Nebraska Research Work Program

FISCAL YEAR 2027

JULY 1, 2026 – JUNE 30, 2027

Prepared by:

NDOT Research Section

Submitted: April 7, 2026

NEBRASKA

Good Life. Great Journey.

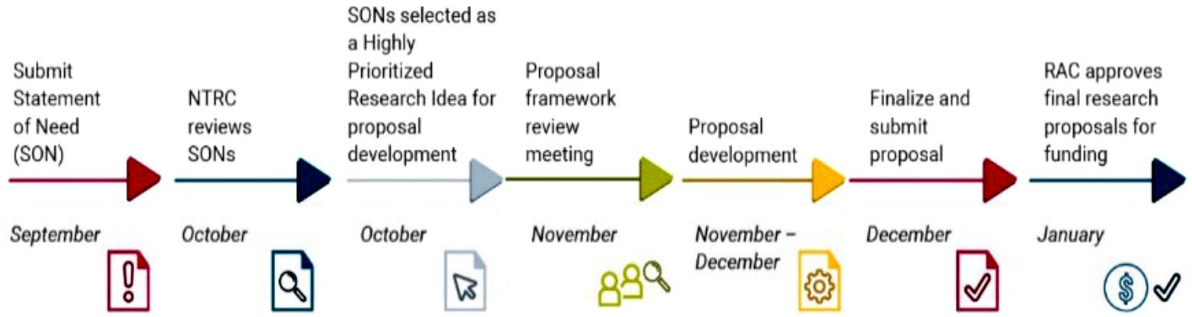
DEPARTMENT OF TRANSPORTATION

Work Program Overview

The Nebraska Department of Transportation (NDOT) Materials and Research (M&R) Division administers the Research Program. The Research Program's mission is to provide more complete knowledge of the basic characteristics of highway geometrics, traffic flow, safety, structural capabilities, economics, financing, administration, and their effectiveness within the total transportation system. The Research Program's primary objectives are:

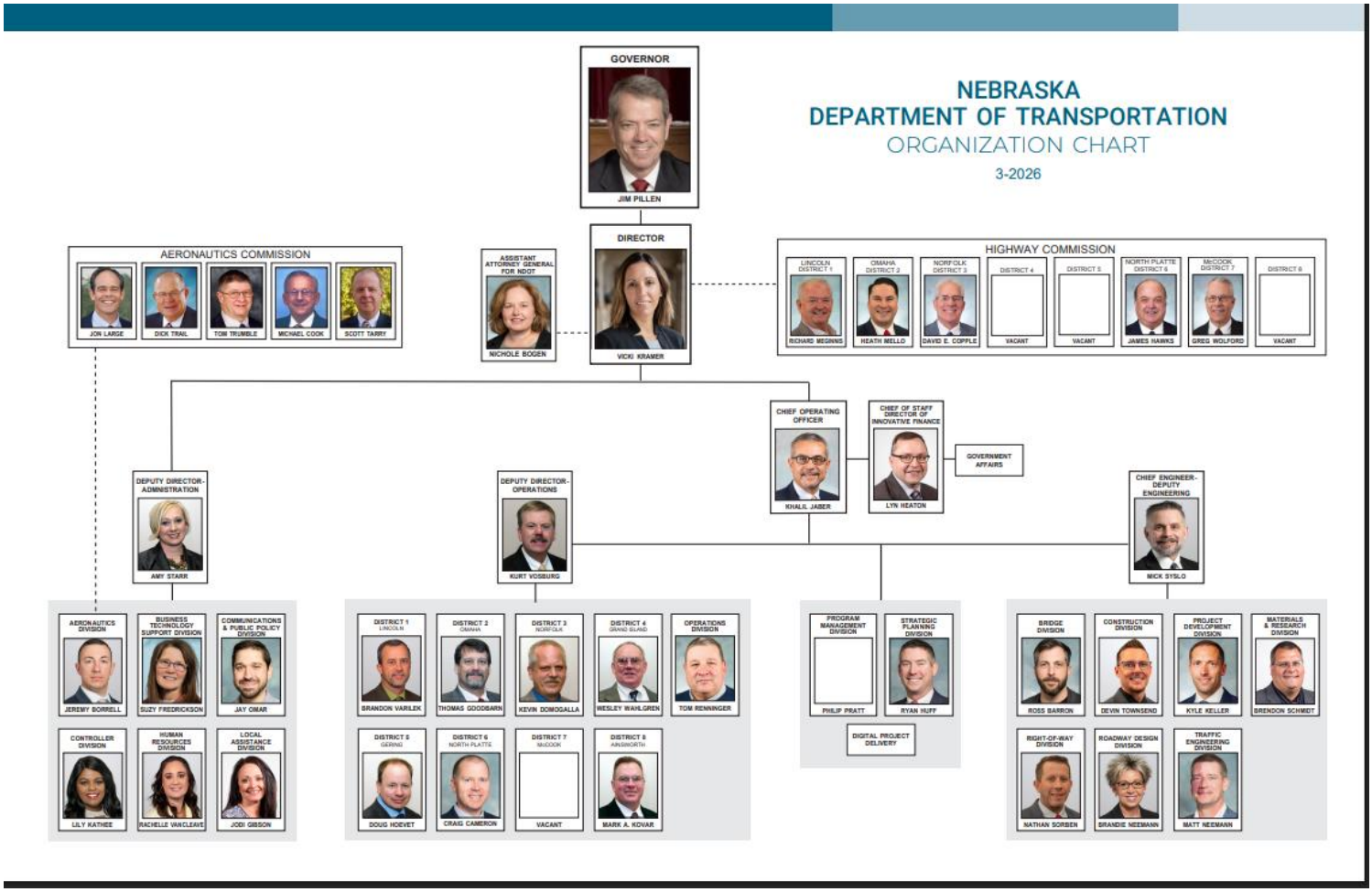
- Reduce highway construction and maintenance costs
- Improve the quality of service to the transportation user
- Increase the planning, operations, and administrative efficiency of various transportation modes
- Reduce accidents and accident severity
- Encompass the interrelationship of socio economic, environmental, and technological factors in the transportation system

Typical NDOT Federally Funded Research Cycle



Nebraska Department of Transportation

Organizational Chart



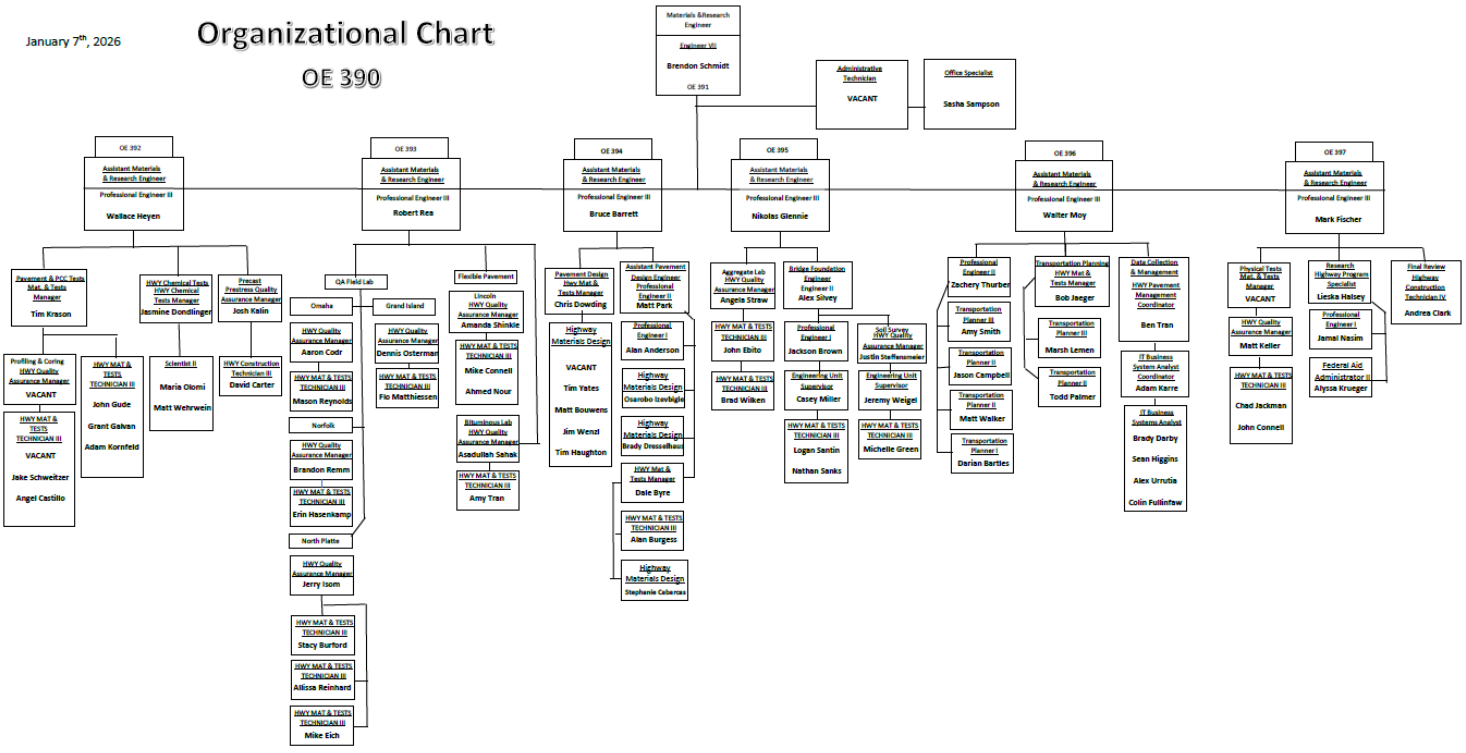
Nebraska Department of Transportation

Materials and Research Division

January 7th, 2026

Organizational Chart

OE 390



*Underfilled


PROGRAM
ACCOMPLISHMENTS


Hosted Research Summit with UNL
≈ 100
Faculty/NDOT staff
Received
47
Statements of Need
Hosted
4
NTRC Focus Group Meetings with
71
NDOT/Industry attendees
16
Prioritized Statements of Need and held Proposal Framework Review Meetings
PROGRAM ACCOMPLISHMENTS FY-2026 TO DATE
Active Projects
26
SPR Projects Spent approximately
$792,086.94
so far in 2025 for Currently Active Projects
As of 1/13/2026
FY26 Transfers
$1,123,680
Pooled Funds Participation, NCHRP and TRB contributions.
Hosted
67
TAC Meetings for Active Research
16
Projects completed in 2025
10
Projects Scheduled to complete by January 31, 2026

RESEARCH HIGHLIGHTS & ACCOMPLISHMENTS

Research Readiness Level Implementation Follow-Ups – Total Projects: 39

- 12 Newly Completed Non-Phased Projects
- 14 Completed Project Follow-Ups
- 10 Newly Completed Phased Projects
- 3 Reviews Pushed to Future
  - (NDOT Team Champion Still Implementing)

Technology Transfer Activities Total: 67

- 50 Presentations
- 25 Papers

Research Program Impact

- 14 Research Readiness Level 5 – Standard Practice
- 8 NDOT-UNL Co-Hosted Seminars
  - **78 Professional Development Hours Awarded**
- 2 NDOT "Research Pays Off" Webinars
  - **92 Professional Development Hours Awarded**

Key Accomplishments

AASHTO High Value Research Award

Approach Guardrail Transition Retrofit to Existing Buttresses and Bridge Rails

AASHTO Maintenance, Management, and Preservation Award

Synthesis of Repair Practices of Damaged Precast/Prestressed Concrete Girders

Research Work Program Goals

FY - 2027

Monitor and assist Active Research

Establish the FY-2028 Research Program

Assist with Implementation of completed research

Work with Principal Investigator on deadlines

Compile Annual Work Program Report for Public Viewing

Administer the Regional Pooled Fund with MwRSF

Upload funded research to TRIS and completed to TRID

Continue Technology Transfer efforts

Look for Peer exchange opportunities

Research Program Management Software Implementation

Continue bi-annual webinar series

Continue to partner with UNL on Transportation Seminars

Host 2026 Research Summit with UNL


CURRENT
FUNDING
OBLIGATIONS

Midwest Roadside Safety Facility (MwRSF) Pooled Fund
Midwest States Pooled Fund Crash Test Program

Nebraska's Lead State Pooled Fund

TPF – 5(430) Control No.: 01010

TPF – 5(533) Control No.: 01010A

	TPF-5(430) CONTROL NO.: 01010				
	SUPPLEMENT NUMBER	STUDY TITLES	TOTAL STUDY BUDGET	EXPENDITURES	REMAINING BUDGET
CURRENT PROJECTS					
FY2020 Year 1	#2	PFP-20-AGT-1: Additional Retrofit Options for Post Conflicts within AGTs (New Jersey)	$251,429	$111,755.43	$139,673.57
	#5	RPFP-20-SR-1: Development of a Short-Radius Guardrail for Intersecting Driveways or Roadways (New Jersey)	$251,031	$209,891.69	$41,140.31
	#9	Contingency FY20 (PF Yr 30) - Year 1	$11,043	$0	$11,043
	#12	*MASH 2016 TL-3 Evaluation of Drop-Arm Road Closure Gate (Wyoming)	$299,396	$110,916.19	$188,479.81
FY2021 Year 2	#15	RPFP-21-CABLE-1: Redesign of the High-Tension Cable Median Barrier – Phase II	$253,893	$234,562.91	$19,330.09
	#18	RPFP-21-AGT-1: Approach Guardrail Transition behind Curb and Elevated Sidewalk (Indiana)	$146,141	$111,162.02	$34,978.98
	#20	RPFP-21-SIGN-1: Breakaway Systems for Ground-Mounted, Large Steel Sign Support Structures (New Jersey)	$77,740	$74,895.86	$2,844.14
	#22	RPFP-21-CONSULT: Annual Consulting Services Support	$61,446	$21,060.48	$40,385.52
	#25	Contingency FY21 (PF Yr 31) - Year 2	$1	$0	$1
	#26	*RPFP-FY2022-WISDOT-1: Reduced Grading for the MGS Long-Span Guardrail System – Phase I	$219,891	$0	$219,891
FY2022 Year 3	#27	FY22-IND-1-PCB: MASH 2016 TL-3 Design and Evaluation of the Indiana F-Shape PCB in Free-Standing, Asphalt Anchored Configurations, and Transitions	$530,131	$112,536.29	$417,594.71
	#28	RPFP-FY2022-MGS-4: Evaluation of Increased Block out Depth with the Midwest Guardrail System	$262,851	$146,488.55	$116,362.45
	#29	RPFP-FY2022-MGS-5: Surface Mounted Strong-Post MGS	$217,840	$127,831.22	$90,008.78
	#30	RPFP-FY2022-AGT-3: Median Approach Guardrail Transition to Concrete Median Barrier	$233,888	$12,320.34	$221,567.66
	#31	RPFP-FY2022-WZ-2: MASH TL-3 Portable Barrier System – Phase II	$331,619	$7,093.33	$324,525.67
	#32	RPFP-FY2022-WZ-3: Midwest PCB – Anchored Median Installations	$155,262	$110,813.52	$44,448.48
	#36	Contingency FY22 (PF Yr 32) - Year 3	$46,459	$0	$46,459
		Page Subtotals	$3,350,061	$1,391,328	$1,958,734

1. Budget Numbers as of 03/31/2026
2. Budget shows expenses that may not be entered into FMIS.
3. Only active projects are shown. Supplements which have been completed are not shown.
4. * Projects developed with other State's funds through interagency agreement

SUPPLEMENT NUMBER		STUDY TITLES	TOTAL STUDY BUDGET	EXPENDITURES	REMAINING BUDGET
	TPF-5(430) CONTROL NO.: 01010				
	CURRENT PROJECTS - Continued				
FY2023 Year 4	#37	RPFP-FY2023-MGS-1: Modification and Evaluation of the MGS Long Span with Increased Span Length	$377,870	$2,093.63	$375,776.37
	#38	RPFP-FY2023-AGT-1: Guidelines for Flaring Thrie-Beam Approach Guardrail Transitions - Phase IV (Continuation)	$310,591	$130,173.67	$180,417.33
	#39	RPFP-FY2023-GET-1: Generic End Terminal – Further Development and Evaluation	$437,226	$87,489.97	$349,736.03
	#40	RPFP-FY2023-MWQA-1: Continued Revisions to MwRSF Pooled Fund Q & A Website	$45,421	$6,642.14	$38,778.86
	#41	RPFP-FY2023-AUTO-1: Coordination and Collaboration with Vehicle Manufacturers and Automotive Industry	$56,219	$23,873.95	$32,345.05
	#42	RPFP-FY2023-CONSULT: Annual Consulting Services Support	$65,000	$1,531.80	$63,468.20
	#45	Contingency FY2023 (PF Yr 33) - Year 4	$19,805	$2,999.04	$16,805.96
	#46	MASH TL-3 Evaluation of Illinois DOT's Steel Railing, Type SMX	$319,463	$72,653.44	$246,809.56
	#48	*FY2023-WisDOT-Slope-1: Guidance for MGS Installed Adjacent to Steep Slopes at Variable Offsets-Phase I	$239,647	$43,856.30	$195,790.70
FY2024 Year 5	#49	*WISDOT MASH TL-3 Evaluation Of New Jersey Shape Parapet With 3-in. Overlay; State to state Agreement	$251,591	$6,903.13	$244,687.87
	#50	*FY2024-WY-1-BOX: Development and Evaluation of Box-Beam Barrier Configuration for Shielding Fixed Objects and Bridge Ends in Medians	$799,998	$13,778.32	$786,219.68
	#51	MASH Evaluation of Florida Single Post Signs Phase II	$750,000	$63,055.10	$686,944.90
	#52	*FY2024-WISC-CONC-1: Anchoring Temporary Barrier to Asphalt Phase III	$167,436	$0	$167,436
	#53	RPFP-FY2024-CONC-3: Grade-Separated Concrete Median Barrier	$213,580	$0	$213,580
	#54	RPFP-FY2024-CONC-5: Guidelines for Concrete Median Barrier Anchorage to Slabs	$309,915	0	$309,915
	#55	RPFP-FY2024-MGS-1: W-Beam and Thrie Beam Splice Joint Redesign – Phase I	$86,092	$0	$86,092
	#56	RPFP-FY2024-MGS-3: Reduced Grading for the MGS Long-Span Guardrail System	$322,730	$12,862.89	$309,867.11
	#57	RPFP-FY2024-THRIE-1: Development of a Limited Deflection MASH TL-4 Thrie-Beam Guardrail	$184,262	$8,853.75	$175,408.25
	#58	RPFP-FY2024-GET-1: Development of a Generic End Terminal - Phase IV	$138,529	$0	$138,529
	#59	RPFP-FY2024-AUTO-1: LS-DYNA Investigation of Electric Vehicles and Roadside Hardware	$142,319	$9,748.19	$132,570.81
	#60	RPFP-FY2024-CONSULT: Annual Consulting Services Support	$65,000	$621.99	$64,378.01
	#61	RPFP-FY2024-MPFW: Midwest Pooled Fund Website	$12,571	$0	$12,571
	#62	RPFP-FY2024-LS-DYNA: LS-DYNA Modeling Enhancement Support	$40,000	$14,339.26	$25,660.74
	#63	RPFP-FY2024-BR-TRAINING: Implementation of MASH Bridge Railing and Deck Overhang Research	$45,488	$523.60	$44,964.40
	#64	RPFP-FY2024-CALTRANS-LSDYNA: LS-DYNA Simulation Consulting Support	$30,000	$338.38	$29,661.62
	#65	*RPFP-FY2024-WISC-CONC-2: Portable Concrete Barrier Anchorage with Removeable Anchors	$130,000	$0	$130,000
		PAGE SUBTOTAL	$5,560,753	$502,339	$5,058,414

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Pooled Funds Completed

Completed Pooled Fund Research TPF – 5(430) Control No.: 01010		
Supplement		**Study Title**
Year 1 2020	#1	MGS with Reduced Embedment and Post Spacing over Low-Fill Culverts (Indiana)
	#3	Guidelines for Flaring Thrie-Beam Approach Guardrail Transitions - Phase II
	#4	Further Evaluation of the End Terminals Adjacent to Curb (New Jersey)
	#6	Annual Consulting Services Support
	#7	Pooled Fund Center for Highway Safety
	#8	LS-DYNA Modeling Enhancement Support
	#10	MASH 2016 TL-3 Evaluation of the MGS with Half Post Spacing and 7-ft Posts adjacent to Slope (Wisconsin)
	#11	Phase 1 Review of Median Barrier Warrants and ISPE of Cable Median Barriers (CMBs) In Kansas: ISPE
	#13	Crash Safety Evaluation of Concrete Barrier Sloped End Treatments (Iowa)
	#14	Evaluation Of Guidelines for Installing Cable Median Barrier in Kansas
Year 2 2021	#16	Modification and Evaluation of the Asphalt Pin Tie-Down for F-shape PCB: Test No. WITD-4
	#17	MASH TL-3 Portable Barrier System (Nebraska/Wyoming)
	#19	Guidelines for Flaring Thrie-Beam Approach Guardrail Transitions - Phase III
	#23	Midwest Pooled Fund Website
	#24	LS-DYNA Modeling Enhancement Support
Year 3 2022	#33	Annual Consulting Services Support
	#34	Midwest Pooled Fund Website
	#35	LS-DYNA Modeling Enhancement Support
Year 4 2023	#43	
	#44	LS-DYNA Modeling Enhancement Support
	#47	MnDOT MASH TL-3 Thrie Beam Bullnose Installation Manual

	TPF-5(533) CONTROL NO.: 01010A				
	SUPPLEMENT NUMBER	STUDY TITLES	TOTAL STUDY BUDGET	EXPENDITURES	REMAINING BUDGET
	CURRENT PROJECTS				
FY2025 Year 1	#1	RPFP-FY2025-CABLE-1: Evaluation of Midwest High-Tension Cable Median Barrier in 6H:1V V-Ditch – Phase III	$336,854	$0	$336,854
	#2	RPFP-FY2025-CONC-1: Strength Requirements for Concrete Median Barrier Anchorages	$450,439	$0	$450,439
	#	RPFP-FY2025-MGS-6: Investigation of Guardrail Modifications to Accommodate Electric Vehicles	$258,900	$0	$258,900
	#4	RPFP-FY2025-GET-1: Development of a Generic End Terminal – Phase IV – CONTINUATION	$25,992	$0	$25,992
	#5	RPFP-FY2025-Q&A-1: Summary Report on MwRSF Q and A Site	$98,906	$0	$98,906
	#6	RPFP-FY2025-CONSULT: Annual Consulting Services Support	$67,955	$0	$67,955
	#7	RPFP-FY2025-MPFW: Midwest Pooled Fund Website	$13,142	$0	$13,142
	#8	RPFP-FY2025-LS-DYNA: LS-DYNA Modeling Enhancement Support	$41,818	$0	$41,818
	#9	RPFP-FY2025-LS-DYNA-EV: LS-DYNA Investigation of Electric Vehicles and Roadside Hardware – Supplemental Funding	$62,274	$0	$62,274
	#10	RPFP-FY2025-CONTIGENCY: FY2025 Midwest Pooled Fund Program Contingency Funding	$8,720	$0	$8,720
	#11	RPFP 2025: DEVELOPMENT OF SMALL WILDLIFE EXCLUSION FENCING INCORPORATED INTO GUARDRAIL (ODOT)	$292,620	$0	$292,620
FY2026 Year 2	#12	RPFP-FY2026-CABLE-1: Concept development of Midwest Cable System End Terminal	$342,912	$0	$342,912
	#13	RPFP-FY2026-MGS-1: Strong-Post MGS Attached to Culvert Adjacent to 2H:1V Slope	$291,672	$0	$291,672
	#14	RPFP-FY2026-MGS-5: Phase II – Surface Mounted Strong Posts for MGS	$330,345	$0	$330,345
	#15	RPFP-FY2026-ZOI-1: Median Barriers with Top-Mounted Fixed Objects	$255,062	$0	$255,062
	#16	RPFP-FY2026-CONSULT: Annual Consulting Services Support	$65,216	$0	$65,216
	#17	RPFP-FY2026-MPFW: Midwest Pooled Fund Website	$18,092	$0	$18,092
	#18	RPFP-FY2026-LS-DYNA: LS-DYNA Modeling Enhancement Support	$60,033	$0	$60,033
	#19	RPFP-FY2026-CONTINGENCY: FY2026 Midwest Pooled Fund Program Contingency	$131,668	$0	$131,668
	TOTAL TPF-5(533) ACTIVE PROJECTS		$3,152,620	$0	$3,152,620

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U.S. Department of Transportation
Federal Highway Administration

The Transportation Pooled Fund (TPF) Program allows federal, state, and local agencies and other organizations to combine resources to support research into shared transportation priorities.

Pooled Fund Projects and Other Contributions (100% Federally Funded)			
Study Titles	Funding Type	FY2026 Expenditures	Commitments for FY027
Pooled Fund Commitment	Y550/Y560	$615,000	$625,000
Transportation Research Board (TRB) Annual Transfer	Y550	$111,165	$114,500
National Cooperative Highway Research Program (NCHRP) Annual Transfer	Y550	$425,572	$438,340
Total		**$1,151,737**	**$1,177,840**

Pooled Fund Projects and Other Contributions (100% Federally Funded)			
Study Titles	**Funding Type**	**FY2026 Expenditures**	**Commitments for FY027**
TPF-5(451) Road Usage Charge (RUC) America	Y550	$25,000	$25,000
TPF-5(466) National Road Research Alliance- NRRA (Phase II)	Y550	$75,000	$75,000
TPF-5(470) Guidelines for Determining Traffic Signal Charge and Clearance Intervals	Y550	$30,000	$30,000
TPF-5(479) Clear Roads Winter Highway Operations Phase III	Y550	$30,000	$30,000
TPF-5(480) Building Information Modeling (BIM) for Infrastructure	Y550	$30,000	$30,000
TPF-5(508) Concrete Bridge Engineering Institute (CBEI)	Y550	$30,000	$30,000
TPF-5(515) Evaluation of Low-Cost Safety Improvements	Y550	$5,000	$5,000
TPF-5(517) Performance Centered Concrete Construction	Y550	$20,000	$20,000
TPF-5(520) Improving Traffic Detection Through New Innovative i-LST Technology Demonstration Pilot Print	Y550	$30,000	$30,000
TPF-5(523) Building Information Modeling (BIM) for Bridges and Structures Phase II	Y560	$20,000	$20,000
TPF-5(526) Western States Consortium	Y550	$15,000	$15,000
TPF-5(533) Midwest Roadside Safety Pooled Fund Program (FY25-FY29)	Y560	$65,000	$65,000
TPF-5(536) Ahead of the Curve-Migration from NCHRP to AASHTO Technical Training Solutions	N/A	$10,000	N/A
TPF-5(537) Improving the Quality of Highway Profile Measurement	Y560	N/A	$30,000
TPF-5(544) Technology Transfer Concrete Consortium (FY25-FY29)	Y560	$12,000	$12,000
TPF-5(545) Smart Work Zone Deployment Initiative (FY25-FY29)	Y560	$25,000	$25,000
TPF-5(546) Recycled Materials Resource Center – 5th Generation	N/A	$40,000	N/A
TPF-5(550) Performance Based Specification of Fiber Reinforced Concrete	Y560	$30,000	$30,000
TPF-5(554) Traffic Control Device Consortium	Y560	$30,000	$30,000
TPF-5(556) Uncrewed Aircraft Systems (UAS) Standardization	Y560	$25,000	$25,000
TPF-5(561) Consortium for Asphalt Pavement Research and Implementation (CAPRI) - Phase 2	Y560	$10,000	$10,000
TPF-5(566) Connected Corridors Advancement Initiative	Y560	$50,000	$50,000
TPF-5(574) Developing a Roadmap for UHPC	Y560	$8,000	$8,000
Solicitation 1653 State DOT Council for Strategic AI Adoption	Y560	N/A	$20,000
Solicitation 1655 Traffic Analysis Roundtable	Y560	N/A	$10,000
Commitment		**$615,000**	**$625,000**

Note: Solicitations are pooled funds pending approval before turning into a full project. Funds will not be used until the project is approved.

FHWA Federal-Aid Division State Planning and Research

Sub-Part B (SPR-B) Program Funding

In Progress Projects
And
New Projects

	IN-PROGRESS RESEARCH						
	CONTROL NUMBER	PROJECT NUMBER SPR-	FUNDING TYPE	STUDY TITLES and Transportation Research Boad Research in Progress (RiP) link	TOTAL STUDY BUDGET	EXPENDITURES	REMAINING BUDGET
FY 2023	01046L	FY23(023)	Y560	Regression Equation Update with NET and USGS	$129,200	$62,445	$66,755
FY 2024	01057C	FY24(028)	Y560	Local Characterization of Unbound Materials (Soils/Aggregates) for AASHTOWare Pavement ME Design in Nebraska	$159,035	$66,665	$92,370
FY 2025	01071A	FY25(038)	Y560	Electric Arc Furnace Slag as a Paving Material – Phase I: Physical, Chemical, Morphological and Mineralogical Characterization and Environmental Analysis	$151,272	$21,004	$130,268
	01071B	FY25(039)	Y560	Evaluation of Low-Temperature Cracking (LTC) Performance Testing Methods to Assess Nebraska Asphalt Mixtures	$133,882	$17,071	$124,803
	01071C	FY25(040)	Y560	The Utilization of Waste Plastic as a Polymer Modifier for Asphalt Binders	$141,874	$17,071	$124,803
	01071D	FY25(041)	Y560	Effect of Nighttime Lighting on Construction Workers' Safety	$147,497	$36,471	$111,026
	01071E	FY25(042)	Y560	Optimization of Energy Dissipation Using Staggered Weirs	$136,135	$65,268	$70,867
	01071F	FY25(043)	Y560	Evaluation of NDOT's Construction Stormwater Detention Measures Using Full-Scale Testing Techniques	$199,999	$88,221	$111,778
	01071G	FY25(044)	Y560	Integrated Bridge, Transportation Network, and Community Resilience Framework for Nebraska	$147,436	$49,833	$97,603
	01071J	FY25(046)	Y560	Revised Curing Practices for NDOT Bridge Decks to Minimize Restrained Shrinkage Cracks	$165,460	$110,607	$54,853
	01071K	FY25(047)	Y560	Effect of Bridge Width on Crashes in Nebraska	$152,230	$20,379	$131,851
	01071L	FY25(048)	Y560	Development of Accurate and Reliable Average Annual Daily Traffic (AADT) Factoring Methods	$150,732	$63,175	$87,557
	01071M	FY25(049)	Y560	Crash Modification Factor and Feasibility Analysis of Lighting Rural Intersections in Nebraska	$172,618	$20,555	$152,063
				Page Subtotal	$1,987,370	$638,765	$1,356,597

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	IN-PROGRESS RESEARCH - continued						
	CONTROL NUMBER	PROJECT NUMBER SPR-	FUNDING TYPE	STUDY TITLES and Transportation Research Boad Research in Progress (Rip) link	TOTAL STUDY BUDGET	EXPENDITURES	REMAINING BUDGET
FY 2026	01078A	FY26(050)	Y560	AI and Immersive AR/VR for Sustained Material and Construction Inspection Training	$142,359	$0	$142,359
	01078B	FY26(051)	Y560	Development of Reliable Wireless Connectivity in Support of e-Ticketing System in Nebraska Rural Construction Sites	$173,485	$0	$173,485
	01078C	FY26(052)	Y560	Alternative Pavement Rehabilitation Strategy Using a Geogrid Interlayer	$179.875	$0	$179.875
	01078D	FY26(053)	Y560	Characterization of Sediment Loads and Size Distribution in Nebraska Roadway Runoff - Phase II	$193,213	$0	$193,213
	01078E	FY26(054)	Y560	Development of a Tool to Streamline and Expedite the General Permit Application	$180,000	$0	$180,000
	01078F	FY26(055)	Y560	Camber Control in Precast/Prestressed Concrete NU Girders	$85,575	$0	$85,575
	01078G	FY26(056)	Y560	Performance Evaluation of the First UHPC Bridge Project in Nebraska	$99,727	$0	$99,727
	01078H	FY26(057)	Y560	Assessment of Crash Reduction Traffic Control Measures at T-intersections on Rural Highways	$175,616	$0	$175,616
	01078J	FY26(058)	Y560	Exploring Pathways for Innovative Finance Mechanisms to Empower Transportation Project Development in Nebraska	$176,164	$0	$176,164
	01078K	FY26(059)	Y560	Selection, Integration, and Effectiveness Study of Input Data for Nebraska Variable Speed Signs on I-80	$169,946	$0	$169,946
	01078L	FY26(060)	Y560	Evaluating the Interoperability of Connected and Autonomous Vehicles and Signal Phasing and Timing Infrastructure	$185,796	$0	$185,796
	01078M	FY26(061)	Y560	Review and Study of Dynamic Wireless Power Transfer Technology for In-Road Charging of Electric Vehicles	$79,954	$0	$79,954
	01078N	FY26(062)	Y560	Gravel Road Performance Enhancements -Phase II	$177,000	$0	$177,000
	01078P	FY26(063)	Y560	Development of ME Pavement Design for Cementitious Material Reinforced Subgrades	$180,143	$0	$180,143
				PAGE SUBTOTAL	**$2,198,853**	**$0**	**$2,198,853**
BUDGET FOR IN PROGRESS PROJECTS					**$4,186,223**	**$638,765**	**$3,555,450**

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NEW FY2027 PROJECTS						
CONTROL NUMBER	PROJECT NUMBER SPR-	FUNDING TYPE	STUDY TITLES	TOTAL STUDY BUDGET	EXPENDITURES	REMAINING BUDGET
01089A	FY27(064)	Y560	The Use of Recycled Plastic in Concrete Pavements – Phase II	$159,875.00	$0	$159,875.00
01089B	FY27(065)	Y560	Cost-Benefit Analysis of Preemptive Weather-Related Road Closures	$150,554.83	$0	$150,554.83
01089C	FY27(066)	Y560	Developing a Nebraska-Specific Evaluation Framework for Superheavy Load Movements on Pavements	$162,527.00	$0	$162,527.00
01089D	FY27(067)	Y560	The Use of Recycled Plastic in Asphalt Pavements – Phase II	$159,897.00	$0	$159,897.00
01089E	FY27(068)	Y560	Nebraska Risk-Informed Construction Scheduling and Impact Analysis	$189,448.00	$0	$189,448.00
01089F	FY27(069)	Y560	Advancing Pollinator Habitat Monitoring through Remote Sensing on Nebraska Roadsides	$174,632.10	$0	$174,632.10
01089G	FY27(070)	Y560	Development and Evaluation of Approach Guardrail Transition with Increased Span Length between Concrete Bridge Rail and First Transition Post – Phase II	$218,846.00	$0	$218,846.00
01089H	FY27(071)	Y560	Implementation of UHPC Bridge Deck Overlays in Nebraska	$146,264.00	$0	$146,264.00
01089J	FY27(072)	Y560	High-Strength, Corrosion-Resistant Reinforcement for Empirical Deck Design	$163,397.00	$0	$163,397.00
01089K	FY27(073)	Y560	Evaluation of Alternative Intersection and Interchange Options for Nebraska	$189,930.00	$0	$189,930.00
01089L	FY27(074)	Y560	Modernizing NDOT's Pavement Marking Program for Retroreflectivity Compliance and Cost-Effective Restriping	$218,687.00	$0	$218,687.00
			BUDGET FOR NEW PROJECTS	$1,934,057.93	$0	$1,934,057.93

OTHER PROGRAM ITEMS						
CONTROL NUMBER	PROJECT NUMBER SPR-	FUNDING TYPE	STUDY TITLES	TOTAL STUDY BUDGET	EXPENDITURES	REMAINING BUDGET
RAPID RESPONSE RESEARCH						
			Rapid Response Research FY2023 Allocation	$180,000	N/A	N/A
			Rapid Response Research FY2024 Allocation	$35,000	N/A	N/A
			Rapid Response Research FY2025 Allocation	$200,000	N/A	N/A
			Rapid Response Research FY2026 Allocation	$140,000	N/A	N/A
			Rapid Response Research FY2027 Allocation	$25,000	N/A	N/A
Funds Allocated for Rapid Response Research				$580,000	N/A	N/A
Funds previously allocated to completed projects				$84,938	N/A	N/A
Funds available for projects				$495,062	N/A	N/A
01071P	RRR (003)	Y560	UHPC Decked I-Beam for Accelerated Bridge Construction	$48,992	$0	$48,992
01078C	FY26(052)	Y560	Alternative Pavement Rehabilitation Strategy Using a Geogrid Interlayer	$11,720	$0	$11,720
TOTAL AVAILABLE FY27 FUNDS FOR RAPID RESPONSE RESEARCH				$434,350	$0	$434,350

PROGRAM MANAGEMENT, IMPLEMENTATION, AND COORDINATION RESOURCES						
01078Q	CC(001)	Y560	Consultant use for Implementation and Research Coordination – FY25	$25,000	$0	$80,000
		Y560	Consultant use for Implementation and Research Coordination – FY26	$25,000		
		Y560	Consultant use for Implementation and Research Coordination – FY27	$30,000		
OTHER RESOURCES				$80,000	$0	$80,000
Total New Projects and FY27 Other Program Items				$2,387,407.93	$0	$2,387,407.93

1. Budget Numbers as of 03/31/2026
2. Budget shows expenses that may not be entered into FMIS
3. Only Active Projects are shown. Completed projects are not shown.

FHWA Federal-Aid Division State Planning and Research

Sub-Part B (SPR-B) Program Funding

In Progress and New Research Projects Description

Control Number	01046L
Project Number	**SPR-FY23(023)**
Project Title	**Regression Equation Update**
Principal Investigator	**Kellan R. Stauch – USGS**
Project Start Date	**07/01/2022**
Project Completion Date	**07/01/2026**
Technical Advisory Committee	**Kirk Harvey, Jason Dayton, Julie Ramirez, Ross Barron, Jamie Reinke – DNR, Jared Ashton, Stefan Schaepe, Deanna Ringenberg, Brenda Desmore – USGS, Anna Allen, Ricki Kuvach, Kyle Hall – FHU, Emilie Hudon**
Project Total Costs	**$129,600**
Project Expenditures to Date	**$62,445**
Number Of Extensions Granted	**Two (2)**
Percentage Of Project Complete	**16%**
Status	**On Approved Revised Schedule**
FY-2027 Budget	**$66,755**
FY-2027 Tasks To Be Completed	**Tasks 1-4**

Background: This project will implement StreamStats for Nebraska. StreamStats is an online mapping interface that is designed to provide a user-friendly tool that researchers, managers, and others can use to rapidly and easily compute basin characteristics, and flow statistics. These statistics describe the frequency of extreme conditions in streams and rivers and are valuable data that are routinely used by regulators, designers, builders, natural resource managers, biologists, and others. Estimates of peak flow statistics are often needed to fulfill design or regulatory requirements, however, without StreamStats, flow data are generally only available for locations where there is a long-term stream gage. Statistical regression analyses of peak flows at stream gage locations can be used to estimate flows at locations without stream gages by relating extreme flow to basin characteristics. A wide variety of professionals, including engineers, scientists, regulators, and natural-resources managers regularly compute and use streamflow statistics, such as the I-percent annual exceedance probability flood statistics. These professionals must dedicate resources to determine drainage area, watershed boundaries and basin characteristics upstream from a site of interest for each project they work on, because there are no publicly available web tools such as StreamStats in Nebraska. Often the methods used to estimate the flows related to these events at un-gaged locations are time-consuming, resource-intensive and may generate non-reproducible results. These methods are seldom available to the public and non-hydrologists because they require considerable expertise and computer resources. This project would allow the public to gain access to a consistent, fast, and widely accepted method of estimating a variety of useful flow statistics. Statewide regression equations for peak-flow frequencies in Nebraska have been published previously, but since the last report was published many years of streamflow data have been collected, analysis techniques have changed, and geospatial datasets have improved. In addition, the Nebraska Department Natural Resources (NeDNR) is cm Tenthly in the process of updating the geospatial datasets, peak streamflow statistics and regression equations for Nebraska. This project will integrate and process the Nebraska Department of Natural Resources updated geospatial datasets, peak streamflow statistics and regression equations into a free and readily available web-based application that would allow professional users and the public to quickly and easily access streamflow statistics at gaged and ungagged locations.

Objective: A process has been designed by the USGS national team for implementing the StreamStats tool, as has already been done in 43 other States. A national team at the U.S. Geological Survey (USGS) has developed the StreamStats user interface (Figure 1), but the web tool must be implemented on a state-by-state basis. This project will adapt StreamStats to Nebraska datasets, using the national implementation model to provide a web tool that will greatly reduce the amount of effort, time, and cost required for a user to estimate peak-flow statistics at user-selected points. To develop the StreamStats web tool, several tasks are required:

1.) Integrating NeDNR derived geospatial datasets into the StreamStats web interface.

2.) Review and approval of NeDNR peak streamflow statistics and regression equations. NeDNR peak streamflow statistics and regression equations will be analyzed for quality assurance to ensure that approp1iate methods and procedures were used to develop accurate streamflow regression equations. Results of regression equations will also be compared to results calculated using StreamStats to ensure reproducibility of the solutions and identify and reconcile any possible discrepancies.

3.) Implementation and coding of regression equations into the StreamStats web tool.

4.) All data sets will be published in a permanent publicly available repository (e.g., Science base https://www.sciencebase.gov/catalog/) with associated complete metadata.

Tasks & Percentage Completed

Tasks	Budget by Task	Percent Completed
Task 1: StreamStats GIS development and implementation	**$34,800**	**50%**
Task 2: Peak Flow Regression Equation review and approval	**$29,800**	**20%**
Task 3: Peak flow regression equation implementation into StreamStats	**$36,600**	**0%**
Task 4: Analysis and publication of datasets and metadata	**$48,000**	**0%**

Deliverables: Direct measurable environmental benefits such as improved water quality are expected to result from the implementation of this tool arising from the ability of managers and decision-makers to better plan for extreme flow conditions. Frequencies of peak flows are important to understanding floodplain connectivity, wetlands dynamics, geomorphology, instream habitat and the impacts of human infrastructure on the environment during flooding.

Performance: Project has an approved extension request.

CONTROL NUMBER	01071A
Project Number	**SPR-FY24(028)**
Project Title	**Local Characterization of Unbound Materials (Soils/Aggregates) for AASHTOWare Pavement ME Design in Nebraska**
Principal Investigator	**Jamilla Teixeira – UNL**
Project Start Date	**07/01/2024**
Project Completion Date	**05/31/2027**
Technical Advisory Committee	**Bruce Barrett, Brady Dresselhaus, Matthew Park, Nikolas Glennie, and Alex Silvey**
Project Total Costs	**$159,035**
Project Expenditures to Date	**$66,665**
Number Of Extensions Granted	**One (1)**
Percentage Of Project Complete	**60%**
Status	**On approved Schedule**
FY-2027 Budget	**$92,370**
FY-2027 Tasks to Be Completed	**Tasks 2-6**

Background: Several states have started using the AASHTOWare Pavement ME Design (Pavement ME) for road design, and recently Nebraska DOT is also taking notice. What separates Pavement ME (ME) from other design procedures is that this empirical-mechanistic approach takes into account the material's individual response to predict the overall pavement performance. In the ME, there are three different levels of input to meet accuracy, and they require a set of material properties. However, obtaining the input parameters is a time-consuming step that oftentimes limits the application of ME. The resilient modulus (Mr) is one of the key fundamental material properties required. To contribute to implementing ME in the design of Nebraska pavements, this study aims to (1) establish a large data set of localized Mr and characteristics of unbound materials in Nebraska, (2) develop a simple method to correlate the modulus with commonly used geotechnical properties. To meet the goal, we will conduct (1) an extensive literature review of ME and other state studies, (2) laboratory testing of selected unbound materials for physical-mechanical properties and investigation of the existing correlations between Mr and soil properties, (3) evaluation and calibration of Mr for selected unbound materials and verification of the correlation to estimate Mr using soils model, and (4) finite element modeling of flexible and rigid pavement employing stress-dependent model and evaluate the sensitivity analysis varying unbound materials. Unbound and subgrade materials will be sampled from at least five different areas including problematic soils, and various testing will be conducted to determine numerous properties and characteristics including: materials classification (AASHTO and USCS), moisture-density relations, unconfined compressive strength, and resilient modulus. The resilient modulus test will be conducted according to AASHTO T 307 procedure equipped by the UNL. The resulting outcomes with statistical analyses will show the archive data set of NE unbound materials for implementing ME more optimally.

Objective: The objectives of this research are to 1) establish an extensive data set of localized Mr and other geotechnical characteristics of unbound materials for representative NE locations, 2) develop a simple and robust method to correlate the Mr with commonly used geotechnical properties that meet for Level 2 inputs, and 3) evaluate the effect of input parameters on the performance of the typical NE pavement structures.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Extensive Review	**$14,049**	100%
Task 2: Material Sampling	**$21,214**	75%
Task 3: Experimental Program	**$70,193**	50%
Task 4: Develop correlations of Mr and other geotechnical properties	**$28,468**	55%
Task 5: Sensitivity analysis	**$16,620**	10%
Task 6: Design Recommendation	**$8,491**	10%
Task 7: Report	**$1,000**	0%

Deliverables: Based on the analyses of the data generated from this research, reliable experimental data to meet Levels 1 and 2 inputs will be prepared, and the resilient modulus models will be calibrated for local unbound pavement design. The extensive literature review (state DOT studies, national-international studies, etc.), laboratory testing, and finite element modeling simulation will provide recommended practices for roadway design in the future. Successful accomplishment of this research will provide a good level of confidence that NDOT can save costs due to more optimized pavement design. These advantages can lead to reducing long-term maintenance costs and enhancing the performance and design life of new and rehabilitated pavements.

Performance: Project has an approved extension request

CONTROL NUMBER	01071A
Project Number	**SPR-FY25(038)**
Project Title	**Electric Arc Furnace Slag as a Paving Material – Phase I: Physical, Chemical, Morphological, and Mineralogical Characterization and Environmental Analysis**
Principal Investigator	**Jamilla Teixeira – UNL**
Project Start Date	**07/01/2024**
Project Completion Date	**05/31/2027**
Technical Advisory Committee	**Bruce Barrett, Nikolas Glennie, Brendon Schmidt, Matthew Park, Lieska Halsey, Wally Heyen**
Project Total Costs	**$151,272**
Project Expenditures to Date	**$21,004**
Number Of Extensions Granted	**One (1)**
Percentage Of Project Complete	**66%**
Status	**On Schedule**
FY-2027 Budget	**$130,268**
FY-2027 Tasks to Be Completed	**Task 1-5**

Background:

NDOT is interested in exploring the utilization of Electric Arc Furnace Slag (EAF) as an alternative for soil stabilization. This research initiative holds the potential to diminish the necessity for commercial stabilizing agents like hydrated lime or Portland cement, Consequently, contributing to a reduction in CO2 emissions and offering a sustainable solution for pavement construction in Nebraska. The application of slags for soil stabilization has become a prominent topic within the pavement community. It presents an opportunity to enhance pavement performance, leading to longer-lasting roads by improving soil engineering properties. Simultaneously, it addresses the growing accumulation of materials in landfills while reducing carbon emissions.

Objective:

The primary objectives of this research are to:

1. Conduct a bibliometric analysis aimed at identifying key national and international studies, alongside research institutions, focusing on the utilization of slag specifically for pavement applications.
2. Gather and synthesize technical reports and U.S. state agency specifications, with a specific emphasis on delineating the prerequisites necessary for employing slag as a material for pavement applications. Characterize development behavior and required embedment lengths for full development of GFRP bars in UHPC.
3. Identify the main sources of slags in Nebraska and characterize them in terms of physical, chemical, mechanical, mineralogical, and morphological characteristics that are considered important for stabilization of soils.
4. Verify if the addition of slags can pose environmental concerns due to leaching of hazardous heavy metals in comparison with traditional stabilizing materials.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Literature Review	**$ 5,749**	95%
Task 2: Sample Collection and Preparation	**$6,296**	90%
Task 3: Experimental Plan (Slag Characterization and Environmental Analysis)	**$68,860**	75%
Task 4: Examination of Feasibility and Potential Implementation	**$36,094**	30%
Task 5: Documentation and Presentation	**$34,276**	40%

Deliverables:

This study will enrich the state-specific soil stabilization strategies and pavement sustainable solutions. Successfully accomplished research will show if the EAF slag is technically and environmentally suitable for paving application. With the success of this initial stage laboratory-based research, the research team plan to move to a second phase focused on soil-slag mechanical characterization and field evaluation. A procedure manual for using EAF/caster slags will be prepared and delivered to NDOT at the end of multi-phase study. Those results will be suggested to be incorporated into the NDOT Standard Specifications for Highway Construction, which can be used for statewide and countywide implementation.

Performance:

Project Started on July 1st, 2024.

Control Number	01071B
Project Number	**SPR-FY25(039)**
Project Title	**Evaluation of Low-Temperature Cracking (LTC) Performance Testing Methods to Assess Nebraska Asphalt Mixtures**
Principal Investigator	**Chun-Hsing Ho – UNL**
Project Start Date	**07/01/2024**
Project Completion Date	**05/31/2026**
Technical Advisory Committee	**Robert Rea, Bruce Barrett, Brendon Schmidt, Matthew Park, Lieska Halsey**
Project Total Costs	**$133,882**
Project Expenditures To Date	**$16,924**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**72%**
Status	**On Schedule**
FY-2027 Budget	**$116,958**
FY-2027 Tasks To Be Completed	**Task 2-4**

Background:

NDOT has embarked on the development of balanced mix design (BMD) method with the two previous NDOT-funded research projects, Phase I (SPR-FY22 (002)) and Phase II (SPR-FY23(016) that considers 2 main distresses: rutting and mid-temperature cracking. Although the research outcomes show that the proposed BMD methods are practically efficient and implementable, they are limited and do not assess low temperature cracking resistance of asphalt mixtures, which is considered as one of the main concerns in cold climate states like Nebraska. Based on the NCHRP 20-07(406) report, there are three states (Iowa, Minnesota, and Missouri) in the mid-US regions that require a thermal cracking test in their mix design specifications [1]. The report further indicated that among state DOTs and asphalt contractors, the most commonly used thermal cracking tests were the Semi-Circular Bend Test (SCB), the Disc-Shaped Compact Tension Test (DCT), the Indirect Tensile (IDT) Creep Compliance and Strength Test, the Thermal Stress Restrained Specimen Test (TSRST), the Illinois Flexibility Index Test (I-FIT) and Bending Beam Rheometer (BBR) test (Figure 1).

Objective:

The primary objectives of this research are to:

1. Conduct LTC tests on the different binders and mixtures collected from Nebraska field projects to verify the sensitivity and reproducibility of suggested tests from literature. The selected mixtures will include various binder PG grade, source, and content, aggregate types (virgin and RAP) and nominal maximum aggregate size.
2. Verify the LTC sensitivity to mixture volumetrics. Plant collected mixtures will be lab compacted at different levels of air voids to verify LTC test susceptibility to this mixture parameter.
3. Compare results from the two scales (binder & mixture) of material testing with results obtained from samples collected from NDOT paving projects approved by NDOT TAC members.
4. Establish preliminary pass/fail thresholds based on the obtained results and comparison with literature for future QC and acceptance purposes

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Literature Review	**$ 45,507**	100%
Task 2: Experimental Plan	**$19,462**	95%
Task 3: Lab Test	**$31,803**	90%
Task 4: Data Analysis	**$54,509**	90%
Task 5: Documentation and Final Report	**$1,100**	75%

Deliverables:

This study will contribute to the implementation of Nebraska Balanced Mix Design (BMD). Currently, only volumetric characteristics are considered in the design of Nebraska asphalt mixtures, and the effects of new materials such as recycling agents, antioxidants, polymers, waste plastics, and/or high RAP materials cannot be fully addressed. Furthermore, the addition of an NDOT project with a focus on LTC (Low Temperature Cracking) is a critical need that will allow the determination of the most suitable LTC test method to be incorporated into the Nebraska BMD approach. In this way, fundamental properties of mixtures can better address the effects of low temperature, such as thermal cracking and mixture interactions during freeze-thaw conditions.

Performance:

Project started July 1st, 2024.

Control Number	01071C
Project Number	**SPR-FY25(040)**
Project Title	**The Utilization of Waste Plastic as a Polymer Modifier for Asphalt Binders**
Principal Investigator	**Jamilla Teixeira – UNL**
Project Start Date	**07/01/2024**
Project Completion Date	**05/31/2027**
Technical Advisory Committee	**Robert Rea, Bruce Barrett, Brendon Schmidt, Matthew Park, Lieska Halsey**
Project Total Costs	**$141,874**
Project Expenditures to Date	**$17,071**
Number Of Extensions Granted	**One (1)**
Percentage Of Project Complete	**67%**
Status	**On Schedule**
FY-2027 Budget	**$124,803**
FY-2027 Tasks to Be Completed	**Task 1-5**

Background:

Polymer-modified asphalt (PMA) has shown great promise in improving the performance of flexible asphalt pavements at low, intermediate, and high temperatures by increasing pavement resistance to permanent deformation, thermal cracking, and fatigue cracking. Recently, waste plastics (WPs) have been explored for making PMAs and incorporating them in asphalt binder through wet processes due to WP abundance and their ability to act as bonding enhancers. NDOT is interested in exploring the use of WP as an alternative sustainable material for binder modification. This research effort can contribute to reducing, reusing, and recycling waste plastic materials while providing enhanced binders and asphalt mixtures.

Objective:

The primary objectives of this research are to:

1. Evaluate the effect of PE WP size on asphalt's storage stability. We will vary the WP sizes from millimeter (mm) to micrometer (mm) and nanometer (nm) ranges. We will determine the storage stability of the modified asphalt binder using a globally established separation tube test (also called the cigar tube test).
2. Determine the distribution and aggregation behavior of WPs (of different composition and size) in the asphalt binder. We will use time-resolved dynamic light scattering techniques that provide time-dependent measurement and information about particle aggregation behavior in a liquid dispersion media (here the binder).
3. Verify the rheological properties of single and hybrid PMAs with and without the use of surfactants subjected to short- and long-term aging. We will test the WP/Surf incorporated PMAs using dynamic shear rheometer and bending beam rheometer.
4. Compare the results from hybrid PMA with commercial highly polymer modified base binders used in Nebraska.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Literature Review	**$ 11,838**	97%
Task 2: Waste Sampling and Characterization	**$ 17,669**	95%
Task 3: PMA Laboratory Tests (Blends and Tests)	**$ 42,816**	70%
Task 4: Analysis of Test Results	**$ 37,403**	60%
Task 5: Documentation and Presentation	**$ 31,149**	60%

Deliverables:

This research is expected to develop a stable polymer modified asphalt (PMA) with improved storage stability and rheological properties compared to the commercial PMAs that are currently in use. The project targets the production of PMAs using waste plastics -
that will reduce the overall cost of production for PMAs and will provide long-term stability to the asphalt pavement. The research project will also develop information about WPs characteristics that will provide the best performing and highly stable PMA without increasing the cost of PMA production and application. The micro- and nanoscale WPs are also expected to enhance the durability and crack-resistance or prevention of crack-initiation of the asphalt pavements through bridging between aggregates.

Performance:

Project Started July 1st, 2024.

Control Number	01071D
Project Number	**SPR-FY25(041)**
Project Title	**Effect of Nighttime Lighting on Construction Workers' Safety**
Principal Investigator	**Chun-Hsing Ho – UNL**
Project Start Date	**07/01/2024**
Project Completion Date	**05/31/2026**
Technical Advisory Committee	**Devin Townsend, Lorraine Legg, Cameron Craig, Lieska Halsey, Abe Anshasi - FHWA**
Project Total Costs	**$147,497**
Project Expenditures to Date	**$36,471**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**60%**
Status	**On Schedule**
FY-2027 Budget	**$111,026**
FY-2027 Tasks to Be Completed	**Task 3-6**

Background:

Current roadway lighting is designed specifically to provide illumination for vehicles and pedestrians in support of residential street and highway operations. However, the illumination levels are usually less than 20% of what is required for work operations [1] and do not take nighttime construction into consideration. Many states Departments of Transportation (DOT) use some form of nighttime work zone lighting based on the Federal Highway Administration's Nighttime Lighting Guidelines [2] and NCHRP's Illumination Guidelines [3] to conduct construction and maintenance activities on or near the travel portion of the road system. However, in the past 10 years, light emitting diode (LED) technology has evolved, and the illuminance of lighting sources has increased; the resources for nighttime lighting design from the two national guidelines have been outdated and need improvements and updates. More recently, Indiana DOT [4] and Virginia DOT [5] have conducted research projects about the glare assessment based on the lighting system's parameters and luminance levels of lighting sources, but their demonstration settings were performed in a controlled environment, and no real field test was used to assess the effectiveness of the proposed lighting set-ups. The geometry and characteristics of construction operations and highway profiles vary by place, so lighting arrangements should be conducted in a practical way that would be suitable for the structure of highways in Nebraska. Therefore, this proposal is prepared to provide NDOT, construction organizations (e.g., Associated General Contractors of America, AGC Nebraska Chapter), and contractors with a list of recommendation of nighttime lighting arrangements for construction operations at night as well as to supplement informed knowledge about construction lighting setups and update guidelines to the NDOT "Standard Specifications for Highway Construction".

Objective:

The primary objectives of this research are to evaluate the effect of lighting on work zone safety, taking the perspectives of construction workers and motorists into consideration for nighttime lighting arrangements, including:

1. the effect of lighting (i.e., glare/luminance/visibility) on the visual performance of construction workers.
2. the effect of orientation and placement of light towers on the perception of construction workers and motorists.
3. the identification of unsafe conditions due to inadequate lighting arrangements at nighttime work zones

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Literature Review	**$ 24,557**	100%
Task 2: Survey	**$18,087**	100%
Task 3: Experimental Plan and Prototyping	**$28,613**	80%
Task 4: Data Analysis	**$69,636**	60%
Task 5: Field Test and Assessment	**$5,504**	0%
Task 6: Documentation and Final Report	**$1,100**	30%

Deliverables:

This study will contribute to the state-of-the-practice nighttime lighting guidelines by conducting a series of field prototyping on glare and luminance assessments through a variety of lighting arrangements. The proposed project is prepared based on glare and luminance assessments from the perspectives of construction workers and motorists in nighttime work zones. We will evaluate factors influencing the safety of nighttime construction work zones such as orientation of lights, placement of light towers, type of lights, etc. and provide a list of recommended arrangement of lighting systems for future nighttime construction planning. Specifically, the project will focus on the effect of glare/luminance/visibility on the perception of motorists, the visual performance of construction workers, the interference of construction workers and equipment/vehicles, and the identification of unsafe conditions at nighttime work zones on I-80. The implementation of an NDOT project with a focus on lighting arrangements is a vital addition to being incorporated into NDOT's daily construction operations, roadway design, and traffic control measures.

Performance:

Project started July 1st, 2024

Control Number	01071E
Project Number	**SPR-FY25(042)**
Project Title	**Optimization of Energy Dissipation Using Staggered Weirs**
Principal Investigator	**David Admiraal – UNL**
Project Start Date	**07/01/2024**
Project Completion Date	**05/31/2027**
Technical Advisory Committee	**Julie Ramirez, Kyle Hall - FHU, Anna Allen, Lieska Halsey, Jason Dayton, Kirk Harvey, Jordon Sanford, Ben Fischer – FHU, Ricki Kuvach, Adbul Sultonov, Elise Rojas, Nawshin Haque, Chris Urkoski, Matthew Vanpelt, David Qudus**
Project Total Costs	**$136,135**
Project Expenditures to Date	**$65,268**
Number Of Extensions Granted	**One (1)**
Percentage Of Project Complete	**75%**
Status	**On Schedule**
FY-2027 Budget	**$70,867**
FY-2027 Tasks to Be Completed	**Task 1, 3 to 10**

Background:

Energy dissipation at culvert outlets is necessary for preventing excessive scour that can result in damage to the outlet structure, adjacent roadway, or downstream channel. Energy dissipation basins have long been used for this purpose because of their simple design and effectiveness, but these basins take a lot of space and result in stagnant water pools. Improvements to dissipation structures can help reduce the size of these basins, which results in reduced project cost and helps eliminate stagnant pools.

Objective:

The objective of the proposed research is to optimize the staggered weir so that it maximizes flow energy dissipation to minimize downstream erosion. In the research process, we will both:

1. optimize the geometry of the staggered weir to improve its effectiveness and
2. extend its range of applicability by modifying the testing system so that we can investigate a much wider set of inlet Froude numbers and inflow conditions.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Literature and Design Process Review	**$ 6.386**	90%
Task 2: Model Revisions	**$41.437**	100%
Task 3: TAC 1- Data Collection Strategy	**$0**	100%
Task 4: Test Data One (Variable Geometry Data)	**$47.639**	80%
Task 5: TAC 2- Review Variable Geometry Data	**$0**	0%
Task 6: Test Data Two (Follow-up Tests)	**$6,514**	0%
Task 7: TAC 3- Review Follow-up Data	**$0**	0%
Task 8: Design Integration	**$11,715**	0%
Task 9: Report Preparation	**$13,072**	0%
Task 10: Final Presentation, Draft Revisions, and Reporting	**$9,372**	0%

Deliverables:

There will be three primary outputs of this project: (1) A thorough description of the test procedure to determine the optimal staggered-weir geometry and the result, (2) a detailed dataset for the optimal staggered-weir geometry, and (3) integration of test results into spreadsheets and/or software for simplified design of staggered-weir dissipation structures.

Performance:

Project started July 1st, 2024.

Control Number	01071F
Project Number	**SPR-FY25(043)**
Project Title	**Evaluation of NDOT's Construction Stormwater Detention Measures Using Full-Scale Testing Techniques**
Principal Investigator	**Michael A. Perez – Auburn University**
Project Start Date	**07/1/2024**
Project Completion Date	**05/31/2026**
Technical Advisory Committee	**Jason Jurgens, Ronald Poe, Lieska Halsey, Kyle Hall - FHU, Julie Ramirez, Ricki Kuvach**
Project Total Costs	**$199,999**
Project Expenditures to Date	**$88,221**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**75%**
Status	**On Schedule**
FY-2027 Budget	**$111,778**
FY-2027 Tasks to Be Completed	**Tasks 2 and 5-7**

Background:

Earthmoving activities associated with highway construction create increased risk of downstream pollution from stormwater runoff. Rainfall dislodges sediment and runoff mobilizes soil particles and other pollutants that can cause significant risk to receiving water bodies. Excessive sediment in waterways can harm aquatic life by increasing turbidity, reducing fish habitats, as well as increasing the risk of flooding by reducing the flow capacity of rivers and streams. The cost of sediment in surface waters is drastic, with the cost of sediment pollution being estimated at $16 billion in 1998, including the physical, biological, and chemical damage caused by unmanaged or improperly managed stormwater discharges.

Objective:

The objective of this proposed research is to evaluate NDOT's standard silt trap and sediment trap used to facilitate impoundment and capture sediment. This study is divided into three primary objectives:

1. Develop a full-scale testing methodology that allows for the performance comparison of construction stormwater detention practices,
2. Evaluate construction stormwater detention practices and modified installations through full-scale testing at the AU-SRF that mimics conditions found on a NDOT highway construction project, and
3. Develop implementable design guidance and comparisons on the use of detention practices on construction projects, including performance, costs, installation, maintenance requirements, etc.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Kickoff Meeting	**$1,000**	100%
Task 2: Literature Review	**$16,000**	90%
Task 3: Design Experimental Detention Measures/Develop Testing Methodology	**$12,000**	100%
Task 4: Construction of Experimental Detention Measures	**$40,000**	100%
Task 5: Conduct Full-Scale Testing	**$103,000**	75%
Task 6: Data Analysis	**$12,000**	50%
Task 7: Final Report	**$15,999**	0%

Deliverables:

This study is expected to provide immediate implementable results for NDOT. A complete report containing an executive summary and complete record of the project, including methods, data collection and analysis will be provided. In addition, a technology transfer brief will be created to summarize key findings. Design recommendations for evaluated stormwater detention practices will be developed for NDOT implementation consideration. This guidance will include clear specifications, drawings, and language for stormwater detention practices that may be considered for future stormwater management plans.

Performance:

Project started July 1st, 2024.

Control Number	01071G
Project Number	**SPR-FY25(044)**
Project Title	**Integrated Bridge, Transportation Network, and Community Resilience Framework for Nebraska**
Principal Investigator	**Christine Wittich – UNL**
Project Start Date	**07/01/2024**
Project Completion Date	**05/31/2027**
Technical Advisory Committee	**Ryan Huff, Ross Barron, Tom Renninger, Walter Moy, Emilie Hudon, Lieska Halsey, Kirk Harvey, Jason Dayton, Joshua Martin – FHWA, Ben Fischer – FHU, Matthew Wieseler**
Project Total Costs	**$200,877**
Project Expenditures To Date	**$49,833**
Number Of Extensions Granted	**One (1)**
Percentage Of Project Complete	**30%**
Status	**Behind Schedule**
FY-2026 Budget	**$97,603**
FY-2026 Tasks To Be Completed	**Tasks 1-5**

Background:

Climate-related disasters, such as flooding, routine damage infrastructure, weakening economies, and significantly impact communities within the country and within Nebraska. Since 1980, 338 climate-related disasters in the United States have incurred damage exceeding $1 billion (NOAA 2022). The average number of billion-dollar disasters per year has more than doubled from 7.7 events to 17.8 events over the past 5 years and is expected to continue to increase. The State of Nebraska Long-Term Recovery and Resilience Plan specifically identify efficient assessment, restoration, and revitalization of infrastructure systems as a priority, and the state transportation network is critical to state climate resilience. NDOT's Long-Range Transportation Plan (LRTP) identified "secure and resilient transportation" as one of its six overarching goals to achieve by 2040. Climate-related disasters, such as flooding, can have initially catastrophic impacts, such as structural collapse, critical route closures, and casualties; however, the impacts can also cascade due to the interdependencies of modern communities. Given the anticipated increased frequency of major flood events combined with the potentially devastating impacts, it is critical for the state of Nebraska and the Department of Transportation to increase resilience to future hazards.

Objective:

Given the critical need to evaluate and quantify resilience considering the integrated Nebraska transportation network and broader community, the following technical objectives guide the proposed work:

1. Develop a framework for quantifying resilience considering an integrated state transportation and community model.
2. Validate the developed resilience framework using the floods of 2019.
3. Demonstrate the use of the resilience framework for prioritization and planning for future hazards.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Literature Review and Survey	**$ 29,624**	95%
Task 2: Development of Resilience Model	**$47,008**	60%
Task 3: Validation of Resilience Model	**$48,276**	10%
Task 4: Case Study Demonstration	**$37,235**	0%
Task 5: Final Reporting	**$38,734**	0%

Deliverables:

The primary outcomes of this project will be:

1) a validated flood resilience model which can be used by NDOT for prioritizing maintenance and recovery planning; and,

2) prioritization of potential resilience improvement projects. The implementation of the latter is straightforward, where NDOT can elect to implement the considered projects with known improvements to transportation resilience. Implementation of the resilience model is a focus of the project's third objective. The resilience model will be developed in Python, such that the state-of-the-art IN-CORE platform can be leveraged. The PIs will work with the TAC to demonstrate the model's usage within ongoing scenario-planning efforts or other current and future projects that may benefit from resilience quantification, which will be documented in detail in the final technical report.

Performance:

Project started July 1st, 2024.

Control Number	01071H
Project Number	**SPR-FY25(045)**
Project Title	**Refined Analysis of Slab Bridges for Load Rating**
Principal Investigator	**Marc Maguire - UNL**
Project Start Date	**07/01/2024**
Project Completion Date	**05/31/2026**
Technical Advisory Committee	**Babrak Niazi, Ross Barron, Emilie Hudon, Lieska Halsey, Matthew Wieseler, Kpandji Lakmon**
Project Total Costs	**$40,635**
Project Expenditures to Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**99%**
Status	**Ahead of Schedule**
FY-2027 Budget	**$40,635**
FY-2027 Tasks To Be Completed	**Task 3**

Background:

NDOT has approximately 100 slab bridges in its inventory that were originally built as early as the 1930's. Material strengths were relatively low, e.g., fy = 33 ksi, and f'c = 3000 psi or less. These structures often fail to pass load rating procedures and Super load (NDOT's) automated Routing and Rating System that uses LARS/Super load and LFR employing a beamline approach. Beamline analysis requires a distribution width E (the lane's width to support one or two lanes of trucks). The load demands are inversely proportional to E, i.e., a refined finite element analysis (FEA) might increase E by 20%, so the load demand decreases by 20%. Better analysis can potentially economize bridge operations and allow vehicles to cross these structures safely. The process might allow increasing or removing the posting sign for any posted structures.

Objective:

Provide a method for computing refined effective widths for load rating slab bridges. The primary objectives of this research are to:

1. Develop a finite element application that analyzes slab bridges to determine the response, specifically longitudinal bending moments.
2. Use the response to compute and report effective widths.
3. Validate the application with static checks and comparisons with LRFD and LFD equations.
4. Write output graphics and reports that aid the validation of computations and permit checking.
5. Document where the results may be entered into AASHTOWare BrR to create bridge/structure alternatives
6. Demonstrate using the bridge alternative for different operational use cases.
7. Create a short video on the use of the application
8. Provide a webinar to NDOT for engineers interested in using this application

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Application Development	**$27,422**	100%
Task 2: Implementation	**$6,419**	100%
Task 3: Final Report	**$6,794**	95%

Deliverables:

This study will enrich the state-specific load rating strategies for slab bridges and help develop better load rating solutions. Comsol has a tool to develop the user interface. The finite element tool and application development are tightly integrated and are unique to the industry. The Comsol tool is then used to compile the interface and the interface to Comsol runtime modules. (Similar to almost all Windows applications that use Microsoft's runtime DLLs.) The runtime can be embedded into an executable application file (.exe), or the application can address a runtime downloaded separately. The end user does not have to purchase a Comsol license, and Comsol has no claim on these applications, royalties, etc. NDOT can share this application with their consultants, and others as they wish.

Performance:

Project started July 1st, 2024.

Control Number	01071J
Project Number	**SPR-FY25(046)**
Project Title	**Revised Curing Practices for NDOT Bridge Decks to Minimize Restrained Shrinkage Cracks**
Principal Investigator	**Jiong Hu – UNL**
Project Start Date	**07/01/2024**
Project Completion Date	**05/31/2027**
Technical Advisory Committee	**Wally Heyen, Ross Barron, Kyle Zillig, Kent Miller, Maher Tadros – e. Construct, Emilie Hudon, Lieska Halsey, Matthew Wieseler, Josh Martin - FHWA**
Project Total Costs	**$165,460**
Project Expenditures To Date	**$110,607**
Number Of Extensions Granted	**One (1)**
Percentage Of Project Complete	**72%**
Status	**On Schedule**
FY-2027 Budget	**$54,853**
FY-2027 Tasks To Be Completed	**Tasks 2-6**

Background:

Due to their high cement content and low water-to-cement ratio, cast-in-place concrete bridge decks are particularly susceptible to early-age cracking. This is often exacerbated by the shrinkage of concrete when constrained by supporting girders. Such cracks can lead to significant issues, such as rebar corrosion and delamination, posing primary concern for the Nebraska Department of Transportation (NDOT). Recognizing this challenge, recent and ongoing research initiatives at NDOT, including projects SPR-FY22(001)1 and SPR-P1 (19) M0832, as well as ongoing studies at NDOT Materials & Research (M&R), have identified promising strategies to mitigate this issue. These strategies include internal curing, reduction in cementitious material content, and the use of innovative admixtures (e.g., E5® Internal Cure admixture), all aimed at reducing shrinkage-related cracking in bridge decks. The previous projects exemplify a successful approach for reducing free and restrained shrinkage strains in concrete bridge decks by reducing cementitious material content by 50, 100, and 150 lbs. per cubic yard and optimizing aggregate gradation. This approach is expected to significantly lower the likelihood of shrinkage cracking in concrete bridge decks. Despite the progress in reducing concrete shrinkage, there remains a gap in understanding regarding the feasibility of shortened curing durations when using lower-shrinkage mixtures.

Objective:

The proposed study seeks to establish revised NDOT bridge deck curing practices based on evaluating the effects of varying curing durations on the shrinkage and crack potential of different concrete mixtures, particularly in the context of typical bridge girder restraints. This research is intended to guide the development of more effective and efficient curing protocols, aligning them with the specific characteristics of various concrete mixtures used in bridge construction. The study's specific objectives are as follows:

1. Review existing curing practices and criteria for concrete shrinkage for bridge deck applications, drawing insights from other Departments of Transportation (DOTs).
2. Conduct an in-depth evaluation of early and long-term concrete shrinkage under various curing methods and practices.
3. Numerically and experimentally assess the cracking potential of newly developed low shrinkage mixtures under different curing conditions when subjected to typical bridge deck restraints.
4. Revise NDOT guidelines for bridge-deck curing practices when adopting lower-shrinkage mixtures.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Literature Review	**$8,158**	100%
Task 2: Concrete Shrinkage Evaluation	**$40,185**	88%
Task 3: Analytical Investigation	**$17,219**	65%
Task 4: Cracking Potential Assessment	**$74,749**	55%
Task 5: Guideline Development	**$7,014**	0%
Task 6: Documentation and Presentation	**$18,135**	25%

Deliverables:

The proposed study has great potential to be implemented by NDOT. If the revised curing practices demonstrate feasibility through various laboratory tests, analytical investigations, and mockup trials, NDOT may opt for a field demonstration project. This project would validate bridge decks' performance against premature cracking, utilizing the newly revised curing protocol. Such a practical application will be pivotal in confirming the effectiveness of these updated practices in real-world scenarios.

Performance:

Project started July 1st, 2024.

Control Number	01071K
Project Number	**SPR-FY25(047)**
Project Title	**Effect of Bridge Width on Crashes in Nebraska**
Principal Investigator	**Aemal Khattak – UNL**
Project Start Date	**07/01/2024**
Project Completion Date	**05/31/2026**
Technical Advisory Committee	**Don Butler, Ross Barron, Emilie Hudon, Matthew Wieseler, Matthew Marra, Todd Hill, Josh Martin -FHWA**
Project Total Costs	**$152,230**
Project Expenditures to Date	**$20,379**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**70%**
Status	**On Schedule**
FY-2027 Budget	**$131,851**
FY-2027 Tasks to Be Completed	**Tasks 3-6**

Background:

Bridges and bridge approaches sometimes are changed to accommodate increased traffic volume, lane expansion, maintaining adequate clearance, non-motorized accommodation, or for construction and maintenance cost optimization. Such changes may alter the relationship between bridge and approach widths and may impact on the safety of the travelling public. The Nebraska Department of Transportation (NDOT) "Bridge Office Policies and Procedures," initially published in January 2000 and revised in December 2016, serves as the reference and design guideline for NDOT bridge engineers, designers, detailers, and consultants working with the NDOT bridge office. However, NDOT staff lacks comprehensive guidelines regarding the impact of bridge and approach widths on crash frequencies and severities. A comprehensive research-based study is required to determine how bridge widths should be designed in relation to approach widths, while considering crash prevention and ensuring motorists have unrestricted mobility between bridge lanes.

Objective:

1. Investigate crash frequencies and severity across various bridge width intervals, such as 1-20 ft, 20-24 ft, 24-30 ft etc. Emphasis will be placed on assessing how safety is impacted when bridge widths exceed 30 ft. Gather and synthesize technical reports and U.S. state agency specifications, with a specific emphasis on delineating the prerequisites necessary for employing slag as a material for pavement applications. Characterize development behavior and required embedment lengths for full development of GFRP bars in UHPC.
2. Examine variations in crash frequencies and severity based on relative bridge-roadway intervals. This will involve studying the effects of different relative bridge-roadway width ranges, including 9 ft or narrower, 7-8 ft narrower, and so forth, up to 1-2 ft wider, 3-4 ft wider, etc., on crashes.
3. Perform a multivariate analysis on crash frequency and severity in relation to bridge width intervals and other relevant factors including but not limited to as bi-directional travel vs divided multilane travel, posted speed limits, traffic volume, bridge type and inside shoulder width, crash temporal aspects, work zone conditions, road surface conditions and bridge safety countermeasures.
4. Perform a multivariate analysis on crash frequency and severity in relation to bridge-roadway relative width (difference in bridge and approach roadway width) intervals and other relevant factors, including, but not limited to, posted speed limits, bridge type and geometric aspects, crash temporal aspects, road surface conditions, work zone conditions, bridge safety countermeasures, lane configuration, and traffic volume.
5. Forecast future crash frequency and severity resulting from various bridge widths across Nebraska's highway system bridges by developing robust statistical models for predicting both crashes and their severity. Additionally, this will involve estimating separate models for work zones on bridges.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: TAC Meeting and Literature Review	**$ 17,421**	100%
Task 2: Data Collection	**$24,008**	100%
Task 3: Data Aggregation, Processing, and Exploration	**$24,805**	90%
Task 4: Multivariate Analysis	**$26,292**	65%
Task 5: Predictive Analysis (Statistical Modelling)	**$30,112**	60%
Task 6: Final Report and TAC Presentation	**$29,592**	25%

Deliverables:

The research will be implemented and utilized through collaboration with NDOT Traffic Engineering, Highway Safety, and the Roadway Design Divisions. The research team can provide NDOT with comprehensive guidelines for conducting safety and operational studies related to bridge width decisions. Additionally, we will actively share our findings through presentations and publications at local, regional, and national forums to disseminate the valuable insights gained from this research.

Performance:

Project started on July 1st, 2024.

CONTROL NUMBER	01071L
Project Number	**SPR-FY25(048)**
Project Title	**Development of Accurate and Reliable Average Annual Daily Traffic (AADT) Factoring Methods**
Principal Investigator	**Li Zhao – UNL**
Project Start Date	**07/01/2024**
Project Completion Date	**05/31/2026**
Technical Advisory Committee	**Nam Nguyen, Matt Neemann, Alan Swanson, Don Butler, Kar Sia, Walter Moy, Abe Anshasi – FHWA, Lieska Halsey, Scott Sorenson, Nolan Lund**
Project Total Costs	**$150,732**
Project Expenditures To Date	**$63,175**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**85%**
Status	**On Schedule**
FY-2026 Budget	**$87,557**
FY-2026 Tasks to Be Completed	**Tasks 4-5**

Background:

According to the Federal Highway Administration (FHWA), "Annual Average Daily Traffic (AADT) estimates, with as little bias as possible, the mean traffic volume across all days for a year for a given location along a roadway". AADT provides crucial information about road activity in terms of vehicular volume (i.e., vehicles per day) on specific road segments. As such, it plays a pivotal role in supporting highway agency activities that include planning, design, maintenance, operations, safety, environmental analysis, finance, engineering economics, and performance management. Moreover, AADT serves as a key parameter for the allocation of funds to state Departments of Transportation (DOTs). Nebraska DOT (NDOT) is required to collect and report AADTs to the FHWA annually as part of the Highway Performance Monitoring System program, as well as make these data publicly available. This is because AADTs are used by a wide range of stakeholders in Nebraska, including NDOT divisions, city traffic engineers, and private consultants. Therefore, providing accurate AADTs is imperative, while using inaccurate AADTs in one or more of the mentioned studies would result in direct economic losses for the state.

Objective:

The primary objective of this project is to determine the most appropriate temporal adjustment factor for estimating AADT on the Nebraska highway systems. To accomplish this, the team will undertake a rigorous and comprehensive evaluation of the current AADT factor compared to alternative factors. The specific goals are to identify the most effective temporal adjustment factors among various options such as month of the year, week of the year, day of the week, and their combinations. It should be noted that the scope of this research is limited to NDOT-managed highway systems excluding interstates and local functional roads. In other words, the AADT factoring study in this project is limited to FHWA functional classes 2 to 6.

Tasks & Percent Completed:

Task	Budget by Task	Percent Completed
Task 1: Literature Review	**$27,606**	**100%**
Task 2: Preliminary Data Study	**$30,460**	**100%**
Task 3: Adjust Factor Calculation	**$42,968**	**100%**
Task 4: Spreadsheet Tool Development	**$25,787**	**60%**
Task 5: Final Report and Presentation	**$23,911**	**10%**

Deliverables:

If NDOT's current AADT estimation method needs to be updated, this project will create a tool to facilitate implementation. The tools will be developed using Microsoft Excel and Visual Basic for Applications (VBA). Input from the NDOT traffic analysis team will be sought to ensure that the tool aligns with their usage needs and preferences. It is expected that the NDOT traffic analysis team will be able to use the developed tool immediately upon the completion of this research project. The project team is committed to offering ongoing support for the tool beyond project completion.

Performance:

Project started July 1st, 2024.

CONTROL NUMBER	01071M
Project Number	**SPR-FY25(049)**
Project Title	**Crash Modification Factor and Feasibility Analysis of Lighting Rural Intersections in Nebraska**
Principal Investigator	**Aemal Khattak – UNL**
Project Start Date	**07/01/2024**
Project Completion Date	**05/31/2027**
Technical Advisory Committee	**Alan Swanson, Matt Neemann, Don Butler, Abe Anshasi – FHWA, Bryce Hallmark – HDR, Lieska Halsey, Dave Hansen, Kris Fornoff, Scott Sorensen**
Project Total Costs	**$172,618**
Project Expenditures to Date	**$20,555**
Number Of Extensions Granted	**One (1)**
Percentage Of Project Complete	**42%**
Status	**On Schedule**
FY-2027 Budget	**$152,063**
FY-2027 Tasks to Be Completed	**Tasks 2 - 6**

Background:

Intersection lighting is an important countermeasure intended to enhance safety for drivers during nighttime. According to the National Highway Transportation Safety Administration (NHTSA), nighttime driving conditions account for more than 40% of fatalities, although only 27% of crashes occur at night (NHTSA, 2012). Federal Highway Administration (FHWA) reported that the number of fatal crashes occurring in daylight is about the same as those that occur in darkness. However, the nighttime fatality rate is three times greater than the daytime rate because only 25% of vehicle miles traveled (VMT) occur at night (FHWA, 2023). FHWA and other studies reported that installing lights at the intersection may reduce accidents by around 30% to 40% (FHWA, 2023; Bruneau and Morin, 2005).

Objective:

The primary objectives of this research are to:

1. Document current intersection lighting practices and CMFs nationwide.
2. Develop Nebraska-based CMF for lighting rural intersections.
3. Conduct Nebraska-based benefit-cost trade-off analysis for lighting rural intersections.
4. Develop guidelines for best practices of rural intersection lighting.

Tasks & Percent Completed:

Task	Budget by Task	Percent Completed
Task 1: Literature Review	**$ 18,072**	**100%**
Task 2: Nationwide Intersection Lighting Practices and Reported CMFs	**$21,982**	**90%**
Task 3: Data Collection	**$26,083**	**75%**
Task 4: Nebraska Rural Intersection and Driver Behavior	**$27,645**	**35%**
Task 5: Determination of Nebraska-based CMF	**$27,343**	**20%**
Task 6: Feasibility Analysis and Guidelines	**$24,160**	**0%**
Task 7: Final Report	**$27,333**	**0%**

Deliverables:

The guidelines will aid in finding best practices for lighting rural intersections with respect to types of intersections (i.e., 3-legged, 4-legged), traffic conditions (i.e., AADT, truck percentage), and illumination configuration. The research team can offer software tools/models to NDOT to conduct benefit-cost analysis. The results of this project will be added to the FHWA's CMF Clearinghouse and submitted for consideration to include in future editions of the HSM. Implementation and utilization of the research will be via NDOT Traffic Engineering, District staff, and Roadway Design Divisions. The research team will make presentations and publications of the research results at various local, regional, and national forums.

Performance:

Project started July 1st, 2024.

Control Number	01078A
Project Number	**SPR-FY26(050)**
Project Title	**AI and Immersive AR/VR for Sustained Material and Construction Inspection Training**
Principal Investigator	**Kyungki Kim – UNL**
Project Start Date	**8/19/2025**
Project Completion Date	**7/31/2027**
Technical Advisory Committee	**Devin Townsend, Lorraine Legg, Cameron Craig, Andy Dearmont, Shawn Jording, and Drew Wilson**
Project Total Costs	**$142,359**
Project Expenditures To Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**20%**
Status	**On Schedule**
FY-2027 Budget	**$142,359**
FY-2027 Tasks To Be Completed	**Tasks 3 to 6**

Background:

To ensure the long-term performance of roadway infrastructure, it is essential for highway agencies to adopt innovative strategies to address two interconnected challenges: knowledge retention and knowledge transfer. Knowledge retention refers to the ability to preserve the wealth of inspection knowledge accumulated over decades, while knowledge transfer focuses on effectively training new inspectors to bridge the knowledge gap left by departing staff.

Objective:

This project leverages advancements in Large Language Models (LLMs), such as OpenAI's ChatGPT, which can understand and generate human-like responses using extensive data. LLMs have demonstrated proven capabilities in related areas, such as contextual knowledge retrieval, interactive training, and generating domain-specific insights, making them highly suitable for addressing challenges associated with inspection training and knowledge retention.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Literature Review and Inspection Training Material Collection	**$20,019**	**80%**
Task 2: Development of InspectionGPT Chatbot	**$32,817**	**70%**
Task 3: Development of pilot VR Training Module	**$25,633**	**0%**
Task 4: Integration of InspectionGPT with VR Module	**$33,594**	**0%**
Task 5: Analysis and Discussion	**$15,349**	**0%**
Task 6: Documentation and Demo Sessions	**$14,946**	**0%**

Deliverables:

The proposed project is expected to deliver several direct benefits:

- AI-driven knowledge management.
- Interactive knowledge access.
- Immersive and personalized training.
- Sustainable knowledge retention and training

Performance:

Project will begin on July 1st, 2025.

Control Number	01078B
Project Number	**SPR-FY26(051)**
Project Title	**Development of Reliable Wireless Connectivity in Support of e-Ticketing System in Nebraska Rural Construction Sites**
Principal Investigator	**Chun-Hsing Ho – UNL**
Project Start Date	**8/19/2025**
Project Completion Date	**7/31/2027**
Technical Advisory Committee	**Devin Townsend, Andy Dearmont, Tyler Carlson, Alicea McCluskey, Jason Lehn, and Drew Wilson**
Project Total Costs	**$173,485**
Project Expenditures to Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**10%**
Status	**On Schedule**
FY-2027 Budget	**$173,485**
FY-2027 Tasks to Be Completed	**2-6**

Background:

As of 2020, 24 state DOT agencies have been using e-ticketing, with 13 piloting it before the construction season and 11 starting during the season. Additionally, five agencies were preparing for or considering pilot projects. However, the implementation of the e-ticketing system has faced challenges including lack of internet connectivity in rural areas, missing data, and the need for quality control processes specific to e-Ticketing.

Objective:

The objectives of Site-Net are cost-efficiency and automation. Cost efficiency will ensure the low cost of capital expenditure for the whole system and can be applied to various scenarios. Automation will ensure that the network will operate automatically without human intervention in the field. The Site-Net includes multiple components, i.e., one cellular base station with an embedded omnidirectional antenna, one embedded core network, a LEO backhaul, and multiple mobile devices. The design and development of Site-Net will leverage the unique experiences of Husker-Net (deployed by the research team), which is the first-ever campus-scale private 5G network in Nebraska.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Literature Review	**$32,200**	**90%**
Task 2: Site Survey and Needs Assessment	**$29,957**	**0%**
Task 3: Network Design, Configuration, and Prototyping	**$49,487**	**0%**
Task 4: Integration of Wireless Network with e-Ticketing System	**$60,692**	**0%**
Task 5: Monitoring, Maintenance, and Technical Support	**-**	**0%**
Task 6: Documentation and Final Report	**$1,150**	**0%**

Deliverables:

The following outcomes will be anticipated after completion of the proposed project:

1. Reliable and cost-effective wireless network: Site-Net will be available to enable seamless data access and transmission to databases.
2. Seamless e-Ticket transfer: The integrated wireless network (Site Net and LoRa) will enhance contactless data entry systems without unnecessary physical contact, reducing waiting time and promoting safety at rural construction sites.
3. In addition to e-ticketing, the proposed wireless network will be beneficial to the following construction projects including intelligent compaction wireless concrete testing protocol, etc.

Performance:

Project will begin on July 1st, 2025.

Control Number	01078C
Project Number	**SPR-FY26(052)**
Project Title	**Alternative Pavement Rehabilitation Strategy Using a Geogrid Interlayer**
Principal Investigator	**Jamilla Teixeira – UNL**
Project Start Date	**8/19/2025**
Project Completion Date	**7/31/2027**
Technical Advisory Committee	**Bruce Barrett, Matthew Park, Nicholas Glennie, Kevin Domogalla, Rob Davis, Brendon Schmidt, Ahmed ElAshwah**
Project Total Costs	**$179,875**
Project Expenditures to Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**17%**
Status	**On Schedule**
FY-2027 Budget	**$179,875**
FY-2027 Tasks to Be Completed	**Tasks 1-6**

Background:

The major distress affecting the performance of AC-PCC composite pavements is reflective cracking - a phenomenon of propagation of cracks from an existing cracked pavement surface into and through the newly laid overlay due to traffic and/or temperature induced stresses. The distress due to reflective cracking can be retarded by the installation of different interlayer systems, which can improve the performance of the asphalt overlays by providing stress relief, reinforcement and moisture control.

Objective:

The overarching goal of this study is to explore one alternative rehabilitation strategy using geogrid reinforcement in HMA overlays considering the typical Nebraska asphalt mixture (SLX) in the composite design. This project will assess whether the proposed approach meets performance and design life goals by:

1. Conduct an extensive literature review on the state-of-the-art and state-of-practice on geogrid application for pavement rehabilitation.
2. Develop a framework to evaluate the performance of lab-compacted geogrid reinforced composite samples in laboratory.
3. Verify the effects of geogrid strength and asphalt overlay thickness on the overall composite flexural (cracking) resistance.
4. Perform an initial assessment of field surface cracking potential and pavement strain response considering two rehabilitated sections (with and without geogrid).

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Literature Review	**$13,059**	**50%**
Task 2: Sample Collection and Preparation	**$13,045**	**32%**
Task 3: Experimental Program	**$34,778**	**15%**
Task 4: Analysis of Laboratory Test Results	**$28,051**	**3%**
Task 5: Field Implementation and Monitoring	**$65,365**	**0%**
Task 6: Documentation and Presentation	**$25,578**	**0%**

Deliverables:

The anticipated scientific contributions of this research involve enhancing Nebraska's rehabilitation strategies to improve pavement construction and maintenance in Nebraska.

Performance:

Project will begin on July 1st, 2025

Control Number	01078D
Project Number	**SPR-FY26(053)**
Project Title	**Characterization of Sediment Loads and Size Distributions in Nebraska Roadway Runoff – Phase II**
Principal Investigator	**Bruce Dvorak – UNL**
Project Start Date	**11/25/2025**
Project Completion Date	**05/31/2028**
Technical Advisory Committee	**Julie Ramirez, Anna Allen, Ron Poe, Brian Anderson, Jason Jurgens, Kirk Harvey, Kyle Hall - FHU, Ricki Kuvach; Adbul Sultonov; Elise Rojas; Nawshin Haque; Chris Urkoski; Matthew Vanpelt; Jason Dayton; David Qudus**
Project Total Costs	**$193,213**
Project Expenditures to Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**4%**
Status	**On Schedule**
FY-2027 Budget	**$193,213**
FY-2027 Tasks to Be Completed	**Tasks 1-5**

Background:

In 2023, a research project was initiated to measure sediment concentrations, sediment size distributions, and flow rates from roadways and roadway drainages. The goal was to collect data for better design of inline sediment removal equipment in MS4 cities. The target sediment removal tool was a device called the SAFL baffle, but the information provided by the project will prove useful for a much wider range of applications.

Objective:

1. Identify four sampling sites that will represent the variability in Nebraska's Revised. 2021 MS4 communities in terms of soil types, storm drainage systems, traffic flow, and communities.
2. Modify our roadway runoff sediment collection methods and equipment to operate efficiently in locations remote from Lincoln.
3. Collect a complete set of roadway sediment runoff data during the two-year grant period that includes multiple seasons.
4. Update our model and guidelines to better represent the broader range of MS4 communities in Nebraska.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Completed
Task 1: Sampling Site Preparation	**$61,226**	**10%**
Task 2: Data Collection and Processing	**$80,478**	**0%**
Task 3: Literature Review Update	**$9,986**	**0%**
Task 4: Revise Phase 1 Model with Expanded Dataset	**$31,056**	**0%**
Task 5: Final Products	**$10,467**	**0%**

Deliverables:

1. Sediment characterization models, including models for size and concentration distributions, based on data from eight test sites, including four new test sites located throughout Nebraska. In combination with data from the previous project, we will provide a thorough analysis of sediment runoff findings for the state.
2. Improved sizing of SAFL Baffles for inline sediment removal, resulting in optimized design and maintenance costs. Additional sediment data and wider geographical coverage will complement guidelines developed during the first study.
3. A detailed guide of how to implement results from both project phases using existing inline sediment separation design software.

Performance:

Project will begin on July 1st, 2025

Control Number	01078E
Project Number	**SPR-FY26(054)**
Project Title	**Development of a Tool to Streamline and Expedite the General Permit Application**
Principal Investigator	**Nathan Huynh – UNL**
Project Start Date	**8/19/2025**
Project Completion Date	**7/31/2027**
Technical Advisory Committee	**Jason Jurgens, Ben Trenne, Jake Smith, Sumalatha Poda, Charlene Shaw, Claire Inbody, Brett Harbison - Army, Jeremy Grauf - Army , Luke Pitts - FHWA, Joshua Martin - FHWA**
Project Total Costs	**$180,000**
Project Expenditures to Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**15%**
Status	**On Schedule**
FY-2027 Budget	**$180,000**
FY-2027 Tasks to Be Completed	**Tasks 1-5**

Background:

The Nebraska Department of Transportation (NDOT) plays a vital role in developing and maintaining infrastructure projects that often intersect with environmentally sensitive areas such as wetlands and rivers. These projects are governed by Section 404 of the Clean Water Act, which requires permits for discharging dredged or fill material into waters of the United States. Compliance with this regulation is essential to ensure responsible stewardship of aquatic ecosystems and adherence to federal environmental standards.

Objective:

The primary goal of this study is to develop and implement an e-permitting tool that streamlines and accelerates the Section 404 general permit application process for NDOT. This tool will be developed initially using Survey123 to expedite the development process to demonstrate how it and AI capabilities can reduce inefficiencies in the current manual system, ensuring more consistent, accurate, and timely submissions. Throughout the development process, the project team will work with NDOT's IT division, BTSD, in coordination with Project Development Division to investigate how the e-permitting tool can be integrated into NEDS or whether the tool should be implemented in NEDS before it is rolled out to consultants.

Tasks & Percent Completed:

Task	Budget by Task	Percent Completed
Task 1: Needs Assessment and Research	**$27,248**	**40%**
Task 2: Tool Development	**$50,231**	**10%**
Task 3: Testing and Validation	**$50,231**	**0%**
Task 4: Implementation and Training	**$28,027**	**0%**
Task 5: Final Report and Presentation	**$24,262**	**0%**

Deliverables:

The implementation of the proposed e-permitting tool will deliver transformative benefits to NDOT, consultants, regulatory agencies, and the public by addressing inefficiencies in Section 404 general permit application process. These benefits include:

1. Increased Efficiency
2. Cost Savings
3. Enhanced Compliance and Accuracy

In addition to the final project report, the project will deliver two primary outputs: E-Permitting Tool Software and User Manual and Training Materials

Performance:

Project will begin on July 1st, 2025

Control Number	01078F
Project Number	**SPR-FY26(055)**
Project Title	**Camber Control in Precast/Prestressed Concrete NU Girders**
Principal Investigator	**George Morcous – UNL**
Project Start Date	**8/19/2025**
Project Completion Date	**7/31/2027**
Technical Advisory Committee	**Emilie Hudon, Ross Barron, Matt Weiseler and Kent Miller**
Project Total Costs	**$85,575**
Project Expenditures To Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**25%**
Status	**On Schedule**
FY-2027 Budget	**$85,575**
FY-2027 Tasks to Be Completed	**Tasks 1-6**

Background:

Recently, NDOT conducted an internal study to better predict camber at release and revise camber tolerance. The study proposed modifications to camber predictions at release as well as an updated camber tolerance. These modifications include using 1.5 ksi higher compressive strength at release than specified, corrected unit weight based on the final compressive strength, and K1 factor equal to 1.0 for aggregate when calculating initial MOE (Eci). The updated camber tolerance is considered the larger of ± 1/8 inch per 10 ft of the length up to 1.0 in. and ±30% of the camber listed in the plans.

Objective:

1. Develop procedures to predict and control shipping and erection cambers of NU girders. This includes considering the effect of dunnage location during storage and accounting for a wide range of girder age for predicting camber at shipping and erection rather than constant value.
2. Measure the actual modulus of elasticity of the self-consolidating concrete (SCC) mixtures commonly used in NU girder production to have more realistic estimates than those of the AASHTO equation that depends on the compressive strength, unit weight, and aggregate type modification factor.

Tasks & Percent Completed:

Tasks	Budget By Task	Percent Completed
Task 1: Review State Practices	**$11,239**	**75%**
Task 2: MOE Testing and Analysis	**$19,522**	**50%**
Task 3: NU Girder Camber Parametric Study	**$14,990**	**20%**
Task 4: Camber Control Policy Procedure	**$14,990**	**0%**
Task 5: Camber Data Collection and Validation	**$15,940**	**0%**
Task 6: Report and Presentation	**$8,895**	**0%**

Deliverables:

This study is expected to provide immediate results that are implementable in the form of a policy, procedure, manual or guide that can be used by the precast producers, contractors, and NDOT inspectors without the need for additional research.

Performance:

Project will begin on July 1st, 2025

Control Number	01078H
Project Number	**SPR-FY26(057)**
Project Title	**Assessment of Crash Reduction Traffic Control Measures at T-intersections on Rural Highways**
Principal Investigator	**Li Zhao – UNL**
Project Start Date	**8/19/2025**
Project Completion Date	**7/31/2027**
Technical Advisory Committee	**Alan Swanson, Scott Sorensen, Don Butler, Kyle Christenson and Harrison Redepenning**
Project Total Costs	**$175,616**
Project Expenditures to Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**15%**
Status	**On Schedule**
FY-2027 Budget	**$175,616**
FY-2027 Tasks to Be Completed	**Tasks 1-7**

Background:

NDOT has implemented several countermeasures, such as oversized stop signs, rumble strips, flashing beacons, and pavement markings, to mitigate risks at T-intersections. Despite these efforts, crashes continue to occur at a high rate. There is a significant need for further research to evaluate the effectiveness of various strategies under different conditions so that they can be optimized.

Objective:

The primary objective of this research is to enhance safety at rural T-intersections on highways by reducing crashes and fatalities through an evidence-based evaluation of current traffic control measures and the development of optimized strategies. To achieve this overarching goal, the project team will work in consultation with the Technical Advisory Committee (TAC) to accomplish the following specific objectives.

1. Identify High-Rish T-intersections
2. Analyze Driver Behavior and Stopping Patterns
3. Evaluate the Effectiveness of Current Countermeasures
4. Recommend Enhancements to Traffic Control Strategies

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Complete
Task 1: Literature Review	**$17,461**	**85%**
Task 2: Inventory-crash data integration	**$43,754**	**40%**
Task 3: Field speed data collection	**$32,888**	**0%**
Task 4: Crash modeling	**$19,821**	**0%**
Task 5: Speed behavior study	**$26,551**	**0%**
Task 6: Traffic Control Guidelines	**$18,063**	**0%**
Task 7: Final Report and Presentation	**$17,079**	**0%**

Deliverables:

The findings of this research will be directly actionable and integrated into NDOT's existing safety and traffic management strategies. The implementation plan will focus on translating research outcomes into practical guidelines, tools, and updates to current traffic control standards for rural T-intersections. The key steps in implementation include:

1. •Development of Guidelines and Recommendations
2. •Updating NDOT's Traffic Control Standards

Performance:

Project will begin on July 1st, 2025

Control Number	01078J
Project Number	**SPR-FY26(058)**
Project Title	**Exploring Pathways to Innovative Finance Mechanisms to Empower Transportation Project Development in Nebraska**
Principal Investigator	**Yunping Liang – UNL**
Project Start Date	**8/19/2025**
Project Completion Date	**7/31/2027**
Technical Advisory Committee	**Lyn Heaton, Ryan Huff; Stephanie Camerone; Korey Donahoo, Lily Kathee-Harner, Devin Townsend, Jodi Gibson**
Project Total Costs	**$181,164**
Project Expenditures to Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**17%**
Status	**On Schedule**
FY-2027 Budget	**$181,164**
FY-2027 Tasks to Be Completed	**Tasks 2 to 8**

Background:

Innovative finance mechanisms are expected to play a key role in supporting Nebraska's major transportation initiatives, including the Nebraska Expressway System. Authorized in 1988, the Expressway system was originally estimated to be completed by 2003. Now, Nebraska is entering the last stretch of the program. Moreover, innovative Revised. 2021 finance mechanisms are an integral part of the Infrastructure Investment and Jobs Act (IIJA), which presents significant opportunities for Nebraska. The IIJA allocates substantial federal funding to modernize transportation infrastructure, including roads, bridges, and public transit systems. This is crucial for Nebraska, where 8.8% of bridges are rated structurally deficient, and there is a pressing need to improve transportation networks to support economic growth, public safety, infrastructure resilience and efficiency, as well as improved quality of life for Nebraskans.

Objective:

The objectives of this project include:

1. Synthesizing best practices from state DOTs in utilizing innovative finance mechanisms, highlighting avoidable errors, and illustrating these through case studies. This will consider aspects such as utilization objectives, program development, risk management, and stakeholder engagement
2. Understanding NDOT's specific and pressing needs, readiness & challenges, concerns, and stakeholder landscape
3. Understanding other state DOT's transition journey through in-depth interviews and/or focus groups
4. Suggesting curated pathways for NDOT to utilize innovative finance, sticking with Nebraska contexts and representing nationwide state-of-practice
5. Delivering technical assistance sessions and materials to a wide range of stakeholders – including state and local governments, industry representatives, and civic organizations – for knowledge dissemination and consensus building

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Complete
Task 1: Conduct a Literature Review and Synthesize lessons learned	**$28,953**	**100%**
Task 2: Develop a stakeholder outreach plan to understand NDOT's objectives, concerns, and challenges	**$14,477**	**80%**
Task 3: Interview with NDOT staff	**$23,961**	**0%**
Task 4: Develop a stakeholder outreach plan to understand the circumstances of leading state transportation agencies (STA)	**$14,477**	**0%**
Task 5: Interview with STA Staff	**$35,455**	**0%**
Task 6: Design pathways by qualitative comparative analysis	**$20,154**	**0%**
Task 7: Prepare a draft report	**$14,978**	**0%**
Task 8: Prepare deliverables and a final report	**$28,708**	**0%**

Deliverables:

The primary expected benefit of this project is to provide NDOT with specific, curated, and actionable recommendations to support its transition to a financing agency. The outcomes of this project can directly support NDOT's ongoing efforts related to RIA establishment and P3 implementation. The outcomes can inform forthcoming specifications related to alternative project delivery and innovative finance, as well as potential organizational changes for these purposes.

Performance:

Project will begin on July 1st, 2025

Control Number	01078K
Project Number	**SPR-FY26(059)**
Project Title	**Selection, Integration, and Effectiveness Study of Input Data for Nebraska Variable Speed Signs on I-80**
Principal Investigator	**Li Zhao – UNL**
Project Start Date	**8/19/2025**
Project Completion Date	**7/31/2027**
Technical Advisory Committee	**Timothy Foss, Tom Renninger, Kathy Fischer, David Hansen, Mike Mattison**
Project Total Costs	**$169,946**
Project Expenditures to Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**25%**
Status	**On Schedule**
FY-2027 Budget	**$169,946**
FY-2027 Tasks to Be Completed	**Tasks 2 to 6**

Background:

Since 2024, the Nebraska DOT has been installing VSS along I-80 (from east to west). As of end of 2024, VSS has been installed in Districts 5 and 6 at around every 8 miles or less, located 1100 – 1200 feet beyond end of on-ramps. NDOT is planning to extend the installation of VSS along the entire I-80. Figure 1 shows the placement of VSS in the field. To capture drivers' attention, the signs are installed on both sides of the interstate, each paired with a flasher mounted on top. This research addresses these gaps (e.g., data inputs, sensor technologies, system performance under extreme conditions, and driver compliance) by systematically evaluating the difference data sources and associated sensors and equipment, and what combination of data is most effective for implementing VSS on I-80.

Objective:

The focus of this research project is to optimize the deployment and effectiveness of VSS along both directions of I-80 in Nebraska by improving the selection and integration of multi-sensor data and recommending appropriate safe speeds. The specific research objectives are as follows:

1. Identify and Evaluate Suitable Sensors
2. Develop and Implement Data Integration Methods
3. Assess System Effectiveness

Tasks & Percent Completed:

Tasks	Budget By Task	Percent Complete
Task 1: Literature Search	**$22,311**	**100%**
Task 2: Sensor Performance Comparisons	**$30,299**	**15%**
Task 3: Field Test and Data Collection	**$33,855**	**10%**
Task 4: Evaluation of Advisory Speed Determination Algorithm	**$31,000**	**0%**
Task 5: Driver Compliance Study	**$31,350**	**25%**
Task 6: Final Report and Deliverables	**$21,131**	**0%**

Deliverables:

The research findings will support NDOT in prioritizing sensor technologies and algorithms and enhancing the operational effectiveness. This will ensure efficient use of resources for the full-scale implementation of VSS along I-80. Specifically, the benefits include:

1. Optimized Sensor Integration
2. Enhanced Advisory Speed Determination
3. Driver Compliance Understanding

Performance:

Project will begin on July 1st, 2025

Control Number	01078L
Project Number	**SPR-FY26(060)**
Project Title	**Evaluating the Interoperability of Connected and Autonomous Vehicles and Signal Phasing and Timing Infrastructure**
Principal Investigator	**Chun-Hsing Ho – UNL**
Project Start Date	**8/19/2025**
Project Completion Date	**7/31/2027**
Technical Advisory Committee	**Matt Neemann, Scott Sorenson, Tyler Reeh, Suzy Fredrickson**
Project Total Costs	**$185,796**
Project Expenditures to Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**28%**
Status	**On Schedule**
FY-2027 Budget	**$185,796**
FY-2027 Tasks to Be Completed	**Tasks 2 to 6**

Background:

NDOT's Traffic Division has embarked on implementing two SPaT corridors (US-6/N-31 in Gretna/Sarpy County and N-370 in Papillion/Bellevue) that are planned to contain connected vehicle technology (Figure 3). To prepare for SPaT-V2I communications on the two SPaT corridors, NDOT needs to assess the interoperability of CAV communication and SPaT infrastructure to enhance traffic safety and mobility. Therefore, this project proposes a series of vehicle-to-SPaT infrastructure tests using the UNL-owned autonomous vehicle (Figure 4) to facilitate the interoperability tests. The tests will focus on: (1) the interaction of CAVs with the new SPaT corridor communications infrastructure, and (2) the operational impact of the CAV infrastructure. The first focus will be on signal noise and reliability between the infrastructure and CAVs, while the second will examine the in-field operational impacts on the two corridors with and without the CAV infrastructure.

Objective:

The proposed project includes the following objectives:

1. Evaluate the quality of SPaT data
2. Assess the reliability of the success rate of SPaT data delivery to CAVs while considering factors such as the distance to the approaching CAVs, traffic density, and weather conditions.
3. Examine how CAVs dynamically adjust their approaching speed based on SPaT
4. Simulate different levels of CAV market penetration to evaluate the impact of SPaT data

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Complete
Task 1: Literature Review	**$32,403**	**100%**
Task 2: Site Survey and SPaT Infrastructure Assessment	**$30,532**	**65%**
Task 3: Testing and Prototyping SPaT and CAV Communication	**$32,331**	**0%**
Task 4: Field Validation of SPaT and CAV Communication	**$77,880**	**0%**
Task 5: Monitoring, Maintenance and Troubleshooting	**$11,500**	**0%**
Task 6: Documentation and Presentation	**$1,150**	**0%**

Deliverables:

The expected outcomes of the project will help NDOT:

1. Ensure safety and mobility for CAV-SPaT infrastructure and the traveling public.
2. Prepare and develop its current workforce with its CAV-SPaT initiatives.
3. Determine the effectiveness of current SPaT communication infrastructure with CAV technology by analyzing SPaT communication and traffic mobility/environment data, including SPaT message transmission, signal noise and reliability, drive speed adjustment, weather conditions, stop and go decision, priority management of emergency vehicles, and queue warning in support of SPaT infrastructure and CAV communications.

Performance:

Project will begin on July 1st, 2025

Control Number	01078M
Project Number	**SPR-FY26(061)**
Project Title	**Review and Study of Dynamic Wireless Power Transfer Technology for In-Road Charging of Electric Vehicles**
Principal Investigator	**Liyan Qu- UNL**
Project Start Date	**8/19/2025**
Project Completion Date	**7/31/2027**
Technical Advisory Committee	**Ryan Huff, Khalil Jaber, Bruce Barrett, Matthew Park, Brendon Schmidt, Brandie Neemann, Jeni Campana**
Project Total Costs	**$79,954**
Project Expenditures To Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**18%**
Status	**On Schedule**
FY-2027 Budget	**$79,954**
FY-2027 Tasks to Be Completed	**Tasks 1 to 6**

Background:

This research project proposes to address the questions and issues through a thorough literature study on the state-of-the-art inductive DWPT technology and its implementations in in-road charging systems, particularly the existing pilot in-road charging projects. The findings of this research project are expected to provide guidelines for designing the best pilot in-road charging system using the inductive DWPT technology for the NDOT project and help generate the best possible outcomes from the project.

Objective:

The objectives of the study are to address the questions and issues raised in the design and implementation of the DWPT-based in-road charging system through:

1. literature study on the current state of the art of inductive DWPT technology and its implementations in in-road charging systems; and
2. study on the existing pilot in-road charging projects, in collaboration with the consulting team if possible.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Complete
Task 1: Literature Search and Management	**$5,029**	**40%**
Task 2: Literature Review and Study	**$23,776**	**15%**
Task 3: Technical Report and Presentation	**$29,618**	**10%**
Task 4: Meetings with TAC Members throughout the life of the project	**$2,798**	**20%**
Task 5: Project Reporting	**$13,144**	**15%**
Task 6: Project Final Presentation, Final Report, and Deliverables	**$5,591**	**0%**

Deliverables:

The findings of this research project are anticipated to provide guidelines for the design and implementation of a viable, effective in-road charging system using the inductive DWPT technology and the evaluation of the system in terms of the performance metrics defined for the NDOT project. This will help eliminate the uncertainties and maximally mitigate the risks in the design and implementation of the in-road charging system, help save project time and cost and help generate best possible outcomes from the project.

Performance:

Project will begin on July 1st, 2025

Control Number	01078N
Project Number	**SPR-FY26(062)**
Project Title	**Gravel Road Performance Enhancements – Phase II**
Principal Investigator	**Bora Cetin**
Project Start Date	**8/19/2025**
Project Completion Date	**7/31/2027**
Technical Advisory Committee	**Bruce Barrett, Matthew Park, Nikolas Glennie, Brandon Varilek, Robert Rankin, Andrew Buchmeier, Terry Rogers - Martin Marietta; Larry Legg – Lancaster County, Bruce Filipi – Saline County; Don Robb – Hall County; Ann Chytka - Burt County; Gary Connot – Holt & Boyd County; Chris Jacobsen – Custer County; Tim Burgeson - Harlan County; Barb Keegan – Box Butte County; Steve Baird – Scottsbluff County**
Project Total Costs	**$177,000**
Project Expenditures To Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**30%**
Status	**On Schedule**
FY-2027 Budget	**$177,000**
FY-2027 Tasks to Be Completed	**Tasks 2, and 4 to 6**

Background:

The Gradation Optimization tool has been developed from Phase I research. Despite the tool having been used for various other types of aggregates, it is mainly based on stiffness and durability properties. While the higher these properties, the less road distress one would observe (e.g., rutting, wash boarding, potholes, dust), it is important to verify these in the actual field conditions and tune the tool accordingly. In addition, the proposed study plans to quantify the long-term performance benefits of the test sites built via life cycle analyses (LCA).

Objective:

The proposed project will be a Phase II follow-on to Gravel Road Performance Enhancements-Phase I project, with a project goal of verifying and calibrating the accuracy of the Gradation Optimization tool by field testing in one of the counties in Nebraska. This will be achieved through the completion of four objectives:

1. Selection of the appropriate site for building test sections and collecting both subgrade soils and gravel road materials (from the existing surface and nearby quarries,
2. Develop a viable design for test section for field construction via use of the developed model in the first phase.
3. Construct test sites with different blends (as well as control) and evaluate them geomechanically
4. Collect data and calibrate the model. In addition, light detection and ranging (LiDAR) will also be utilized to monitor the surface changes on the test sites; and
5. Analyze the benefits of material blends in terms of cost savings, long-term service life, and environmental impacts via LCA.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Complete
Task 1: Kickoff Meeting	**$0**	**100%**
Task 2: Laboratory Testing	**$38,478.33**	**0%**
Task 3: Design and Construction of Test Sections	**$15,391.33**	**100%**
Task 4: Performance Monitoring and Field Testing after Spring Thaw(s)	**$38,478.03**	**0%**
Task 5: Life Cycle Analyses (LCAs)	**$23,087.00**	**0%**
Task 6: Final Report	**$61,565.32**	**0%**

Deliverables:

This study is expected to provide immediate implementable results for NDOT. A complete report containing an executive summary and complete record of the project, including methods, data collection, and analysis will be provided. In addition, a technology transfer brief will be created to summarize the findings. Gradation and construction guidelines will be developed for NDOT implementation consideration.

Performance:

Project will begin on July 1st, 2025

Control Number	01078P
Project Number	**SPR-FY26(063)**
Project Title	**Development of ME Pavement Design for Cementitious Material Reinforced Subgrades**
Principal Investigator	**Jongwan Eun – University of Maryland**
Project Start Date	**8/19/2025**
Project Completion Date	**7/31/2027**
Technical Advisory Committee	**Bruce Barrett, Matthew Park, Brady Dresselhaus; Nikolas Glennie; Alex Silvey; Brendon Schmidt; Ahmed ElAshwah**
Project Total Costs	**$180,143**
Project Expenditures to Date	**$0**
Number Of Extensions Granted	**None**
Percentage Of Project Complete	**35%**
Status	**On Schedule**
FY-2027 Budget	**$180,143**
FY-2027 Tasks to Be Completed	**Tasks 2 to 7**

Background:

This study focuses on cementitious materials aligns with sustainability goals by promoting resource efficiency and reducing greenhouse gas emissions associated with traditional construction methods (Bisht et al., 2019; Toohey et al. 2012; Van dam et al., 2015). Incorporating sustainable additives, such as fly ash, enhances soil performance while utilizing industrial byproducts, supporting circular economy practices. By advancing ME design protocols, this research contributes to infrastructure durability and environmental sustainability, providing Nebraska's roadway systems with a resilient and sustainable foundation to meet modern engineering demands.

Objective:

The primary objective of this study is to evaluate and optimize the design parameters of subgrade soils treated with cementitious materials, focusing on resilient modulus and environmental resistance of specimens subjected to freezing and thawing cycles and moisture changes. The goal is to develop best practices for subgrade stabilization tailored to Nebraska's soil conditions, enabling the efficient implementation of ME pavement design.

Tasks & Percent Completed:

Tasks	Budget by Task	Percent Complete
Task 1: Extensive Review	**$13,463**	**100%**
Task 2: Material Sampling	**$18,964**	**40%**
Task 3: Experimental Program	**$47,223**	**0%**
Task 4: Develop Correlations of MR with other Geotechnical Properties	**$37,504**	**0%**
Task 5: Sensitivity Analysis	**$34,682**	**0%**
Task 6: Design Recommendation	**$18,000**	**0%**
Task 7: Report	**$10,306**	**0%**

Deliverables:

The proposed research will provide significant benefits to Nebraska's infrastructure by delivering practical tools and knowledge for enhanced subgrade stabilization. Key outcomes include:

1. A robust dataset and calibrated input parameters for NDOT's use in AASHTOWare Pavement ME Design (PMED).
2. Advanced laboratory testing studies to refine design practices.
3. Cost-effective and durable pavement strategies tailored to Nebraska's soil conditions.
4. Reduction in costs, time, and effort for roadway maintenance through optimized PMED implementation

Performance:

Project will begin on July 1st, 2025

Project Descriptions

CONTROL NUMBER	01089A
PROJECT NUMBER	SPR-FY27(064)
PROJECT TITLE	The Use of Recycled Plastic in Concrete Pavements - Phase 2
PRINCIPAL INVESTIGATOR	Jamilia Teixeira-UNL
PROJECT START DATE	7/1/2026
PROJECT COMPLETION DATE	5/31/2028
TECHNICAL ADVISORY COMMITTEE	TBD
PROJECT TOTAL COSTS	$159,875
PROJECT EXPEDITURES TO DATE	-
NUMBER OF EXTENSIONS GRANTED	-
PERCENTAGE OF PROJECT COMPLETE	-
STATUS	-
FY-2027 BUDGET	-
FY-2027 TASKS TO BE COMPLETED	Tasks 1 to 3.

Background:

In Nebraska, Phase 1 of this NDOT-funded study provided the first feasibility study of incorporating recycled plastic aggregates (RPA) and recycled plastic fibers (RPF) into concrete. Early findings indicated that incorporating up to 10% RPA or 1.5% RPF did not compromise key fresh and mechanical properties such as slump, air content, compressive strength, splitting tensile strength, or modulus of rupture in comparison with the control mix (47B concrete). In fact, compressive strength values at 28 days exceeded 4,500 psi across tested mixtures. Furthermore, semi-circular bending (SCB) fracture testing revealed substantial improvements in ductility and fracture energy as ductility indices increased by as much as 135% for RPA and up to 225% for RPF mixtures, while fracture energy rose by 14– 45% for RPA and 47–147% for RPF mixtures. These results confirm the potential of RP materials to reduce crack propagation, enhance energy absorption, and improve overall structural resilience. Such improvements are particularly promising for paving applications, which must be able to withstand heavy traffic loads without cracking.

Objective:

The overarching goal of Phase II is to build upon the feasibility results of Phase 1 and address critical knowledge gaps by investigating the long-term durability, structural performance, and constructability aspects of recycled plastic concrete. The specific objectives are:

1. To determine the consistency of RPs characteristics for quality control and quality assurance purposes. Key characterization tests will be conducted on samples obtained from different processing periods in the recycling facility.
2. To develop RP-modified 47BD concrete mix designs with maximized combined aggregate gradation using recycled plastics as part of the fine aggregates and with the addition of RP fibers, and a RP-modified concrete with RP fibers only. Fresh and mechanical properties will be verified at early and mature stages.
3. To verify the scalability of the solutions and their mechanical and durability properties using ready mixed concrete. Ready mix RP-concrete will be delivered to the lab, and samples will be produced. The team will verify the mechanical and durability performance.
4. To examine the feasibility and potential implementation of the solutions by producing concrete slab segments to simulate field placement and consolidation practices and to identify any potential issues related to field construction.

Tasks & Percent Completed:

Tasks	Budget by Task
Literature Review	$20,859
Waste Plastic Sample Collection and Preparation	$21,696
Laboratory Testing of Lab-Produced Concrete Mixtures	$27,043
Assessment of Scalability and Durability Using Ready-Mixed Concrete	$30,976
Examination of Feasibility and Potential Implementation	$31,451
Documentation and Final Report	$21,850

Deliverables:

The successful development and implementation of this research in our state will also provide significant environmental benefits, such as preservation of limited natural resources, reduction of energy consumption, reduction of disposed and discarded solid waste, and reduction of emissions. Together, these outcomes will provide NDOT with robust, performance-based evidence to enable safe, cost-effective, and sustainable integration of recycled plastics into Nebraska’s concrete infrastructure.

CONTROL NUMBER	01089B
PROJECT NUMBER	SPR-FY27(065)
PROJECT TITLE	Cost-Benefit Analysis of Preemptive Weather-Related Road Closures
PRINCIPAL INVESTIGATOR	Alan W. Black-Southern Illinois University Edwardsville
PROJECT START DATE	7/1/2026
PROJECT COMPLETION DATE	5/31/2028
TECHNICAL ADVISORY COMMITTEE	TBD
PROJECT TOTAL COSTS	$150,554.83
PROJECT EXPEDITURES TO DATE	-
NUMBER OF EXTENSIONS GRANTED	-
PERCENTAGE OF PROJECT COMPLETE	-
STATUS	-
FY-2027 BUDGET	-
FY-2027 TASKS TO BE COMPLETED	Tasks 1 to 3.

Background: The decision to close a road and disrupt the flow of commerce and the traveling public results in significant costs. While maintaining roadway access is always the most preferred option, there may be scenarios, such as a multi-vehicle weather-related crashes, that induce a closure regardless of best efforts. Further, these crash scenarios place additional risk on the safety of transportation personnel, law enforcement, and emergency first responders. The resultant crash clean-up and recovery of damaged vehicles may further impede maintenance operations for a far longer duration than that of a proactive closure. NDOT, and the transportation community as a whole, presently face unprecedented challenges with staffing shortages, financial uncertainty, and increasingly variable weather conditions. As such, the ability to determine when, where, and for how long to strategically close a road to maximize safety, minimize cost, and promote overall efficiency and reliability across the transportation network is paramount. The proposed project seeks to provide NDOT with quantitative metrics for meteorological trigger thresholds for road closures and a cost-benefit analysis of such decisions. This will allow NDOT to make consistent, justifiable decisions about when to close (and re-open) roads during extreme weather conditions.

Objective: The objective of the proposed project seeks to provide strategic guidance to NDOT in identifying the meteorological thresholds (or decision points) for which consideration of a preemptive safety closure would be warranted and the cost-benefit of such decisions. The work will provide guidance to determine if a road should be closed, when it should be closed, and when it should be re-opened. The expected products of the research effort will be a framework for recommending preemptive closures in the context of their anticipated cost-benefit based on past events.

Tasks & Percent Completed:

Tasks	Budget by Task
Literature Review	**$17,564.73**
Data Collection and Database Development	**$31,365.59**
Retrospective Case Study Analysis	**$31,365.59**
Pilot Real-time Assessment and Validation	**$37,638.71**
Project Management	**$32,620.21**

Deliverables: The research products and deliverables will be actionable insights for NDOT in terms of future decision-making with respect to roadway closures during adverse weather conditions. These insights will allow NDOT to make consistent closure decisions that better address the needs of its road network users and balance mobility while prioritizing safety and efficiency.

CONTROL NUMBER	01089C
PROJECT NUMBER	SPR-FY27(066)
PROJECT TITLE	Developing a Nebraska-Specific Evaluation Framework for Superheavy Load Movements on Pavements
PRINCIPAL INVESTIGATOR	Qusai Alomari UNL
PROJECT START DATE	7/1/2026
PROJECT COMPLETION DATE	5/31/2028
TECHNICAL ADVISORY COMMITTEE	TBD
PROJECT TOTAL COSTS	$162,527
PROJECT EXPEDITURES TO DATE	-
NUMBER OF EXTENSIONS GRANTED	-
PERCENTAGE OF PROJECT COMPLETE	-
STATUS	-
FY-2027 BUDGET	-
FY-2027 TASKS TO BE COMPLETED	Tasks 1 to 3.

Background: Nebraska continues to receive superload permit requests whose non-standard axle/tire layouts, slow-roll operations, and edge-proximity produce subsurface stress patterns that are not consistently captured by current screening practices. Although the federal framework and SuperPACK provide a sound mechanistic basis, they have not yet been exercised in a Nebraska-focused parametric fashion to reveal which combinations of pavement structure, material properties, axle weights, and spacings govern ultimate capacity and service-limit responses on state routes. Without that evidence, route approvals remain slower and less consistent, and operating conditions or mitigations are difficult to specify with confidence.

Objective:

1. Conduct a focused SuperPACK parametric study on Nebraska-representative flexible pavement sections to quantify how structure, material properties, axle weights, axle spacings, and escorted slow-roll speeds influence subgrade bearing, localized shear, and surface-deflection responses.
2. Derive preliminary acceptance bounds from the parametric results that NDOT can use for permit screening and condition setting.
3. Examine select marginal cases using advanced finite-element analysis to determine when nonlinear stress–strain behavior would meaningfully change decisions relative to SuperPACK screening.
4. Produce concise input checklists and calculation templates that list the minimum data needed to apply the screening charts and execute SuperPACK runs for Nebraska-specific cases
5. Define the validation and implementation plan for subsequent phases that will finalize thresholds and extend the approach to rigid and composite pavements.

Tasks & Percent Completed:

Tasks	Budget by Task
Project Planning and Correspondence	**$19,421**
SuperPACK Setup and Data Assembly	**$33,795**
Parametric Analysis with SuperPACK	**$37,849**
Targeted Advanced FE Benchmarking	**$43,092**
Reporting and Implementation Material	**$28,371**

Deliverables: This study will provide NDOT with a focused, evidence-based screen for superload movements on Nebraska highways. By exercising SuperPACK in a structured parametric study and benchmarking marginal cases with an advanced FE tool, the work will yield preliminary acceptance bounds that can be applied directly to permit reviews. The project will also clarify when a simple mechanics-based screen is sufficient and when an advanced check is warranted, improving the efficiency of reviewer time and aligning engineering findings with transparent cost-recovery logic. Because the analysis uses Nebraska representative sections, inputs, and axle/tire nuclei taken from real permits, the results will be credible to internal reviewers and external stakeholders and will establish a practical pathway to extend the approach to rigid and composite pavements in subsequent phases.

CONTROL NUMBER	01089D
PROJECT NUMBER	SPR-FY27(067)
PROJECT TITLE	The Use of Recycled Plastic in Asphalt Pavements- Phase 2
PRINCIPAL INVESTIGATOR	Jamilla Teixeira-UNL
PROJECT START DATE	7/1/2026
PROJECT COMPLETION DATE	5/31/2028
TECHNICAL ADVISORY COMMITTEE	TBD
PROJECT TOTAL COSTS	$159,897
PROJECT EXPEDITURES TO DATE	-
NUMBER OF EXTENSIONS GRANTED	-
PERCENTAGE OF PROJECT COMPLETE	-
STATUS	-
FY-2027 BUDGET	-
FY-2027 TASKS TO BE COMPLETED	Tasks 1 to 3.

Background:

Phase I - feasibility work was limited in scope. Laboratory-produced mixtures were not fully validated against the variability of plant production, long-term field performance remains unknown, and the recyclability of plastic-modified mixtures was not addressed. Therefore, there is a critical need to answer the following research questions:

- To what extent can laboratory mixing procedures replicate the variability, rigor, and performance of plant-produced plastic-modified asphalt mixtures?
- How do recycled plastic–modified asphalt mixtures perform after long-term aging, particularly considering its cracking resistance under environmental conditions?
- How do plastic-modified field test sections perform over multiple seasons under Nebraska's extreme temperature cycles?
- Does the addition of recycled plastics affect the quality and usability of reclaimed asphalt pavement (RAP) in future recycling cycles?

Objective:

1. Compare lab versus plant-produced performance parameters from plastic-modified SPR mixtures. We will determine whether laboratory mixing protocols can reliably replicate plant-produced mixtures by comparing performance parameters from lab and plant produced mixtures.
2. Verify the long-term cracking resistance of plant-produced mixtures. Plant-collected mixtures will be subjected to long-term aging protocols followed by fracture tests.
3. Evaluate the resistance of plastic-modified SPR under extreme environmental conditions. Seasonally driven monitoring at three-month intervals over two years will be done to capture seasonal performance under Nebraska's extreme temperature cycles using drone technology along with AI and geospatial techniques.
4. Verify the recyclability of plastic-modified SPR mixtures. We will evaluate the recyclability of plastic-modified mixtures by characterizing RAP samples with and without plastics. Those RAP will be then used to produce SPR mixtures and cracking tests will be performed.

Tasks & Percent Completed:

Tasks	Budget by Task
Literature Review	**$8,938**
Sample Collection and Preparation	**$17,094**
Laboratory Experimental Evaluation	**$22,875**
Field Monitoring and Analysis	**$70,964**
Assessment of Recyclability of Plastic Mixtures	**$21,234**
Examination of Feasibility and Potential Implementation	**$12,788**
Documentation and Presentation	**$6,004**

Deliverables: The findings of this research will demonstrate the feasibility of modifying asphaltic materials through the use of recycled plastics which can potentially improve the durability of asphalt pavements, resulting in significant cost savings and more sustainable asphalt pavements. The successful development and implementation of this research in our state will also provide significant environmental benefits, such as preservation of limited natural resources, reduction of energy consumption, reduction of disposed and discarded solid waste, and reduction of emissions.

CONTROL NUMBER	01089E
PROJECT NUMBER	SPR-FY27(068)
PROJECT TITLE	Nebraska Risk-Informed Construction Scheduling and Impact Analysis
PRINCIPAL INVESTIGATOR	Li Zhao-UNL
PROJECT START DATE	7/1/2026
PROJECT COMPLETION DATE	5/31/2028
TECHNICAL ADVISORY COMMITTEE	TBD
PROJECT TOTAL COSTS	$189,448
PROJECT EXPEDITURES TO DATE	-
NUMBER OF EXTENSIONS GRANTED	-
PERCENTAGE OF PROJECT COMPLETE	-
STATUS	-
FY-2027 BUDGET	-
FY-2027 TASKS TO BE COMPLETED	Tasks 1 to 3.

Background: NDOT's current scheduling approach does not quantify schedule risk or identify which activities, pay items, or external factors most often contribute to late completion. Because uncertainty is unavoidable in most construction activities, contract-time determination requires more than fixed production rates and simple activity sequencing. NDOT also lacks a consistent way to evaluate the financial consequences of schedule disruptions, including agency costs, contractor time-related costs, and user delay costs. As a result, NDOT does not yet have a unified, data-driven framework that can 1) provide reliable production-rate estimates from past Nebraska projects, 2) determine reasonable contract time using probabilistic activity durations, 3) quantify the likelihood of delay, 4) identify critical delay drivers, and 5) assess cost exposure under different disruption scenarios. A modernized scheduling method that combines historical production data with probability-based modeling will allow NDOT to assign contract time more accurately, anticipate delay risk, support more consistent bidding processes, and reduce agency and user cost exposure.

Objective: The overarching goal of this project is to develop a data-driven, probability-based scheduling tool that enables NDOT to determine reasonable contract time and proactively assess construction delay risks throughout the project lifecycle. Specifically, four objectives are pursued in this research project.

1. Establish a baseline production-rate library by analyzing historical NDOT design-bid build projects, including actual item production rates, task durations, and the frequency and causes of time extensions, covering common and high-impact project types.
2. Develop a probability-based scheduling and decision module to estimate contract time allowance for each activity and the project, and when conditions change, update the schedule and run risk analysis to produce probability ranges for milestones (e.g., completion date).
3. Quantify project schedule risk by assigning probability distributions to key task durations, running risk simulations and identifying the activities and external factors most likely to drive delays, and estimate cost exposure under different disruption scenarios.
4. Provide the NDOT with an Excel/VBA tool that integrates progress update functions for post-letting monitoring, such as the up-to-date production rates, task logic, delay risk, and cost to estimate working days per pay item, simulate the probability of project completion, and display decision-support outputs (e.g., cost)

Tasks & Percent Completed:

Task	Budget by Task
Literature Search & NDOT Project Review	**$18,878**
Production Rate Library Establish and Updates	**$31,844**
PERT-based Probability Scheduling	**$31,844**
Monte Carlo Simulation for Uncertainty Scenarios	**$27,331**
Delay Risk and Cost Analysis	**$42,506**
Scheduling Tool Development	**$19,528**
Final Report & Deliverables	**$15,876**

Deliverables: At the project level, this research will provide NDOT with a data-driven approach to construction scheduling that improves the accuracy, transparency, and consistency of contract-time determination by developing updated production-rate benchmarks and integrating probability-based scheduling methods. The combination of using up-to-date production rates and considering risk in delay occurrences will allow the NDOT to develop a more accurate construction schedule and completion date. At the agency level, it will support Section 1304 of MAP-21 in which Congress declares that it is in the national interest to promote the use of innovative technologies and practices that increase the efficiency of construction and accelerate project delivery. This directly aligns with NDOT's strategic goal to use established state and industry best practices, new technologies, and creativity to deliver well-designed, high-quality projects.

CONTROL NUMBER	01089F
PROJECT NUMBER	SPR-FY27(069)
PROJECT TITLE	Advancing Pollinator Habitat Monitoring through Remote Sensing on Nebraska Roadsides
PRINCIPAL INVESTIGATOR	Mercy Manzanares, Monarch Joint Venture
PROJECT START DATE	7/1/2026
PROJECT COMPLETION DATE	5/31/2028
TECHNICAL ADVISORY COMMITTEE	TBD
PROJECT TOTAL COSTS	$174,567.70
PROJECT EXPEDITURES TO DATE	-
NUMBER OF EXTENSIONS GRANTED	-
PERCENTAGE OF PROJECT COMPLETE	-
STATUS	-
FY-2027 BUDGET	-
FY-2027 TASKS TO BE COMPLETED	Tasks 1 to 3.

Background:

To meet monitoring and reporting requirements under the Monarch CCAA, NDOT must collect consistent data on milkweed stem density and nectar-plant cover across extensive roadside networks. Current field-based approaches, though effective, are resource-intensive, limited in spatial coverage, and require a specialized level of biological expertise. NDOT needs a scalable and cost-effective remote sensing strategy that can meet CCAA requirements. Furthermore, NDOT must understand the costs and benefits to applying this technology in-house or via external contract, and how the products could be applied to offer NDOT versatile imagery and data outputs that can support broader environmental review needs, planning, and maintenance decisions.

Objective:

1. Customized Remote Sensing Protocols: Adapt and evaluate UAV-based remote sensing protocols for pollinator habitat monitoring to result in a workflow for analyzing and summarizing remote sensing data compatible with and formatted for CCAA submission.
2. CCAA Compliance Report: Develop a comprehensive, CCAA-compliant monitoring report that synthesizes field and/or UAV-derived habitat data, evaluates habitat metrics against Monarch CCAA monitoring requirements, and supports NDOT's regulatory obligations.
3. UAV Program Capacity: Build internal NDOT-collaborator capacity and support adoption of UAV technology for environmental evaluation and project delivery.
4. Cost-Benefit Evaluation: Evaluate the efficiencies enabled by UAV surveys compared to traditional field methods.
5. Expanded UAV Applications: Evaluate how UAV imagery is created while surveying pollinator habitat, could support additional NDOT environmental and project delivery needs

Tasks & Percent Completed:

Tasks	Budget By Task
Task 1. Customized Remote Sensing Protocols	**$43,500**
Task 2. Surveys and CCAA Compliance Reporting	**$67,500**
Task 3. Grow UAV Program Capacity	**$36,000**
Task 4. Cost and Benefit Evaluation	**$15,000**
Task 5. Expanded UAV Applications	**$8,000**
Project Management and Reporting for NTC	**$4,567.70**

Deliverables:

1. Regulatory Compliance and Reporting: Provides NDOT with an efficient, validated method to meet annual Monarch CCAA monitoring requirements and produces standardized outputs compatible with national frameworks while providing imagery to help discuss projects with state and federal regulatory agencies.
2. Improved Data Quality and Decision Support: Delivers high-resolution data on milkweed density and nectar cover supporting environmental review and monarch CCAA compliance.
3. Technology Transfer and Capacity Building: Builds NDOT's internal capacity through workshops, trainings, and SOP development, strengthening staff readiness.
4. First-In-Nation Innovation & Organizational Leadership: Positions NDOT as a national leader in adopting advanced UAV and machine-learning tools to enhance data-driven decision-making across transportation systems.

CONTROL NUMBER	01089G
PROJECT NUMBER	SPR-FY27(070)
PROJECT TITLE	Development and Evaluation of Approach Guardrail Transition with Increased Span Length between Concrete Bridge Rail and First Transition Post – Phase II
PRINCIPAL INVESTIGATOR	Tewodros Yosef – UNL
PROJECT START DATE	7/1/2026
PROJECT COMPLETION DATE	5/31/2028
TECHNICAL ADVISORY COMMITTEE	TBD
PROJECT TOTAL COSTS	$218,846
PROJECT EXPEDITURES TO DATE	-
NUMBER OF EXTENSIONS GRANTED	-
PERCENTAGE OF PROJECT COMPLETE	-
STATUS	-
FY-2027 BUDGET	-
FY-2027 TASKS TO BE COMPLETED	Tasks 1 to 3.

Background:

Phase I of this project, funded by NDOT, addressed this need at the concept and simulation level. MwRSF researchers developed and refined several long-span AGT concepts for the 34-in. tall NDOT thrie-beam system and used LS-DYNA simulations to evaluate their performance with increased span between the concrete buttress and the first transition post under MASH TL-3 impact conditions. The work included evaluation of the upstream W-beam to thrie-beam transition, the downstream thrie-beam to rigid buttress connection, and identification of critical impact points for both the pickup truck and small car tests. These analyses demonstrated that the selected long-span concept is a promising candidate, but they do not satisfy FHWA requirements. Federal acceptance of new roadside safety hardware under MASH requires full-scale crash testing. An FHWA eligibility letter cannot be obtained on the basis of simulations alone. Without full-scale crash testing, the long-span AGT system cannot be fully validated, adopted statewide, or included in NDOT standard plans. Phase II is therefore needed to conduct the required full-scale MASH TL-3 crash tests and provide an FHWA-compliant evaluation of the new long-span AGT system.

Objective:

The primary objective of this research is to conduct full-scale crash testing to evaluate the crashworthiness of the long-span 34-in. tall NDOT thrie-beam AGT system under MASH TL-3 conditions and to support future FHWA eligibility under MASH. Based on Phase I LS-DYNA simulations and prior full-scale testing of the standard 34-in. tall NDOT AGT system, upstream transition tests were judged noncritical for the long-span configuration. This Phase II study will therefore conduct one full scale crash test, MASH test designation no. 3-21 at the critical impact point on the downstream transition identified in Phase I. The results will verify whether the long-span AGT satisfies MASH TL-3 impact safety performance for the 2270P pickup truck impact and will provide the technical basis to plan the remaining downstream small car test, MASH test designation no. 3-20, and any needed design refinements in a future Phase III effort.

Tasks & Percent Completed:

Tasks	Budget by Task
Project Planning and Correspondence	**$30,017**
Construction and Full-Scale Crash Testing	**$156,756**
Reporting and Project Deliverables	**$32,073**

Deliverables:

The primary objective of this research is to conduct full-scale crash testing to evaluate the crashworthiness of the long-span 34-in. tall NDOT thrie-beam AGT system under MASH TL-3 conditions and to support future FHWA eligibility under MASH. Based on Phase I LS-DYNA simulations and prior full-scale testing of the standard 34-in. tall NDOT AGT system, upstream transition tests were judged noncritical for the long-span configuration. This Phase II study will therefore conduct one fullscale crash test, MASH test designation no. 3-21 at the critical impact point on the downstream transition identified in Phase I. The results will verify whether the long-span AGT satisfies MASH TL-3 impact safety performance for the 2270P pickup truck impact and will provide the technical basis to plan the remaining downstream small car test, MASH test designation no. 3-20, and any needed design refinements in a future Phase III effort.

CONTROL NUMBER	01089H
PROJECT NUMBER	SPR-FY27(071)
PROJECT TITLE	Implementation of UHPC Bridge Deck Overlays in Nebraska
PRINCIPAL INVESTIGATOR	Jiong Hu-UNL
PROJECT START DATE	7/1/2026
PROJECT COMPLETION DATE	5/31/2028
TECHNICAL ADVISORY COMMITTEE	TBD
PROJECT TOTAL COSTS	$146,264.00
PROJECT EXPEDITURES TO DATE	-
NUMBER OF EXTENSIONS GRANTED	-
PERCENTAGE OF PROJECT COMPLETE	-
STATUS	-
FY-2027 BUDGET	-
FY-2027 TASKS TO BE COMPLETED	Tasks 1 to 3.

Background: NDOT Project SPR-FY24(034) confirmed the superior mechanical and durability performance of Nebraska's non-proprietary UHPC mixtures, field implementation remains a critical missing step. Bridge deck overlays require substantially larger material volumes and longer placement durations than typical UHPC applications, such as joint connections or patch repairs. These factors introduce challenges in production logistics, equipment capacity, and quality control that must be validated under real construction conditions. Currently, NDOT and local contractors lack documented field procedures and specifications tailored to Nebraska's climate, materials, and construction practices. Key uncertainties remain regarding surface preparation methods (e.g., milling versus hydrodemolition), on-site batching and mixing of large quantity using truck mixers, placement sequencing, construction joints, finishing, curing, and early-age strength verification. Without full-scale field demonstration and training, these unknowns limit NDOT's ability to specify UHPC overlays in new or rehabilitation bridge projects.

Objective:

1. Develop NDOT-specific construction and quality control/quality assurance (QA/QC) guidelines for UHPC overlay production and placement.
2. Train NDOT personnel, contractors, and suppliers through mockup exercises and field workshops.
3. Identify and execute one or two pilot bridge overlay projects using Nebraska-developed UHPC mixtures. One of these projects could be UHPC overlay for a new bridge deck. The team will work with NDOT and AGC members to achieve this objective.
4. Evaluate each phase of the process: surface preparation, batching, mixing, placement, curing, and finishing, under field conditions (i.e. large volume).
5. Provide NDOT with specifications, lessons learned, and best-practice recommendations for future statewide deployment.

Tasks & Percent Completed:

Tasks	Budget by Task
1. Synthesis of State and National UHPC Overlay Experience	**$15,320**
2. Logistics of Production, Construction, and Quality Control	**$17,663**
3. Mockup and Training	**$53,864**
4. Implementation Project	**$43,975**
5. Guidelines Development and Reporting	**$13,442**

Deliverables: The implementation of UHPC bridge deck overlays in Nebraska is expected to produce immediate and long-term benefits for both NDOT and the traveling public. The dense, impermeable UHPC layer will significantly reduce chloride ingress and freeze–thaw damage, extending bridge service life by several decades and lowering maintenance costs. Field validation of Nebraska's non-proprietary mixtures will provide NDOT with a cost-effective and locally sourced alternative to commercial UHPC products, supporting sustainable material use and statewide economic benefits. In addition, the project will generate construction and quality-control guidelines, as well as training resources, to strengthen the capacity of NDOT personnel, contractors, and suppliers. The successful demonstration bridge will serve as a model for future rehabilitations, promoting broader use of UHPC overlays across Nebraska's bridge network. Ultimately, this project will transition UHPC from an emerging research material to a practical, standardized technology that enhances bridge durability and performance statewide.

CONTROL NUMBER	01089J
PROJECT NUMBER	SPR-FY27(072)
PROJECT TITLE	High-Strength, Corrosion-Resistant Reinforcement for Empirical Deck Design
PRINCIPAL INVESTIGATOR	Joshua Steelman – UNL
PROJECT START DATE	7/1/2026
PROJECT COMPLETION DATE	5/31/2028
TECHNICAL ADVISORY COMMITTEE	TBD
PROJECT TOTAL COSTS	$163,397.00
PROJECT EXPEDITURES TO DATE	-
NUMBER OF EXTENSIONS GRANTED	-
PERCENTAGE OF PROJECT COMPLETE	-
STATUS	-
FY-2027 BUDGET	-
FY-2027 TASKS TO BE COMPLETED	Tasks 1 to 3.

Background: The Nebraska DOT seeks to maximize the long-term durability and minimize the lifecycle maintenance costs of the bridge deck for an upcoming major river-crossing replacement, where future deck rehabilitation or replacement would be exceptionally costly, disruptive, and hazardous. Although the DOT has adopted guidance intended to improve deck durability, current practices still rely primarily on empirical deck design provisions developed decades ago using Grade 60 reinforcing steel. These provisions specify total reinforcing area but do not require explicit evaluation of crack control parameters, do not account for the use of higher-strength reinforcing (e.g., Grade 80 or Grade 100), and do not provide direction on how reduced steel area enabled by higher yield strength may affect crack formation, crack widths, or long-term durability. At the same time, while recent European research has proposed durability-focused design approaches that incorporate explicit crack-width considerations, there remains significant disagreement within the research and practitioner communities regarding the extent to which crack width directly correlates with reinforced concrete durability. As a result, it is not yet clear whether or how such approaches should be adopted by the Nebraska DOT; however, a thorough review and synthesis of this work is essential to inform any future deck reinforcement guidelines. As the Department considers transitioning to higher-grade reinforcement to reduce material quantities and construction complexity, it currently has no validated methodology to configure bar size, spacing, and reinforcement ratios to ensure adequate crack control, residual crack behavior, and ultimate strength performance.

Objective:

1. Review and synthesize available guidance in the United States and internationally to achieve durability in concrete deck design.
2. Incorporate synthesized findings for bridge deck detailing to achieve ductility to develop and experimentally investigate alternate bridge deck details using higher grade, corrosion-resistant steel reinforcing for the Decatur bridge replacement, considering the following grades of reinforcement: 60 ksi (control group), 80 ksi, and 100 ksi.

Tasks & Percent Completed:

Tasks	Budget by Task
1. Correspondence / Project Management	**$4,370**
2. Literature Review and Review of Current Practices	**$48,563**
3. Physical Test Planning	**$12,295**
4. Physical Testing	**$64,993**
5. Final Deliverables	**$33,177**

Deliverables: For a major river-crossing structure where deck replacement is extraordinarily costly, disruptive to the traveling public, and hazardous for construction personnel, even modest improvements in durability translate into substantial economic, safety, and operational benefits. The results will enable the Nebraska DOT to make informed decisions that reduce long-term maintenance expenditures, minimize traffic impacts associated with future deck rehabilitation or replacement, enhance worker and motorist safety by reducing construction interventions, and improve overall bridge system reliability. Ultimately, the research will equip the DOT with actionable, defensible guidance that supports more resilient infrastructure and superior stewardship of public resources.

CONTROL NUMBER	01089K
PROJECT NUMBER	SPR-FY27(073)
PROJECT TITLE	Evaluation of Alternative Intersection and Interchange Options for Nebraska
PRINCIPAL INVESTIGATOR	Aemal Khattak – UNL
PROJECT START DATE	7/1/2026
PROJECT COMPLETION DATE	5/31/2028
TECHNICAL ADVISORY COMMITTEE	TBD
PROJECT TOTAL COSTS	$189,930
PROJECT EXPEDITURES TO DATE	-
NUMBER OF EXTENSIONS GRANTED	-
PERCENTAGE OF PROJECT COMPLETE	-
STATUS	-
FY-2027 BUDGET	-
FY-2027 TASKS TO BE COMPLETED	Tasks 1 to 3.

Background:

NDOT has implemented and developed guidance for a limited set of unconventional designs (e.g., certain RCUTs and diverging diamond interchanges) and has accumulated experience through selected projects and research studies. However, many other viable unconventional intersection and interchange configurations remain either untested or insufficiently evaluated for use in Nebraska. Current guidance does not provide a consistent, Nebraska-specific framework for comparing these alternatives against more conventional designs over a range of traffic, geometric, and environmental conditions. NDOT studies often focused on either operational performance or isolated safety outcomes, and did not consistently integrate construction, retrofit, and maintenance costs into a unified benefit-cost framework. NDOT therefore lacks robust, Nebraska-specific tools to: (1) screen and select candidate unconventional facilities; (2) quantify trade-offs in operations, safety, and cost; and (3) develop practical guidelines that can be directly used by designers, planners, and district staff. This gap creates uncertainty when considering unconventional options and may limit NDOT's ability to fully leverage designs that could offer meaningful safety and mobility benefits.

Objective:

- Select the most suitable unconventional intersection and interchange designs for Nebraska, appropriate for both rural and urban contexts.
- Assess the operational impacts of the alternative intersection/interchange and associated costs.
- Assess the safety impacts of the alternative intersection/interchange and associated costs.
- Assess the construction and maintenance costs.
- Develop alternative intersection/interchange guidelines based on benefit/cost analysis.

Tasks & Percent Completed:

Tasks	Budget By Task
1. TAC Meeting and Review of Literature	**$17,485**
2. Facility Type Selection and Data Collection	**$36,310**
3. Operational Analysis and Associated Cost Estimation	**$32,438**
4. Safety Analysis and Associated Cost Estimation	**$24,709**
5. Construction/Retrofit and Maintenance and Associated Cost Estimation	**$27,946**
6. Benefit/Cost Analysis and Establish Guidelines	**$29,138**
7. Final Report and TAC Presentation	**$21,903**

Deliverables: The proposed research will provide NDOT with a structured and evidence-based approach for identifying the most suitable unconventional intersection and interchange options for Nebraska. By evaluating both the designs already implemented within the state and additional alternatives that may be considered soon, the study will broaden NDOT's understanding of how various unconventional treatments perform under different traffic, geometric, and environmental conditions in Nebraska. A key outcome of this effort will be the development of guidelines that incorporate the latest analytical methods, Nebraska-calibrated microsimulation results, new safety findings, and national best practices. Ultimately, the outcomes will contribute to more efficient operations and enhanced safety at Nebraska's intersections and interchanges.

CONTROL NUMBER	01089L
PROJECT NUMBER	SPR-FY27(074)
PROJECT TITLE	Modernizing NDOT's Pavement Marking Program for Retroreflectivity Compliance and Cost-Effective Restriping
PRINCIPAL INVESTIGATOR	Li Zhao – UNL
PROJECT START DATE	7/1/2026
PROJECT COMPLETION DATE	5/31/2028
TECHNICAL ADVISORY COMMITTEE	TBD
PROJECT TOTAL COSTS	$218,687.00
PROJECT EXPEDITURES TO DATE	-
NUMBER OF EXTENSIONS GRANTED	-
PERCENTAGE OF PROJECT COMPLETE	-
STATUS	-
FY-2027 BUDGET	-
FY-2027 TASKS TO BE COMPLETED	Tasks 1 to 3.

Background: The evaluation of pavement marking materials primarily relies on their retroreflectivity, which is the measure of how effectively markings reflect vehicle headlight illumination back toward the driver. Deciding when pavement markings need to be restriped is not straightforward because their visibility depends on retroreflectivity. Nebraska Department of Transportation (NDOT) currently follows a pavement marking policy that is last updated over twenty years ago. The practice is based on fixed restriping frequencies (e.g., annually) determined by corridor type and traffic volume. The Federal Highway Administration (FHWA) requires all agencies to implement a pavement marking retroreflectivity maintenance method by September 6, 2026, and specifies minimum maintained retroreflectivity values of 50 mcd/m²/lx for roadways with posted speeds ≥ 35 mph and 100 mcd/m²/lx for speeds ≥ 70 mph. NDOT does not yet maintain a comprehensive or statewide pavement marking retroreflectivity dataset. Without historical measurements or geographically representative data, it cannot characterize how different marking materials deteriorate across Nebraska's diverse traffic and climate conditions. This lack of data limits NDOT's ability to transition from a frequency-based to a performance-based maintenance strategy that meets FHWA requirements, manages costs, and improves operational efficiency.

Objective: The overall goal of this research project is to provide NDOT with a documented, MUTCD-compliant, and data-driven method for maintaining pavement marking retroreflectivity that ensures safety, regulatory compliance, and cost-effective use of maintenance resources. To achieve this goal, the project will pursue the following specific objectives: develop a Nebraska-specific hybrid maintenance method, develop a statistically sound statewide data-collection plan, develop and calibrate degradation models, and quantify expected life-cycle benefits.

Tasks & Percent Completed:

Tasks	Budget by Task
1. Literature Review of State Methods	**$15,323**
2. Develop Hybrid Performance-Based Maintenance Framework	**$15,662**
3. Develop Data Collection Plan and Preliminary Data Analysis	**$113,660**
4. Develop and Validate Degradation Models	**$20,413**
5. Quantify Life-Cycle Cost Savings to the Performance-Based Method	**$21,243**
6. Develop Guidelines for NDOT's Pavement Marking Maintenance	**$18,191**
7. Prepare Final Report and Presentation	**$14,194**

Deliverables:

The primary benefit of this research is to provide NDOT with a MUTCD-compliant, datadriven method for maintaining pavement marking retroreflectivity. Other benefits include:

1. Enhanced Safety and Nighttime Visibility.
2. Optimized Maintenance Scheduling and Cost Savings.
3. Improved Asset Management and Decision-Support Capability.


RESEARCH
DIVERSITY
STRATEGY
FAQ
RESEARCH
EDUCATION
RISK
TEAMWORK
LEARNING
INNOVATION
RESULTS
EXPERIENCE


COMPLETED

Completed Published Projects

Transport Research Documentation (TRID) Link and NDOT Research Website

Project Number	Research Title with Links
FY21(003)	The Effect of Antioxidant Additives and Recycling Agents on Performance of Asphalt Binders and Mixtures – Phase II
FY22(005)	Groundwater Flooding on Highways in the Nebraska Sandhills: Applying Remote Sensing, Precipitation and Groundwater Modeling to Determine Depth, Cause and Frequency
FY23(013)	High-Mast Tower Foundation – Phase II
FY23(014)	Gravel Road Performance Enhancements – Phase I
FY23(015)	Application of Cementitious Materials and Fiber Reinforcement to Enhance Lime Stabilization for Nebraska Shale Soils
FY23(016)	Nebraska Balanced Mix Design – Phase II
FY23(018)	Updating Rainfall Zones and Intensities in Nebraska for Improved Design of Non-bridge-sized Drainage Structures
FY23(019)	Minimizing Take of Threatened Rattlesnakes and Optimizing Project Review in SE Nebraska
FY23(021) *	Impacts of Stream Bed Adjustments on Local Bridge Morphology
FY23(022)*	Air-coupled GPR and HD Imaging for High-Speed Bridge Deck Evaluation
FY23(024)	Repair/Preservation of Concrete Compression Members in Bridges Using Ultra-High-Performance Concrete (UHPC)
FY24(026)	Evaluation of Critical Shear Strength of Soils in Nebraska Based on Revised CPT
FY24(027)	The Use of Recycled Plastic in Asphalt Pavements: Feasibility Study
FY24(029)	Assessment of Winter Maintenance Performance Objectives Using Maintenance Decision Support System
FY24(030)	Development and Evaluation of Crashworthy Approach Guardrail Transition with Increased Span Length between Concrete Bridge Rail and First Transition Post -Phase I
FY24(031)	Sediment Collection and Analysis of Sediment Contributing to State Storm Sewer Facilities
FY24(032) *	Update of Intersection/Interchange Guidelines for Rural Expressways in Nebraska
FY24(033)	Drainage Area Limitations of Single Watershed, Peak Flow Estimates from NRCS Methods
FY24(034)*	Ultra-High-Performance Concrete (UHPC) for Bridge Deck Overlay and Structural Deck Repair
FY24(035)*	Framework for Quantifying Benefits to Disadvantaged Communities: Application to Nebraska's National Electric Vehicles Infrastructure (NEVI)
FY24(036) *	Assessment of Truck Parking Demand and Safety During Normal and Severe Weather Conditions in Nebraska
FY24(037) *	Guidance for Left-Turn Flashing Yellow Arrow (FYA) Implementation in Nebraska
RRR (002) *	Feasibility Study of Local Waste Plastic Materials in Concrete
FY25(045) *	Refined Analysis of Slab Bridges for Load Rating

(*) Note: These projects are anticipated to be published in May 2026.

Completed Projects Implementation Follows the

Research Readiness Level (RRL) Assessment

- The RRL concept is based on the FHWA Technology Readiness Level Guide and was adapted to meet NDOT's specific needs.
- Research Readiness Level (RRL) Assessment identifies the immediate next steps for a research or technology development project by assigning an RRL number indicating how close to acceptance as standard practice the project is.
- The RRL Assessment provides a systematic method for identifying how NDOT can best support the development of research at various stages in the process.

2025-2026 Totals: 39 total projects

- Newly Completed Non-Phased Projects – 12 Projects
- Completed Project Follow Ups – 11 Projects
- Newly Completed Phased Projects – 10 Projects
- Pushed Review to Future NDOT Team Champion Still Implementing – 3 Projects
- **New** Promise to Pause - Research was successful; but due to changes in industry or leadership, results will not be implemented - 3
- 68 Technology Transfers
    - 50 presentations
    - 25 papers

Newly Completed Non-Phased Projects – 12 Projects

Project Number	Project Title	RRL Number	Technology Transfers
FY22(009)	Accelerated Bridge Construction (ABC) Decision Tool Research Report NDOT Recommendations Based on Completed Research	Level 1	None
FY22(010)	Feasibility Study: Application of Steel Sheet-Piles for the Abutment of Water-Crossing Bridges in Nebraska Research Report NDOT Recommendations Based on Completed Research	Level 2	None
M087	Field Monitoring of Joint-less Curved Integral Abutment Bridge in Nebraska Research Report NDOT Recommendations Based on Completed Research	Level 2	None
FY23(024)	Repair/Preservation of Concrete Bridges Using Ultra-High-Performance Concrete (UHPC) Research Report NDOT Recommendations Based on Completed Research	Level 3	2 presentations 1 paper
FY21(010)	Crashworthy Perforated Square Steel Tube (PSST) Mailbox Support – Phase I Research Report NDOT Recommendations Based on Completed Research	Level 4	None
FY23(025)	Modeling Pedestrian and Bicyclist Crash Exposure with Location-Based Service Data Research Report NDOT Recommendations Based on Completed Research	Level 4	1 presentation
FY24(033)	Drainage Area Limitations for NDOT Hydrologic Computations Research Report NDOT Recommendations Based on Completed Research	Level 4	3 presentations
FY23(019)	Minimizing Take of Threatened Rattlesnakes and Optimizing Project Review in SE Nebraska Research Report NDOT Recommendations Based on Completed Research	Level 4	1 presentation
FY23(018)	Updating Rainfall Zones and Intensities in Nebraska for Improved Design of Non-Bridge-Sized Drainage Structures – Phase I Research Report NDOT Recommendations Based on Completed Research	Level 5	None
FY21(004)	Approach Guardrail Transition Retrofit to Existing Buttresses and Bridge Rails Research Report NDOT Recommendations Based on Completed Research	Level 5	None
FY22(005)	Groundwater Flooding on Highways in the Nebraska Sandhills: Applying Remote Sensing, Precipitation, and Groundwater Modeling to Determine Depth, Cause, and Frequency Research Report NDOT Recommendations Based on Completed Research - pending	N/A	None
FY23(018)	Updating Rainfall Zones and Intensities in Nebraska for Improved Design of Non-Bridge-Sized Drainage Structures – Phase I Research Report NDOT Recommendations Based on Completed Research	Level 5	None

Completed Project Follow Ups – 11 Projects

Project Number	Project Title	RRL Number	Technology Transfers
M073	Development of DSR Test Method to Determine Binder Low-Temperature Properties Research Report NDOT Recommendations Based on Completed Research	Level 2 remained at Level 2	1 presentation 1 paper
M067	Offset Right-Turn Lanes on State Highway Systems Research Report NDOT Recommendations Based on Completed Research	Level 4 remained at Level 4	None
M083	Application of Internal Curing to Improve Concrete Bridge Deck Performance Research Report NDOT Recommendations Based on Completed Research	Level 3 moved to Level 4	None
M096	Evaluating ASCT Operations for Dodge Street Corridor Research Report NDOT Recommendations Based on Completed Research	Level 3 moved to Level 5	None
M071	Development of High-Performance Rapid Patching Materials for Pavement Repair Research Report NDOT Recommendations Based on Completed Research	Level 4 moved to Level 5	3 presentations 1 paper
M117	Research and Education for Optimizing the Development and Implementation of an Unmanned Aircraft Program at the Nebraska Department of Transportation Research Report NDOT Recommendations Based on Completed Research	Level 4 moved to Level 5	None
M069	Evaluation of Reducing Cement Content in NDOR Class R Combined Aggregate Gradations Research Report NDOT Recommendations Based on Completed Research	Level 4 moved to Level 5	3 presentations
M090	Synthesis of Repair Practices of Damaged Precast/Prestressed Concrete Girders Research Report NDOT Recommendations Based on Completed Research	Level 4 moved to Level 5	None
M092	Research on School Zone Safety Research Report NDOT Recommendations Based on Completed Research	Level 4 moved to Level 5	None
M081	Correlation Analysis of MDSS and NEWINS Research Report NDOT Recommendations Based on Completed Research	Level 4 moved to Level 5	None
In-House	Validation of the Mechanical Rocker Test Method for Ice Melting Capacity (MRT-IMC) Research Report NDOT Recommendations Based on Completed Research	Level 3 moved to Level 5	None
M110	Biopolymerized Slope/Subgrade Stabilization and Advanced Field Monitoring Research Report NDOT Recommendations Based on Completed Research	Level 3 moved to Level 5	1 paper

Newly Completed Phased Projects – 10 Projects

Project Number	Project Title	RRL Number	Technology Transfers
FY21(003)	Effect of Antioxidant Additives and Recycling Agents on Performance of Asphalt Binders and Mixtures Research Report NDOT Recommendations Based on Completed Research	Level 2 remained at Level 2	5 papers 3 presentations
FY22(003)	Asphalt Binder Laboratory Short-Term Aging – Phase I and Phase II Research Report NDOT Recommendations Based on Completed Research	Level 2 remained at Level 2	None
FY23(016)	Nebraska Balanced Mix Design – Phase I and Phase II Research Report NDOT Recommendations Based on Completed Research	Level 2 remained at Level 2	4 presentations
FY23(013)	High-Mast Tower Foundation – Phase I and Phase II Research Report NDOT Recommendations Based on Completed Research	Level 3 remained at Level 3	2 presentations
NA	Nondestructive Testing (NDT) For Bridge Deck Evaluation 2016 - 2025 NDOT Recommendations Based on Completed Research (In Progress)	Level 3 remained at Level 3	1 presentation 2 papers
NA	Development and Implementation of Ultra-High-Performance Concrete in Nebraska 2017 - Present NDOT Recommendations Based on Completed Research	Level 3 remained at Level 3	1 paper 7 presentations
FY22(011)	Truck Platooning Effects on Girder Bridges – Phase I and Phase II Research Report NDOT Recommendations Based on Completed Research	Level 3 moved to Level 4	7 presentations 7 papers
FY23(017)	Development of the Nebraska Department of Transportation Winter Severity Index – Phase I and Phase II Research Report NDOT Recommendations Based on Completed Research	Level 3 moved to Level 4	2 presentations
FY22(011)	A Statewide Geographic Information System (GIS) as a Predictive Tool for Locating Deeply Buried Archeological Deposits in Nebraska: Phase I, Phase II, and Phase III Research Report NDOT Recommendations Based on Completed Research	Level 3 moved to Level 5	2 presentations 3 papers
FY21(011)	Establishment of Wildflower Islands to Enhance Roadside Health, Ecological Value, and Aesthetics – Phase I and Phase II Research Report NDOT Recommendations Based on Completed Research	Level 3 moved to Level 5	None

Pushed Review to Future NDOT Team Champion Still Implementing – 3 Projects

Project Number	Project Title	RRL Number	Technology Transfers
M085	Precast Concrete Deck-to-Girder Connection using UHPC Research Report NDOT Recommendations Based on Completed Research	Level 3	2 presentations
M097	Research on Weather Relationships to Crashes Research Report NDOT Recommendations Based on Completed Research	Level 3	None
In-House	Utilizing Kryton KIM Technology Research Report NDOT Recommendations Based on Completed Research	Level 2	None

Promise to Pause - Research was successful; but due to changes in industry or leadership, results will not be implemented - 3

Project Number	Project Title	RRL Number	Technology Transfers
M096	Evaluating ASCT Operations for Dodge Street Corridor Research Report NDOT Recommendations Based on Completed Research	Level 3 moved to From Promise to Pause	None
M088	Supporting Bridge Management with Advanced Analysis and Machine Learning Research Report NDOT Recommendations Based on Completed Research	Level 4 moved to From Promise to Pause	5 presentations
M082	Early Detection of Near-Surface Void Defects in Concrete Pavement Using Drone-Based Thermography and GPR Methods Research Report NDOT Recommendations Based on Completed Research	Level 4 moved to From Promise to Pause	2 papers

Ultra-High-Performance Concrete (UHPC) for Bridges

Presented by: Dr. George Morcous
(University of Nebraska – Lincoln)

May 2025

Minimizing Take of Threatened Rattlesnakes and Optimizing Project Review in SE Nebraska

Presented by: Shaun Dunn
(Nebraska Game and Parks Commission)

October 2025

Contact

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