BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

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Jeffrey B. Mullan
MassDOT Secretary and CEO
and MPO Chairman

Karl H. Quackenbush
Acting Director, MPO Staff

MEMORANDUM

DATE **March 10, 2011**

TO **Transportation Planning and Programming Committee of the Boston Region Metropolitan Planning Organization**

FROM **Karl H. Quackenbush, Acting CTPS Director**

RE **Work Program for: Roundabout Installation Screening Tool**

ACTION REQUIRED

Review and approval

PROPOSED MOTION

That the Transportation Planning and Programming Committee of the Boston Region Metropolitan Planning Organization vote to approve the work program for Roundabout Installation Screening Tool

PROJECT IDENTIFICATION

Unified Planning Work Program Classification
Technical Support/Operations Analysis Projects

CTPS Project Number
13252

Client
Boston Region Metropolitan Planning Organization

CTPS Project Supervisors
Principal: Efi Pagitsas
Manager: Seth Asante

Funding
MassDOT 3C PL Contract #66104

BACKGROUND

Modern roundabouts, unlike the much larger traffic circles (rotaries),[1] built in the first half of the 1900s, are often a more efficient and safer form of traffic control at unsignalized intersections and, sometimes, at signalized intersections as well. If the conditions are right for a roundabout treatment, designing an intersection in this manner can increase its traffic processing capacity, and can make the location safer, more energy-efficient, pedestrian-friendly, and aesthetically pleasing.

Demand for modern roundabouts throughout the state has risen in the last decade. In order to respond to roundabout requests from municipalities, the MassDOT Highway Division is interested in having a consistent policy that would point confidently to a roundabout as the preferred choice of traffic control over other types of intersections, for example, two-way stop control or traffic signal control. Before a Functional Design Report and further design are funded, a planning-level evaluation would be necessary to inform MassDOT staff whether roundabout control is appropriate and feasible, and how its performance would compare to other types of intersection control based on a number of evaluation criteria.

To this end, this study will develop screening tools for the MassDOT Highway Division to implement into its policy for roundabout control at intersections. MassDOT Highway Division staff will use these tools when they review proposals for the design and construction of roundabouts. This is especially important for federal-aid-funded roundabout designs, which typically include state numbered routes, major and minor arterials, and collectors.

Some of the evaluation criteria that MPO staff will use to develop the screening tool would relate to the following concepts:

- Desirable/optimum traffic volume conditions for considering a roundabout design over a signalized intersection design or a two-way stop-control design
- Traffic volume conditions for a single-lane versus a two-lane roundabout
- Range of left-turn traffic volumes for which a roundabout treatment would be appropriate
- Common crashes and other safety issues which a roundabout may help eliminate
- Appropriateness of roundabouts as speed-control devices
- Design attributes to accommodate bicyclists and pedestrians
- Types of aesthetic and environmental impacts that might be expected

[1] Modern roundabouts integrate design parameters to help reduce vehicle speeds on the approaches and the circulating lane. They are configured to improve efficiency and safety, and to promote compact design. Three features distinguish them from traffic circles: Yield on Entry (approaching vehicles yield to circulating vehicles); Deflection (vehicles from all approaches are deflected around the central island, which slows traffic, promotes yielding, and increases safety); and Approach Flare (approaches often flare at entry to increase capacity).

MPO staff will be responsible for this study and will work closely with the MassDOT Highway Division and the Office of Transportation Planning. Work will include a review of literature of FHWA and other states' guides on screening tools, guides, and policies.

The product of this study will be a roundabout planning guide for screening locations under roundabout design consideration for various roadway classifications in the Commonwealth.

IMPACT ON MPO WORK

This is MPO work and will be carried out in conformance with the priorities established by the MPO.

OBJECTIVE

This study will develop a modern roundabout screening tool for MPO and MassDOT Highway Division staff to use when they consider intersection design proposals with roundabout traffic control or when they evaluate unsignalized intersections for alternative control designs.

WORK DESCRIPTION

Task 1 Form, and Coordinate with, an Advisory Task Force

Staff will develop a roundabout planning-level screening tool under the guidance of the MassDOT Highway and Planning divisions. The staff of these MassDOT divisions will be the primary users of the tool and they need to participate in order for the evaluation tool to reflect their experiences to date and meet their requirements for the development of a comprehensive, effective, and useful tool.

Upon approval of the work program, a meeting will be convened to discuss initially the parameters of this study, the direction for the literature search, and the likely evaluation criteria. Staff will call a second meeting to present the literature search findings and establish the final evaluation criteria. A third and final meeting will be held to present the draft screening tool and request reviews and comments.

Product of Task 1

Documentation of notes from three meetings with Advisory Task Force

Task 2 Search Literature on the Subject of Roundabout Screening

The FHWA and several state DOTs have already developed informational guides and policies for the installation of both modern roundabouts, primarily designed for arterial and collector road systems, and neighborhood mini-roundabouts, used on local, residential streets. As the present MassDOT Highway Design Manual does not include guidance on roundabout design or screening methods, in this task, staff will focus on screening methods for the former type of roundabout, designs of which MassDOT and MPO staff would be typically asked to review.

MPO staff will review screening tools found in the literature and modify them under guidance by the Advisory Task Force to adapt to existing MassDOT roadway design principles, practices, and priorities. Typically, these criteria include safety, operations, efficiency, environmental impacts, compact design, energy consumption, level of maintenance required, pedestrian and bicyclist circulation, lighting requirements, and aesthetics.

Products of Task 2

A technical memorandum summarizing literature search findings on the subject of planning-level screening and evaluation of roundabout-control design at intersection locations

Task 3 Develop Roundabout Screening Tool

Following the literature review, staff will propose to the Advisory Task Force a series of evaluation areas to consider, with associated criteria and thresholds, for validating roundabout control at a given intersection location. In fact, staff will not simply put together information found in the literature. Rather, staff will examine the information critically, draw on engineering judgment, look at MassDOT and Advisory Task Force-specific considerations, and then come up with a proposal to the Advisory Task Force.

Evaluation areas could include:

- Objectives and main purpose for roundabout treatment of location (safety, operations, other)
- Traffic demand (Average Daily Traffic [ADT], turning movements, and truck traffic)
- Safety (high crashes, skewed geometry, excessive speeds)
- Operations (accommodation of a high volume of left turns and U-turns, and a high rate of future traffic growth)
- Traffic control (traffic calming, existing two-way stop control that does not qualify for a traffic signal)
- Pedestrian and bicycle accommodation
- Space requirements
- Access opportunities (access management, redevelopment, traffic growth)
- Impacts (utilities, building access, existing building footprint)

- Environment (energy consumption)
- Aesthetics
- Construction and maintenance costs
- Unfavorable conditions nearby for the construction of a roundabout
- Compare to alternative designs (four-way stop or traffic signal control)

From discussions with the Advisory Task Force, a final list of areas to consider will be determined for inclusion in the screening tool. These will be incorporated into the tool as tables, questions to be answered by the analyst who performs the evaluation, and a flow chart that charts graphically the evaluation and validation process.

Products of Task 3

A screening tool consisting of flow charts, tables, and text that can be applied to guide intersection control decisions about modern roundabouts according to evaluation criteria such as safety, operations, space requirements, environment, bicyclist and pedestrian accommodation, aesthetics, and public education and acceptance

Task 4 Document Roundabout Screening Tool

The results of the study, including flow charts, tables, and other supporting material for the screening tool, will be documented in a technical memorandum for the review of the Advisory Task Force and the TPPC.

Product of Task 4

A technical memorandum documenting the study's findings and recommendations regarding a MassDOT screening process for modern roundabouts

ESTIMATED SCHEDULE

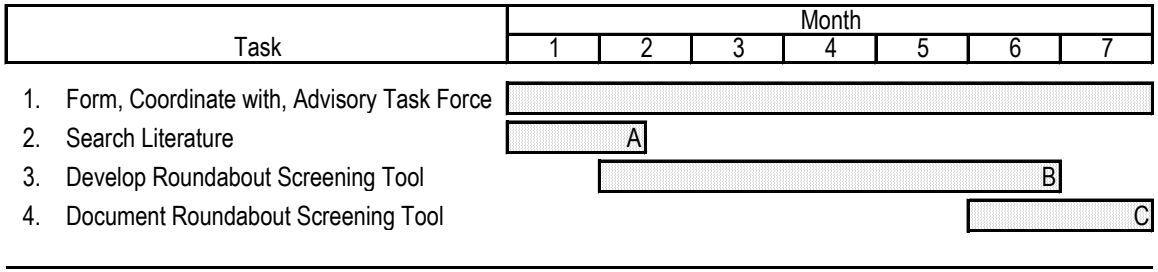
It is estimated that this project will be completed seven months after the notice to proceed is received. The proposed schedule, by task, is shown in Exhibit 1.

ESTIMATED COST

The total cost of this project is estimated to be $39,992. The total cost includes the cost of 15.7 person-weeks of staff time and overhead at the rate of 90.69 percent. A detailed breakdown of estimated costs is presented in Exhibit 2.

KHQ/EP/ep

Exhibit 1
ESTIMATED SCHEDULE
Roundabout Installation Screening Tool



Products/Milestones

A: Technical memorandum summarizing literature search

B: Screening tool for the evaluation of roundabout control

C: Technical memorandum on study findings and screening process recommendations

Exhibit 2
ESTIMATED COST
Roundabout Installation Screening Tool

Direct Salary and Overhead	**$39,992**

Task	Person-Weeks M-1	P-5	Temp	Total	Direct Salary	Overhead (@ 90.69%)	Total Cost
1. Form, Coordinate with, Advisory Task Force	0.2	0.5	0.0	0.7	$1,125	$1,020	$2,145
2. Search Literature	0.0	1.0	3.8	4.8	$3,505	$3,178	$6,683
3. Develop Roundabout Screening Tool	0.2	6.0	0.0	6.2	$9,899	$8,977	$18,876
4. Document Roundabout Screening Tool	1.5	2.5	0.0	4.0	$6,444	$5,844	$12,288
Total	1.9	10.0	3.8	15.7	$20,973	$19,020	$39,992

Other Direct Costs	**$0**

TOTAL COST	**$39,992**

Funding
MassDOT 3C PL Contract #66104