recommended - Enforcement

- **DPS Enforcement**
  - Immediate response to detections
  - Quarterly DPS DUI Task Force
- **Command Center**
  - Immediate dispatch
  - Video verification
  - Incident management
Business Process Enhancements

• Implemented the *Field Condition Checklist* based in part on a form developed by TTI
• Increased inspection frequency of signs
• Updates design standards to include specific countermeasures on all future designs
• Task Force stays active and meets regularly to review safety-related issues
• Maintain open communication

Opportunities Ahead

• New provisions in 2009 MUTCD
• Pilot Test results by NTTA Task Force
• Technology advancement in vehicle design and telecommunication infrastructure
• Continued partnership with other agencies to
  - deploy effective countermeasures consistently
  - improve enforcement and incident response
• Better public awareness
Which way to go from here?

Questions?

The mission of the North Texas Tollway Authority is to enhance mobility through responsible and innovative tolling solutions.