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Quarterly Progress Report

Project Title:	Elimination of Weight Restrictions on Amtrak, NJ Transit, and Conrail Lines
NJDOT PROJECT NUMBER: 2010-11	NJDOT RESEARCH PROJECT MANAGER: Edward S. Kondrath
TASK ORDER NUMBER: 244	PRINCIPAL INVESTIGATOR: Dr. Hani Nassif
Project Starting Date: 1/1/2010 Original Project Ending Date: 6/30/2011 Modified Completion Date: 12/31/2011	Period Starting Date: 7/1/2011 Period Ending Date: 9/30/2011

1. Project Progress Summary

Task No.	Task Description	Percent of Total Project Budget	Cost of Task	% of task this quarter	Cost this quarter	% of task to date	Total Cost to date
1	Literature Search	7%	$28,564	0%	$0	100%	$28,564
2	Bridge Inspection	11%	$43,625	0%	$0	100%	$43,625
3	Load Rating and Finite Element Modeling	22%	$90,637	0%	$0	95%	$85,899
4	Field Tests and Load Rating using the Test Results	28%	$114,222	0%	$0	95%	$108,711
5	Recommendation and Plan for Weight Increase and Bridge Maintenance	16%	$65,325	25%	$16,331	90%	$58,652
6	Implementation and Quarterly Report	17%	$71,000	31%	$22,010	95%	$67,466
Total		**100%**	**$413,373**	**9%**	**$38,341**	**95%**	**$392,917**

2. Project Overview

Project Objectives

The main objective of this study is to evaluate current conditions of various railroad bridges, and load-rate the bridges according to AREMA provisions to allow travels of 286-kip railcars. Additional field tests and detailed finite element analysis will be conducted for more accurate condition evaluation of the bridges. Recommendations for appropriate maintenance of the bridges will be provided to operate the bridges safely and cost-effectively for the remaining life of the bridges. Based on the study of the selected railway bridges, general guidelines for bridge inspection and maintenance will also be provided in this study.

Project Abstract

The overall growth in the economy and population in the United States led to a significant expansion of railroad traffic levels by the late 1990s. The freight railroad system facilitates large volume of freight movement cost-effectively. The railroad system is obviously important because the other alternative transportation methods, such as vehicles and trucks, cause concerns about congestion, air quality, and safety. Moreover, the cost to build and maintain new infrastructure and equipment is extremely high. Many railroad bridges were built before World War II approaching their design lives, and freight railcars, in many cases, use passenger rail systems to reduce maintenance cost.

In New Jersey freight railcars travel over many passenger rail systems. Recent increase of railcar weight limits from 263,000 lb to 286,000 lb raised additional concerns for the passenger rail systems since the bridges in the passenger rail system were not designed based on the increased railcar weight. Impact of the railcar weight on those bridges should be evaluated first to allow the use of passenger lines for the freight travels.

In this study, the impact of the increased railcar weight was investigated on the bridges located in New Jersey. The research approach adopted by the RIME team is aiming at evaluating current load-carrying capacity of various types of bridges and providing recommendations for load rating, repair, and maintenance to allow 286,000-lb railcar traffic on the passenger lines.

More detailed literature review will be conducted to find similar previous research and practices, followed by a review of inspection reports of all bridges. In cases where inspection

reports are not available or there is lack of information, current bridge conditions and actual dimensions of the bridges can be evaluated from field inspections. Based on the field inspections, a number of critical bridges on New Jersey's rail lines will be selected and load-rated based on the current American Railway Engineering and Maintenance-of-Way Association (AREMA) specifications as well as the analytical studies. Enough number of sample bridges will be selected, so that the selected bridges can represent bridges with various structural systems and material types. Finite element modeling will be also adopted for the more accurate assessment of the bridges and to develop a methodology for evaluating and load-rating railroad bridges. Based on the field inspection results, critical bridge(s) will be selected for field tests. The selected bridges will be instrumented and tested under live loads (moving railcars). Finally, recommendations for load rating, maintenance, repair, and rehabilitation of the bridges will be provided for safe operation of the bridges on various New Jersey lines. The recommendations will be applicable for other railroad bridges that support railcars with the increased standard weight.

Briefly, this project will address problems with the existing railroad bridges under the increased railcar loading. From this research, the RIME research team will provide guidelines for the inspection, maintenance, and load rating of the existing railroad bridges as well as the cost-effective analysis of this change in the freight weight limits.

3. Description of Work Completed by Task over This Period

Task 1 — Literature Search

- This task has been finalized.

Task 2 — Review of Bridge Inspection Reports and Coordination of Tasks

- This task has been finalized.

Task 3 — Load rating and Finite Element Modeling

- The finite element model for Bergen County MP 5.48 has been calibrated using the preliminary testing data collected during the sensor installation as well as the testing data from the 286 kips railcar field testing.

- The finite element model for Raritan Valley Line MP 31.15 will be calibrated using the preliminary testing data collected during the sensor installation after obtaining the passenger car configuration from NJ Transit.

Task 4 — Field Tests and Bridge Load Rating using Field Test Results

- The Rutgers team performed the pre-installation field visit for Raritan Valley Line MP 31.15 on Sept. 16th, 2011, the field condition and accessibility was investigated during the field visit.
- On Sept. 22nd, 2011, 16 sensors and 4 reflective tapes have been instrumented on span 2 and 3 of Raritan Valley Line MP 31.15. After the installation, all 16 strain transducers have been connected to the junction boxes and all the sensors have been tested and proved to be successfully instrumented.
- After the installation, the Rutgers team collected the 3 runs of data with the passenger train loading on Sept. 22nd, 2011 and 3 runs of data on Sept. 23rd, 2011. These data will be used to calibrate the FE model after obtaining the passenger train configuration from NJ Transit.
- The Rutgers team collected the 14 runs of strain data and 12 runs of deflection & velocity data with the passenger train loading on Sept. 30th, 2011. These data will be used to calibrate the FE model after obtaining the passenger train configuration from NJ Transit.

Task 5 — Recommendation and Plan for Weight Increase and Bridge Maintenance

- On July 28th and August 15th, the project team met with NJ Transit to present project progress and summary of the to-date findings. Additionally, cost modeling methodology was presented. The project team also received updated origin-destination data from NJ Transit, and discussed refinement of the cost model.
- Origin-destination data for the deliveries of Bay State Milling was acquired for the purpose of the cost model. The data was uploaded into the cost model as destinations of truck traffic from entry points to New Jersey, to be used in the analysis.

Task 6— Implementation and Quarterly Progress Report

- Seventh quarter report has been submitted.

4. Proposed activities for next quarter by task:

Task 1— Literature Search

- This task is finalized.

Task 2— Review of Bridge Inspection Reports and Coordination of Tasks

- This task is finalized.

Task 3— Load Rating and Finite Element Modeling

- The finite element model for Raritan Valley MP 31.15 will be calibrated using the preliminary testing data collected during the sensor installation after obtaining the passenger railcar configuration from NJ Transit.
- The Rutgers team will also calibrate the Finite Element Models for North Jersey Coast Line MP 0.39 after performing the load tests.
- Various maintenance and rehabilitation scenarios will be simulated using the calibrated FE model.

Task 4— Field Tests and Bridge Load Rating using Field Test Results

- The Rutgers team will also instrument and test the North Jersey Coast Line MP 0.39.

Task 5— Recommendation and Plan for Weight Increase and Bridge Maintenance

- Evaluate the bridge condition using the field testing data.
- Simulate various maintenance and rehabilitation scenarios using calibrated FE model.
- Cost modeling for the HX drawbridge and Bay State Milling data which is currently underway will be finalized.

Task 6— Implementation and Quarterly Progress Report

- Final report will be submitted in this quarter.

5. List of deliverables provided in this quarter by task:

- Evaluate the bridge condition using the field testing data.

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6. Progress on Implementation and Training Activities:

7. Problems/Proposed Solutions:

8. Project Summary:

Original Project Budget	$302,571
Modified Project Budget	$413,373
Total Project Expenditure to date	$392,917
% of Total Project Budget Expended	95%

NJDOT Research Project Manager Concurrence: _____ Date: _____