

**ALASKA DOT&PF RESEARCH
ANNUAL WORK PLAN
Amendment 1**

Federal Fiscal Year 2023-2024



Spring 2023

Research Development and Technology Transfer

Alaska Department of Transportation & Public Facilities

The Research Development and Technology Transfer (RD&T2) Section within the Division of Design and Engineering Services of the Alaska Department of Transportation & Public Facilities (DOT&PF) provides research management, library, technical assistance, training, and technology deployment services to DOT&PF, local transportation agencies, and their partners.

RD&T2 provides services largely through the collaborative relationships with and financial support from the Federal Highway Administration, the University of Alaska, University Transportation Centers, and the DOT&PF. By leveraging resources and developing partnerships with a variety of transportation organizations and professionals. RD&T2 taps into a vast network of expertise and resources and eliminates duplication of effort. RD&T2 also provides an avenue for multidisciplinary support from a network of engineering, management, leadership, law, planning, and the environment.

This document is the proposed work plan for the DOT&PF Research program for federal fiscal year 2023 based on project selection process outlined in our Standard Operating Procedures Manual available online at our website: <http://dot.alaska.gov/stwddes/research/index.shtml>

I, Anna Bosin, Research Program Manager, DOT & PF of the State of Alaska, do hereby certify that the State of Alaska is in compliance with all requirements of 23 U.S.C. 505 and its implementing regulations with respect to the research, development, and technology transfer.

For additional information, contact:
Anna Bosin, P.E.
Research, Development, & Technology Transfer Manager
Division of Statewide Design & Engineering Services
Alaska Department of Transportation & Public Facilities
820 E 15th Ave
Anchorage, AK 99501
907.269.6208
Anna.bosin@alaska.gov

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Fiscal Summary

Amendment 1 includes multiple off-cycle research needs requests as well as adjustments to the previously approved projects. For clarity, adjustments are updated in the below table to show the changes and are “highlighted” to draw attention to the project row. Off-cycle projects are included in a separate table.

Research Projects Selected for FFY23

Adjustments

All the projects are funded by 80% Federal (SP&R-B) and 20% State match for the combined totals shown. All projects are total project costs. Completion dates and durations are estimates.

	Title	Champion(s)	Researcher(s)	FFY23 (\$) *FFY22 Start	Est. Comp. Date
1.	Implicit Safety Benefits for Vulnerable Road Users HFHWY00303/4000(221)	Matt Walker Mary McRae	Dr. Nathan Belz, UAF		12/31/24
2.	Alaska’s transportation workforce detours: Maximizing training opportunities and outcomes in DOT&PF’s key industries HFHWY00282/4000(212)	Katherine Keith, Aaron Nickols, Cina Fisher	Katherine Keith, ISER/UAA		12/31/2024
3.	Alaska Low Emission Ferries Pilot Program HFHWY00281/4000(213)	Katherine Keith	Katherine Keith, SEC	*	9/30/2023
4.	DOT&PF Image Server deployment	David Oliver Jeremey Arnold Adam Rolfe	TBD		11/2023

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		Ryan Marlow			
5.	Remote Management of Facilities and Assets with Digital Twins Digitalization of Remote Assets (STIC)	Ryan Marlow Vine Yelmene, Troy Hicks, Jillian Nicolazzo	In-House		10/2023
6.	Structural Adequacy of Culverts in Poor Condition	Dr. Paul Janke, Jake Ciufu, Jeff Stutzke, Bob Trousil	Ken Karle, Hydraulic Mapping and Modeling		3 years 10/2025
7.	Avalanche Detection and Warning System Using an Infrasound Monitoring Network along Thane Road, Juneau AK. HFHWY00304/4000(222)	Pat Dryer	Pat Dryer, Snowbound Solutions		2/28/2025
8.	Use of Polymer Fluids in Stabilized Base Courses	Steve Saboundjian, Jeff Currey	Billy Connor, UAF		1 year 11/2023
9.	Hydroacoustic Down-the-Hole Drilling Noise Study HFHWY00302/4000(220)	Doug Kolwaite	Illingworth & Rodkin, Inc. James Reyff		12/31/2024
10.	Computer Vision Tools for Bridge Inspections and Reporting HFHWY00301/4000(219)	Elmer Marx, Larry Owen and Nicholas Murray	Dr. Mostafa Tazarv, South Dakota State University		12/31/2026
11.	Seismic Behavior of Hider Wing-Walls HFHWY00298/4000(215)	Elmer Marx and Nick Murray	Dr. Mervyn Kowalsky, NCSU		6/30/2026
12.	Weldability of Bridge Steel with Protective Coatings	Leslie Daugherty	Carolin Fink, Ohio State Univ.		2 years 10/2024
13.	Roadway foundation cooling using structured foam layers HFHWY00294/4000(218)	Mathew Billings, Jeff Currey, Steve Saboundjian	Douglas J. Goering, PhD, PE UAF		3/31/2025
14.	Shake Table Tests of Grade 80 Piers HFHWY00296/4000(214)	Elmer Marx and Nick Murray	Dr. Mervyn Kowalsky, NCSU		12/31/2025

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15.	Capacity and Acceptance Criteria of Welded Splices in Cold-Bent Reinforcing Steel HFHWY00297/4000(216)	Leslie Daugherty	Carolyn Fink, Ohio State		18 months 9/30/2024
16.	Research Administration FFY21-23 HFHWY00222/4000(207)	Anna Bosin	N/A		9/30/2024
16.	Rapid Research & Deployment FFY21-23 HFHWY00223/000S(945)	Anna Bosin	Varies		9/30/2024
Grand Total				\$4,013,658	

	Off-Cycle New Research Title	Champion(s)	Researcher(s)	FFY23 (\$)	Est. Comp. Date
1A.	Evaluation of Load Ratings for Alaska Legal Loads Exempted by Federal Law	Leslie Daugherty, Larry Owen	TBD		2/2024
2A.	Complete Streets for Alaska DOT&PF	James Marks, Judy Chapman	Smart Growth America		9/30/2024
3A.	Civil Rights Title VI & Equity Best Practices Workshops	Rashaud Joseph	WSP		3/30/2024
4A.	Anchorage Pilot Protected Bike Lanes	Brad Coy, MOA	TBD		12/31/2024
Total				\$1,550,000	

Research Projects Selected for FFY24:

All the projects are funded by 80% Federal (SP&R-B) and 20% State match for the combined totals shown. All projects are total project costs. Completion dates are estimates.

	Title	Champion	Researcher(s)	FFY24	Est. Comp. Date
1.	Alaska DOT&PF Equity Sample Review of Programming and Policies	Rashaud Joseph, Judy Chapman, James Marks	TBD		18 months 6/2026
2.	Evaluation of Low Earth Orbit Broadband	Vince Yelmene Ryan Marlow	TBD		15 months 3/2026
3.	Alaska DOT&PF Human Trafficking Data Collection and Strategic Recommendations	Troy LaRue, Dylan Blankenship, John Clendenin	TBD		18 months 6/2026
4.	Alaska Transportation Systems Management & Operations Strategic Plan HFHWY00299/4000(217)	Pam Golden	TBD	*	10/31/2023
5.	Innovation Corridors	Anna Bosin	TBD		3 years 10/27
6.	Statewide GNSS Network	Travis Test, Troy Hicks, Hans Pederson	TBD		5/2025
7.	Estimating inelastic displacement demands for bridges under seismic forces	Elmer Marx, Nick Murray	Dr. Mervyn Kowalsky, NCSU		42 months 4/2028
8.	Analysis of existing aufeis data near bridge embankments collected by airborne surveys	Mike Knapp	Horacio Toniolo, UAF		2 years 10/26
9.	Decked Bulb Tee Girder – Loss of pre-stress validation	Elmer Marx, Nick Murray, Douglas Gelineau	Dr. Andrew Metzger and Billy Connor, UAF		12/2025

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10.	Next Generation of Reinforced Concrete Structure: Electric Energy Storing, Self-Sensing Reinforced Concrete Elements	Elmer Marx	Dr. Mohammad Pour-Ghaz, NCSU		42 months 4/2028
11.	Camera Based Computer Vision Measurements for Bridge Field Testing	Elmer Marx, Larry Owen and Nicholas Murray	Dr. Mostafa Tazarv, South Dakota State University		2 years 11/2026
12.	AI Tools for Rapid Post-Earthquake Damage Assessment of Bridges with Standard and Substandard Columns	Elmer Marx and Nick Murray	Dr. Mostafa Tazarv, South Dakota State University		2 years 11/2026
13.	Seismic Detailing of Steel H-Pile Connections	Elmer Marx and Nick Murray	Dr. Mervyn Kowalsky, CSU		42 months 4/2028
14.	Improved modeling for ACE and ventilated shoulder design	Mathew Billings, Jeff Currey, Steve Saboundjian	Douglas J. Goering, UAF		1 year 11/2025
	Grand Total			\$2,766,847	

TBD – To be determined. No identified person/institution at this time.

Pooled Fund Studies FFY23/24

The Pooled Fund program is a joint effort between State DOTs and FHWA to share resources towards common research goals. FHWA or a DOT can be a lead agency for a pooled fund project. Alaska DOT&PF participates in pooled fund studies by transferring 100% SP&R federal funds to the lead agency and assigning a DOT&PF staff person as the technical advisor to participate in the national effort. Pooled funds generally take 3-5 years of commitment participation from each member agency as projects are developed, conducted, and disseminated.

Title	FFY23	FFY24	Commitment	Lead Org.
Aurora	25,000	25,000	Previously committed	Iowa
Universal Consequences-Based Liquefaction Hazard Analysis Framework for All CPT-Compliant Soils	20,000	20,000	Previously Committed	Utah
Connected Vehicle Pooled Fund Study	25,000	25,000	25K/year	Virginia
Clear Roads Phase III	25,000	25,000	25K/year	MN
Avalanche Research Pool	25,000	25,000	25K/year	CO
Roadside Safety Research for MASH Implementation	50,000	50,000	50k/year, increase from \$25K/year	WA
Develop Countermeasure Strategies for Protecting Bridge Girders Against Overheight Vehicles Impact	50,000	50,000	50K/Year, previously committed	FHWA
Developing and Calibrating Fragmental Rockfall Models using Physics Engines	30,000	30,000	Previously Committed	WA
Assmt. and Repair of Pre-strssd Bridge Girders Sbjtd to Over-Height Truck Impacts	0	0	Ends in 2023	Missouri
Road Usage Charge West	0	0	Ends in 2022	Oregon
Western Alliance for Quality Transportation Construction (WAQTC) 2021-2025	24,000 (FFY22&23)	12,000	\$12K/year	Utah
Center for the Aging Infrastructure: Steel Bridge Research, Inspection, Training and Education Engineering Center - SBRITE	35,000	35,000	3-year commitment required.	Indiana

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NCHRP dues - Alaska	689,080*	689,080*	*Estimate from 2022	NCHRP
TRB Core Program Services for a Highway RD&T Program	139,086*	139,086*	*Estimate from 2022	FHWA
<u>2023 through 2025 Biennial Asset Management Conference and Training on Implementation Strategies</u>	12,000		\$12k/year for 2 attendees	Iowa DOT

FHWA Approved Pooled Fund Studies can be found at: <https://www.pooledfund.org/Home>

FFY23 Off-Cycle Project Summaries

1A. Evaluation of Load Ratings for Alaska Legal Loads Exempted by Federal Law

Category: Bridge

Funding: \$

Manager: Larry Owen

Champion and Technical Advisors: Leslie Daugherty, Larry Owen

Due to federal law as specified in Appendix C to 23 CFR Part 658, Alaska is not required to have a specified maximum gross vehicle weight (GVW). Permitted overloads weighing up to 410,000 pounds have successfully crossed Alaska's bridges with no apparent structural distress. This research study is intended to determine how the lack of a maximum GVW could affect Alaska's bridge inventory. This study will include a review of weigh-in-motion (WIM) data, overload permit history, current bridge inventory capacity, AASHTO and National Bridge Inspection Standards (NBIS) requirements, etc.

Benefits to the State: This research would determine if State Legal Loads are overloading bridges and if so, how to address this service life cost through load rating and load posting policies.

2A. Complete Streets for Alaska DOT&PF

Category: Policy

Funding: \$ (Safe and Accessible Transportation Options Funding, 100% Federally Eligible)

Manager:

Champion: James Marks, Judy Chapman

Like most DOTs, Alaska DOT&PF has focused major capital projects on adding capacity to meet our mission to "Keep Alaska Moving through Service and Infrastructure." And, also like other DOTs, this has until recently meant catering to the needs of vehicle drivers. However, both FHWA and Alaska DOT&PF have prioritized the safety of all road users, and as a part of this emphasis, FHWA encourages States to adopt and implement Complete Streets policies that prioritize the safety of all users in transportation network planning, design, construction, and operations. Section 11206 of the BIL defines Complete Streets standards or policies as those which "ensure the safe and adequate accommodation of all users of the transportation system, including pedestrians, bicyclists, public transportation users, children, older individuals, individuals with disabilities, motorists, and freight vehicles." Section 11206 of the BIL requires states and MPOs to use 2.5 percent of their State Planning and Research funds "to increase safe and accessible options for multiple modes for people of all ages and abilities". The proposed project creates a framework so Alaska can maximize the return on these investments.

Benefits to the State: Adopting a Complete Streets Policy will allow DOT&PF as well as subrecipients to position itself better to receive BIL funding that targets Complete Streets-type capital projects. Training in Complete Streets will help DOT&PF partner with subrecipients on projects across Alaska.

3A. Civil Rights Title VI & Equity Best Practices Workshops

Category: Policy

Funding: \$

Manager:

Champion: Rashaud Joseph

WSP will assist and advise the Alaska Department of Transportation Civil Rights Department with training and guidance regarding Title VI and Equity Best Practices currently used in the industry to ensure there is limited impact to current and potential FHWA and USDOT funding. Specifically, DOT&PF and client groups need current best practices and tools to address Title VI requirements including workforce development and other applicable civil rights requirements that are much different than a decade ago. This research will develop customized resources for each DOT&PF region and uniquely designed for the audience types, including 1) Internal staff, 2) Contractors/Consultants; and 3) Stakeholders and impacted communities.

Benefit to the State: The state of practice regarding Title VI and Equity has dramatically changed and DOT&PF must learn new ways of engaging with stakeholders to further the Department’s mission for delivering FHWA surface transportation program as well as help administer grants from the new BIL/IIJA initiatives. This is a comprehensive, customized approach for Alaska.

4A. Anchorage Pilot Protected Bike Lanes

Category: Innovation

Funding: \$ (Complete Streets-type research, 100% Federally Eligible)

Manager: City of Anchorage

Champion: Brad Coy, City Traffic Engineer, Daniel Volland Anchorage Assembly

This pilot study will test, demonstrate, and refine methods for implementing PBLs in Anchorage. Refining the methods now will help ensure cost-effective implementation of permanent PBLs in the future. A temporary demonstration of PBLs will also help bicyclists, drivers, and other residents in Anchorage begin learning how to safely and effectively interact with these facilities, setting them up for success when similar facilities are built in the future. Temporary installations are naturally a low-cost option to trial new infrastructure initiatives in the community vs. leaping to permanent infrastructure changes. This demonstration will also include public outreach to educate local businesses and other stakeholders on the advantages of PBLs, setting the stage for future public discourse on other proposed PBL facilities.

Benefit to the State:

This will serve as the first test of PBLs in Anchorage and Alaska. Therefore, the project itself is both innovative and unique. Tentatively, locations being considered include routes that have follow-on Capital project funding: Gambell St, Fireweed Lane, A Street but final corridor selections will be determined during project scoping with both the DOT&PF and City of Anchorage management. The outcomes of any pilot study will inform future Department and City policy for both quick builds and protected bike lanes.