Maryland ITS Architecture Conformity Form

Submission Date
1. Submission date: 3/19/2018
Organizational Information
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Point of Contact Information
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General Project Information
8. ITS project name/title: I-270 Innovative Congestion Management Project: Ramp Metering

9. Project type:	10. Project scope (select all that apply):
☒ New ☐ Replacement ☐ Expansion	☒ Software installation/upgrade ☒ Hardware installation/upgrade ☒ Operations/Maintenance ☒ Systems Integration ☒ Planning ☐ Other (provide more detail below)

11. Summarize the project (including how this project relates to existing ITS projects/systems): A Ramp Metering System will be implemented along I-270, both southbound and northbound. The elements of the ramp metering system are designed to optimize operations on I-270 by managing the release rate of vehicles entering I-270. The Ramp Metering System will choose a vehicle rate of release at each ramp based on mainline traffic flow conditions, in the vicinity of the ramp or along other segments along I-270, and queue length at the ramp. Time of Day / Day of Week (TOD/DOW) scheduling will be implemented as necessary.

The ramp meters will regulate the flow of vehicles onto the I-270 mainline by using traffic signal displays on each of the ramps to release vehicles at a rate of 240 to 1,800 vehicles per hour, based on traffic conditions and number of lanes on the ramp. Metering rates will be selected based on real-time mainline flows and ramp queues. An individual ramp meter location may be controlled by a local mainline traffic detector location installed in the vicinity of the ramp or multiple ramp meter locations may be controlled by a single mainline detector location installed near a bottleneck. Ramp metering will operate primarily during the AM and PM peak periods, but will be activated when mainline congestion thresholds (flow, occupancy or speed) are reached (such as when a major incident or special event occurs). By managing the amount of traffic entering I-270 and breaking up platoons that make it difficult to merge, congestion will be reduced and the merging movements will be safer.

Ramp meters will be installed at every northbound and southbound entrance ramp from the arterials to I-270, except MD 85 to southbound I-270. Along I-370 approaching the ramps to I-270, additional warning signs/signals will be installed to alert freeway motorists to the ramp queuing ahead. Metering the I-270 ramps, including along those segments that generally do not experience recurring congestion, will help alleviate any potential equity-related opposition and to manage fluctuations in flow rates entering I-270 that could vary with non-recurring congestion.

12. Describe the needs this project will satisfy:
The existing traffic conditions vary for I-270 southbound and northbound mainline. Morning and evening peak periods feature slow speeds, recurring congestion and non-recurring congestion. The congestion causes increased incidents and safety issues. Recurring congestion occurs daily Monday thru Friday in morning and evening peak hours. Non-recurring congestion due to various causes, such as crashes, special events, disabled vehicles, and adverse weather conditions, have a significant impact on reliability. To improve mobility and reliability along I-270, the goal is to consistently reduce travel times and delay across peak periods.

One solution for congestion relief is to control the traffic volume entering I-270 by the means of innovative Intelligent Signal Systems, called Ramp Metering. As defined by FHWA, this strategy consists of deploying traffic signals on ramps to dynamically control the rate vehicles enter a freeway facility. This smooths the flow of traffic onto the mainline, allowing efficient use of existing freeway capacity. Adaptive/traffic responsive ramp metering utilizes traffic responsive algorithms (as opposed to pre-timed or fixed time rates) that can optimize either local or systemwide conditions. Real-time and anticipated traffic volumes on the freeway facility will be used to control the rate of vehicles entering the freeway facility. Based on the conditions, the ramp meter rates will be adjusted dynamically. Ramp Metering will address recurring congestion on I-270, and can be used as a traffic management tool to address non-recurring congestion.

13. List the users of the project when complete:

- Motorists
- Emergency Responders
- Law Enforcement
- Commercial Vehicle Operators

14. Describe how the users will benefit from the project:
Improved mobility, reduced congestion and enhanced safety.

15. Describe the geographic areas to be served:
I-270 northbound and southbound between I-495 and MD 85.

Architecture-Specific Information

16. Summarize the current status of the project (including where it stands in terms of the Systems Engineering process diagram shown in the accompanying Conformity Guide): Operational Concept Document has been completed and accepted by MDOT SHA. Project is currently in design, with construction anticipated Summer 2018.

17. List stakeholder agencies and their roles/responsibilities for this project:

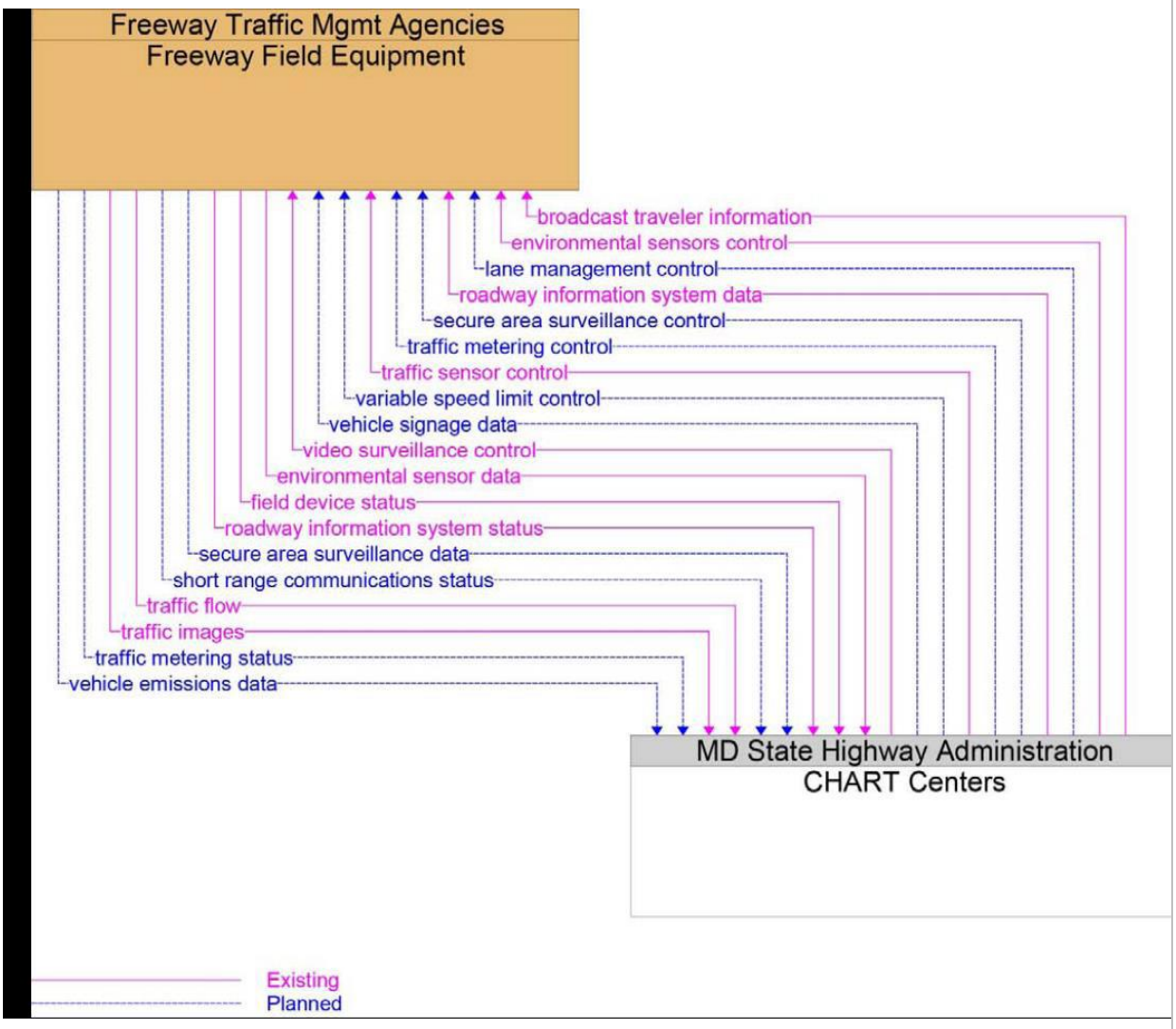
- Maryland State Highway Administration – owner and operator
- Maryland State Police - Enforcement

18. Identify the functional requirements for this project:

Functional Requirements are identified in Chapter 6 and 8 of the attached Operational Concept Document

19. Show how your project aligns with the Interconnect and Information Flow Diagrams in the MD ITS Architecture:

The proposed ramp metering system is in conformance with the Maryland Statewide ITS Architecture. The Architecture currently includes ramp metering as part of the roadway subsystems which includes Freeway Field Equipment. The I-270 ICM project is included in the planned project section of the November 2016 versions of the Architecture. The proposed ramp meter system will not alter any portion of the architecture. It will enhance the existing communications between elements of the “Centers” and “Field” subsystems within the Architecture. The implementation of ramp metering serves to enhance information being exchanged between the Maryland State Highway Administration "CHART Centers" and "Freeway Field Equipment" elements. The Architecture includes the Signal Operations Section and Traffic Development Support Division as part of the “CHART Centers” based on the arterial portion of the Architecture. The CHART Centers will also have access to the proposed central management software, read/write privileges will be established by MDOT SHA.



20. Describe the configuration & technology options considered for this project and indicate which were selected:

Traffic Signal Assembly consists of mast arm poles mounted downstream of the proposed stop line. Three-section (circular-red, circular-yellow, circular-green) LED traffic signal heads will be mounted to the mast arm pole, which is most familiar to drivers. The traffic signal assembly will consist of overhead signs mounted between the traffic signal heads.

Hazard Identification Beacon (HIB) assembly, consisting of pedestal pole mounted HIB and signs, installed in advance of the ramp meter stop line, will be installed to warn motorists when ramp metering is in progress.

Signs will be installed on the advanced HIB, mast arm traffic signal assembly and ground mounted near the stop line to provide motorists regulatory and warning information regarding the ramp meter installation. Signs will include W3-8 flashing sign, R10-28 and 29 on mast arms, and ground mounted R10-6a.

Traffic Signal Controllers with ramp metering software will be housed in base mounted cabinets at locations providing adequate accessibility for maintenance.

Detection System will include queue, demand, passage and mainline detectors to determine the metering rate at each ramp.

Communications Interface Communication from each ramp meter location will be achieved through Ethernet IP network using cellular communications, similar to existing MDOT SHA communication standards for traffic signals.

21. Describe the procurement options considered for this project and indicate which were selected:

Concrete General, Inc, is contracted with MDOT SHA to deliver all elements of the I-270 Innovative Congestion Management Project. CGI will design, procure and install the Ramp Metering System.

22. Identify applicable ITS standards to be used in support of this project:

- National Transportation Communications for ITS Protocol (NTCIP)
- Traffic Management Data Dictionary (TMDD)

23. Describe your plan for ensuring adequate operations and maintenance of this project after implementation:

MDOT SHA will be responsible for operations and maintenance.

Other Information

24. Please provide any other relevant information:

NA

Project Schedule

25. Estimated start date: Construction 7/2018	26. Estimated completion date: 11/2019

Estimated Capital Budget

27. Total capital budget: $30,000,000.00
28. Percent federal funding & sources**: 0%**
29. Percent state funding & sources: **100%**
30. Percent local funding & sources: **0%**
31. Percent other funding & sources: **0%**
Estimated Annual Operations & Maintenance Budget
32. Total annual O&M budget: $300,000.00
33. Percent federal funding & sources: 0%
34. Percent state funding & sources: 100%
35. Percent local funding & sources: 0%
36. Percent other funding & sources: 0%