

2019 UDOT RESEARCH PROBLEM STATEMENT

*** Problem statement deadline is Feb. 6, 2019. Submit statements to UTRAC@utah.gov. ***

Title: Loading and Wetting-Induced Settlement of Bridge Approach Embankments

No. (Office Use): 19.04.06

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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:

Research from other states has shown that wetting-induced settlement/heave caused by deformations within approach embankments for bridges can either exacerbate the bumps at the ends of the bridges or be the primary cause for the bumps. This information, in combination with the fact that embankment materials on UDOT project do not always meet specifications, has prompted the need for this research, which is a continuation of research that has been ongoing relative to the bump at the bridge problem.

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

Determine the loading/wetting stress-strain properties of selected embankment materials under varying density, load, and moisture conditions and propose changes to embankment specifications.

3. Explain why this research is important:

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

The issue of bumps at the end of bridges is of ongoing concern to UDOT and nearly all other states. This research will address one of the least understood aspects of this problem – how do deformations caused by wetting of the embankment contribute to this problem?

4. List the major tasks:

1. Perform an extensive literature review of the subject. (Much of it has already been performed)
2. Obtain and process materials for testing. (Representatives from the Geotech and Structures groups have identified 10 materials to be tested.) Conduct ancillary tests such as soil classification and Proctor tests.
3. Perform one-dimensional loading/wetting tests in the laboratory on compacted specimens with varying relative compaction, water content, total stress at wetting, and method of compaction. Most tests will be conducted in a standard consolidometer. Some tests (e.g. Free Draining Granular Backfill) will be tested in a large-scale consolidometer (20 in. in diameter by 8 in. tall).
4. Based on the results from the literature review and the laboratory testing, along with discussions with appropriate UDOT and University of Utah personnel, draft revisions to the UDOT specifications for embankment materials will be developed.
5. A final report will be prepared.

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

1. Proposed interim specifications for embankment materials
2. Final report detailing the results and conclusions from the research

6. Describe how the research results will be implemented:

(In response, consider addressing UDOT leader support, process or standard improvement, etc.)

Changes to specifications for embankment materials

7. Requested from UDOT: \$50K

Other/Matching Funds: \$40K

Total Cost: \$90K

(or UTA for Public Transportation)

8. Outline the proposed schedule, including start and major event dates:

	Major Task	Q 3 2019			Q 4 2019			Q 1 2020			Q 2 2020		
1	Literature Review	█											
2	Obtain Materials for Laboratory Tests	█											
3	Process Materials for Laboratory Testing	█	█										
4	Classification of All Soils	█	█										
5	Proctor Tests	█	█										
6	1D Lab Loading/Wetting Tests	█	█	█	█	█	█	█	█	█	█	█	
7	Interim Revisions to Embankment Specs										█		
8	Final Report for this Phase of Research										█	█	