

# 2019 UDOT RESEARCH PROBLEM STATEMENT

\*\*\* Problem statement deadline is Feb. 6, 2019. Submit statements to [UTRAC@utah.gov](mailto:UTRAC@utah.gov). \*\*\*

**Title:** Evaluating Ramp Meter Delay in Utah

**No. (Office Use):** 19.03.02

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**Select ONE Subject Area**  Materials/Pavements  Maintenance  Traffic Mgmt/Safety  Structures/Geotech  
 Planning  Perf Mgmt/Data Analytics  Public Transportation  Other

## 1. Describe the problem to be addressed:

Ramp metering has been used since the late 1950s and early 1960s. Ramp metering involves the deployment of a traffic signal on a freeway ramp that is used to control the rate that vehicles enter the freeway facility. Controlling the rate vehicles are allowed to enter the facility allows traffic on the facility to flow in a more consistent manner (*I*). The Utah Department of Transportation (UDOT) is interested in taking an active role in evaluating and monitoring ramp meter delays across the state in an effort to provide better information to the public regarding wait times at metered ramps.

The purpose of this research is to utilize existing ramp sensor design to calculate ramp meter delays and to develop an algorithm to calculate wait times based on sensor occupancy, number of lanes, and ramp meter rate. The eventual goal is to have a tool that UDOT could publish live to a website (not part of this research) to communicate to the public where they can expect long wait times at ramps. In addition, the research would be utilized to develop a set of scores/index values that could be used as performance measures to communicate system performance to leadership, operational staff, and the public. The performance measures may include thresholds for different performance levels (e.g., A, B, C, D, F or red, yellow, green scores). A sample of corridors would then be evaluated to fine tune and field verify the process and to develop final recommendations.

References:

1. Federal Highway Administration (FHWA). Ramp Management and Control Handbook.  
<[https://ops.fhwa.dot.gov/publications/ramp\\_mgmt\\_handbook/manual/manual/5\\_1.htm](https://ops.fhwa.dot.gov/publications/ramp_mgmt_handbook/manual/manual/5_1.htm)> (Accessed Jan. 26, 2019).

## 2. Write the project objective (25 words or less):

Evaluate ramp meter delays using existing sensor design and develop an index that can be used as a performance measure to communicate system performance.

## 3. Explain why this research is important:

**(In response, consider addressing specific UDOT goals, applicability in Utah or other states, etc.)**

UDOT will benefit from this research by gaining a better understanding of the performance of ramp meters across the state. Using the results of the research, ramp meter systems will be “graded” to communicate system performance to leadership, operational staff, and the public. The results can then be published to the web (by UDOT) in helping to provide situational awareness and context of ramp meter delays across the state. UDOT can also use the data to balance freeway performance with ramp meter wait times.

## 4. List the major tasks:

1. Kickoff meeting to develop a project scope of work and detailed cost estimate.
2. Perform a literature review.
3. Analyze available data and evaluate possible performance measures.
4. Select performance measures and develop threshold values.
5. Evaluate sample networks and report results.

- 6. Provide limited recommendations and conclusions.
- 7. Report the results to UDOT in the form of a written report.

**5. List the expected deliverables (reports, manual, specification, design method, training, etc.):**

- 1. Engineering report documenting the literature review and research results.
- 2. Methodology to evaluate ramp meter quality over time.
- 3. Limited recommendations on ramp meter operations and quality of service across the state.

**6. Describe how the research results will be implemented:  
(In response, consider addressing UDOT leader support, process or standard improvement, etc.)**

The results are expected to be implemented on a website by the UDOT Freeway Operations Division to monitor and evaluate ramp performance over time and to develop a high-level dashboard (not a part of this research) for use by UDOT and the public. The results of the research would allow staff to better understand how ramps are operating and how they have improved (or declined) over time.

<b>7. Requested from UDOT: \$65,000 (or UTA for Public Transportation)</b>	<b>Other/Matching Funds: \$</b>	<b>Total Cost: \$65,000</b>
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**8. Outline the proposed schedule, including start and major event dates:**

It is recommended that this project begin in late summer or early Fall 2019 with the initial tasks of the project scope of work and detailed estimate, followed by the remaining tasks as outlined. The results of the research will then be reported to UDOT in the form of a written report. It is anticipated that the project would take 16-18 months.