

## QUARTERLY PROGRESS REPORT

Fiscal Year 2015/2016 , Quarter 1st

Caltrans Task Manager: John Slonaker      Task ID/Project ID (for Caltrans use only): 2808

Task Order No.: TO 023      Contract No.: 65A0529

1. Task Title: Performance Analysis and Control Design for Onramp Metering of Merging Bottlenecks
2. Describe last quarter's tasks/deliverables:

During the first quarter of 2015-2016, from July to September, 2015, most of the tasks were related to the analysis of an isolated merge bottleneck considering the Link Queue Model integrated with Capacity Drop Model in order to understand and answer the most fundamental questions.

We were able to classify the operating regions of a single merge bottleneck based on its demand, capacity, and dropped-capacity levels. Also, we have established conditions when the meter will be effective. Both of these results are independent of the control strategy.

Also, considering the ALINEA strategy, we found the region of stability (i.e., the values of each parameter that is guaranteed the system will work) for the parameters.

All the analysis were reported in a paper submitted to TRB conference 2016, which title is "System Performance and Controller Design of the PI-ALINEA Ramp Metering Scheme" (de Souza and Jin). It contains all the major results achieved consisting in the main deliverable of the period. In addition, we validate those results using the Cell-Transmission-Model which results we expect to submit the first version in the following months.

3. Describe next quarter's tasks/deliverables and their due dates:

Next quarter we will set up a simulation in the proposed study site, on I-405N SR-133 to Jeffrey using the Cell-Transmission Model. We use PeMS data for setting the demand levels, calibrating the fundamental diagram and obtaining dropped-capacity value.

The specific tasks are (due-date):

1. Set-up the simulation environment for the specific case, considering the geometric data based on satellite figures (October, 20);
2. Review previous research conducted by our group in the same site(I-405N) to the set of parameters for each stretch of the simulation (fundamental diagram, capacity, dropped-capacity level, etc) (November, 5)
3. Implement ALINEA in the three ramps and find for the best set of parameters for each of them (November, 30);

4. Define the scenarios to be considered (for example, “base case fixed control”, “base case ALINEA”, “increased demand fixed control”, “increased demand ALINEA control”, “variable demand fixed time control”, “variable demand ALINEA”). (December, 7)
5. Report results and presentation. (January, 6)

The deliverable of this quarter will be a brief report containing all the simulation details, methodology, results and comments and conclusion. A presentation containing the main points and results will also be done.

4. Describe Project Status:

- Are you on time with your schedule?  
 YES  
 NO
- Are you on budget?  
 YES  
 NO
- Are you on scope?  
 YES  
 NO

If the answer to any of the above is NO, please explain below:

5. Estimated percent of work completed: 50%  
 Estimated percent of budget expended: 50%

6. What are your expenditure projections for the next four quarters or until the project’s end?

| FY 15/16; Q1 | FY 15/16; Q2 | FY 15/16; Q3 | FY 15/16; Q4 |
|--------------|--------------|--------------|--------------|
| \$           | \$           | \$           | \$           |

Use this area for any additional information. Clearly identify which Section this information applies to.

N/A

Submitted By: Wenlong Jin

Date: 10/15/2015