Research Project Quarterly Progress Report

Date: 11/1/2024 **Project Number:** TPF-5(430) Suppl. #51

Project Title: Development, Testing, and MASH Evaluation of Single Column Sign Supports – Phase II

Principal Investigator: Joshua S. Steelman, Ph.D., P.E.

Principal Contact Information Email: joshua.steelman@unl.edu **Phone:**

Project Start Date: 4/23/2024 **Project Completion Date:** 6/30/2027

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning & Misc Management	$27,584	5	$22,130	5	$5,454
2. Design and Analysis	$55,320	0	$0	0	$55,320
3. Physical Tests	$630,428	0	$0	0	$630,428
4. Reporting and Deliverables	$36,668	5	$20,000	5	$16,668
5.					
6.					
7.					
8.					
9. TOTAL	$750,000	5	$42,130	5	$707,870

Progress and Accomplishments this Quarter:
(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Task 1 – Initiated background review of ISPE studies and methodologies.

Task 2 – None.

Task 3 – None.

Task 4 – Resumed review and completion of Phase I reports.

Circumstances Affecting Project, Scope, or Budget:
(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

Per discussion with sponsor, tasks need to be revised. Sponsor desires to shift focus with respect to signs to an ISPE study. Also desires to allocate a portion of funding to PCB studies.

Anticipated Work Next Quarter: Tasks below refer to rescoped work plan included in the NCE.

Task 1 – Revised Tasks TBD.

Task 2 – Revised Tasks TBD.

Task 3 – Revised Tasks TBD.

Task 4 – Complete reporting from Phase I.

Total Percentage of Project Completion:

5%

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) SUPPL. #46

Project Title: ILDOT Steel Railing, Type SMX

Principal Investigator: Rosenbaugh, Loken, Faller, Bielenberg

Principal Contact Information Email: srosenbaugh2@unl.edu **Phone:** (402) 472-9324

Project Start Date: 12/2/2022 **Project Completion Date:** 12/31/2026

Report Period:

July 1, 2024 to September 30, 2024

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% Work Completed This Quarter	Expenses This Quarter	Total Expenses to Date	Total % of Task Completed	Remaining Budget
Project Planning, CAD, and Communications	$19,489	75%	$3,940	$18,295	98%	$1,194
Fabrication of Test Article	$111,818	25%	$1,314	$1,314	5%	$110,504
Crash Test MASH 3-11	$73,768	0%	$0	$0	0%	$73,768
Repair of Test Article	$21,830	0%	$0	$0	0%	$21,830
Crash Test MASH 3-10	$58,108	0%	$0	$0	0%	$58,108
Removal, Disposal, and Site Restoration	$15,026	0%	$0	$0	0%	$15,026
Final Reporting and Filing FHWA Eligibility Letter	$19,424	0%	$0	$0	0%	$19,424
Total	$319,463	-	$5,254	$19,609	7%	$299,854

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter including meetings, work plan status, significant progress, etc.)

In Q2 2024, ordering of materials for construction of the IL Steel Bridge Railing, Type SMX was begun. Final, minor details were also clarified with MwRSF's test site construction staff.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

The budget numbers presented herein include labor charges through the end of September 2024.

No challenges have been encountered affecting the timeline of this project, and no significant delays are anticipated at this time.

Anticipated Work Next Quarter:

In Q4 2024, the railing and deck specimen will be constructed. It is likely that MASH crash testing will occur in Q4 2024, including test no. 3-11, local repairs (as needed after test no. 3-11), and test no. 3-10.

Total Percentage of Project Completion:

7%

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. 27 – FY22-IND-1-PCB _ Phase I

Project Title: MASH 2016 TL-3 Design and Evaluation of the Indiana F-Shape PCB in Free-Standing, Asphalt-Anchored Configurations, and Transitions

Principal Investigator: Bob Bielenberg

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 7/1/2022 **Project Completion Date:** 7/31/2025

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☐ **On Schedule**
- ☒ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning, CAD, and Reporting	$15,680.00	0	$0.00	38.3	$9,678.00
2. Full Scale Crash Testing	$99,975.00	0	$0.00	76.8	$23,215.00
3. Design and Analysis	$49,176.00	3.6	$1,768.00	3.6	$47,408.00
4. Full Scale Crash Testing	$105,607.00	0	$0.00	0	$105,607.00
5. Reporting and Project Deliverables	$14,622.00	0	$0.00	0	$14,622.00
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

1. Project Planning, CAD, and Reporting: MwRSF received approval to move forward in 3Q 2024.

2. Full Scale Crash Testing: None

3. Design and Analysis: MwRSF created and validated a simulation model of test no. INPCB-1. This model has proven capable of reproducing the joint failure observed in the full-scale crash test and can now be used to investigate design modfications.

4. Full-Scale Testing: None

3. Reporting and Project Deliverables: None

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

Based on the failure of the full-scale crash test of the free-standing INDOT PCB, INDOT has requested that the project be rescoped to modify the barrier to meet MASH. MwRSF will attempt to rescope the effort to meet these goals in the upcoming quarter. It should be noted that the contract agreement for this research has was just officially completed in mid July 2203, and the rescope effort had to await the completion of the original contract so that a revised contract can be created with the rescope agreement.

The rescoped research effort was submitted in August 2023. MwRSF received approval to move forward in 3Q 2024. The progress tasks and budget numbers have been updated in the QPR to reflect the revised scope.

Anticipated Work Next Quarter:

1. Project Planning, CAD, and Reporting: None

2. Full Scale Crash Testing: None.

3. Design and Analysis: MwRSF will try to simulate design modifications to the barrier joints including changing the hook plate length, grade, and or thickness.

4. Full-Scale Testing

3. Reporting and Project Deliverables: None

Total Percentage of Project Completion:

29.7%

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. 27 – FY22-IND-1-PCB _ Phase II

Project Title: MASH 2016 TL-3 Design and Evaluation of the Indiana F-Shape PCB in Free-Standing, Asphalt Anchored Configurations, and Transitions

Principal Investigator: Bob Bielenberg

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 7/1/2022 **Project Completion Date:** 7/31/2025

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning, CAD, and Reporting	$8,122.00	0	$0.00	0	$8,122.00
2. Full Scale Crash Testing	$126,812.00	0	$0.00	0	$126,812.00
3. Reporting and Project Deliverables	$7,705.00	0	$0.00	0	$7,705.00
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

1. Project Planning, CAD, and Reporting: None
2. Full Scale Crash Testing: None
3. Reporting and Project Deliverables: None

Note that Phase II will not be initiated until the successful evaluation of the barrier system in Phase I.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

Note that failure of the free-standing PCB crash testing in Phase I of the effort has led to a rescoping of the project. As such, funds may be diverted from the Phases II and III research efforts to accommodate the rescope and project timelines and tasks may be adjusted accordingly.

Anticipated Work Next Quarter:

1. Project Planning, CAD, and Reporting: None
2. Full Scale Crash Testing: None
3. Reporting and Project Deliverables: None

Note that Phase II will not be initiated until the successful evaluation of the barrier system in Phase I.

Total Percentage of Project Completion:

0.0%

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. 27 – FY22-IND-1-PCB _ Phase III

Project Title: MASH 2016 TL-3 Design and Evaluation of the Indiana F-Shape PCB in Free-Standing, Asphalt Anchored Configurations, and Transitions

Principal Investigator: Bob Bielenberg

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 7/1/2022 **Project Completion Date:** 7/31/2025

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning, CAD, and Reporting	$17,433.00	0	$0.00	0	$17,433.00
2. Design and Analysis	$37,592.00	0	$0.00	0	$37,592.00
3. Full Scale Crash Testing	$202,961.00	0	$0.00	0	$202,961.00
4. Reporting and Project Deliverables	$13,704.00	0	$0.00	0	$13,704.00
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

1. Project Planning, CAD, and Reporting: None
2. Design and Analysis: None
3. Full Scale Crash Testing: None
4. Reporting and Project Deliverables: None

Note that Phase III will not be initiated until the successful evaluation of the barrier system in Phase I.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

Note that failure of the free-standing PCB crash testing in Phase I of the effort has led to a rescoping of the project. As such, funds may be diverted from the Phases II and III research efforts to accommodate the rescope and project timelines and tasks may be adjusted accordingly.

Anticipated Work Next Quarter:

1. Project Planning, CAD, and Reporting: None
2. Design and Analysis: None
3. Full Scale Crash Testing: None
4. Reporting and Project Deliverables: None

Note that Phase II will not be initiated until the successful evaluation of the barrier system in Phase I.

Total Percentage of Project Completion:

0.0%

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. #2

Project Title: Additional Retrofit Options for Post Conflicts within AGTs

Principal Investigator: Faller, Rosenbaugh, Rasmussen, Bielenberg, Lechtenberg, Reid, Stolle

Principal Contact Information Email: srosenabugh2@unl.edu **Phone:** (402) 472-9324

Project Start Date: 1/21/2020 **Project Completion Date:** 12/31/2022 (12/31/2024)

Report Period:	**Due Date:**
☒ Quarter 1 (July 1 – September 30)	October 31
☐ Quarter 2 (October 1 – December 31)	January 31
☐ Quarter 3 (January 1 – March 31)	April 30
☐ Quarter 4 (April 1 – June 30)	July 31

Project Schedule Status:

- ☐ **On Schedule**
- ☒ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total Expenses to Date	Total % of Task Completed	Remaining Budget
1. Planning & Correspondence	$27,155	0%	$0	$18,596	70%	$8,559
2. Design and Analysis	$106,064	100%	$3,002	$76,540	90%	$29,524
3. Bogie Testing	$99,897	0%	$0	$48,330	60%	$51,567
4. Reporting and Deliverables	$18,313	0%	$0	$0	0%	$18,313
5.						
6.						
7.						
8.						
9. Total	$251,429	-	$3,002	$143,466	75%	$107,963

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Test plans were assembled for 2 additional dynamic bogie tests in order to analyze the foundation requirements for the surface mounted AGT post. The selected surface-mounted W6x15 will be attached to 3' x 2' x 8" deep concrete slabs. Note, this size slab corresponds to the post spacing of an AGT and the approximate lateral width of the system. One slab will be free standing while the other is doweled into the adjacent tarmac. Both posts will be impacted at a 90 degree angle to evaluate foundation movement. These test plans were drawn in CAD and sent to the test site for fabrication.

The research team also began the investigation of the surface-mounted AGT posts when placed adjacent to surface mounted MGS posts. This analysis was to evaluate the potential for either standard MGS with posts installed in soil or surface-mounted MGS system to connect to an AGT with surface-mounted posts.

Component models of the selected AGT posts were developed and calibrated using data from AGTRB-7. The calibrated posts were inserted into a calibrated model of the AGT and evaluated in comparison to existing, calibrated AGT models with posts installed in soil. Additional modeling is underway to investigate standard and surface-mounted MGS systems connected to the surface-mounted AGT. Preliminary simulations suggest that the surface-mounted AGT is comparable to the standard AGT, and likely to be crashworthy according to MASH evaluation criteria.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

The budgets herein include labor charges through August 2024.

The project was behind schedule, and a request for a no-cost extension was submit in late 2022. The NCE was granted and the end date was updated to 12/31/2023. A second no-cost extension request was submit in November 2023 (along with a few other Pooled Fund Year 30 projects). This NCE was accepted in the 1st quarter of 2024 and extended the project to the end of 2024.

Anticipated Work Next Quarter:

The final two component tests will be conducted and analyzed, and the final computer simulations will be completed. Work will also include documentation of the project in the summary report.

Total Percentage of Project Completion:

75%

Research Project Quarterly Progress Report

Date: 10/30/2024 **Project Number:** TPF-5(430) Suppl. #4, RPFP-20-TERM-1

Project Title: Further Evaluation of the End Terminals Adjacent to Curb

Principal Investigator: Robert Bielenberg and Cody Stolle, Faller, et al

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 1/21/2020 **Project Completion Date:** 12/31/2024

Report Period: **Due Date:**

- ☒ Quarter 1 (July 1 – September 30) ---------- October 31
- ☐ Quarter 2 (October 1 – December 31)---------- January 31
- ☐ Quarter 3 (January 1 – March 31) ---------- April 30
- ☐ Quarter 4 (April 1 – June 30)---------- July 31

Project Schedule Status:

- ☐ **On Schedule**
- ☒ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning & Correspondence	$19,248.00	0%	$0.00	65.3%	$6,679.00
2. Full-Scale Crash Testing	$176,505.00	0.0%	$0.00	98.0%	$3,564.00
3. Design & Analysis	$39,381.00	0.0	$0.00	80.8	$7,571.00
4. Reporting & Deliverables	$22,074.00	8.7	$1,910.00	8.7	$20,164.00
5.					
6.					
7.					
8.					
9. Total	$257,208.00	1.5%	$3,863.00	84.5%	$39,888.00

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

In this quarter, MwRSF worked on completion of the summary report. A draft of the report will be sent to the sponsors for review in the 4Q of 2024 and edits will be implemented.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

The COVID-19 pandemic and business responses may play a factor in future efforts. MwRSF has not been shut down and is still working, but much of the personnel has transitioned to working remotely, as has much of the country during this time of social distancing. This major shift in regular work operations may lead to delays and inefficiencies as well as other unforseen hurdles. MwRSF will continue to make progress on this research in the most effective manner possible moving forward.

Currently, the full-scale testing may be delayed due to its status in the MwRSF testing que. COVID-19 has reduced avaiable staff at the outdoor test facility, created increased employee leave, and created material procurement issues. These issues have created a backlog of testing ath the facility. MwRSF is trying our best to resolve the test backlog, but delays are currently expected for most projects. We will continue to update the status of the full-scale testing and its effect on the overall project timeline.

Due to other project constraints and measurement errors in film analysis of the testing, MwRSF will not finish the summary report for the research effort by the current end date. MwRSF has requested and received a NCE until 12/31/24 as funding remains available in the project.

Anticipated Work Next Quarter:

in the next quarter, a draft of the report will be sent to the sponsors for review in the 4Q of 2024 and edits will be implemented. The final report will be completed.

Total Percentage of Project Completion:
85.2%

Research Project Quarterly Progress Report

Date: 10/30/2024 **Project Number:** TPF-5(430)_Suppl5_RPFP-20-SR-1

Project Title: Development of a Short-Radius Guardrail for Intersecting Driveways or Roadways

Principal Investigator: J. Reid, R. Faller, R. Bielenberg, K. Lechtenberg, S. Rosenbaugh

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 1/16/2020 **Project Completion Date:** 12/31/2024

Report Period: **Due Date:**

- ☐ Quarter 1 (July 1 – September 30) ---------- October 31
- ☐ Quarter 2 (October 1 – December 31)---------- January 31
- ☐ Quarter 3 (January 1 – March 31) ---------- April 30
- ☒ Quarter 4 (April 1 – June 30)---------- July 31

Project Schedule Status:

- ☐ **On Schedule**
- ☒ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning and Correspondence	$30,952.00	0.0%	$0.00	38.3%	$19,096.00
2. Design and Analysis	$177,021.00	2.8	$4,990.00	86.7	$23,491.00
3. Reporting and Project Deliverables	$43,059.00	0.0%	$0.00	0.0%	$43,059.00
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

In this quarter, MwRSF continued the efforts from the previous quartuer to simulate a short-radius system that dissipates energy through inertial resistance. The simulation effort focused on simulation of additonal impact conditions/locations on the system and determining potential feasiblity issues with the design concept. Simulations with strategically located posts were implemented to address issues with the design. Results of the simulations are currently being review. The research team is also weighing potential alternative paths for the concept.

Effort was also focused on reporting of the results to date.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

The COVID-19 pandemic and business responses may play a factor in future efforts. MwRSF has not been shut down and is still working, but much of the personnel has transitioned to working remotely, as has much of the country during this time of social distancing. This major shift in regular work operations may lead to delays and inefficiencies as well as other unforseen hurdles. Additionally, changes to businesses outside of MwRSF may lead to possible delays in material acquisition. MwRSF will continue to make progress on this research in the most effective manner possible moving forward.

Due to other project constraints, MwRSF will not finish the research effort by the current end date. MwRSF has requested and received approval for a NCE until 12/31/24 as funding remains available in the project.

This project currently is scheduled to end 12/31/24. Funding remains to complete additional research efforts and reporting needs to be completed. As such, the research team will request and NCE during 4Q 2024.

Anticipated Work Next Quarter:

MwRSF will make additional progress on simulation of the inertial post short-radius concept. MwRSF will also setup a meeting to review the results to date with sponsors and determine the best path moving forward for the concept as well as other potential options for treatment of intersecting roadways.

Total Percentage of Project Completion:
65.9

Pooled Fund
Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. #15, RPFP-21-CABLE-1

Project Title: Redesign of the High-Tension Cable Phase II

Principal Investigator: Faller, Asadollahipajouh, Bielenberg, Holloway, Lechtenberg, Rosenbaugh, Stolle

Principal Contact Information Email: kpolivka2@unl.edu **Phone:** (402) 472-9070

Project Start Date: 7/1/2021 **Project Completion Date:** 12/31/2024

Identify Quarter:	Identify Period of Performance:	Identify Quarterly Report Submittal Deadline:
Quarter 1	7/1/24 - 9/30/24	10/31/24

Project Schedule Status:

- ☐ **On Schedule**
- ☒ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Plan/Corresp, CAD, Material Certs	$16,861.00	0%	$0.00	90%	$1,131.00
2. Full-Scale Crash Testing	$217,148.00	2%	$0.00	90%	$2,265.00
3. Reporting & Project Deliverables	$19,887.00	0%	$5,570.00	30%	$14,317.00
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Continued internal review and editing.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

.None

Anticipated Work Next Quarter:

Complete internal review of draft report. Submit to sponsors for review. Publish and disseminate final report to sponsors.

Total Percentage of Project Completion:

85%

Pooled Fund
Research Project Quarterly Progress Report

Date: 10/30/2024 **Project Number:** TPF-5(430) Supp#16 - RPFP-21-CONC-2

Project Title: Anchoring of Temporary Barrier to Asphalt - Phase II

Principal Investigator: Faller, Bielenberg, et al.

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 7/1/2021 **Project Completion Date:** 12/31/2024

Identify Quarter:	Identify Period of Performance:	Identify Quarterly Report Submittal Deadline:
Quarter 1	7/1/24 - 9/30/24	10/31/24

Project Schedule Status:

- ☒ **On Schedule**
- ☒ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning and Correspondence	$13,939.00	11.5	$1,539.00	45.6	$7,285.00
2. Design and Analysis	$59,224.00	0	$0.00	100	$0.00
3. Full-Scale Crash / Bogie Testing	$122,413.00	0	$0.00	99.7	$406.00
4. Reporting and Project Deliverables	$29,295.00	9.0	2631	9.0	$26,664.00
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

In this quarter, MwRSF worked toward the completion of the summary report detailing the design, simulation, and full-scale crash testing.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None

The COVID-19 pandemic and business responses may play a factor in future efforts. MwRSF has not been shut down and is still working, but much of the personnel has transitioned to working remotely, as has much of the country during this time of social distancing. This major shift in regular work operations may lead to delays and inefficiencies as well as other unforeseen hurdles. Additionally, changes to businesses outside of MwRSF may lead to possible delays in material acquisition. MwRSF will continue to make progress on this research in the most effective manner possible moving forward.

Anticipated Work Next Quarter:

In the next quarter, MwRSF will continue work towards completion of the summary report.

Total Percentage of Project Completion:

84.7%

Pooled Fund
Research Project Quarterly Progress Report

Date: 10/30/2024 **Project Number:** TPF-5(430) Suppl#17 - RPFP-21-CONC-3

Project Title: MASH TL-3 Portable Barrier System

Principal Investigator: Faller, Bielenberg, et al.

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 7/1/2021 **Project Completion Date:** 12/31/2024

Identify Quarter:	Identify Period of Performance:	Identify Quarterly Report Submittal Deadline:
Quarter 1	7/1/24 - 10/31/24	10/31/2024

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning and Correspondence	$33,717.00	0	$0.00	18.9	$27,337.00
2. Design and Analysis	$81,642.00	12.4	$10,115.00	62.9	$30,311.00
3. Reporting and Project Deliverables	$32,937.00	0	$0.00	0	$32,937.00
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

In this quarter, MwRSF completed development simulation models of the final prototype of the barrier design. Simulations of were conducted on an 8 ft long segment length with revised reinforcement. The simulations showed that the prototype design worked very well. As such, design details were developed in CAD. MwRSF is working to establish meetings with fabricators to build prototypes for testing and discuss any design changes needed for fabrication.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None

The COVID-19 pandemic and business responses may play a factor in future efforts. MwRSF has not been shut down and is still working, but much of the personnel has transitioned to working remotely, as has much of the country during this time of social distancing. This major shift in regular work operations may lead to delays and inefficiencies as well as other unforeseen hurdles. Additionally, changes to businesses outside of MwRSF may lead to possible delays in material acquisition. MwRSF will continue to make progress on this research in the most effective manner possible moving forward.

Based on the need to finalize the design with fabricators and make necessary design modifications as well as complete the final summary report, MwRSF will request a NCE to extend this effort to 12/31/25. This will not affect moving forward with crash testing in a subsequent phase.

Anticipated Work Next Quarter:

In the next quarter, MwRSF will attempt to setup a meeting with manufacturers for feedback on the design and fabrication of prototypes.

Total Percentage of Project Completion:

38.9

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. #18, RPFP-21-AGT-1

Project Title: Approach Guardrail Transition Behind Elevated Sidewalk

Principal Investigator: Faller, Pajouh, Bielenberg, Lechtenberg, Rosenbaugh, Steelman, and Stolle

Principal Contact Information Email: srosenabugh2@unl.edu **Phone:** (402) 472-9324

Project Start Date: 7/1/2021 **Project Completion Date:** 12/31/2024

Report Period: **Due Date:**

- ☒ Quarter 1 (July 1 – September 30) — October 31
- ☐ Quarter 2 (October 1 – December 31) — January 31
- ☐ Quarter 3 (January 1 – March 31) — April 30
- ☐ Quarter 4 (April 1 – June 30) — July 31

Project Schedule Status:

- ☐ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☒ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total Expenses to Date	Total % of Task Completed	Remaining Budget
1. Planning and CAD	$27,125	100%	$1,884	$14,164	55%	$12,961
2. Design and Analysis	$87,468	0%	$0	$55,521	70%	$31,947
3. Reporting and Project Deliverables	$31,548	0%	$0	$0	0%	$31,548
4.						
5.						
6.						
7.						
8. Total	$146,141	-	$1,884	$69,685	51%	$76,456

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Work this quarter was focused incorporating curbs and elevated sidewalks into the validated AGT models in preparation for conducting MASH 3-11 impacts into the AGTs behind elevated sidewalks. This involved shifting the depth of the ground from the soil back fill to the toe of the curb (or roadway surface).

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Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

The budget numbers presented herein include labor charges through May 2024.

This project was proposed and budgeted with the understanding that the vehicle and tire models had to be updated as part of a different project prior to conducting simulated crash tests as part of this project. As such, the project was put on hold until Spring of 2023.

In the summer of 2024, the post-doc working on this project left for other employment opportunities. As such, MwRSF has been searching for another individual to conduct the LS-DYNA analysis.

Due to the above delays, the project is behind schedule. Plenty of funds remain to complete the work, there have just been time delays. Thus, an NCE will be filled prior to the end of 2024.

Anticipated Work Next Quarter:

MASH 3-11 impacts into the AGTs behind curb will be simulated.

Total Percentage of Project Completion:

51%

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. #19, RPFP-21-AGT-3

Project Title: Guidelines for Flaring AGTs, Phase III

Principal Investigator: Faller, Pajouh, Bielenberg, Lechtenberg, Rosenbaugh, Steelman, and Stolle

Principal Contact Information Email: srosenabugh2@unl.edu **Phone:** (402) 472-9324

Project Start Date: 7/1/2021 **Project Completion Date:** 12/31/2024

Report Period: **Due Date:**

- ☒ Quarter 1 (July 1 – September 30) — October 31
- ☐ Quarter 2 (October 1 – December 31) — January 31
- ☐ Quarter 3 (January 1 – March 31) — April 30
- ☐ Quarter 4 (April 1 – June 30) — July 31

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total Expenses to Date	Total % of Task Completed	Remaining Budget
1. Planning and CAD	$4,705	0%	$0	$4,705	100%	$0
2. Full-Scale Crash Testing	$109,854	0%	$0	$109,854	100%	$0
3. Reporting and Project Deliverables	$6,748	0%	$0	$6,748	100%	$0
4.						
5.						
6.						
7.						
8. Total	$121,307	-	$0	$121,307	100%	$0

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

All of the labor associated with the full-scale crash testing of the flared AGTs was charged to this project, Phase III. Thus, all funds have been exhausted from Phase III of this project and Phase III has been closed. All work remaining on the project (project reports and final analysis) will be charged to Phase IV project, project number TPF-5(430) Suppl. #38. Please see the QPR for Phase IV of the project for further updates.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

See above

Anticipated Work Next Quarter:

NA

Total Percentage of Project Completion:

100%

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. #20, RPFP-21-SIGN-1

Project Title: Breakaway Systems for Ground Mounted, Large Steel Sign Support Structures

Principal Investigator: Joshua S. Steelman, Ph.D., P.E.

Principal Contact Information Email: joshua.steelman@unl.edu **Phone:** (402) 472-1972

Project Start Date: 7/1/2021 **Project Completion Date:** 12/31/2024

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Plan/Corresp, Lit search, survey	$21,681.00	0	$0	100	$0.00
2. Sign Configuration Analysis & Selection	$28,702.00	5	$3,000	75	$336
3. Research Report & Deliverables	$27,357.00	5	$2,251	50	$2,508
4.					
5.					
6.					
7.					
8.					
9. TOTAL	$77,740.00	3	$4,534	70	$2,844

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Task 1 – None.

Task 2 – Analyzed sign configurations selected for consistency with state survey and identified as likely critical using updated NCHRP 318 procedure.

Task 3 – Continued documentation of findings from Task 1 and methodology for Task 2.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None.

Anticipated Work Next Quarter:

Task 1 – None anticipated.

Task 2 – Complete analysis of signs identified in Task 1 to identify critical configurations.

Task 3 – Complete final report.

Total Percentage of Project Completion:

70%

Research Project Quarterly Progress Report

Date: 11/03/2024 **Project Number:** TPF-5(430) Suppl. #21, RPFP-21-POLE-1

Project Title: Breakaway Pole Research

Principal Investigator: Faller, R.K., Bielenberg, R.W., Pajouh M.A., Fang C., and Stolle Cody

Principal Contact Information Email: mojdeh.pajouh@unl.edu **Phone:** 402-472-0920

Project Start Date: 07/01/2021 **Project Completion Date:** 12/31/2024

Report Period:	**Due Date:**
☒ Quarter 1 (July 1 – September 30)	October 31
☐ Quarter 2 (October 1 – December 31)	January 31
☐ Quarter 3 (January 1 – March 31)	April 30
☐ Quarter 4 (April 1 – June 30)	July 31

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total Expenses to Date	Total % of Task Completed	Remaining Budget
1. Project Planning & Management & CAD	$66,665	0%	$0	$66,665	100.00%	$0
2. Design and Analysis	$162,291	1.25%	$2,032	$110,649	68.18%	$51,642.00
3. Reporting and Project Deliverables	$40,509	0%	$0	$11,000	27.15%	$29,509.00
4.						
5.						
6. Total	$269,455	0.75%	$2,032	$188,314	69.89%	$81,151

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Over the past quarter, the report has been undergoing internal review.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None

The project costs presented herein include labor charges until the end of September 2024.

Anticipated Work Next Quarter:

In the upcoming quarter, the report will be finalized.

Total Percentage of Project Completion:

70%

Pooled Fund
Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. #15, RPFP-21-MPFW

Project Title: Midwest Pooled Fund Website

Principal Investigator: Faller, Asadollahipajouh, Bielenberg, Holloway, Lechtenberg, Rosenbaugh, Stolle

Principal Contact Information Email: kpolivka2@unl.edu **Phone:** (402) 472-9070

Project Start Date: 7/1/2021 **Project Completion Date:** 12/31/2024

Identify Quarter:	Identify Period of Performance:	Identify Quarterly Report Submittal Deadline:
Quarter 4	7/1/24 - 9/30/24	10/31/24

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Website Develop, Populate, and Host	$18,573.00	10%	$1,854.00	80%	$3,475.00
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Continue maintenance, repair, and upkeep of the website. Update research hub with new completed projects.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

This is continuation funding until the funds from Project No.: RPFP-20-PFCHS – TPF-5(430) Supplement #7, Project Title: Pooled Fund Center for Highway Safety have been exhaused.

The COVID-19 pandemic and business responses may play a factor in future efforts. MwRSF has not been shut down and is still working, but much of the personnel has transitioned to working remotely, as has much of the country during this time of social distancing. This major shift in regular work operations may lead to delays and inefficiencies as well as other unforseen hurdles. MwRSF will continue to make progress on this research in the most effective manner possible moving forward.

Anticipated Work Next Quarter:

Troubleshooting and fixing any issues that have occurred during the transition. Continue maintenance, repair, and upkeep of the website. Update research hub with new completed projects.

For the Hardware Clearinghouse project, upload pool fund MASH crashworthy systems to the new site.

Total Percentage of Project Completion:

80%

Pooled Fund
Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. 28, RPFP-FY20220-MGS-4

Project Title: Evaluation of Increased Blockout Depth with the Midwest Guardrail System

Principal Investigator: Faller, Asadollahipajouh, Bielenberg, Holloway, Lechtenberg, Perry, Rosenbaugh, Stolle

Principal Contact Information Email: kpolivka2@unl.edu **Phone:** (402) 472-9070

Project Start Date: 7/1/2022 **Project Completion Date:** 7/31/2026

Identify Quarter:	Identify Period of Performance:	Identify Quarterly Report Submittal Deadline:
Quarter 1	7/1/24 - 9/30/24	10/31/24

Project Schedule Status:

- ☐ **On Schedule**
- ☒ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning, Correspondence, CAD, Material Certs	$25,679.00	30%	$8,000.00	35%	$16,602.00
2. Design & Analysis	$18,893.00	1%	$133.00	100%	$0.00
3. Full-Scale Crash Testing	$203,413.00	15%	$29,913.00	20%	$164,083.00
4. Reporting	$14,866.00	0%	$0.00	0%	$14,866.00
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Completed system construction.

On August 29, MwRSF conducted the test on the MGS with 24" deep blockouts according to MASH 2016 test designation 3-11. We impacted the system 141" upstream from the centerline of the splice between post nos. 16 and 17 at a speed of 62.6 mph and an angle of 25.1 degrees. The vehicle encountered only minimal roll and pitch and remained upright as the system safely redirected the vehicle. All occupant risk values were found to be within the limits. Minimal occupant compartment deformation was found. Therefore, test no. MGSDB-1 was determined to be acceptable according to the MASH 2016 safety performance criteria for test designation no. 3-11.

Test data analysis was completed. System was repaired and prepared for the second test.

On September 26, MwRSF conducted the test on the MGS with 24" deep blockouts according to MASH 2016 test designation 3-10. We impacted the system 96" upstream from the centerline of the splice between post nos. 16 and 17 at a speed of 63.2 mph and an angle of 24.9 degrees. The vehicle encountered only minimal roll and pitch and remained upright as the system safely redirected the vehicle. All occupant risk values were found to be within the limits. Minimal occupant compartment deformation was found. Therefore, test no. MGSDB-2 was determined to be acceptable according to the MASH 2016 safety performance criteria for test designation no. 3-10.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

Signed contracts for the project were not received until July 2023. Thus, the project close date was shifted back 1 year to account for this delay and allow 3 years for the project to be completed.

Anticipated Work Next Quarter:

Complete data and video analysis on both tests. Remove the system.

Initiate compiling research report.

Total Percentage of Project Completion:
30%

Research Project Quarterly Progress Report

Date: 11/1/2024 **Project Number:** TPF-5(430) Suppl. #29

Project Title: Surface Mounted Strong-Post MGS

Principal Investigator: Faller, Pajouh, Bielenberg, Lechtenberg, Stolle, Rosenbaugh, Perry, and Steelman

Principal Contact Information Email: srosenabugh2@unl.edu **Phone:** (402) 472-9324

Project Start Date: 7/1/2022 **Project Completion Date:** 7/31/2026

Report Period:	**Due Date:**
☒ Quarter 1 (July 1 – September 30)	October 31
☐ Quarter 2 (October 1 – December 31)	January 31
☐ Quarter 3 (January 1 – March 31)	April 30
☐ Quarter 4 (April 1 – June 30)	July 31

Project Schedule Status:

- ☐ **On Schedule**
- ☒ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total Expenses to Date	Total % of Task Completed	Remaining Budget
1. Planning & Correspondence	$44,669	20%	$5,000	$19,956	55%	$24,713
2. Design and Analysis	$69,511	80%	$30,846	$42,278	60%	$27,233
3. Bogie Testing	$75,357	0%	$0	$0	0%	$75,357
4. Reporting and Deliverables	$28,303	0%	$0	$0	0%	$28,303
5.						
6.						
7.						
8.						
9. Total	$217,840	-	$35,846	$62,234	29%	$156,606

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status,

Recall that during the April meeting of the Midwest Pooled Fund Sponsors, two design concepts were discussed and selected for further evaluation: (1) a post with weakening slots in the compression flange that causes premature buckling of the post and absorbs energy through plastic deformation of the post and (2) a symmetric post with a thinner base plate that will absorb energy through plate deformations. Note the 2nd option may work for median applications as it is symmetric.

Both options were evaluated using LS-DYNA model simulations. Priority was assigned to the roadside (i.e., single-direction) post, although preliminary simulations with the symmetrical post were also promising. Results of test AGTRB-7 and AGTRB-8 were used to calibrate a steel post and baseplate material model using LS-DYNA, and the calibrated model was then tuned to predict loads and energy absorption for concepts of surface-mounted post designs.

Six of the roadside configurations were detailed for component testing. A test plan was completed for these posts in which they will be subjected to dynamic bogie impacts at a height of 25 in. The test plan was sent to the test site and the posts are currently being assembled. Note, not all 6 post details will be impacted, as subsequent tests will be determined bases on prior test results.

Using a calibrated standard MGS model, simulations were conducted investigating CIP locations for the connection between standard MGS in soil and the surface-mounted MGS with the breakaway post design, as well as impacts within the breakaway post region. All simulation results were consistent with standard MGS with posts installed in soil. No simulations exhibited tendencies for vaulting, instability, pocketing, or wheel snag. Some additional simulations are currently in progress to investigate a surface mounted MGS approaching the surface-mounted approach guardrail transition.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

The budgets herein include labor charges through August 2024.

Signed contracts for the project were not received until August of 2023. Thus, the project close date was shifted back 1 year to account for this delay and allow 3 years for the project to be completed.

Anticipated Work Next Quarter:

Work will continue on the modeling and simulation efforts to optimize the post configurations for the noted design concepts. Component testing will be scheduled and may be conducted during fall and winter months, if weather conditions remain favorable.

Total Percentage of Project Completion:

29%

Research Project Quarterly Progress Report

Date: 11/1/2024 **Project Number:** TPF-5(430) Suppl. #30

Project Title: Median Approach Guardrail Transition to Concrete Median Barrier

Principal Investigator: Faller, Pajouh, Bielenberg, Lechtenberg, Stolle, Rosenbaugh, Perry, and Steelman

Principal Contact Information Email: srosenabugh2@unl.edu **Phone:** (402) 472-9324

Project Start Date: 7/1/2022 **Project Completion Date:** 7/31/2026

Report Period:	**Due Date:**
☒ Quarter 1 (July 1 – September 30)	October 31
☐ Quarter 2 (October 1 – December 31)	January 31
☐ Quarter 3 (January 1 – March 31)	April 30
☐ Quarter 4 (April 1 – June 30)	July 31

Project Schedule Status:

- ☐ **On Schedule**
- ☒ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

	Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total Expenses to Date	Total % of Task Completed	Remaining Budget
1.	Planning & Correspondence	$42,550	100%	$207	$1,971	5%	$40,579
2.	Design and Analysis	$42,083	0%	$0	$0	0%	$42,083
3.	Full-Scale Crash Testing	$134,051	0%	$0	$0	0%	$134,051
4.	Reporting and Deliverables	$15,204	0%	$0	$0	0%	$15,204
5.							
6.							
7.							
8.							
9.	Total	$233,888	-	$207	$1,971	1%	$231,917

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Work on this project has not yet begun. Midwest Pooled Fund efforts have been focused on other Pooled-Fund projects with higher priority (e.g., older Pooled Fund projects that are closing at the end of 2024).

Charges this quarter were administrative and project communication related.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

The budgets herein include labor charges through August 2024.

Signed contracts for the project were not received until August of 2023. Thus, the project close date was shifted back 1 year to account for this delay and allow 3 years for the project to be completed.

Anticipated Work Next Quarter:

The project will begin with a literature review of guardrail transitions (both roadside and median configurations), median W-beam guardrail, and concrete median barriers. The review will focus on MASH crash tested systems, but AGTs evaluated to NCHRP Report No. 350 standards may be included if more data is deemed necessary. Data collected from this literature review will be utilized to identify critical components and possible failure mechanisms for the median transition.

Total Percentage of Project Completion:

1%

Research Project Quarterly Progress Report

Date: 10/30/2024 **Project Number:** TPF-5(430) Suppl. #31 - RPFP-FY2022-WZ-2

Project Title: MASH TL-3 Portable Barrier System – Phase II

Principal Investigator: Bob Bielenberg

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 7/1/2022 **Project Completion Date:** 7/31/2025

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning and Correspondence	$25,089.00	0	$0.00	1.6	$24,687.00
2. Full-Scale Crash Testing	$291,118.00	0	$0.00	0	$291,118.00
3. Reporting and Project Deliverables	$15,412.00	0	$0.00	0	$15,412.00
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

1. Project Planning and Correspondence: None
2. Full-Scale Crash Testing: None
3. Reporting and Project Deliverables : None

Note that the current Phase I Design effort is underway (TPF-5(430) Suppl#17 - RPFP-21-CONC-3). The full-scale crash testing in this effort will begin once Phase I is completed.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None

Anticipated Work Next Quarter:

None

Total Percentage of Project Completion:

0.1

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430)_Suppl. #32, RPFP-FY2022-WZ-3

Project Title: Anchoring Temporary Barriers to Asphalt in Median Installations

Principal Investigator: B. Perry

Principal Contact Information Email: brandon.perry@unl.edu **Phone:** (402) 472-906

Project Start Date: 7/1/2022 **Project Completion Date:** 7/31/2026

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning and Correspondence	$38,845.00	6.3	$2,448.60	40.82	$22,989.63
2. Design and Analysis	$85,108.00	10.82	$9,211.40	77.0	$19,575.71
3. Reporting and Project Deliverables	$31,279.00	0	$0.00	0	$31,279.00
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

1. Project Planning, CAD, and Reporting: Internal meetings to discuss LS-DYNA results

2. Design and Analysis: LS-DYNA simulation development was completed. All alternate anchor pin configurations with different impact points including saddle caps were simulated.

3. Reporting and Project Deliverables: None

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None.

Anticipated Work Next Quarter:

MwRSF will work toward completing simulations of alternate anchor pin configuations and impact points without saddle caps.

Total Percentage of Project Completion:

52.43

Research Project Quarterly Progress Report

Date: 10/30/2024 **Project Number:** TPF-5(430) Suppl. #33 - RPFP-FY2022-CONSULT

Project Title: Annual Consulting Services Support

Principal Investigator: Bob Bielenberg

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 7/1/2022 **Project Completion Date:** 7/31/2025

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Annual Consulting Services Support	$65,000.00	44.2	$17,694.51	79.0	$13,628.49
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

This project allows MwRSF to be a valuable resource for answering questions with regard to roadside safety issues. MwRSF researchers and engineers are able to respond to issues and questions posed by the sponsors during the year. Major issues discussed with the States have been documented in our Quarterly Progress Reports and all questions and support are accessible on a MwRSF Pooled Fund Consulting web site.

In the past quarter MwRSF has responded to a series of state inquiries. The Quarterly Progress Report summarizing these responses has been attached to this document. The summary will also be available for download at the recently completed MwRSF Pooled Fund Consulting web site - http://mwrsf-qa.unl.edu/

We are continuing to work with and improve the MwRSF Pooled Fund Consulting web site as our experience with it grows. We would ask that all Pooled Fund member states use the new site from this point forward for their inquiries and to contact us with any issues they experience with the web site.

The summary of the consulting effort for this quarter is attached with the progress update.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None

Anticipated Work Next Quarter:

MwRSF will continue to answer questions and provide support to the sponsors during the upcoming quarter.

We would ask that all questions be submitted through the web site so that they can be answered and archived therein.

http://mwrsf-qa.unl.edu/

Total Percentage of Project Completion:
79.0

Pooled Fund
Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. #34, RPFP-YR2022-MPFW

Project Title: Midwest Pooled Fund Website

Principal Investigator: Faller, Asadollahipajouh, Bielenberg, Holloway, Lechtenberg, Perry, Rosenbaugh, Stolle

Principal Contact Information Email: kpolivka2@unl.edu **Phone:** (402) 472-9070

Project Start Date: 7/1/2022 **Project Completion Date:** 7/31/2026

Identify Quarter:	Identify Period of Performance:	Identify Quarterly Report Submittal Deadline:
Quarter 4	7/1/24 - 9/30/24	10/31/24

Project Schedule Status:

- ☐ **On Schedule**
- ☒ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Website Develop, Populate, and Host	$12,111.00	0%	$25.00	0%	$10,743.00
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Project progress is listed in Project No. RPFP-21-MPFW-TPF-5(430) Supplment #23

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

This is continuation funding until the funds from Project No.: RPFP-21-MPFW – TPF-5(430) Supplement #23, Project Title: Midwest Pooled Fund Website have been exhausted.

Signed contracts for the project were not received until July 2023. Thus, the project close date was shifted back 1 year to account for this delay and allow 3 years for the project to be completed.

Anticipated Work Next Quarter:

None

Potentially will be initiated if the funds in Project No.: RPFP-21-MPFW-TPF-5(430) Supplement #23 have been exhausted in the quarter.

Total Percentage of Project Completion:

0%

Research Project Quarterly Progress Report

Date: 10/30/2024 **Project Number:** TPF-5(430) Suppl. #34 - RPFP-FY2022-LS-DYNA

Project Title: LS-DYNA Modeling Enhancement Support

Principal Investigator: Bob Bielenberg

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 7/1/2022 **Project Completion Date:** 7/31/2025

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. LS-DYNA Modeling Enhancement	$40,000.00	30.4	$12,156.00	78.5	$8,618.00
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

In this quarter, MwRSF researchers used the LS-DYNA funding to continue the implementation of advanced guardrail steel fracture models into existing models of the MGS. The baseline model of the steel fracture was further improved through the development of mesh dependcy algorithms in LS-DYNA that allow the steel fracture model to be used on models with varying mesh sizes. This allows much broader use of the steel material model to predict fracture.

Additionally, drafts of two research papers are in development to document the steel fracture material model effort.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None

Anticipated Work Next Quarter:

MwRSF will continue to use the LS-DYNA funds to support modeling needs in ongoing Midwest Pooled Fund Projects. This may include the following.

1. MwRSF has recently done an extensive amount of research in advance soil modeling techniques for use in modeling dynamic post in soil interactions. These models have been primarily developed on a component level. Research is needed to more fully developed these advanced soil modeling techniques and incorporate them into existing roadside hardware models to improve our model fidelity and allow improved investigation of soil parameters effects on roadside hardware such as post embedment, slopes, and other factors.
2. MwRSF has recently developed advanced steel fracture parameters for the GISSMO material failure command in LS-DYNA. This allows users to relate the stress state of the material to the failure strain in order to aid in predicting failure under multiple types of loading conditions. To date, the research in this area has focused mainly on the simulation of coupon samples used to develop the failure parameters. Research is needed to incorporate this steel failure methodology into existing guardrail and roadside hardware models.
3. MwRSF sees a need for advancement in concrete modeling methods. Currently several concrete material models exists and previous research at MwRSF has investigated the material models themselves. However, further research is needed to investigate the incorporation of reinforcing steel and in the concrete material and ensuring effective load transfer through the reinforcing steel. Additional investigation of bonding and development of the reinforcement is needed as well.
4. Vehicle model improvements are a constant need for Midwest Pooled Fund research efforts. Currently needed vehicle model improvements include more refined tire models, enhanced suspension models with suspension failure, and upgrades to existing TL-4 single unit truck and TL-5 tractor-trailer models. Additionally, George Mason University (GMU) plans to release a new 1100C vehicle model based on the Hyundai Accent. Conversion and troubleshooting of this new 1100C vehicle model will require a considerable effort. However, it

is believed that the new vehicle model could provide much improved 1100C simulation results as the current 1100C vehicle is a 2010 Toyota Yaris that has been discontinued and is not used in MASH crash testing.

5. MwRSF sees the need for development of an improved model of the MGS. The current model is based on older modeling techniques and was validated with older vehicle models that are being phased out. It is believed that its use for studying more complex impact events and system modifications could be significantly improved if the model were updated with the new soil and steel fracture models discussed previously.

Next quarter, the team work to publish the papers on steel fracture modeling and try to implement the material model with existing models of the MGS and other barrier systems.

Total Percentage of Project Completion:

78.5

Pooled Fund
Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. #37, RPFP-FY2023-MGS-1

Project Title: Modification & evaluation of the MGS Long Span with Increase Span Length

Principal Investigator: Faller, Asadollahipajouh, Bielenberg, Holloway, Lechtenberg, Perry, Rosenbaugh, Steelman, Stolle

Principal Contact Information Email: kpolivka2@unl.edu **Phone:** (402) 472-9070

Project Start Date: 12/1/2022 **Project Completion Date:** 12/31/2026

Identify Quarter:	Identify Period of Performance:	Identify Quarterly Report Submittal Deadline:
Quarter 1	7/1/243 - 9/30/243	10/31/24

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Plan/Corresp, CAD, Material Certs	$28,003.00	0%	$165.00	0%	$27,283.00
2. Full-Scale Crash Testing	$331,604.00	0%	$0.00	0%	$331,604.00
3. Reporting & Project Deliverables	$18,263.00	0%	$0.00	0%	$18,263.00
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

None

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

Signed contracts for the project were not received until July 2023.

Anticipated Work Next Quarter:

Review proposed modifications from previously completed study. Create survey of options for member states.

Total Percentage of Project Completion:

0%

Research Project Quarterly Progress Report

Date: 11/1/2024 **Project Number:** TPF-5(430) Suppl. #38

Project Title: Guidelines for Flaring AGTs, Phase IV

Principal Investigator: Faller, Pajouh, Bielenberg, Lechtenberg, Rosenbaugh, Steelman, and Stolle

Principal Contact Information Email: srosenabugh2@unl.edu **Phone:** (402) 472-9324

Project Start Date: 12/2/2022 **Project Completion Date:** 12/31/2026

Report Period: **Due Date:**

- ☒ Quarter 1 (July 1 – September 30) — October 31
- ☐ Quarter 2 (October 1 – December 31) — January 31
- ☐ Quarter 3 (January 1 – March 31) — April 30
- ☐ Quarter 4 (April 1 – June 30) — July 31

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total Expenses to Date	Total % of Task Completed	Remaining Budget
1. Planning and CAD	$26,727	10%	$5,000	$15,098	60%	$11,629
2. Crash Testing MASH TL-3	$262,333	90%	$46,175	$93,234	60%	$169,099
3. Reporting and Project Deliverables	$21,531	0%	$0	$0	0%	$21,531
4.						
5.						
6.						
7.						
8. Total	$310,591	-	$51,175	$108,334	50%	$253,404

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Previously, all of the crash tests were performed on the 25:1 flared AGT, the final four of them passing MASH TL-3 criteria. Research efforts on the flared AGT project was focused on the system design and physical testing of the project, while all of the charges were being applied to the previous Phase of the project (Phase III - TPF-5(430) Supplement 19). Currently, all of the final analysis and project reporting for all seven of the tests is being conducted and charged to this Phase IV project.

Work this past quarter was focused on documenting all seven crash tests conducted as part of this research project. There are internal drafts for the first two tests, and these drafts are currently being reviewed.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

During Phase II of the project, tests FLAGT-1 through FLAGT-3 failed to meet MASH performance criteria. As such, the project has had to be re-scoped and system has had to be redesigned and the tests re-run. Additional project funds were necessary to complete the full-scale testing on flared AGTs. A Phase III was approved as part of the FY 2021 program, and Phase IV of the project was funded in FY 2023.

As the project continued, charges we applied to the oldest of the open Flared AGT projects. Thus, all of Phase II funds were spent, then all of Phase III before Phase IV was charged. Phase III of the project (TPF-5(430) Supplement 19) ran out of funds during Q2 of 2024. Thus, charges for this research effort started to be applied to this project's (Phase IV) funds in Q2 2024.

The budget numbers presented herein include labor charges through August 2024.

Anticipated Work Next Quarter:

The test site will be cleaned up and the damaged system will be removed and disposed.

Project reports will be written for all of the crash testing conducted as part of this project. To avoid confusion, each system configuration will be documented separately (own report). Thus, each of the first three failed tests will be documented in individual reports, while the four successful tests will be contained within a single report.

The report covering FLAGT-1 will be sent to the states in 2024 Q4. The report covering FLAGT-2 may be sent out in December or early 2025.

Total Percentage of Project Completion:

50%

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) -Suppl #39

Project Title: PF23 GET-1: Generic End Terminal - Further Development and Evaluation

Principal Investigator: Cody Stolle

Principal Contact Information Email: cstolle2@unl.edu **Phone:** (402) 472-4233

Project Start Date: 12/2/2022 **Project Completion Date:** 12/31/2026

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☐ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☒ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning & CAD	$43,537.00	4%	$3,008.00	16%	$32,273.00
2. Analysis, Design, Sysetm Modifications	$21,150.00	0%	$0.00	51%	$10,025.00
3. Dynamic Bogie Tests	$93,155.00	0%	$0.00	31%	$64,738.00
4. Full-Scale Tests	$253,095.00	0%	$0.00	0%	$253,095.00
5. Report	$26,289.00	0%	$0.00	0%	$26,289.00
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Test plans for two component testing efforts were developed. The first test plan (GETA-1) was intended to evaluate the anchorage under tensile failure conditions, and the second test plan (GETA-2) was intended to evaluate a modified MASH 3-32 impact condition. Hardware associated with the construction has been fabricated and the tests are currently awaiting scheduling and prioritization.

Some issues were identified with bolts used to connect the SKT cable release bracket to the rail. Minimal guidance or information was available from patent drawings, materials guides, and publicly-available information for bolt grades, sizes, shapes, and types. The research team eventually selected several candidate bolts which were likely to be the same as the noted "shoulder bolts" called out in the SKT manuals, based on the available dimensions and side-by-side comparisons.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

Project is awaiting installation and testing in MwRSF pit. Planning completed to prepare for rapid-succession testing if results of tests are acceptable.

Anticipated Work Next Quarter:

Both component tests (GETA-1 and GETA-2) are anticiapted for fall 2024. If component tests are successful, the system will be rebuilt after GETA-2 and the first full-scale test will be conducted.

Total Percentage of Project Completion:

10.2%

Research Project Quarterly Progress Report

Date: 11/6/2024 **Project Number:** PF23 MWQA-1

Project Title: Continuted revisions to MwRSF Pooled Fund Q&A website

Principal Investigator: Cody Stolle

Principal Contact Information Email: cstolle2@unl.edu **Phone:** (402) 472-4233

Project Start Date: 12/2/2022 **Project Completion Date:** 12/31/2026

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☐ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☒ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning & CAD	$6,815.00	0.5%	$60.00	3.8%	$6,533.00
2. Design and Analysis	$34,277.00	0%	$0.00	0%	$29,711.00
3. Reporting and Project Deliverables	$4,329.00	0%	$0.00	0%	$4,329.00
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Website contractors are still delayed in implementing feedback from the PF Year 29 study. Further work is paused until previously-completed research is added to website and the research team is able to confirm it will function as desired.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

Delays with the web programming team have been prolonged and difficult. Significant turnover at the hired agency and uncompleted work on paid funds are delaying project progress. Progress will resume as soon as the existing recommended updates are implemented.

Anticipated Work Next Quarter:

Upon completion of the website updates, the research team will review the updated website format, content, and data. The prototype website may be sent to state DOTs for initial review and commenting. The research team will then begin the process of reviewing additioanl questions on the Q&A site and updating content again with new filters, links, categories, and attributes to continue the work of PF Year 29 project.

Total Percentage of Project Completion:

1.3

Research Project Quarterly Progress Report

Date: 10/30/2024 **Project Number:** RPFP-FY2023-AUTO-1

Project Title: PF23 AUTO-1: Coordination & Collaboration w/ Vehicle Manufacturers & Auto Industry

Principal Investigator: Bob Bielenberg, Cody Stolle, Ron Faller

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 12/2/2022 **Project Completion Date:** 12/31/2026

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1.	$40,000.00	4.9	$1,978.00	51.5	$19,381.00
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

MwRSF continued discussions with the Society of Automotive Engineers and the Insurance Institute for Highway Safety to advance vehicle-to-roadside system compatibility topics, as well as to expand the interaction with the automotive community. In July 2024, MwRSF researchers met with SAE representatives and suggested future applications and crossover work with OEM suppliers regarding roadside safety compatibility. While it was suggested that some pushback may occur, SAE was supportive and offered to investigate opportunities with OEMs.

IIHS also supplied additional contacts and investigations related to OEM suppliers and industry information. Additional information was provided on EV crashworhtiness and rates of automotive injury and damage claims.

Tesla engineers reached out and established a time for a follow-up meeting on roadside safety topics scheduled for the fall of 2024.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None

Anticipated Work Next Quarter:

MwRSF will continue to discuss potential automotive research conference papers to submit and attend. Papers will focus and potential areas of overalp between roadside safety design and automotive safety as well as potential issues between EVs and current roadside hardware.

Total Percentage of Project Completion:
51.5

Research Project Quarterly Progress Report

Date: 10/30/2024 **Project Number:** TPF-5(430) Suppl. #42 - RPFP-FY2023-CONSULT

Project Title: Annual Consulting Services Support

Principal Investigator: Bob Bielenberg

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 12/2/2022 **Project Completion Date:** 12/31/2026

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Annual Consulting Services Support	$65,000.00	1.1	$690.00	1.1	$64,310.00
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

This project allows MwRSF to be a valuable resource for answering questions with regard to roadside safety issues. MwRSF researchers and engineers are able to respond to issues and questions posed by the sponsors during the year. Major issues discussed with the States have been documented in our Quarterly Progress Reports and all questions and support are accessible on a MwRSF Pooled Fund Consulting web site.

In the past quarter MwRSF has responded to a series of state inquiries. The Quarterly Progress Report summarizing these responses has been attached to this document. The summary will also be available for download at the recently completed MwRSF Pooled Fund Consulting web site - http://mwrsf-qa.unl.edu/

We are continuing to work with and improve the MwRSF Pooled Fund Consulting web site as our experience with it grows. We would ask that all Pooled Fund member states use the new site from this point forward for their inquiries and to contact us with any issues they experience with the web site.

The summary of the consulting effort for this quarter is attached with the progress update.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None

Anticipated Work Next Quarter:

MwRSF will continue to answer questions and provide support to the sponsors during the upcoming quarter.

We would ask that all questions be submitted through the web site so that they can be answered and archived therein.

http://mwrsf-qa.unl.edu/

Total Percentage of Project Completion:
1.1

Pooled Fund
Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. #43, RPFP-FY2023-MPFW

Project Title: Midwest Pooled Fund Website

Principal Investigator: Faller, Asadollahipajouh, Bielenberg, Holloway, Lechtenberg, Perry, Rosenbaugh, Stolle

Principal Contact Information Email: kpolivka2@unl.edu **Phone:** (402) 472-9070

Project Start Date: 12/1/2022 **Project Completion Date:** 12/31/2026

Identify Quarter:	Identify Period of Performance:	Identify Quarterly Report Submittal Deadline:
Quarter 1	7/1/24 - 9/30/24	10/31/24

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Website Develop, Populate, and Host	$12,868.00	0%	$25.00	0%	$12,843.00
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

None

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

This is continuation funding until the funds from Project No.: RPFP-22-MPFW – TPF-5(430) Supplement #34, Project Title: Midwest Pooled Fund Website have been exhaused.

Anticipated Work Next Quarter:

None

Total Percentage of Project Completion:

0%

Research Project Quarterly Progress Report

Date: 10/30/2024 **Project Number:** TPF-5(430) Suppl. #44 - RPFP-FY2023-LS-DYNA

Project Title: LS-DYNA Modeling Enhancement Support

Principal Investigator: Bob Bielenberg

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 12/2/2022 **Project Completion Date:** 12/31/2026

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. LS-DYNA Modeling Enhancement	$40,000.00	100	$27,784.00	100	$40,000.00
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

In this quarter, MwRSF researchers used the LS-DYNA funding to continue the implementation of advanced guardrail steel fracture models into existing models of the MGS. The baseline model of the steel fracture was further improved through the development of mesh dependcy algorithms in LS-DYNA that allow the steel fracture model to be used on models with varying mesh sizes. This allows much broader use of the steel material model to predict fracture.

Additionally, drafts of two research papers are in development to document the steel fracture material model effort.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None

Anticipated Work Next Quarter:

MwRSF will continue to use the LS-DYNA funds to support modeling needs in ongoing Midwest Pooled Fund Projects. This may include the following.

1. MwRSF has recently done an extensive amount of research in advance soil modeling techniques for use in modeling dynamic post in soil interactions. These models have been primarily developed on a component level. Research is needed to more fully developed these advanced soil modeling techniques and incorporate them into existing roadside hardware models to improve our model fidelity and allow improved investigation of soil parameters effects on roadside hardware such as post embedment, slopes, and other factors.
2. MwRSF has recently developed advanced steel fracture parameters for the GISSMO material failure command in LS-DYNA. This allows users to relate the stress state of the material to the failure strain in order to aid in predicting failure under multiple types of loading conditions. To date, the research in this area has focused mainly on the simulation of coupon samples used to develop the failure parameters. Research is needed to incorporate this steel failure methodology into existing guardrail and roadside hardware models.
3. MwRSF sees a need for advancement in concrete modeling methods. Currently several concrete material models exists and previous research at MwRSF has investigated the material models themselves. However, further research is needed to investigate the incorporation of reinforcing steel and in the concrete material and ensuring effective load transfer through the reinforcing steel. Additional investigation of bonding and development of the reinforcement is needed as well.
4. Vehicle model improvements are a constant need for Midwest Pooled Fund research efforts. Currently needed vehicle model improvements include more refined tire models, enhanced suspension models with suspension failure, and upgrades to existing TL-4 single unit truck and TL-5 tractor-trailer models. Additionally, George Mason University (GMU) plans to release a new 1100C vehicle model based on the Hyundai Accent. Conversion and troubleshooting of this new 1100C vehicle model will require a considerable effort. However, it

is believed that the new vehicle model could provide much improved 1100C simulation results as the current 1100C vehicle is a 2010 Toyota Yaris that has been discontinued and is not used in MASH crash testing.

5. MwRSF sees the need for development of an improved model of the MGS. The current model is based on older modeling techniques and was validated with older vehicle models that are being phased out. It is believed that its use for studying more complex impact events and system modifications could be significantly improved if the model were updated with the new soil and steel fracture models discussed previously.

Next quarter, the team work to publish the papers on steel fracture modeling and try to implement the material model with existing models of the MGS and other barrier systems.

Total Percentage of Project Completion:

100

Research Project Quarterly Progress Report

Date: 10/30/2024 **Project Number:** RPFP-FY2024-CONC-3

Project Title: PF24 CONC-3: Grade-Separated Concrete Median Barirer

Principal Investigator: Tewodros Yosef, Ron Faller, Andrew Loken, Josh Steelman, Scott Rosenbaugh

Principal Contact Information Email: tyosef2@unl.edu **Phone:** (402) 472-2019

Project Start Date: 2/20/2024 **Project Completion Date:** 6/30/2027

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning and Correspondence	$56,337.00	0%	$0.00	0%	$56,337.00
2. Design and Analysis	$112,046.00	0%	$0.00	0%	$112,046.00
3. Reporting and Project Deliverables	$45,197.00	0%	$0.00	0%	$45,197.00
4.					
5.					
6.					
7.					
8.					
9. Total	$213,580.00	0%	$0.00	0%	$213,580.00

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Task 1: Project Planning and Correspondence

Status: No progress

Task 2: Design and Analysis

Status: No progress

Task 3: Reporting and Project Deliverables

Status: No progress

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None

Anticipated Work Next Quarter:

Task 1: Project Planning and Correspondence - Literature Review

In the next quarter, MwRSF researchers will initiate a literature review focusing on several key areas: retaining wall design and analysis methodologies under impact conditions, concrete barrier design, and dynamic soil response to impact loading. Additional review efforts will be dedicated to examining previous analytical, numerical, and experimental research related to retaining structures subjected to dynamic loads.

The literature review will encompass research efforts on similar systems, including the analysis and design of concrete barriers on mechanically stabilized earth (MSE) retaining walls, barrier-moment slab systems, full-scale crash testing, and computer simulation of concrete median barriers on MSE walls. The review will critically analyze and describe relevant national and international research based on several criteria: the applicability of the methodologies, the conclusiveness of the research findings, and their utility in developing a MASH TL-4 grade-separated concrete median barrier/wall.

Task 2: Design and Analysis – None Anticipated

Task 3: Reporting and Project Deliverables – None Anticipated

Total Percentage of Project Completion:
0.0

Research Project Quarterly Progress Report

Date: 11/1/2024 **Project Number:** TPF-5(430) Suppl. #54

Project Title: Guidelines for Concrete Median Barrier Anchorage to Slabs

Principal Investigator: Rosenbaugh, Loken, Faller, Bielenberg, Lechtenberg, Stolle, Perry, and Steelman

Principal Contact Information Email: srosenabugh2@unl.edu **Phone:** (402) 472-9324

Project Start Date: 2/20/2024 **Project Completion Date:** 6/30/2027

Report Period:	**Due Date:**
☒ Quarter 1 (July 1 – September 30)	October 31
☐ Quarter 2 (October 1 – December 31)	January 31
☐ Quarter 3 (January 1 – March 31)	April 30
☐ Quarter 4 (April 1 – June 30)	July 31

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total Expenses to Date	Total % of Task Completed	Remaining Budget
1. Planning & Correspondence	$24,085	100%	$99	$99	1%	$23,986
2. Design and Analysis	$93,302	0%	$0	$0	0%	$93,302
3. Dynamic Component Tests	$155,150	0%	$0	$0	0%	$155,150
4. Reporting and Deliverables	$37,378	0%	$0	$0	0%	$37,378
5.						
6.						
7.						
8.						
9. Total	$309,915	-	$99	$99	0%	$309,816

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Work on this project has not yet begun. MwRSF has been focusing efforts on other Pooled Fund projects with higher priority (e.g., those closing at the end of 2024).

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

The budgets herein include labor charges through August 2024.

Signed contracts for the project were not received until February of 2024. Thus, the project close date was shifted back to June 2027.

Anticipated Work Next Quarter:

The research project will begin with a literature review covering concrete barrier strength analysis and barrier anchorage requirements. The literature review will include full–scale crash testing of concrete barriers with various anchorage configurations and numeric simulation efforts concerning impact loading of concrete structures. The data points and knowledge obtained from the literature review will be used to guide the design of the barrier segments evaluated in physical component testing.

Total Percentage of Project Completion:

1%

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. #55, RPFP-24-MGS-1

Project Title: W-Beam and Thrie Beam Splice Joint Redesign – Phase I

Principal Investigator: Joshua S. Steelman, Ph.D., P.E.

Principal Contact Information Email: joshua.steelman@unl.edu **Phone:**

Project Start Date: 2/20/2024 **Project Completion Date:** 6/30/2027

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning and Background	$21,831	0	$0	0	$21,831
2. Design and Analysis	$35,295	0	$0	0	$35,295
3. Reporting and Project Deliverables	$28,966	0	$0	0	$28,966
4.					
5.					
6.					
7.					
8.					
9. TOTAL	$86,092	0	$0	0	$86,092

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

Task 1 – No progress.

Task 2 – No progress.

Task 3 – No progress.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None.

Anticipated Work Next Quarter:

Task 1 – Initiate literature review and patent search.

Task 2 – None anticipated.

Task 3 – None anticipated.

Total Percentage of Project Completion:

0%

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) SUPPL. #56-RPFP-FY2024-MGS-2

Project Title: Reduced Grading for the MGS Long-Span Guardrail System

Principal Investigator: Robert Bielenberg

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 4/23/2024 **Project Completion Date:** 06/30/2026

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning and Correspondence	$19,460.00	0	$0.00	0	$19,460.00
2. Full-Scale Crash Testing	$209,617.00	0	$0.00	0	$209,617.00
3. Reporting and Project Deliverables	$22,514.00	0	$0.00	0	$22,514.00
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

1. Project Planning and Correspondence

- None.

2. Full-Scale Crash Testing

-None

3. Reporting and Project Deliverables

- None

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

Note that this project is a follow on study with additional testing for an existing WisDOT project to evaluate the long span with reduced grading. That project is currently underway. As such, this effort will not be addressed until the full-scale testing in the exisitng is completed.

Anticipated Work Next Quarter:

None.

Total Percentage of Project Completion:

0.0

Pooled Fund
Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. #57, RPFP-FY2024-THRIE-1

Project Title: Development of Limited Deflection MASH TL-4 Thrie Beam Guardrail

Principal Investigator: Faller, Perry, Lechtenberg, Stolle, Rosenbaugh, Bielenberg, Steelman, Pajouh

Principal Contact Information Email: mojdeh.pajouh@unl.edu **Phone:** (402) 472-920

Project Start Date: 2/20/2024 **Project Completion Date:** 6/30/2027

Identify Quarter:	Identify Period of Performance:	Identify Quarterly Report Submittal Deadline:
Quarter 1	7/1/24 - 9/30/24	10/31/24

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning, Correspondence, CADD	$30,804.00	0%	$0.00	0%	$30,804.00
2. Design, Analysis, LS-DYNA	$117,463.00	0%	$0.00	0%	$117,463.00
3. Reporting & Project Deliverables	$35,995.00	0%	$0.00	0%	$35,995.00
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

None

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None

Anticipated Work Next Quarter:

None

Total Percentage of Project Completion:

0%

Pooled Fund
Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. #58, RPFP-FY2024-GET-1

Project Title: Development of a Generic End Terminal - Phase IV

Principal Investigator: Faller, Perry, Lechtenberg, Stolle, Rosenbaugh, Bielenberg, Steelman, Pajouh

Principal Contact Information Email: cstolle2@unl.edu **Phone:** (402) 472-4233

Project Start Date: 2/20/2024 **Project Completion Date:** 6/30/2027

Identify Quarter:	Identify Period of Performance:	Identify Quarterly Report Submittal Deadline:
Quarter 1	7/1/24 - 9/30/24	10/31/24

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning, Correspondence, CADD	$12,972.00	0%	$0.00	0%	$12,972.00
2. Design & Analysis	$0.00	0%	$0.00	0%	$0.00
3. Full-Scale Crash Testing	$125,557.00	0%	$0.00	0%	$125,557.00
4. Reporting & Project Deliverables	$0.00	0%	$0.00	0%	$0.00
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

None

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

NOTE: RPFP-FY2024-GET-1 is a continuation of existing generic end terminal research. The Midwest Pooled Fund States requested that this project be funded to the extent possible in FY2024. The cost for a single full-scale crash test and reporting was determined to be $163,392. This amount would force the total funding to exceed the FY2024 Midwest Pooled Fund Program total funding of $1,514,998 by $24,863. As such, $138,529 will be applied to RPFP-FY2024-GET-1 in FY2024. MwRSF will attempt to perform as much of the research within the available funding as possible. With the current funding level, the reporting of the research effort will need to be funded in a subsequent funding period in order to complete the effort.

Anticipated Work Next Quarter:

None

Total Percentage of Project Completion:

0%

Research Project Quarterly Progress Report

Date: 8/5/2024 **Project Number:** RPFP-FY2024-AUTO-1

Project Title: LS-DYNA Investigation of Electric Vehicles and Roadside Hardware

Principal Investigator: A. Loken, R. Bielenberg, C. Stolle, R. Faller

Principal Contact Information Email: aloken2@unl.edu **Phone:** (402) 417-4694

Project Start Date: April 1, 2024 **Project Completion Date:** March 31, 2027

Report Period:

July 1, 2024 to September 30, 2024

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% Work Completed This Quarter	Expenses This Quarter	Total Expenses to Date	Total % of Task Completed	Remaining Budget
Project Planning and Communications	$22,014	10%	$376	$376	5%	$21,638
EV Selection, Conversion, and Simplification	$48,625	90%	$3,387	$3,387	5%	$45,238
EV Impact Simulations with Roadside Hardware	$55,852	0%	0	0	0%	$55,852
Final Reporting	$15,828	0%	0	0	0%	$15,828
Total	$142,319	100%	0	0	2%	$138,556

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter including meetings, work plan status, significant progress, etc.)

In Q3 2024, further project planning, including the roadmap for evaluating and improving the model, was performed. Initial evaluation and conversion efforts were begun. Baseline NCAP frontal impact, gravity settling, and free-rolling simulations were executed. Model units were converted from N-mm-s to kN-mm-ms (MwRSF standard). Early efforts in restructuring and annotating the LS-DYNA keyword deck were also initiated.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

The budget numbers presented herein include labor charges through the end of September 2024.

No challenges have been encountered affecting the timeline of this project, and no significant delays are anticipated at this time.

Anticipated Work Next Quarter:

In Q4 2024, restructuring and annotation of the LS-DYNA keyword deck will be completed. Baseline simulations will be re-executed using the restructured model with updated units to ensure the behavior was unchanged during conversion.

Key targets for Q4 2024 include:

- Improving the computational efficiency of the model by removing complex, non-structural assemblies, such as the instrument panel, center console, etc.
- Modifying the model such that it rolls smoothly, which will involve modification of the suspension.

Total Percentage of Project Completion:

2%

Research Project Quarterly Progress Report

Date: 10/30/2024 **Project Number:** TPF-5(430) Suppl. #60 - RPFP-FY2024-CONSULT

Project Title: Annual Consulting Services Support

Principal Investigator: Bob Bielenberg

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 12/2/2022 **Project Completion Date:** 12/31/2026

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Annual Consulting Services Support	$65,000.00	0	$0.00	0	$65,000.00
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

This project allows MwRSF to be a valuable resource for answering questions with regard to roadside safety issues. MwRSF researchers and engineers are able to respond to issues and questions posed by the sponsors during the year. Major issues discussed with the States have been documented in our Quarterly Progress Reports and all questions and support are accessible on a MwRSF Pooled Fund Consulting web site.

In the past quarter MwRSF has responded to a series of state inquiries. The Quarterly Progress Report summarizing these responses has been attached to this document. The summary will also be available for download at the recently completed MwRSF Pooled Fund Consulting web site - http://mwrsf-qa.unl.edu/

We are continuing to work with and improve the MwRSF Pooled Fund Consulting web site as our experience with it grows. We would ask that all Pooled Fund member states use the new site from this point forward for their inquiries and to contact us with any issues they experience with the web site.

The summary of the consulting effort for this quarter is attached with the progress update.

Note that no funds will be applied to this effort until the previous consulting funding from previous years is fully expended.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None

Anticipated Work Next Quarter:

MwRSF will continue to answer questions and provide support to the sponsors during the upcoming quarter.

We would ask that all questions be submitted through the web site so that they can be answered and archived therein.

http://mwrsf-qa.unl.edu/

Total Percentage of Project Completion:
0.0

Pooled Fund
Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) Suppl. #61, RPFP-FY2024-MPFW

Project Title: Midwest Pooled Fund Website

Principal Investigator: Faller, Perry, Lechtenberg, Stolle, Rosenbaugh, Bielenberg, Steelman, Pajouh

Principal Contact Information Email: kpolivka2@unl.edu **Phone:** (402) 472-9070

Project Start Date: 2/20/2024 **Project Completion Date:** 6/30/2027

Identify Quarter:	Identify Period of Performance:	Identify Quarterly Report Submittal Deadline:
Quarter 1	7/1/24 - 9/30/24	10/31/24

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Website Develop, Populate, and Host	$12,571.00	0%	$25.00	0%	$12,546.00
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

None

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

This is continuation funding until the funds from Project No.: RPFP-FY2023-MPFW – TPF-5(430) Supplement #43, Project Title: Midwest Pooled Fund Website have been exhaused.

Anticipated Work Next Quarter:

None

Total Percentage of Project Completion:

0%

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) SUPPL. #62-RPFP-FY2024-LS-DYNA

Project Title: LS-DYNA Modeling Enhancement Support

Principal Investigator: Robert Bielenberg

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 4/23/2024 **Project Completion Date:** 06/30/2026

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. LS-DYNA Modeling Enhancement	$40,000.00	0	$0.00	0	$40,000.00
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Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

In this quarter, MwRSF researchers used the LS-DYNA funding to continue the implementation of advanced guardrail steel fracture models into existing models of the MGS. The baseline model of the steel fracture was further improved through the development of mesh dependcy algorithms in LS-DYNA that allow the steel fracture model to be used on models with varying mesh sizes. This allows much broader use of the steel material model to predict fracture.

Additionally, drafts of two research papers are in development to document the steel fracture material model effort.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None

Anticipated Work Next Quarter:

MwRSF will continue to use the LS-DYNA funds to support modeling needs in ongoing Midwest Pooled Fund Projects. This may include the following.

1. MwRSF has recently done an extensive amount of research in advance soil modeling techniques for use in modeling dynamic post in soil interactions. These models have been primarily developed on a component level. Research is needed to more fully developed these advanced soil modeling techniques and incorporate them into existing roadside hardware models to improve our model fidelity and allow improved investigation of soil parameters effects on roadside hardware such as post embedment, slopes, and other factors.
2. MwRSF has recently developed advanced steel fracture parameters for the GISSMO material failure command in LS-DYNA. This allows users to relate the stress state of the material to the failure strain in order to aid in predicting failure under multiple types of loading conditions. To date, the research in this area has focused mainly on the simulation of coupon samples used to develop the failure parameters. Research is needed to incorporate this steel failure methodology into existing guardrail and roadside hardware models.
3. MwRSF sees a need for advancement in concrete modeling methods. Currently several concrete material models exists and previous research at MwRSF has investigated the material models themselves. However, further research is needed to investigate the incorporation of reinforcing steel and in the concrete material and ensuring effective load transfer through the reinforcing steel. Additional investigation of bonding and development of the reinforcement is needed as well.
4. Vehicle model improvements are a constant need for Midwest Pooled Fund research efforts. Currently needed vehicle model improvements include more refined tire models, enhanced suspension models with suspension failure, and upgrades to existing TL-4 single unit truck and TL-5 tractor-trailer models. Additionally, George Mason University (GMU) plans to release a new 1100C vehicle model based on the Hyundai Accent. Conversion and troubleshooting of this new 1100C vehicle model will require a considerable effort. However, it

is believed that the new vehicle model could provide much improved 1100C simulation results as the current 1100C vehicle is a 2010 Toyota Yaris that has been discontinued and is not used in MASH crash testing.

5. MwRSF sees the need for development of an improved model of the MGS. The current model is based on older modeling techniques and was validated with older vehicle models that are being phased out. It is believed that its use for studying more complex impact events and system modifications could be significantly improved if the model were updated with the new soil and steel fracture models discussed previously.

Next quarter, the team work to publish the papers on steel fracture modeling and try to implement the material model with existing models of the MGS and other barrier systems.

Total Percentage of Project Completion:

0.0

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) – Suppl. #26

Project Title: FY2022-WISDOT-1: Reduced Grading for the MGS Long-Span Guardrail System – Phase I

Principal Investigator: Robert Bielenberg

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 6/30/2021 **Project Completion Date:** 12/31/2026

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning and Correspondence	$20,172.00	24.6	$4,970.00	45.0	$11,097.00
2. Design and Analysis	$11,731.00	0	$0.00	0	$11,731.00
3. Full-Scale Crash Testing	$171,067.00	0	$0.00	0	$171,067.00
4. Reporting and Project Deliverables	$17,801.00	0	$0.00	0	$17,801.00
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Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

1. Project Planning and Correspondence

- None

2. Design and Analysis

- None

3. Full-Scale Crash Testing

- The test plans for the full-scale crash test are in the field for material ordering. The system is in the current MwRSF test que and will be conducted when a time slot for the testing opens up.

4. Reporting and Project Deliverables

- None

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None.

Anticipated Work Next Quarter:

In the upcoming quarter, MwRSF will work towards procurement of materials for the test system and conducting the full-scale crash test.

Total Percentage of Project Completion:
4.1

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430) SUPPL. #49-RPFP-FY2023-WISDOT-OVERLAY-1

Project Title: MASH TL-3 Evaluation Of New Jersey Shape Parapet With 3-in. Overlay

Principal Investigator: Robert Bielenberg

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 4/23/2024 **Project Completion Date:** 06/30/2026

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☐ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☒ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning and Correspondence	$19,460.00	21.0	$4,091.91	21.0	$15,368.09
2. Full-Scale Crash Testing	$209,617.00	0	$0.00	0	$209,617.00
3. Reporting and Project Deliverables	$22,514.00	0	$0.00	0	$22,514.00
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Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

1. Project Planning and Correspondence

- MwRSF completed the CAD details for the system and of sent them to the test site to be placed in the testing que.

2. Full-Scale Crash Testing

-None

3. Reporting and Project Deliverables

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None.

Anticipated Work Next Quarter:

In the upcoming quarter, the researchers will work on procuring materials for the full-scale crash testing and building the test article

Total Percentage of Project Completion:

1.6

Research Project Quarterly Progress Report

Date: 11/03/2024 **Project Number:** TPF-5(430) Suppl. #48, RPFP-FY23-WISDOT-SLOPE-1

Project Title: Guidance for MGS Installed Adjacent to Steep Slopes at Variable Offsets – Phase I

Principal Investigator: Faller, R.K., Bielenberg, R.W., Pajouh M.A., Tewodros Yosef, and Brandon Perry

Principal Contact Information Email: mojdeh.pajouh@unl.edu **Phone:** 402-472-0920

Project Start Date: 12/02/2022 **Project Completion Date:** 12/31/2026

Report Period:	**Due Date:**
☒ Quarter 1 (July 1 – September 30)	October 31
☐ Quarter 2 (October 1 – December 31)	January 31
☐ Quarter 3 (January 1 – March 31)	April 30
☐ Quarter 4 (April 1 – June 30)	July 31

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total Expenses to Date	Total % of Task Completed	Remaining Budget
1. Project Planning & Management & CAD	$19,994	22.31%	$4,461.00	$10,225.00	51.14%	$9,769.00
2. Dynamic Component Testing	$99,482	0%	$0	$0	0%	$99,482.00
3. Analysis, Design, and LS-DYNA Simulation	$90,830	0%	$0	$0	0%	$90,830.00
4. Reporting and Project Deliverables	$29,341	0%	$0	$0	0%	$29,341.00
Total	$239,647	0%	$4,461.00	$10,225.00	4.27%	$229,422.00

Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter including meetings, work plan status, significant progress, etc.)

In the past quarter, the research team conducted six dynamic component tests at the test site.

1. Two tests using 6 ft long W6x16 posts at the slope break point (SBP) of a 2:1 slope.
2. Two tests using 7 ft long W6x16 posts at the SBP of a 2:1 slope.
3. Two tests using 7 ft long W6x16 posts on level terrain.

The testing data has been processed and analyzed.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope, and fiscal constraints, along with recommended solutions to those problems.)

None

The project costs detailed in this report encompass all labor charges incurred until September 2024.

Anticipated Work Next Quarter:

The data collected from these dynamic component tests will be analyzed and compared to previous dynamic bogie testing of standard guardrail posts on level terrain. Additionally, this data will be utilized to develop post-soil resistance inputs for computer simulations.

Total Percentage of Project Completion:

4.3%

Research Project Quarterly Progress Report

Date: 10/30/2024 **Project Number:** TPF-5(430) Suppl. 12 – FY20-WY-1-GATE: MASH 2016 Th 3

Project Title: Evaluation of Drop-Arm Road Closure Gate

Principal Investigator: R. Bielenberg and R. Faller,

Principal Contact Information Email: rbielenberg2@unl.edu **Phone:** (402) 472-9064

Project Start Date: 2/26/2020 **Project Completion Date:** 5/9/2026

Report Period: **Due Date:**

- ☒ Quarter 1 (July 1 – September 30) ---------- October 31
- ☐ Quarter 2 (October 1 – December 31)---------- January 31
- ☐ Quarter 3 (January 1 – March 31) ---------- April 30
- ☐ Quarter 4 (April 1 – June 30)---------- July 31

Project Schedule Status:

- ☐ **On Schedule**
- ☒ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning and Correspondence	$17,507.00	12.8	$2,240.00	74.4	$4,484.00
2. Design and Analysis	$10,862.00	24.6	$0.00	99.7	$35.34
3. Full-Scale Crash Testing	$254,880.00	0.0%	$0.00	31.7%	$173,966.00
4. Reporting and Project Deliverables	$16,147.00	0.0%	$0.00	9.4%	$14,634.00
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Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

MwRSF met with WYDOT to further discuss the design options for the revised road closure gate. Due to concerns with the additional mass posed by moving to a 4"x4" gate arm, that option was abandoned. Instead, it was agreed to approach to manufacturer regarding incorporation of a closed arm guide system. MwRSF drew up the concept for the closed arm guide and provided it to B&B Roadway. They have agreed to fabricate the part for the test system and would supply it moving forward.

At the same time, MwRSF was asked by WYDOT to inquire about the used of a motorized actuator rather than a hand winch for the gate. WYDOT desired that the actuator be powered and controled by a plug in unit that did not need to be attached to the support pole to limit additional mass. B&B responded that this could be done and that the actuator would only add 50-75 lbs. However, the could would increase by $19,000.

This cost addition was prohibitive. WYDOT and MwRSF are in discussions with B&B regarding the use of a powered winch mounted to the support pole in lieu of the hand winch and are awating feedback on that option.

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

Currently, material shipping delays and delays to the overall MwRSF test que have put the project behind schedule. MwRSF will attempt to continue to meet the proposed schedule to the degree possible.

Currently, the full-scale testing has been delayed due to its status in the MwRSF testing que. COVID-19 has reduced avaiable staff at the outdoor test facility, created increased employee leave, and created material procurement issues. These issues have created a backlog of testing ath the facility. MwRSF is trying our best to resolve the test backlog, but delays are currently expected for most projects. We will continue to update the status of the full-scale testing and its effect on the overall project timeline.

Due to these delays, MwRSF has requested and received an NCE until 9/30/2022.

As noted previously, the failure of test no. WRCG-1 required revision of the scope and budget for the project. MwRSF revised these items and provided them to WYDOT for approval. MwRSF recevied activation of the project in September 2023.

Note that the budget table included has been updated with the revised scope and budget figures.

Anticipated Work Next Quarter:

In the next quarter, MwRSF develop the final road closure gate configuration ofr testing after receving feedback from B&B and WYDOT on the winch option. CAD details will be developed and sent to the MwRSF test site for material acquistion and scheduling in the test que.

Total Percentage of Project Completion:
35.5%

Research Project Quarterly Progress Report

Date: 10/31/2024 **Project Number:** TPF-5(430)_Sup.50,RPFP-FY2024-WY-1-BOX

Project Title: Box-Beam Barrier Configuration for Shielding Fixed Objects and Bridge Ends in Medians

Principal Investigator: B. Perry

Principal Contact Information Email: brandon.perry@unl.edu **Phone:** (402) 472-0906

Project Start Date: 2/20/2024 **Project Completion Date:** 5/31/2027

Quarter:	Period of Performance:	Quarterly Report Submittal Deadline:
☒ Quarter 1	July 1 – September 30	October 31
☐ Quarter 2	October 1 – December 31	January 31
☐ Quarter 3	January 1 – March 31	April 30
☐ Quarter 4	April 1 – June 30	July 31
☐ Quarter 5	July 1 – September 30	October 31
☐ Quarter 6	October 1 – December 31	January 31
☐ Quarter 7	January 1 – March 31	April 30

Project Schedule Status:

- ☒ **On Schedule**
- ☐ **On Approved Revised Schedule**
- ☐ **Ahead of Schedule**
- ☐ **Behind Schedule**

Progress:

Task	Total Budget	% work Completed This Quarter	Expenses This Quarter	Total % of Task Completed	Remaining Budget
1. Project Planning and Correspondence	$46,495.00	1.17	$545.00	16.17	$38,975.42
2. Design and Analysis	$19,127.00	0	$0.00	0	$19,127.00
3. Full-Scale Crash Testing	$673,199.00	0	$0.00	0	$673,199.00
4. Reporting and Project Deliverables	$61,177.00	0	$0.00	0	$61,177.00
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Progress and Accomplishments this Quarter:

(Provide an informative summary of tasks/activities that occurred this quarter includes meetings, work plan status, significant progress, etc.)

1. Project Planning, CAD, and Reporting: Box beam literature review, WYDOT and NYSDOT box beam standards review
2. Design and Analysis: None
3. Full-Scale Crash Testing: None
4. Reporting and Project Deliverables: None

Circumstances Affecting Project, Scope, or Budget:

(Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints, along with recommended solution to those problems.)

None.

Anticipated Work Next Quarter:

MwRSF will begin to draw concepts. Note that September hours are not included in the expenses.

Total Percentage of Project Completion:

0.94