EXECUTIVE SUMMARY

REVERSIBLE LANES
ALONG MAJOR THOROUGHFARES IN MIAMI-DADE COUNTY

Work Order No. GPC VI-4

September 2016
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INTRODUCTION

Travel delays due to peak-period and peak-direction congestion affect the productivity and quality of life of nearly all travelers in Miami-Dade County. Adding roadway capacity to improve travel times is challenging due to high costs and environmental impacts associated with, designing, constructing, and purchasing Right of Way (ROW) for new travel lanes and/or roadways. Therefore, ensuring optimal utilization of existing transportation assets is crucial.

A reversible lane is one such transportation system management technique that ensures a higher utilization of existing transportation assets while reducing the negative externalities associated with the widening of roadway facilities. The reversible lane system designates traffic/travel flow in one direction during some period of time and reverses it to the opposing direction during some other period of time. This reversal of traffic/travel flow from one direction to another can take place along a single center lane, multiple center/inside lanes, shoulders, or the entire roadway. The direction of traffic/travel flow can be adjusted at different times to adapt to changing traffic/travel conditions. These conditions are most commonly based on demand associated with frequent and predictable unbalanced peak-period travel times such as on corridors that accommodate predominantly commuter traffic/travel. The basic principle is to configure the lanes of a roadway or the entire roadway to provide additional directional capacity to match anticipated periodic unbalanced directional traffic/travel demand. Reversible lanes allow transportation agencies to make better use of new or existing underutilized roadways by aligning the capacity with traffic demand.
PROJECT NEED

Miami-Dade County is in need of possible solutions to the congestion problem associated with morning and afternoon peak travel periods. The purpose of this study is to evaluate the feasibility of implementing reversible lanes along major thoroughfares in Miami-Dade County, particularly during peak commute travel times with the intent of addressing traffic congestion in a cost-effective manner.

PROJECT OBJECTIVE

The objective of this study is to identify potential roadways throughout Miami-Dade County where a reversible lanes pilot program can be successfully implemented providing the community with the benefit of reduced congestion at a low cost.
PROJECT BACKGROUND

Reversible lanes have been studied in the past along a few roadways in the County (i.e. NW 199th Street, US-1, NW 7th Avenue). Only NW 199th Street currently operates in Miami-Dade County, but only during special events. The studies that have examined reversible lanes in the County are:

2. Miami-Dade County / Florida Department of Transportation State Road 7 (NW 7th Avenue) Reversible Lane Project (2007)
3. Miami-Dade MPO Special-Use Lanes Study (2005)

WHAT ARE REVERSIBLE LANES?

A reversible lane, or reversible roadway, is a transportation facility on which the direction of travel flow changes during some specified period of time to serve the direction with greater travel demand. Its purpose is to increase the directional capacity of the roadway during the daily peak travel period. In essence, reversible lanes “shift” the directional capacity of roadways.
REVERSIBLE LANE APPLICATION

For expedited implementation, minimized complexity, and reduced reconstruction, the ideal roadway cross section for reversible lane treatment should have a center Two-Way Left Turn Lane (TWLTL) or a paved median. Furthermore, roadways with an odd number of lanes and with more than five (5) lanes are preferred since these characteristics will maintain at least two (2) lanes for the non-peak direction of travel throughout the day. That is, these characteristics ensure that the non-peak direction does not become oversaturated with traffic flow when “shifting” the capacity of the roadway to favor the peak direction. Roadways with three (3) and four (4) lanes will only have one (1) lane serving the non-peak direction and this could easily become oversaturated in emergency situations when the lane is, or needs to be closed.
THE APPROACH

This study began with a literature review to understand the cost, safety, operations, design, and success of reversible lanes on relevant corridors with similar environments as Miami-Dade County. Applying the knowledge obtained from this research, a system-level analysis and tiered screening process was ensued to determine the best corridors in the County that could benefit commuters by implementing reversible lanes. Two (2) selected corridors were then further examined by creating concept plans, developing a cost estimate, and creating an implementation plan.

LITERATURE REVIEW & RELEVANT CORRIDORS

In the literature review 16 studies focused on major arterial and collector roadways were reviewed to extract important lessons pertaining to reversible lanes. These lessons resulted in the following conclusions:

- Traffic demand should exceed existing roadway supply
- Traffic congestion should be, to most extent, periodic and predictable
- The ratio between major and minor roadway traffic volumes should be 2:1 or 3:1, preferably, to avoid traffic issues on side-streets
- One-way pairs, where applicable, are preferred over reversible lanes
- Reversible lane termini should have sufficient capacity to avoid bottlenecks
- NCHRP Synthesis 340 provides evidence that suggest reversible lanes do not contribute significantly to increased frequency or severity of crashes
- Reversible lanes tend to be commuter oriented, deemphasizing pedestrians, bicyclists, and community revitalization

Furthermore, the literature review gave way to a review of relevant corridors with reversible lanes through the Americas. In total eleven (11) nation-wide facilities and three (3) international facilities were reviewed and the following conclusions were made:

- Most reversible lane facilities are two-way roadways with a center TWLTL
- On average reversible lane(s) segments are 2 miles long
- On average reversible lane(s) segments have 5 to 7 lanes
- Most corridors connect suburban areas to a Central Business District (CBD)
- Left turn prohibitions are common practice with reversible lane operation
- On-street parking removal/prohibitions are common practice as well
- Additional investment in traffic control devices and enforcement is needed
- Surrounding commercial land use is preferred over residential land use
ANALYSIS & SCREENING

The tiered screening involved analyzing all arterials and collectors within Miami-Dade County using the following criteria:

Tier 1: Preliminary Screening

- **Primary Criteria**
  - Directional Distribution
    - Spatial: 60%/40% directional distribution preferred
    - Temporal: A frequency of directional distribution duration of 100% to 75% was preferred during both the AM and PM peak
  - **Secondary Criteria**
    - Roadway Length: Thoroughfares longer than 2 miles were preferred
    - Connectivity to the CBD or higher order roadway: Corridors that serve as commuter routes to the CBD or that connected to higher order roadways were preferred
    - Arterial and Collectors: Freeways, ramps, and rural highways were not selected for further analysis
    - Jurisdiction: Roads with a single jurisdiction were preferred

Tier 2: In-depth Screening

- Planned & Ongoing Improvements: Roadways with capacity projects included in the Long Range Transportation Plan (LRTP) and in the Miami-Dade County Metropolitan Planning Organization (MPO) Transportation Improvement Program (TIP) were excluded from further consideration
- Daily Volume: Thoroughfares with high daily traffic were preferred since this characteristic indicates a greater need for improvement and a larger number of potential beneficiaries
- Truck Percentage: Corridors with more than 10% truck traffic are undesirable for reversible lane implementation due to geometric and operational constraints
- Median Type: Roadways with paved medians or center TWTL were preferred over raised medians due to reduced construction costs and ease of implementation
- Number of Lanes: A minimum of two (2) lanes in each direction is suggested even with reversible operations
- Surrounding Land Use: Commercial land use adjacent to the corridor(s) was preferred
- Transit Routes: Roadways with one (1) or no transit routes were preferred
- Signalized Intersections: Thoroughfares with less than 10 traffic signals were encouraged
- School Zones: Roadways with reduced speed school zones were penalized
- Generic Capital Cost: A generic per mile capital cost estimate was developed and the lower the cost the better
In addition, roadways with on-street parking, mid-block pedestrian crossings, railroad crossings, part of an FDOT project, having high turning movement volumes, and having issues with access management were considered undesirable.

RESULTS

Through the screening process and agency coordination Tier 1 resulted in fifteen (15) feasible corridors in Miami-Dade County for reversible lane application. This corridors are:

1. NE 6th Avenue
2. NW 7th Avenue
3. NW 7th Street
4. NW 25th Street
5. NW 32nd Avenue
6. NW 36th Street
7. NW 87th Avenue
8. SW 40th Street
9. SW 104th Street
10. SW 152nd Avenue
11. SW 184th Street
12. US-1/Dixie Highway
13. SW 8th Street
14. SW 88th Street
15. NW 114th Avenue

Based on the Tier 2 criteria a grading matrix was developed to screen the aforementioned fifteen (15) corridors. From the grading matrix two (2) corridors ranked highest making them the best candidates for reversible lanes implementation. These thoroughfares are NW 7th Street and NW 32nd Avenue. As consequence, conceptual plans, visualization, and a preliminary cost estimates of improvements for these two (2) roadways were developed.
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<th>Section Number</th>
<th>Operational</th>
<th>Lane Type</th>
<th>Width</th>
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<th>Solar Height</th>
<th>Solar Setback</th>
<th>Solar Support</th>
<th>Solar Railing</th>
<th>Projector Rail</th>
<th>Solar</th>
<th>Chevrons</th>
<th>Protector</th>
<th>Guardrail</th>
<th>Tensile/Ballistic</th>
<th>Tension</th>
<th>Shear Force</th>
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**Notes:**
- Lane Type: 2 Lanes = 2 lanes, 3 Lanes = 3 lanes, etc.
- Width: Measurement in feet.
- Solar: Height of solar panel above ground level.
- Solar Height: Height of solar panel from solar support.
- Solar Setback: Distance from solar panel to nearest structure.
- Solar Support: Type of support for solar panel.
- Solar Railing: Protective railing around solar panel.
- Projector Rail: Rail for projectors.
- Chevrons: Type and size of chevrons.
- Protector: Type of protector for solar panel.
- Guardrail: Type of guardrail.
- Tensile/Ballistic: Type of tensile or ballistic protection.
- Tension: Tension force applied.
- Shear Force: Shear force capacity.
REVERSIBLE LANES ALONG MAJOR THOROUGHFARES IN MIAMI-DADE COUNTY

NW 7TH STREET
FROM NW 57TH AVE TO NW 12TH AVE

4.5 MILES
135 19 07 ON-STREET PARKING
SIGNALIZED INTERSECTIONS PEDESTRIAN CROSSINGS

POTENTIAL COST
$7.4M

TRANSITIONS: At the entry/exit from a portion of roadway with reversible lanes shall be smoothly merged, and advance signs shall be installed to notify all users of the boundaries of the reversible lane control.

DYNAMIC MESSAGE SIGN
APPROACHING NW 57TH ST (LOOKING EAST)

WESTERN TERMINUS
BIG REVERSIBLE LANE AT NW 57TH AVE (LOOKING EAST)

WESTERN CONDITIONS
END REVERSIBLE LANE AT NW 57TH AVE (LOOKING WEST)
REVERSIBLE LANES ALONG MAJOR THOROUGHFARES IN MIAMI-DADE COUNTY

NW 32ND AVENUE
FROM NW 36TH ST TO NW 79TH ST

05 MILES
15 SIGNALIZED INTERSECTIONS
10 SIGNALIZED PEDESTRIAN CROSSING

POTENTIAL COST
$7.7 M

TRANSITIONS at the entrance and exit from a portion of roadway with reversible lanes shall be accurately placed and advance signs shall be installed to notify or warn drivers of the boundaries of the reversible lane control.

DYNAMIC MESSAGE SIGN
APPROACHING NW 39TH ST LOCKING NORTH

SOUTHERN TERMINUS
END REVERSIBLE LANE AT NW 39TH STREET LOCKING SOUTH

NORTHERN CONDITIONS
FROM NW 39TH STREET TO NW 139TH STREET
UTILIZES PAVED SHOULDER TO ACCOUNT
NEXT STEPS TO BE TAKEN

IMPLEMENTATION PLAN

A Project Development and Environmental (PD&E) Study requiring:
- A refinement of the preliminary conceptual alternatives
- A detailed traffic operations analysis study
- A detailed multimodal safety study
- An analysis of expressway accessibility
- A compatibility analysis with special events at Marlins Park
- An analysis of social and environmental impacts
- A community and stakeholder engagement

PHYSICAL IMPLEMENTATION

- Milling & Resurfacing existing asphalt pavement
- Minor reconstruction of existing medians and traffic separators
- Installation of new pavement markings and signage
- Installation of new intelligent transportation systems (ITS) and traffic control devices
- And utility coordination and potential relocation
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