



**WYOMING DEPARTMENT OF
TRANSPORTATION
2018 STATE PLANNING AND RESEARCH
WORK PROGRAM REPORT
Third Quarter**

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INTRODUCTION

The Wyoming Department of Transportation 2018 State Planning and Research Work Program Report (Work Program) is prepared in accordance with Federal statutes, rules and regulations, and FHWA requirements. Work Program is defined in *Title [23 C.F.R Part 420, Sec. 103](#)* as:

...a periodic statement of proposed work, covering no less than one year, and estimated costs that document eligible activities to be undertaken by State DOTs and/or their subrecipients with FHWA planning and research funds.

Title 23 C.F.R Part 420, [Sections 111, 207 and 209](#) sets out that the Work Program should consist of a) a list of and description of the work and/or activities to be accomplished during the program period; b) an estimated cost for each eligible activity; c) a description of any cooperatively funded activities that are part of a national or regional pooled study, including the NCHRP contributions; and d) financial summaries which show the funding levels for each activity, which should include the Federal and state share, and any matching funds for each individual project. Further, *Subpart (c), of Title 23 of the Code of Federal Regulations, [Section 420.209](#)*, requires research programs certify that their program is in full compliance with the requirements set out in Subpart B, of Part 420.

Research performed by Principle Investigators during fiscal year 2017 is included in this report. The Work Program shall be updated as new projects are authorized during fiscal year 2018. For work to be included, it must go through the WYDOT proposal process and fall under the above statutory requirements. During the proposal process, the Research Advisory Committee (RAC) reviews each proposal to determine whether it offers a cost benefit to WYDOT, and whether the proposal is in line with the WYDOT mission statement and goals. The RAC convenes quarterly (October, January, April, and July), and at other times as deemed necessary.

After the RAC determines that a proposal meets the above criteria, it is forwarded to the WYDOT Executive Staff and FHWA, who make the final determination on whether the project should be funded using State Planning and Research Funds. No research project can be conducted without written approval from both the Executive Staff and FHWA.

Proposals for and descriptions of current/active research projects can be found on the WYDOT Research Center website. Final reports for all closed research projects from 2009 forward are also archived on the WYDOT Research Center website. Research reports for projects between the years of 1969 to 2009 can be obtained by contacting the Research Center.

Title 23 C.F.R. Sec 420.209

Certificate of Compliance

I, Keith R. Fulton, P.E., Assistant Chief Engineer for the Engineering and Planning Division, do hereby certify that the State is in compliance with the requirements of 23 C.F.R. 505 and its implementing regulations with respect to the research, development, and technology transfer program, and contemplate no changes in statutes, regulations or administrative procedures which would affect such compliance.

Keith R. Fulton, P.E.
Assistant Chief Engineer for Engineering and Planning

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Chapter 1. 2018 Budget Summary

This chapter sets out the proposed budget for fiscal year (FY) 2018¹.

1. State Planning & Research (SP&R) Funds	\$5,350,000
REVENUE	
2. SP&R RES Funds	\$1,334,268
3. LTAP Special Allocation (Fund 438)	\$125,000
4. FY2017 unobligated funds	\$304,928
5. Total Revenues	\$1,766,197
EXPENSES	
6. NCHRP	\$293,539
7. TRB Correlation Service (est.)	\$85,000
8. Technology Transfer to U.W. Fund 438	\$125,000
9. LTAP Funds RS01218	\$12,500
10. Administrative Costs (est.)	\$138,959
11. Pooled Fund	\$150,000
12. State Research Projects (80% Federal)	\$866,529
13. ICAP funds (80% Federal)	\$93,318
14. Total Expenses	\$1,764,845
TOTAL FY2018 FEDERAL FUNDS AVAILABLE	\$1,352

LINE NUMBER EXPLANATIONS:

1. Total *estimated* 2018 SP&R funds.

REVENUE

2. Pursuant to [23 U.S.C. 505\(b\)\(1\)](#), not less than 25 percent of the SP&R funds must be used for research, development, and technology transfer activities. WYDOT presently obligates the minimum amount, which is made up of 100 percent Federal funds.
3. See Local Technical Assistance Program (LTAP) and Technology Transfer (T²) Center summary for a complete financial breakdown.
4. Un-obligated Federal funds from previous fiscal year apportionments.
5. Summation of lines 2 through 4.

EXPENSES

6. The National Cooperative Highway Research Program (NCHRP) contribution is 5.5 percent of the SP&R RES Funds. This obligation is 100 percent Federal funds.
7. The TRB Correlation Service is a pooled fund and obligated annually using 100 percent Federal funds.

¹ The funds set out in this budget summary are a guesstimate of the funds that will be available in FY 2018.

8. The University of Wyoming Technology Transfer Center's funding is contracted for and obligated annually. See Technology Transfer (T²) Center summary for financial breakdown.
9. LTAP funding is contracted and obligated annually. See Local Technical Assistance Program (LTAP) for financial breakdown.
10. See Administrative Cost summary for financial breakdown.
11. See Transportation Pooled Fund Projects summary for financial breakdown.
12. State research projects use 80 percent Federal funds. See State Research Projects summary for financial breakdown.
13. Indirect Cost Allocation Plan (ICAP) funds (an additional 8.23 percent for projects begun prior to FY2017, and 11 percent for projects begun in FY2017 and forward) added on to each contract (80 Federal/20 state split).
14. Summation of lines 6 through 14.

TOTAL

15. Total amount available for new research (revenue, less expenses).

Chapter 2. 2018 Expense Summary

2.1 National Cooperative Highway Research Program (NCHRP) Contribution

Identification: TPF-5(418)

Contacts: WYDOT Representative:
Tim McDowell, P.E.
307-777-4177
WYDOT Programming
5300 Bishop Blvd.
Cheyenne WY 82009

Funding: \$293,539

Scope: Administered by the Transportation Research Board (TRB) and sponsored by the member departments (i.e., individual state departments of transportation) of the American Association of State Highway and Transportation Officials (AASHTO), in cooperation with the Federal Highway Administration (FHWA), NCHRP was created in 1962 as a means to conduct research in acute problem areas that affect highway planning, design, construction, operation, and maintenance nationwide.

The state departments of transportation are the sole sponsors of NCHRP. Support is voluntary and funds are drawn from the state's Federal-Aid Highway apportionment of SP&R funds. Furthermore, the funds can be spent only for the administration of problems approved on ballot by at least two-thirds of the states. Each state's allocation amounts to 5.5 percent of its SP&R apportionment and is set forth in supplementary tables issued with each year's Federal-Aid Highway apportionments.

NCHRP is 100 percent Federally funded, requiring no state match.

2.2 Transportation Research Board Correlation Service (TRB) Contribution

Also known as the Core Program Services for a Highway Research, Development, and Technology Program, 2018.

Identification: TPF-5(109)

Contacts: WYDOT Representative:
Tim McDowell, P.E.
307-777-4177
WYDOT Programming
5300 Bishop Blvd.
Cheyenne WY 82009

Funding: \$85,000 (est.)

Scope: The Research Correlation Service of the Transportation Research Board of the National Academy of Sciences is subscribed to annually by WYDOT. Membership allows receipt of all major publications and input to various national research programs including NCHRP. In 2002, FHWA authorized the yearly payment of the TRB Correlation Service using the FHWA-administered pooled fund mechanism. Starting in FY1995, FHWA allowed the TRB correlation service charge to be paid with 100 percent Federal funding, requiring no state match.

2.3 Technology Transfer (T2) Center at The University of Wyoming

Identification: LTAP017
 LTAP018
 FUND 438

Contacts:	Principal Investigator:	Project Champion:
	Khaled Ksaibati, P.E., Ph.D	Tim McDowell, P.E.
	307-766-6230	307-777-4177
	University of Wyoming	WYDOT Programming
	Laramie WY 82071	5300 Bishop Blvd. Cheyenne WY 82009

Funding Summary:

<i>Code</i>	<i>Funds</i>	<i>State Portion</i>	<i>Federal Portion</i>	<i>Budgeted</i>
LTAP (0438)	Local Tech. Assistance		\$125,000	\$125,000
HPRF	(WYDOT) SP&R RES	\$31,250		\$31,250
SCFM	SC Fund (4 cent)	\$31,250		\$31,250
CCOF	Municipal & County	\$31,250		\$31,250
CCOF	University of Wyoming	\$31,250		\$31,250
Total		\$125,000	\$125,000	\$250,000

Scope: The Local Technical Assistance Program (LTAP) is part of the Federal Highway Administration's Technology Transfer Program. LTAP creates a process using Technology Transfer Centers to transfer research findings and new technology to the local-level end-user. Technology Transfer Centers have been established in each state to provide information, advice, and training to local agencies, with Wyoming's Technology Transfer Center being established in 1985 at the University of Wyoming.

Wyoming Statute §21-17-115 states that:

The University of Wyoming may operate a technology transfer center and provide training to Wyoming county and municipality employees regarding current trends in transportation technology.

The state portion of the funding comes from equal contributions from WYDOT (Wyo. Stat. §21-17-110(a)(i)); Wyoming counties (Wyo. Stat. §21-17-110(a)(ii)); Wyoming cities and towns (Wyo. Stat. §21-17-110(a)(iii)); and the University of Wyoming (Wyo. Stat. §21-17-110(a)(iv)), in an annual amount not less than \$25,000 and a maximum of \$31,250. The Federal government or other non-state contribution must equal that of the total state portion.

2.4 Local Technical Assistance Program (LTAP) at University of Wyoming

Identification: RS01218

Contacts: Principal Investigator: Project Champion:
 Khaled Ksaibati, P.E., Ph.D Tim McDowell, P.E.
 307-766-6230 307-777-4177
 University of Wyoming WYDOT Programming
 Laramie WY 82071 5300 Bishop Blvd.
 Cheyenne WY 82009

Funding Summary:

<i>Code</i>	<i>Funds</i>	<i>State Portion</i>	<i>Federal Portion</i>	<i>Budgeted 2017</i>
RS01218	Federal		\$30,000	\$30,000
	State Match	\$7,500		\$7,500
Total		\$7,500	\$30,000	\$37,500

Scope: The Technology Transfer Center (T²) is part of the Federal Highway Administration's Technology Transfer Program. The Technology Transfer Center transfers research findings and new technology to the local-level end-user. Technology Transfer Centers have been established in each state to provide information, advice, and training to local entities.

2.5 Administration of Research

Identification: RES2218

Contacts: WYDOT Representative:
Enid White, Research Manager
307-777-4182
WYDOT Research Center
5300 Bishop Blvd
Cheyenne WY 82009

Funding Summary: (*Project RES2218, Activity RES0*)

Title	State Portion	Federal Portion	Budgeted 2018
Research Proposal Development	\$1,000	\$4,000	\$5,000
Research Printing	\$100	\$400	\$500
Research Office Supplies	\$150	\$600	\$750
Vehicle Usage	\$100	\$400	\$500
Research Library Materials	\$200	\$800	\$1,000
RAC Administration	\$9,100	\$36,400	\$45,500
Research Presentation	\$1,000	\$4,000	\$5,000
Travel	\$1,100	\$4,400	\$5,500
National RAC Meeting	\$70	\$280	\$350
Employee Time Charges and Leave	\$14,107	\$56,427	\$70,534
Contract Management and Misc	\$800	\$3,200	\$4,000
Professional Fees	\$65	\$260	\$325
TOTAL	\$27,792	\$111,167	\$138,959

2.6 - Pooled Fund Projects Funding Summary

	Obligated 1995-2012	Obligated 2013	Obligated 2014	Obligated 2015	Obligated 2016	Obligated 2017	Total Obligated
TPF-5(054) Development of Maintenance Decision Support System	\$225,000		\$25,000				\$250,000
TPF-5(193) Midwest States Regional Pooled Fund Project	\$360,000					\$195,000	\$555,000
TPF-5(253) Member-Level Redundancy in Built-up Steel Members	\$75,000						\$75,000
TPF-5(317) Evaluation of Low Cost Safety Improvements						\$30,000	\$30,000
TPF-5(310) Peer Exchange					\$5,902		\$5,902
TPF-5(337) Avalanche Research Pooled Fund					\$75,000		\$75,000
SOL (_____) Comprehensive Field Load Test and Geotechnical Investigation Program						\$150,000	\$150,000

Notes: Pooled Fund research projects are generally 100 percent Federal funds.

2.6.1 – TPF-5(054) Development of Maintenance Decision Support System

Contacts:

Lead Agency Contacts: Dave Huft South Dakota DOT 605-773-3358	Project Champion: Jeff Frazier, P.E. Field Operations, WYDOT 5300 Bishop Blvd. Cheyenne WY 82009 307-777-4052
Investigator: Leono@meridan-enviro.com	

Period of Study: Proposal Approved: July 2005
Completed: 2017

Scope: The purpose of this study was to develop a system capable of integrating accurate weather forecasts, road condition reports, and maintenance resource information so proactive maintenance decisions can be made before and during adverse weather events, resulting in a higher level of service, reduced operational costs, and safer highway conditions.

Status: Each district in Wyoming has several roads with Maintenance Decision Support System (MDSS) sites, and is using the information gathered as a tool in determining snow removal procedures. The software being developed for commercial use has many variables allowing each user state to input equipment and chemical parameters available for each road condition, and the software will generate snow removal recommendations for that condition. Unfortunately, due to the lack of funding only a few roads in Wyoming are currently benefitting from this study. Additional funding of \$25,000 was approved by the WYDOT RAC for FY2012 but was never obligated. These funds were finally paid out of the FY2014 budget.

The MDSS research program is now well into its 10th phase. The core MDSS software services have been operational within numerous state transportation agencies for several years. An initial suite of “Management Tools” has been implemented. During Phase VII, MDSS applications for IOS and Android mobile platforms were designed, developed, and made available to pooled fund study member agencies. New features and capabilities continue to be added in the present phase of work.

This Project is scheduled to close in October of 2017. WYDOT no longer provides funds for this project, but does benefit from the research being conducted.

2.6.2 – TPF-5(193) Midwest States Pooled Fund Crash Test Program

Contacts:

Lead Agency Contact: Jodi Gibson Nebraska Department of Roads 402-479-3687	Project Champions: WYDOT Bridge 5300 Bishop Blvd Cheyenne WY 82009 307-777-4427
	Bill Wilson, P.E. WYDOT Engineering Services 5300 Bishop Blvd. Cheyenne WY 82009 307-777-4216

Period of Study: Start Date: July 1, 2012
Estimated Completion: Unknown –
Cleared by FHWA

Scope: To crash test highway roadside appurtenances to assure that they meet criteria established nationally.

Status: Information gained from the various projects within this pooled fund has proven beneficial to WYDOT. All quarterly reports for this project can be found on the Pooled Fund Webpage (<http://www.pooledfund.org/Details/Study/418>).

2.6.3 –TPF-5(253) Member Level Redundancy in Built-up Steel Members

Contacts:

Lead Agency Contact:	Project Champion:
Indiana DOT	WYDOT Bridge
Division of Research	5300 Bishop Blvd
Tommy Nantung	Cheyenne WY 82009
tnantung@indot.in.gov	307-777-4427
Phone: 765-463-1521 ext 248	

Period of Study: Proposal Approved: August 2011
Estimated Completion: May 2018

Scope: The objective of this research project is to quantify the redundancy possessed by built-up members. For example, a riveted built-up member will not typically “fail” if one of the components fractures. However, very little experimental data is available to quantify the remaining fatigue life or strength of a member when one of the components fails. Furthermore, if built-up members are located in bridges classified as fracture critical, when significant member redundancy can be shown, the bridge may not need to be classified as fracture critical (FC). However, doing so would release these members from the more rigorous arms-length inspection currently required. As a result, should a component fail, it may go undetected for an extended interval. Thus, a portion of the project is devoted to setting rational inspection intervals for these members. Lastly, the advantages of using built-up members fabricated with high performance steel (HPS) components fastened using high strength (HS) bolts in new construction will also be explored.

Status: During the past quarter, the major steps included: 1) gained additional support from AASHTO T-14 and FHWA to prepare ballot items related to specifications for evaluating internal redundancy in built up members; and 2) Design and testing for the second axially loaded specimen. In the next quarter, the project will:

- a) Continue working on parametric studies associated with axial members.
- b) Test additional prototype axial test specimen.
- c) Prepare a new ballot for evaluating flexural members for consideration by AASHTO T-14 for the August mid-year meeting in Denver.

2.6.4 – TPF-5(317) Evaluation of Low Cost Safety Improvements

Contacts: FHWA: Project Champion:
Roya Amjadi Joel Meena
Roya.amjadi@fhwa.dot.gov 5300 Bishop Blvd
202-493-3383 Cheyenne WY 82009
307-777-4374

Period of Study: Proposal Approved: April 2015
Estimated Completion: Cleared by FHWA

Scope: The scope of the ELCSI–PFS is to conduct a research project of the priority strategies in the NCHRP Report 500 Guides. Originally, a target of 20 strategies totaling \$4.38 million over 5-years was planned for ELCSI–PFS studies in four phases. Currently, this study has outperformed its original goals, and has added four extra phases for a total of eight phases. The original budget of \$4.38 million remains the same. To provide much needed reliable measures for effectiveness of various low-cost safety improvements, this study's performance period has been extended beyond 2017.

Status: The 2017 Annual Technical Activity Committee (TAC) meeting was conducted successfully on June 14-15. The Phase X study started in June of 2017 for:

- a. Adaptive Signal Control Technologies.
- b. Bicycle Lanes, Added by Reducing Land and/or Shoulder Width.
- c. Variable Speed Limits.
- d. Roadside Fixed Objectives.

Numerous reports were published from this project.

2.6.5 – TPF-5(337) Avalanche Research Pool

Contacts:	David Reeves Colorado DOT David Reeses@state.co.us 303-757-9518	Lead Contact: Tory Thomas WYDOT Jackson WY
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Period of Study: Proposal Approved: November 2015
Estimated Completion: Cleared by FHWA

Scope: The study's mission is to support collaborative research efforts in the field of avalanche hazard assessment and mitigation, with the goal of improving the safety, efficiency, and quality of control efforts, along with providing better information gathering and analysis techniques and seamless integration of new technologies to further these goals. The participation of many transportation related agencies in this study will also further cooperation in this industry, leading to improved future development of beneficial technologies and improved sharing of information and avalanche data, greatly furthering the safety, efficiency, and quality of the work done in this field for all relevant agencies.

Status: The first project conducted was assessing the Gazex Avalanche Control Effectiveness with Terrestrial Laser Scanning.

2.6.6 SOL _____. Comprehensive Field Load Test and Geotechnical Investigation Program for Development of LRFD Recommendations of Driven Piles on Intermediate Geomaterials

Contacts: Kam Ng
Assistant Professor
University of Wyoming
303-766-4388

Lead Contact:
Todd Sullivan, P.G.
Engineering Geologist
WYDOT
Cheyenne WY

Period of Study: Proposal Approved: October 2017
Estimated Completion: 2023

Scope: The overall goal of the proposed research project is to develop LRFD recommendations for driven piles on IGM.

Status: The research project will have several direct benefits to state DOTs, deep foundations industries, and other relevant stakeholders.

2.7 - State Research Projects Funding Summary (Obligated)²

Project Number	Title	Contract Amount	Federal SP&R Obligation 2012-2016 (80% of contract amount and 80% of ICAP*)	State Match 2012-2016 (20% contract amount, plus 20% ICAP)	Federal SP&R Obligation 2017/18 (80% contract, plus 80% ICAP ** funding)	State Obligation 2017/18 (20% contract, plus 20% ICAP funding)	Total Funds (SP&R, ICAP and State Match)
RS06211	Comprehensive Technology Assessment for Avalanche Hazard Management: Developing and applying an avalanche hazard technology optimization process to a case study on U.S. Route 189-191, in Hoback Canyon, Wyoming	\$344,428	\$298,220	\$74,555			\$372,775
RS07212	Jackson South Snow Supporting Structures Proposed Performance and Health Monitoring of WYDOT Project No. N104085, Teton County, Jackson, Wyoming	\$113,586	\$97,989	\$24,497			\$122,934
RS0221	Evaluating Effectiveness of Fly Ashes to Mitigate Alkali-Silica Reaction	\$65,975	\$57,124	\$14,281			\$71,405
RS02216	Characterization of Crushed Bases in Wyoming	\$64,577	\$55,914	\$13,978			\$69,892
RS03216	Calibrating Crash Modification Factors for Wyoming-Specific Conditions: Application of the Highway Safety Manual – Part D	\$79,234	\$68,604	\$17,151			\$85,755
RS04216	Traffic Thresholds in Deer Road Crossing Behavior	\$36,960	\$32,002	\$8,000			\$40,002
RS05216	Wyoming Low Volume Roads Traffic Volume Estimation: Phase 2 *See explanation on P. 46 for full breakdown for funds.	\$119,100					\$119,100
RS06216	Development of Load and Resistance Factor Design Procedures for Driven Piles on Soft Rocks in Wyoming	\$160,372	\$138,857	\$34,714			\$173,571
RS07216	Driver Performance and Behavior in Adverse Weather Conditions: In Investigation using SHRP2 Naturalistic Driving Study Data *See explanation on P. 48 for full breakdown for funds.	\$292,674	\$112,674 \$150,000	\$30,000			\$292,674

² Unless stated otherwise, all projects receive 80% federal funding and 20% state funding.

Project Number	Title	Contract Amount	Federal SP&R Obligation 2012-2016 (80% of contract amount and 80% of ICAP*)	State Match 2012-2016 (20% contract amount, plus 20% ICAP)	Federal SP&R Obligation 2017/18 (80% contract, plus 80% ICAP ** funding)	State Obligation 2017/18 (20% contract, plus 20% ICAP funding)	Total Funds (SP&R, ICAP and State Match)
RS08216	Updating and Implementing the Grade Severity Rating System (GSRs) for Wyoming Mountain Passes	\$157,004	\$135,940	\$33,985			\$169,925
RS09216	Design and Performance Evaluation of a SemiFlexible Snow Barrier for Avalanche Protection	\$138,781	\$120,162	\$30,041			\$150,203
RS10216	Last Mile Commercial Package Delivery as a Revenue Generation Tool for Rural Public Transportation Systems in Wyoming. *See explanation on P. 51 for full breakdown for funds.	\$40,143	\$34,758	\$8,689			\$43,447
RS11216	Effectiveness of Nighttime Speed Limit Reduction in Reducing Wildlife Vehicle Collisions	\$320,226			\$277,249	\$69,312	\$346,561
RS02217	Structural Health Monitoring of Highway Bridges Subjected to Overweight Vehicles, Phase II – Field Deployment	\$220,374			\$195,692	\$48,923	\$244,615
RS03217	Development of an Ultra-Accelerated test to Evaluate Alkali-Silica Reaction Potential in Concrete	\$142,880			\$126,878	\$31,719	\$158,597
RS04217	Evaluation of the WYDOT Research Center and Research Program (Phase III)	\$44,328			\$39,363	\$9,841	\$49,204
RS05217	Wyoming Local Technical Assistance Center, Safety Kit for Indian Tribes *See explanation on P. 33 for full breakdown for funds.	\$17,500			\$14,000	\$3,500	\$17,500
RS06217	Site Characterization and Site Specific Seismic Ground Motions Analysis for Transportation Infrastructure in Wyoming	\$140,500			\$124,764	\$31,191	\$155,955
RS07217	Field Testing and Long Term Monitoring of Selected High-Mast Lighting Towers	\$177,779			\$157,868	\$39,467	\$197,335
RS08217	Implementation of SHRP 2 Results within the Wyoming	\$364,162			\$320,920	\$8,648	\$364,162

Project Number	Title	Contract Amount	Federal SP&R Obligation 2012-2016 (80% of contract amount and 80% of ICAP*)	State Match 2012-2016 (20% contract amount, plus 20% ICAP)	Federal SP&R Obligation 2017/18 (80% contract, plus 80% ICAP ** funding)	State Obligation 2017/18 (20% contract, plus 20% ICAP funding)	Total Funds (SP&R, ICAP and State Match)
	Connected Vehicle Variable Speed Limit System. SHRP 2 Implementation Assistance Program (Round 4)				\$34,594		
RS09217	Crash Modification Factors for Wyoming – Specific Conditions: Application of the Highway Safety Manual – Part D. Phase 2	\$155,943			\$138,478	\$34,619	\$173,097
RS02218	Revegetation Success and Weed Resilience of Wyoming Right-of-Way	\$151,270			\$134,328	\$33,582	\$167,910
RS03218	Developing a New Barrier Condition Index (BCI) to Optimize Barrier Improvement in Wyoming	\$179,645			\$159,525	\$39,881	\$199,406
RS04218	Human Machine Interface (HMI) for Connected Vehicle: Requirements, Development and Assessment	\$228,820			\$203,192	\$50,798	\$253,990
RS05218	MASH-16 3-10 Crash Test of a Box Beam Guardrail.	\$60,139			\$53,403	\$13,351	\$66,754
RS06218	Safety and Operational Analysis with Mitigation Strategies for Freeway Truck Traffic in Wyoming	\$143,187			\$127,150	\$31,788	\$158,938
RS07218	Assessment and Evaluation of I-80 Truck Loads and their Load Effects: Phase 2	\$177,420			\$157,549	\$39,387	\$196,936
RS08218	Investigating Potential Solutions to Interstate 80 Barrier Effect on Mule Deer and Pronghorn	\$142,680			\$126,700	\$31,675	\$158,375

*ICAP Rate 8.23%

**ICAP Rate 11%

2.7.1 – RS06211 A Comprehensive Technology Assessment for Avalanche Hazard Management: Developing and applying an avalanche hazard technology optimization process to a case study on US Route 189-191 in Hoback Canyon, Wyoming



Source: Rand Decker

Contacts: Principal Investigator: Rand Decker, Ph.D., P.E.
 Rand Decker, Sole Proprietor
 83 El Camino Tesoros
 Sedona, Arizona 86336
 928-202-8156

Project Champion: Tory Thomas
 District 3
 Rock Springs, WY
 307-352-3031

Period of Study: Proposal Approved: October 2012
 Estimated Completion: September 2015
 First Revised Contract Completion: December 2017

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (8.23% above Total Contract Amount)	Other Funds	Total Funds (Total Contract, state match, and ICAP)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of contract amount and 80% of ICAP)	Total State Match (20% of contract amount and 20% of ICAP)
2013	\$344,428	\$28,347		\$372,775	\$298,220	\$74,555

Scope: Develop a generic, broadly applicable, structured process to optimize the choice of avalanche hazard management methods and technology for a given roadway application, including an assessment of the state-of-the-art TAS O’BELLX portable, remotely operable gas blaster for active avalanche control.

Status: Due to an unusually heavy snowfall in the winter for 2016-2017, an extension for this project was granted. The report will be finalized in December of 2017.

2.7.2 – RS07212 Jackson South Snow Supporting Structures Proposed Performance and Health Monitoring of WYDOT Project No. N104085, Teton County, Jackson, Wyoming



Source: Joshua Hewes

Contacts:	Principal Investigator:	Project Champion:
	Joshua Hewes, Ph.D.	Jamie Yount
	InterAlpine, Engineers, LLC	Tory Thomas
	24 West Quartz RD	District 3
	Flagstaff, AZ 86005	307-733-3126

Period of Study: Proposal Approved: September 2012
 Estimated Completion: September 2017

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (8.23% above Total Contract Amount)	Other Funds	Total Funds (Total Contract amount, state match, and ICAP)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of contract amount and 80% of ICAP)	Total State Match (20% of contract amount and 20% of ICAP)
2013	\$113,586	\$9,348		\$122,934	\$98,347	\$24,587

Scope: Evaluate the performance of the milepost 151 snow supporting structure installation, and provide an initial basis for development of design guidelines for future constructed snow defense measures at other locations within the western United States. The project will also design parameters and establish domestic guidance documents.

Status: After a delay due to foundation issues, the instrumentation has been placed and the project is moving forward. The instrument array is now 100 percent complete and functioning as intended. The project is currently on schedule and the final report is in draft form.

2.7.3 – RS02215 Evaluating the Effectiveness of Fly Ashes to Mitigate ASR and Using Recycled Concrete Aggregate in New Construction



Source: Jennifer Tanner

Contacts:	Principal Investigator:	Project Champion:
	Jennifer Tanner	Chris Romo
	University of Wyoming	WYDOT
	Laramie Wyoming 82071	5300 Bishop Blvd
	307-766-2073	Cheyenne WY 82009
		307-777-4074

Period of Study: Proposal Approved: Nov. 19, 2014
 Estimated Completion: Sept. 30, 2018

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (8.23% above Total Contract Amount)	Other Funds	Total Funds (Total Contract amount, state match, and ICAP)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of contract amount and 80% of ICAP)	Total State Match (20% of contract amount and 20% of ICAP)
2015	\$65,975	\$5,430		\$71,405	\$57,124	\$14,281

Scope: The Principle Investigator shall conduct tests on fly ashes; evaluate moderately reactive, reactive and highly reactive aggregates; conduct concrete prism testing; demolish blocks and make recycled concrete aggregate; and continue monitoring field specimens.

Status: The project is about 70 percent complete. The Principle Investigator is continuing to monitor the field specimens, and measure the C1293 specimens. The project is currently testing autoclave specimens.

2.7.4 – RS02216 Characterization of Crushed Bases



Source: Google Images

Contacts: Principal Investigators: Kam Ng
 Khaled Ksaibati
 University of Wyoming
 Laramie WY 82071
 307-766-6230

Project Champion: Ryan Steinbrenner
 Mike Farrar
 5300 Bishop Blvd
 Cheyenne WY 82009

Period of Study: Proposal Approved: October 2015
 Estimated Completion: January 31, 2018

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (8.23% above Total Contract Amount)	Other Funds	Total Funds (Total Contract amount, state match, and ICAP)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of contract amount and 80% of ICAP)	Total State Match (20% of contract amount and 20% of ICAP)
2016	\$64,577	\$5,315		\$69,892	\$55,914	\$13,978

Scope: The proposed research serves as a complementary study to enhance the pavement design in Wyoming through the characterization of base materials. The research project has the following objectives: 1) characterize the properties of local base materials; 2) understand the effects of rock type, moisture content, fine content, and gradation of base modulus; 3) improve base modulus estimations; and 4) facilitate the full MEPDG implementation in the State of Wyoming.

Status: The project is 96 percent complete. The data has been completed. The final report is being revised for final approval and submission to WYDOT.

2.7.5 – RS03216 Calibrating Crash Modification Factors for Wyoming Specific Conditions: Application of the Highway Safety Manual – Part D



Source: Google Images

Contacts: Principal Investigators: Mohamed Ahmed
University of Wyoming
Laramie WY 82071
307-766-5550

Project Champion: Matt Carlson
5300 Bishop Blvd
Cheyenne WY 82009

Period of Study: Proposal Approved: October 2015
Estimated Completion: April 30, 2017

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (8.23% above Total Contract Amount)	Other Funds	Total Funds (Total Contract, state match, and ICAP)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of contract amount and 80% of ICAP)	Total State Match (20% of contract amount and 20% of ICAP)
2016	\$79,234	\$6,521		\$85,755	\$68,604	\$17,151

Scope: The Highway Safety Manual provides crash modification factors (CMF) for roadway segments, intersections, interchanges, special facilities, and road networks. CMFs could be applied individually, if a single treatment is proposed, or multiplicative, if multiple treatments are implemented. In this study, the Empirical Bayes (EB) approach to analysis before-after effects will be utilized. The EB method can overcome the limitations faced by simple before-after evaluation and compare group methods by not only accounting for egression to the mean effects, but also accounting for traffic volume changes when identifying the crash modifications.

Status: The project was completed in 2017 under WY-1704F.

2.7.6 – RS04216 Traffic Thresholds in Deer Road-Crossing Behavior



Source: Google Images

Contacts: Principal Investigators: Corinna Riginos
Northern Rockies Conservation
Jackson WY

Project Champion: Pete Hallsten
218 West C Street
Basin WY
307-568-3413

Period of Study: Proposal Approved: October 2015
Estimated Completion: May 31, 2018

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (8.23% above Total Contract Amount)	Other Funds	Total Funds (Total Contract, state match, and ICAP)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of contract amount and 80% of ICAP)	Total State Match (20% of contract amount and 20% of ICAP)
2016	\$36,960	\$3,042		\$40,002	\$32,002	\$8,000

Scope: The overarching objective is to provide transportation planners with information that will help them to evaluate the placement of wildlife-vehicle mitigation measures. This should increase the cost effectiveness of mitigation measures and will be vital to reducing the rising problem of wildlife vehicle collisions while maintaining and enhancing landscape connectivity for wildlife in Wyoming.

Status: The project is 90 percent complete. The major project is to process the video footage of deer road crossing at six sites in southwest Wyoming. Large format maps of the wildlife vehicle collisions for each District were prepared. The Principle Investigator will continue to gather deer road crossing behavior data.

2.7.7 – RS05216 Wyoming Low Volume Roads Traffic Volume Estimation, Phase II



Source: Google Images

Contacts: Principal Investigators: Khaled Ksaibati
 University of Wyoming
 Laramie WY 82071
 307-766-6230

Project Champion: Martin Kidner
 Mark Wingate
 5300 Bishop Blvd
 Cheyenne WY 820091

Period of Study: Proposal Approved: This project was not approved by the RAC and does not use SP&R funds, but is managed by the Research Center
 Estimated Completion: February 29, 2018

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (8.23% above Total Contract Amount)	Other Funds	Total Funds (Total Contract, state match, and ICAP)	Breakdown of the Total Funds	
					Total Federal SP&R	Total State Match
2016	\$119,100	\$900		\$120,000	\$108,588	\$11,412

Scope: There are three basic goals of this project. First, the travel demand model developed in Phase 1 will be enhanced by including oil and gas impacts in the model and improving the transportation analysis zone delineation of the study location. Second, implementation of the model for the remaining 19 counties in Wyoming will be conducted. Finally, an analysis will be carried out to determine the length of time over which estimates can be considered valid and when to update the model to improve accuracy of results to account for traffic variations in the future.

Status: The project is 65 percent complete. The following tasks have been completed: review model development process; develop a TAX Delineation methodology; determine trip rates for crop, oil and gas production; implement improved model for south east Wyoming (Region 1); validate the utility of model for Region 1; develop TAZs for remaining regions; and develop road networks for each county.

2.7.8 – RS06216 Development of Load and Resistance Factor Design Procedures for Driven Piles on Soft Rocks in Wyoming



Source: Google Images

Contacts: Principal Investigators: Khaled Ksaibati
University of Wyoming
Laramie WY 82071
307-766-6230

Project Champion: Jim Coffin
5300 Bishop Blvd
Cheyenne WY 82009
307-777-4205

Period of Study: Proposal Approved: January 2016
Estimated Completion: December 2018

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (8.23% above Total Contract Amount)	Other Funds	Total Funds (Total Contract, state match, and ICAP funds)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of contract amount and 80% of ICAP)	Total State Match (20% of contract amount and 20% of ICAP)
2016	\$160,372	\$13,199		\$173,571	\$138,857	\$34,714

Scope: The overall goal of the proposed research project is to develop locally calibrated LRFD procedures for driven piles of soft rocks in Wyoming. Recognizing the design and construction challenges of piles driven on soft rocks, the research project is proposed to accomplish the following: a) advance the knowledge of design and construction of piles driven on soft rocks; b) alleviate the aforementioned design and construction challenges; and c) advance the current state of practice pertaining to the design and construction of piles of soft rocks.

Status: The project is 46 percent completed. The research team will be establishing a criterion to differentiate soil, intermediate geomaterials (IGM) and hard rocks, determine the statistical parameters of static analysis methods for subsequent Load and Resistance Factor Design (LRFD) calibration, and perform regression analysis to establish models to improve pile resistance estimations.

**2.7.9 – RS07216 Driver Performance and Behavior in Adverse Weather Conditions:
An Investigation using SHRP2 Naturalistic Driving Study Data**



Source: Google Images

Contacts: Principal Investigators: Project Champion:
 Mohammed Ahmed Tim McDowell
 University of Wyoming 5300 Bishop Blvd
 Laramie WY 82071 Cheyenne WY 82009
 307-766-6550

Period of Study: Proposal Approved: January 2016
 Estimated Completion: March 2018

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (8.23% above Total Contract Amount)	Total Funds (SP&R Funds, state match, and SHRP2 Funding)	Breakdown of the Total Funds		
				SP&R Funds	SHRP2	State Match
2016	\$292,674	\$0.00	\$292,674	\$112,674	\$150,000	\$30,000

Scope: WYDOT and the University of Wyoming have completed a proof-of-concept utilizing a sample naturalistic driving study data set and the Roadway Information Database. The main goal of this study is to enhance the understanding of how drivers respond to adverse weather and road conditions.

Status: The project is in the final stage and a final report is being prepared.

2.7.10 – RS08216 Updating and Implementing the Grade Severity Rating System (GSRS) for Wyoming Mountain Passes



Source: Google Images

Contacts:	Principal Investigators:	Project Champion:
	Khaled Ksaibati	James Evensen
	Dick Apronti	Joel Meena
	University of Wyoming	Matt Carlson
	Laramie WY 82071	5300 Bishop Blvd
307-766-6230	Cheyenne WY 82009	

Period of Study: Proposal Approved: April 2016
 Estimated Completion: January 2019

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (8.23% above Total Contract Amount)	Other Funds	Total Funds (Total Contract, state match, and ICAP funds)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2016	\$157,004	\$12,921		\$169,925	\$135,940	\$33,985

Scope: The study is aimed at achieving two main goals. First, the FHWA’s GSRS model will be updated to reflect the current truck population characteristics. This will be achieved by carrying out field tests with an instrumented vehicle to update parameters in the model that reflect current truck characteristics and braking systems. The second objective of the study is to evaluate Wyoming mountain passes and their warning systems with regard to truck downgrade crashes. By doing this, the best means of communicating with truck drivers to reduce the probability of runaway truck incidences can be recommended.

Status: The project is 36 percent completed. Data has been collected; an evaluation of the existing Wyoming mountain pass warning system was conducted; and a review FHWA GSRS model was conducted.

2.7.11 – RS09216 Design and Performance Evaluation of a Semiflexible Snow Barrier for Avalanche Protection



Source: Josh Hewes

Contacts: Principal Investigators: Josh Hewes
InterAlpine Engineers, LLC
24 West Quartz Rd
Flagstaff AZ 86005

Project Champion: Tory Thomas
WYDOT
Rock Springs, WY

Period of Study: Proposal Approved: April 2016
Estimated Completion: December 2019

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (8.23% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP funds)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2016	\$138,781	\$11,422		\$150,203	\$120,162	\$30,041

Scope: The objectives of this study are to provide the necessary background information that will describe the relative performance of snow supporting umbrellas (SSU) in their ability effectively to mitigate the risk of avalanche release from the starting zone. The work will also provide a framework for engineers that will help guide them through each step of the design process on future projects where SSU are utilized on a larger scale to minimize avalanche danger to motorists.

Status: The Principle Investigator has developed a standardized design procedure that will be adopted by engineers for design of SSUs. The design shall be installed in August and/or September of 2017.

2.7.12 – RS10216 Last Mile Commercial Package Delivery as a Revenue Generation Tool for Rural Public Transportation System in Wyoming



Source: Google Images

<p>Contacts:</p>	<p>Principal Investigators: Jaydeep Chaudhari Western Transportation Institute Bozeman MT 59717</p>	<p>Project Champion: Talbot Hauffe 5300 Bishop Blvd Cheyenne WY 82009</p>
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Period of Study: Proposal Approved: July 2016
 Estimated Completion: October 2017

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (8.23% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and SHRP2 Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2016	\$40,143	\$3,304		\$43,447	\$34,758	\$8,689

Scope: The goal of this project is to assess the feasibility of last mile package delivery as a revenue generation tool for rural public transportation systems in Wyoming. The objectives are to a) understand the impact of technologies and innovative last mile package delivery systems; b) synthesize current last mile package delivery practices in public transportation systems in rural states; c) analyze policies of states regarding the use of public transportation for package delivery; and d) estimate demand, capacity need, and revenue generation for rural transit systems in regard to last mile package delivery.

Status: A web meeting was conducted in January of 2017 with the Project Champion. A survey was conducted and the results have been received by WYDOT. The Principle Investigator is working on the quantification of commercial package delivery demands.

2.7.13 – RS11216 Effectiveness of Nighttime Speed Limit Reduction in Reducing Wildlife Vehicle Collisions



Source: Google Images

<p>Contacts:</p>	<p>Principal Investigators: Corinna Riginos Northern Rockies Conservation Jackson WY</p> <p>Marcel Huijser Western Transportation Institute Bozeman MT</p>	<p>Project Champion: Keith Compton District 3, WYDOT Rock Springs WY 307-352-3031</p>
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Period of Study: Proposal Approved: July 2016
Estimated Completion: January 2019

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (8.23% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2016	\$320,226	\$26,335		\$346,561	\$277,249	\$69,312

Scope: The overarching objective of this project is to provide transportation planners with scientifically defensible and robust information about whether reducing nighttime speed limits is an effective means of reducing vehicle collisions with wildlife.

Status: This project is 33 percent complete. Field data has been collected; Principle Investigator has coordinated with WYDOT to gather carcass record data; and analysis of the data has begun.

2.7.14 – RS02217 Structural Health Monitoring of Highway Bridges Subjected to Overweight Vehicles, Phase II – Field Deployment



Source: Google Images

<p>Contacts:</p>	<p>Principal Investigators: Johnn Judd, Ph.D., S.E. Michael Barker, Ph.D., P.E University of Wyoming 1000 East University Avenue Laramie WY 82071</p>	<p>Project Champion: Paul Cortez, P.E. WYDOT 5300 Bishop Blvd Cheyenne WY 82009</p>
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Period of Study: Proposal Approved: October 2016
 Estimated Completion: December 2018

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2017	\$220,374	\$24,241		\$244,615	\$195,692	\$48,923

Scope: The preliminary research in Phase I of this project demonstrated that the fiber Bragg grating (FBG) based sensor structural health monitoring (SHM) system is a viable concept with the potential of implementation and provided valuable data on bridge performance. In Phase II of the project, the FBG-based SHM system will be deployed and operated in the field.

Status: The project is in the early stages and no quarterly reporting has been received.

2.7.15 – RS03217 Development of an Ultra Accelerated Test to Evaluate ASR Potential in Concrete



Source: Jennifer Tanner

<p>Contacts:</p>	<p>Principal Investigators: Jennifer Tanner, Ph.D., P.E. University of Wyoming 1000 East University Ave. Laramie WY 82071</p>	<p>Project Champion: Chris Romo, P.E. Bob Rothwell, P.E. Greg Milburn, P.E. WYDOT 5300 Bishop Blvd. Cheyenne WY 82009</p>
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Period of Study: Proposal Approved: October 2016
Estimated Completion: September 2020

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2017	\$142,880	\$15,717		\$158,597	\$126,878	\$31,719

Scope: A proposed test could potentially replace the year long concrete prism test with a weeklong test for evaluation of combinations of coarse and fine aggregates. The primary goal of this project is cost savings by producing durable concrete with an extended service life.

Status: The project is in the early stages and no quarterly reporting has been received.

2.7.16 – RS04217 Evaluation of the WYDOT Research Center and Research Program (Phase III)



<p>Contacts:</p>	<p>Principal Investigators: Khaled Ksaibati, Ph.D., P.E. University of Wyoming 1000 East University Ave. Laramie WY 82071</p>	<p>Project Champion: Tim McDowell, P.E. WYDOT 5300 Bishop Blvd. Cheyenne WY 82009</p>
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Period of Study: Proposal Approved: October 2016
 Estimated Completion: May 2018

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2017	\$44,328	\$4,876		\$49,204	\$39,363	\$9,841

Scope: Evaluate the performance of the WYDOT Research Center and develop strategies that will implement real cost-to-benefit analyses on the performance measures used by the WYDOT Research Center.

Status: Work is progressing on this project. The Principle Investigator is working on the performance measure information and the budget data.

2.7.17 – RS05217 Wyoming Local Technical Assistance Center. Safety Kit for Indian Tribes



Source: Google Images

Contacts:	Principal Investigators:	Project Champion:
	Khaled Ksaibati, Ph.D., P.E. University of Wyoming 1000 East University Ave. Laramie WY 82071	Tim McDowell, P.E. WYDOT 5300 Bishop Blvd. Cheyenne WY 82009

Period of Study: Proposal Approved: December 2016
 Estimated Completion: September 2017

Funding Summary:

Fiscal Year	Total Contract, Amendment	Federal	State Match	ICAP 11% 80/20 split	Other Match Funds or Internal Funds
2017	\$17,500	\$14,000	\$3,500	\$0.00	\$0.00

Scope: Develop a toolkit that will help Indian Tribes in identifying their transportation safety needs and deploy low cost safety improvement.

Status: Work is progressing on this project.

2.7.18 – RS06217 Site Characterization and Site Specific Seismic Ground Motions Analysis for Transportation Infrastructure in Wyoming



Source: Google Images

<p>Contacts:</p>	<p>Principal Investigators: Shawn Griffiths, Ph.D. University of Wyoming 1000 East University Ave. Laramie WY 82071</p>	<p>Project Champion: Jeff Booher, P.E. Kirk Hood, P.G. WYDOT 5300 Bishop Blvd. Cheyenne WY 82009</p>
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Period of Study: Proposal Approved: March 2017
Estimated Completion: July 2019

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2017	\$140,500	\$15,455	\$	\$155,955	\$124,764	\$31,191

Scope: Establish the procedures, steps, and training required for WYDOT personnel to perform site-specific ground motion analyses.

Status: Work is progressing on this project.

2.7.19 – RS07217 Field Testing and Long-Term Monitoring of Selected High-Mast Lighting Towers



Source: Google Images

<p>Contacts:</p>	<p>Principal Investigators: Robert Connor Jason Lloyd Purdue University S-Brite Center 1040 South River Road West Lafayette, IN</p>	<p>Project Champion: Paul Cortez, P.E. WYDOT 5300 Bishop Blvd. Cheyenne WY 82009</p>
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Period of Study: Proposal Approved: March 2017
 Estimated Completion: March 2019

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2017	\$177,779	\$19,556		\$197,335	\$157,868	\$39,467

Scope: Determine the cause of fatigue damage in several high mast lighting towers.

Status: Work is progressing on this project.

2.7.20 – RS08217 Implementation of SHRP2 Results within the Wyoming Connected Vehicle Variable Speed Limit System – SHRP2 Implementation Assistance Program (Round 4)



Source: Google Images

<p>Contacts:</p>	<p>Principal Investigators: Mohamed Ahmed, Ph.D., P.E. Rhonda Young, Ph.D., P.E. University of Wyoming Laramie WY</p>	<p>Project Champion: Vince Garcia, P.E. Tim McDowell, P.E. WYDOT 5300 Bishop Blvd. Cheyenne WY 82009</p>
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Period of Study: Proposal Approved: June 2017
 Estimated Completion: August 2019

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Total Funds (SP&R Funds, state match, and SHRP2 Funding)	Breakdown of the Total Funds		
				SP&R Funds	SHRP2	State Match
2017	\$364,162	\$0.00	\$364,162	\$320,920	\$34,354	\$8,648

Scope: The primary objective of the second phase is to model driver’s responses to various adverse weather and road conditions.

Status: Work is progressing on this project.

**2.7.21 – RS09217 Crash Modification Factors for Wyoming- Specific Conditions:
Application of the Highway Safety Manual – Part D. Phase 2**



Source: Google Images

<p>Contacts:</p>	<p>Principal Investigators: Mohamed Ahmed, Ph.D., P.E. University of Wyoming Laramie WY</p>	<p>Project Champion: Matt Carlson, P.E. WYDOT 5300 Bishop Blvd. Cheyenne WY 82009</p>
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Period of Study: Proposal Approved: June 2017
Estimated Completion: December 2019

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2017	\$155,943	\$17,154		\$173,097	\$138,478	\$34,619

Scope: This phase is to continue the validation of the applicability and transferability of the HSM to Wyoming-specific conditions.

Status: Work is progressing on this project.

2.7.22 – RS02218 Revegetation Success and Weed Resilience of Wyoming Right-of-Way



Source: Google Images

<p>Contacts:</p>	<p>Principal Investigators: Kristina Hufford University of Wyoming Laramie WY</p>	<p>Project Champion: R. Scott Gamo WYDOT 5300 Bishop Blvd. Cheyenne WY 82009</p>
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Period of Study: Proposal Approved: October 2017
 Estimated Completion: November 2020

Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2018	\$151,270	\$16,640		\$167,970	\$134,328	\$33,582

Scope: The objectives of this proposal are to evaluate different reclamation seed mixes over the years to determine the rate of reseeding success and better define combinations of species and site variables that contribute to successful revegetation outcomes. The proposal will also compare sites and seed mixes for resilience to invasion by high impact species, such as cheatgrass. Data will contribute to recommendations to maximize seeding success and minimize weeds, and will assist future evaluations of other vegetation factors, such as minimizing traffic/wildlife conflicts.

Status: This project is in the early stages and no quarterly report has been received.

2.7.23 – RS3218 Developing a New Barrier Condition Index (BCI) to Optimize Barrier Improvements in Wyoming



Source: Google Images

<p>Contacts:</p>	<p>Principle Investigators Khaled Ksaibati Amirarsalan Molan, University of Wyoming 1000 East University Avenue Laramie WY 82071</p>	<p>Project Champion Martin Kidner WYDOT 5300 Bishop Blvd. Cheyenne WY 82009</p>
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Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2018	\$179,645	\$19,761		\$199,406	\$159,525	\$39,881

Scope: This study is set up to evaluate the conditions of barrier systems in Wyoming. Improvement recommendations will be provided and optimized for each barrier system (segment) to upgrade the performance of the barriers in a cost effective way.

Status: This project is in the early stages and no quarterly report has been received.

2.7.24 – RS4218 Human Machine Interface (HMI) for Connected Vehicle: Requirements, Development and Assessment



Source: Mohamed Ahmed

<p>Contacts: Principle Investigators Mohamed Ahmed University of Wyoming 1000 East University Avenue Laramie WY 82071</p>	<p>Project Champion Vince Garcia WYDOT 5300 Bishop Blvd Cheyenne WY 82001</p>
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Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2018	\$228,820	\$25,170		\$253,990	\$203,192	\$50,798

Scope: Develop a HMI that is effective in delivering critical information while minimizing distraction risks that might be posed by the system.

Status: This project is in the early stages and no quarterly report has been received.

2.7.25 – RS5218 MASH-16 3-10 Crash Test of a Box Beam Guardrail



Source: Google Images

<p>Contacts:</p>	<p>Principle Investigators Matt Robinson Texas A&M Transportation Institute Bryan TX</p>	<p>Project Champion Bill Wilson WYDOT 5300 Bishop Blvd Cheyenne WY 82009</p>
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Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2018	\$60,139	\$6,615		\$66,754	\$53,403	\$13,351

Scope: Contract with TTI to conduct a full scale, 62 mph crash test with the MASH small car. If ITT determines that the test meets all MASH criteria, they will prepare a justification to FHWA for an eligibility letter.

Status: The contracts are being circulated.

2.7.26 – RS6218 Safety and Operational Analysis with Mitigation Strategies for Freeway Truck Traffic in Wyoming



Source: Google Images

<p>Contacts: Principle Investigators Khaled Ksaibati Milan Zlatkovic University of Wyoming 1000 East University Avenue Laramie WY 82071</p>	<p>Project Champion Matt Carlson WYDOT 5600 Bishop Blvd Cheyenne WY 82009</p>
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Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2018	\$143,187	\$15,751		\$158,938	\$127,150	\$31,788

Scope: The project will consist of safety analysis with CMF development, operational analysis and recommendation of mitigation strategies along (I-80 in Wyoming. The project will attempt to determine the measures of effectiveness for freeway truck traffic. The Principle Investigator shall develop a toolkit that will include user-friendly tools for CMF and shockwave analysis, and customizable VISSIM models.

Status: This project is in the early stages and no quarterly report has been received.

**2.7.27 – RS7218 Assessment and Evaluations of I-80 Truck Loads and Their Load Effects:
Phase 2: Service**



Source: Google Images

<p>Contacts: Principle Investigators Jay Puckett Brian Goodrich BridgeTech, Inc. 302 S. 2nd Street Suite 201 Laramie WY 82070</p>	<p>Project Champion Jeffrey Booher Paul Cortez WYDOT 5300 Bishop Blvd. Cheyenne WY 82009</p>
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Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2018	\$177,420	\$19,516		\$196,936	\$157,549	\$39,387

Scope: The purpose of this study is to determine reliability indices and live load factors for archetype bridges for actual in-service loads.

Status: This project is in the early stages and no quarterly report has been received.

2.7.28 – RS8218 Investigating Potential Solutions to Interstate 80 Barrier Effect Pronghorn



Source: Google Images

<p>Contacts: Principle Investigators Bill Rudd Matt Kauffman Hall Sawyer Wyoming Cooperative Fish and Wildlife Research Unit University of Wyoming 1000 East University Avenue Laramie WY 82071</p>	<p>Project Champion Keith Compton R. Scott Gamo Thomas Hart WYDOT 5300 Bishop Blvd Cheyenne WY 82009</p>
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Funding Summary:

Fiscal Year	Total Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds	Total Funds (Total Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2018	\$142,680	\$15,695		\$158,375	\$126,700	\$31,675

Scope: The purpose of this study is to collect movement data and develop predictive models for pronghorn to aid WYDOT and agency partners in reducing wildlife vehicle collisions and conserving ungulate migrations along the I-80 corridor.

Status: This project is in the early stages and no quarterly report has been received.

2.7.29 – RS9218 Wyoming Low Volume Roads Traffic Volume Estimation Phase III Study



Source: Google Images

<p>Contacts:</p>	<p>Principle Investigators Er Yue Khaled Ksaibati University of Wyoming 1000 East University Avenue Laramie WY 82071</p>	<p>Project Champion Mark Wingate Ed Fritz 5300 Bishop Blvd Cheyenne WY 82009</p>
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Funding Summary:

Fiscal Year	Total SP&R Contract, Amendment and/or revision Amount	ICAP (11% above Total Contract Amount)	Other Funds Mountain Plains Consortium and University of Wyoming	Total Funds (Total SP&R Contract Amount, state match, and ICAP Funding)	Breakdown of the Total Funds	
					Total Federal SP&R (80% of total contract amount)	Total State Match (20% of total contract amount)
2018	\$0.00	\$0.00	\$164,868.96	\$0.00	\$0.00	\$0.00

Scope: This project is set up to integrate the tourism data with transportation planning by implementing a four step modeling process to estimate traffic volumes.

Status: The contract is being circulated at this time.

