U.S. Department of Transportation
Federal Highway Administration

Nevada Division

705 N. Plaza Street, Suite 220
Carson City, NV 89701
Phone 775 687-1204

September 14, 2021

In Reply Refer To:
HPL-NV

Sondra Rosenberg
Assistant Director of Planning
Nevada Department of Transportation
1263 South Stewart Street
Carson City, NV 89712

RE: 2022 State Planning & Research Work Program Approval

Dear Ms. Rosenberg:

The FY 2022 State Planning and Research (SPR) Work Program submitted on August 31, 2021 is approved. The Nevada Department of Transportation (NDOT) is authorized to proceed with the work beginning October 1, 2021 and ending September 30, 2022. This approval is for the scope of work identified in the 2022 SPR Work Program and any authorization or reimbursement is contingent upon availability of Federal funds.

The approved FY 2022 SPR Work Program funds are limited to those identified in the Program which are approximately $5,890,727 for Part I and $2,140,880 for Part II and shall not exceed available carryover plus FY 2022 allocations. SPR funds shall be administered in accordance with the provisions of 2 CFR 1201 and 23 CFR 420.

If you have any questions regarding this action, please contact me at 775.687.5331 or by e-mail at Enos.Han@dot.gov.

Sincerely,

Enos Han
Planning Program Manager

CC.:
Melissa Chandler, Corridor Planning and Special Studies Program Lead, NDOT
Mark Costa, Multimodal Program Development Chief, NDOT
Mathew Bradley, Corridor Planning and Special Studies Program Manager, NDOT
Ken Chambers, Research Chief, NDOT

Steve Sisolak, Governor of Nevada

State Planning & Research Annual Work Program

Nevada Department of Transportation Planning Division Federal Fiscal Year 2022

SPR-PL-0001(058) (TBD)

Kristina Swallow, P.E., Director

1263 South Stewart Street, Carson City, NV 89712

Contents

Introduction

This State Planning and Research (SPR) Program for Federal Fiscal Year (FFY) 2022 has been prepared to outline the planning and research activities for the Nevada Department of Transportation (NDOT). The SPR program aims to define the continuing, comprehensive, and coordinated transportation planning efforts that NDOT will facilitate within the upcoming federal fiscal year, October 1, 2021 – September 30, 2022. The SPR Work Program is required by Federal regulation.

The work detailed in this SPR Work Program informs decisions through expertise and innovation in planning, policy, data, analysis, and research services to support a sustainable and integrated statewide multimodal transportation system. It supports performance-based decisions based on sound data and planning processes and ensures Nevada's residents and visitors have a safe and connected multimodal transportation system.

The SPR program proposal is divided into two sections. The first section, Part I Planning, outlines the planning activities for which NDOT will seek federal reimbursement. The second section, Part II Research, outlines the important research studies the NDOT will oversee.

Overview of State Planning and Research (SPR) Program

The State Planning and Research (SPR) Program is a congressionally authorized and appropriated program that funds statewide transportation planning and research activities. The funds are used to establish a cooperative, continuous, and comprehensive ('3Cs') planning framework for making transportation investment decisions and to carry out transportation research activities throughout each State. These federal funds serve to assist states in meeting their planning objectives in correlation with Federal Transit Administration (FTA) and Federal Highway Administration (FHWA) regulations and guidance.

The SPR Program reflects the partnership between the federal and state governments for the statewide transportation planning process as the primary mechanism for collaborative transportation decision-making throughout the State. Federal transportation programs require coordination of statewide planning with metropolitan planning, statewide trade/ economic development planning activities, and related multi-state planning efforts.

The Planning Division within the NDOT is made up of several program areas that all play essential roles in the Department's planning objectives and have the goal of meeting federally mandated planning, research, and data collection requirements. The SPR program tasks are implemented by appropriate planning program areas based on the responsibility of work and organization. While each proposed planning initiative may fall within the responsibility of a specific program area, there is synergistic collaboration throughout the planning division, ensuring that essential transportation planning goals are met.

The provisions of 23 U.S.C. 135, 23 U.S.C. 150, and 49 U.S.C. 5304, as amended, require each State to carry out a continuing, cooperative, and comprehensive performance-based statewide multimodal transportation planning process, including the development of a long-range statewide transportation plan and State Transportation Improvement Program (STIP).

Acknowledgments

The State of Nevada Department of Transportation receives federal funding for the State Planning and Research (SPR) program through congressional authorizations and appropriations to the United States Department of Transportation (USDOT). Statewide and Metropolitan Planning funding is administered by the USDOT Federal Highway Administration (FHWA) through the FHWA – Nevada Division Office in Carson City and the Federal Transit Administration (FTA) through the FTA Region 9 Office in San Francisco, CA.

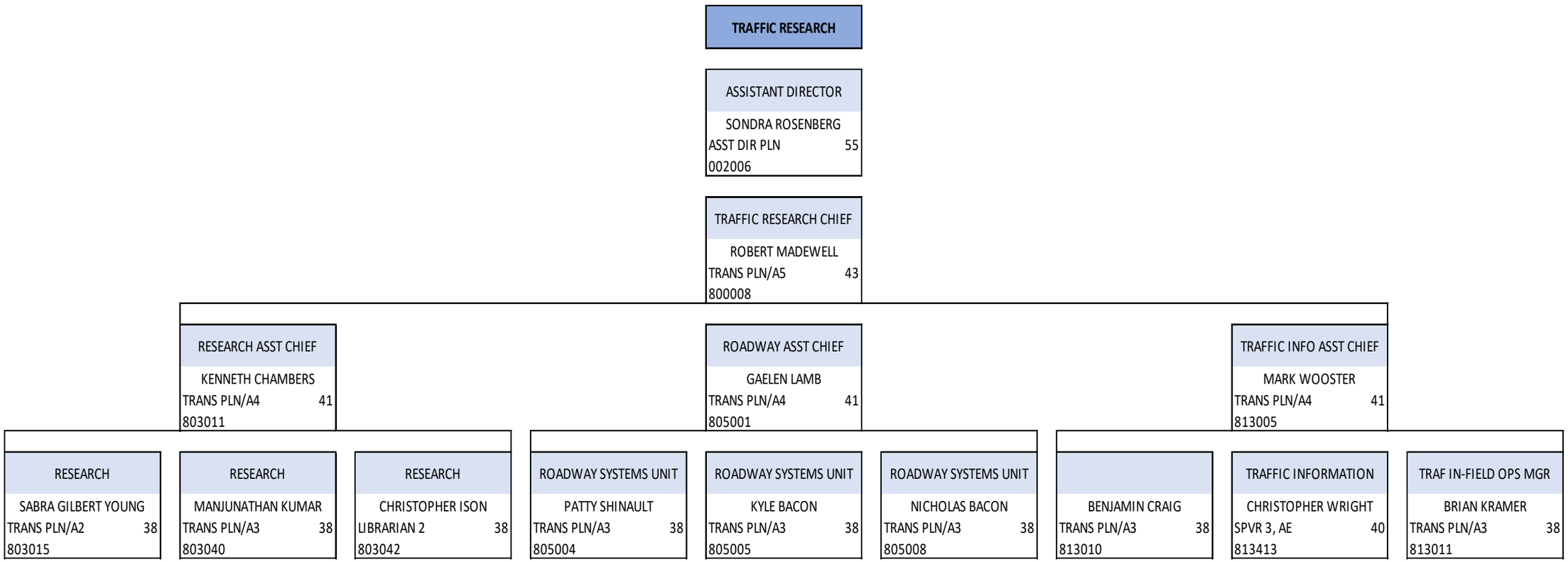
The State of Nevada Department of Transportation (NDOT) administers the SPR program through its Planning Division, Office of Multimodal Planning and Program Development.

Questions and inquiries about the NDOT SPR program may be addressed to:

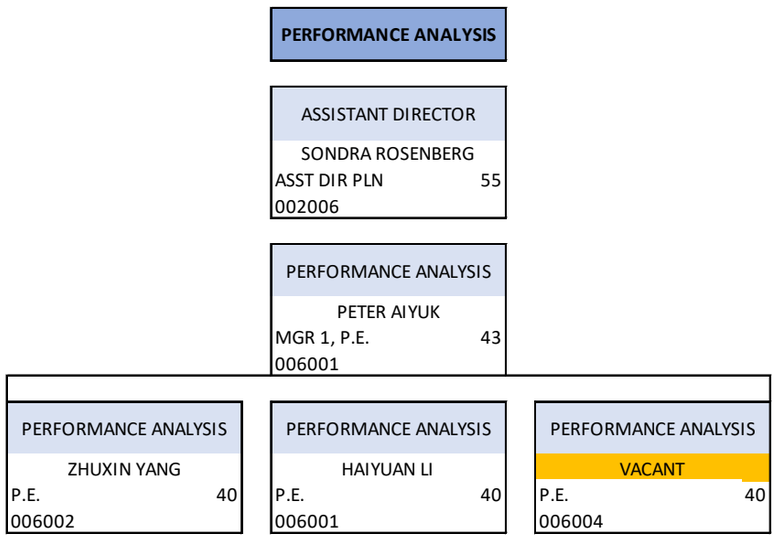
Melissa Chandler
Corridor Planning & Special Studies Program Lead
Planning | Multimodal Program Development
Nevada Department of Transportation
o 775.888.7170 | f 775.888.7668
e mchandler@dot.nv.gov| w dot.nv.gov

Nevada DOT Planning Organization Charts

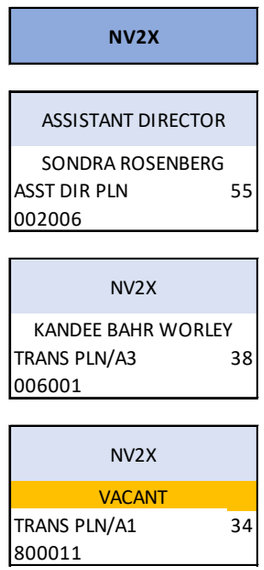
Road Data & Research Organizational Chart



Performance Analysis Organizational Chart



NV2X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ASSISTANT DIRECTOR
SONDRA ROSENBERG
ASST DIR PLN 55
002006
NV2X
KANDEE BAHR WORLEY
TRANS PLN/A3 38
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VACANT
TRANS PLN/A1 34
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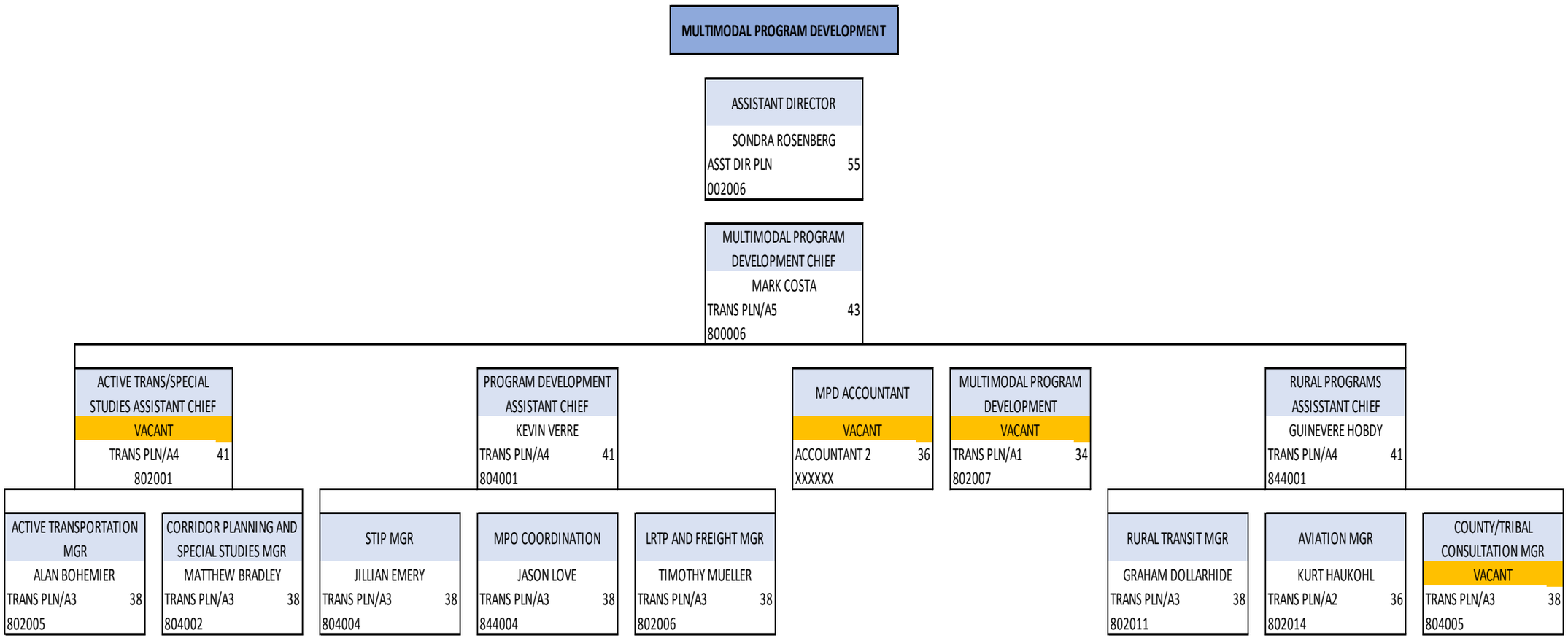
Multimodal Program Development Organizational Chart



Part I: Planning Program Budget Summary

Available Funding Estimate for Federal Fiscal Year 2022

(Report: FMISW10A 6/01/21)

2022 Apportionment

2022 Projected Apportionment (2021 federal allocation)	$5,890,727
2022 State Match	$1,472,682
Total FFY 2022 apportionment	$7,363,409

2020 Carryover

Statewide Planning MAP-21 EXT	$1,486,173
Statewide Planning FAST	$0
Total Federal Carryover	$1,486,173
Total State Match	$371,543
Total Carryover	$1,857,716

Total Estimated Funds Available for FFY 2022		$9,221,125
	80%	$7,376,900
	20%	$1,844,225

SPR FFY 2022 Budget Summary Part I by Program Area

Task	Activity	Title	TOTAL 2022 BUDGET
PLANNING ADMINISTRATION			
1001	3601	Planning Program Management	$160,000.00
1002	3603	Research Library	$163,000.00
1003	3614	Planning and Environmental Linkages	$40,000.00
		Total Planning Administration Budget	**$363,000.00**
NV2X			
1004	3616	Emerging Technology and Innovation	$100,000.00
1005	3609 3611	Climate Planning	$323,000.00
		Total NV2X Budget	**$423,000.00**
ROADWAY SYSTEMS			
1006	3607	Roadway Inventory	$270,000.00
1007	3610	Roadway Video and Lidar Imaging	$200,000.00
1008	3612	Mileposting	$105,000.00
1009	3653	Functional Classification & Boundary	$50,000.00
1010	3660	Highway Performance Monitoring System	$550,000.00
1011	3608	Road Relinquishments -- Transfers	$50,000.00
		Total Roadway System Budget	**$1,225,000.00**
TRAFFFIC INFORMATION			
1012	3623	Continuous Traffic Counts	$200,000.00
1013	3624	Short-Term Traffic Counts	$1,110,000.00
1014	3626	Vehicle Classification	$200,000.00
1015	3632	Vehicle Weight	$300,000.00
1016	3627	Special Traffic Studies	$110,000.00
1017	3982	Travel Demand Forecasting	$400,000.00
		Total Traffic Information Budget	**$2,320,000.00**

PERFORMANCE ANALYSIS			
1018	3651	Mandated Reports	$75,000.00
1019	3860	Alternative Funding (VMT)	$75,000.00
1020	3650	Performance Management	$150,000.00
1021	3659	Innovative Planning	$125,000.00
1022	3655	Benefit Cost Studies	$125,000.00
1023	3656	State Highway Preservation and Reporting	$40,000.00
1024	3863	Nevada Construction Cost Study	$10,000.00
1025	3644	Fuel Tax Revenue Management	$150,000.00
		Total Performance Analysis	**$750,000.00**

ACTIVE TRANSPORTATION			
1026	3679	Active Transportation Planning	$499,172.00
1027	3970	Corridor Planning Program	$1,197,877.00
		Total Multimodal Planning Budget	**$1,697,049.00**

RURAL PROGRAMS			
1028	3961	Public Transportation Planning	$200,000.00
1029	3955	County Consultation	$155,000.00
1030	3602	Tribal Consultation	$115,000.00
		Total Multimodal Planning Budget	**$470,000.00**

PROGRAM DEVELOPMENT			
1031	3980	One Nevada Transportation Plan TPF 5(456)	$505,000.00
1032	3690	Freight Transportation Planning / Rail	$302,000.00
1033	3979	eSTIP Consultant Support	$316,976.00
1034	3984	Transportation Investment Programming Work Program	$269,200.00
1035	3613	Multi-State Coordination and Planning	$150,000.00
1036	3957	Nevada MPO/RTC Coordination	$199,900.00
		Total Program Development Budget	**$1,743,076.00**

LOCATION SERVICES			
1037	3617	SPR Mapping	$200,000.00
1038	3728	Imagery	$25,000.00
		Total Location Services Budget	**$225,000.00**

Total 2022 SPR Programmed Budget	$9,216,125.00

SPR PART I POOLED FUNDS [Activity 3980] **TPF-5(456)** *Page 73*	**$5,000.00**
Total 2022 SPR	**$9,221,125.00**

Part I: Planning Program Section Descriptions

Planning Administration

Planning Program Management

TASK: 1001
ACTIVITY: 3601
OPERATIONAL SECTION: Planning Administration
PROGRAM MANAGER: Melissa Chandler

Funding for FFY2022 – Annual Request

Staffing	$160,000
Consultant	
Other	
Federal Amount (80%)	**$128,000**
State Match (20%)	**$32,000**
Total Requested Amount	**$160,000**

PARTICIPATING AGENCIES: NDOT, FHWA, MPOs
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Provide technical and policy review of the Statewide Planning and Research Program (SPR). Provide direction for the studies in the SPR Program. Represent the Nevada Department of Transportation at local, state, and federal meetings related to the products funded in part or entirety by the SPR Program.

The Transportation Planning Advisory Committee (TPAC) is intended to advise, solicit input and interact with NDOT's Planning management team and staff on issues that affect transportation planning in Nevada. This advisement/interaction may include reviewing, commenting, and making recommendations on NDOT planning studies, plans, guidance, and special duties such as serving as the Steering Committee for the One Nevada Transportation Plan. An additional purpose of the committee is to help NDOT with its public outreach efforts by providing valued input into the transportation planning decision-making process.

Previous Related Work:
- Annual, continuous, and ongoing activity.

Proposed Activities and Expected Products:
- NDOT's Planning Division will continue to direct financial resources to meet the federal, state, and Departmental needs to achieve the overall SPR Work Program.
- Develop Statewide Planning and Research Program (SPR) annually for FHWA approval.
- Quarterly Progress Reports to FHWA.

- Perform oversight duties of the SPR work programs, including processing work program amendments and modifications.
- Develop, review, and update policies and procedures for NDOT Planning programs.
- This task will require travel due to the statewide transportation coordination efforts.
- On-call admin and oversight

Transportation Planning Advisory Committee (TPAC)

- Hold quarterly meetings
- Prepare agendas and presentations
- Involve the TPAC members as much as possible during and in-between meetings.
- Invite members to use the TPAC in their activities

Research Library

TASK: 1002
ACTIVITY: 3603
OPERATIONAL SECTION: PLANNING ADMINISTRATION
PROGRAM MANAGER: Mitch Ison / Kenneth Chambers

FFY2022 – Annual Request

Staffing	$100,000
Consultant	$0
Other	$63,000
Federal Amount (80%)	**$130,400**
State Match (20%)	**$32,600**
Total Requested Amount	**$163,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties, and Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
To provide access to the highest quality information possible regarding all facets of the transportation industry to all members of the Nevada Department of Transportation (NDOT), the Federal Highway Administration (FHWA), the Local Technical Assistance Program (LTAP), state and local governments, Nevada academic institutions, and the public. Information will be provided in the form of research reports, monographs, periodicals, and reference materials.

The Research Librarian will be responsible for library operations, including:
- Maintaining a collection in print and electronic format
- Compiling usage records
- Assisting users seeking information on specific subjects
- Ensuring that all incoming material is properly cataloged
- Monitoring available material for possible acquisition to ensure current state-of-the-art research information is available for use.

Previous Related Work:
- Managed the ASTM Compass database subscription.
- New reference materials were added to the library collection.
- Continued role as gatekeeper for AASHTO electronic publications, including making these publications available to NDOT staff.
- Additional electronic publications were added to NDOT's website.
- NDOT research reports were cataloged and made available in several places.
- Continued NDOT participation in the third Library Pooled Fund project.
- Electronic publication access improved for staff working at home.

Proposed Activities and Expected Products:

- Development of NDOT's library collection.
- Manage the circulation of materials and library patron accounts.
- Provide access to other library collections through OCLC interlibrary loan.
- Cataloging and processing new materials in accordance with the Library of Congress classification.
- Maintenance of the library's web-based catalog.
- Update NDOT holdings in the international OCLC WorldCat database.
- Promoting library services through the library website, intranet site, email updates.
- Stewardship of electronic databases and other electronic materials, including role as designated department "Gatekeeper" for AASHTO publications.
- NDOT participation in the Library Pooled Fund project.
- Represent NDOT in transportation national library community.
- Travel and training to support the activities identified in this task.

Planning and Environmental Linkages

TASK: 1003
ACTIVITY: 3614
OPERATIONAL SECTION: PROGRAM DEVELOPMENT
PROGRAM MANAGER: Kevin Verre

FFY2022 – Annual Request

Staffing	
Consultant	$40,000
Other	
Federal Amount (80%)	**$32,000**
State Match (20%)	**$8,000**
Total Requested Amount	**$40,000**

PARTICIPATING AGENCIES: NDOT, CAMPO, RTCSN, RTCWC, TMPO, FHWA
FINANCIAL RESPONSIBILITY: NDOT, FHWA
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Update guidelines and checklists to consider environmental, community, and economic needs early in the planning process and carry out comprehensive planning information through development and environmental review to improve project delivery time frames. Updated guidelines will be tailored towards applicable NDOT and partner agency/stakeholder needs.

Previous Related Work:
- Development of Project Initiation Form (2014)
- Planning and Environment Linkages document and checklist (FY 2013)
- Project Development and Scoping Guidelines (2008)

Proposed Activities and Expected Products:
- Update PEL form checklist and guidelines for appropriate Planning Studies
- Recommendations for Improving PEL process
- Use developed PEL document on relevant planning studies
- Evaluate the effectiveness of the document/checklist
- Provide information on PEL document/checklist to MPOs and other partners for their use
- Coordinate with One Nevada implementation process
- Provide sufficient support to each MPO in order to deliver statewide planning consistency to help better inform RTPs/long-range plan.

NV2X

Emerging Technology and Innovation

TASK: 1004
ACTIVITY: 3616
OPERATIONAL SECTION: NV2X
PROGRAM MANAGER: Kandee Bahr Worley

Funding for FFY2022 – Annual Request

Staffing	$80,000
Consultant	$0
Other	$20,000
Federal Amount (80%)	**$80,000**
State Match (20%)	**$20,000**
Total Requested Amount	**$100,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
The purpose of this activity/task is to create NDOT's "Office of Innovation." To stay informed and involved in all emerging technologies in transportation that have a potentially transformative impact on the role and function of the Nevada Department of Transportation. This task will help keep the Department informed and engaged at the national, state, and local level on changing policies and regulations and pilot studies on autonomous vehicles, connected vehicles, hyperloop, shared mobility, and other emerging technologies and trends as they evolve.

Previous Related Work:
The NDOT Director's Office has worked with consultant support on emerging technology and innovative mobility issues, including proposed roles and responsibilities for NDOT and partner agencies and proposed pilot/implementation projects. NDOT has been coordinating for several years with the DMV and GOED on autonomous and connected vehicles, mainly focusing on policy and events such as Go NV to bring a larger conversation on the topic to the state. Also, NDOT has coordinated with Hyperloop One on potential development opportunities in Nevada, including applying for the Hyperloop One Global Challenge.

Proposed Activities and Expected Products:
Creation of programs, coordinating and implementing needed changes to best prepare all Divisions for new roles concerning autonomous and connected vehicles, and research and evaluate transformational technologies that will significantly impact travel behavior.

Coordination with other agencies and the private sector to ensure Nevada is ready for the change in

transportation, both from a technical standpoint and its impact on travel behavior. Coordination with divisions across the Department, including Maintenance, Traffic Operations, Planning, Performance Analysis, and Traffic Safety, to ensure adequate preparedness for this transformational change.

Coordinate the State Transportation Innovation Council in coordination with FHWA.

Advise the NDOT Director's office and the State Transportation Board on emerging topics, technologies, and travel behaviors.

Climate Planning

TASK: 1005
ACTIVITY: 3609, 3611
OPERATIONAL SECTION: NV2X
PROGRAM MANAGER: Kandee Bahr Worley

Funding for FFY2022 – Annual Request

Staffing	$21,000
Consultant	$114,000
Other	$188,000
Federal Amount (80%)	**$258,400**
State Match (20%)	**$64,600**
Total Requested Amount	**$323,000**

PARTICIPATING AGENCIES: FHWA, NDOT, GOE, NDEP, MPOs, CITIES AND COUNTIES
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

This task includes participation in statewide transportation climate action planning (Activity 3611) and continuing the progress of the Alternative Fuel Highways program in Nevada (Activity 3609). These tasks have been merged due to overlapping goals and outcomes.

Purpose and Scope:
To identify and develop strategies to reduce the transportation sector's contribution to greenhouse gas emissions in Nevada. The state has joined the US Climate Alliance and has established emissions targets set in Senate Bill 254. NDOT will continue to coordinate with the Department of Conservation and Natural Resources and the Governor's Office of Energy to develop a Climate Action Plan emphasizing transportation. NDOT also needs to develop resiliency and adaptation strategies for maintaining our assets and keeping the traveling public safe.

Continue to locate and grow Alternative Fuel Corridors in compliance with the FAST Act and the US Department of Transportation's request to identify and develop routes to reduce greenhouse gasses nationwide. The FHWA, NDOT, Nevada Governor's Office of Energy, RTC's and MPO's, Cities/Counties, and external partners work together to develop urban and rural corridors, which allow drivers to use alternative fuel vehicles to utilize the national highway system. Examples of alternative fuels include biodiesel, ethanol, electricity, propane, compressed natural gas, and hydrogen.

Previous Related Work:
Continued work with FHWA and the alternative fuel highway designation. Nevada has added to the national highway alternative fueling system during five open nomination periods. The focus has been on electric vehicles; however, we have been able to designate two highways for propane and continue to become agnostic in our fuel options. Nevada State Climate Strategy (2020) included specific policy initiatives and general information about additional strategies that need further development.

Proposed Activities and Expected Products:

Activity 3611

- Evaluate statewide transportation planning strategies to reduce GHG emissions working in coordination with public and private partners.
- Utilize available data and identify the data gaps that need to be filled in to develop a performance-based process for evaluating proposed strategies.
- Identify and evaluate strategies that state agencies can implement to reduce GHG emissions in coordination with other state agencies.
- Apply adaptation strategies to protect, manage, and maintain the state's transportation assets.
- Ensure the inclusion of GHG reduction and adaptation in the project prioritization process being developed under the One Nevada Plan implementation.

Activity 3609:

- Continue efforts to complete routes on the national highway system within Nevada that meet the criteria for designation as "Alternative Fuel" highways. Collaborate with CORWest, REVWest, and other states to build highway cohesiveness, allowing travelers to travel nationally using alternative fuels and travel from state to state.
- Participation in the REV West Alternative Fuel Corridor Committee and support the eight states within the governor signed MOU standards.
- Locate and discuss locations of Alternative Fuel Sites.
- Outreach to franchised service stations within Nevada aimed to locate opportunities for multiple alternative fueling prospects and increase highway designation.
- Coordinate with FHWA on submittals for designation of routes to the National Alternative Fuel Highway System.
- Work with NDOT Traffic Operations to develop and approve signage locations along approved corridors.
- In a joint effort with the Department of Energy and NV Energy continues to offer "Ride and Drive" event opportunities throughout the state of Nevada, eventually adding to the array of vehicles to include different fuel types.
- Evaluate regulatory framework concerning the limitations of all alternative fuel infrastructure.
- Research and study the trends in alternative fuels, nationally and globally.
- Educate NDOT customers on different alternative fuels with literature, fact sheets, and social media presence.
- Cultivate an alternative fuel station map for Nevada's 511, NDOT's Website, and other social media outlets.
- Work with the State of California for the designation of Scenic Highway Alternative Fuel National Designation.

Roadway Systems

Roadway Inventory

TASK: 1006
ACTIVITY: 3607
OPERATIONAL SECTION: ROADWAY SYSTEMS
PROGRAM MANAGER: Kyle Bacon – Gaelen Lamb

Funding for FFY2022

Staffing	$240,000
Consultant	$20,000
Other	$10,000
Federal Amount (80%)	**$216,000**
State Match (20%)	**$54,000**
Total Requested Amount	**$270,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Inventories are maintained to provide a variety of roadway statistics. These inventories support management systems, including the addition and deletion of State routes, pavement management, asset management system, and the Highway Performance Monitoring System (HPMS) (23CFR, Part 420.105(b)). They are used to support the statewide Geographic Information Systems (GIS) road centerline geometries, public road mile certification (23CFR, Part 460), and the development of Annual Vehicle Miles of Travel. In addition, this task is used for the submission of federal-aid highway system actions per 23CFR, Part 40, including interstate route designations, National Highway System (NHS)designations, National Truck Network designations, Indian reservation roads designations, and American Association of State Highway and Transportation Officials US route numbering actions. This activity also supports state highway system designation per NRS 408.285.

Previous Related Work:
- Approximately 4600 GIS road inventory updates were completed.
- The 2021 annual publication of *The State Maintained Highways of Nevada* was completed, and over 500 copies were distributed.
- 59 public and/or interagency road research requests were completed.
- Road inventory changes have been submitted to the Federal Systems section and have been documented in the HPMS attribute tables.

Proposed Activities and Expected Products:
- Review, maintain and manage the State maintained road inventory to include processing As-Builts, retracements, new construction alignments, Right-Of-Way transactions, and Quality Control edits.

Update and maintain road inventory data in the State Maintained Highways of Nevada hard copy and online database.

- Administer and manage the State System route designations including AASHTO approvals, assigning new route designations, recording route information, and Route Master edits.
- Research, document, and submit road history data to the NDOT Records Management office in accordance with the Public Records Act (NRS 239), provide road history data to interagency personnel and outside entities as requested.
  Road inventory audits include frequent travel and discussions and/or meetings with the City and County entities related to the public road mileage.
- Annual publication of *"The State Maintained Highways of Nevada"* and accurately document the road inventory data.
- Prepare and submit AASHTO applications, document route designation changes in the Route Master, and electronic and hard copy files.
- Respond to road history research requests in a timely manner and as outlined in the NDOT Public Records guidelines.
- Schedule travel and road audit meetings and accurately document the road inventory data. Maintain the public road mile records.
- Locate, identify and list Indian/Tribal roads from start to finish measures that are state-owned within Nevada. Consultant to be paid from On-Call consultant agreement. Expected products form this is updater and final report listing all Nevada state-owned roads that are approved for the IRR program (Indian Reservation Roads) for verification of public road miles reported by the FHWA.

Roadway Video and Lidar Imaging

TASK: 1007
ACTIVITY: 3610
OPERATIONAL SECTION: ROADWAY SYSTEMS
PROGRAM MANAGER: Kyle Bacon – Gaelen Lamb

Funding for FFY2022 – Annual Request

Staffing	$190,000
Consultant	$0
Other	$10,000
Federal Amount (80%)	**$160,000**
State Match (20%)	**$40,000**
Total Requested Amount	**$200,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Video and Lidar imagery (VLI) provides the department and other agencies with current and historic roadway imaging data for 1) State maintained roadways, and 2) Local roads that receive Federal Aid (defined as roads functionally classified from FC 1 to FC 5 plus Urban Minor Collectors). Collected imagery data also provides a resource for geospatial asset data collection and accurate measurements of roadway features from the desktop.

Imagery data allows departmental personnel to view and analyze roadway conditions, characteristics, assets, and other objects. Using powerful viewer and analyzing software applications - the need for travel, interruption of service to the traveling public, and staff exposure to the safety hazards of conducting these activities in the field – are significantly reduced.

This data is relied upon for approximately 50% of the HPMS (23 CFR, Part 420.105(b)) data requirements and 25% for Asset Management now required by MAP 21.

Funding for this fiscal year will be used to collect and process data from NDOT's VLI Data Collection vehicle. The data will then be post-processed, reviewed (QA/QC), and uploaded into NDOT's existing Mandli 'Roadviewer' and 'Workstation' applications. Collection for FY 2022 will focus on completing state-maintained roads and may include some important local route updates previously collected, as well as specific requests from other divisions. (Collection is planned on a rotational basis for state routes and other routes on a Tri-annual basis).

This year, we plan to work with our consultant, who provides the Roadview Viewers and assists with our vehicle service agreement to help us extract additional data to be posted in the Roadview program. Additional funding in the amount of $550,000 is planned for the consultant agreement.

Previous Related Work:

- Road video images have been collected in Carson City, Churchill, Douglas, Esmeralda, Humboldt, Lander, Lyon, Mineral, Nye, and Washoe Counties.
- Data was updated and entered for the HPMS and Asset Management programs.
- Over 710 routes were video logged, and the data was uploaded to Roadview Explorer.
- The review of program procedures and the 3-year rotation schedule for functionally classified roads is ongoing.
- Data was collected, reviewed, and updated on all Federal-Aid functionally classified roads and will be used for HPMS requirements, Roadview Explorer, and maps.

Proposed Activities:

- Collect video images on all State maintained and functionally classified roads throughout Nevada.
- Provide VLI training and support to NDOT staff as needed.
- Maintain Mandli Workstation license records and ensure program compliance.
- Schedule travel related to the VLI program.
- Create a forward-facing software interface for the public to utilize our road imagery and lidar data.
- Contract a consultant to assist NDOT with initial extraction of road assets from collected data and imagery and create a maintainable methodology for NDOT divisions to own and maintain respective extracted data, current and moving forward.

Expected Products:

All Classified roads, Class 1-6 will be collected in this fiscal year throughout the state.

Mileposting

TASK: 1008
ACTIVITY: 3612
OPERATIONAL SECTION: ROADWAY SYSTEMS
PROGRAM MANAGER: Patty Shinault – Gaelen Lamb

Funding for FFY2022 – Annual Request

Staffing	$103,000
Consultant	$0
Other	$2,000
Federal Amount (80%)	**$84,000**
State Match (20%)	**$21,000**
Total Requested Amount	**$105,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
The Milepost Program provides office and field reference by providing a linear reference system for roadway-related data management on state-maintained highways. Mileposting is currently utilized for data collection and histories in the Pavement Management System, Maintenance Management System, right-of-way descriptions, encroachment permitting, construction contract Title Sheet's, and crash data location, to name a few. Mileposts are also utilized by emergency response and law enforcement. This activity supports HPMS data collection requirements per 23CFR, Part 420.105(b), assists with compliance with MUTCD guidelines, and NRS 408.285.

Previous Related Work:
- Over 375 edits were made to the Milepost Index and Route Master.
- 55 Milepost Panel location requests for new projects were completed.
- 36 Enhanced milepost panels were requested for Interstate, US, and State routes.
- 25 Electronic Title Sheet and Location Sketch reviews were completed.
- 18 As-Built reviews were completed.
- ARCADIS has been working on the new Milepost Index and Route Master platforms.
- A reconciliation of the mileage in the State Maintained Highways of Nevada publication and the Milepost Index was completed.

Proposed Activities:
- Review, maintain and manage the Milepost Index, ensure that the panel locations are accurate, engineer stations are current, and descriptions are accurate.
- Review, process and document milepost panel requests, milepost panel replacements and Title Sheet/Location Sketch reviews. Notify emergency response personnel when major changes have occurred to the milepost panel locations.

- GPS and mark milepost panel locations as requested by NDOT maintenance supervisors and district Engineers.
- Schedule travel to verify the accuracy of milepost panels and GPS locations.
- Research, document, and submit milepost history data to the NDOT Records Management office in accordance with the Public Records Act (NRS 239), provide milepost history data to interagency personnel and outside entities when requested.
- Continued work with the consultant to implement the new milepost index platform from Oracle and onto SQL.

Expected Products:

- Milepost Index accuracy to include current milepost locations, engineer stations and route descriptions. Annual archival of the Milepost Index, publication on the NDOT SharePoint and Internet site.
- Timely review and approval of milepost panel replacements and milepost panel location requests. Notify emergency response personnel when major changes have occurred to the Milepost program.
- Complete research requests promptly and accurately document all records.
- Schedule travel and document GPS data.
- Provide responses to milepost panel history requests in a timely manner and accurate documentation of the results.

Functional Classification and Boundary

TASK: 1009
ACTIVITY: 3653
OPERATIONAL SECTION: ROADWAY SYSTEMS
PROGRAM MANAGER: Nick Bacon – Gaelen Lamb

Funding for FFY2022 – Annual Request

Staffing	$48,000
Consultant	$0
Other	$2,000
Federal Amount (80%)	**$40,000**
State Match (20%)	**$10,000**
Total Requested Amount	**$50,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
All roadways statewide are cooperatively categorized, with local transportation officials and the FHWA, according to the trade-off between mobility and access per 23 CFR, Part 470.105. Functional classification of highway systems provides a basis for determining federal-aid eligibility and apportionment of Federal Highway funds. This activity also cooperatively establishes urbanized boundaries statewide building on boundaries established by census data.

Previous Related Work:
- Functional Classification map reviews are ongoing and updated as needed.
- Urban boundary reviews are ongoing.
- A functional Classification change was finalized for Orchard Rd., Santa Barbara Dr., and Vicky Ln. in Douglas County.
- A functional classification change of Lompa Lane in Carson City was completed.
- Process initiated to perform a comprehensive review of Clark County. Covid-19 has temporally stalled this for now.

Proposed Activities:
- Review existing functional classification maps for corrections and ensure the maps comply with the 10-year review requirement. Update the maps on the NDOT SharePoint and Internet sites as needed.
- Maintain and update the urban boundary data in ESRI, Roads and Highways in preparation of the annual HPMS submittal.
- Functional classification reviews are on-going.
- Schedule travel, accurately document the functional classification data and update the hard copy files.
- Scheduled travel and local government meetings related to urban boundaries and functional

classification will continue once COVID 19 restrictions have been lifted. Travel will be scheduled in a timely manner, accurately entered, and submitted via NEATS.

Expected Products:

- A comprehensive review of Clark County and Las Vegas Urbanized functional classification maps has been initiated and are ongoing.
- Urban boundary changes will be noted on the appropriate map and documented in the hard copy files.
- Functional classification changes will be noted on the appropriate map and documented in the hard copy files.
- Scheduled travel and local government meetings related to urban boundaries and functional classification will continue once COVID 19 restrictions have been lifted. Travel will be scheduled in a timely manner, accurately entered, and submitted via NEATS.

Highway Performance Monitoring System

TASK: 1010
ACTIVITY: 3660
OPERATIONAL SECTION: ROADWAY SYSTEMS
PROGRAM MANAGER: Nick Bacon – Gaelen Lamb

Funding for FFY2022 – Annual Request

Staffing	$248,000
Consultant	$300,000
Other	$2,000
Federal Amount (80%)	**$440,000**
State Match (20%)	**$110,000**
Total Requested Amount	**$550,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
To provide the FHWA, NDOT and the transportation community with essential data on highway condition, performance, usage, geometrics, etc. for all public roads statewide. This satisfies the reporting requirements set forth by 23 CFR, Part 42.105(b), within the guidelines and requirements defined by the Office of Highway Policy Information (OHPI).

Previous Related Work:
- The 2020 (2019 data) HPMS data submittal was completed on time to the FHWA.
- HPMS sample adequacy is currently being reviewed.
- 522 LRS edits were completed, and 9350 GIS edits were completed.
- Work continues with local government agencies to develop a workflow collection plan for local road data.
- Arcadis continues to construct a new Milepost Index and Route Master platform.
- Continued workflow and Roads and Highways functionality.
- Completed the annual public road mile certification report and submitted it to FHWA.

Proposed Activities:
- Annual HPMS data submittal.
- Additional funding ($300,000 per year for FF2020, 2021 & 2022) to work with a consultant (Arcadis) to continue Roads and Highways implementation and build a new platform for the Milepost Index and Route Master is being planned by NDOT IT.
- Establish workflow processes and data storage formats required for the conversion to a geospatial platform. Update and maintain NDOT's LRS.
- Annual review of HPMS Sample adequacy.
- Prepare and submit the annual public road mile certification to FHWA.

Expected Products:

- Ensure the 2021 (2020 data) HPMS data is submitted in a timely manner on or before both April 15th and June 15th deadlines
- Through the consultant (Arcadis) and with the additional funding, successful Roads and Highways on-going implementation and working with NDOT IT to plan and implement the Milepost Index and Route Master upgrades.
- Review the HPMS sample adequacy numbers and ensure that we comply with FHWA guidelines and have adequate coverage.
- Submit the public road mile certification in a timely manner consistent with FHWA guidelines. Establish workflows and procedures with local entities to ensure accurate data, and we achieve 100% compliance.

Road Relinquishments - Transfers

TASK: 1011
ACTIVITY: 3608
OPERATIONAL SECTION: ROADWAY SYSTEMS
PROGRAM MANAGER: Mark Wooster – Bob Madewell

Funding for FFY2022 – Annual Request

Staffing	$48,000
Consultant	$0
Other	$2,000
Federal Amount (80%)	**$40,000**
State Match (20%)	**$10,000**
Total Requested Amount	**$50,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
The State of Nevada has an active and aggressive Road Relinquishment and Road Transfers program. Transfers occur between the State and Local Governments which include Incorporated Cities and Counties. Nevada State Regulation (NRS408.527) mandates a process for opening discussions, reviewing roads, and completing the road relinquishment transfer process between agencies. Currently, these roads are accounted for in the annual Road Certification Mileage required under C.F.R Title 23 Parts 460.1 – 460.3 and U.S.C. 23, Chapter 4 section 402(c). Additionally, when these roads are transferred, they are reviewed for possible changes to the Federal Road Classification required under per 23 CFR, Part 470.105 and further go through a process of removal from the State's Asset Management plan required under MAP-21

Previous Related Work:
- City of North Las Vegas-State Route 147, Lake Mead Blvd, Yale to Pecos is being transferred to the City of North Las Vegas and expected to transfer operation and maintenance to the City by Oct 1, 2020. ROW transfer to follow later.
- City of North Las Vegas -Negotiations was started with the City of North Las Vegas for State Route FRCL07 (frontage road between IR15 and US93 in the City of North Las Vegas) for transfer to the City.
- City of Las Vegas – Negotiations was started with the City of Las Vegas for portions of State Route 574, SR 596, and SR 599 FRCL40 (D. St).
- City of Las Vegas – expecting final transfer of ownership to the City for the following roads by the end of FY20 Fed Yr. Portions of SR159, SR589, and SR582. Operations and Maintenance were transferred to them in 2019. Expecting transfer of final ownership for Summerlin Parkway (SR613) from City to State by the end of FY20.
- Clark County - Final transfer or ownership for portions of SR159, SR582, SR596, SR589, and SR593 and have been transferred to Clark County government entities effective June 2020. We are awaiting

the transfer of C215, Warm Springs to Stephanie from the County to the State.

Proposed Activities

- Initiate discussions and negotiate with local state governments to transfer roads between agencies.
- Make the appropriate administrative changes to the state road inventory.
- Reconcile the relinquished mileage with the certified public road mileage.
- Road inventory audits include frequent travel and discussions and/or meetings with local state government entities related to road transfers.

Expected Products:

- Some state roads will be acquired, and some transferred to local state government entities.
- Changes in the road inventory will be reflected in the Milepost Index, Route Master, hard copy/electronic files, ESRI line work, and annual publications.
- Schedule travel and road inventory audit meetings accurately, document the road inventory data, and maintain the road transfer records.

Traffic Information

Continuous Traffic Counts

TASK: 1012
ACTIVITY: 3623
OPERATIONAL SECTION: TRAFFIC INFORMATION
PROGRAM MANAGER: MARK WOOSTER

Staffing	$150,000
Consultant	$0
Other	$50,000
Federal Amount (80%)	**$160,000**
State Match (20%)	**$40,000**
Total Requested Amount	**$200,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Incorporated Cities

FINANCIAL RESPONSIBILITY: FHWA, NDOT

FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
The purpose of the Continuous Traffic Counts Program is to develop seasonal factors used to expand short-term counts to Annual Average Daily Traffic (AADT). Continuous traffic count data provides monthly, daily, and hourly factors, design hour volumes, directional splits, and seasonal trends.

Continuous count traffic statistics are used for populating the Federal Highway Performance Monitoring System (HPMS), Federal Highway's Travel Monitoring Analysis System (TMAS), and the State of Nevada's Pavement Management System (PMS) databases. Additionally, continuous count data are utilized in environmental studies, roadway design, urban and rural planning, and the development of Vehicle Miles of Travel (VMT) Report.

The continuous traffic counting program collects data statewide for both rural and urban areas. The number and location of continuous count sites are based upon the Federal Highway Administration's Traffic Monitoring Guide (TMG).

The continuous count data is compiled with the short-term count data to develop NDOT's Annual Traffic Report (ATR) at the end of each calendar year. The ATR has a summary page of statistical information regarding the traffic at each continuous count site. Maps are also provided in the ATR, and each short-term count site's factored AADT is included.

Previous Related Work:
Ongoing

Proposed Activities and Expected Products:

- Use Jackalope software to
    - calculate Annual Average Daily Traffic (AADT) statistics
    - calculate and update seasonal factors for the year
    - calculate hourly, daily, and monthly factors
    - calculate design hour (K) and directional (D) factors
- Update the Federal HPMS AADTs and K & D factors with information from activities above.
- Submit traffic data monthly to Federal TMAS from continuous counters.
- Update the State of Nevada's PMS with AADTs from continuous counters.
- Update the State of Nevada's Traffic Information Access (TRINA) website with traffic statistics or continuous counters.
- Update the State of Nevada's Railroad Crossing Database System with AADTs for continuous counters.
- Supply current continuous counters' AADTs for use in the Nevada Traffic Accident Statistics Software.
- Supply current AADT items such as seasonal factors and traffic counts from any point in time throughout the year to the Metropolitan Organizations for updates to their Regional Travel Demand Models.
- Update the State of Nevada's Bridge Structure Database System with AADTs from continuous counters in such locations as continuous counters exist.
- Supply continuous counters AADTs for the development of the VMT Report.
- Purchase supplies to repair or replace continuous counters as needed and as state budget allows.
- Data collection procedures are updated annually in the Nevada Department of Transportation's Traffic Monitoring System for Highways (TMS/H).
- Develop Nevada's Annual Traffic Report ATR Pages.
- Update FHWA's Traffic Volume Trends (TVT) Report.
- Process data from the new SR-160 continuous counter and other new volume data from various continuous counters.
- Travel will be necessary to complete the activities within this task.

Short-Term Traffic Counts

TASK: 1013
ACTIVITY: 3624
OPERATIONAL SECTION: TRAFFIC INFORMATION
PROGRAM MANAGER: MARK WOOSTER

Funding for FFY2022 – Annual Request

Staffing	$665,000
Consultant	$250,000
Other	$195,000
Federal Amount (80%)	**$888,000**
State Match (20%)	**$222,000**
Total Requested Amount	**$1,110,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Short-term count data provides Annual Average Daily Traffic (AADT) statistics used for populating the Federal Highway Performance Monitoring System (HPMS) and the State of Nevada's Pavement Management System (PMS) data bases. Additionally, short-term count data are utilized in environmental studies, roadway design, urban and rural planning, and the development of Vehicle Miles of Travel (VMT) Report.

The short-term count program provides traffic volume statistics for all of Nevada's roadway systems. Short-term traffic counts are collected for all rural and urban areas.

Previous Related Work:
Ongoing

Proposed Activities and Expected Products:
- Update the Federal HPMS AADTs for all short-term count sites.
- Update the State of Nevada's PMS AADTs for short-term count sites.
- Purchase an undisclosed number of short-term traffic counters as the state budget allows.
- Update the State of Nevada's Traffic Information Access (TRINA) website with traffic statistics for short-term count sites.
- Supply a special session of data for model calibration along a particular screen line AADTs to the Metropolitan Organization's Regional Travel Demand Models.
- Update the State of Nevada's Bridge Structure Database System with the Short-Term Count program where Short-Term counters exist.
- Update the State of Nevada's Railroad Crossing Database System with AADTs from short-term count sites.

- Supply current AADTs from short-term count sites for use in the Nevada Traffic Accident Statistics Software.
- Supply AADTs from short-term count sites for the development of the VMT Report
- Renew annual traffic data analysis software (Jackalope) license required for data processing.
- Data collection procedures for short-term sites are updated annually in the Nevada Department of Transportation's Traffic Monitoring System for Highways (TMS/H)
- Nevada's Annual Traffic Report includes short-term count sites.
- Update Nevada's TRINA application to include statewide short-term traffic counts.
- Provide for a loop contract to repair non-functional short-term loop sites and add loops in new locations. Loop sites that fall into disrepair are either estimated (meaning that we do not have a traffic count for design, safety, or federal reporting) or collected with hose counters. Hose counts cost more in material and expose NDOT personnel to significantly more time in the roadway to obtain the traffic count. Additionally, at many of these locations, it is not feasible to obtain a hose count.
    - These new loops sites will provide design data to support projects throughout the Department and local agencies statewide.
    - These new loops sites will provide greater data coverage for HPMS, MIRE, pavement analysis, and annual reporting.
- Travel will be necessary to complete the activities within this task.

Vehicle Classification

TASK: 1014
ACTIVITY: 3626
OPERATIONAL SECTION: TRAFFIC INFORMATION
PROGRAM MANAGER: MARK WOOSTER

Funding for FFY2022 – Annual Request

Staffing	$182,000
Consultant	$0
Other	$18,000
Federal Amount (80%)	**$160,000**
State Match (20%)	**$40,000**
Total Requested Amount	**$200,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Governmental Agencies
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
The purpose of vehicle classification is to provide estimates of the composition of traffic by vehicle types. The classification counts provide design designation data in terms of Average Daily Traffic (ADT) Truck (T)% and Design Hour Volume (DHV) T%. The truck classification provides the percent of distribution by the various truck types to be matched with average weight by type to determine pavement base and surface requirements. Classification counts are used in environmental assessments, pavement management programs, urban and rural transportation planning, Highway Performance Monitoring System (HPMS), Federal Highway's Travel Monitoring Analysis System (TMAS), and freight movement studies.

This is a statewide program with counts in both rural and urban areas. The frequency and extent of coverage are based on the Federal Highway Administration's Traffic Monitoring Guide (TMG).

Previous Related Work:
Ongoing

Proposed Activities and Expected Products:
- Calculate Annual Average Daily Truck (T%) Traffic statistics for use in HPMS and other annual reporting.
- Calculate Truck seasonal factors for use in HPMS and other annual reporting.
- Calculate DHV T% factors for use in HPMS and other annual reporting.
- Update the Federal HPMS truck traffic AADTs and K & D factors.
- Submit truck traffic data monthly to Federal TMAS.
- Update the State of Nevada's PMS truck traffic statistics.
- Supply current truck statistics to the Metropolitan Organization's Regional Travel Demand Models.

- Update the State of Nevada's Bridge Structure Database System with truck AADTs.
- Update the State of Nevada's Railroad Crossing Database System with truck AADTs.
- Supply current truck AADTs for use in the Nevada Traffic Accident Statistics Software
- Supply truck AADTs for development of the VMT Report.
- Data collection procedures are updated annually in the Nevada Department of Transportation's Traffic Monitoring System for Highways (TMS/H).
- Produce Vehicle Classification portion of Nevada's Annual Traffic Report.
- Update Federal Highway Administrations Traffic Volume Trends (TVT) Report with vehicle classification information.
- Travel will be necessary to complete the activities within this task.

Vehicle Weight

TASK: 1015
ACTIVITY: 3632
OPERATIONAL SECTION: TRAFFIC INFORMATION
PROGRAM MANAGER: MARK WOOSTER

Funding for FFY2022 – Annual Request

Staffing	$284,000
Consultant	$0
Other	$16,000
Federal Amount (80%)	**$240,000**
State Match (20%)	**$60,000**
Total Requested Amount	**$300,000**

PARTICIPATING AGENCIES: FHWA, NDOT
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
The vehicle weight program provides truck weight and characteristics such as axle/gross vehicle weights, axle spacing, and vehicle dimensions for the statewide roadway network. Truck weights and related data are collected using Weigh-In-Motion (WIM) systems. The data is used at the state and national levels in consideration of transportation policy, allocation of highway costs and revenue, size and weight regulations, the establishment of geometric design criteria, and a variety of special administrative, planning, design, and research studies.

This is a statewide program with WIM systems in both rural and urban areas. The frequency and extent of coverage are based on the Federal Highway Administration's Traffic Monitoring Guide (TMG).

Previous Related Work:
- Revised NRS to match FAST Act.
- Quarterly Truck, Size, and Weight Quarterly Enforcement meetings established.
- Worked with NDOT's Multi-Modal Division on the Nevada State Freight Plan.
- Calibrated four WIM systems in Northern Nevada to ensure optimal accuracy of Nevada's truck weight data.

Proposed Activities and Expected Products:
- Quarterly Truck Size and Weight meetings with NDOT, FHWA, NHP and DMV.
- Completion of required annual certification.
- Submit weight data quarterly to FHWA.
- Install WIM and truck weight and inspection infrastructure as required for State Enforcement Plan (SEP) implementation.

- Provide monthly overweight reports to the Nevada Highway Patrol.
- Provide truck weight summaries to various counties, cities, and consultants.
- Data collection procedures are updated annually in the Nevada Department of Transportation's Traffic Monitoring System for Highways (TMS/H).
- Daily & monthly ESAL Reports.
- Travel will be necessary to complete the activities within this task.

Special Traffic Studies

TASK: 1016
ACTIVITY: 3627
OPERATIONAL SECTION: TRAFFIC INFORMATION
PROGRAM MANAGER: MARK WOOSTER

Funding for FFY2022 – Annual Request

Staffing	$96,000
Consultant	$0
Other	$14,000
Federal Amount (80%)	**$88,000**
State Match (20%)	**$22,000**
Total Requested Amount	**$110,000**

PARTICIPATING AGENCIES: Statewide CPIMTU and Local Agencies, NDOT, FHWA
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: FHWA, NDOT

Purpose and Scope:
Provide special traffic information as needed to highway planners, engineers, top management, and other requesters. This data is used in developing speed studies, signal warrant studies, pedestrian studies, and various others.

Previous Related Work:
- Signal warrant studies as requested.
- Passing sight distance studies as requested.
- Speed studies as requested.
- Curve speed studies as requested.
- Turning movement studies as requested.
- Delay studies as requested.
- Pedestrian studies as requested.

Proposed Activities and Expected Products:
- Conduct signal warrant studies.
- Conduct passing sight distance studies.
- Conduct speed studies.
- Conduct turning movement studies.
- Conduct delay studies.
- Conduct pedestrian studies.
- Travel will be necessary to complete the activities within this task.

Data collection procedures are updated annually in NDOT's Traffic Monitoring System for Highways (TMS/H).

Travel Demand Forecasting

TASK: 1017
ACTIVITY: 3982
OPERATIONAL SECTION: TRAFFIC INFORMATION
PROGRAM MANAGER: MARK WOOSTER

Funding for FFY2022 – Annual Request

Staffing	$200,000
Consultant	$200,000
Other	$0
Federal Amount (80%)	**$320,000**
State Match (20%)	**$80,000**
Total Requested Amount	**$400,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties & Local Governmental Agencies
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
This task aims to conduct travel demand forecasting activities relevant to planning, transportation elements, and master plan development. This includes a review of consultant traffic modeling. The increased volume of recent projects (larger phased projects in particular) requires more time and more rounds of review per project.

This activity also fulfills the oversight responsibilities outlined in the Stewardship Agreement between the Federal Highway Administration (FHWA) and NDOT for the Code of Federal Regulations Title 23.

Previous Related Work:
Ongoing

Proposed Activities and Expected Products:
- Develop travel demand forecasts and other traffic statistics for evaluating projects in accordance with FHWA and NDOT policy.
- Review travel demand methodologies and forecasts prepared by consultants and other entities in accordance with FHWA and NDOT policy.
- Work with Washoe County RTC and the City of Fernley to include the expanding Fernley area and their potential for industrial and other types of growth in the regional traffic model.
- Continue holding biannual meetings for the Nevada Forecasting Group to review travel demand forecasting issues with participating agencies statewide collaboratively.
- Renew annual Trans CAD licenses for five NDOT employees.
- Upgrade the State of Nevada travel demand model to the latest version of TransCAD (TransCAD 8). This update is necessary to increase the accessibility and accuracy of the model. This project is

projected to take five years and will include the following elements:

- Update model to the latest version of TransCAD to increase the efficiency of model operation.
- Update population and employment files that now form part of the basis for project prioritization throughout the Department.
- Model update to include verifying and updating of model network attributes to ensure they reflect current field conditions.
- Provide consultant-led training related to the use of the TransCAD model. Technical training will enable staff to operate the newer software. Additional training intended for a wider audience will educate managers and decision-makers. If advanced functionality is identified, this task will investigate the potential for On-Call contact to perform complex model operations beyond the scope of normal Traffic Information staff capacity.

- Travel will be necessary to complete the activities within this task.
- Provide information, support, and participate in travel demand forecast activities conducted by the four MPOs.
- Support and participate in the Census Transportation Planning Products (CTPP) Technical Service Product, including an annual contribution towards Nevada's total share.

Performance Analysis

Mandated Reports

TASK: 1018
ACTIVITY: 3651
OPERATIONAL SECTION: PERFORMANCE ANAYLSIS
PROGRAM MANAGER: Jocene Yang

Funding for FFY2022 – Annual Request

Staffing	$75,000
Consultant	$0
Other	$0
Federal Amount (80%)	**$60,000.00**
State Match (20%)	**$15,000.00**
Total Requested Amount	**$75,000.00**

PARTICIPATING AGENCIES: FHWA, NDOT
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Develop and disseminate information concerning the state's ability to fund long-range transportation programs. Provide transparency on the State's and Local Transportations agency's capital outlay and maintenance activities on revenues and expenditures.

Previous Related Work:
- Production of FHWA reports:
  - 534
  - 536
  - 532
  - 551M
  - Motor fuel data report

Proposed Activities and Expected Products:
- Develop fuel tax reports from the data received from the Department of Motor Vehicles.
- Continue extracting cost information from NDOT and the Department of Motor Vehiclesaccounting systems for use in highway cost-allocation studies and legislative and management reports.
- Prepare reports, including the Department's Facts & Figures Report that details the history of highway finance in Nevada.
- Request and collect revenue and expenditure data from local transportation agencies
- Prepare and submit the Local Highway report to FHWA.
- Coordinate with the NDOT divisions to provide data and other support services used to prepare and

report the State Highway Capital outlay & Maintenance Expenditure report to FHWA.

- Continue to coordinate and collaborate with NDOT Accounting division to prepare the Maintenance and Expenditure by State government report to make sure it is in line with the FHWA 534 report.
- Respond to road history research requests in a timely manner and as outlined in the NDOT Public Records guidelines.
- Schedule travel and road audit meetings and accurately document the road inventory data. Maintain the public road mile records.

Alternative Funding (VMT)

TASK: 1019
ACTIVITY: 3860
OPERATIONAL SECTION: PERFORMANCE ANALYSIS
PROGRAM MANAGER: Jocene Yang

Funding for FFY2022 – Annual Request

Staffing	$75,000
Consultant	$0
Other	$0
Federal Amount (80%)	**$60,000.00**
State Match (20%)	**$15,000.00**
Total Requested Amount	**$75,000.00**

Pooled Funds TPF-5(288) RUC West (25,000) ON HOLD
MOU with MBUFA (5,500)

PARTICIPATING AGENCIES: FHWA, NDOT
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
In collaboration with western states, Nevada is establishing a broad west-coast coalition to assess, evaluate, and identify a sustainable alternative funding mechanism with the potential to replace the existing fuel tax system. The study will include testing from simple odometer-based or annual registration-based VMT Fee system to High Tech system. This will minimize privacy concerns and give users a choice to select from a variety of payment mechanisms the method that best meets the user's individual needs and preferences.

Previous Related Work:
- Phase 1 and 2 of the study was initiated in 2009/2010 in cooperation with the two RTCs, UNR, and UNLV. There were 20-30 volunteer vehicles were used as prototypes to prepare for the larger west-coast coalition study.
- Phase 2A worked on:
    - MOBI (Mass Opinion Business Intelligence)
    - Asset Optimization, Financial Sustainability
    - Regulatory issues
    - transition strategies
    - Low-cost/low-tech VMT fee system feasibility
    - equity issues
    - public acceptance
    - in-vehicle technology

Proposed Activities and Expected Products:

- Continue to evaluate the feasibility of a future-oriented sustainable funding mechanism.
- Gather information from any national commissions, Consortiums, and other states.
- Participate in a proposed road usage fee Regional Pilot Program through the RUC West Consortium.
- Travel as necessary to attend collaborative meetings and participate in public outreach.
- Collaborate with other states within the RUC West Consortium, the Mileage Based User Fee Alliance, and the United States Department of Transportation. The U.S. DOT and many other States across the nation are evaluating different mechanisms to identify alternative funding to help meet the need of the transportation system. RUC West is undertaking a Road Usage Charge Regional Pilot project that will provide information about the feasibility of such a system and its potential implementation on a large scale. Other projects which address issues related to road usage charging are also currently being undertaken by RUC West.

Performance Management

TASK: 1020
ACTIVITY: 3650
OPERATIONAL SECTION: Performance Analysis
PROGRAM MANAGER: Peter Aiyuk

Funding for FFY2022 – Annual Request

Staffing	$150,000
Consultant	$0
Other	$0
Federal Amount (80%)	**$120,000**
State Match (20%)	**$30,000**
Total Requested Amount	**$150,000**

Pooled Funds TPF-5(326) RI DOT (53,250)
Total Duration: ONGOING

PARTICIPATING AGENCIES: FHWA, NDOT
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Implement a next-generation system to comply effectively with the MAP-21/FAST-ACT by tracking all related NPRM's and comments related to performance measures and targets development and reporting. Comply with the Governor's Performance Requirements along with coordinating and tracking Stewardship & Oversight Agreement performance measures. Develop a sophisticated system for monitoring, evaluating, and reporting our performance measures through initiation and innovation with FHWA Technical Service Programs and develop an electronic reporting platform. Collaborate with MPO's and other stakeholders as a Performance Management working group to develop a unified statewide approach to addressing performance measures and target setting for internal planning purposes and business process improvement.

Previous Related Work:
- PEG Performance Management Group monthly collaboration meetings.
- Hosted the Transportation Performance Management Capability Maturity Model Workshop.
- Attended Safety Target Setting Workshop.
- Produced a report on the current culture of performance management practice at NDOT.

Proposed Activities and Expected Products:
- Nevada State Legislature Assembly Bill 595 (year)requires NDOT to develop, monitor, and implement a comprehensive performance management system for NDOT and submit the report to the Transportation Board.
- Identify needs and potential solutions for a system that will automatically retrieve data from the various divisions for consistency and ease of use.

- Aid other divisions - The Performance Analysis Division will provide performance management assistance to various divisions and help coordinate our efforts with consultants and other agencies.
- Regularly review the performance measures of effectiveness.
- Collaborate with FHWA/FTA to provide timely reports.
- Participate in AASHTO Technical Service Program (Innovative Initiative).
- Implementation, adjustment, and training to use a state-of-the art system for performance management. This will help in the accountability of NDOT's investments in the decision-making process to optimally allocate our resources.

Innovative Planning

TASK: 1021
ACTIVITY: 3659
OPERATIONAL SECTION: Performance Analysis
PROGRAM MANAGER: Peter Aiyuk

Funding for FFY2022 – Annual Request

Staffing	$25,000
Consultant	$100,000
Other	$0
Federal Amount (80%)	**$100,000**
State Match (20%)	**$25,000**
Total Requested Amount	**$125,000**

PARTICIPATING AGENCIES: FHWA, NDOT, CAMPO, RTCSN, RTCWC, TMPO
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Collaborate with the Multimodal Division (Program Development Section) and other local planning agencies to ensure a performance-driven, outcome-based planning and programming process so that investment priorities in planning and programing documents, including the STIP, are linked to achieving performance targets. Use of engineering/economic analysis (EEA) tool will be utilized.

Previous Related Work:
Ongoing effort to implement provisions of the Planning rule in MAP-21 and FAST-ACT

Proposed Activities and Expected Products:
- Meet with Program Development and other divisions/entities responsible for incorporating performance targets and investments into programming documents.
- Review and stay up to date with state programming documents.
- Review plans developed by various NDOT divisions.
- Review program reports, when necessary, to ascertain significant progress towards achieving performance targets.
- Travel to meet with other planning/transportation agencies and discuss performance-based planning and programming in their agencies to help achieve statewide performance targets.
- Summary report on investments and performance targets

Benefit Cost Studies

TASK: 1022
ACTIVITY: 3655
OPERATIONAL SECTION: PERFORMANCE ANALYSIS
PROGRAM MANAGER: Harry Li

Funding for FFY2022 – Annual Request

Staffing	$25,000
Consultant	$100,000
Other	$0
Federal Amount (80%)	**$100,000**
State Match (20%)	**$25,000**
Total Requested Amount	**$125,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Consultants, Universities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT, FHWA, NDOT, Consultants, Universities

Purpose and Scope:
Conduct benefit-cost studies on regionally significant projects to help NDOT in the project selection and prioritization process to help allocate resources most effectively.

Previous Related Work:
Benefit-Cost studies conducted by state universities and in-house as needed.

Proposed Activities and Expected Products:
- Nevada Revised Statute 408.3195 requires NDOT to conduct benefit-cost studies on NDOT projects.
- Conduct benefit cost studies on regionally significant projects to help NDOT in the project selection and prioritization process to help allocate resources most effectively.
- To conduct benefit-cost studies for other divisions and stakeholders as needed.
- Develop separate detailed and comprehensive reports on projects
- Develop a final summary of projects in one document and deliver to NDOT
- Develop electronic copies of the benefit-costs and the report and deliver them to NDOT.

State Highway Preservation and Reporting

TASK: 1023
ACTIVITY: 3656
OPERATIONAL SECTION: PERFORMANCE ANALYSIS
PROGRAM MANAGER: Jocene Yang

Funding for FFY2022 – Annual Request

Staffing	$40,000
Consultant	$0
Other	$0
Federal Amount (80%)	**$32,000**
State Match (20%)	**$8,000**
Total Requested Amount	**$40,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Consultants, Universities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT, Consultants, Universities

Purpose and Scope:
Develop pavement and bridge preservation analysis and report to highlight the state of those assets and what investments will be required to keep them at acceptable levels.

Previous Related Work:
Ongoing

Proposed Activities and Expected Products:
- Nevada Revised Statute 408.203 requires NDOT to prepare pavement preservation report and submit to the Legislative Counsel Bureau.
- Use the LCCA in the pavement preservation reporting process.
- Study automating the process to save time and money and improve accuracy.
- Study developing an automated pavement preservation reporting and visualization process.

Nevada Construction Cost Study

TASK: 1024
ACTIVITY: 3863
OPERATIONAL SECTION: PERFORMANCE ANALYSIS
PROGRAM MANAGER: Peter Aiyuk

Funding for FFY2022 – Annual Request

Staffing	$10,000
Consultant	$0
Other	$0
Federal Amount (80%)	**$8,000**
State Match (20%)	**$2,000**
Total Requested Amount	**$10,000**

PARTICIPATING AGENCIES: FHWA, NDOT
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Investigate a cost-effective method to develop the Nevada State-specific Construction Cost Index by evaluating existing tools and proposed NDOT estimating software (Master Works) to determine enhancements and or modifications to produce the index. The index will be used to gauge transportation revenues against construction cost and inform the department's decision-makers of the net effect of fuel tax indexing revenue and future transportation needs. The scope will include tracking and "smoothing" out data of archived award prices of major constructions items. Yearly maintenance (updates) are performed to keep the Index current.

Previous Related Work:
- Discussed and evaluated archived major construction bid items and prices to determine which are critical to develop the Highway Construction Cost Index.
- Held a meeting with Materials and Construction to solicit input and determine need and scope.

Proposed Activities and Expected Products:
- Continue to research NDOT's historical award prices of predetermined major transportation construction items through the financial data warehouse.
- Continue to have meeting with the Scoping section about the functionality of the new enterprise software master works and if it is possible to include a cost index functionality.
- Construction cost items are periodically aggregated to simplify incorporation into the index.
- Continue to analyze data and refine the appropriate methodology to be used for index formulation.
- Ongoing review of Producer Price Index (PPI) information that tracks historical trends to calibrate potential applications after development.

Fuel Tax Revenue Management

TASK: 1025
ACTIVITY: 3654
OPERATIONAL SECTION: PERFORMANCE ANALYSIS
PROGRAM MANAGER: Peter Aiyuk

Funding for FFY2022– Annual Request

Staffing	$50,000
Consultant	$100,000
Other	$0
Federal Amount (80%)	**$120,000**
State Match (20%)	**$30,000**
Total Requested Amount	**$150,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Consultants, Universities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT, Consultants, Universities

Purpose and Scope:

- Study the implementation of the recommendations coming out of the first phase of the fuel study and related data integration.
- The study will show how the current achieved fuel data can be easily accessed and integrated with the use of simple query functionality to add value to the data.
- Develop and implement a robust, sophisticated fuel tax revenue management and reporting system to help improve divisional efficiencies, reduce reporting errors, and streamline report delivery for on-time to receive federal reimbursement seamlessly.

Previous Related Work:

- Developed and advertised a request for proposal and evaluated submitted proposals.
- Held regular monthly meetings with the consultant to discuss the progress of the project.
- Produced report on the study of the fuel and related data integration. The report included developing a data dictionary of all the fuel and related data received from Nevada DMV and MPOs.
- Evaluated the current data system to determine data schema and level of standardization to understand problem areas to develop a better system fully.

Proposed Activities and Expected Products:

- Federal regulations require NDOT to submit the fuel tax revenue statistics regularly to FHWA for reimbursement of expenses to the State Highway Fund.
- Implement a robust fuel consumption and fuel tax revenue reporting system and automate the process.
- Study and design a roadmap for developing a fuel data management system that will be simple to

implement at the initial phase, but with an architectural capability of future expansion.

- Implement an automated system to provide fuel tax revenue projections by Counties with the use of achieved fuel data and other information currently stored in the rudimentary system.
- Develop charts, graphs, statistical analyses framework.
- Automated reporting mechanism to fill the forms and report to FHWA for reimbursement.
- Seamlessly receive fuel consumption and revenue collection data from the DMV and other reporting agencies.
- Produce hard copies of reports.
- Produce soft copies of reports.
- Study the possibility of developing a data and report visualization platform.

Active Transportation and Special Studies

Active Transportation Planning

TASK: 1026
ACTIVITY: 3679
OPERATIONAL SECTION: Active Transportation & Special Studies
PROGRAM MANAGER: Scott Bohemier

Funding for FFY2022 – Annual Request

Staffing	$199,172
Consultant	$300,000
Other	$0
Federal Amount (80%)	**$399,338**
State Match (20%)	**$99,834**
Total Requested Amount	**$499,172**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
To plan and initiate programs improving mobility of bicyclists, pedestrians, scooters, or other micro-mobility devices. To promote bicycling and walking in Nevada using improved infrastructure and educational activities for people of all ages and abilities. Encourage the development of accessible and connected non-motorized infrastructure to build a functional multimodal system. To plan and initiate programs that promote the mobility of pedestrians and bicyclists, pedestrian and bicycle activities, and safety. Encourage the development of pedestrian facilities as part of the multimodal system.

In 2021 NDOT began the revision the TAP process to provide clarity and transparency to applicants. The process revisions aim to improve project delivery by focusing on project readiness and conducting more in-depth analysis in the areas of NEPA and Right of Way.

Develop an implementation plan for NDOT's Complete Streets Policy.

- Assist with the development of complete street projects requested by local entities.
- Provide a framework determining when elements of Complete Streets should be included within NDOT projects.
- Review existing and appropriate NDOT guidance, standards, manuals, policies, and processes.
- Make recommendations and modifications needed to comply with the Complete Streets Policy.
- Review current processes and recommend how to accommodate Complete Streets concepts on NDOT projects.

Previous Related Work:

- Completed 11 rural county bicycle plans, which are now amended into the Statewide Bicycle Plan.
- Developed bicycle and pedestrian safety information.
- Review new NDOT projects for bicycle and pedestrian accommodation.
- Development of the Statewide Bicycle Touring Map.
- NDOT Complete Streets Policy has been approved and communicated within NDOT as well as external stakeholders.

Proposed Activities and Expected Products:

- Development of a Statewide Active Transportation Plan
- Improve the accommodation of bicycles and pedestrians through construction zones in cooperation with Design and Construction Divisions and agency Districts.
- Refine the development of design specifications for bicycle facilities in coordination with the Design Division.
- Coordinate with local entities and adjacent states to establish U.S. Bike Routes (USBR); USBR48 (I-80 corridor), USBR50 (US50 corridor), USBR70 (I-15 corridor), and USBR79 (US93 corridor north of US50). Coordinate with the NDOT Roadway Systems Division to develop applications to the AASHTO Special Committee on Route Numbering for USBR designation.
- Participate as a member of the Technical Work Group and Critical Emphasis Area Groups for the Strategic Highway Safety Plan to improve bicyclist and pedestrian safety.
- Encourage local entities to pursue funding related to bicycle and pedestrian education, encouragement, enforcement, engineering, and evaluation of student mobility via such funding programs as Transportation Alternatives, Recreation Trails, etc.
- Work with local jurisdictions in developing projects which enhance student bicyclist and walking mobility and safety.
- Assist and train stakeholders on the basic philosophy and components of a Safe Routes to School program.
- Coordinate and participate with local bicycle committees and advisory boards.
- As necessary, promote bicycling and walking in Nevada as a transportation mode by attending related events held both in Nevada and in the adjoining state communities.
- Provide direct outreach at public events related to bicycle and pedestrian safety.
- Promote Nevada Moves Day (spring) and International Walk to School Day (October) as mode shift target days for stakeholders.

An approved statewide list of Transportation Alternatives projects is to be contracted for construction within the next two fiscal years.

- Review and revise NDOT Rules and Procedures Manual as needed to match FHWAprogram guidance and rules and regulations.
- Effectively execute and handoff projects to the NDOT LPA group and follow-up to expedite to ensure project advertisement within the three-year deadline.
- Solicit applications biannually.
- Review applications for eligibility and submit them to the selected scoring committee.
- Coordinate with the scoring committee, review applications based on established criteria, and establish a prioritized list of projects and programs.

- Establish funding levels for project funding and apply to approved applications.
- Present to NevadaBicycle and Pedestrian Advisory Board for recommendation to NDOT.
- Notify applicants of projects funded for implementation of project agreements.
- Work with the MPO's and NDOT staff to have the project funding amended/adopted into the RTIP/eSTIP.
- Work with the MPO's and NDOT staff to have the project funding amended/adopted into the RTIP/eSTIP.
- Process requests for Transportation Alternatives project scope revisions.
- Provide updated information to NDOT Staff for changes to the RTIP/eSTIP
- Review and update Transportation Alternatives project status and federal funding status.
- Attend annual FHWA Transportation Alternatives Coordinators meeting/workshop.
- Travel will be required to meet with applicants and to attend any national TAPworkshops/meeting.
- Transportation Alternatives Program (TAP) Guidance
- Staff will work with a consultant to develop internal guidelines and policies for the Transportation Alternatives Program (TAP).
- Review of Complete Streets concepts and FHWA Framework.
- Summary of existing processes with suggested modifications.
- Listing of suggested Complete Street Design resources.
- Consultations with affected internal divisions.
- Summary descriptions of Complete Street determination criteria including Latent Demand models.
- Training for affected divisions

Corridor Planning Program

TASK: 1027
ACTIVITY: 3970
OPERATIONAL SECTION: Active Transportation & Special Studies
PROGRAM MANAGER: Matthew Bradley

Funding for FFY2022 – Annual Request

Staffing	$150,000
Consultant	$1,047,877
Other	$0
Federal Amount (80%)	**$958,302**
State Match (20%)	**$239,575**
Total Requested Amount	**$1,197,877**

PARTICIPATING AGENCIES: FHWA, NDOT, MPOs, Counties & Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
To provide funding for transportation analysis of corridors within Nevada's multimodal transportation network. With the update of the Nevada Statewide Transportation Plan ("ONE Nevada") underway, several major corridors for potential improvements are being studied and assessed at a high level for potential improvements. As a complement to the "One Nevada" Statewide planning process, there is a need for smaller scale and more refined corridor planning and study to identify potential areas of need for improvements, both for existing and new corridors within the state.

Previous Related Work:
- One Nevada Transportation Plan and Prioritization Implementation
- I-15 and US 93 Critical Corridor Plans
- Boulder Highway Corridor Study, in coordination with RTC SNV

Proposed Activities and Expected Products:
- To implement the Statewide Transportation Plan (One Nevada Plan) through a specific transportation corridor study.
- Provide advice and assistance to districts, local communities, and federal agencies on preparing scope, schedule, and budget for corridor improvements.
- Manage, track, coordinate, and recommend review and approval of corridor planning studies.
- Develop, update, and utilize tools and methods to identify mobility needs, analyze safety data, and assess the costs and benefits of multimodal transportation improvement strategies within a corridor.
- Continue coordination with MPOs, RTCs, and local jurisdictions in the identification of transportation corridor improvement needs.

- Identify team and stakeholders for each corridor.
- Gather information on the history of previous planning efforts for each corridor.
- Describe and define the scope for each planning study
- Define and describe the goals for each corridor plan
- The following corridor studies are anticipated to begin or continue during FFY 2022
    - Mt Rose
        - The study began on October 2020 and will conclude in November 2021.
        - The Mt. Rose Corridor Plan will define a vision for future Mt. Rose Highway corridor improvements from Veteran's Parkway to Douglas Fir Drive.
        - The study will develop a long-term action plan and identify potential near-term improvements for implementation consideration. A final Corridor Action Plan will be completed by November 2021.
    - US 50 – Stateline to Spooner Summit, in coordination with TRPA/TTD
        - The study began in March 2021
        - The US 50 Corridor Management Plan (CMP) will assess and evaluate needs along the corridor within the Lake Tahoe Basin and be consistent with existing TRPA-MPO plans, goals, objectives, and goals described in the Lake Tahoe Compact.
    - McCarran Blvd, in coordination with RTC WA
        - The department entered into a cooperative agreement with the Regional Transportation Commission of Washoe County.
        - The Plan will define a vision for future McCarran Blvd corridor improvements
        - The study began in July 2021 and will conclude in November of 2023.
    - SR 159/160, in coordination with RTC SNV
        - NDOT determined through the One Nevada Needs Assessment that the SR159/SR160 should be considered for a corridor study. The One Nevada Needs Assessment tool uses a data-driven process. NDOT will conduct a corridor study to evaluate the needs of this corridor.

Rural Programs

Public Transportation Planning

TASK: 1028
ACTIVITY: 3961
OPERATIONAL SECTION: Rural Programs
PROGRAM MANAGER: Guinevere Hobdy

Funding for FFY2022 – Annual Request

Staffing	$75,000
Consultant	$125,000
Other	$0
Federal Amount (80%)	**$160,000**
State Match (20%)	**$40,000**
Total Requested Amount	**$200,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT, Consultant (TBD)

Purpose and Scope:
Our purpose is to manage the statewide transit program, including planning and administrative programming efforts. Our efforts will enhance public transportation services and mobility in rural Nevada through innovation, plan and program development, and efficient use of available resources. This will also improve the efficiency and effectiveness of funding and operational efforts through the implementation and oversight of statewide performance measures. To achieve this, we will provide administrative, planning, coordination, and technical and programming support to each of Nevada's rural transit operators and mobility managers.

Previous Related Work:
- Transit Operations Management System (in development)
- Statewide Transit Plan (in development)
- Administer Statewide Transit Program (ongoing)
- Compliance Oversight/Performance (new)

Proposed Activities and Expected Products:
- Transit staff will continue to assist consultant and NDOT IT staff with development.
- Statewide Transit Plan – Transit staff has been working toward developing an RFP to obtain consultant support for this plan. Staff will work with a consultant to develop a statewide transit plan that will better define overarching goals and objectives, quantify the state's transit needs, and recommend programmatic and policy initiatives to strengthen the statewide transit system.

- State Transit Association – Transit staff will work with a consultant to develop a course of action and/or advance the movement toward forming a state transit association. Formation of such an entity would enhance transit in the state through advocacy for transit and the provision of services essential to the mission of impacting the future health of public transportation. With a collective voice to advocate for transit, create awareness, and enhance safety, economic development, and innovative solutions, public transportation could be better positioned to serve the state's citizens.
- Administer statewide transit program – provide training, technical assistance, and oversight of subrecipient agencies; manage federal funds; conduct planning and programming activities that enhance the program's performance measures, goals and objectives.
- Compliance Oversight/Performance Planning – Transit staff will work with a consultant to complete compliance monitoring activities that will, in effect, be the research that produces data points for the rest of the project. This data will feed into performance analyses of rural transit service providers funded by NDOT. The analyses would show individual and common trends and areas of strength and weakness while depicting data by various categorical breakdowns such as geography, operator type, etc. This information will maintain compliance with federal regulations and give Transit staff information to make more informed decisions about project selection and how to improve the statewide transit network.

Transit Operations Management System development – project included in previous iterations of SPR workplan include consultant support. This project was transferred and funded to another division within NDOT.

County Consultation

TASK: 1029
ACTIVITY: 3955
OPERATIONAL SECTION: Rural Programs
PROGRAM MANAGER: Guinevere Hobdy

Funding for FFY2022 – Annual Request

Staffing	$70,000
Consultant	$75,000
Other	$10,000
Federal Amount (80%)	$124,000
State Match (20%)	$31,000
Total Requested Amount	**$155,000**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
The purpose of these consultations is to gain input from the 14 rural counties on projects to be included in the upcoming STIP and the long-range plan. Historically we have visited each county twice a year. One visit was a working group session lasting 1-2 hours in a workshop format. The second visit was a leadership level meeting between the NDOT leadership and the county commissioners (the NDOT County Tour). COVID prevented us from conducting in-person workshops and meetings with the commissioners. However, we continued to virtually engage with the counties, by email and phone with commissioners to learn about their needs. The County Tour meetings with the County Commissions were done virtually to update the previously mentioned requests, adding new requests where applicable and sharing the STIP and state work program for the current and outlying years.

Previous Related Work:
Each year, NDOT develops a comprehensive workbook to highlight the STIP and work program and future potential projects identified in the past. A key part of the workbook will list all the county requests that we have heard from them over the years, including the top two priorities the county has verified in commission meetings. In addition, we add crash and safety data and AADT for the roads in the county to be a part of the discussion.

Proposed Activities and Expected Products:
Rural County Consultation Revitalization – Our staff with work with a consultant to revitalize the County Consultation program. The revitalization will provide outreach and education on our new OneNV long-range planning tool. This will help the county commissioners and the public to set realistic expectations for long-range planning goals. The scope of work may include and is not limited to:

- Develop plan & strategy
- Analyze the success of tours & workshops from feedback via surveys
- Develop goals for county consultations in collaboration with rural counties
- Develop outreach and digitize education tools for the county commissioners
- Develop Policy and Guidelines
- Create a Story Map for each county with data, maps, and the process (highways, money spent, crash data, STIP and Work Program projects past, present, and future (short and long-range).
  This will give them real-time information and expectations
- Develop public education campaigns (community blog via Zendesk, newsletter, pop-ups), etc.

Staff will engage the counties to roll out the new consultation process, and this will include at a minimum:

- Two workshops focused on education of short and long-range planning and the new OneNV and enhanced County process
- Conduct targeted issue workshops on priority issues
- County Tours

Tribal Consultation

TASK: 1030
ACTIVITY: 3602
OPERATIONAL SECTION: Rural Programs
PROGRAM MANAGER: Guinevere Hobdy

Funding for FFY2022 – Annual Request

Staffing	$30,000
Consultant	$75,000
Other	$10,000
Federal Amount (80%)	**$92,000.00**
State Match (20%)	**$23,000.00**
Total Requested Amount	**$115,000.00**

PARTICIPATING AGENCIES: FHWA, NDOT, Tribal Governments, Nevada Indian Commission

FINANCIAL RESPONSIBILITY: FHWA, NDOT

FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
The Tribal Liaison coordinates with the 27 sovereign tribal nations in Nevada during the planning process for projects and issues that may be of interest to, or impact, Tribal Nations. The Tribal Liaison participates in long-range transportation planning or meet with Tribal representatives as needed/requested throughout the year to discuss transportation needs, concerns, and challenges that intersect or align with our state facilities.

Additional scope of work includes assisting NDOT staff with:
1. Meeting state laws, mandates, and requirements outlined in our guidelines and policies.
2. Provide guidance with TERO, sales tax, and resolving issues.
3. Coordination of annual reporting.
4. Developing or updating guidelines and policies for NDOT staff.

Previous Related Work:
The Tribal Liaison continues to participate in meetings held by the Nevada Indian Commission who continue to develop the policy as required by NRS 233A, plus determine who will attend training when it becomes available. The next step is creating the state policy based on the new law, and NDOT comments on the process. The new process and policy will be in place by the new Federal Fiscal year and should fit hand in hand with the federal requirements.

The tribal liaison met with several tribes by in-person visits prior to the Covid pandemic, but after March 2020, all meetings were held virtually or on the phone. The tribal concerns mainly dealt with transportation issues with entrance onto tribal lands where our roads are an easement on the tribal

reservations. All tribal areas for recreation were closed, and tribes sought our help to assist with the ability to close roads to protect the tribe. There were also issues related to the tribes getting food and resources on some roads that were not optimal.

In addition to pandemic responses with the tribes and the Department of Emergency Management, the tribal liaison reached out to many tribes in a phone consultation and virtual online consultations to address issues on road projects in and around the tribal land. This involved keeping the tribes informed when the project is being designed, planned, and sent out for contract. The tribal liaison is also the point of contact for all consultation going forward and is a part of confirming tribal boundaries for the Right of Way division at NDOT.

As with any national crisis, there is fallout from the pandemic as some tribes were forced to lay off transportation staff which will be an added challenge going forward.

Proposed Activities and Expected Products:

Tribal Guidelines and Policy – Tribal Consultation staff will work with a consultant to develop internal guidelines and policies to meet the new statewide policies developed by the Nevada Indian Commission per NRS 233A. These requirements include but are not limited to annual reporting to the Nevada Indian Commission, proper documentation, and division tribal liaison training. NDOT staff will utilize these guidelines to ensure we are communicating effectively, assisting tribal nations with transportation concerns and planning needs.

In addition to the guideline and policy development, we will continue consultations with tribal leaders to understand the needs of the tribes around the state and establish direct and ongoing communication. The consultations will focus on safety, transportation concerns, economic development, and long-range planning by doing the following:

- Attend state sponsored tribal cultural training
- Identify projects in the STIP and annual work program that could impact the tribes and set up meetings to discuss those impacts.
- Attend Nevada Indian Commission meetings
- Attend quarterly state-tribal liaison meetings
- Meet with tribal leaders and transportation staff to assist with transportation discussions and coordinate long-range planning for the tribe.

Program Development

One Nevada Transportation Plan

TASK: 1031
ACTIVITY: 3980
OPERATIONAL SECTION: Program Development
PROGRAM MANAGER: Kevin Verre, Tim Mueller

Funding for FFY2022 – Annual Request

Staffing	$0
Consultant	$500,000
Econ works – Pooled Funds - TPF 5(456)	$0
Federal Amount (80%)	**$400,000**
State Match (20%)	**$100,000**
Total Requested Amount	**$500,000**

Pooled Funds TPF-5(456) *$5,000*

PARTICIPATING AGENCIES: FHWA, NDOT, MPOs, Counties, Citiies, Associations, State and Federal Agencies

FINANCIAL RESPONSIBILITY: FHWA, NDOT

FUNCTIONAL RESPONSIBILITY: NDOT, Consultant

Purpose and Scope:
Nevada's multimodal transportation system is a network of assets that must efficiently meet the demand to move goods and commerce. This network of assets encompasses roadways and other modal facilities. The growing demands on these resources have created an essential need to prioritize project development. The One Nevada Plan developed a foundational start to moving project development into a performance-based direction and continuing effort. Further development of useful tools and procedures will afford the plan its needed details to become more effective. The DEPARTMENT will prioritize projects and create a transparent process for project development, confirming the transportation needs of the State are being met.

This amendment intends to supplement the first phase of the One Nevada Implementation. In the first phase of the One Nevada Implementation, the Short-Range Project List was established, prioritized, harmonized, and amended throughout the year. The Long-Range Need Identification and validation processes were established. The Mid-Range options were presented to connect the long-range and mid-range elements of transportation planning. Please note deliverables are outlined in task order/scope of work.

Previous Related Work:

Short-Range Prioritization/Harmonization

- Established a process to update the STIP/ WP project lists with clear and accurate project information, mapped in GIS.
- Developed methodology for scoring projects when criteria did not have associated data based on a keyword search or a project type assignment.
- Performed prioritization using NDOT-customized PRIORITIZE tool.

Mid-Range/Long-Range

- Reviewed NDOT's and other state's planning processes to identify options for a mid-range process that enhances current processes while connecting needs to prioritized projects.
- Established a roadmap for the Long-Range Needs to filter into project concepts and then prioritize funded projects.
- Established a database to collect long-range needs.
- Identified a process for stakeholder-driven needs to be evaluated through a data-driven need validation tool.

Revised/Updated Scope of Work

Task 1 – Continue Project Management

Task 2 – Refine Long-Range Needs Process

Task 3 – Establish Mid-Range Processes

Task 4 – Continue Short Range Prioritization and Harmonization Refinements

Task 5 – Ultimate Process, NDOT Training/ Maintenance

Additional information about each of the tasks listed above can be found in Agreement P702-18-802.

EconWorks

Purpose and Scope:

The Econ Works tool (National Pooled Fund Study: TPF-5(456) will provide transportation planners with a better understanding of the economic impact of transportation projects, by continuing the delivery and improvement to the Strategic Highway Research Program (SHRP) 2 Econ Works product and adding additional case studies to provide more robust economic analysis. This is funded at $5,000 per year for four years ($20,000 total).

Previous Related Work:

- Website and case studies at https://planningtools.transportation.org/13/econworks.html

Proposed Activities and Expected Products:

- Update the case studies with Nevada projects
- Use the on-line tools that are available to help inform the One Nevada Transportation Plan process

Freight Transportation Planning / Rail

TASK: 1032
ACTIVITY: 3690
OPERATIONAL SECTION: Program Development
PROGRAM MANAGER: Bill Thompson

Funding for FFY2022 – Annual Request

Staffing	$77,000
Consultant	$225,000
Other	**$0**
Federal Amount (80%)	**$241,600**
State Match (20%)	**$60,400**
Total Requested Amount	**$302,000**

PARTICIPATING AGENCIES: NDOT, MPOs, Counties, Cities, FHWA, FTA, FRA, NHP
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT, Consultant

Purpose and Scope:
To improve the freight transportation system in Nevada. To update the State Freight Plan and consider, among other issues: Economic Vitality, Increased Safety, and Alternatives to enhance the integration and connectivity of the freight network. Incorporate autonomous system technologies into Nevada's freight network. Develop strategies, policies, and methodologies that work to improve the freight transportation system statewide. To provide a focus on the railroad from the state perspective and participate in rail discussions across the state as needed per the 2021 Rail Plan.

Previous Related Work:
- Truck Parking Implementation Plan, year completed: 2019
- Truck Parking Availability System (TPAS), ongoing, expected to be completed 2023
- 2021 State Rail Plan

Proposed Activities and Expected Products:
- Begin an update to the Nevada Statewide Freight Plan (NSFP).
- Identify and document freight supply chains and trends.
- Identify freight clusters and update existing freight Infrastructure.
- Identify and update the inventory of facilities.
- Identify freight mobility issues.
- Initiate the creation of a GIS-based inventory of the related freight elements within the state through truck GPS data.
- Updates to the truck component of the Nevada travel demand model.
- Develop a cost-constrained freight investment plan.

- Identify potential freight projects.
- Continue performance reporting and needs assessment.
- TPAS effort is ongoing and is expected to be completed in 2023 will be incorporated into the updated NSFP.
- Coordinate with GOED and Regional Development Authorities on new rail project advancement
- Connect regularly with the Class 1 Railroads, other rail lines, and other stakeholders as needed
- Serve as a liaison with Northern Nevada Development Agency for the new Fernley Multimodal Freight Facility
- Engage with rail stakeholders around the state
- Engagement with the Port of Oakland on rail activities

NDOT Freight Activities:

- Collaborate with appropriate Divisions to implement projects defined in the NSFP prioritized list of improvements.
- Integrate recommendations from the NSFP update into the performance-based One Nevada Transportation Plan.
- Coordinate, as appropriate, with the Freight Advisory Committee (FAC) and the Western States Freight Coalition
- Continue efforts for implementing the NDOT led WIM Study for permanent truck inspection equipment, stations, and data system.
- Attend quarterly Vehicle Size & Weight Enforcement meetings and plan reviews.
- Participate in Road Safety Assessments and 3R reviews.
- Collaborate with the AASHTO SCOP Freight Planning Task Force.
- Collaborate with the Nevada Trucking Association, the Ports of Oakland, Long Beach, and Los Angeles regarding ongoing truck issues with freight along the I-80 and I-15 corridors.
- Continually review changes to the Code of Federal Regulations, Nevada Revised Statutes, Nevada Administrative Code, and NDOT Transportation Policies to ensure the Freight Plan is consistent and compatible.
- Performance Reporting Data Needs Identification and Reporting Process.

Statewide Transportation Improvement Program (STIP)

TASK: 1033
ACTIVITY: 3979
OPERATIONAL SECTION: Program Development
PROGRAM MANAGER: Jillian Emery, Jason Love

Funding for FFY2022 – Annual Request

Staffing	$0
Consultant	$316,976
Other	$0
Federal Amount (80%)	**$253,581**
State Match (20%)	**$63,395**
Total Requested Amount	**$316,976**

PARTICIPATING AGENCIES: FHWA, NDOT, MPOs, FTA, EPA
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
The Statewide Transportation Improvement Program (STIP) is a fiscally constrained planning and programming document that encompasses Transportation Improvement Programs (TIP) from each Metropolitan Planning Organization (MPO) across the State of Nevada. Utilizing the new eSTIP system an online, multi-level secure access that allows each entity to input project data to be reviewed and approved by all State and Federal agencies according to the Federally approved STIP process and in compliance with all CFRs. This scope of work accounts for the annual maintenance of the system, which includes the eSTIP, PLANA and RTP interfaces, by EcoInteractive for the Software as a Service as well as staff time for developing new features and reports for the eSTIP system.

Previous Related Work:
This is an ongoing contract for the maintenance of the system built five years ago by NDOT, MPO, and FHWA staff. The NDOT eSTIP is a nationally recognized system as a model of an excellent eSTIP system that features public and secure interfaces allowing all agencies to maintain and own the project-level data. The system allows for maximum transparency to the public as acknowledged and lauded by the Nevada Governor, State Transportation Board, and FHWA.

Proposed Activities and Expected Products:

- **Software as a Service (SaaS) e-STIP platform**
  - Maintain and manage the eSTIP interface
  - Enhance reporting features to the eSTIP system
  - Update fiscally constrained project list for each MPO TIP
  - Update fiscally constrained project list, which includes MPO TIPs and Non-MPO projects for

the creation of the 4 year, fiscally constrained STIP.

- Amend and Modify the TIPs and STIP when necessary
- Process invoices from EcoInteractive
- Review and approval of MPO TIPs in accordance with CFR.
- Attendance at Project Status, Project Development, Project Countdown, and other project-level meetings will be necessary to acquire information and data.
- Review and comment on the Regional Transportation Plan (RTP) of the MPOs.
- Review funding apportionments from Federal Management Information System (FMIS).
- Submit project data to MPOs for TIP and RTP call for projects.
- Review and update processes with the latest federal guidelines and transportation acts.
- Develop RTP interfaces for the public website portion of the eSTIP
    - Project Lists
    - Fiscal Constraint
    - Interactive Map Features
    - Enhanced Search Features
    - County Reporting
    - Financial Info graphs
    - Enhancements to PLANA interface to better coordinate and collect information for the One Nevada prioritization process

Transportation Investment Program

TASK: 1034
ACTIVITY: 3984
OPERATIONAL SECTION: Program Development
PROGRAM MANAGER: Jillian Emery, Jason Love

Funding for FFY2022 – Annual Request

Staffing	$269,200
Consultant	$0
Other	$0
Federal Amount (80%)	**$215,360**
State Match (20%)	**$53,840**
Total Requested Amount	**$269,200**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties, Cities, State/Federal Agencies
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
This task is for the overall management of the department's NDOT STIP, Work Program, and TAP programs. The STIP is a fiscally constrained planning and programming document created in cooperation with the four Metropolitan Planning Organizations (MPO) across the state and is inclusive of their Transportation Improvement Programs (TIP). NDOT Planning Staff will work with the MPOs to develop and review the RTPs/RTIPs to ensure federal compliance before incorporation into the STIP. The NDOT WP highlights elements from the STIP regarding projects administered and funded by the federal funds allocated to NDOT and the prioritization of projects utilizing the State Gas Tax. This objective complies with CFR 450.214 and NRS 408.233. The TAP program is the overall tracking, reporting and management of the staff's efforts to ensure effective delivery of all the TAP projects that have been awarded to date. These programs require regular meetings, staff time for consultation with the various MPOs and agencies across the state, and NDOT, internal staff.

Previous Related Work:
FY 2016-FY2034 TSP

Proposed Activities and Expected Products:
- Nevada Department of Transportation Statewide Transportation Improvement Program Nevada Department of Transportation Work Program
- Regional Transportation Commission Southern Nevada Regional Transportation Plan and Regional Transportation Improvement Program

Multi-State Coordination and Planning

TASK: 1035
ACTIVITY: 3613
OPERATIONAL SECTION: Program Development
PROGRAM MANAGER: Kevin Verre

Funding for FFY2022 – Annual Request

Staffing	$0
Consultant	$150,000
Other	$0
Federal Amount (80%)	**$120,000**
State Match (20%)	**$30,000**
Total Requested Amount	**$150,000**

PARTICIPATING AGENCIES: FHWA, NDOT
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Coordinate with neighboring states for planning and program development to plan beyond the boundaries for the state to facilitate consistency and efficiency among all modes between neighboring states.

NDOT has a renewed focus on improving multi-state efforts for continued cooperation and collaboration of transformative initiatives relative to interstates 15 and 80. NDOT is a member of two multi-state partnerships:

I-15 Mobility Alliance comprised of state departments of transportations and local jurisdictions within the states of California, Nevada, Arizona, and Utah with a focus on reducing or eliminating congestion, improving interregional travel and reliability, and cultivating the safe movement of people and goods

I-80 Corridor Winter Coalition comprised of the western state departments of transportations from California, Nevada, Utah, Wyoming, and Nebraska, designed to provide better and more comprehensive I-80 corridor conditions information to both transportation agencies and to travelers.
NDOT has numerous ongoing efforts associated with both these multi-state partnerships. Parametrix, Inc. will provide professional services to NDOT for the I-15 and I-80 Multi-State

Coordination Program. This master services agreement identifies the overall required services that will be provided to deliver four distinct projects along these two corridors:
1. I-80 Multi-State Corridor Operations and Management (MCOM) Grant
2. I-80 Multi-State Coordination
3. I-15 Multi-State Mobility Alliance

Previous Related Work:

- Continuous: Ongoing coordination with Arizona DOT, Utah DOT, Caltrans regarding planning practices and opportunities for cooperation on initiatives, studies, or projects.

- I-15 Corridor System Master Plan (document completed March 2012, continued effort for ongoing coordination with California, Arizona, Utah)

- I-15 Alliance Cooperative Agreement between Caltrans, NDOT, and UDOT (Agreement #R230-13-800)

- I-11 & Intermountain West Corridor Study (Anticipated completion September 2014 - Agreement #P120-12-800)

- I-80 Corridor System Plan (California, Utah, Wyoming - Completed August 2014, continued effort for ongoing coordination with Stakeholder Network)

- 15 Mobility Alliance and Multistate Corridor Operations and Management Program:
    - Updated website for I-15 Mobility Alliance (FY 2015/16)
    - I-15 Multistate
    - Corridor Operations Concept of Operations Plan (FY 2017)
    - I-15 Multistate Decision Support System Development (FY 2017)

Proposed Activities and Expected Products:

- Regular meetings with Neighboring States interested in coalition activities - ongoing
- Coordination regarding corridor studies, regional plans, planned improvements, data sharing, and operational coordination - ongoing
- Continue to collaborate with other states to adapt or create innovative planning practices
- Manage I-15 Alliance and MCOM Project – ongoing
- Continue to provide information related to multi-state efforts
- Continued work towards an agreement with I-80 Winter Coalition partners
- Ongoing work towards an agreement with Caltrans for further planning coordination on I-15

Project 1. I-80 MCOM Grant – Separate Federal Grant (not SPR funded)
This project is a joint effort by the I-80 Corridor Coalition with the overall goal of improving freight mobility and safety, work will be performed to enhance communication between transportation system operators and commercial users of the I-80 Corridor. The I-80 MCOM grant identified that the I-80 project would build upon the platform and system developed for I-15 and add the required I-80 corridor elements, including an additional Caltrans District (District 3), Wyoming DOT and Nebraska DOT. Data interfaces are already in place for Nevada and Utah and require that additional elements from the I-80 corridor be integrated. This project will be completed within 18 months from notice to proceed and will include the following tasks:

Task 1. Project Management Task 2. System Inventory
Task 3. Concept of Operations/Requirements
Task 4. I-80 System Development and Integration with I-15 project website Task 5. Stakeholder Outreach

Project 2. I-80 Multi-State Coordination -- State Funded (not SPR funded)
The Consultant will work with NDOT to coordinate a multi-state agreement between the states of California, Nevada, Utah, Wyoming, and Nebraska to advance the I-80 corridor coalition's mission of establishing an institutional structure for coordinating operations in the western states.
Task 1. Project Management Task 2. Multi-state Coordination
Task 3. Establish I-80 Coalition charter/agreement Task 4. Website Maintenance
Task 5. Grant Support (includes coordination of letters of support for individual states applications from I-80 Coalition member agencies)

Project 3. I-15 Multi-State Mobility Alliance – Joint Funded by Caltrans
The Consultant will work with NDOT and the I-15 Mobility Alliance to continue the multi-state momentum to further the vision, mission, and objectives of the I-15 Mobility Alliance. This project will be completed over the next 3 years and will include the following tasks:
Task 1. Project Management
Task 2. Update I-15 Immediate Projects of Interregional Significance (IPIRS) Task 3. Alliance Coordination/Master Plan Update
Task 4. Grant Proposal/Support
Task 5. Dynamic Mobility Project Support
Task 6. Coordination efforts between NDOT and LVCA on the Moves I-15 Regional effort

Joint Funded by 2 states

CA	$300,000.00
NV	$300,000.00

NDOT share planned to be SPR funded over 24-month period:
Planned for FFY 2021/22 NDOT SPR funds -- $150,000 for consultant support Planned for FFY 2021 NDOT SPR funds -- $150,000 for consultant support Total planned for FFY 2021 and FFY 2022 – NDOT SPR Funds -- $300,000

Nevada MPO/RTC Coordination

TASK: 1036
ACTIVITY: 3957
OPERATIONAL SECTION: Program Development
PROGRAM MANAGER: Melissa Chandler

Funding for FFY2022 – Annual Request

Staffing	$159,900
Consultant	$0
Other	$40,000
Federal Amount (80%)	**$159,920**
State Match (20%)	**$39,980**
Total Requested Amount	**$199,900**

PARTICIPATING AGENCIES: FHWA, NDOT, Counties and Incorporated Cities
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Regular contact points for each MPO/RTC regularly checks in with MPO/RTC and provides advice and administrative oversight. Advice is given by telephone, email, conference call, and in person. NDOT bases advice on regular review and analysis of existing and proposed federal requirements and through regular discussions with FHWA and FTA. Review and update UPWP development guidance in consultation with the MPOs/RTCs. The guidance is shared at annual UPWP coordination meetings. Meet with MPO senior staff bi-monthly to share information, discuss guidance, and share best practices.

Previous Related Work:
Annual, continuous, and ongoing activity.

Proposed and Expected Products:
- NDOT and MPOs/RTCs jointly certify that the metropolitan transportation planning process is being carried out in accordance with applicable federal and state laws and regulations.
- Coordination for integrating performance management targets between the state and the MPO/RTC's to ensure consistency in the planning process.
- Facilitate metropolitan planning agreements between NDOT and MPOs/RTCs.
- Administer the FHWA PL and FTA 5303 pass-through funds for metropolitan planning.
- Maintain and update allocation formulas for planning funds distribution in collaboration with MPOs.
- Develop and process funding agreements on a biennial or annual basis.
- Receive, review, and submit annual performance and expenditure reports to FHWA and FTA.
- Participate in reviewing the Regional Transportation Plans (RTPs) and plan amendments and forward updates to FHWA and FTA as needed.

- Planning Staff will consider the potential fiscal impact of potential changes to MPO boundaries and possible options for regional and inter-county planning coordination would have on the state and the state transportation programs.
- Provide Guidance, direction, and oversight on management of the Metropolitan (PL) planning programs and Travel Demand Management (TDM) Club Ride Program.
- Work in partnership with MPOs and RTCs to develop UPWPs to ensure coordinated, continuous, and comprehensive transportation planning consistent with applicable federal laws and regulations.
- Keep abreast of changes to federal metropolitan planning laws and regulations and communicate changes to department management and MPOs/RTCs.
- Responsible for contract management, oversight, and invoice processing for assigned awards and planning grants under the federal transportation planning programs.
- Work with planning study managers and project managers on planning studies at the metropolitan level.
- Coordinates the Unified Work Program goals with RTC's and MPO's. Receive and coordinate internal NDOT review of draft UPWP.
- Prepare agreements, monitor progress, and review submitted reports from local agencies involved in the UPWP process and other RTC's/MPO's programs.
- Track funding and distribution and provide updates to upper management, FHWA, and FTA.
- Monitor and track federal planning funds (FHWA PL, FTA 5303, CMAQ).
- Review and process amendments to the UPWPs and other MPOs/RTCs planning agreements.
- Review and process quarterly invoices and statements of work associated with UPWPs and other RTC's/MPO programs.
- Review and process year-end package report from MPOs/RTCs and reconcile with NDOT's record of invoices.
- Coordinate with RTC's/MPO's and other agencies partners regarding NDOT planning efforts.
- Attendance at the Regional Transportation Commission Board Meetings, Executive Advisory Committee, Metropolitan Planning Subcommittee, Regional Project Coordination Committee, and Transportation Resource Advisory Committee.
- Cooperative agreement with CAMPO to assist in the development of the Carson Area MPO Travel Demand Model
- Cooperative agreement with RTCSNV to assist in the development of the Las Vegas Area MPO Travel Demand Model
- Task 1 – Data Collection
- Task 2 – Update CAMPO/RTVSNV TDM Base Year Scenario
- Task 3 – Validate Updated CAMPO/RTCSNV TDM Base Year Scenario
- Task 4 – Update CAMPO/RTCSNV TDM Future Year Scenarios
- Deliverable – Prepare Model Update and Validation Memorandum

MPO Agenda Memos

- These memos will provide the NDOT Executive Leadership Team (ELT) with a summation of NDOT specific topics that the MPO is considering.
- Staff will review the potential impact and recommendations from current NDOT planning studies that are occurring within the MPO boundary. This information will be included in the memo and help to provide additional context for the ELT.

Location Services

SPR Mapping

TASK: 1037
ACTIVITY: 3617
OPERATIONAL SECTION: LOCATION SERVICES
PROGRAM MANAGER: John Burgess

Funding for FFY2022 – Annual Request

Staffing	$200,000
Consultant	$0
Other	$0
Federal Amount (80%)	**$160,000**
State Match (20%)	**$40,000**
Total Requested Amount	**$200,000**

PARTICIPATING AGENCIES: FHWA, NDOT
FINANCIAL RESPONSIBILITY: FHWA, NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
To create and distribute transportation maps and related cartographic/GIS information to meet NDOT planning requirements for Visualization, (CFR 450.210 (a)(v)), Functional Classification Mapping, (CFR 470.105 (2)), Corridor Studies, (CFR 450.318). Mapping and GIS Data additionally support Travel and Tourism to the public per (23 U.S.C 135 (d)(1)(J)).

Previous Related Work:
Ongoing

Proposed Activities and Expected Products:
- Produce and update transportation maps utilizing standard digital photogrammetric, cartographic, and GIS techniques.
- Acquire, research, and generate cartographic/GIS data and related information.
- Travel to project locations to collect and verify map features in the field.
- Develop, maintain, and publish GIS databases, cartographic files, and archives.
- Publish and distribute Transportation Planning Maps and act as a clearinghouse for geospatial digital data and hard copy map-related information.
- Serve as the Nevada Department of Transportation representative and act as a liaison for various mapping-related activities.

Products include:

- The Official Highway Map
- Functional Classification Mapping
- GIS Base Map and data
- enlarged area/city maps
- 30-minute planimetric Map Atlas series
- Corridor Mapping support
- State Maintained Highways of Nevada book
- Traffic Count Station book
- County Tour/STIP mapping, custom transportation maps, and GIS data/mapping to support Tourism and Visualization products.

Imagery

TASK: 1038
ACTIVITY: 3728
OPERATIONAL SECTION: LOCATION SERVICES
PROGRAM MANAGER: John Burgess

Funding for FFY2022 – Annual Request

Staffing	$25,000
Consultant	$0
Other	$0
Federal Amount (80%)	**$20,000**
State Match (20%)	**$5,000**
Total Requested Amount	**$25,000**

PARTICIPATING AGENCIES: NDOT
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
To acquire, adjust, synthesize, and distribute digital and hard copy images to provide "Visualization Products" for public consumption, (CFR 450.210 (a)(v)). Aerial survey and imagery production will be utilized to develop individual corridor planning efforts on an as-needed basis (CFR 450.318). The most significant portion of this project will be to support the aviation workgroup within the Planning Division. Products developed will enhance situational awareness and safety at our public airport facilities for aviation use. Additionally, The NDOT Aviation programs' photography will also be utilized in future aviation system plans, economic impact, and land-use plans.

Previous Related Work:
Ongoing

Proposed Activities and Expected Products:
- Conduct aerial photography missions for transportation planning purposes, including flights of all Nevada public airport facilities, flights to support mapping and GIS efforts for the Department, and aerial imagery acquisition for corridor planning efforts.
- Produce digital aerial photos, photo mosaics, enlargements, mountings, displays, 3D surfaces, and videos to meet department planning needs for visualization.
- Provide resource grade map data for planning purposes

Part II: Research, Development, and Technology Transfer Budget Summary

SPR FFY 2022 Budget Summary Part II

Budget Summary for
FFY 2022 State Planning and Research (SPR) Annual Work Program
Part II

Task	Title	RDT Federal Funds ($)	State Match ($)	Total ($)
22-1	Research Development and Implementation	$246,970	$61,743	$308,713
22-2	Product Evaluation Program	$132,869	$33,217	$166,086
22-3	TPF-5(xxx) National Cooperative Highway Research Program (NCHRP), estimated	$435,000		$435,000
22-4	TPF-5(xxx) Transportation Research Board (TRB) Core Program Services for RD&T, estimated	$105,000		$105,000
22-5	TPF-5(319) Transportation Management Center (TMC) Pooled Fund Study	$25,000		$25,000
22-6	TPF-5(437) Technology Transfer Concrete Consortium (FY20-24)	$12,000		$12,000
22-7	TPF-5(479) Clear Roads Phase III	$25,000		$25,000
22-8	TPF-5(444) Partnership for the Transformation of Traffic Safety Culture - Phase 2	$20,000		$20,000
22-9	Solicitation # 1539: 2023 through 2025 Biennial Asset Management Conference and Training on Implementation Strategies	$12,000		$12,000
22-10	TPF-5(442) Transportation Research and Connectivity	$25,000		$25,000
22-11	TPF-5(380) Autonomous Maintenance Technology	$25,000		$25,000
22-12	TPF-5(451) Road Usage Charge West	$25,000		$25,000
22-13	TPF-5(394) Western Maintenance Partnership Phase 3	$15,000		$15,000
22-14	Agreement 608-17-803 Lateral Analysis Guidelines for Drilled Shafts in Nevada Based on LRFD Framework	$50,335	$12,584	$62,919
22-15	Agreement 743-18-803 Galena Creek Bridge Health Monitoring Instrumentation	$32,524	$8,131	$40,655
22-16	Agreement 744-18-803 Proof-of-Concept Research of Roadside LiDAR Sensing Multimode Traffic	$36,109	$9,027	$45,136
22-17	Agreement 302-19-803 Developing Lower Modulus Polymer Resin Binder Systems Specifications for High Friction Surface Treatment (HFST) on Asphalt Pavements in Nevada	$92,540	$23,135	$115,675
22-18	Agreement 733-19-803 Development of Dual-Purpose Desert Tortoise Crossing Culverts	$232,876	$58,218	$291,094
22-19	Agreement 732-19-803 Traveler Expectations and Future Use of Highway Rest Areas in the Western United States	$83,742	$20,935	$104,677
22-20	Agreement 676-19-803 Human-Augmented Technology Interaction (HATI) for Improving Construction Quality Control and Task	$112,037	$28,009	$140,046
22-21	Agreement 227-20-803 Characterization of Unbound Materials for Mechanistic-Empirical Pavement Design for NDOT Districts 2 and 3	$62,253	$15,563	$77,816
22-22	Agreement 399-20-803: Comparison and Evaluation of Roadside Animal Sensing and Driver Warning Systems	$101,889	$25,472	$127,361
22-23	Agreement 227-21-803: Develop a Study of Geosynthetic (Geogrid and Woven Geotextile) Materials for Reducing Pavement Section Thickness	$54,122	$13,530	$67,652
22-24	Agreement 142-21-803: Feasibility of Implementing Pedestrian Hybrid Beacon (PHB) Signals for Impoving Safety and Mobility in	$89,679	$22,420	$112,099
22-25	Agreement 147-21-803: Investigating Implementation Potentials of Turbo Roundabouts in Nevada	$88,936	$22,234	$111,170
	Part II Total	$2,140,880	$354,219	$2,495,099

Part II: Research, Development, and Technology Transfer Section Descriptions

Research

Research Development and Implementation

TASK: 22-01
ACTIVITY: 3859
OPERATIONAL SECTION: RESEARCH
FUNDS: $308,713

Funding for FFY2022 – Annual Request

Federal (80%)	**$246,970**
State Match (20%)	**$61,743**
Total Amount	**$308,713**

PARTICIPATING AGENCIES: NDOT
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
The purpose is to develop research projects and facilitate the implementation of research findings, including technology transfer. The activities include, but are not limited to, identifying Department research needs, soliciting research problem statements, developing and reviewing research proposals, monitoring research project progress, conducting tests and demonstration projects, and disseminating research reports. Through these activities, research projects are initiated, and research results and new technologies are identified to solve problems and issues or address the Department needs for process improvement and deployment of technology and innovation to achieve its strategic goals.

Previous Related Work:
Ongoing

Expected Products:
Administration of NDOT's Research Program, which consists of projects and tasks identifiedthroughout this document.

Proposed Activities and Expected Products:

- Conduct solicitations of research problem statements from internal divisions and externalresearch entities
- Write and edit research problem statements and proposals
- Issue requests for proposals and review them along with the affected divisions
- Prioritize the proposals with the Department's research advisory committee and approveresearch projects with the research management committee
- Develop project agreements and coordinate their executions
- Establish, coordinate, and chair research project panel meetings to review projectprogress and discuss potential problems

- Write, edit, and disseminate research reports
- Publish research results to provide information on research activities and recenttechnologies
- Coordinate or conduct workshops, pilot projects, and training on recenttechnologies/innovations
- Facilitate project budget formulations, budget revisions, agreement amendments, andpayments for research work performed
- Participate in Transportation Research Board (TRB) and AASHTO research-related activities, including meetings, workshops, and webinars
- Travel and training to support the activities identified in this task

Product Evaluation Program

TASK: 22-02
ACTIVITY: 3869
OPERATIONAL SECTION: RESEARCH
FUNDS: $166,086

Funding for FFY2022 – Annual Request

Federal (80%)	**$132,869**
State Match (20%)	**$33,217**
Total Amount	**$166,086**

PARTICIPATING AGENCIES: FHWA, NDOT
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Coordinate the meetings of the Product Evaluation Committee (PEC); facilitate the review of specifications and acceptance criteria, facilitate field testing, update the Qualified Product List (QPL), participate as a representative for NDOT in AASHTO NTPEP (National TransportationProduct Evaluation Program) activities.

Previous Related Work:
Ongoing

Expected Products:
- Facilitate review of products based on current specifications
- Maintain an accurate QPL
- Coordinate regular meetings of the Product Evaluation Committee

Proposed Activities:
Assist vendors in facilitating their application submissions; coordinate the quarterly meetings of the Product Evaluation Committee; facilitate field tests; coordinate reporting of the tests; andupdate the QPL as needed (usually quarterly). Maintain databases that support the QPL categories' specifications and acceptance criteria. Activities include participating and contributing to AASHTO's related technical service program: National Transportation Product Evaluation Program (NTPEP), subscriptions applicable to product evaluation and product evaluators including, but not limited to ASTM specifications and AASHTO standards.

Participate in travel and training, meetings, and conferences, both in-person and virtually, with various local, state, and federal transportation stakeholders to address current and potential issuesand topics regarding the Product Evaluation program.

National Cooperative Highway Research Program (NCHRP)

NATIONAL POOLED FUND STUDY: TPF-5(XXX)
TASK: 22-03
ACTIVITY: N/A
OPERATIONAL SECTION: RESEARCH
FUNDS: $435,000 (estimated; TBD based on actual federal apportionment)

Funding for FFY2022 – Annual Request

Federal (100%)	**$435,000**
Total Amount	**$435,000**

PARTICIPATING AGENCIES: FHWA, NDOT, AASHTO
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: Transportation Research Board (TRB)

Purpose and Scope:
Nevada's fiscal year 2021 contribution to the National Cooperative Highway Research Program (NCHRP).

Previous Related Work:
Ongoing.

Expected Products:
A myriad of national research projects, publications, reports, and technology from every transportation-related arena.

Proposed Activities:
NCHRP's annual program

Transporation Research Board (TRB) Core Program Services for RD&T

NATIONAL POOLED FUND STUDY: TPF-5(XXX)
TASK: 22-04
ACTIVITY: N/A
OPERATIONAL SECTION: RESEARCH
FUNDS: $105,000 (estimated; TBD based on actual federal apportionment)

Funding for FFY2022 – Annual Request

Federal (100%)	**$105,000**
Total Amount	**$105,000**

PARTICIPATING AGENCIES: FHWA, NDOT, All State DOTs
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: Transportation Research Board (TRB)

Purpose and Scope:
Annual subscription to the Transportation Research Board of the National Academy of Science- National Research Council.

Previous Related Work:
Ongoing.

Expected Products:
Availability of useful findings of research and other information by all feasible means including several TRB publication series, the output of the transportation information services, and through personal contacts during scheduled field visits by the TRB professional staff.

Proposed Activities:
- Participation in technical activities committees to share NDOT's current practices and learn other states' best practices
- Access to all information concerning past, current, and proposed research related to transportation from all possible sources

Transportation Management Center (TMC)

NATIONAL POOLED FUND STUDY: TPF-5(319)
TASK: 22-05
ACTIVITY: N/A
OPERATIONAL SECTION: RESEARCH
FUNDS: $25,000
CONTACT: Rod Schilling, NDOT Traffic Operations, Ext 7863

Funding for FFY2022 – Annual Request

Federal (80%)	**$**
State Match (20%)	**$**
Total Amount	**$**

PARTICIPATING AGENCIES: NDOT, MRF Associates, PB Farradyne, Texas Transportation Institute, University of Virginia, I-95 Corridor Coalition, and State DOTs: AL, CA, FL, GA, IA, IL, KS, MI, MN, MO, NC, NJ, NY, OH, PA, TN, TX, UT, VA, WA, and WI

FINANCIAL RESPONSIBILITY: NDOT

FUNCTIONAL RESPONSIBILITY: FHWA

Purpose and Scope:
Developing and enhancing business management of TMCs; developing and delivering roadway and travel condition information.

Previous Related Work:
- Configuration Management for Transportation Management Systems
- Transportation Management Systems Maintenance Concept and Plans
- Changeable Message Sign Operation and Messaging
- TMC Operator Requirements and Position Descriptions, Phase 1
- TMC Operator Requirements and Position Descriptions, Phase 2: Interactive Software
- Managing Travel for Planned Special Events
- Impacts of Dynamically Displaying Messages on Changeable Message Signs
- TMC Operations Manual
- Coordinated Freeway and Surface Street Operational Plans and Procedures
- TMC Staffing and Scheduling for Day-to-Day Operations
- TMC Clearinghouse Development and Initiation
- TMC Performance Monitoring, Evaluation and Reporting Handbook
- Developing and Using Concept of Operations in Transportation Management Systems
- Multi-State, Statewide and Regional TMC Concept of Operations and Requirements
- Recovery and Mitigations for TMCs
- Driver Use of Real-Time Enroute Travel Time Information
- TMC Human Factors Design Guidelines: Requirements Analysis
- Procuring, Managing, and Evaluating the Performance of Contracted TMC Services

Expected Products:

Exposure to best practices for developing traffic management centers and managing their evolution, as well as efforts to improve day-to-day operations of TMCs, 511, Freeway Service Patrol, Traffic Incident Management, and effective use of ITS devices such as DMS signs, cameras, and RWIS stations.

Proposed Activities:

- Developing, training, hiring, and contracting for TMC staff and services
- Sharing of knowledge and information on 511, Freeway Service Patrol, Traffic Incident Management, and effective use of ITS devices such as DMS signs, cameras, RWIS stations, etc.

Technology Transfer Concrete Consortium (FY20-24)

NATIONAL POOLED FUND STUDY: TPF-5(437)
TASK: 22-06
ACTIVITY: N/A
OPERATIONAL SECTION: RESEARCH
FUNDS: $12,000
CONTACT: Charlie Pan, NDOT Chief of Materials, Ext 7784

Funding for FFY2022 – Annual Request

Federal (100%)	**$12,000**
Total Amount	**$12,000**

PARTICIPATING AGENCIES: FHWA, NDOT, and State DOTs: AL, CA, CO, FL, GA, IA, ID, IL, IN, KS, LA, MI, MN,MO, NC, ND, NE, NY, OH, OK, PA, RI, SD, TN, TX, UT, WA, and WI

FINANCIAL RESPONSIBILITY: NDOT

FUNCTIONAL RESPONSIBILITY: State of Iowa DOT

Purpose and Scope:
The purpose is to identify, support, facilitate, and fund concrete research and technology transfer initiatives.

Previous Related Work:
Cooperative project that began in 2008.

Proposed Activities and Expected Products:
- Identify and direct the development and funding of technology transfer materials such as tech brief summaries and training materials from research results
- Review the CP Road Map initiatives and provide feedback to the FHWA, industry, and the CP Tech Center on those initiatives
- Be part of the Track Team for the CP Road Map Mix Design and Analysis Track providing guidance to coordinating activities with the track
- Provide research ideas to funding agencies
- Identify and instigate needed research projects
- Include current activities and deliverables of the pooled fund on the CP Road Map project website
- Maintain pooled fund project website with current activities and deliverables
- Develop pooled fund research projects for solutions to concrete and concrete pavement issues
- Act as a technology exchange forum for the participating entities
- Contribute to a technology transfer newsletter on concrete pavement research activities every six months in cooperation with the CP Road Map activities
- Publish electronic quarterly reports following lead state guidelines
- Post quarterly reports to the website
- Submit a final report to participants that documents the results of the entire project

Clear Roads Phase III

NATIONAL POOLED FUND STUDY: TPF-5(479)
TASK: 22-07
ACTIVITY: N/A
OPERATIONAL SECTION: RESEARCH
FUNDS: $25,000
CONTACT: Anita Bush, NDOT Maintenance and Asset Management, Ext 7856

Funding for FFY2022 – Annual Request

Federal (100%)	**$25,000**
Total Amount	**$25,000**

PARTICIPATING AGENCIES: Minnesota DOT (Lead), NDOT and State DOTs: AK, AZ, CA, CO, CT, DE, IA, ID, IL, IN, KS, MA, Maryland DOT, MDOT SHA, ME, MI, MO, MT, ND, NE, NHDOT, NY, OH, OR, PA, RI, SD, TX, UT, VA, VT, WA, WI, WV, and WY

FINANCIAL RESPONSIBILITY: NDOT

FUNCTIONAL RESPONSIBILITY: FHWA

Purpose and Scope:
Winter operations are the second largest expenditure in NDOT's Maintenance Operations, second to Pavement Maintenance. We spend about $14+M per year on our Snow and Ice Control Program to keep the traveling public safe during and after winter storms. By increasing efficiencies in the winter maintenance operations, a significant amount of money can be saved.

Clear Roads is a national research consortium focused on rigorous testing of winter maintenance materials, equipment, and methods for use by highway maintenance crews. Since getting under way in 2004, Clear Roads has grown to include 34-member agencies, each contributing $25,000 annually to fund research and technology transfer.

Previous Related Work:
Phase II

Proposed Activities and Expected Products:
Representatives from the participating departments of transportation meet twice a year to discuss and prioritize projects, share effective practices, and review research results.

Partnership for the Transformation of Traffic Safety Culture – Phase 2

NATIONAL POOLED FUND STUDY: TPF-5(444)
TASK: 22-08
ACTIVITY: N/A
OPERATIONAL SECTION: RESEARCH
FUNDS: $20,000
CONTACT: Fred Shakal, NDOT Safety Engineering, Ext 7459

Funding for FFY2022 – Annual Request

Federal (100%)	**$20,000**
Total Amount	**$20,000**

PARTICIPATING AGENCIES: Montana DOT (Lead), NDOT and State DOTs: CA, CT, IA, ID, IL, IN, LA, NH, TX, UT, VT, and WA

FINANCIAL RESPONSIBILITY: NDOT

FUNCTIONAL RESPONSIBILITY: FHWA

Purpose and Scope:
Stem a possible increase in crashes due to the use of marijuana.

Previous Related Work:
Phase I. This project also considers potential strategies for intervention.

Proposed Activities and Expected Products:
Provide new ideas and mitigation strategies to reduce crashes and injuries.

FFY 23-25 Biennial Asset Management Conference and Training on Implementation Strategies

NATIONAL POOLED FUND STUDY: Solicitation #1539
TASK: 22-09
ACTIVITY: N/A
OPERATIONAL SECTION: MAINTENANCE AND ASSET MANAGEMENT
FUNDS: $12,000 (FFY2021 and 2022)
CONTACT: Anita Bush, NDOT Maintenance and Asset Management, Ext 7856

Funding for FFY2022 – Annual Request

Federal (100%)	**$12,000**
Total Amount	**$12,000**

PARTICIPATING AGENCIES: NDOT and State DOTs: IA, PA, and TX
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Federal mandates regarding asset management are new, and the Maintenance and Asset Management Division desires to ensure that the Nevada Department of Transportation is in full compliance with the federal regulations.

Previous Related Work:
The study began in 2016 as TPF-5(335); FHWA will assign the current pooled fund project number on the current solicitation number: 1539.

Proposed Activities and Expected Products:
- Provide communication and information sharing among the member states
- Provide an opportunity and forum for discussion of research needs, and provided research ideas to TRB in order to conduct national research that benefits all states, but specifically Nevada
- Provide a technology and knowledge exchange forum to enhance the practical knowledge of member states concerning asset management implementation

Transportation Research and Connectivity

NATIONAL POOLED FUND STUDY: TPF-5(442)
TASK: 22-10
ACTIVITY: N/A
OPERATIONAL SECTION: RESEARCH
FUNDS: $25,000
CONTACT: Mitch Ison, NDOT Research Library, Ext 7895

Funding for FFY2022 – Annual Request

Federal (80%)	**$25,000**
Total Amount	**$25,000**

PARTICIPATING AGENCIES: NDOT and State DOTs
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: Oklahoma DOT

Purpose and Scope:
To support coordinated development of transportation libraries as well as research organizations without dedicated libraries, the following objectives will be undertaken. These objectives will be accomplished through member activities and partnerships with professional groups such as the Transportation Research Board (TRB) Library and Information Science for Transportation Committee (LIST), the Special Libraries Association (SLA) Transportation Division, and the National Transportation Knowledge Network (NTKN).

- Develop a toolkit of recommendations and best practices for transportation research organizations that do not have a transportation librarian
- Partner with the NTKN to analyze the effectiveness of libguides, identify gaps in coverage, and survey the needs of DOTs
- Develop a white paper analyzing the current condition of transportation information infrastructure, including review of pertinent knowledge management resources
- Develop a cooperative digitization project among members, in partnership with the NTL, to convert copies of older materials to digital formats, as well as providing ADA compliance support for digital documents
- Enhance communication between group members (hold annual pooled fund meeting in conjunction with the AASHTO RAC conference)

Previous Related Work:
The Research Library currently maintains printed (and some digital) copies of older NDOTpublications. It has been a long-term goal to conserve these publications and make themavailable in digital format.

Proposed Activities and Expected Products:
In addition to the potential application of knowledge management (KM) practices at NDOT and conserve valuable institutional knowledge, another deliverable of the TRC would be the development of a cooperative digitization project with the National Transportation Library (NTL). Older material will be converted to digital formats and provide ADA compliance support for digital documents.

Autonomous Maintenance Technology

NATIONAL POOLED FUND STUDY: TPF-5(380)
TASK: 22-11
ACTIVITY: N/A
OPERATIONAL SECTION: RESEARCH
FUNDS: $25,000
CONTACT: Wayne Miller, NDOT Equipment Superintendent, Ext 8400

Funding for FFY2022 – Annual Request

Federal (100%)	**$25,000**
Total Amount	**$25,000**

PARTICIPATING AGENCIES: NDOT and State DOTs
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: Colorado DOT

Purpose and Scope:
The mission of this study is to support and promote collaborative research efforts in the field of autonomous technologies. In work zone applications, to improve the safety, efficiency, and quality of work efforts, along with providing better solutions and valuable lessons learned for integrating new technologies to further these goals.

The group will fund research and development efforts to achieve the program goals, with initially proposed research focusing on:

- Improvements on existing ATMA/AIPV platforms (Autonomous Truck Mounted Attenuator/Impact Protection Vehicle)
- Expansion of the use of ATMA/AIPV platforms beyond striping
- Refining policy and operational procedures for autonomous work vehicles
- Investigate additional applications for autonomous vehicles in maintenance operations
- Other New Technology

Previous Related Work:
None

Proposed Activities and Expected Products:
Participation in this study will assist NDOT in the decision whether to pursue the purchase of an autonomous truck-mounted attenuator. This includes the pros and cons of purchased fully automated equipment vs. retrofitted equipment.

Road Usage Charge West

NATIONAL POOLED FUND STUDY: TPF-5(451)
TASK: 22-12
ACTIVITY: N/A
OPERATIONAL SECTION: RESEARCH
FUNDS: $25,000
CONTACT: Peter Aiyuk, NDOT Performance Analysis, Ext 7192

Funding for FFY2022 – Annual Request

Federal (100%)	**$25,000**
Total Amount	**$25,000**

PARTICIPATING AGENCIES: Oregon DOT (Lead), NDOT and State DOTs: AK, AZ, CA, CO, HI, ID, KS, MT, ND, NE, NM, OK, PADOT, TX, UT, WA, and WY

FINANCIAL RESPONSIBILITY: NDOT

FUNCTIONAL RESPONSIBILITY: FHWA

Purpose and Scope:
Through the leadership of the Consortium, member states and provinces will have the research, technical expertise, operational understanding, and member support to be poised to initiate an effective interoperable Road Usage Charge (RUC) system investigation. Demonstration, or implementation, if and when desired.

Previous Related Work:
Oregon, the lead state, has been actively developing and testing pilot efforts for alternatives for gasoline taxes for many years.

Expected Products:
Subject to available Transportation Pooled Fund resources and separate funding from Consortium Members, the Work Plan will undertake select topics, research, projects, and activities that fall within the following areas:

- Legal and Institutional arrangements for implementing an RUC
- Public policy analysis and development
- Public Information/Communications
- Technical research and system development
- Consumer-oriented system design
- Identification of essential requirements to create a regional RUC system
- Multi-jurisdictional issues such as revenue allocation, cost-sharing, compliance, enforcement, interoperability, clearinghouse setup and operations, and dispute resolution
- Applicability and compatibility with federal programs, rules, or laws, including the directing and shaping of national guidelines based on the best practices developed by the Consortia
- Establishment of system standards and a certifications process that promotes and ensures:
- Accuracy
- Security

- Tamper resistance
- Economic impacts
- Business models for program operations, including alternatives that optimize the use of private industry and marketplace forces to drive efficiencies and consumer acceptance
- National and/or federal RUC considerations

Proposed Activities:

- Explore the technical and operational feasibility of a multi-jurisdictional road usage charge system
- Investigate public and key decision-maker criteria for acceptance and share experience and lessons learned to foster positive outcomes
- Develop standards and protocols for how road use charges could best be collected and remitted among the various jurisdictions
- Develop preliminary operational concepts for how a multi-jurisdictional road usage charge system could be administered
- Develop a model for regional cooperation and interoperability that can be used in the Western region and potentially across North America
- Engage the automotive manufacturing and technology sector to encourage the ability for mileage reporting to occur in conjunction with other products and services the sector provides in the marketplace
- Share knowledge to maximize the preparedness for and efficiency of policy and program development for road usage charging among the members

Western Maintenance Partnership Phase III

NATIONAL POOLED FUND STUDY: TPF-5(394)
TASK: 22-13
ACTIVITY: N/A
OPERATIONAL SECTION: RESEARCH
FUNDS: $15,000
CONTACT: Anita Bush, NDOT Maintenance and Asset Management, Ext 7856

Funding for FFY2022 – Annual Request

Federal (100%)	**$15,000**
Total Amount	**$15,000**

PARTICIPATING AGENCIES: Utah DOT (Lead), NDOT,State DOTs: CA, ID, MT, TX and WA
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: Utah DOT

Purpose and Scope:
Highway maintenance and preservation is one of the primary goals of the Department. The Western Maintenance Partnership (WMP) aims to provide a partnering forum for promoting effective maintenance strategies.

Previous Related Work:
In the 1980s, the Rocky Mountain Maintenance Tour established a highly effective forum for the exchange of information, techniques, policies, and strategies for the maintenance of highway systems. Since then, the WMP ran from 2006-2014 and again from 2015-2019 under separate Transportation Pooled Fund projects.

Proposed Activities and Expected Products:
Provide a partnering forum for promoting effective maintenance strategies through:

- Annual meeting (WASHTO Committee on Maintenance) and a multi-day annual workshop/scan tour for discussion and exchange of information and knowledge abouteach state's maintenance program
- Provide a forum to define, support, and share the technology of mutual interest
- Provide funds for formal training presentations during the annual workshop
- Provide funds for management support of WMP
- Provide funds for special studies, investigations, research, and training

Lateral Analysis Guidelines for Drilled Shafts in Nevada Based on LRFD Framework

AGREEMENT: 608-17-803
TASK: 22-14
ACTIVITY: 3862
OPERATIONAL SECTION: RESEARCH
FUNDS: $62,919
START DATE: January 2019
END DATE: July 2022

Funding for FFY2022 – Annual Request

	Total	FFY2022
Federal (80%)	**$236,713**	**$50,335**
State Match (20%)	**$59,178**	**$12,584**
Total Amount	**$295,891**	**$62,919**

PARTICIPATING AGENCIES: NDOT and the University of Nevada, Reno
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Load and Resistance Factor Design (LRFD) is mandatory for all bridge projects funded by FHWA. Compared with the allowable-stress design (ASD) method, LRFD can achieve consistent reliability between the superstructure and substructure. The current AASHTO LRFD specifications (AASHTO 2014 with 2015 and 2016 interim revisions) and the AASHTO LRFD Seismic Guide Specifications offer vague guidance on the lateral stability requirements and analytical modeling techniques for deep foundations.

Design guidelines with appropriate recommendations for lateral analysis and lateral stability need to be developed for NDOT to account for local soil conditions, design practices, and foundation dimensions commonly encountered within the state of Nevada. A reliable method is needed to ensure accurate, economical, and safe deep foundations designs, specifically drilled shafts, and to ensure uniformity in the design approach and desired lateral performance across the state. NDOT must develop a robust and enhanced design methodology to carry out LRFD of large diameter drilled shafts.

Previous Related Work:
Several DOTs, including North Carolina DOT (Robinson et al. 2006); Arizona DOT (Wetz et al. 2010); Caltrans (Post 2015); and Washington DOT (Baker and Lehmann 2016), have developed improved guidelines for the design of deep foundations under lateral loads based on recent research. The issues with these guidelines are that they are not compatible with the design practice in Nevada in terms of shaft diameter. There is not a consensus on how to handle lateral analysis. There is also not a consensus on the method for evaluating the lateral stability (i.e. “stable length”).

Proposed Activities and Expected Products:

- A report summarizing findings and recommendations on Point of Fixity (PoF) definition
- Final report including a full description of the new tool with several solved examples and a design guideline

Galena Creek Bridge Health Monitoring Instrumentation

AGREEMENT: 743-18-803
TASK: 22-15
ACTIVITY: 3862
OPERATIONAL SECTION: RESEARCH
FUNDS: $40,655
START DATE: February 2019
END DATE: March 2022

Funding for FFY2022 – Annual Request

	Total	FFY2022
Federal (80%)	**$239,826**	**$32,524**
State Match (20%)	**$59,956**	**$8,131**
Total Amount	**$299,782**	**$40,655**

PARTICIPATING AGENCIES: NDOT and the University of Nevada, Reno
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Structural Health Monitoring (SHM) has rapidly gained interest worldwide on the premise of changes in operational characteristics due to varying loading conditions. Importantly, damage may be detected in complex structural systems via response measurements using various sensors and proper data processing. In this respect, the Nevada Department of Transportation instrumented and monitored one of Nevada's signature bridges, namely Galena Creek Bridge, with a limited number of sensors since its early construction phase in 2004.

NDOT would like to re-establish instrumentation throughout the Galena Creek Bridge and continuously monitor the bridge using the installed instrumentation. The overall objective of the proposed research is to develop and install an instrumentation and monitoring system in the Galena Creek Bridge. The instrumentation system should provide measurements that will show the bridge's response to thermal, wind, seismic, and traffic loadings. The system should be integrated with the Department's on-site ITS hardware to allow real-time data transfer.

Previous Related Work:
The Galena Creek Bridge is a 1726' long cast-in-place seven-span post-tensioned box girder bridge. The bridge superstructure consists of three frames separated by span hinges. The middle frame of the bridge includes a 689' concrete arch span. NDOT instrumented and monitored the middle frame of the Galena Creek Bridge throughout its initial construction. The final phase of the instrumentation and monitoring project used dynamic loading and accelerometers to characterize the dynamic properties of the bridge in its new condition state. The instrumentation system was used to briefly monitor the bridge under traffic loading until the monitoring project ended and the cellular communication system with the instrumentation stopped.

Proposed Activities and Expected Products:

The anticipated deliverables include:

- Fully functional SHM system; sensors, hardware, and on-site software
- Web services, and alike to facilitate remote monitoring, access to real-time data, remote access to system software setup, broadcasting of threshold notifications to staff
- Staff training to facilitate seamless integration.

Proof-of-Concept Research of Roadside LiDAR Sensing Multimode Traffic

AGREEMENT: 744-18-803
TASK: 22-16
ACTIVITY: 3862
OPERATIONAL SECTION: RESEARCH
FUNDS: $45,136
START DATE: February 2019
END DATE: April 2022

Funding for FFY2022 – Annual Request

	Total	FFY2022
Federal (80%)	**$247,665**	**$36,109**
State Match (20%)	**$61,916**	**$9,027**
Total Amount	**$309,581**	**$45,136**

PARTICIPATING AGENCIES: NDOT and the University of Nevada, Reno
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Given that existing traffic sensors do not provide trajectory data, 360-degree light detection and ranging (LiDAR) sensors are an attractive option because they detect surrounding objects with high accuracy and frequency and are not influenced by light conditions. The project team has developed algorithms specifically for roadside LiDAR sensing systems and is the worldwide leading research group in this area. Proof-of-concept research is still needed to evaluate the accuracy, reliability, and efficiency of the developed algorithms and roadside LiDAR sensing systems for various traffic scenarios and applications.

Previous Related Work:
There are various LiDAR sensors for mapping, survey, and autonomous vehicles. With consideration to cost and performance, 360-degree LiDAR (different types) and test flash LiDAR will be used for this project. 360-degree LiDAR detects surrounding objects and generates a cloud of object points at centimeter-level accuracy. Cost-efficient LiDAR sensors are now more widely available on the market. Research and field testing of roadside LiDAR at UNR has demonstrated that this is the best available solution for collecting all-traffic data.

Expected Products:
- Demonstration of portable platforms and infrastructure-based systems
- Raw LiDAR data collected by multiple LiDAR sensors at each proposed study site
- Multimode trajectories extracted from roadside LiDAR data collected at each site
- GPS trajectory data collected with UNR CAVs and portable high-accuracy GPS devices
- Evaluation of accuracy of roadside LiDAR trajectories
- Case study reports of five roadside LiDAR applications
- Roadside LiDAR deployment guidance and implementation plan

Proposed Activities:

- Task 1: Project management and progress report
- Task 2: Implement roadside LiDAR sensing systems
- Task 3: Proof-of-concept of obtaining high-accuracy multimodal traffic trajectories with roadside LiDAR
- Task 4: Proof-of-Concept of applying LiDAR all-traffic trajectory data
- Task 5: Develop roadside LiDAR deployment guidance and NDOT implementation plan
- Task 6: Final Report

Developing a Lower Modulus Polymer Resin Binder Systems Specifications for High Friction Surface Treatment (HFST) on Asphalt Pavements in Nevada

AGREEMENT: 302-19-803
TASK: 22-17
ACTIVITY: 3862
OPERATIONAL SECTION: RESEARCH
FUNDS: $115,675
START DATE: November 2019
END DATE: March 2022

Funding for FFY2022 – Annual Request

	Total	FFY2022
Federal (80%)	**$120,000**	**$92,540**
State Match (20%)	**$30,000**	**$23,135**
Total Amount	**$150,000**	**$115,675**

PARTICIPATING AGENCIES: NDOT
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Thermal incompatibility between High friction surface treatments (HFST) and asphalt pavement is a primary contributor to early age failure of such treatments. Along with thermal compatibility, modulus and heat deflection properties play a role in the change in the strength of the resin binder system during higher temperature service conditions to prevent the loss of aggregates.

HFST are thin applications of high quality, polish-resistant aggregates bonded to a pavement surface with a polymer resin of some type. Because of their high cost, HFSTs are typically used as spot safety treatments in locations with high accident rates related to possible friction deficiencies, such as tight curves and ramps. The research needs will be addressed by identifying suitable polymer binders for use in HFSTs on asphalt surfaces under typical Nevada environmental conditions. Appropriate test methods and specification limits will be recommended. After a suite of possible polymer binders is identified, their performance in terms of aggregate retention will be tested using a three-wheel polishing device.

Previous Related Work:
Although some research has been done to bring light to various contributors, nothing has been developed regrading test methods that connect how to offset the thermal variances that contribute to early failures properly.

Expected Products:
- Detailed literature review on possible resins
- Specifications for appropriate materials (polymer resins) for use in HFSTs in Nevada
- Detailed implementation plan

- A final report identifying the results of the study, to include specifications for material with lower tensile strength, higher tensile elongation, a higher heat deflection temperature/glass transition temperature, and better UV stability

Proposed Activities:

- Task 1: Detailed Literature Search
- Task 2: Laboratory Testing of Polymer Resins
- Task 3: Laboratory Testing of HFSTs with Candidate Resins
- Task 4: Final Report

Development of Dual-Purpose Desert Tortoise Crossing Culverts

AGREEMENT: 733-19-803
TASK: 22-18
ACTIVITY: 3862
OPERATIONAL SECTION: RESEARCH
FUNDS: $291,094
START DATE: January 2020
END DATE: May 2022

Funding for FFY2022 – Annual Request

	Total	FFY2022
Federal (80%)	**$334,590**	**$232,876**
State Match (20%)	**$83,648**	**$58,218**
Total Amount	**$418,238**	**$291,094**

PARTICIPATING AGENCIES: NDOT
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
NDOT maintains many hundreds of miles of highway in Mojave Desert tortoise habitat, 400 miles of which are protected by exclusionary tortoise fencing. While the exclusionary fencing protects desert tortoises from highway mortality, it does not address the issue of habitat fragmentation and may add to the problem.

The desert tortoise has exhibited a strong preference for movements along dry desert washes. In some areas, exclusionary tortoise fencing is connected to drainage features (culverts) that pass under roadways to reduce habitat fragmentation. However, the design requirements of these drainage features commonly conflict with the movement abilities of the desert tortoise. Many of these culverts have large rocks (rip-rap) placed at the openings to minimize erosion, but the large voids within the rip-rap are an entrapment hazard for desert tortoises and cause mortality. Backfilling the rip-rap with native soil may have limited utility, as it does well on flat terrain. Still, the voluminous water flows commonly observed in desert flood events may be carried away in steeper areas.

While dual-purpose structures have proven successful in some areas, other areas struggle to balance hydraulic function, maintenance requirements, and tortoise accessibility.
Having design plans to retrofit additional drainage culverts, backed by research, will allow NDOT and BLM to move forward with plans to increase desert tortoise connectivity.

Previous Related Work:
NDOT's current practice involves connecting exclusionary tortoise fencing to the entrances of some drainage features that pass under NDOT roadways to create a desert tortoise underpass crossing. While this method has worked in some locations, other areas present a challenge for successfully facilitating

tortoise movement under the roadways. Many drainage culvert features are unattractive to tortoises, difficult for the animals to navigate, or dangerous generally do not successfully fulfill everyone's needs. Additionally, preliminary literature review indicates limited studies of various crossing structures for desert tortoise have taken place. There have also been limited efforts in conducting research and implementing experimental design of desert tortoise crossings. Accordingly, there is currently a lack of published information available.

Expected Products:

- Literature Review Report
- Monitoring Summary Report
- Hydraulic Evaluation Report
- Comprehensive Dual-Purpose Crossing Report
- Engineering drawings and plans to retrofit culverts

Proposed Activities:

- Task 1: Literature Review
- Task 2: Monitor Existing Crossings
- Task 3: Hydraulic Evaluations
- Task 4: Summary Report
- Task 5: Determine High Priority Areas
- Task 6: Final Report/Implementation Plan

Traveler Expectations and Future Use of Highway Rest Areas in the Western United States

AGREEMENT: 732-19-803
TASK: 22-19
ACTIVITY: 3862
OPERATIONAL SECTION: RESEARCH
FUNDS: $104,677
START DATE: November 2019
END DATE: July 2022

Funding for FFY2022 – Annual Request

	Total	FFY2022
Federal (80%)	**$160,000**	**$83,742**
State Match (20%)	**$40,000**	**$20,935**
Total Amount	**$200,000**	**$104,677**

PARTICIPATING AGENCIES: NDOT
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Nevada currently has 35 rest areas with a total of 102 buildings. These buildings range in age from eight to 52 years, and the statewide average age is 32 years. Services at most stops are minimal, the function of many buildings is significantly hampered due to age. Most are not adequately accessible to those with disabilities. Almost none were designed with commercial vehicle use in mind. Maintenance has been deferred for so many years that most are not even candidates for restoration or renovation. For these reasons, the State is in a position where most of the rest areas require replacement.

In addition, the entire concept of the current rest area system appears to be outmoded. Diverse factors such as the interstate highway system, vehicles with high range potential, autonomous vehicles, and GPS navigation contribute to vastly different needs at rest areas. This, combined with the overwhelmingly poor condition of existing facilities, NDOT has identified the need for a massive and committed capital construction program. To craft this program, NDOT must study the expectations for modern travelers' services, which locations make the most sense for new or refurbished facilities and the likely expectations of future highway travelers.

Previous Related Work:
Most modern studies appear to focus on rest area economic viability and effect on traffic safety. The majority of design guidelines appear to be from generations ago, and almost no research was discovered that focuses on this project's specific objectives.

Expected Products:
- List of recommended high-priority new or refurbished rest area locations along with recommended

amenities
- A map of recommended locations along interstates and highways showing traveler needs and expectations
- Tiered identification of what amenities should be included at the locations identified on the map
- Rest area implementation plan

Proposed Activities:
- Task 1: Literature Review
- Task 2: Inventory Data Collection
- Task 3: Rest Area User Survey
- Task 4: Identify Areas of Unmet Need and Recommend Locations for New or Rehabilitated Rest Areas
- Task 5: Traffic Crash Analysis
- Task 6: Benefit/Cost Analysis
- Task 7: Final Report

Human-Augmented Technology Interaction (HATI) for Improving Construction Quality Control and Task Monitoring

AGREEMENT:	676-19-803
TASK:	22-20
ACTIVITY:	3862
OPERATIONAL SECTION:	RESEARCH
FUNDS:	$140,046
START DATE:	January 2020
END DATE:	June 2022

Funding for FFY2022 – Annual Request

	Total	FFY2022
Federal (80%)	**$200,000**	**$112,037**
State Match (20%)	**$50,000**	**$28,009**
Total Amount	**$250,000**	**$140,046**

PARTICIPATING AGENCIES:	NDOT
FINANCIAL RESPONSIBILITY:	NDOT
FUNCTIONAL RESPONSIBILITY:	NDOT

Purpose and Scope:

Construction errors and quality inspections are significant problems that have negative impacts on many aspects of construction projects, including rework, schedule delay, increased cost, work-related accident/injury, and low productivity. The magnitude of this impact is significant as it accounts for approximately $2.5 billion per year of the total project cost. One of the biggest challenges is human-based visual inspection, which is a very common method of inspection. Many literature studies point out that this technique is limited, subjective, and unreliable, and the engineers are aware of difficulty and consequences associated with the technique. With the advent of emerging media and sensing technology, these problems can be significantly mitigated if applied properly to reinforce the ability of inspectors through HATI. Therefore, NDOT has determined the need to explore the capability of HATI with technology implementation for more accurate and reliable inspection.

Previous Related Work:

Construction researchers have adopted technological innovation in the last few years and developed various automated (or semi-automated) tools for construction management and operation. Advanced technologies, such as building information modeling, wireless sensing systems, and various scanning systems, were used. Although this movement has offered a paradigm shift in many aspects of construction, especially safety and planning of construction schedules. Little research has explored the capability of HATI. Leveraged by augmented and/or virtual reality technologies.

Expected Products:

An interim report documenting findings of the first year of the project. A final report documenting findings related to best practices and potential pitfalls for AR implementation. A detailed description of

the process used for creating and applying computer codes to generate the AR application and supporting documentation for setting up additional AR devices if NDOT should choose to invest in this technology further based on the findings of this research.

Proposed Activities:

- Task 1: Define sure interface (UI) requirements for AR to support NDOT needs
- Task 2: Build AR iterations to support field testing of AR for communication
- Task 3: Quantify benefits and drawbacks of using AR for NDOT communication
- Task 4: Identify best practices and potential pitfalls for using AR to support project communication

Characterization of Unbound Materials for Mechanistic-Empirical Pavement Design for NDOT Districts 2 and 3

AGREEMENT: 227-20-803
TASK: 22-21
ACTIVITY: 3862
OPERATIONAL SECTION: RESEARCH
FUNDS: $77,816
START DATE: August 2020
END DATE: July 2022

Funding for FFY2022 – Annual Request

	Total	FFY2022
Federal (80%)	**$144,336**	**$62,253**
State Match (20%)	**$36,084**	**$15,563**
Total Amount	**$180,420**	**$77,816**

PARTICIPATING AGENCIES: NDOT
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
The American Association of State Highway and Transportation Officials (AASHTO) adopted the Mechanistic-Empirical Pavement Design Guide (MEPDG) as an interim pavement design standard in 2008. The Nevada Department of Transportation (NDOT) already started implementing the MEPDG for the structural design of flexible and rigid pavements. The MEPDG follows a hierarchical approach in defining the required engineering properties of the pavement structure. Three levels of input are specified: 1, 2, and 3. Level 1 offers the highest level of accuracy, while level 3 provides the lowest level of accuracy. In the case of unbound materials, the resilient modulus (Mr) value for each base, borrow, and subgrade layer is the main required engineering property. Additional unbound materials properties include Atterberg limits, gradation, conductivity, and coefficient of lateral pressure. Level 1 requires the Mr property to be measured in the laboratory under repeated load triaxial (RLT) conditions.
Level 2 allows the determination of Mr through correlations with other empirical properties of the unbound materials, such as the Resistance value (R-value). Level 3 allows the use of Mr default values or the estimation of Mr from basic properties of the unbound materials such as Atterberg limits, gradation, etc.

While the RLT provides a fundamental approach to characterize the nonlinear stress-dependent behavior of unbound materials, the test itself is time-consuming and costly; thus, it has not been typically conducted during the design phase of a pavement project. In light of these issues, most state highway agencies have elected to implement level 2 input for unbound materials.
Therefore, a well-defined fundamental approach must be followed to establish a highly reliable relationship for determining Mr of unbound materials encountered throughout Nevada from other properties that can be practically and reliably measured.

The objective of the proposed study is to develop relationships that relate the Mr properties of unbound materials from Districts 2 and 3 to R-value and other physical properties.

Previous Related Work:

In 2017, NDOT took a major first step towards updating the process for determining Mr of unbound materials for the design of flexible and rigid pavements in Nevada. The 2017 research project developed prediction models for Mr properties of unbound materials used in NDOT District 1. Current NDOT Mr equation in terms of R-value consistently overestimates the Mr for all layers and for both new and rehabilitation designs. This further supports the need to establish prediction models for the design Mr of unbound and subgrade layers based on the strength and physical properties of locally available granular materials and in-place natural soils.

Expected Products:

A Final report for the entire project documenting all the findings and recommendations from Tasks 1–4 will also be prepared and submitted at the end of the project duration. The final report will include assessing the influence of the developed correlation equations (i.e., Mr prediction models) on the NDOT MEDPG as conducted through the AASHTOWare Pavement ME Design software.

Proposed Activities:

- Task 1. Identify Soil and Aggregate Materials
- Task 2. Laboratory Testing
- Task 3. Development of the Mr Prediction Models
- Task 4. Incorporate the Mr Correlations into the NDOT MEPDG Guide
- Task 5. Reporting

Comparison and Evaluation of Roadside Animal Sensing and Driver Warning Systems

AGREEMENT: 399-20-803
TASK: 22-22
ACTIVITY: 3862
OPERATIONAL SECTION: RESEARCH
FUNDS: $127,361
START DATE: November 2020
END DATE: December 2023

Funding for FFY2022 – Annual Request

	Total	FFY2022
Federal (80%)	**$239,680**	**$101,889**
State Match (20%)	**$59,920**	**$25,472**
Total Amount	**$299,600**	**$127,361**

PARTICIPATING AGENCIES: NDOT
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
A past research study determined wild and domestic animals account for more than 500 crashes annually, costing the Nevada public more than $21 million and killing over 5,032 wild animals every year. These numbers are estimated to be 50% higher in unreported crashes, which indicate an even more serious problem that threatens the wildlife eco-system, hence direly calls for a solution. While safety crossings and fencing have proven very effective in saving thousands of wild animals, they are considered a static countermeasure that mainly focuses on establishing connectivity for animals to cross the roads. Additionally, these crossings and fencing measures may not be feasible in some locations because of institutional or funding issues usually associated with the fact that many rural roads are already built and carry fast-moving traffic. This project aims to develop an animal detection platform that relies on combined detection technologies, edge computing for on-site fast processing and detection, and an advanced driver warning system to enable proactive measures to avoid vehicle-animal crashes.

This research aims to identify the optimal animal detection technology to improve safety on Nevada roads and preserve Nevada wildlife. The specific research objectives are to:

1. Establish a side-by-side comparison based on field tests between various animal detection technologies: (a) for accuracy and false detection, (b) for Net present value and Benefit-Cost Analysis, and (c) in various weather, visibility, and environmental conditions.
2. Develop an individual and/or multimodal sensor-based edge detection system for: (a) animal detection and tracking, (b)animal-vehicle event detection, (c) carcass detection in or near roadways.
3. Develop a driver warning system based on I2V communication, and
4. Test the animal detection and driver warning system in multiple test sites in Nevada.

Previous Related Work:

The state-of-the-practice in the US shows various field studies in the past two decades (2000~2020) on animal warning systems spread across the western states (CA, WA, AZ, WY, NM, and MN). These states have largely deployed radar, infrared or laser beam, infrared sensors, body heat sensors, microwave sensors, and video-based motion sensing for animal detection.

NDOT has completed two related projects. The first was on the evaluation of wildlife warning systems and other countermeasures to reduce deer-vehicle crashes. Such countermeasures focused on grade separations, warning signs activated during deer migrations or during deer crossing, fencing, and roadside reflectors and roadway lighting, focusing on only two locations in Nevada (I-80 and US 93). The second study identified animal-vehicle crash hotspots in Nevada based on animal migration patterns and many other factors. Based on these studies, NDOT implemented several countermeasures to preserve wildlife and reduce crashes.

Expected Products:

- Design and demonstration of the roadside platform and a protocol for testing
- Raw data collected by multiple sensors at each proposed study site, trajectories extracted from roadside sensor data, and evaluation of the accuracy of roadside trajectories
- Case study reports of connectivity and communication
- Roadside Animal Detection System Deployment Guidance
- Final report

Proposed Activities:

- Task 1: Project management and communication
- Task 2: Implementation of the roadside animal-sensing-warning system and controlled test
- Task 3: Deployment and maintenance of the ITS Trailer
- Task 4: Sensor data processing, validation, comparison, and integration
- Task 5: Proof-of-concept of connecting sensing platforms to driver warning
- Task 6: Development of roadside sensing deployment guidance and NDOT implementation plan
- Task 7: Final Report

Develop a Study of Geosynthetic (Geogrid and Woven Geotextile) Materials for Reducing Pavement Section Thickness

AGREEMENT: 227-21-803
TASK: 22-23
ACTIVITY: 3862
OPERATIONAL SECTION: RESEARCH
FUNDS: $67,652
START DATE: June 2021
END DATE: December 2022

Funding for FFY2022 – Annual Request

	Total	FFY2022
Federal (80%)	**$81,182**	**$54,122**
State Match (20%)	**$20,296**	**$13,530**
Total Amount	**$101,478**	**$67,652**

PARTICIPATING AGENCIES: NDOT
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
This research aims to develop a study to evaluate and quantify any pavement structural benefits resulting from the use of geosynthetics placed in or under the aggregate base layer under real-world conditions. If a benefit is observed, this research could be used as the basis for future modifications to NDOT's pavement design policies and practices. The detailed objectives include:

1) Develop a plan to place multiple test sections, including one or more control sections without geogrid, which address the relevant variables that might be expected based on a review of the literature and other agency experience;
2) Develop an evaluation and testing plan for the test sections, including before, during, and after construction; and
3) Develop construction guidelines for the test sections and draft specifications for the geosynthetics to be utilized.

Previous Related Work:
Surrounding states have been reported to be using geogrids to reduce structural sections for new construction. Additionally, in 2014 FHWA performed a study titled "Performance of Geosynthetics for Use as Subgrade Stabilization," however additional study is needed to determine effectiveness in areas of elevated temperature, which will be covered in this research project.

Expected Products:
A Final report documenting all findings and recommendations from the project will serve as the guide for building test sections, documenting design inputs and as-built information, testing and monitoring. It

will be a reference for future data analysts. It will also include an implementation plan for the future three phases (construction, data collection, and analysis) of the overall field study, including a preliminary cost estimate.

Proposed Activities:

- Task 1: Literature Review
- Task 2: Experimental Design
- Task 3: Testing Plan
- Task 4: Specifications and Construction Guidelines
- Task 5: Report

Feasibility of Implementing Pedestrian Hybrid Beacon (PHB) Signals for Improving Safety and Mobility in Nevada

AGREEMENT: 142-21-803
TASK: 22-24
ACTIVITY: 3862
OPERATIONAL SECTION: RESEARCH
FUNDS: $112,099
START DATE: April 2021
END DATE: July 2023

Funding for FFY2022 – Annual Request

	Total	FFY2022
Federal (80%)	**$180,658**	**$89,679**
State Match (20%)	**$45,165**	**$22,420**
Total Amount	**$225,823**	**$112,099**

PARTICIPATING AGENCIES: NDOT
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Investigate the feasibility and effectiveness of deploying and operating PHB signals to improve traffic safety and efficiency in Nevada's urban transportation systems. Deployment guidelines need to be developed to identify needs for PHB signal installations, provide methods to estimate costs and benefits, and direct the development of PHB signal timing. In particular, this research will study the strengths and weaknesses of the PHB signals compared to other treatments widely used in Nevada and seek to identify potential improvements by adopting the PHB signals upon the existing facilities.

Previous Related Work:
PHB signals were developed in the late 1990s. The latest MUTCD included PHB signals as a special installation to facilitate pedestrian crossings, and now PHB signals have been widely adopted nationwide. Nevertheless, research has been insufficient regarding the implementations and operations of PHB signals. Operational improvements of PHB signals were mentioned in some studies; however, investigations are still needed in order to achieve such improvements, e.g., developing coordination between a PHB signal and adjacent signals to minimize the interference with traffic progression.

Expected Products:
A final report will be submitted containing guidelines for the installation of PHBs and recommendations for PHB signal operations and timing. Results can immediately be used to identify locations for PHBs and implement PHBs that are coordinated with the adjacent traffic signals to allow for mobility of both pedestrians and vehicles on the roadway network.

Proposed Activities:

- Task 1: Develop Technical Advisory Committee
- Task 2: Literature Review, Surveys, and Interviews
- Task 3: Analyze Nevada Pedestrian-Involved Crashes
- Task 4: Preliminary Treatment Selection Guide for Pedestrian Crosswalk Treatments
- Task 5: Preliminary Timing Recommendations
- Task 6: Microsimulation Models
- Task 7: Stakeholder Webinar
- Task 8: Final Models, Selection Tool, and Timing Criteria
- Task 9: Stakeholder Webinar
- Task 10: Final Report

Investigating Implementation Potentials of Turbo Roundabouts in Nevada

AGREEMENT: 147-21-803
TASK: 22-25
ACTIVITY: 3862
OPERATIONAL SECTION: RESEARCH
FUNDS: $111,170
START DATE: August 2021
END DATE: July 2023

Funding for FFY2022 – Annual Request

	Total	FFY2022
Federal (80%)	**$203,282**	**$88,936**
State Match (20%)	**$50,820**	**$22,234**
Total Amount	**$254,102**	**$111,170**

PARTICIPATING AGENCIES: NDOT
FINANCIAL RESPONSIBILITY: NDOT
FUNCTIONAL RESPONSIBILITY: NDOT

Purpose and Scope:
Turbo roundabouts are a new type of roundabout that provides a spiraling flow of traffic with mountable raised lane dividers that control the traffic path and speed, requiring drivers to choose their direction before entering the roundabout. This research will investigate the implementation potentials of turbo roundabouts in Nevada through evaluations of applicable conditions, safety benefits, operational performances, costs, etc. The results can be used by transportation agencies in Nevada or other jurisdictions to implement and operate turbo roundabouts in the future.

Previous Related Work:
No previous work in Nevada. Turbo roundabouts were first built in the Netherlands in 2000. As of today, there have been 390 turbo roundabouts installed worldwide, mostly in European countries. The research related to the implementation of turbo roundabouts in the U.S. is scarce. FHWA published two reports—in 2019 and 2020—providing information primer about turbo roundabouts; however, additional research efforts are still required.

Expected Products:
A procedure (e.g., warrant analysis) and evaluation tool to assist Nevada in further evaluating turbo roundabout installation.

Proposed Activities:
- Task 1: Hold Project Start-up Meeting
- Task 2: Review Pertinent Existing Literature and Best Practices
- Task 3: Perform Micro-simulation Assessment
- Task 4: Perform Human Factors (or Driver Experience) Assessment

- Task 5: Develop a Selection Procedure for Turbo Roundabouts as an Intersection Control Option
- Task 6: Develop Educational Resources and Conduct Effectiveness Analysis
- Task 7: Develop an Implementation Plan
- Task 8: Develop Recommendations and Final Project Report
- Task 9: Conduct Project Management Tasks