Gannett Fleming

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I-75 ITS
SAFETY SYSTEM PROJECT

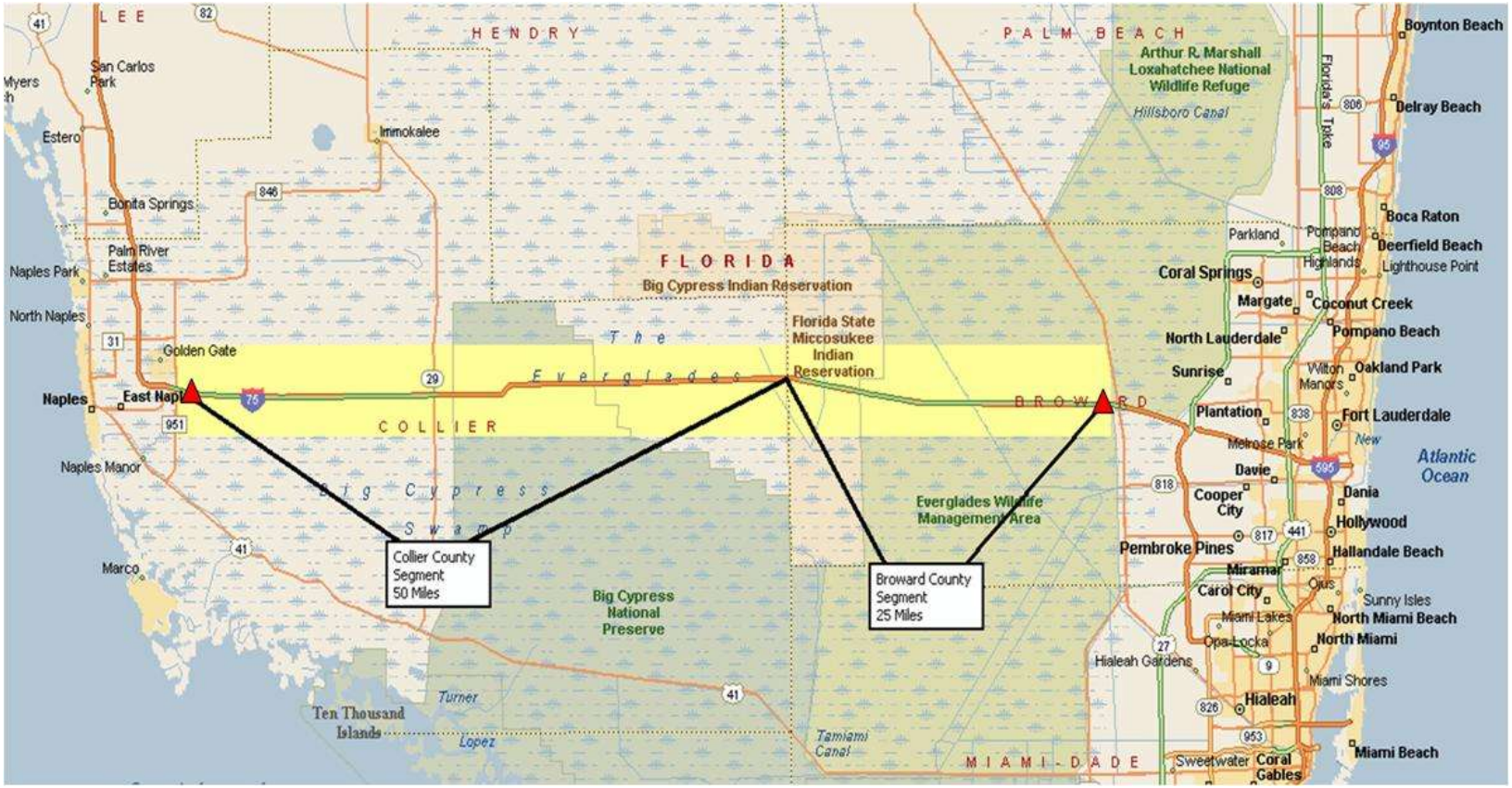
For
2011 ITS Tennessee
Annual Meeting
September 29, 2011






Project Study Limits

I-75/Alligator Alley – From Broward County Toll Plaza To Collier County Toll Plaza



Project Objective

- To Determine if the Application of ITS Technologies Can Have a Cost-Effective Impact on Reducing Severe Alligator Alley Crash History
- To Assess Seamless Integration of I-75 ITS Safety System into District Four and District One ITS Operations Through Statewide SunGuide® Software

Fire and rescue crews respond to a crash on Alligator Alley about 9 miles from the Collier-Broward county line. Four tractor-trailers and a car crashed on Interstate 75 in a remote area of western Broward County, killing three people and causing two of the vehicles to erupt in flames, authorities said Tuesday. The crash happened shortly before midnight.
AP photo by Lou Toman/South Florida Sun-Sentinel

Alligator Alley Crash Problem

- Crash Frequency
  - 1029 recorded crashes from 2001 through 2006
  - Collier County (679 crashes) and Broward County (350 crashes)
- Crash Severity
  - 86 fatal crashes (generated 114 fatalities)
  - Collier County (61 fatal crashes) and Broward County (25 fatal crashes)
  - 646 personal injury crashes (generated 1232 personal injuries)
- Major Crash Types
  - Overturned vehicles (253 crashes – approximately 25% total)
  - Rear end (145 crashes – approximately 14% total)
  - Hit fence (110 crashes – approximately 11% total)

Broward County Crash Summary By Type

2001 – 2006

I-75/Alligator Alley (Broward County Segment – 25 miles) Crash Summary by Crash Type						
Type of Crash	2001-2004	2005	2006	6-Year Total	% of Total	Mean Crashes per Year
Overturned Vehicles	49	18	19	86	24.6	14.33
Rear End	31	8	9	48	13.7	8.00
Hit Fence	24	5	2	31	8.9	5.17
Hit Guardrail	24	4	4	32	9.1	5.33
Ran Into Ditch/Canal	21	3	1	25	7.1	4.17
Sideswipe	16	7	4	27	7.7	4.50
Hit Utility Pole	3	1	1	5	1.4	.83
Head On	4	0	1	5	1.4	.83
Hit Concrete Barrier/Bridge Abutment	7	2	3	12	3.4	2.00
All "Others"	47	19	13	79	22.7	13.17
Total Crashes	**226**	**67**	**57**	**350**	**100%**	**58.33**

Broward County Crash Summary By Severity And Conditions

2001 – 2006

I-75/Alligator Alley (Broward County Segment – 25 miles) Crash Summary by Severity, Lighting Condition and Surface Condition								
Year	No. of Crashes	Severity			Lighting Condition		Surface Condition	
		*Fatal Crashes	**Injury Crashes	Property Damage Crashes	Daylight	Dark	Dry	Wet
2001-2004	226	13	137	76	138	88	183	43
2005	67	3	41	23	43	24	55	12
2006	57	9	35	13	38	19	48	9
Total	350	25	213	112	219	131	286	64
Percent		**7.1%**	**60.9%**	**32%**	**62.6%**	**37.4%**	**81.7%**	**18.3%**

*25 fatal crashes generated 36 fatalities and 66 personal injures
**213 injury crashes generated 401 personal injures

Collier County Crash Summary By Type

2001 – 2006

I-75/Alligator Alley (Collier County Segment – 50 miles) Crash Summary by Crash Type						
Type of Crash	2001-2004	2005	2006	6-Year Total	% of Total	Mean Crashes per Year
Overturned Vehicles	110	24	33	167	24.6	27.83
Rear End	76	8	13	97	14.3	16.17
Hit Fence	55	14	10	79	11.6	13.17
Hit Guardrail	30	9	14	53	7.8	8.83
Ran Into Ditch/Canal	12	2	2	16	2.3	2.66
Sideswipe	36	5	8	49	7.2	8.17
Hit Utility Pole	4	0	2	6	0.9	1.00
Head On	2	0	2	4	0.6	.67
Hit Concrete Barrier/Bridge Abutment	16	2	4	22	3.2	3.67
All "Others"	109	40	37	186	27.5	31.00
Total Crashes	**450**	**104**	**125**	**679**	**100%**	**113.17**

Collier County Crash Summary By Severity And Conditions

2001 – 2006

I-75/Alligator Alley (Collier County Segment – 50 miles) Crash Summary by Severity, Lighting Condition and Surface Condition								
Year	No. of Crashes	Severity			Lighting Condition		Surface Condition	
		*Fatal Crashes	**Injury Crashes	Property Damage Crashes	Daylight	Dark	Dry	Wet
2001-2004	450	41	294	115	266	184	370	80
2005	104	10	63	31	68	36	86	18
2006	125	10	76	39	78	47	115	10
Total	679	61	433	185	412	267	571	108
Percent		**9%**	**63.8%**	**27.2%**	**60.7%**	**39.3%**	**84.1%**	**15.9%**

*61 fatal crashes generated 78 fatalities and 93 personal injuries
**433 injury crashes generated 831 personal injuries

Crash Analysis Summary

- Crash Rate Consistent Across Alligator Alley
- Fatal Crash Locations Spread Out Across Alligator Alley
- Critical Crash Patterns Uniform Across Alligator Alley
- Rear End Crashes Concentrated at I-75 Entrance/Exit Points
- Direction of Traffic Bias to Crash History (Frequency and Severity Tend to Increase in Second Half of Trip)

Traffic And Roadway

Other Key Data

- 85% Percentile Speed @ 85 mph – (Posted Speed Limit is 70 mph)
- No Inside Median Shoulders in Collier County
- 60% of Fatal Crashes Involved Single Vehicles
- Single Vehicle Crashes Near National Average for Interstate Highways (56%)
- 8% of Crashes Involved Tractor Trailers/Heavy Trucks
- 8% of Crashes Involved "Driving Under the Influence"
- Wet Weather Crashes Near Statewide Average for Interstate (18%)
- 11 Crashes Occurred in "Fog" Condition
- No Reported Crashes in "Smoke" Condition
- Recent Resurfacing Projects in Both Counties

Contributing Factors To Crash History

- High Travel Speeds
- Minimal Roadside Recovery Area
- No Inside Median Shoulder
- Driver/Roadway Dynamic
- Driver Error and Misjudgment

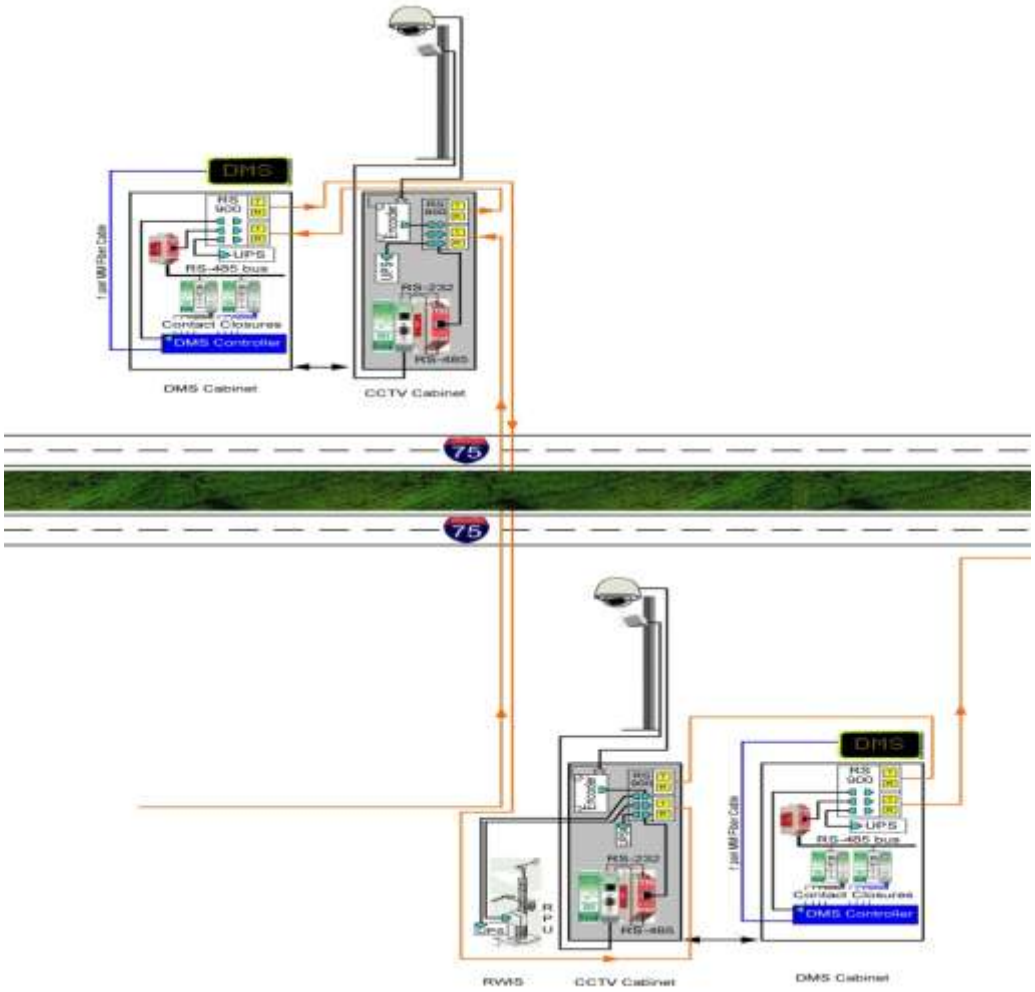
Solution To Crash Problems

- **ONE FULLY INTEGRATED SYSTEM COVERING BROWARD & COLLIER COUNTY ALLIGATOR ALLEY SEGMENTS**
- Maintain Driver Awareness and Focus Through Strategic Spacing of ITS Technologies
- Provide Motorists with Prevailing Traffic and Roadway Condition Information
- Coordinate Implementation of I-75 ITS Safety System with other Alligator Alley Improvements

Proposed ITS Safety System Components

- Speed Monitoring and Warning
  - Interconnected system of detector and DMS
  - Speeds displayed when exceeding threshold value
  - Potential system access by law enforcement
- Road Weather Information
  - Precipitation sensing
  - Smoke/fog sensing
  - Wind speed sensing
- Lane Control Messaging
  - Advanced construction and work zone notification
  - Crash location notification
  - Specific travel lane impact and diversion notification
  - Evacuation/contra flow operation notification

I-75 ITS Safety System Device And Communications Architecture



Benefits Of Integrated System

- Major Incidents on Alligator Alley Generate Regional Traffic Impacts in Both Districts – Coordinated Data Sharing and Seamless Operation Between Districts Needed to Mitigate These Impacts
- Improve Emergency Response Time to Crashes
- Enhancement to Evacuation/Contra-Flow Operation

System Costs

Element	Device Service Life	Device Cost ($K)	Structure Cost ($K)	*Quantity			Cost ($K)			O&M Cost ($K/Year)	
				Broward	Collier	Total	District 4	District 1	Total	District 4	District 1
DMS	10	130	100	6	7	13	1380	1610	2990	36	42
Weather Sensor	10	55	4	3	5	8	177	295	472	12	20
CCTV Camera	10	30	10	2	6	8	80	240	320	4.6	13.8
Detector	10	10	3	6	7	13	78	91	169	3.48	4.06
Software	10	225		40%	60%	100%			225	5.52	8.28
Additional Comm		250		40%	60%	100%	100	150	250	0.6	0.9
								SubTotal	$4,426	62.2	89.04
								25% Contingency	$1,107		
								Total	$5,533		

***Proposed ITS technologies for District Four and District One I-75 ITS D/B projects do not provide desired safety system component functionality.**

Benefit / Cost Assessment

- Analyzed as a Continuous and Homogeneous System
- Conservative Crash Reduction Approach
  - Considered Collier County single vehicle crashes only for mitigation – (reviewed hard copy crash reports for contributing factors)
  - No operational benefits evaluated (e.g., delay & fuel savings, etc.)
  - Used Safety benefits from FDOT HSIP Database
  - Used Capital Recovery method for B/C Analysis
  - Annualized capital costs and recurring costs for 10 years on devices and 20 years on structures

Annualized Cost	Annualized Benefit	Crashes Prevented	Crash Reduction Factor - CRF	Average B/C
$778,000	$3,890,000	21	0.34	5

Steps Toward Implementation

- Formalize District Four and District One Commitment for Deployment, Operation and Maintenance – Preliminary Agreement Between Districts
- Coordinate with Other Projects/Programs
  - I-75 ITS Design/Builds (providing fiber communication network)
  - FHP Alligator Alley Traffic Enforcement Initiative

Project Schedule

- Design/Build Letting in October 2009
- Signed and Sealed Plans Have Been Finalized
- Construction Has Started
  - Underground is in
  - No devices are in
- Completion is Scheduled by End of October 2011

Questions?