National Rural ITS Conference 2006

Design of Automated Variable Speed Limits and

Lane Assignments in Rural Areas

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□ November 2005 - Funding Identified

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- December 2005 On Call Engineering Contract

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- □ January 2006 Started Design
- May 2006 FHWA Required NMDOT to Update Regional Architecture Prior to Approving ITS Projects

- Project Overview
 - Location I-40 East
 - of Albuquerque
 - Length 15 Miles





- Project Overview
 - Typical Section

4 to 6 lanes







Project Overview
 Typical Section
 4 to 6 lanes

6 – Lane Section





- Project Overview
 - Safety Corridor

Goals and Objectives of Safety Corridor

The goal of New Mexico's Safety Corridors program is to identify areas of high crash risk and take steps to correct the problem in order to reduce the number of crashes and fatalities on New Mexico's highways and rural roads.





- Project Overview
 - Safety Corridor
 - □ 65 MPH Speed Limit





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 Truck are Restricted
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 - Avg. Weekday Traffic50,400 VPD





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 - Enhanced Fines for Speeding





Project Overview

Safety Corridor

- □ 65 MPH Speed Limit
- In 6 Lane Sections
 Truck are Restricted
 to the Right Lane
- Avg. Weekday Traffic50,000 VPD
- Enhanced Fines for
 Speeding
- □ Grades Ranging From 0 – 6%





- Project Overview
 - Goal is to Improve Safety through the Deployment of ITS Devices



Project Overview

Deployment of ITS Devices will Include:



Project Overview

- The ITS Devices will be Deployed will Include:
 - Dynamic Message Signs (DMS)





Project Overview

- Dynamic Message Signs (DMS)
- □ Closed Circuit TV (CCTV)





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- □ Microwave Vehicle

Detection Sensors (MVDS)







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Detection Sensors (MVDS)

Roadside Weather Information
 Systems





Project Overview

- Dynamic Message Signs (DMS)
- □ Closed Circuit TV
- Microwave Vehicle
 - Detection Sensors (MVDS)
- Roadside Weather Information
 Systems
- Non-Intrusive Road SurfaceInformation Sensors (NRSIS)





Project Overview

- Dynamic Message Signs (DMS)
- **Closed Circuit TV**
- Microwave Vehicle П Detection Sensors (MVDS)
- **Roadside Weather Information** П Systems
- Non-Intrusive Road Surface П Information Sensors (NRSIS)
- Lane Assignment Signs





Project Overview

- Dynamic Message Signs (DMS)
- □ Closed Circuit TV
- Microwave Vehicle
 Detection Sensors (MVDS)
- Roadside Weather Information
 Systems
- Non-Intrusive Road Surface
 Information Sensors (NRSIS)
- Lane Assignment Signs
- □ Variable Speed Limit Signs (VSLS)





Location of Field Devices



- Inputs From Field Devices
 - CCTV
 - Images Reviewed by Operator

- CCTV
- MVDS
 - □ Speed
 - Occupancy
 - □ Classification

- CCTV
- MVDS
- RWIS
 - □ Temperature
 - Precipitation

- CCTV
- MVDS
- RWIS
- NRSIS
 - Depth of Precipitation/Ice on Road Surface

Weather Elements that Effect Driving are Assigned a Significant Value

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 - Lane Occupancy 0-3

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Condition Matrix

Snow	None	Light	Moderate	Heavy	TOTAL
	0	1	2	3	
	None	Light	Moderate	Heavy	
Kain	0	1	2	3	
Road Surface	None	Wet/Patchy Ice	Ponding/Icy	Standing Water/Snow Packed	
	0	5	10	15	
Fog	>500'	500'- 350'	350' – 125'	<125'	
	0	5	10	15	
% Commercial Vehicles	>10%	10%-20%	18%-30%	< 30%	
	0	1	2	3	
Grade	>1%	2%-3%	4%-5%	<5%	
	0	1	2	3	
Lane Occupancy	<25%	26%-50%	40%-75%	60%-100%	
	0	1	2	3	

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Read Recommendation from

Speed Reduction Matrix

Speed Reduction Matrix

Condition Index Value	< 8	7 – 15	13 – 20	>18
Recommended Speed (% of Posted)	80% - 100%	60% - 80%	40% - 60%	30% or less

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Read Recommendation from

Lane Restriction Matrix

Lane Assignment Matrix

Condition Index Value	< 8	7 – 15	13 – 20	>18
Lane Restrictions	All Lanes Open	All Lanes Open	Restricted to Right 2 Lanes	Restricted to Right Lane Only

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Post Appropriate Messages, Speeds and Lane Assignments

Example

Element	Element Value	Comment
Moderate Snow	2	Rate of snow is less than ¹ / ₂ " per hour
Patchy Ice	10	2 out of the 5 sensors are detecting accumulation of snow on the roadway Surface
There is no fog in the area	0	
There are 22% Commercial Vehicles	1 – 2	The MVDS has detected and calculated 22% Commercial Vehicles
Grade 5 %	2-3	The area is in eastern section of the project area with 5% grade
Lane Occupancy 63%	2 – 3	The lane occupancy is detected and reported by the MVDS
Condition Index Number	17 – 19	

Example

Condition Index = 17 - 19

Recommendation to Advise a Reduction of
 40% - 60% of Posted Speed Limit

SAY 40 MPH

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Questions