



Martin County Congestion Management Process Update 2011



Prepared for



**Martin County
Metropolitan Planning Organization**



Prepared by



Adopted February 20, 2012

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AECOM**

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MARTIN COUNTY CONGESTION MANAGEMENT PROCESS UPDATE 2011
CMP for SR 714 from Citrus Boulevard to Florida's Turnpike Entrance

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Executive Summary

Introduction

Federal regulations require a Congestion Management Process (CMP) in all Transportation Management Areas (TMAs) - urban areas whose population exceeds 200,000. This began with the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991, and was reiterated in the two subsequent re-authorizations. Federal register 23 CFR 450.320 states that a CMP should include methods to monitor and evaluate the performance of the multimodal transportation system, identify the causes of congestion, identify and evaluate alternative actions, provide information supporting the implementation of actions, and evaluate the efficiency and effectiveness of implemented actions. In Florida, this requirement for a CMP is extended to all Metropolitan Planning Organizations (MPO). Florida Statute 339.177 (2) states that "Each metropolitan planning organization within the state must develop and implement a traffic congestion management system. "

The 2035 Regional Long Range Transportation Plan for Martin and St. Lucie Counties includes Congestion Management Process Strategies in Chapter 8. It states that "CMP Strategies are lower-cost alternatives to traditional roadway widening that typically involve traffic operational improvements. CMP Strategies include improvements such as traffic signal timing optimization, adding intersection turn lanes, multimodal transportation solutions, and other traffic operational enhancements."

Consistent with this requirement, Martin County implemented an Advanced Traffic Management System (ATMS) in phases beginning in July, 2009 through its completion in July, 2011.

As part of the CMP Update 2011, the Martin County MPO reviewed the 2010 Level of Service Inventory Report to select those road segments for which the 2010 traffic volumes were above 90% of their respective service volumes. These segments were then sorted in descending order by their daily VMT (Vehicle Miles of Travel), thus treating them equally in terms of congestion intensity, but assigning more importance based on the amount of utilization. In the second order screening, the existence or absence of impending improvements was used to determine the need for further consideration. Based on this systematic screening process, the Martin County MPO selected the SR-714 segment from Citrus Boulevard to the Turnpike for further study, as this segment of SR 714 is not scheduled for improvements until the 2031-2035 time frame and no parallel facilities are scheduled in the current Work Program for improvements.

The study segment of SR 714 is a two-lane undivided roadway, approximately 1.1 mile long with three signalized (Turnpike, 42nd Avenue and Citrus Boulevard) and two unsignalized intersections (SW Armellini Avenue and Deggeller Court).

As such, the primary focus of this CMP Update is to identify congested areas and determine low cost operational improvements to enhance traffic flow along this segment of SR 714. Detailed roadway and safety analyses are not included in the scope of this study.

Congested Areas and Causes for Congestion

The identification process included collecting and analyzing roadway data (such as number of through lanes, turn lanes, lane width, etc), traffic data, signal timing data, and travel time/speed data, and conducting field reviews during peak periods to identify roadway segments and intersections that are currently operating below acceptable Level of Service (LOS D). In addition, traffic projections for future years (2021 and 2031) were developed and analyzed using traffic analysis software (ARTPLAN and Synchro) to determine expected LOS for the corridor and intersections in 2021 and 2031.

The operational analyses conducted with current traffic and roadway conditions revealed that the following intersections and specific traffic movements are experiencing LOS below acceptable levels (worse than LOS D):

- Southbound left-turn movement at Citrus Boulevard operates at LOS F during AM peak period.
- Southbound left-turn movement at 42nd Avenue operates at LOS F during PM peak period.
- The intersection of SR 714/Turnpike operates at LOS E during AM peak period.
- The eastbound left-turn movement at Turnpike operates at LOS E during AM peak period.

The operational analysis conducted with 2021 traffic volumes indicates that:

- The intersection of SR 714/Citrus Boulevard is expected to operate at LOS F during the AM peak period.
- The intersection of SR 714/SW 42nd Avenue is expected to operate at LOS F during the PM peak period.

The operational analysis conducted with 2031 traffic volumes indicates that:

- The intersection of SR 714/Citrus Boulevard is expected to operate at LOS F during the AM peak period.
- The intersection of SR 714/SW 42nd Avenue is expected to operate at LOS F during the PM peak period.
- Since the intersection of SR 714/Turnpike will be improved as part of a FDOT roadway widening project in FY 2015, this intersection is expected to operate at LOS E during PM peak period.

Field reviews conducted during peak periods revealed that the following traffic movements experienced excessive delays, queuing and/or cycle failures:

- Southbound left-turn and eastbound through movements at Citrus Boulevard during AM peak period.
- Westbound through and southbound left-turn movements at 42nd Avenue during PM peak period.
- The eastbound left-turn movement at Turnpike during AM and PM peak periods.
- The southbound right-turn movement at Turnpike during PM peak period.

The results of the Travel Time and Delay Studies conducted during off-peak periods indicate an average travel time of 166 seconds. Based on traffic models developed for peak periods, the average travel time during peak periods is estimated to be 231 seconds, which indicates approximately a 39% increase in travel time during peak hours. Based on increased travel times during congested conditions, and a cost of \$16/hour for lost time, the average annual cost of congestion is estimated to be approximately \$250,000.

The stop and go conditions associated with signal cycle changes and the lack of a fully coordinated signal system (the current coordinated system includes only Citrus Boulevard and 42nd Avenue intersections, but does not include the Turnpike intersection), and inadequate capacity for critical movements at signalized intersections appear to be contributing to increased travel times along the corridor. The Martin County Traffic Engineering Department is in the process of implementing a coordinated signal system to include the Turnpike intersection.

In summary, the operational analyses conducted as part of this study indicate that some specific traffic movements are currently operating at unacceptable levels of service. Also, based on traffic projections for future years, all three signalized intersections within the study segment are expected to operate at LOS F (either during AM or PM peak) in the year 2021 and beyond. The intersection of SR 714/Turnpike will be expanded (with additional through and turn lanes in east/west direction) as part of a programmed roadway widening project along SR 714 in FY 2015, which will improve traffic flow at this intersection. Therefore, operational improvements are needed at the other two signalized intersections (SR 714/42nd Avenue and SR 714/Citrus Boulevard).

Potential Operational Improvements

The current and future traffic conditions were modeled using Synchro software to identify potential operational improvements. Subsequently, traffic models were run with and without improvements to evaluate/quantify the impact of proposed improvements on traffic flow. The improvements that showed positive impact on traffic flow were selected for further consideration. Potential improvements were then prioritized based on factors such as, project cost, potential benefit, Right of Way (R/W) availability, and potential impacts.

Recommendations

Based on the results of the analyses conducted as part of this study, the following improvements are suggested for implementation by Martin County and FDOT to help improve traffic flow along the study segment of SR 714.

SR 714 at Citrus Boulevard

1. Change cycle length to 160 seconds and optimize splits and offsets.
2. Convert the existing southbound through lane to a shared left-turn/ through lane and widen the east leg to accommodate dual southbound left-turn lanes.

3. Widen the west leg to provide two through lanes for eastbound traffic to add additional capacity for eastbound traffic.
4. Extend the westbound right-turn and left-turn lanes.
5. Install guide stripes for all left-turn movements to properly guide left-turning vehicles.
6. Evaluate roadway drainage in the southeast corner and implement necessary actions.
7. It is suggested that the stop bar locations on the west and north legs be reviewed and adjusted as needed.

SR 714 at SW 42nd Avenue

8. Change cycle length to 160 seconds and optimize splits and offsets.
9. Replace the existing vehicle detection equipment at this intersection with updated equipment.
10. Move the stop bars closer to the intersection, if possible.
11. Widen east and west legs to provide two through lanes in each direction to increase capacity.
12. Improve the westbound right-turn radius to accommodate truck traffic.
13. Install guide stripes for all left-turn movements to properly guide left-turning vehicles.

SR 714 at Florida's Turnpike

14. Coordinate this signal with adjacent signalized intersections, High Meadow Avenue to the east and SW 42nd Avenue to the west, and implement a coordinated signal system to improve traffic flow. The Martin County Traffic Engineering Department is in the process of implementing a coordinated signal system from High Meadow Avenue to Citrus Boulevard. The new coordinated system includes this intersection.
15. Convert the existing "protected/permissive" left-turn phase in the eastbound and westbound directions to "protected only" phase to reduce left-turn crashes.
16. Install a right-turn overlap phase for southbound right-turn traffic to reduce delay.
17. Install dual left-turn lanes in the eastbound and westbound directions to reduce delay for left-turning traffic.
18. Evaluate the need to extend the guardrail located on the south side of eastbound SR 714.
19. As part of a FDOT roadway widening project scheduled for FY 2015, an additional through lane will be installed in the eastbound and westbound directions at this intersection. A preliminary review indicates that additional through lanes (to be added as part of this FDOT project) can be extended further west past the Turnpike bridge, but may require some widening on the west side of the bridge. Further evaluation and coordination with FDOT is needed to confirm the feasibility of providing four lanes across the Turnpike Bridge.
20. It is suggested that the outside southbound through lane be converted to a right/through shared lane. Evaluate the need for this improvement again after the Indian Street Bridge project is complete to make sure the southbound right-turn volume remains heavy.
21. Install a 'Queue Detection and Motorist Warning System' to warn eastbound motorists of potential stopped/queued traffic at the intersection.
22. It is suggested that the existing "Stop Here on Red" and "Yield" signs be removed.
23. Install a "Signal Ahead" sign (facing eastbound traffic) on the west side of the Turnpike Bridge.

24. Install guide stripes for all left-turn movements.
25. Refurbish pavement markings on the west leg.
26. Trim the shrubbery located on the northeast corner to help improve southbound right-turn motorists' view of westbound traffic.
27. Replace the broken sidewalk on the northwest corner and implement necessary improvements to provide proper drainage on the NW corner.
28. Install pedestrian features at this intersection.

SR 714 at Armellini Avenue

29. Modify the median opening to allow eastbound left-turn onto Armellini Avenue and restrict the southbound movement from Armellini Avenue to "Right-turn Only."
30. Modify the southbound right-turn radius (to accommodate a WB-40 design vehicle) and reconstruct the curb and replace the existing guardrail end anchor and install additional guardrail to meet current standards.
31. Upgrade pedestrian features, such as the pipe guiderail, crosswalk and sidewalk ramps to meet current standards.

SR 714 at Deggeller Court/Leighton Farms Road

32. Consider striping the median area on SR 714 between Deggeller Court and Leighton Farms Road to better delineate the turning path for northbound and southbound left-turn movements, and thus reduce the potential for head-on collisions.
33. Install a crosswalk on the north leg.
34. Clear sand buildup and other debris from pedestrian ramp areas in the northwest and northeast corners.
35. Evaluate roadway drainage in the northwest and northeast corners and implement necessary actions.
36. It is recommended that Leighton Farm Road be shifted further west (possibly through the permitting process for future developments or roadway projects), so that it is aligned with Deggeller Court to form a proper four-legged intersection. This will provide for safer and more efficient operations at this intersection. As an alternative, consider restricting the northbound movements to "Right-turn Only".

Corridor Improvements

37. Implement a coordinated signal system along SR 714 and connect the signal at the Turnpike intersection with other signalized intersections along the corridor.
38. The guide signing along the corridor should be analyzed and enhanced as needed.
39. Considering that the subject corridor provides access to two major roadways, I-95 and Florida's Turnpike, it is suggested that arterial dynamic message signs be installed at strategic locations to inform motorists of incidents/congestion along I-95 and Florida's Turnpike.
40. Install bicycle facilities as part of future development/roadway projects to help reduce vehicular trips along the corridor.

41. It is suggested that turn lanes be provided (as part of any future development) at driveways to major traffic generators along the corridor to accommodate the access needs of turning traffic and to minimize the negative impact of turning traffic on corridor traffic flow.

Conclusions

This annual update of the Martin County Congestion Management Process identified several operational improvements to reduce congestion and improve traffic flow along the SR 714 corridor from Citrus Boulevard to Florida's Turnpike. The estimated cost of the recommended signal related improvements is approximately \$125,000 and the resulting Benefit/Cost ratio (B/C) is 9.6. The estimated cost of the recommended roadway improvements is approximately \$1 million and the resulting B/C ratio is 6.3.

Some of the recommended improvements, especially those related to signal timing improvements, can be implemented using Martin County Traffic Engineering Department's resources within a relatively short time, thereby providing an immediate benefit to motorists. The remaining roadway improvements need to be considered during the development and adoption of the Martin County Transportation Improvement Program (TIP) and the FDOT 5-Year Work Program.