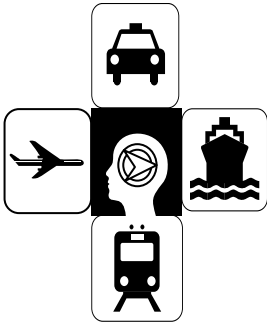


JERSEY DOT'S

"TURNING PROBLEMS INTO SOLUTIONS"



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Think Jersey DOT

Tech Brief

Transit Signal Priority Systems Application and Technology Investigation

NJ-2009-001

March 2009

SO, HERE'S THE PROBLEM



In New Jersey, priorities and capital investment strategies are focusing on improving bus service, including express and Bus Rapid Transit (BRT) in key corridors. One key technological component of these investment strategies is Transit Signal Priority (TSP). Transit Signal Priority is an operational strategy that can allocate additional green time to help transit vehicles (e.g., buses or streetcars) through traffic signal-controlled intersections. Objectives of TSP include improved schedule

adherence and/or reduced running times while minimizing impacts to normal traffic operations. The New Jersey Department of Transportation, Bureau of Research, in cooperation for New Jersey Transit (NJ Transit) needed a quick and cost effective approach to determine which signalized intersections within targeted corridors would be suitable for TSP.

AND HERE'S OUR SOLUTION



Seven agencies with established TSP systems were contacted and/or researched to develop a thorough understanding of the detailed components that have gone into their TSP decision process, including: corridor and intersection eligibility, initial screening criteria, use of microsimulation traffic operations modeling (if any), implementation status, performance measures, and recommendations for agencies considering TSP. The concepts and ideas from these agencies served as a foundation for NJ Transit's own methodology to analyze, at the intersection level, whether or not a signalized intersection is a candidate for TSP. This methodology had to be easily understood and quick to execute. To test as well as fine-tune the approach,

three case studies were then conducted.

INTRODUCTION

The objective of this research is to develop an evaluation process that will assist NJ Transit in quickly determining which intersections are good candidates for TSP. This evaluation process is applicable for passive and active TSP and could be applied to a variety of roadways, including urban arterials, state routes, and county roads.

AND, HERE'S WHAT WE DID...

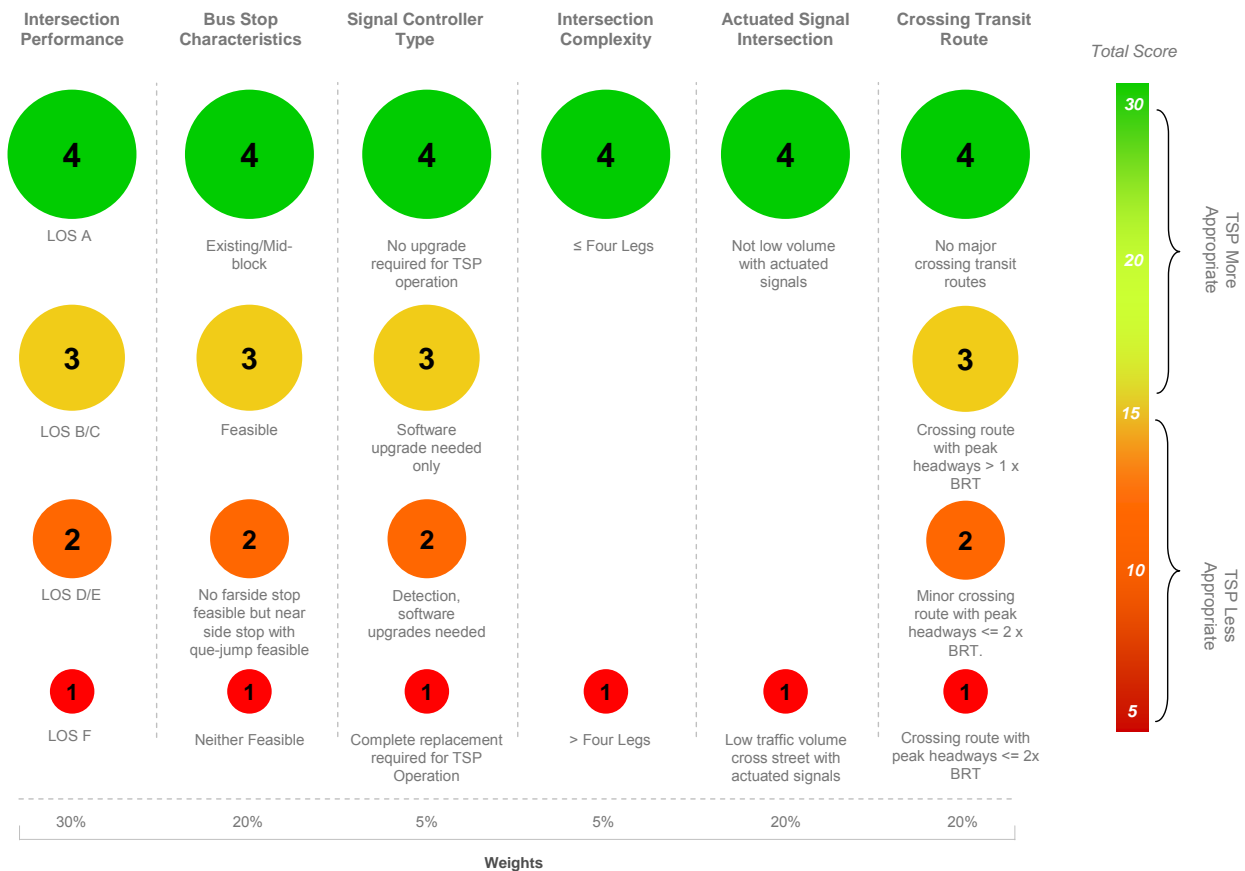
Seven agencies with established TSP systems were contacted and/or researched to develop a thorough understanding of the detailed components that have gone into their TSP decision process. While the agencies surveyed represent a wide range of TSP philosophies and strategies, some themes emerged that were common to at least a majority of agencies in each case.

Using these findings, an evaluation process was then developed for the traffic environment in New Jersey. The process utilized selection criteria to produce an overall scoring mechanism at the intersection level for TSP. Selection criteria were structured into a weighted scoring framework in which individual intersections can be evaluated and ranked in the context of an entire corridor. Likewise, overall corridor scores potentially can be compared with those of other corridors to support resource allocation decisions. The scoring approach is illustrated below.

The scoring approach reflects a fluid spectrum of feasibility in which intersections in a corridor are prioritized based on their TSP suitability. Any number of intersections from none to all may be selected depending on available resources, phasing considerations, program objectives, and other factors.

The intersection evaluation scoring approach assigns scores of 1 (lowest TSP suitability) to 4 (highest TSP suitability) to each of six criteria. Criteria include:

- Intersection Performance – Traffic level of service (LOS);
- Bus Stop Characteristics – Far-side stop or queue jump lane;
- Signal Controller Type – TSP-compatible signal controller;
- Intersection Complexity – Number of intersection approaches;
- Actuated Signal Intersection – Cross-street signal actuation, and
- Crossing Transit Route – Service frequency on cross street.



Each screening criterion also is assigned a weight factor to produce an overall intersection score of 1 to 4. TSP is considered to be more appropriate at intersections with a score near 4 than at those with a score near 1.

The weighting criteria were assigned based on the relative importance of each consideration to overall TSP cost-effectiveness, as indicated by observations from the technology review. Reflecting the importance placed by many agencies on traffic level of service in their microsimulation evaluations, intersection performance was assigned a weight of 30 percent. The frequent mention of cross-street traffic volumes as a TSP consideration (both at the high end as indicated by the presence of crossing transit routes and at the low end as indicated by actuated signals) was reflected in a next highest weight of 20 percent. Based on the widespread preference for far-side stops (or at least queue jump lanes to improve the compatibility of near-side stops with TSP), considerations of bus stop characteristics, including far-side stop locations and queue jump lanes, also were assigned a weight of 20 percent. Considerations that could be relatively easily managed during implementation, including intersection complexity and the TSP compatibility of the signal controller, were assigned the least weight of 5 percent.

RECOMMENDATIONS – WHAT ARE THE NEXT STEPS TO MAKE THIS PROGRAM A SUCCESS?

The preceding methodology provides NJ Transit with a powerful sketch planning tool that can be utilized in a variety of ways as they continue to expand BRT-like service throughout their system. First, NJ Transit will apply this scoring approach to all of the

corridors which have been identified for either BRT or BRT-“like” service. The results of that exercise will assist NJ Transit in setting priorities for those corridors, as well as getting an early look at some of the cost implications of TSP applications by corridor.

Additionally, NJ Transit could consider applying this approach across all the corridors across the entire NJ Transit system. By applying the scoring process on all corridors, a complete statewide perspective would be generated. Having this information already compiled would help facilitate new corridors for BRT consideration.

Finally, NJ Transit could consider institutionalizing this scoring approach by recreating it within a secure web environment. By putting this process within a web environment, NJ Transit planners could easily conduct their own sensitivity analyses on certain corridors and see the impacts of their changes both in a tabular, as well as a GIS environment in real time. The site could be designed to not only create on-screen results but also provide the capability to export to spreadsheets and GIS for presentations and further analyses. Furthermore, NJ Transit could share this site with interested local jurisdictions and traffic engineers. By providing them direct access to the information by which NJ Transit is making decisions, it would further bring the traffic engineering community into the process and encourage acceptance and buy-in. It is the logical next step to this project, to create a tool within a secure NJ Transit web site which would be the repository for all the results, of all the studied corridors.

FOR MORE INFORMATION CONTACT:

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A final report is available online at:

<http://www.state.nj.us/transportation/refdata/research/>

If you would like a copy of the full report, please FAX the NJDOT, Bureau of Research, Technology Transfer Group at (609) 530-3722 or send an email to Research.Bureau@dot.state.nj.us and ask for:

Testing and Evaluation of Graduated Driver License Marker

NJDOT Research Report Number: NJ-2009-001