NEW ENGLAND TRANSPORTATION CONSORTIUM
QUARTERLY PROJECT PROGRESS REPORT

A. PROJECT NUMBER AND TITLE:
Project: NETC 18-1
Title: Development of MASH Computer Simulated Steel Bridge Rail and Transition Details
State Project No.: 023430.18

B. PRINCIPAL INVESTIGATOR(s) & UNIVERSITY(s):
Chuck A. Plaxico, Ph.D.
Roadsafe LLC
Canton, ME

C. WEB SITE ADDRESS: www.RoadsafeLLC.com

D. START DATE (*Per NETC Agreement*): 09-October 2018

E. END DATE (*Per NETC Agreement*): 1-June 2020

F. **ANTICIPATED COMPLETION DATE: 28-May 2020**

G. PROJECT OBJECTIVES:

Phase I

The objectives of the project are to: 1) review existing NETC bridge rail and AGT designs and assess performance aspects to determine preliminary MASH compliance/equivalency, 2) review current standard details and specifications for NETC style bridge rails and transitions used by MaineDOT, NHDOT, RIDOT and VTrans to identify differences in material specifications and dimensional details and 3) evaluate the crash performance of the NETC bridge rail and approach guardrail transition (AGT) designs using finite element analysis (FEA) computer simulation. The impact conditions and assessment procedures for the FEA will conform to the specifications in *MASH* for TL-3 or TL-4 (as appropriate) and will included evaluations of structural capacity of the railing, risk of occupant injury, and vehicle stability during impact and redirection. The systems included in the evaluation are listed below along with the target test level for each system:

- Bridge Rail Systems:
  - NETC curb-mounted 2-Bar Rail (TL3)
  - NETC curb-mounted 3-Bar Rail (TL4) (4-bar curb mounted NETC rail would be considered equivalent to this type)
  - NETC sidewalk-mounted 4-Bar Rail (TL4)
- Bridge Rail Transitions:
  - NETC Style 2-Bar Rail to Thrie Beam (TL3) (NHDOT steel rail transition)
  - NETC Style 3-Bar Rail to Thrie Beam (TL4) (NHDOT steel rail transition)
  - Concrete Transition Barrier to Thrie Beam (TL4) (MaineDOT standard detail)

Project Tasks

- Task 1: Literature Review and Preliminary Assessment of Current Designs
- Task 2: FEA Model Development and Validation of Baseline R350 Design(s)

a) Develop model of sidewalk-mounted 4-bar bridge rail based on existing validated model reevaluate validity against Test NETC 3.

b) Develop model of NETC AGT for 2-Bar bridge rail and validate with Test 401181-1 (R350 Test 3-21).

- Task 3: MASH TL-4 Simulations for NETC 3-Bar Bridge Rail
- Task 4: MASH TL-4 Simulations for NHDOT 3-Bar Transition
- Task 5: MASH TL-4 Simulations for NETC 4-Bar Bridge Rail
- Task 6: MASH TL-4 Simulations for MaineDOT 4-Bar Transition
- Task 7: MASH TL-3 Simulations for NETC 2-Bar Bridge Rail
- Task 8: MASH TL-3 Simulations for NETC 2-Bar Transition

Phase II Project Tasks

- Task 3b: Evaluation of the NETC 3-Bar Bridge Railing with Stronger Lower Rail
- Task 4b: Evaluation of 5.5-ft Post Spacing Between Transition and Bridge Rail
- Task 5b: Test 4-12 Evaluation of NETC 4-Bar Bridge Rail with W8x28 Posts

H. REPORT PERIOD:
Quarter 1, 2020 (January 1 - March 31)

I. ACCOMPLISHMENTS THIS PERIOD:

- Draft Final report was submitted on 4-February 2020.
- The revised final report and response to panel comments was submitted on 23-March 2020.
- A revised version of the Final Report was also submitted on 28-April 2020.
- In the previous quarter we were informed that the deliverables for NETC projects included a Poster, Fact Sheet and webinar to be provided by the contractor at the conclusion of the project. Although these deliverables were not included in our contract, we (Roadsafe) have agreed to provide those at no additional cost to the project.
    a) A draft Fact Sheet for the project was submitted on 27-April 2020 for Panel review.
    b) A revised Fact Sheet was submitted on 28-April 2020.
    c) A Poster for the project was submitted on 30-April 2020.

J. PROBLEMS ENCOUNTERED (If any):

K. TECHNOLOGY TRANSFER ACTIVITIES: None.

L. STATUS BY TASK:

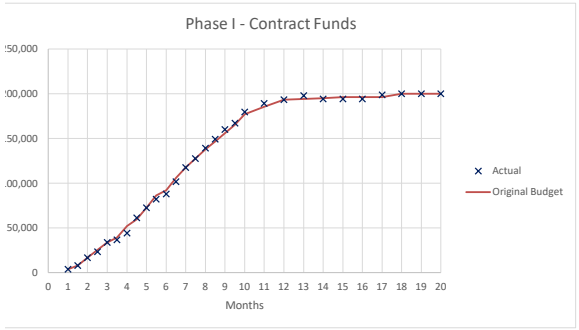
ATTACHMENT A

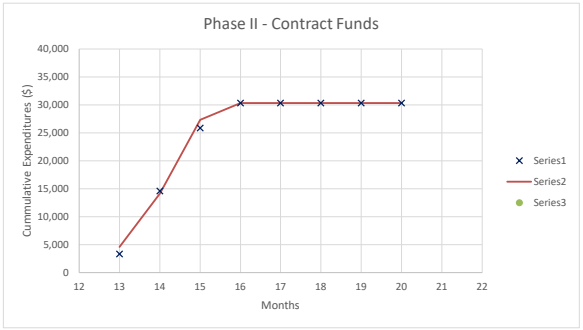
NETC 18-1 Progress Schedule

30-Sep-19

Task NO.	Task Code	Task Description	QTR / Month	Phase I QTR 1 Oct	2	3	QTR 2 Jan	5	6	QTR 3 Apr	8	9	QTR 4 July	11	12	Phase II QTR 5 Oct	14	15	QTR 6 Jan	17	18	QTR 7 Apr	20	21	% Complete
1	Literature Review	Literature Review and Preliminary Assessment of Current Designs		25	50	75 85 100																			100
2(a)	BR Model Validation	Development and Validation of NETC 4-Bar Bridge Rail Model			25	50 80	90	100																	100
2(b)	AGT Model Validaiton	Finite Element Model Development and Validation of 2-Bar AGT				10	12	15	70	100															100
3	3-Bar BR (TL4)	TL4 Simulations of the NETC 3-Bar Bridge Rail Design					10	50	75	100															100
4	3-Bar AGT (TL4)	TL4 Simulations for AGT to 3-Bar Bridge Rail							25	50	75	100													100
5	4-Bar BR (TL4)	TL4 Simulations for the NETC 4-Bar Bridge Rail Design									50	100													100
6	4-Bar AGT (TL4)	TL4 Simulations for AGT to Concrete Abutment										50	80	100											100
7	2-Bar BR (TL3)	TL3 Simulations of the NETC 2-Bar Bridge Rail Design											33	66	100										100
8	2-Bar AGT (TL3)	TL3 Simulations for AGT to 2-bar Bridge Rail												25	60	100									100
9	Interim Meetings	Interim Reports / Meetings				13	25		38		50	63	75	88	100										100
10	QPR	Quarterly Progress Reports					33					67			100		100								100
11	Final Report	Final Report													13	65	90				90	99	100		100
	Direct Expense	Computational Resources and Software (ls-dyna)		0	8	17	25	33	42	50	58	67	75	75	75	80	90	100							100
3B	3-Bar BR (Mod)	Test 4-10 on NETC 3-Bar Bridge Rail with Larger Lower Rail														50	100								100
4B	3-Bar AGT (Mod)	TL4 for 3-Bar Transition with 5.5-ft spacing															50	100							100
5B	4-Bar BR (Mod)	Test 4-12 on NETC 4-Bar Bridge Rail with 8x28 Posts																100							100
9B	Interim Meetings	Interim Reports / Meetings														33	66	100							100
11B	Final Report (Mod)	Update Draft Final Report																	100						100
	Direct Expense	Computational Resources and Software (ls-dyna)														25	75	100							100

Original Schedule
Projected Schedule





Phase I

Funds Expended:		100.00%
Contract Amount:	$	199,936.20
Expended this Period	$	5,682.78
Total Expended to Date:	$	199,936.20
Balance:	$	-

Time Expended:	90%
Start Date:	10/9/2018
Completion Date:	6/1/2020

Phase II

Funds Expended:		100.00%
Contract Amount:	$	30,307.82
Expended this Month	$	4,434.15
Total Expended to Date:	$	30,307.82
Balance:	$	-

M. PERCENT COMPLETION OF TOTAL PROJECT: 100%

N. ACTIVITIES PLANNED FOR NEXT QUARTER:

Develop and present Webinar for the project. The webinar in scheduled for May 28, 2020.

O. FINANCIAL STATUS:

As of March 31, 2020

Total Phase I Project Budget:	$ 199,936.00
Total Phase I Expenditures:	$ 199,936.00
Total Phase II Project Budget:	$ 30,307.82
Total Phase II Expenditures:	$ 30,307.82