

# Road Safety



# Audit Findings

US-20 at Granger Road (MP 5.63) and  
Independence Road (MP 6.41), Benton  
County

April 5, 2012



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# Agenda

- » RSA Procedure
- » RSA Team
- » RSA Scope
- » Project Information
- » Background Information
- » Field Observations and Suggestions
- » RSA Prioritization
- » Issue Summary and Prioritization



# RSA Procedure

## Responsibilities



# RSA Team

- » **Scott Mansur** – *RSA Team Leader* – Transportation Planning, Engineering, Safety and Operations
- » **Michael Tomasini** – Transportation Planning, Engineering, Safety and Operations
- » **Amanda Westmoreland** – Traffic Safety & ODOT Region 2 (Project Resource/Coordinator)
- » **Wade Coatney** – ODOT Roadway Design
- » **David Stearns** – ODOT Striping
- » **Anne Holder** – Traffic Safety/Human Factors
- » **Dave Hacek**– Sign Crew Coordinator
- » **Laurel Byer** – County Engineer
- » **Ron Keil** – OSU Representative and Frequent User



# RSA Scope

- » Two intersections
- » US-20 at Granger Road (MP 5.63) and Independence Road (MP 6.41), Benton County



# Project Site Information

- » Top 5% or 10% SPIS lists since 2006
- » ODOT implemented intersection safety improvements in 2007 to address the high number of collisions
- » Intersections have remained as top 5% SPIS sites
- » Local community vocal regarding safety concerns



# Background Information

- » Roadway Characteristics
- » Surrounding Land Uses
- » Traffic Counts
- » 85<sup>th</sup> Percentile Speed Survey
- » Crash History
- » SPIS Report
- » Crash Diagrams
- » Previous Efforts



# US 20 Roadway

## Characteristics

- » Rural Surrounding Land Uses
- » Rural Minor Arterial/Regional Highway
- » Truck Route
- » Level Terrain



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# Roadway

## Characteristics

- » Posted Speed Limit = 55 mph
- » Paved Width ~42 to 55 feet
- » 1 Through Lane Plus Turn Lanes at
  - Independence Highway
  - Granger Road



# Surrounding Land

## Uses

### » Employment

- Hewlett Packard
- Good Samaritan Regional Medical Center
- Corvallis Clinic
- OSU
- Waste Transfer Station
- Tunnel Radio
- Mountain View Elementary School
- Santiam Christian Academy

### » Emergency Services

### » Residential Housing

### » Recreation

### » Research & Agriculture

### » Adjacent Railroad



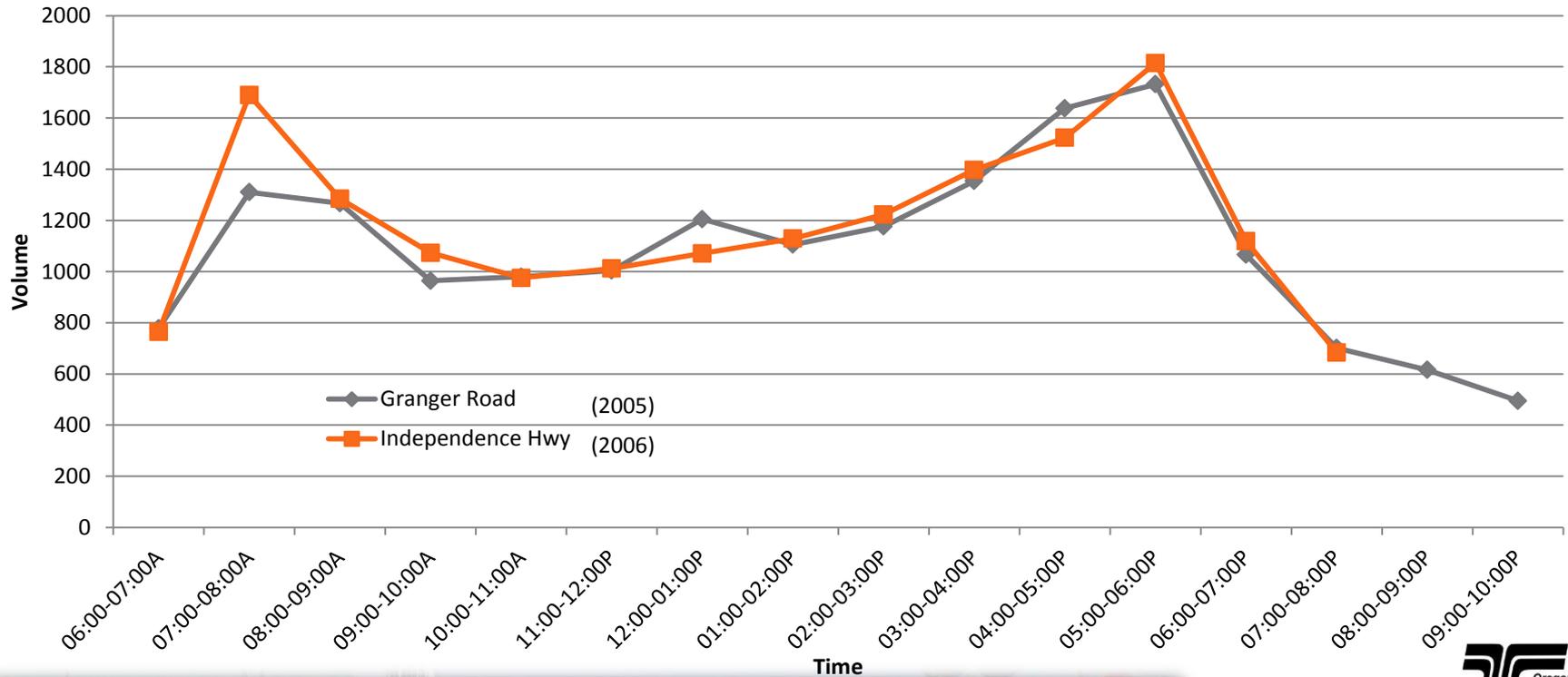
# Traffic Volume

- » ~14,000 AADT (2011 SPIS Report)
- » ~Percent Trucks
  - ~1 to 3% - US 20
  - ~12% - Independence Highway (Waste Transfer Station)
  - ~1% - Granger Road
- » Peak Hours
  - AM: 7:00 to 8:00 am
  - Midday: 3:00 to 4:00
  - PM: 4:00 to 5:00 pm



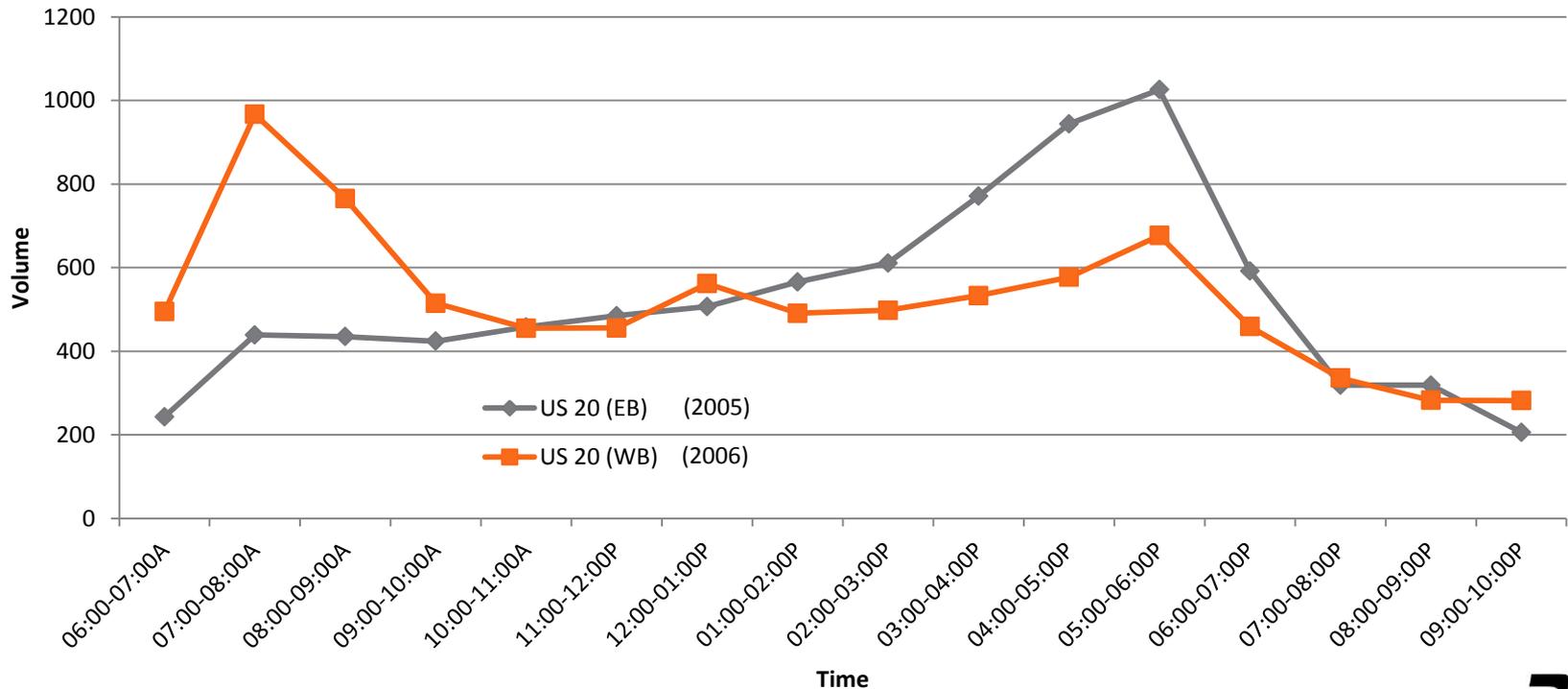
# Traffic Volume

## Intersection Total Entering Volume

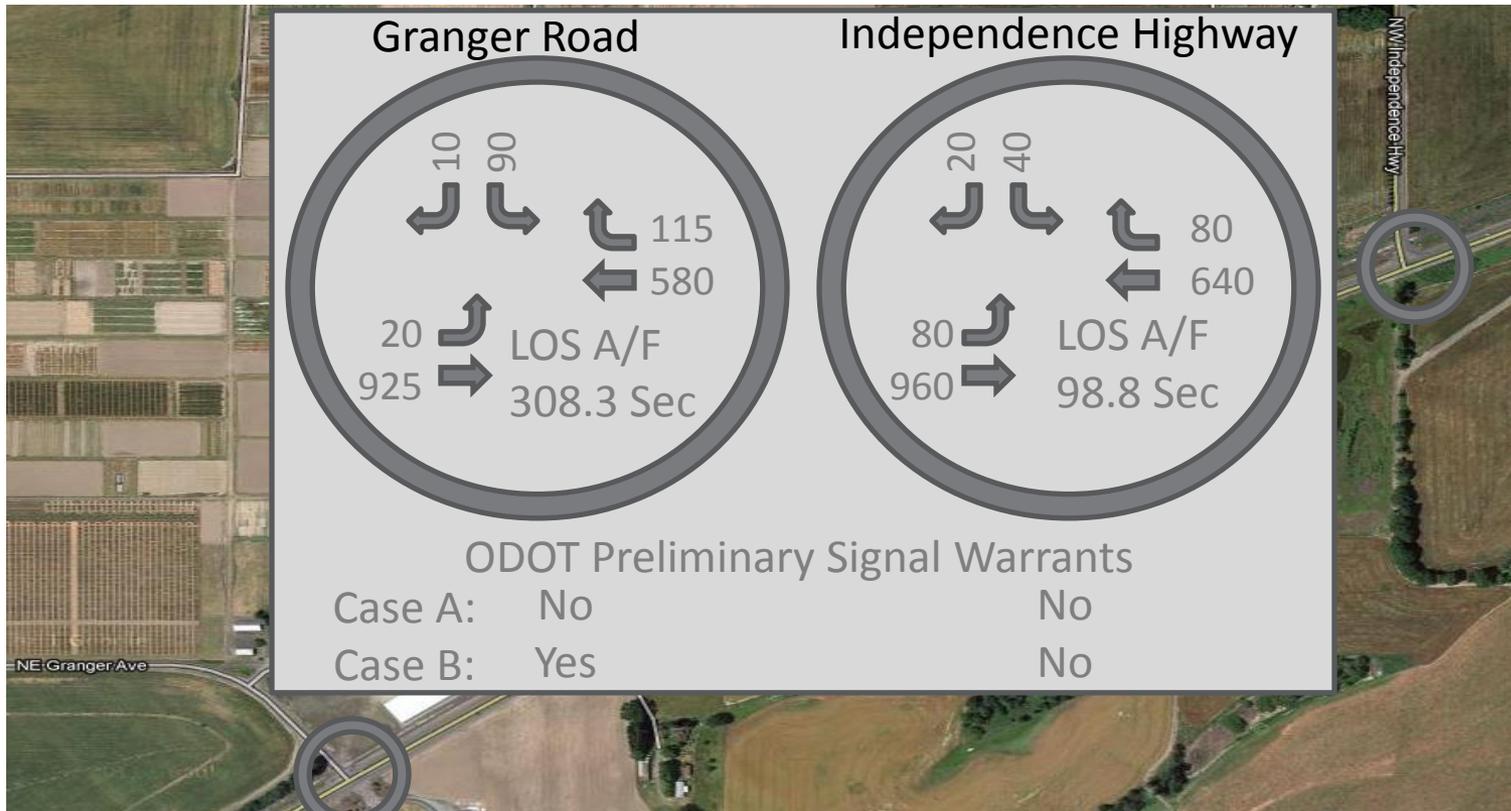


# Traffic Volume

## US 20 Mainline Volume



# PM Peak Hour Turn Movements



# 85<sup>th</sup> Percentile Speed Survey



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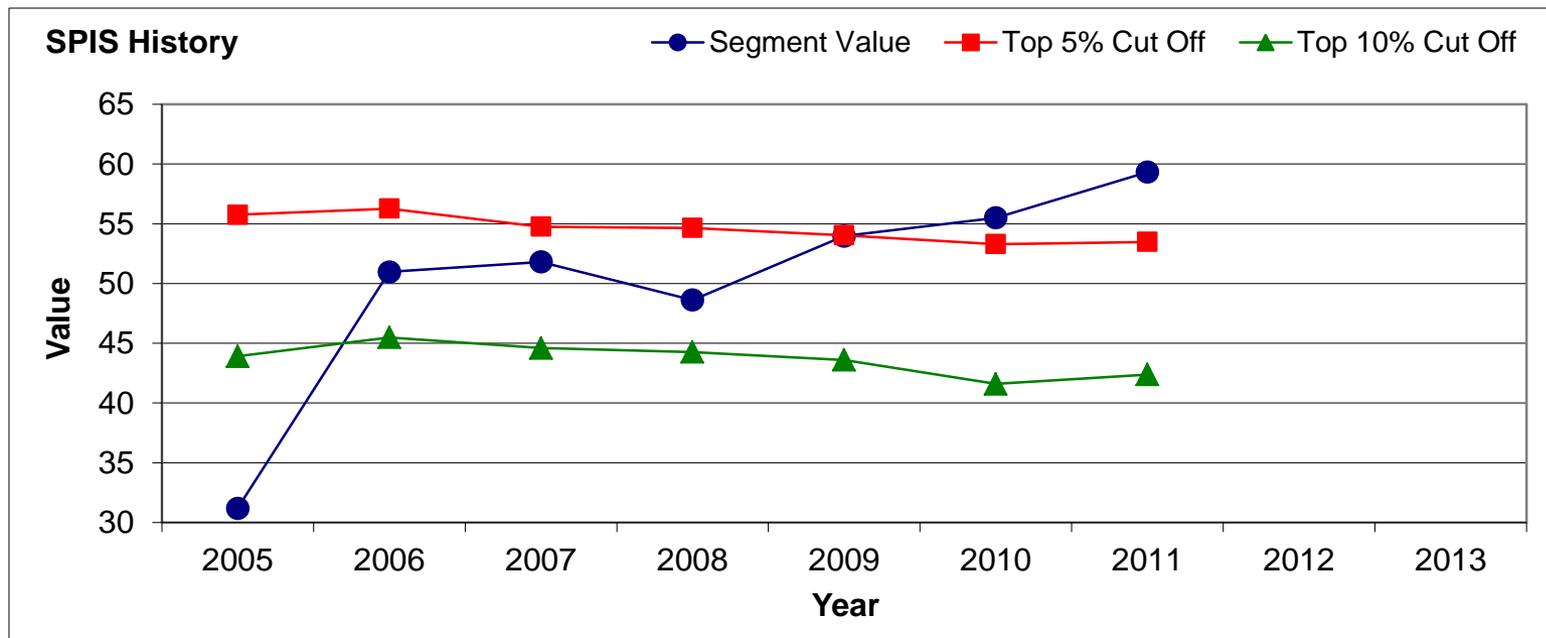
# Previous Efforts

- » Reconstructed Left Turn Lanes to ODOT Standard in 2007
- » Added Right Turn Lanes in 2007
- » New Overhead Flashing Beacons and Warning Signage at Independence Highway



# SPIS Report

## » Independence Highway (2005 to 2011)



# Crash History

## » Independence Highway

- 23 Total Crashes (2006 to 2010)
  - 2 Injury A Crashes (9%)
  - 7 PDO Crashes (30%)
  - 20 Turning Movement Crashes (87%)
  - 14 Occurred between 12:00 and 6:00 p.m. (61%)
  - 18 Occurred during the daylight conditions (78%)
  - 16 Occurred under dry conditions (70%)

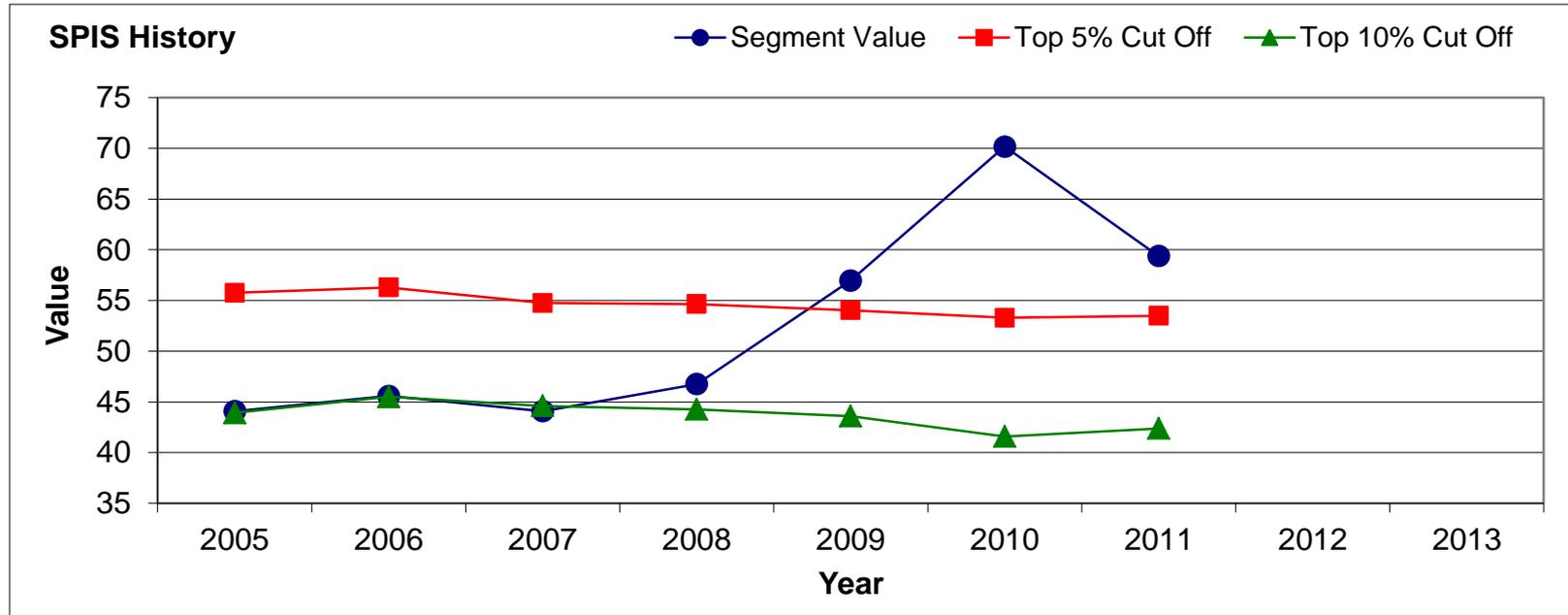






# SPIS Report

» Granger Road (2005 to 2011)



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# Crash History

## » Granger Road

- 41 Total Crashes (2006 to 2010)
  - 1 Injury A Crash (2%)
  - 17 PDO Crashes (41%)
  - 29 Turning Movement Crashes (71%)
  - 25 Occurred between 12:00 and 6:00 p.m. (61%)
  - 36 Occurred during the daylight conditions (88%)
  - 29 Occurred under dry conditions (71%)

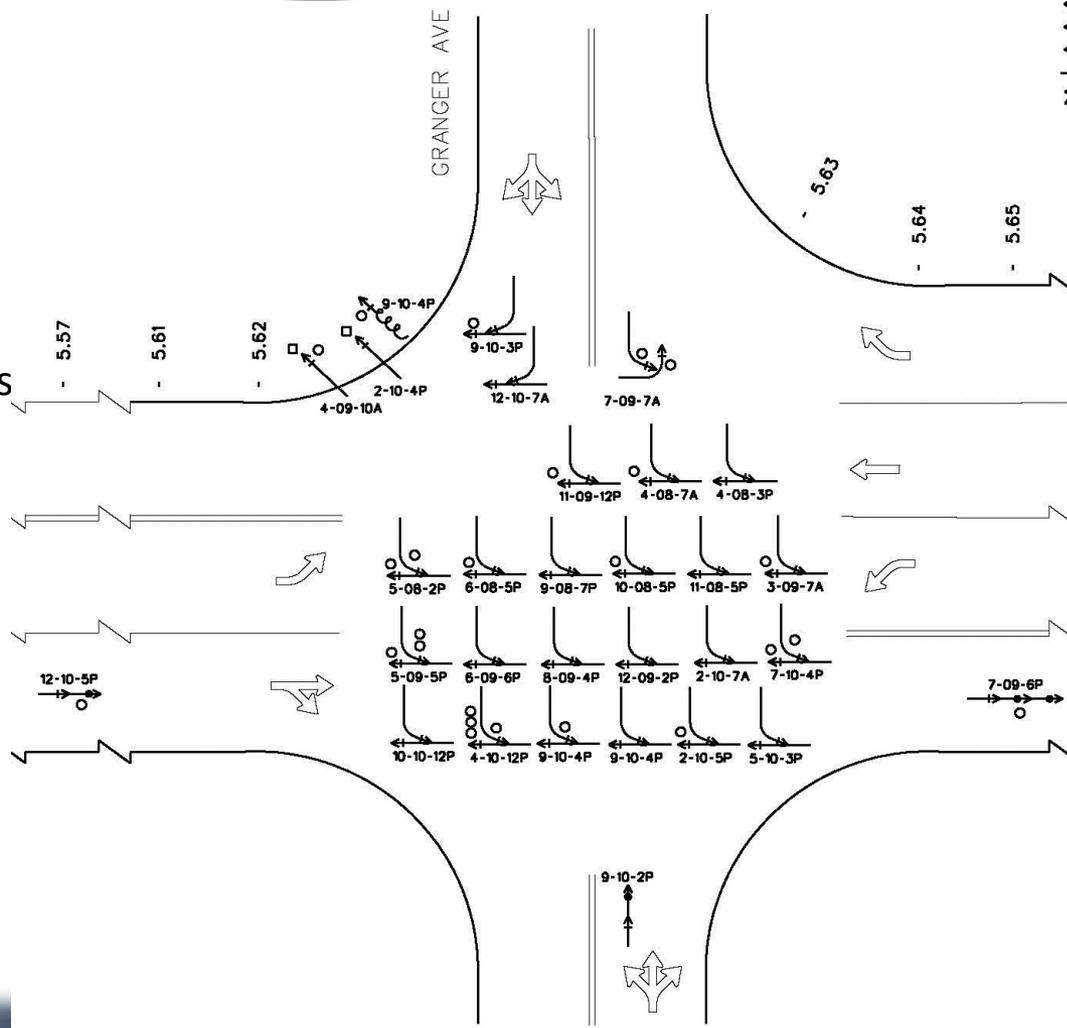




# Crash Diagrams

## » Granger Road

- 2008 to 2010
- Three Years After Improvements
- 29 Collisions
- 21 Left Turn Collisions



# Field Observations and Suggestions

- » Environmental Observations
- » Road User Observations
- » Driver Behavior Observations
- » Geometric Issues
- » Operational Issues
- » Railroad Related Issues
- » Enforcement Issues



# Environmental

## » Observations

- No Observed Weather Related Issues
- Visual Field Clear of Trees and Other Clutter
- No Observed Lighting Issues



# Road Users

## » Observations

- Low Bicyclist and Pedestrian Activity
- Frequent Garbage Trucks
  - Singles and Doubles
- Large Trucks (40+ foot)
- Buses
  - School
  - Transit
- Emergency Vehicles
- Passenger Vehicles



# Driver Behavior

## » Observations

- Road Rage
- Impatient Drivers
- Disregard for Stop Signs
  - Frequently Observed during AM, Midday and PM Peak Hours
- Distracted Drivers
- Majority of Crashes Involve Local Drivers
- No Documented Alcohol Related Crashes (2006 to 2010)
- No Documented High Speeds



# Driver Behavior

» Observation Video- Illegal Two-Stage Left Turn



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# Driver Behavior

- » Observation Video- Rolling Stop during Peak Periods



# Driver Behavior

- » Observation-  
Distracted Drivers



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# Driver Behavior

## » Suggestions

- Enforcement
  - Enforcement Pads
  - Overtime Enforcement Funding
- Education
  - Cell Phone
  - Stop Sign
  - Rail Road Tracks
  - Fines



# Driver Behavior

## » Suggestions

### ➤ Education

- Target Audience
  - Local Drivers
  - Residents
  - Allied Waste
  - School
    - » Bus Drivers
    - » Parents
- Media
  - TV
  - Radio
- Mailings
- Editorials
  - Gazette Times
  - Democrat Herald
- Website



# Geometric

## » Issues

- Narrow Shoulder Width at Independence (East Side)
- Inadequate Storage Between Railroad and Highway on Side Street
- Sight Distance
  - Right Turning Highway Vehicles Blocking View of Side Street Traffic
- No Pedestrian/Bicycle Facilities



# Geometric

## » Suggestions

- Widen Shoulder to East (Westbound at Independence, Eastbound at Granger)
- Install Traffic Signal at one or both locations (No Storage of Vehicles Between Railroad and Highway)
- Install Roundabout
- Restrict Turn Movements (Right In-Right Out)
- Separate Pedestrian and Bicycle Facilities



# Geometric

## » Suggestions

### ➤ Restripe

- Convert Median/Left Turn Lane to Continuous Left Turn (Eastbound)
- Add Buffer Between Right Turn Through Lanes for Improved Sight Distance



*US 20 at Granger Rd.*



*US 20 at Independence Hwy.*



# Operational

## » Issues

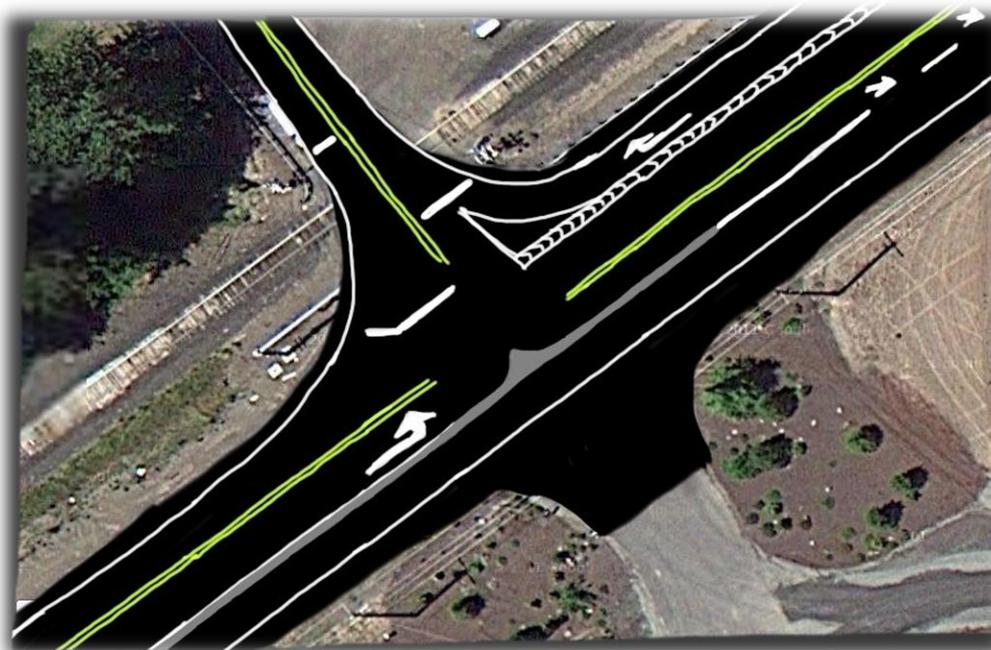
- Majority of Crashes: Left Turn onto Highway and Westbound Through Movements
- Large Platoons of Vehicle on Highway Create Infrequent Gaps
  - 30+ Vehicle Platoons (Eastbound PM Peak)
- Long Delays for Side Street Traffic (2 to 5 minutes)
- Long Queues for Side Street
  - 10+ Vehicles observed in AM and PM Peaks
- Railroad Related Operations
  - 5 Right Turning Vehicles from Highway Queued for Train (AM at Granger)
  - Long Train Delay 6-7 Minutes (AM at Granger)
- Local Diverted Traffic
  - North Albany Road
  - Springhill Drive



# Operational

## » Suggestions

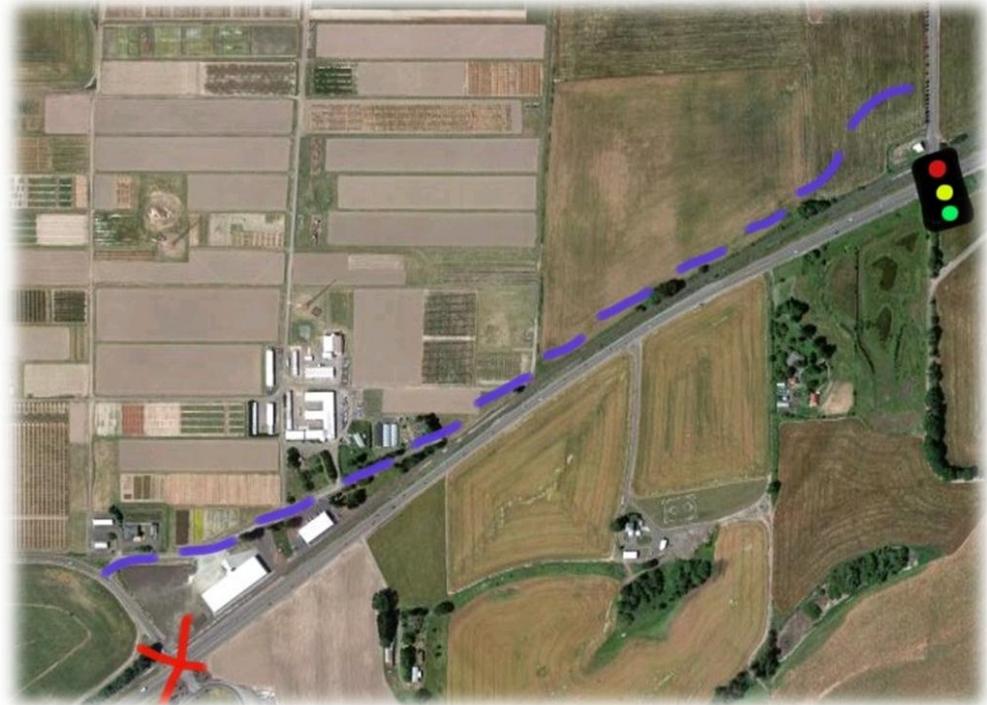
- Acceleration Lane for Left Turns onto US 20 with raised Median and Traffic separator at Granger Road



# Operational

## » Suggestions

- Construct Frontage Road Between Independence Highway and Granger Road
  - Remove Intersection or convert to right in/right out (Granger or Independence)
  - Signalize (Granger or Independence)
  - Raise US 20 to Match Highway Grade to Rail Road Grade (both intersections)



# Operational

## » Suggestions

- Construct Frontage Road Between Independence Highway and Granger Road
- Remove Independence Intersection or convert to right in/right out
- Realign US 20 South of Tracks (Safe Stopping Sight Distance Required by Railroad)
- Construct Roundabout at US 20 and Granger Road



# Operational

## » Suggestions

- Intelligent Transportation System Suggestions
  - Traffic Signal Ahead Warning Signs with Dynamic Flashing Beacons
  - Research New ITS Suggestions
- Other Suggestions
  - Install Yellow Flashing Beacon on Highway at Granger



Source: [http://catss.ucf.edu/projects/documents/reports/htm/projectFR\\_55.htm](http://catss.ucf.edu/projects/documents/reports/htm/projectFR_55.htm)



# Rail Related

## » Issues

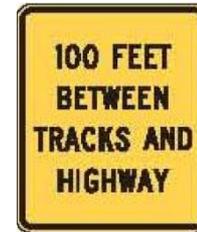
- Limited Storage between Highway and Rail Road on County Road
- Steep Approach Road Grades from Highway (sub standard grades)
- Stop Bar for Rail Road Crossing Arm at Non-Standard Location
- Vehicles Stopping on Rail Road Tracks (Within Dynamic Envelope)



# Rail Related

## » Suggestions

- Signal with RR interconnect and Advanced Warning
- Left and Right Turn Lanes for Minor Street Approach
- Widen Shoulder on Highway
- Increase Elevation of Highway to Meet Standard Approach Grades
- 2009 MUTCD W10-11A Sign “XX FEET BETWEEN TRACKS AND HIGHWAY”



W10-11a



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# Enforcement

## » Issues

- Perceived Lack of Enforcement
- Rolling Stops/Failure to Stop
- Illegal Left Turns
  - Using Westbound Left Turn Lane as an Acceleration Lane at Granger Road
  - Using Painted Median as an Acceleration Lane at Independence Highway
- Distracted Driving
  - Cell Phone Usage
- Road Rage
- Vehicles Queuing on Rail Road Tracks



# Enforcement

## » Suggestions

- Increased Targeted Enforcement
- Enforcement Pads
- Overtime Enforcement Funding



# RSA Prioritization

FHWA Crash Prioritization Risk Category		Severity			
		Negligible	Low	Medium	High
Crash Frequency Category	Frequent	C	D	E	F
	Occasional	B	C	D	E
	Infrequent	A	B	C	D
	Rare	A	A	B	C

## » Crash Severity

- Potential Outcome of a Crash
- High Severity = Fatality or Debilitating Injury

## » Crash Frequency

- Potential for a Crash to Occur
- Frequent = High Crash Potential



# Issue Summary and Prioritization

» Issue	
➤ Narrow Shoulder Width at Independence	
» Suggestion	» Cost
➤ Widen Shoulder	➤ Medium

Severity	Low
Frequency	Rare
Grade	A



# Issue Summary and Prioritization

» Issue	
➤ No Pedestrian/Bicycle Facilities	
» Suggestion	» Cost
➤ Separate Pedestrian and Bicycle Facilities	➤ High

Severity	High
Frequency	Rare
Grade	C



# Issue Summary and Prioritization

## » Issue

- Left Turning Crashes

## » Suggestion

- Convert Median/Left Turn Lane to Continuous Left Turn
- Add Buffer Between Right Turn and Through Lanes and

## » Cost

- Low
- Low-Medium



Severity	High
Frequency	Frequent
Grade	F



# Issue Summary and Prioritization

Severity	High
Frequency	Frequent
Grade	F

## » Issue

- Left Turning Crashes (Cont.)

## » Suggestion

- Acceleration Lane for Left Turns onto US 20 (Median)
- Intelligent Transportation System Solutions
- Restrict Turn Movements (Right In-Right Out)
- Construct Frontage Road Between Independence Highway and Granger Road
- Roundabout or Signal at Granger with Realignment of Highway, Closure of Independence and construction of frontage road
- Signal at Independence with Realignment of Highway, Closure of Granger and construction of frontage road

## » Cost

- Medium
- Medium
- Medium-High
- High
- High
- High



# Issue Summary and Prioritization

Severity	Medium
Frequency	Occasional
Grade	D

## » Issue

- Driver Behavior

## » Suggestion

- Increased Targeted Enforcement
- Enforcement Pads
- Overtime Enforcement Funding
- ITS Solution for Mainline Gaps
- Acceleration Lane for Left Turns onto US 20

## » Cost

- Low
- Low
- Low
- Medium
- Medium



# Issue Summary and Prioritization

Severity	Medium
Frequency	Occasional
Grade	D

## » Issue

- Driver Behavior

## » Suggestion

- Restrict Turn Movements (Right In-Right Out)
- Roundabout at Granger with Realignment of Highway and closure of Independence and construction of frontage road
- Construct Frontage Road Between Independence Highway and Granger Road
- Remove Granger or Independence Intersections
- Signalize Granger or Independence Highway

## » Cost

- Medium-High
- High
- High
- High
- High



# Issue Summary and Prioritization

## » Issue

- Substandard Railroad Grades and Markings

## » Suggestion

- Restripe Stop Bar for Railroad Crossing
- Raise US 20 to Match Highway Grade to Rail Road Grade (To Meet Standard Approach Grades)

## » Cost

- Low
- High

Severity	Negligible
Frequency	Rare
Grade	A



# Issue Summary and Prioritization

Severity	High
Frequency	Rare
Grade	C

## » Issue

- Vehicles Queuing on Rail Road Tracks

## » Suggestion

- 2009 MUTCD W10-11A Sign "XX FEET BETWEEN TRACKS AND HIGHWAY"
- Left and Right Turn Lanes for Minor Street Approach
- Widen Shoulder on Highway
- Signal with RR interconnect and Advanced Warning

## » Cost

- Low
- Medium
- Medium
- High



# Questions



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