NEVADA DEPARTMENT OF TRANSPORTATION

2023 NEVADA STATE HIGHWAY PRESERVATION REPORT

State of Nevada

Department of Transportation

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State Highway Preservation Report

Report to the 2023 Legislature
As Required by Nevada Revised Statute 408.203 (3)

January 2023

(Biennium 2021-2022)

Nevada Revised Statute 408.203(3)

The director of the Nevada Department of Transportation shall report to the Legislature by February 1 of odd-numbered years the progress being made in the Department's 10-year plan for the resurfacing of state highways. The report must include an accounting of revenues and expenditures in the preceding two fiscal years, a list of the projects which have been completed, including mileage and cost, and an estimate of the adequacy of projected revenues for timely completion of the plan.

State of Nevada

Department of Transportation

Vision Statement

To be a leader and partner in delivering effective transportation solutions for a safe and connected Nevada.

Mission Statement

Provide, operate, and preserve a transportation system that enhances safety, quality of life and economic development through innovation, environmental stewardship and a dedicated workforce.

Values

- Respect – Treat others with dignity and value their contributions
- Integrity – Do the right thing
- Accountability – Take pride in our work and be accountable for our actions.
- Communication – Communicate with transparency and responsiveness both internally and externally
- Teamwork – Foster collaborative and effective partnerships both internally and externally
- Flexibility – Be responsive to changing conditions and open to new ideas

Goals

- Safety first
- Cultivate environmental stewardship
- Efficiently operate and maintain the state transportation system
- Enhance internal and external communications
- Enhance organizational and workforce development
- Consistent and effective data management

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EXECUTIVE SUMMARY

The Nevada Department of Transportation (NDOT) publishes the State Highway Preservation Report biennially to summarize the work performed and anticipated workload required to preserve the state-maintained roadway network and bridge infrastructure assets. This report provides the Nevada Legislature with 2021-2022 information that can be used to determine whether future revenues are adequate to maintain and preserve the infrastructure assets at an acceptable level.

NDOT is responsible for maintaining 5,378 centerline miles (13,774 lane miles) of roads and 1,242 bridges. Although the state-maintained roadway network consists of only 14% of the roads in Nevada, the network is overwhelmingly important as 51% of all automobile traffic and 72% of all heavy truck traffic travel on these roads.

Transportation infrastructure funding, including highway preservation funding, is in short supply nationwide including Nevada. Article 9, Section 5 of the Nevada constitution created the State Highway Fund with proceeds from licensing, registration, and other charges with respect to the operation of any motor vehicle upon any public highway in this state plus excise taxes on fuel minus administrative costs. This fund is reserved exclusively for the construction, maintenance, and repair of public highways in Nevada. The Nevada Department of Transportation (NDOT) is funded primarily with a mixture of fuel taxes, which was last increased in 1992, and related user fees as noted above plus federal aid and typically does not utilize any general funds. A safe, efficient and reliable roadway network is important, and it promotes the general welfare of all the people in the State of Nevada. Adequate preservation funding is necessary since deteriorated roads and bridges can impede the general economic and social progress of the State. Investment in infrastructure will boost market economy, advance travel and trade, and provide a legacy from which future generations can prosper.

Pavement and bridge preservation for fiscal years 2021 and 2022 were analyzed and presented in this report. Major findings and conclusions are summarized in the Pavement and Bridge Preservation Synopsis sections.

PAVEMENT PRESERVATION SYNOPSIS

NDOT's Pavement Management System (PMS) is used to help make decisions on how best to maintain and improve the condition of the entire state-maintained roadway network. This network consists of 5,378 centerline miles (13,774 lane miles) of roadway that is classified into five separate road prioritization categories. These road categories are primarily based on average daily traffic (ADT) and federal guidelines for highway classification descriptions, and they share similar rates of deterioration and require similar timing for maintenance and preservation repair work. The pavement in each road prioritization category is objectively rated and quantified using the Present Serviceability Index (PSI) pavement condition rating system. This rating system is divided into six sections that correspond to pavement in very good, good, fair, mediocre, poor, and very poor or failed condition.

Various repair strategies are implemented to improve pavement condition. Maintenance repair strategies include work such as chip seals, filling potholes, and patching. Preservation mostly involves thin overlays and mill and fills used to maintain surface quality. Rehabilitation repair strategies include plant-mix overlays, mill and fills, and cold in place recycling with a plant mix overlay. Reconstruction usually involves a roadbed modification followed by the placement of new bound layers. The cost and construction timing for the various repair strategies can be significantly different and are contingent on the pavement condition at the time of the repair. Significant cost savings are possible when pavement is proactively treated while in fair condition as compared to reactively reconstructed in very poor condition. Repairing pavement in very poor or failed condition requires major reconstruction that costs significantly more than the less invasive techniques that can be used when pavement is in fair or better condition.

$379.9 million was invested for maintenance and rehabilitation repair work in fiscal years 2021 and 2022. This expenditure included $157.1 million investment of state funds, $219.5 million investment of federal funds, and $3.3 million investment of funds from other sources. More than $358.1 million of repair work was contracted out to private contractors and $21.8 million of repair work was performed by NDOT Maintenance personnel. The $358.1 million of contracted repair work restored 767 centerline miles (1,935 lane miles) of pavement to acceptable condition levels. Maintenance repair work was performed on 464 centerline miles (969 lane miles) and rehabilitation repair work was constructed on 303 centerline miles (966 lane miles).

The PSI pavement condition rating system was used to determine if long-term pavement preservation expenditures were adequate to maintain or improve the roadway network to acceptable condition levels. Results show that while historical funding has not been adequate, condition has been generally stable. However, without increased funding, it is anticipated that the overall average condition of the state-maintained roadway network will slowly deteriorate but remain in fair condition for the near future.

In 2020, the current PSI related performance goals were developed to represent what is achievable and provide levels of service appropriate for each category. The current goal is 95% fair or better for category 1, 90% for category 2, 85% for category 3, 75% for category 4, and 50% for category 5. Categories 1, 2, 3, and 4 currently meet or exceed these revised goals. Road prioritization category 5 roads fail to meet the established pavement condition goal.

An estimate of the adequacy of projected spending for the timely completion of the resurfacing plan was ascertained. The recent spending, though higher than historical spending, is still not adequate to meet the established performance goal. Projected expenditure of $205 million is required each year to maintain the roadway network at acceptable condition levels consistent with the goals.

The progress in the 10-year plan for resurfacing of state highways was examined and different budget scenarios were investigated. The investigation included the comparison of the predicted percentage of roads in fair or better condition for years 2021 through 2033 with budget scenarios of $205 million, $161 Million, and $103 million per year expenditures for pavement preservation repair work.

- The first budget scenario included an average $205 million per year expenditure for pavement preservation repair work. This budget scenario represents the necessary spending level, which will maintain a consistent pavement condition of 75% of roads in fair or better condition and allow each category to meet or exceed the established percent fair or better target.
- The second budget scenario is an average of $161 million per year for preservation work. This budget is the average spending for the last two years, which represents an increase

over historical levels, but falls short of the required spending. This scenario would result in the average percentage of roads in fair or better condition deteriorating from 73% in the year 2021 to approximately 69% in the year 2033.

- The third budget scenario consisted of an average $103 million per year expenditure for pavement preservation repair work. This budget is the average expenditure for pavement preservation work from 2013 through 2020. This budget scenario would result in the average percentage of roads in fair or better condition deteriorating from 73% in the year 2021 to approximately 62% by the year 2033.

FIGURE E1 illustrates the comparison of the predicted percentage of roads in fair or better condition spending either $205 million, $161 million, or $103 million per year expenditures for pavement repair work.

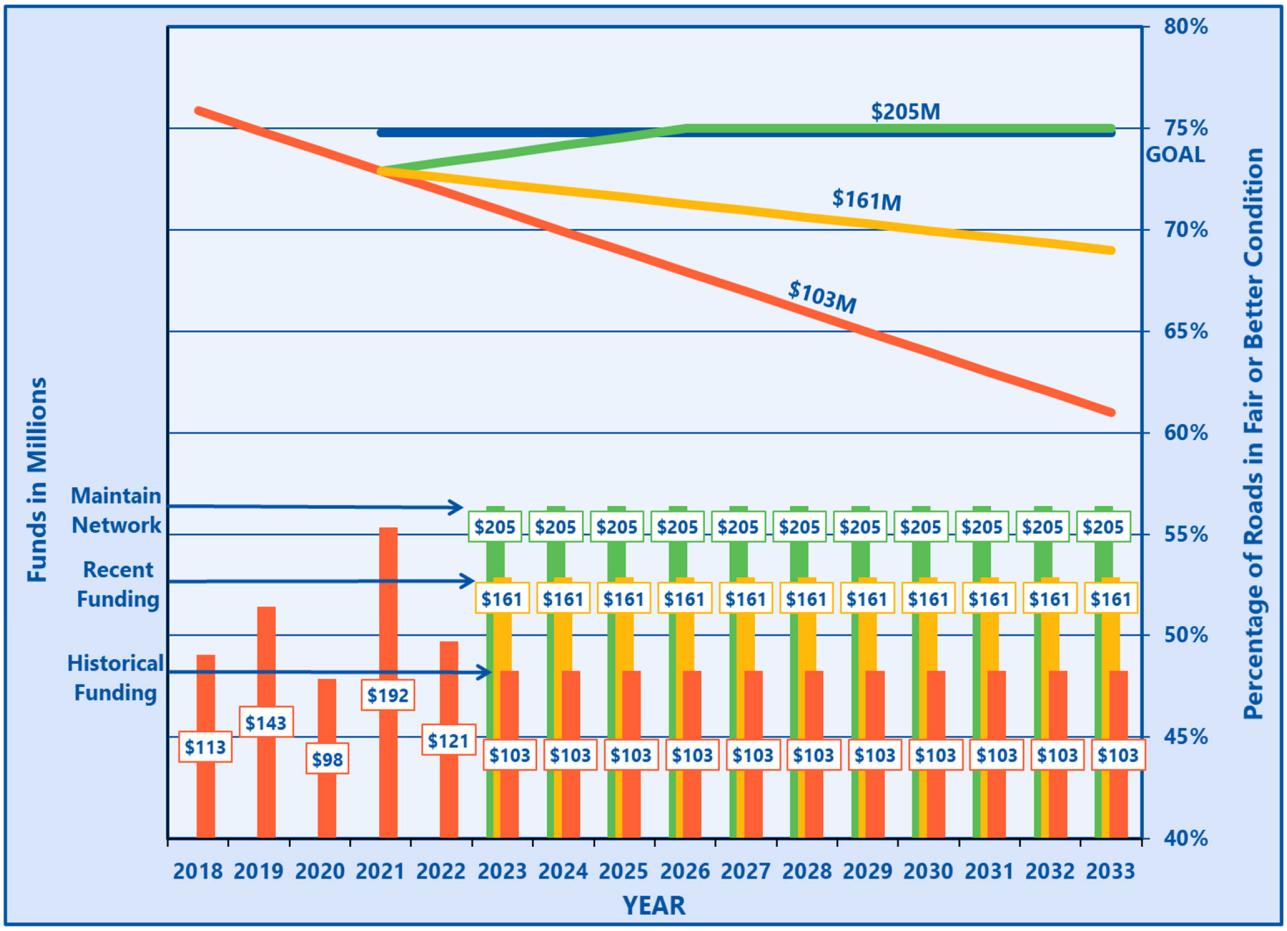

FIGURE E1. Future State-maintained Roadway Network Funding Alternatives

BRIDGE PRESERVATION SYNOPSIS

The Nevada Department of Transportation is responsible for inspecting and reporting the condition of all the bridges open to the public in Nevada, except bridges on federal lands. There are currently 2,128 public bridges in the NDOT bridge inventory. NDOT maintains 1,242 bridges; county and city governments maintain 814 bridges; other local agencies maintain 48 bridges; private entities maintain 11 bridges; railroad maintains 6 bridges; and other state agencies maintain 7 bridges. The bridge inventory data, together with other factors, allow NDOT to identify preservation priorities and monitor the state's effort to maintain bridges in a structurally sound, functional, and safe condition.

Data in the NDOT bridge inventory is collected in accordance with the National Bridge Inspection Standards (NBIS) and is reported to the National Bridge Inventory (NBI). For each bridge, the condition rating is determined for three primary elements: deck, superstructure, and substructure. Bridge-sized culverts have a single, independent rating. NBI general condition ratings are assessed on a scale that ranges from 0 (failed condition) to 9 (excellent condition). The lowest of the three ratings for bridges, or the single rating for culverts, is used to represent the overall condition of the structure. Ratings of 7 or better, represent a bridge that is in good condition and ratings of 5 or 6 represent a bridge in fair condition. If any of the condition ratings are 4 or below, the bridge is in poor condition. A structure deemed to be in poor condition is classified as Structurally Deficient (SD).

Structurally Deficient bridges are not necessarily unsafe or dangerous. Rather, these bridges become a priority for corrective measures, and may be posted to restrict the weight of vehicles using them. If a deficiency is determined to be severe, or the load carrying capacity is extremely low, the bridge would be closed to protect the travelling public. Of the 1242 bridges maintained by NDOT, only 12 or 1% are considered to be Structurally Deficient.

Currently, Nevada bridge conditions compare very favorably to the bridge conditions in many other states, even though more than half of NDOT's bridges are more than 40 years old. However, since older bridges generally have a useful service life of 50 to 75 years, many of NDOT's bridges will require more frequent rehabilitation and replacement in the near future.

When bridges deteriorate and require closure, the resulting detours can be very disruptive to traffic. In both rural and urban bridge closures, the user costs associated with detours can often be quite significant until the bridge is reconstructed or repaired. The importance of bridge maintenance and rehabilitation cannot be overemphasized.

The Nevada Department of Transportation spent a total of approximately $17 million in fiscal years 2021 and 2022 on bridge preservation while spending on bridge preservation for the previous two years was approximately $8 million total. An increasing investment in bridge preservation funding is being implemented to address the anticipated growing rehabilitation and replacements needs of the state's aging inventory. The Department has committed to provide additional bridge preservation funding and, through the One Nevada Plans, looks to prioritize and utilize this investment in the most efficient way possible, to preserve the service-life of structures state-wide.

While the need for preservation funding increases every year as the bridge inventory continues to grow, a much greater funding deficiency is likely to occur because of the age of NDOT's bridges. Many of NDOT's bridges are approaching the end of their service life and the need for bridge replacement funds is expected to increase greatly over the next decade.

Since NDOT already has 566 bridges over 50 years old, the current practice of replacing approximately 3 bridges a year is a replacement rate of 0.5% of the bridges over 50 years old. A replacement rate of 2% a year is necessary to replace the bridges over 50 years old before they reach 100 years old. If a 2% annual replacement rate is reached in ten years and is maintained for another ten years, the number of bridges over 50 years old will begin to stabilize. Twenty years from now, NDOT would have approximately 620 bridges over 50 years old and would be replacing 12 bridges each year.

PAVEMENT PRESERVATION

INTRODUCTION

This report summarizes the Nevada Department of Transportation's (NDOT's) effort to preserve the state-maintained roadway network. The roadway network is vital and one of the state's most valuable assets. Although the roadway network consists of only 14% of the roads in Nevada, approximately 49% of all traffic and 68% of all heavy trucks travel on state-maintained roads. The following discussion explains how NDOT uses its available pavement preservation funds to maintain and rehabilitate the roadway network.

THE PAVEMENT MANAGEMENT SYSTEM

The Pavement Management System (PMS) includes the entire inventory of the state's existing pavement assets and condition. The primary objective of the PMS is to provide information that enables users to make informed decisions about how to maintain and improve the condition of the roadway network while maximizing pavement performance through the practical use of available funds. NDOT's management of the pavement inventory allows maintenance and rehabilitation repair work to be prioritized in an objective and systematic manner. The PMS improves the efficiency of decision making, provides assessment on the consequences of decisions through comparative analysis, and ensures consistency of network and project level activities and results.

ROADWAY NETWORK INVENTORY

The state-maintained roadway network consists of 5,378 centerline miles (13,774 lane miles) of roads. Centerline miles indicate the length of the road, regardless of the number of lanes within each mile. So that the network may be more easily managed, it is classified into five separate road prioritization categories. These road categories are primarily based on average daily traffic (ADT) and federal National Highway System (NHS) designation. Because traffic levels are a primary input in pavement design, each road prioritization category consists of pavements that share similar rates of deterioration and require similar timing for maintenance and preservation repair work.

TABLE 1 lists the five road prioritization categories and their corresponding descriptions. Also listed are several examples of easily recognized roads throughout the state to assist with relating these roads to the assigned categories and descriptions.

TABLE 1. NDOT's Road Prioritization Categories

Road Prioritization Category	[1]Description	Examples
1	Controlled Access Roads	IR015, Clark County IR580, Washoe County IR080, Elko County
2	ADT ≥ 5,000 NHS ADT ≥ 1,250	SR146, St. Rose Parkway, Clark County US050, Lincoln Highway, Carson City SR659, McCarran Blvd, Washoe County
3	1250 ≤ ADT < 5000 NHS ADT < 1250	SR318, Sunnyside Road, Nye County SR028, Lake Tahoe Area, Douglas County US050, Lincoln Highway, Lander/Eureka County
4	250 ≤ ADT < 1250	SR373, Death Valley Jct Road, Nye County SR319, Panaca Road, Lincoln County SR278, Eureka-Carlin Road, Eureka County
5	ADT < 250	SR140, Denio-Adel Road, Humboldt County SR375, Warm Springs Road, Lincoln/Nye County SR722, Carrol Summit Road, Churchill/Lander County

[1]ADT is an acronym for "Average Daily Traffic." The PMS includes the ADT data, as provided by NDOT's Traffic Division, for every road in the state-maintained roadway network.

FIGURE 1 is a map that highlights the state-maintained roadway network inventory identified by NDOT's five road prioritization categories.

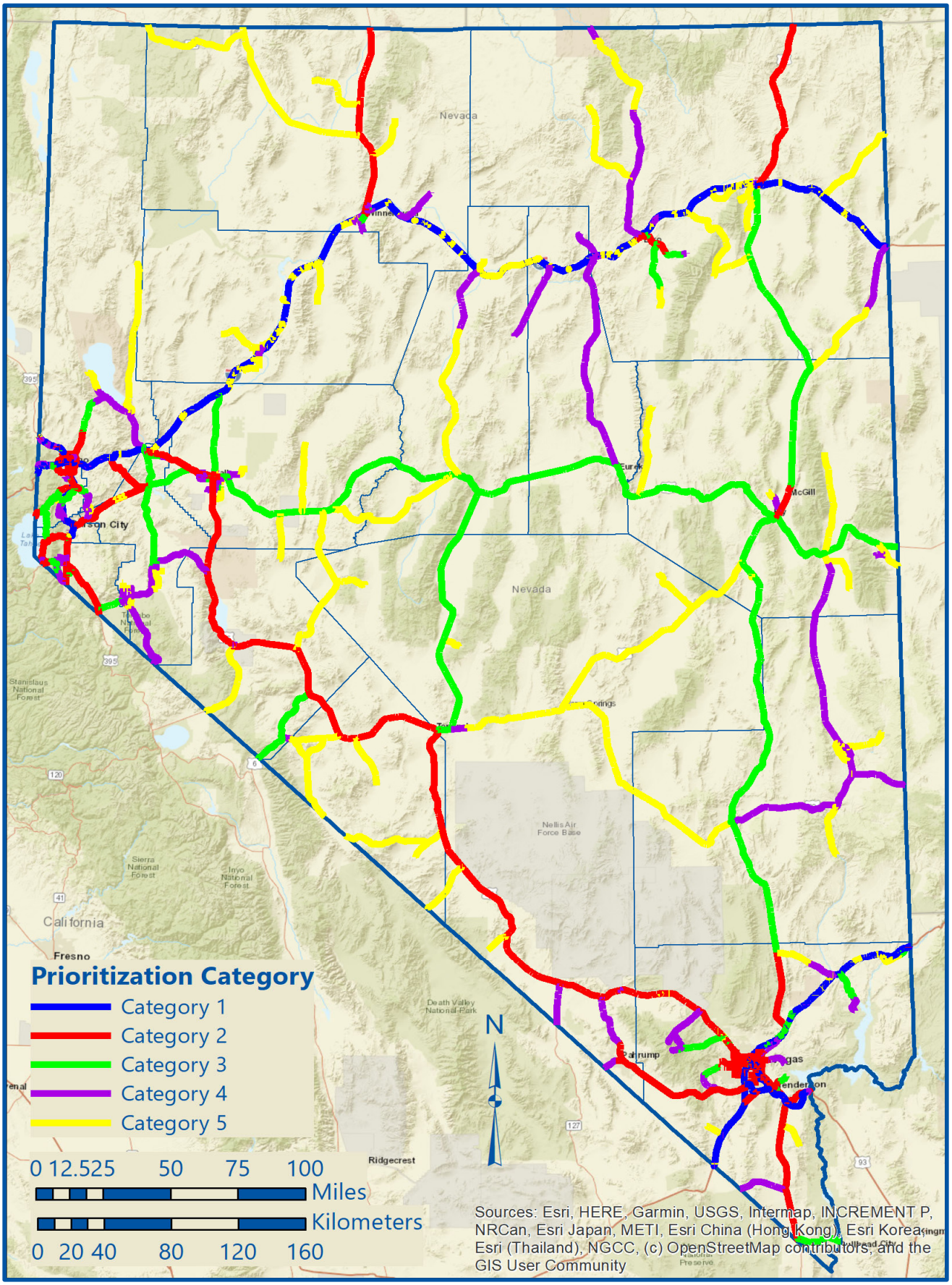

FIGURE 1. Roadway Network Inventory by Road Prioritization Categories

There are numerous methods used to classify roads. The United States Department of Transportation (USDOT) classifies roads for national purposes, while state departments of transportation classify road inventories using methods for state needs and the needs of the individual PMS systems employed. The USDOT system focuses mainly on the purpose of the route, while the NDOT system is largely based on traffic volumes and NHS designation. Despite these differences, the two systems are generally compatible.

TABLE 2 compares the USDOT's classification methodology with NDOT's classification methodology, which will allow individuals familiar with national classification terminology to more easily understand the associated NDOT road prioritization categories.

TABLE 2. Comparison of the USDOT and NDOT Road Classification Systems

USDOT's Functional Classification Category	Description	Examples	NDOT's Road Prioritization Catgegory
1	Interstate	Interstates are the highest classification of arterials and were designed and constructed with mobility and long-distance travel in mind.	1
2	Principal Arterial – Other Freeways and Expressways	The roads in this classification have directional travel lanes and are usually separated by some type of physical barrier. Access and egress points are limited to on-ramp and off-ramp locations, or a very limited number of at-grade intersections.	1 and 2
3	Principal Arterial - Other	The roads in this classification serve major centers of metropolitan areas, provide a high degree of mobility, and can also provide mobility through rural areas.	2 and 3
4	Minor Arterial	Minor arterials link cities, larger towns, and other traffic generators such as resorts.	3, 4, and 5
5	Major Collector	Major collector roads provide service to any county seat not on an arterial route, to the larger towns not directly served by higher systems, and to traffic generators of equivalent intra-county importance such as shipping points, parks, important mining, agricultural areas, and more.	4 and 5
6	Minor Collector	Minor collectors distribute and channel trips between local roads and arterials, usually over a distance of less than three-quarters of a mile.	5
7	Local	Local roads are not intended for use in long distance travel, except at the origin or destination end of the trip, due to their provision of direct access to abutting land.	5

*Nevada's state-maintained roadway network serves the broad expanse within the state's boundaries. While all USDOT classifications are represented in the NDOT system, 6 and 7 are infrequent.

PAVEMENT CONDITION RATING SYSTEM

To help manage pavements so that they can provide a smooth, comfortable, and safe ride, it is useful to have a pavement condition rating system that includes all attributes important to travelers. These attributes include travelers' responses to motion and appearance as demonstrated by a smooth riding surface that is without cracking, rutting, patching, or potholes. NDOT uses a pavement condition rating system called the Present Serviceability Index (PSI) to objectively measures all these important attributes.

The PSI pavement condition rating system uses a value that is calculated using pavement roughness measurements and mathematical formulas that quantify pavement distresses such as cracking, rutting, and patching. These measurements and formulas are combined and standardized into an objective rating scale numbered from zero to five. Pavement rated from four to five is interpreted as pavement in new or very good condition with a smooth surface that is without distress or irregularities. Pavement rated less than two is interpreted as pavement in very poor or failed condition with the roughest of surface conditions and no longer navigable at the posted speed limit. The PSI pavement condition rating system is used to quantify the pavement condition for each road within the state-maintained roadway network.

FIGURE 2 demonstrates how the PSI pavement condition rating system is divided into six condition levels that correspond to pavement in very good, good, fair, mediocre, poor, and very poor or failed condition. Descriptions include photographs of what pavement would typically look like in each condition as well as a discussion of the various stages of disrepair as pavement deteriorates over time.

Pavement Condition	PSI Rating Scale	Description of Pavement Condition
Very Good	5.00 to 4.00	 Pavement in very good condition has an excellent, very smooth ride quality and is without any pavement distress. Pavement is in new condition.
Good	3.99 to 3.50	 Pavement in good condition has a very smooth ride quality and begins to show minor distresses that are typically environmental rather than load related. Distresses include minor non-wheelpath longitudinal and transverse cracks as well as minor surface raveling. Pavement in good condition can especially benefit from preventive maintenance such as crack sealing and surface treatments such as chip, slurry, and scrub seals. Surface treatments impede pavement deterioration and protect the pavement structure from water infiltration and weathering.

FIGURE 2. PSI Rating System and Corresponding Pavement Condition

Pavement Condition	PSI Rating Scale	Description of Pavement Condition
Fair	**3.49 to 3.00**	 Pavement in fair condition has a good ride quality except noticeable environmental distress has developed. Non-wheelpath longitudinal and transverse cracks are frequent. There is light surface oxidation and weathering. Structural distress in the wheelpath in the form of ruts and fatigue cracks begin to occur. Pavement in fair condition is a candidate for a surface treatment such as micro-surfacing or double chip seal, and possibly a two inch overlay. An overlay applied on pavement in this condition will prevent the formation of more severe structural distress.
Mediocre	**2.99 to 2.50**	 Pavement in mediocre condition has a barely acceptable ride quality and has accumulated significant environmental and structural distresses. Pavement has non-wheelpath longitudinal cracking and transverse cracks so closely spaced that block cracks develop. Ruts and fatigue cracks in wheelpath are present. Pavement in mediocre condition is candidate for three inch or thicker overlays and may require patching before the new overlay is placed. Pavement structural deterioration is evident.

FIGURE 2. PSI Rating System and Corresponding Pavement Condition (Continued)

Pavement Condition	PSI Rating Scale	Description of Pavement Condition
Poor	2.49 to 2.00	 Pavement in poor condition has a poor ride quality and has accumulated large amounts of environmental and structural-related distresses. The non-wheelpath longitudinal and transverse cracks are severe. The surface is weathered, rutted, and fatigue cracks are widespread. Lower volume roads are candidates for thick overlays or cold in-place recycling (CIR) and overlay repair. Higher volume roads will require reconstruction such as a full-depth recycling and overlay repair.
Very Poor or Failed	< 2.00	 Pavement in very poor condition has a very poor ride quality and has accumulated significant environmental and structural distresses. The surface is pitted and there are wide non-wheelpath longitudinal and transverse cracks. Networked, spalled fatigue cracks and deep ruts are prevalent. The deterioration is so advanced potholes are frequent. The road is typically no longer navigable at the posted speed limit. Pavement in this condition requires constant maintenance activity such as patching and filling potholes. Citizen complaints are common. This pavement always requires full-depth reconstruction and recycling the road may not be an option.

FIGURE 2. PSI Rating System and Corresponding Pavement Condition (Continued)

PAVEMENT MAINTENANCE AND REHABILITATION STRATEGIES

Pavement service life is a function of many parameters. The parameters of most consequence are the smoothness of the road and the amount of heavy truck loads that the pavement experiences. New pavement has excellent characteristics such as a very smooth ride without any surface distress or defects. Relatively little funding is necessary for new pavement maintenance. However, the smooth ride will gradually become rough due to cracks, distress, or other types of defects as the pavement deteriorates. Therefore, it becomes necessary to spend an increasing amount of funds in order to maintain or rehabilitate the pavement to an acceptable condition level as the pavement deteriorates over time. The types and extents of distress or defects, along with the severity of the pavement roughness, determine what types of repair strategies are required for maintenance and rehabilitation repair work.

Pavement repair strategies are classified into four major categories: Maintenance, Preservation, Rehabilitation, and Reconstruction.

- **Maintenance**. This category includes repairs that address surface deterioration, but that do not improve the pavement's ability to carry traffic loads. This includes fog seals, crack sealing, chip seals, slurry seals, and full and partial depth patching.
- **Preservation**. Used more specifically when describing pavement treatments, preservation includes those treatments applied to roads in good condition in order to prevent further degradation and maintain a high level of service. This category mostly involves thin overlays and mill and fills used to maintain surface quality.
- **Rehabilitation**. This category includes more substantial repairs that are applied when the pavement is in fair or worse condition to repair the structurally deficient section and provide a new surface that improves the pavement's ability to carry traffic loads. Typical rehabilitation treatments include plant-mix overlays, mill and fills, and cold in place recycling with a plant mix overlay.
- **Reconstruction**. Reconstruction repairs are applied to roads that are damaged to the point where they require replacement or recycling of the bound layers, and potentially the base layers. Typically, reconstruction involves a roadbed modification followed by the placement of new bound layers.

For simplicity, in most other sections of this report, the term rehabilitation is used to include all preservation, rehabilitation, and reconstruction work.

FIGURE 3 exhibits the construction timing for pavement repair strategies based on the PSI pavement condition rating system. Maintenance and preservation repair strategies are typically applied when a pavement has a PSI rating of 3.50 or higher. Rehabilitation and reconstruction repair strategies are commonly constructed when a pavement has a PSI rating of 3.49 or less.

It should be noted that the repair strategies explained herein are general policies and that the construction timing varies for each road prioritization category. For example, due to financial constraints, a category 5 road may receive a maintenance treatment such as a chip seal around a PSI rating of 2.5. Conversely, a category 1 road may receive a rehabilitation treatment while still in good condition in order to proactively maintain the higher performance standards present on these routes.

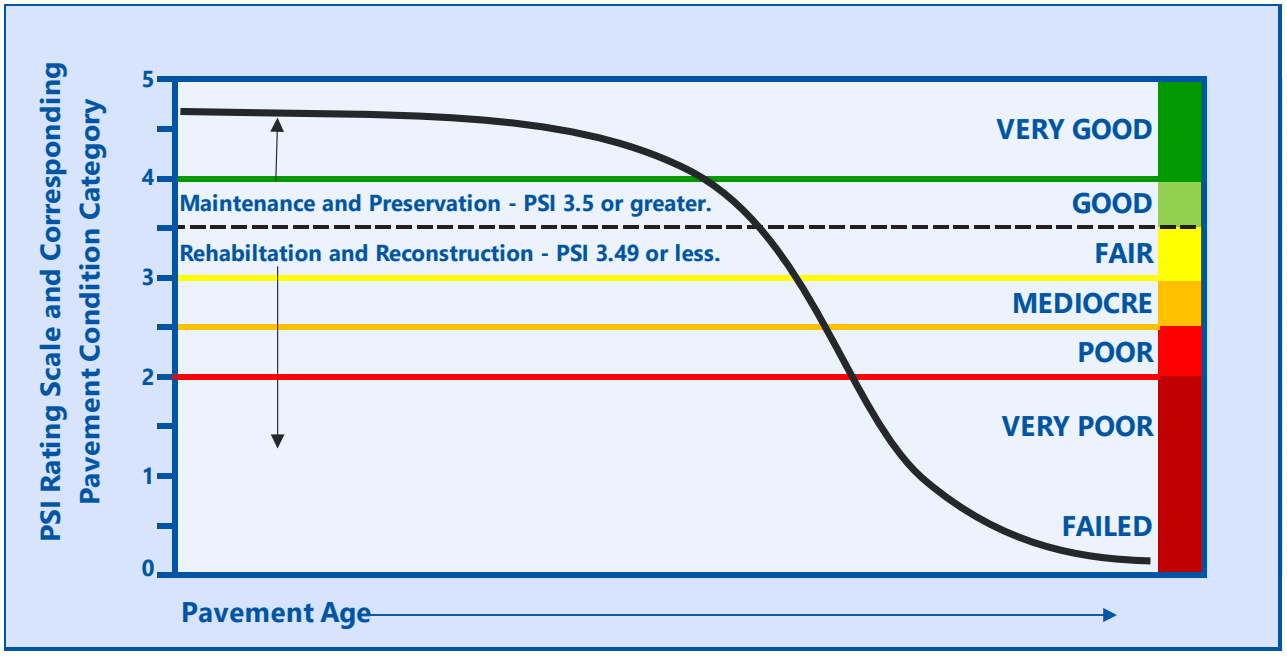

FIGURE 3. Timing for Repair Strategies Based on PSI Rating System

The funds needed for the repair work required to improve roads to acceptable condition levels when pavement is in poor or worse condition are far greater than the funds needed for the repair work when pavement is in fair or better condition. FIGURE 4 shows the timing for the cost saving between various repair options based on the PSI pavement condition rating system. Project

expenditures will significantly increase when pavement is allowed to deteriorate from fair condition into very poor or failed condition. Repair work costs six to ten times more for major reconstruction necessary when pavement is in very poor or failed condition as compared to the less invasive techniques that can be used when pavement is in fair or better condition.

NDOT proactively investigates opportunities to use resources wisely by repairing pavement in fair condition before the pavement deteriorates into worse, and thus more costly to repair condition. This philosophy of proactive pavement repair strategies lowers pavement life-cycle costs and better serves the taxpaying public.

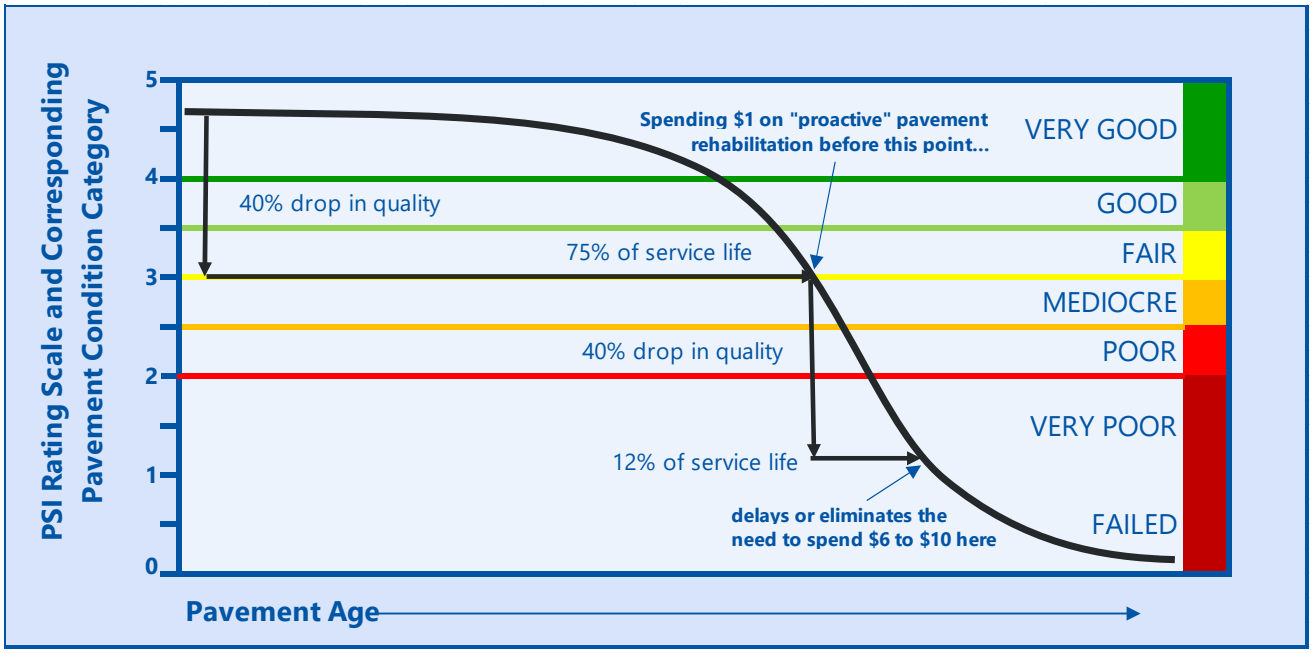

FIGURE 4. Timing for Proactive and Reactive Pavement Rehabilitation Strategies

REVENUE AND EXPENDITURE

The pavement maintenance and rehabilitation repair work that is performed on the state-maintained roadway network is principally funded through the State Highway Fund, which is a dedicated source of funding established by the Nevada State Constitution expressly for this purpose and appropriated by the legislature. State Highway Fund revenue is primarily provided by Federal Aid and state resources such as the State gasoline and special fuel taxes, vehicle registration fees, commercial carrier fees, and driver license fees.

NDOT invested $379,948,943 for maintenance and rehabilitation repair work on the state-maintained roadway network during fiscal years 2021 and 2022. This expenditure included a $157,107,766 investment of state funds, a $219,547,311 investment of federal funds, and a $3,293,866 investment of funds from other sources. Other funding sources include support by local city and public works agencies as well as private utility and telecommunication enterprise with vested interest in localized areas.

There was $358,121,883 of road repair work contracted out to private contractors and $21,827,060 of road repair work performed by NDOT Maintenance personnel. The maintenance repair work was accomplished by both private road contractors and NDOT personnel. The rehabilitation repair work was solely accomplished by private road contractors. FIGURE 5 displays the funding sources and construction expenditures information that includes both maintenance and rehabilitation repair work for fiscal years 2021 and 2022.

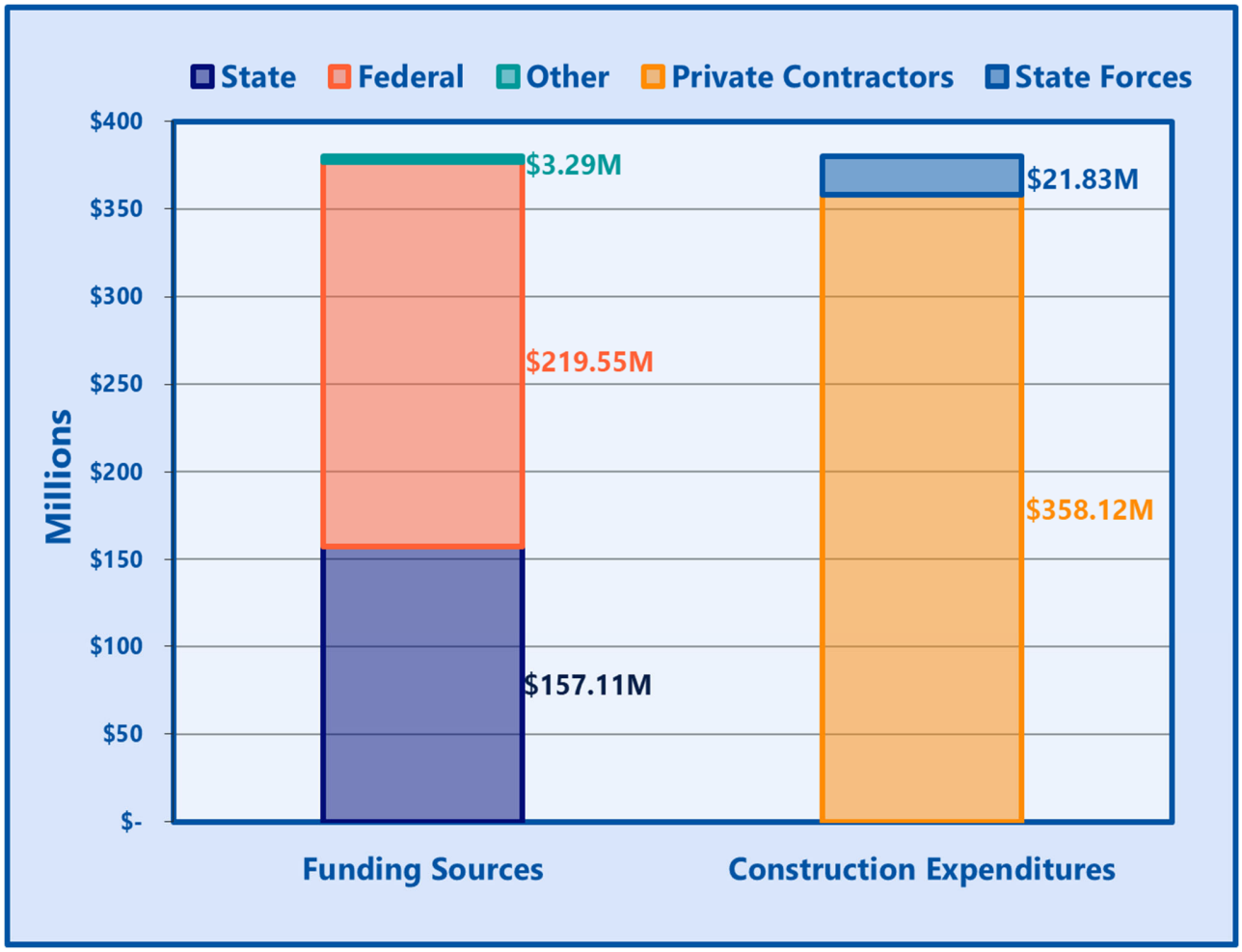

FIGURE 5. Funding Sources and Construction Expenditures

NDOT advertised $358,121,883 of contract maintenance and rehabilitation pavement repair work during fiscal years 2021 and 2022. This obligated expenditure improved or maintained the condition level of 767 centerline miles (1,935 lane miles) of roads. TABLE 3 contains a financial summary of the advertised maintenance and rehabilitation repair work that was accomplished on the state-maintained roadway network during fiscal years 2021 and 2022, along with the corresponding mileage that was improved.

TABLES 4 and 5 list the specific rehabilitation projects that were advertised during fiscal years 2021 and 2022. FIGURE 6 identifies the statewide locations where fiscal year 2021 and 2022 rehabilitation projects were completed.

TABLE 3. Advertised Pavement Repair Work for Fiscal Years 2021 and 2022

Fiscal Year	Contract Maintenance Repair Work Expenditure and Mileage	Contract Rehabilitation Repair Work Expenditure and Mileage	Total Contract Maintenance and Rehabilitation Repair Work Expenditure and Mileage
2021	$19,084,203	$192,186,536	$211,270,739
	174 Centerline Miles 337 Lane Miles	163 Centerline Miles 596 Lane Miles	337 Centerline Miles 933 Lane Miles
2022	$25,295,520	$121,555,624	$146,851,144
	290 Centerline Miles 632 Lane Miles	140 Centerline Miles 370 Lane Miles	430 Centerline Miles 1,002 Lane Miles
Biennium Total	$44,379,723	$313,742,160	$358,121,883
	464 Centerline Miles 969 Lane Miles	303 Centerline Miles 966 Lane Miles	767 Centerline Miles 1,935 Lane Miles

TABLE 4. List of Rehabilitation Projects Advertised in Fiscal Year 2021

FISCAL YEAR 2021					
Contract Number	**County**	**Mileposts**	**Length in Miles**	**Road Category**	**Cost**
3837	Clark	I11CL 16.810 - 22.800	5.777	1	$12,699,263
LOCATION: I 11, CLARK COUNTY, FROM E PARADISE HILLS DR. TO THE CONCRETE SECTION OF HENDERSON SPAGHETTI BOWL, MP CL 16.81 TO MP CL 22.80					
SCOPE: 1INCH REMOVAL WITH 1INCH CRUMB RUBBER OVERLAY					
3842	Churchill Lyon Mineral	US95 CH 0.000 - 15.590 US95 LY 0.000 - 2.820 US95 MI 83.940 - 92.260	26.73	2 2 2	$23,690,821
LOCATION: US 95, FROM THE INTERSECTION OF US95/US95A SOUTH OF SCHURZ TO 2.43 MN OF CHURCHILL COUNTY LINE. MP MI 83.94 TO MI 92.26, MP LY 0.00 TO 2.82, MP CH 0.00 CH 15.590.					
SCOPE: 1.5 INCH COLD MILL WITH 2.5 INCH PBS DENSE GRADE OVERLAY AND .75 INCH PBS OPENGRADE. MISC AREAS OF FULL DEPTH RECONSTRUCT/OVERLAY.					
3843	Clark	SR612 CL 37.880 - 47.300	9.42	2	$27,293,614
LOCATION: SR 612 NELLIS BLVD, CLARK COUNTY, FROM SR 593 TROPICANA BLVD TO SR 604 LAS VEGAS BLVD MP CL 37.90 TO MP CL 47.32					
SCOPE: COLD MILL, PLANT MIX BITUMINOUS SURFACE WITH OPEN GRADE AND ADA RAMPS					
3845	Pershing	IR80 PE 26.150 - 51.300 FRPE11 PE 1.972 - 3.042 FRPE12 PE 0.015 - 0.124	26.329	1 5 5	$24,280,347
LOCATION: I 80, PERSHING COUNTY, FROM 2.28 MILES EAST OF COAL CANYON INTERCHANGE TO 1.69 MILES EAST OF HUMBOLDT INTERCHANGE. MP PE 26.15 TO MP PE 51.30; PERSHING COUNTY FRONTAGE ROADS; FR11 FROM 0.75 MILES W HUMBOLDT INTERCHANGE TO 0.32 MILES E OF HUMBOLDT INTERCHANGE; FR12 FROM CATTLE GUARD R/W FENCE TO FR13					
SCOPE: 1 1/2 INCH COLD MILL, 2 INCH PLANT MIX BITUMINOUS SURFACE WITH OPEN GRADE ON I 80; 1-1/2 INCH COLD MILL, 3 INCH PLANT MIX BITUMINOUS SURFACE WITH OPEN GRADE ON FR11; 2-3/4 INCH COLD MILL, 2 INCH PLANT MIX BITUMINOUS SURFACE WITH OPEN GRADE ON FR12					
3848	Elko	IR80 EL 31.980 - 61.966	29.986	1	$27,097,103
LOCATION: I 80, ELKO COUNTY, FROM 0.932 MILES WEST OF OSINO INTERCHANGE TO 0.611 MILES EAST OF GRAYS CREEK; MP EL 31.980 TO MP EL 61.966					
SCOPE: 1INCH COLD MILL WITH 2 INCH PLANT MIX BITUMINOUS SURFACE WITH 3/4 INCH OPEN GRADED SURFACE					
3854	Elko	IR80 EL 20.260 - 26.580	6.32	1	$10,029,435
LOCATION: I 80, ELKO COUNTY, FROM THE LEADING EDGE OF I-900 AT THE WEST ELKO INTERCHANGE TO MILE POST EL 26.58, MP EL 20.26 TO MP EL 26.58					
SCOPE: 2-3/4 INCH COLD MILL WITH 2 INCH PLANT MIX BITUMINIOUS SURFACE WITH 3/4 INCH OPEN GRADED SURFACE					
3828-READV	Clark	IR15 CL 0.000 - 16.350 SR161CL 6.900 - 7.340	16.790	1 4	$12,693,121
LOCATION: I 15, CLARK COUNTY, REHAB PAVEMENT NB & SB, MP CL 0.00 TO MP CL 16.35; SR 161 AT JEAN INTERCHANGE, MP CL 6.90 TO MP CL 7.34					
SCOPE: 2 IN. COLD MILL W/ 3 IN. PLANT MIX BITUMINOUS SURFACE WITH 3/4 IN. OPEN GRADED SURFACE (SB LANES ONLY); 1IN. COLD MILL W/ 1IN. OPEN GRADED SURFACE (NB LANES ONLY)					
3857	Humboldt	IR80 HU 42.420 - 54.860	12.440	1	$17,812,033
LOCATION: I 80, HUMBOLDT CO, FROM 0.936 MILES EAST OF THE PUMPERNICKEL VALLEY INTERCHANGE TO 1.788 MILES EAST OF VALMY INTERCHANGE. MP HU 42.42 TO MP HU 54.86					
SCOPE: 2 INCH COLD MILL, 3 INCH PLANT MIX BITUMINOUS OVERLAY WITH OPEN GRADE					
3858	Washoe	SR431WA 0.000 - 8.130 SR28 WA 3.685 - 3.845 SR28 WA 5.217 - 10.990	14.063	3 3 3,2	$28,486,696
LOCATION: SR 431 MT ROSE HWY, WASHOE COUNTY, FROM SR 28 TO 0.062 MILES EAST OF MT ROSE SUMMIT MP WA 0.00 TO MP WA 8.130; SR 28, WASHOE COUNTY, 1.0 MI NORTH OF SAND HARBOR TO NV/CA STATELINE; MP WA 3.685 TO MP WA 3.845, MP WA 5.217 TO MP WA 10.990					
SCOPE: 3-INCH MILL, 2-INCH PBS WITH 1-INCH OG. FULL DEPTH RECONSTRUCT VARIOUS LOCATIONS; 4-INCH COLD MILL, 3-INCH PBS WITH 1-INCH OG					
3866	Lincoln	US93 LN 94.098 - 109.000	14.902	4	$8,104,103
LOCATION: US 93, LINCOLN COUNTY, FROM 0.01 MS OF MINNIE ST. AT B-220 IN CALIENTE, TO 1.03 MN OF SR 319. MP LN 94.098 TO MP LN 109.00					
SCOPE: MILL AND OVERLAY WITH SAFETY IMPROVEMENTS					

TABLE 5. List of Rehabilitation Projects Advertised in Fiscal Year 2022

FISCAL YEAR 2022					
Contract Number	**County**	**Mileposts**	**Length in Miles**	**Road Category**	**Cost**
3881	Clark	IR 15N CL 95.559 - 118.481 IR 15S CL 95.797 - 118.481	22.803	1 1	$32,141,600
LOCATION: I 15, CLARK COUNTY, IN MESQUITE FROM 1.677 MI NORTH OF THE LOGANDALE/OVERTON INTERCHANGE TO 0.370 MI NORTH OF LOWER FLAT TOP DR; SB MP CL 95.559 TO MP CL 118.481, NB MP CL 95.797 TO MP CL 118.481					
SCOPE: 2 INCH COLDMILL, 2 INCH PLANTMIX BITUMINOUS SURFACE WITH OPEN GRADE					
3890	Nye	US95 NY 28.817 - 56.234	28.817	2	$17,741,907
LOCATION: US 95, NYE COUNTY, 1.301 MILES SOUTH OF AMARGOSA VALLEY JUNCTION TO 1.742 MILES SOUTH OF THE AMARGOSA RIVER, MP NY 28.817 TO MP NY 56.234					
SCOPE: 2 INCH COLDMILL WITH 2 INCH PLANTMIX BITUMINOUS SURFACE WITH OPEN GRADE. WIDEN FOR NB AND SB PASSING LANES					
3889	Humboldt	US95 HU 33.000 - 73.410	40.41	2	$18,063,871
LOCATION: US 95, HUMBOLDT COUNTY, FROM 0.100 MILE SOUTH OF SR 140 TO ALBISU ROAD; MP HU 33.00 TO MP HU 73.41					
SCOPE: 3R PROJECT CONSISTING OF A MILL AND OVERLAY WITH HYDRAULIC AND SAFETY IMPROVEMENTS					
3891	Churchill	US50 CH 19.350 - 21.710	2.36	2	$5,076,792
LOCATION: US 50 DOWNTOWN FALLON FROM 0.01M EAST OF ALLEN RD TO RIO VISTA RD. MP CH 19.35 TO CH 21.71					
SCOPE: 3 1/4" COLDMILL WITH 2 1/2" PLANTMIX BITUMINOUS SURFACE WITH OPEN GRADED SURFACE AND ADA IMPROVEMENTS					
3893	Elko	IR80 EL 74.860 - 83.260	8.4	1	$13,443,442
LOCATION: I 80, ELKO COUNTY, FROM 0.82 MILES EAST OF THE EAST WELLS INTERCHANGE TO 1.04 MILES EAST OF THE MOOR INTERCHANGE. MP EL 74.86 TO MP EL 83.26.					
SCOPE: COLDMILL AND OVERLAY WITH LEVELING COURSE, PLANTMIX BITUMINOUS SURFACE AND OPEN GRADED WEARING COURSE.					
3900-READV	Nye/Esmerelda	US95 NY 103.552-107.221 US95 ES 0.000-11.996	15.665	2 2	$12,658,890
LOCATION: US 95, NYE COUNTY, SOUTH OF GOLDFIELD FROM 3.67 MI SOUTH OF THE NY/ES COUNTY LINE TO 4.86 MI SOUTH OF GOLDFIELD SUMMIT. MP NY 103.552 TO MP NY 107.221 AND MP ES 0.00 TO MP ES 11.996					
SCOPE: ROAD SURFACE REHABILITATION, PASSING LANE AND DMS SIGN					
3907	Humboldt	IR80 HU 17.928 - 29.434	11.506	1	$11,568,038
LOCATION: I 80, HUMBOLDT CO, FROM 1.123 MILES EAST OF THE EAST WINNEMUCCA INTERCHANGE TO 0.971 MILES WEST OF THE GOLCONDA INTERCHANGE; MP HU 17.928 TO MP HU 29.434					
SCOPE: 2" COLD MILL, 2" PBS WITH OPEN GRADE					
3910	Mineral	US6 MI 0.000 - 11.957	11.957	3	$10,861,084
LOCATION: US 6, MINERAL COUNTY, FROM THE CA/NV STATELINE TO SR 360, MINA ROAD. MP MI 0.00 TO MP MI 11.957					
SCOPE: MILL AND FILL WITH OPEN GRADE, TRUCK PARKING IMPROVEMENTS					

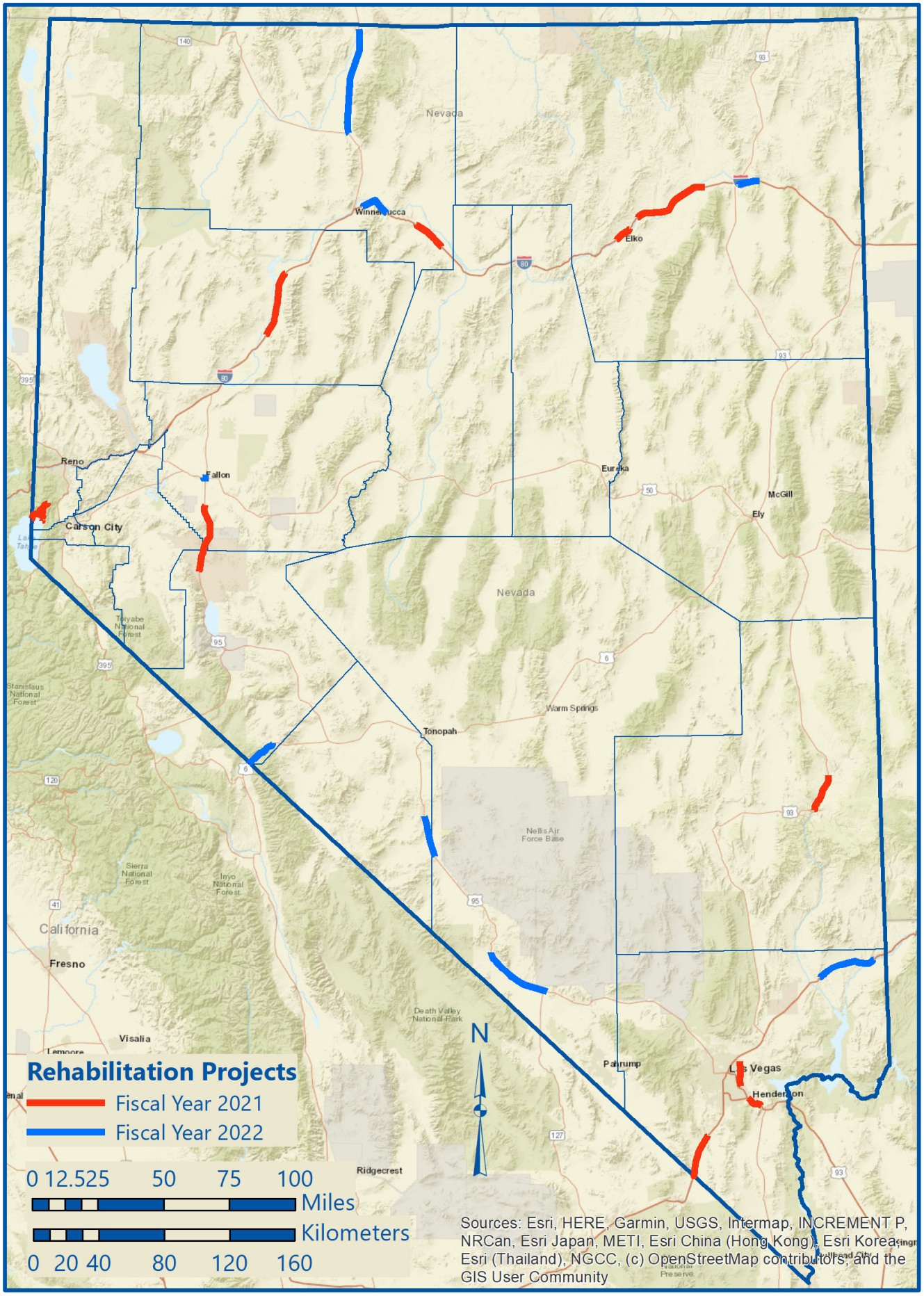

FIGURE 6. Rehabilitation Project Locations

COSTS OF CONSTRUCTION

The costs for maintenance and rehabilitation repair work on highways fluctuate over time. The periodic fluctuations are typically due to instabilities in the costs of road building materials such as asphalt, cement, and steel, as well as the fluctuations in energy costs. Although these fluctuations occasionally lead to price decreases, the general trend for maintenance and rehabilitation repair work costs is in the upward direction.

NDOT recognizes that these periodic cost fluctuations complicate the project planning process and cause uncertainty in the highway construction industry. NDOT tries to mitigate this uncertainty by sharing the risk with contractors through fuel and asphalt escalation clauses in project contracts. However, sharing the risk of cost fluctuations does not eliminate the overall long-term increase in construction costs as reported by the Associated General Contractors of America, the American Road and Transportation Builders Association, the Federal Highway Administration, and other data sources.

The Federal Highway Administration developed the National Highway Construction Cost Index (NHCCI) to measure average changes in the prices of highway construction costs over time. This index is based on pricing information contained in winning highway construction contracts. FIGURE 7 shows the NHCCI index from March 2003 through March 2022. From 2010-2020, the cost trend was a modest 3.5% increase per year. However, starting in 2021, costs have been steadily rising at an annual rate of nearly 20%. When compared to a general index such as the Producer Price Index (PPI) published by the Bureau of Labor Statistics (BLS), the NHCCI exhibits similar patterns, but faster growth. This relationship suggests that the costs of road construction are generally outpacing normal inflation, which further strains the ability to provide necessary funding.

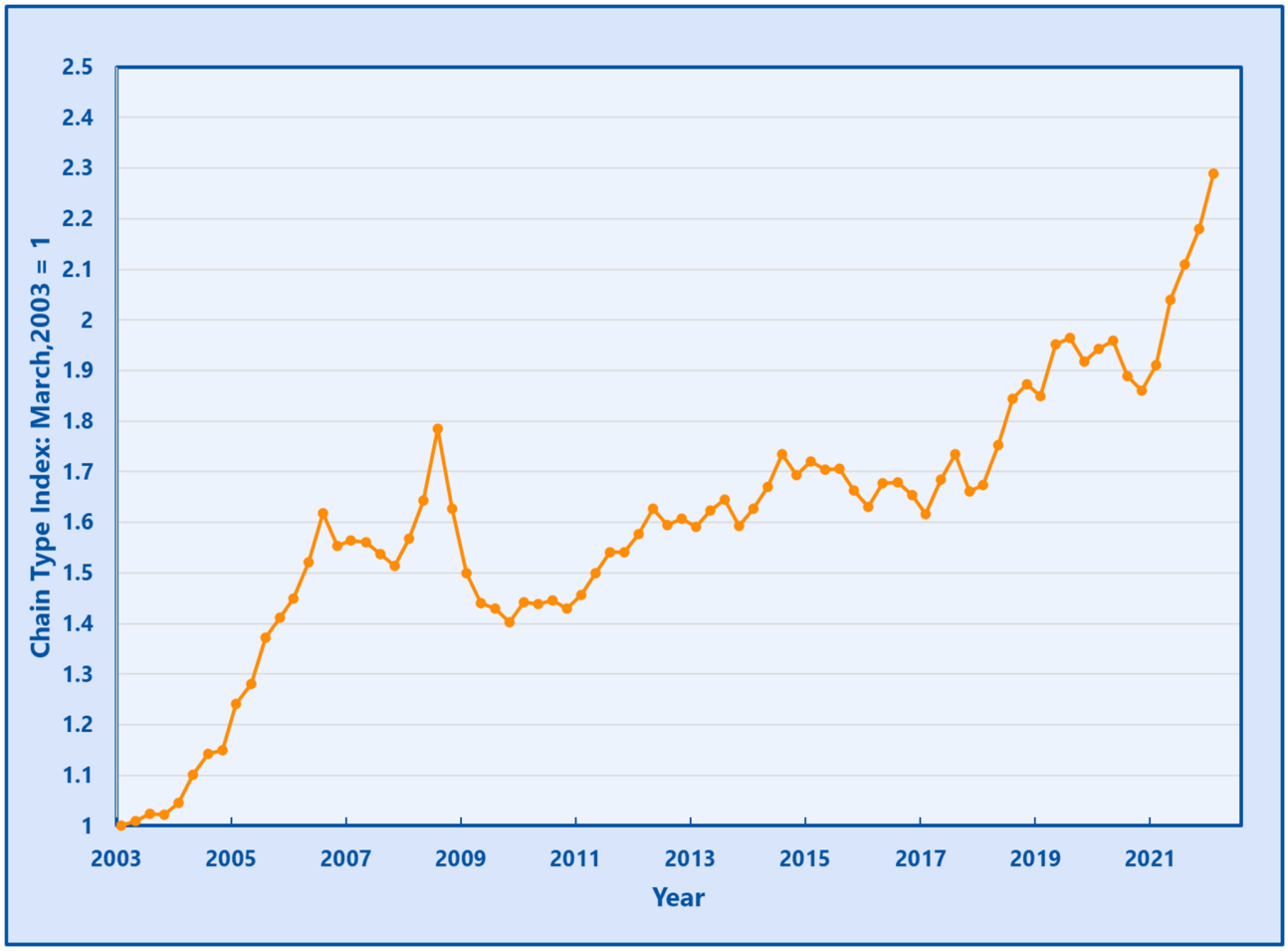

FIGURE 7. National Highway Construction Cost Index (NHCCI)

Source: Federal Highway Administration.

A significant portion of NDOT funding for road construction projects comes from fuel taxes, which have not provided revenue that keeps up with inflation. Because of this, the purchasing power of the revenue for road construction is approximately forty percent of what it was in 1992. Future revenue from fuel taxes will see even more pressure with increasing fuel economy standards and the accelerating adoption of electric vehicles.

PAVEMENT CONDITION

A safe, efficient, and reliable roadway network is a matter of regional importance and promotes the general welfare of all people that live, work, and play in the state. Nevada's pavement has ranked in the top one-half in the nation for the last several years as compared with the overall highway performance and efficiency of other states' roadway networks as reported in the *Annual Highway Report* by the *Reason Foundation*. NDOT uses the PSI pavement condition rating system previously discussed and graphically shown in FIGURE 2 to evaluate and report the condition of the roadway network. TABLE 6 presents the PSI condition data for each road prioritization category on the state-maintained roadway network. Category 1 is divided into asphalt (A) and Portland Cement Concrete (C) surfaces for further clarity.

TABLE 6. PSI Pavement Condition by Road Prioritization Category

Condition	PSI Rating Scale	PSI Condition by Road Prioritization Category Percentage (%) and Centerline Miles						
		Road Category 1		Road Category 2	Road Category 3	Road Category 4	Road Category 5	Roadway Network Totals
		A	C					
Very Good	5.00 to 4.00	74.0% 401.9	6.2% 5.9	40.2% 427.4	21.6% 235.0	5.7% 46.6	0.2% 2.6	**21.4% 1,119**
Good	3.99 to 3.50	21.0% 113.8	30.2% 29.0	37.0% 393.5	44.0% 478.2	37.5% 308.4	11.5% 185.3	**28.9% 1,508**
Fair	3.49 to 3.00	4.4% 23.7	37.2% 35.6	13.1% 139.5	22.2% 240.9	33.9% 278.9	28.8% 465.7	**22.7% 1,185**
Mediocre	2.99 to 2.50	0.6% 3.4	22.7% 21.8	6.0% 64.0	9.7% 104.9	17.0% 140.1	33.9% 547.6	**16.9% 882**
Poor	2.49 to 2.00	0.0% 0.1	3.4% 3.2	2.6% 27.3	2.1% 22.6	4.9% 40.6	15.5% 251.4	**6.6% 345**
Very Poor	< 2.00	0.0% 0.0	0.4% 0.3	1.0% 10.9	0.4% 4.6	1.0% 8.6	10.2% 164.9	**3.6% 189**
Total Miles:		**639**		**1,063**	**1,086**	**823**	**1,618**	**5,229**

* 1) Data as reported in the 2021 PMS Data Warehouse.
2) The reported total of 5,229 miles includes only those roadways that were surveyed in 2021.The total state-maintained roadway network mileage of 5,378 miles mentioned in the Roadway Network Inventory section of the report is the mileage count that includes all roads.

FIGURE 8 is a map of the state's roadway network inventory identified by the PSI rating system. FIGURES 9 through 13 are maps of road prioritization categories 1 through 5 identified by the PSI rating system.

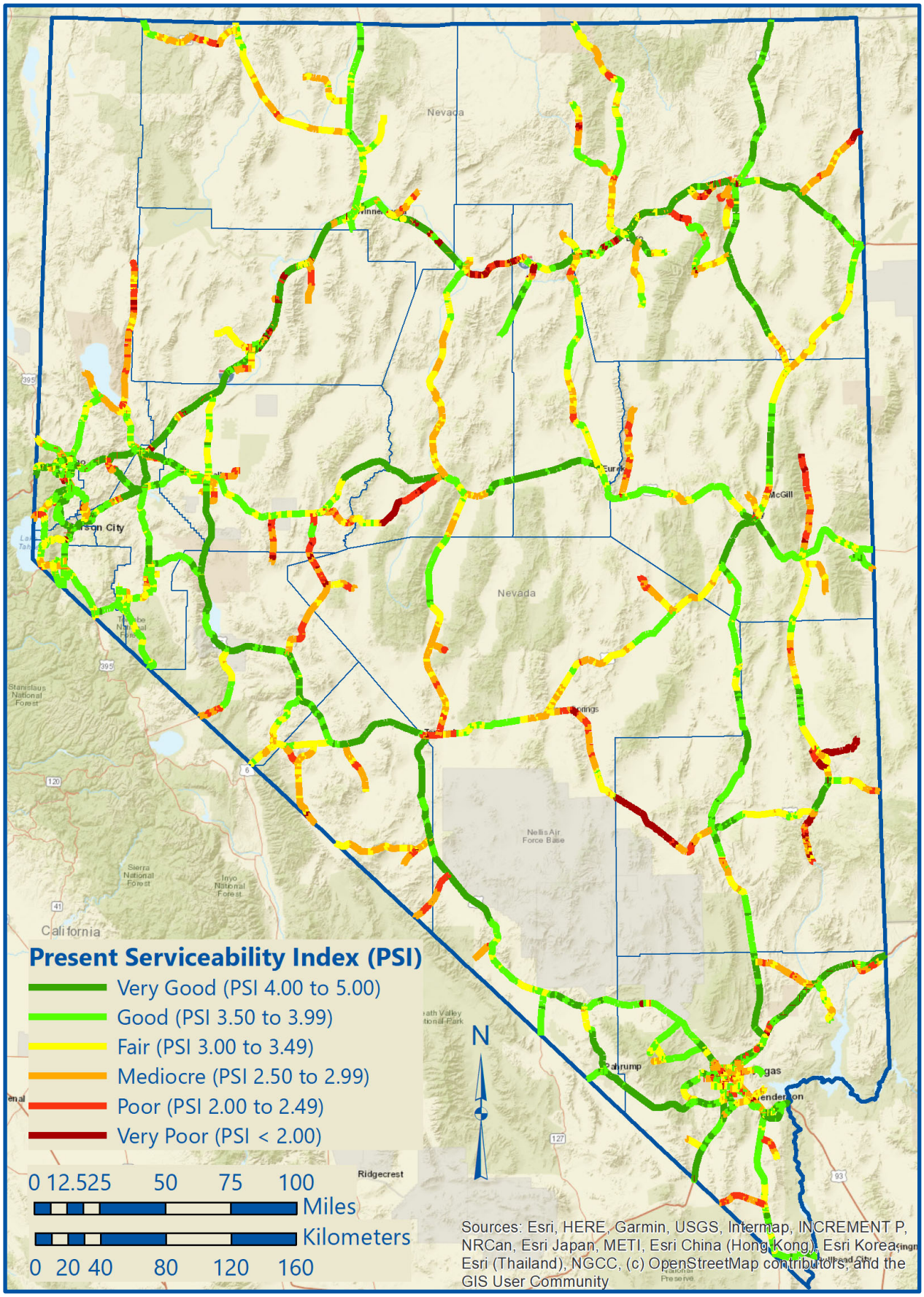

FIGURE 8. Roadway Network Inventory Identified by Present Serviceability Index (PSI)

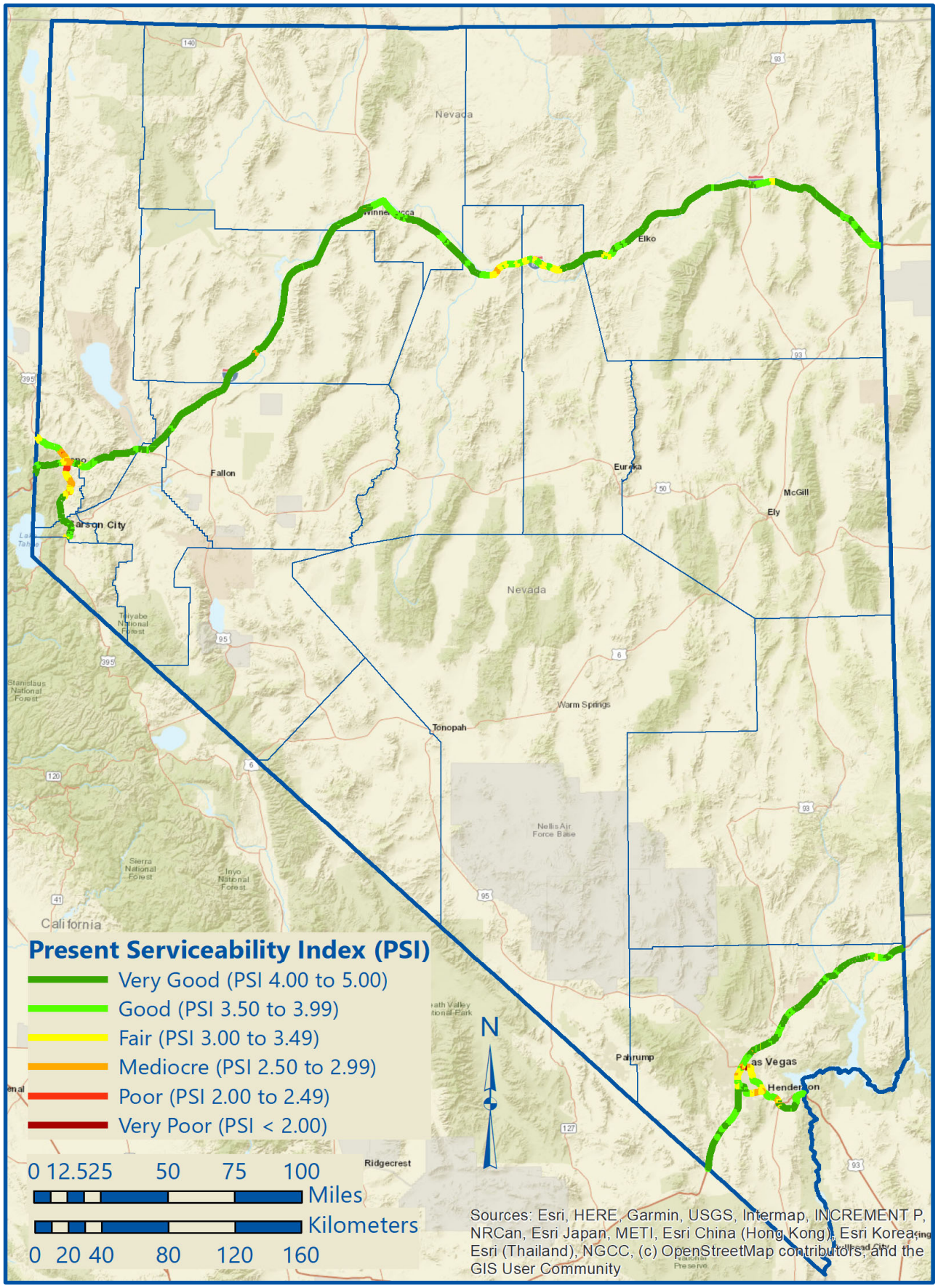

FIGURE 9. Road Prioritization Category 1 by Present Serviceability Index (PSI)

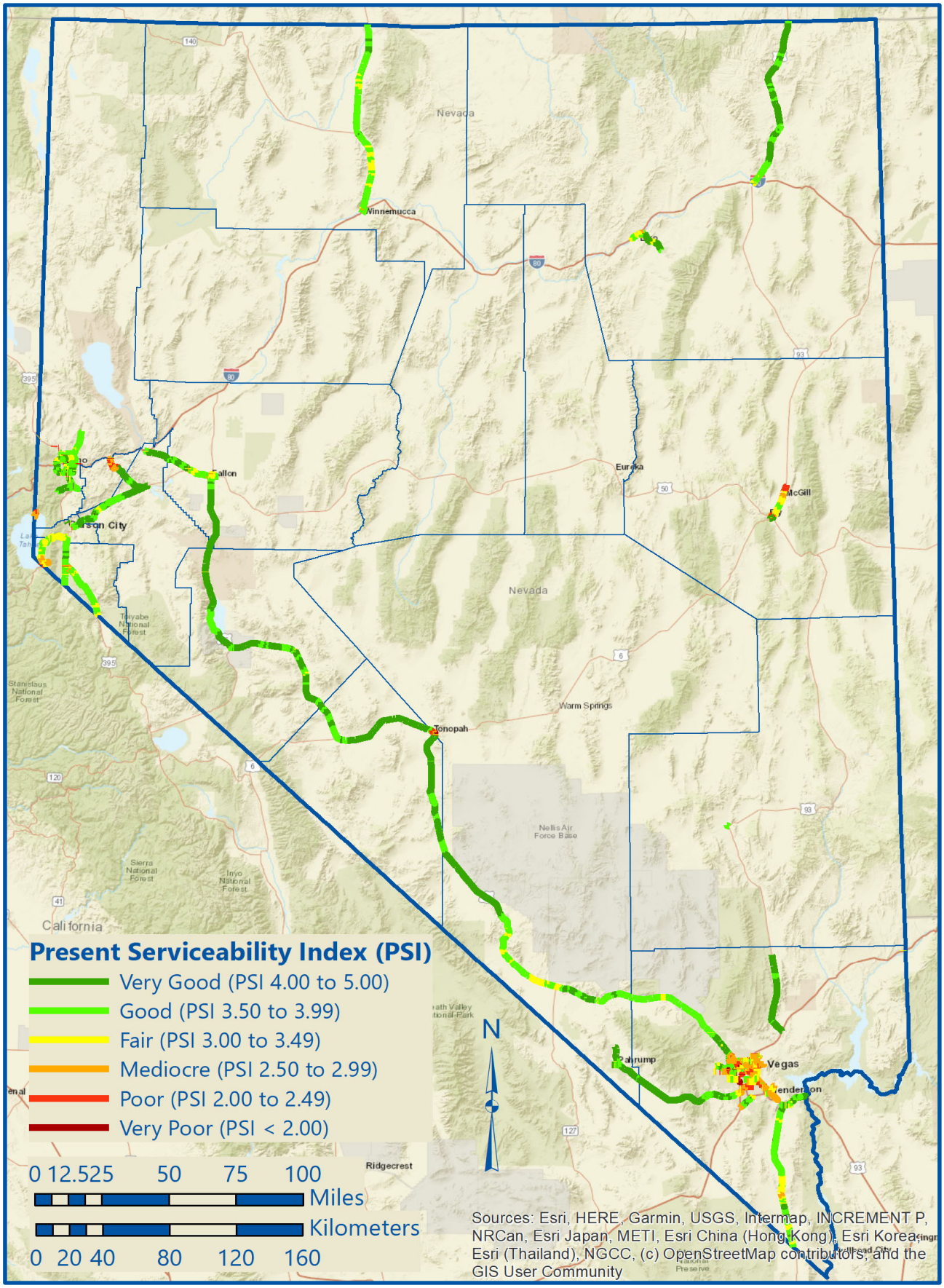

FIGURE 10. Road Prioritization Category 2 by Present Serviceability Index (PSI)

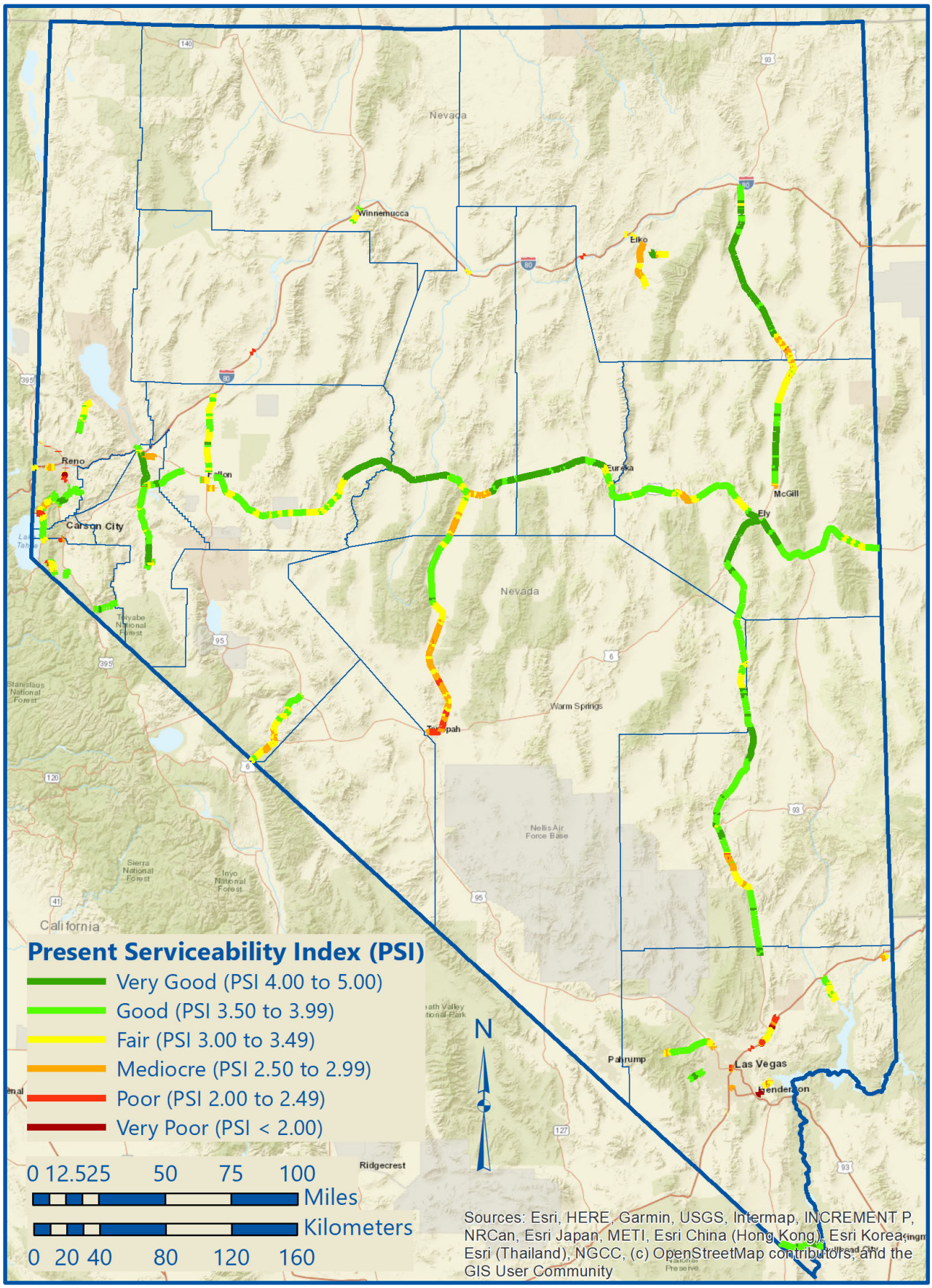

FIGURE 11. Road Prioritization Category 3 by Present Serviceability Index (PSI)

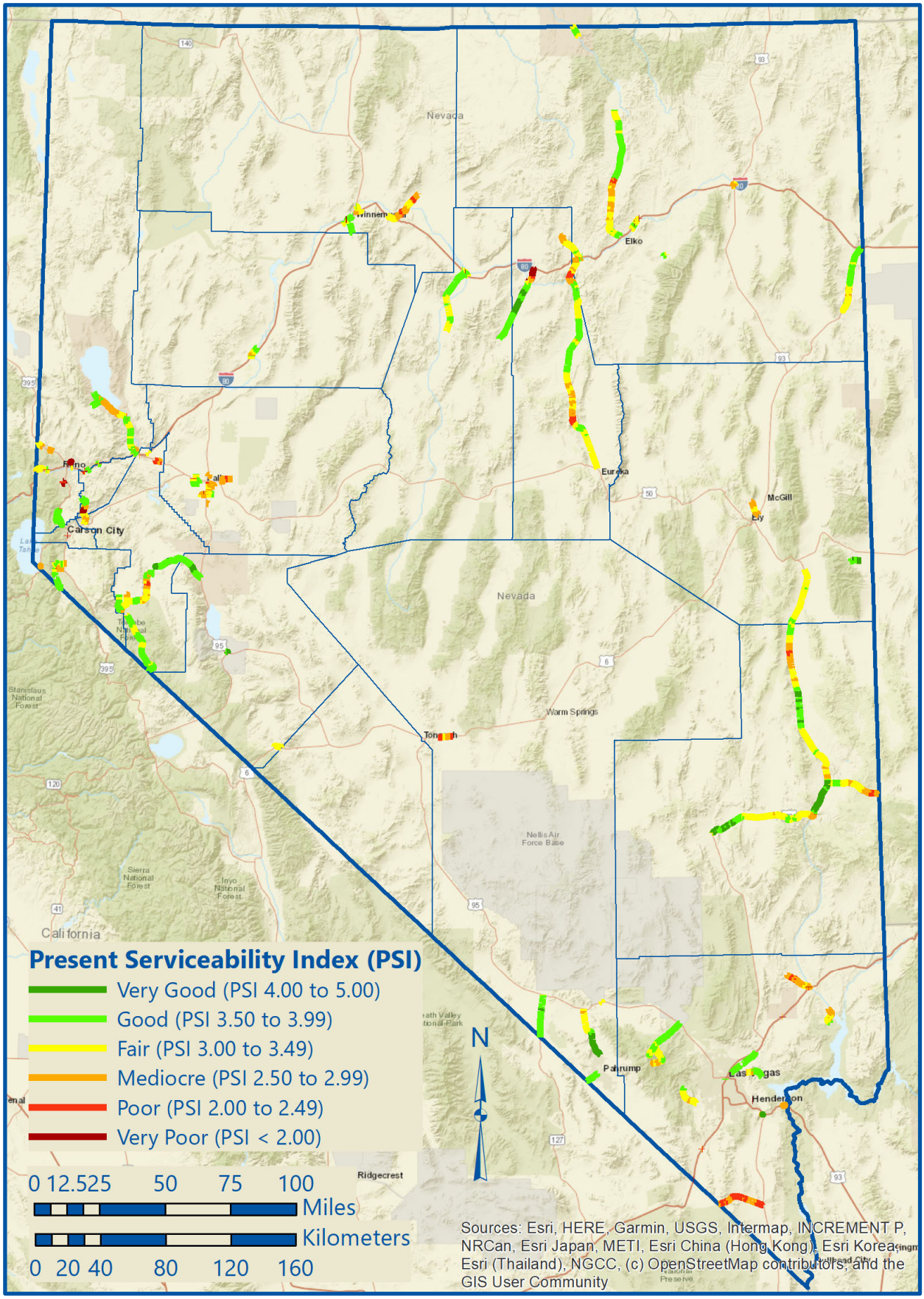

FIGURE 12. Road Prioritization Category 4 by Present Serviceability Index (PSI)

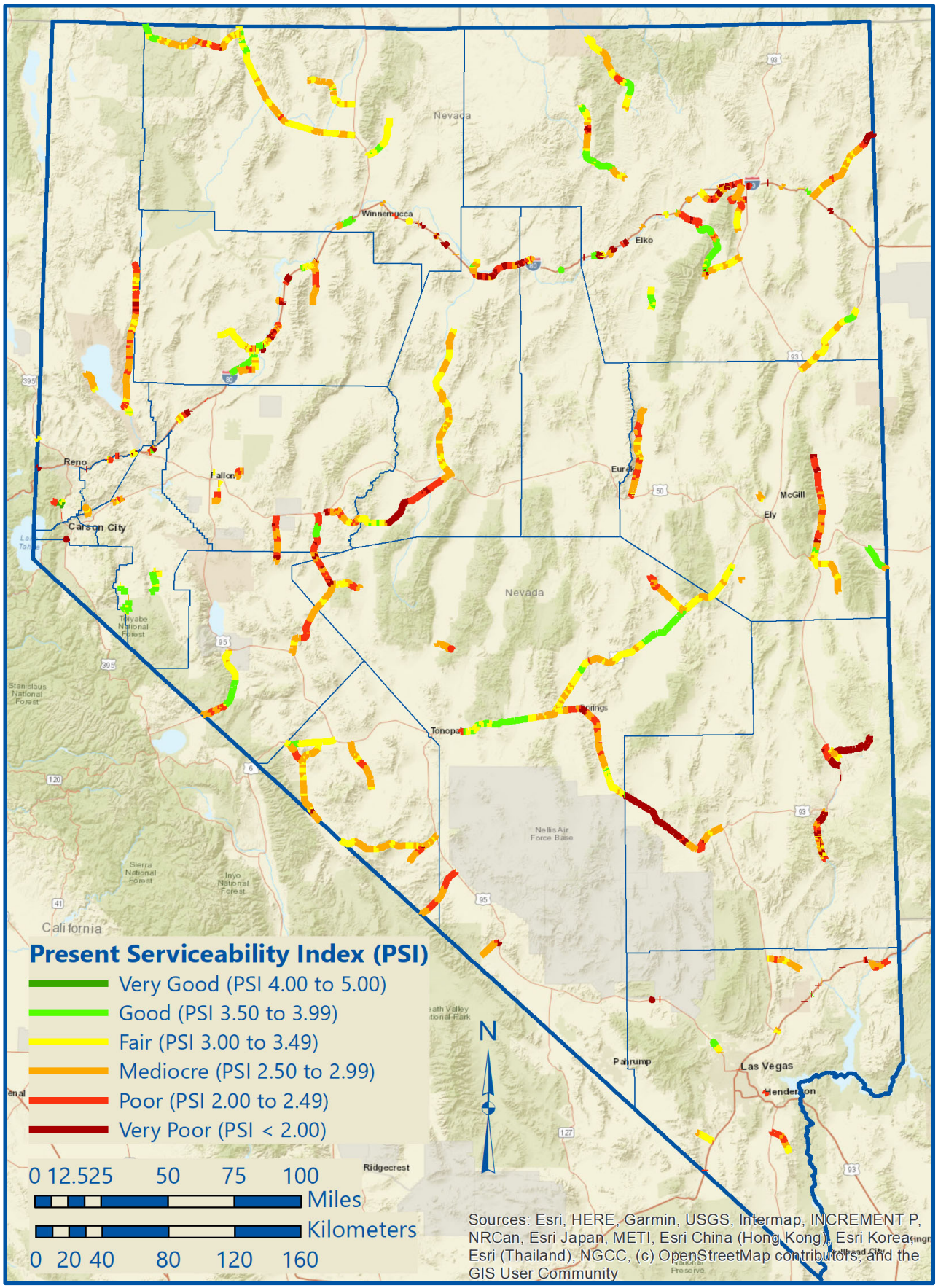

FIGURE 13. Road Prioritization Category 5 by Present Serviceability Index (PSI)

NDOT partitions the state into three districts in order to effectively manage the state's pavement assets. District 1 includes Clark, Esmeralda, Lincoln, and most of Nye County. District 2 is comprised of most of Carson City, Churchill, Douglas, Lyon, Mineral, Pershing, Storey, and Washoe Counties. District 3 consists of the majority of Elko, Eureka, Humboldt, Lander, and White Pine Counties. TABLE 7 shows the pavement condition in each district identified by the PSI rating system, and TABLE 8 shows the pavement condition in each county identified by the PSI rating system.

TABLE 7. District Pavement Condition by Present Serviceability Index (PSI)

District	Average PSI Condition by Road Prioritization Category and Miles per District				
	Road Category 1	Road Category 2	Road Category 3	Road Category 4	Road Category 5
District 1	3.89 177 mi	3.75 567 mi	3.35 318 mi	3.36 286 mi	2.71 538 mi
District 2	4.04 196 mi	3.79 318 mi	3.60 289 mi	3.32 224 mi	2.86 310 mi
District 3	4.10 266 mi	3.76 178 mi	3.79 479 mi	3.35 313 mi	2.83 769 mi
Total All Districts	**4.02 639 mi**	**3.77 1063 mi**	**3.61 1086 mi**	**3.34 823 mi**	**2.80 1618 mi**

TABLE 8. County Pavement Condition by Present Serviceability Index (PSI)

County	Average PSI Condition by Road Prioritization Category and Miles per County				
	Road Category 1	Road Category 2	Road Category 3	Road Category 4	Road Category 5
Carson City	4.04 9.6 mi	3.49 12.5 mi	3.4 4.1 mi	1.63 0.3 mi	2.32 0.7 mi
Churchill	4.26 29.3 mi	3.98 49.0 mi	3.62 132.0 mi	3.01 29.3 mi	2.49 69.4 mi
Clark	3.89 177.0 mi	3.55 314.1 mi	3.37 84.8 mi	3.14 92.5 mi	2.74 56.2 mi
Douglas	Not Applicable	3.53 59.4 mi	3.55 24.1 mi	3.39 19.0 mi	Not Applicable
Elko	4.22 132.7 mi	3.98 83.3 mi	3.73 101.8 mi	3.31 103.7 mi	2.89 273.9 mi
Esmeralda	Not Applicable	4.1 96.7 mi	Not Applicable	Not Applicable	2.9 140.6 mi
Eureka	3.78 25.9 mi	Not Applicable	3.98 47.3 mi	3.33 109.1 mi	2.19 6.2 mi
Humboldt	4.06 61.4 mi	3.67 77.6 mi	3.48 3.9 mi	3.19 28.5 mi	3.03 167.8 mi
Lander	3.62 26.9 mi	Not Applicable	3.71 75.4 mi	3.58 39.3 mi	2.54 136.7 mi
Lincoln	Not Applicable	3.64 1.0 mi	3.63 98.7 mi	3.43 142.7 mi	2.01 105.5 mi
Lyon	4.31 14.3 mi	4.01 51.0 mi	3.73 66.1 mi	3.4 80.0 mi	3.44 34.9 mi
Mineral	Not Applicable	4.11 92.2 mi	3.36 35.2 mi	3.76 15.2 mi	2.86 62.3 mi
Nye	Not Applicable	3.92 130.1 mi	3.28 126.0 mi	3.59 47.4 mi	2.94 249.7 mi
Pershing	4.42 75.1 mi	Not Applicable	2.34 0.3 mi	3.04 8.2 mi	2.84 110.8 mi
Storey	Not Applicable	3.14 10.4 mi	3.78 1.8 mi	3.19 9.0 mi	2.91 3.3 mi
Washoe	3.69 86.7 mi	3.55 68.4 mi	3.42 60.8 mi	3.3 66.3 mi	2.73 66.6 mi
White Pine	Not Applicable	3.09 17.0 mi	3.76 223.9 mi	3.36 32.7 mi	2.82 132.9 mi
Total All Counties	**4.02 639 mi**	**3.77 1063 mi**	**3.61 1086 mi**	**3.34 823 mi**	**2.8 1618 mi**

Past condition data were reviewed using the PSI pavement condition rating system to determine if the funds spent to perform maintenance and rehabilitation repair work were adequate to maintain or improve the average condition of the roadway network. FIGURES 14 through 19 are the results of this review. The most recent year included in each figure is 2021 – the most recent year for which performance data is available. FIGURE 14 demonstrates the overall average PSI for the entire roadway network has been in the upper part of the fair range, with a generally stable trend.

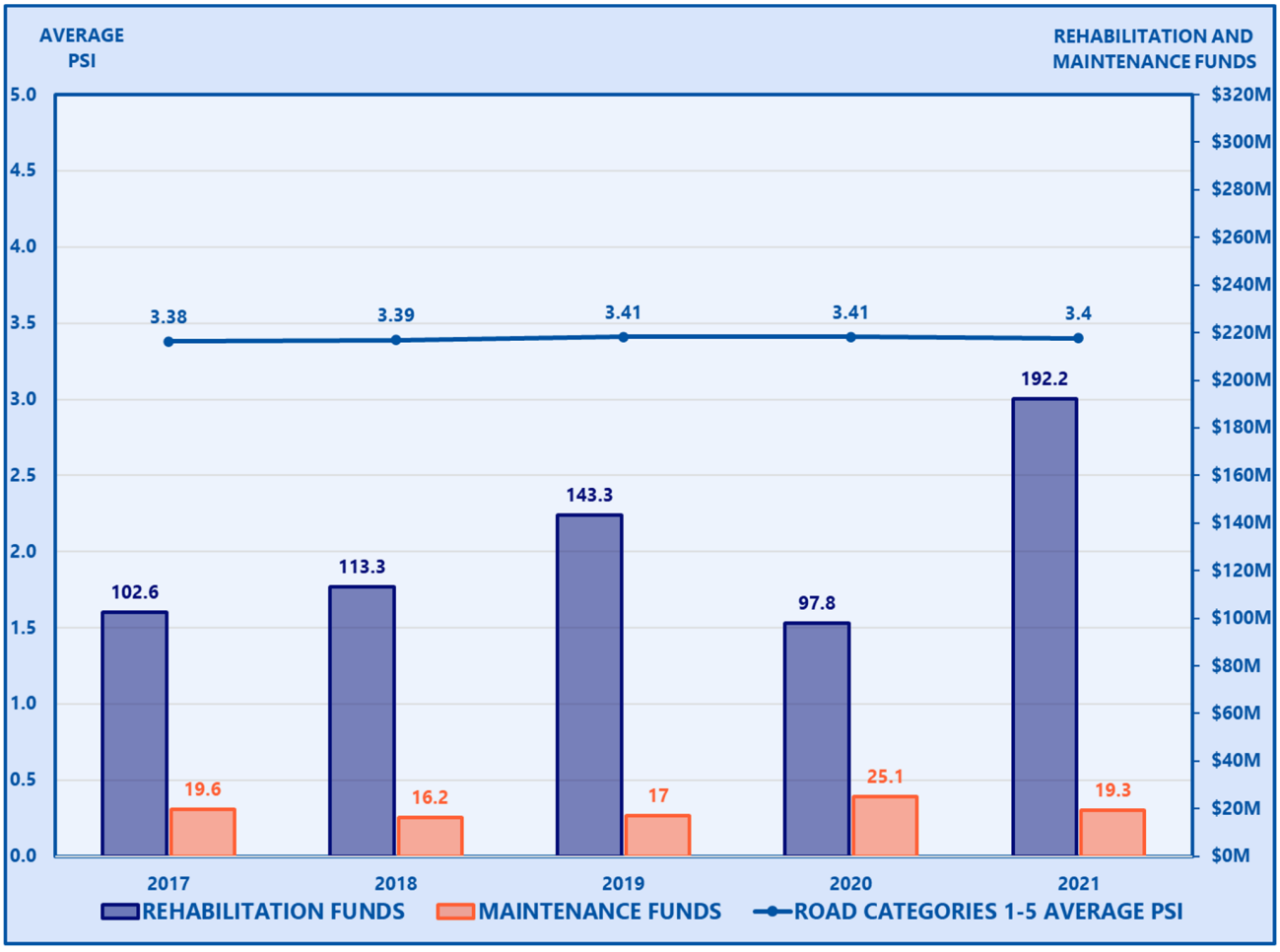

FIGURE 14. Average PSI and Expenditures for Roadway Network

FIGURE 15 illustrates the long-term average PSI for road category 1 and the rehabilitation and maintenance expenditure for each year from 2017 through 2021. Category 1 roads include the controlled access highways such as I-15, I-580, and I-80. Due to interstate economic importance, increased federal condition requirements, and the relatively high volumes and speeds encountered on these routes, they are given the highest priority. Because of this, NDOT spends a substantial amount of the rehabilitation funds to maintain these roads in good condition each year. An average of over $60 million per year has been spent on these roads since 2017. In this time, the overall condition has risen from just outside to just inside the very good category.

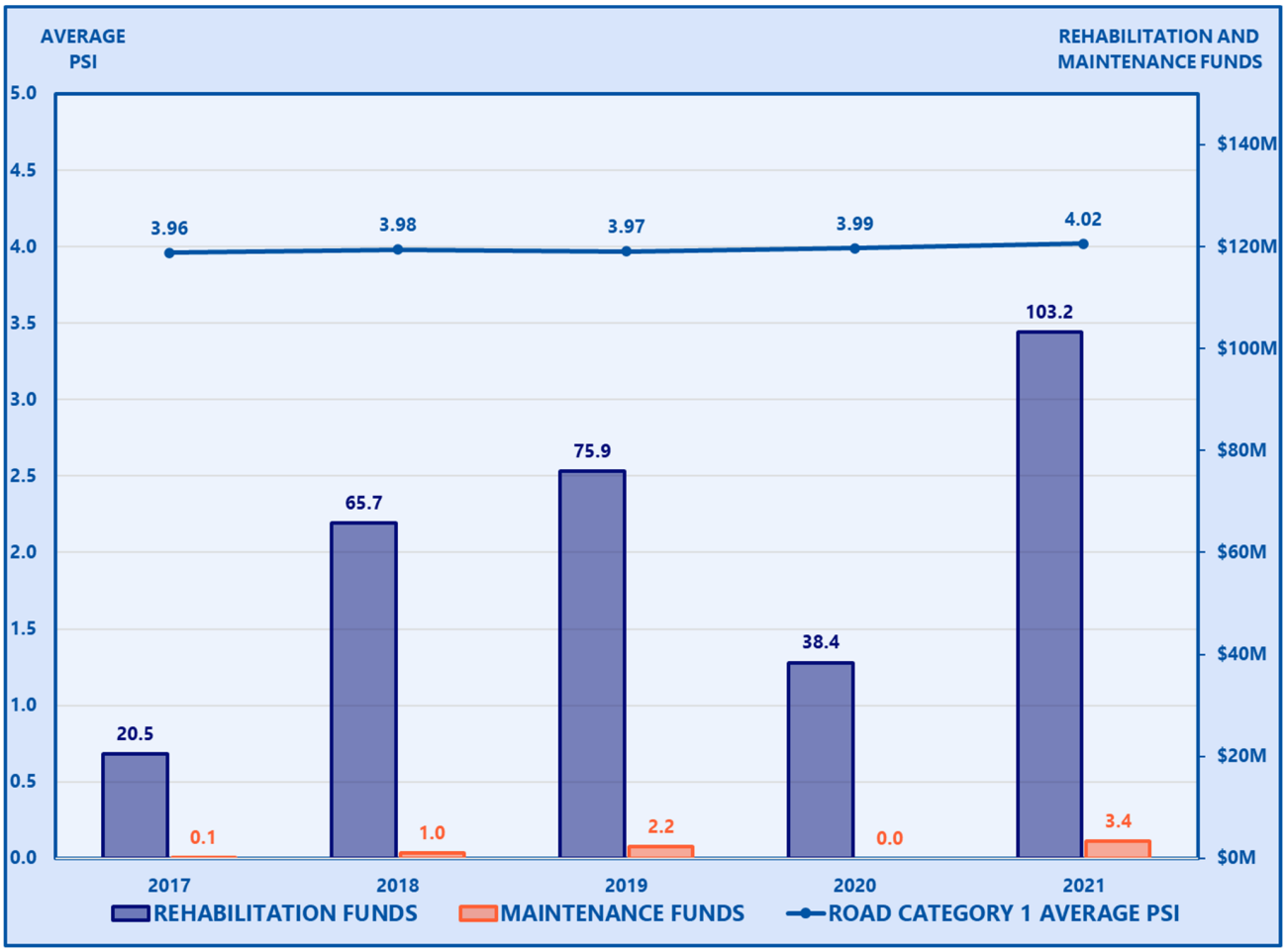

FIGURE 15. Average PSI and Expenditures for Road Category 1

FIGURE 16 shows the long-term average PSI for road category 2 and the rehabilitation and maintenance expenditure for each year from 2017 through 2021. Category 2 roads include routes such as St. Rose Parkway/Lake Mead Drive, US-50 Lincoln Highway in Carson City, and McCarran Boulevard in Reno. The average PSI has remained in good condition through this period, but was declining until 2021. Category 2 roads were previously not meeting performance targets, which led to consistently increasing spending from 2018 to 2021. This increased spending has led to increased performance, and category 2 roads are now meeting performance targets, and should continue to do so.

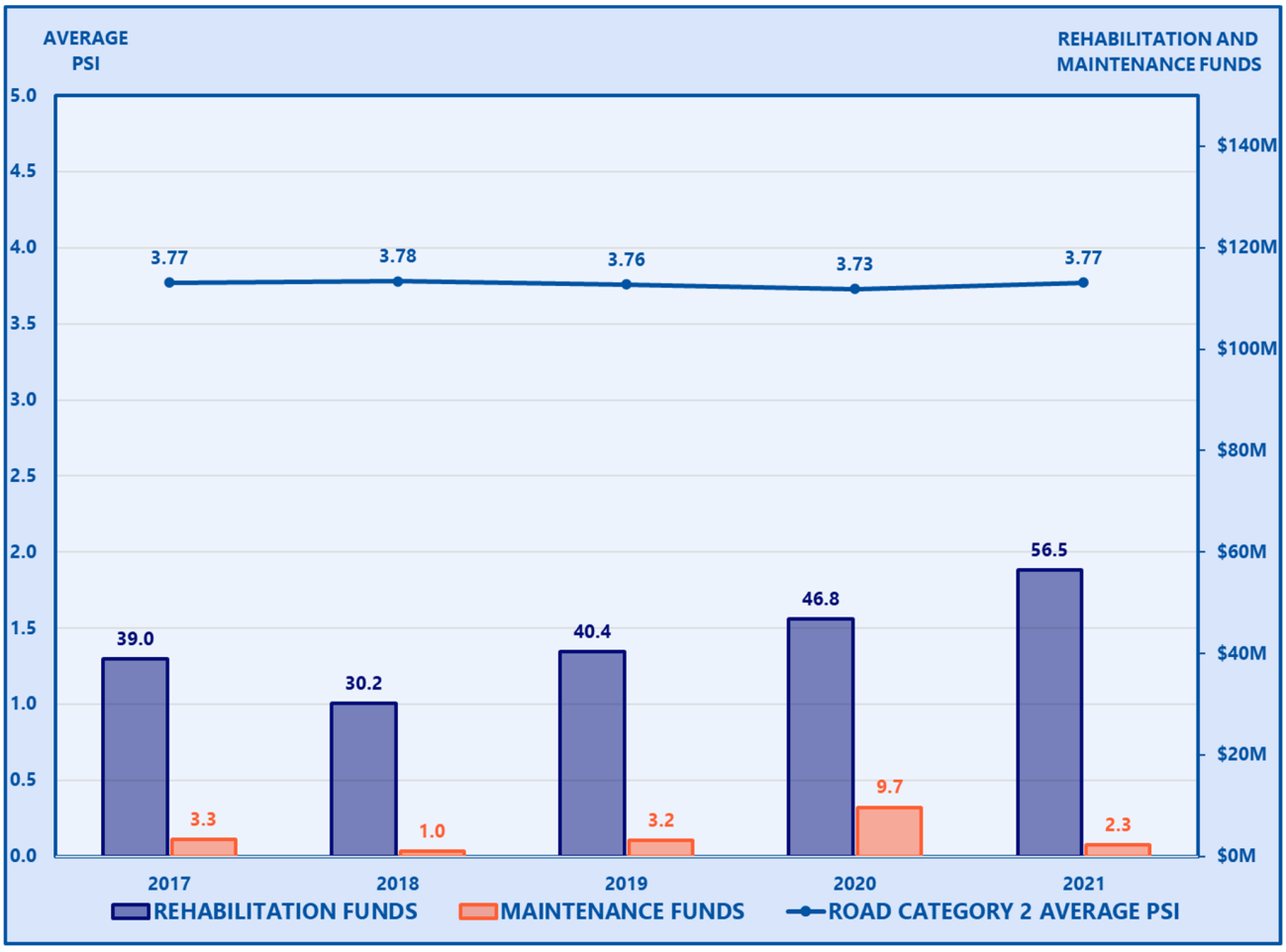

FIGURE 16. Average PSI and Expenditures for Road Category 2

FIGURE 17 displays the long-term average PSI for road category 3 and the rehabilitation and maintenance expenditure for each year from 2017 through 2021. Category 3 roads include routes such as SR-318/Sunnyside Road in Nye County, SR-28 near Lake Tahoe, and US-50 Lincoln Highway in Lander/Eureka Counties. The average PSI has been solidly in good condition but slightly declining. The decline was generally expected because this category of roads was performing well above target levels, and therefore not given priority in spending. As the condition approaches the target, the performance should stabilize. Average funding for road category 3 has been less than $20 million per year since 2017, which is less than necessary for the desired long-term performance of these roads.

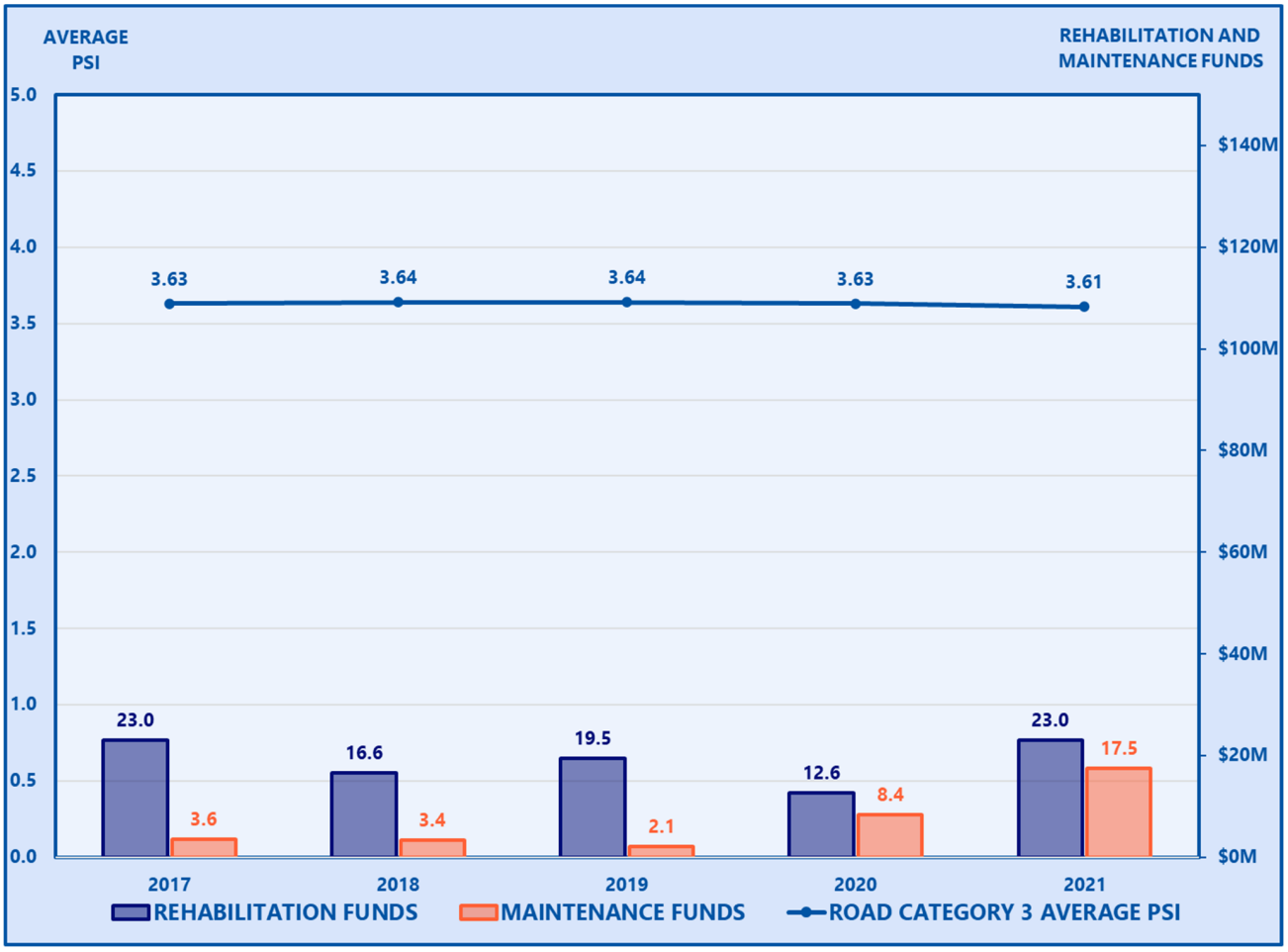

FIGURE 17. Average PSI and Expenditures for Road Category 3

FIGURE 18 demonstrates the long-term average PSI for road category 4 and the rehabilitation and maintenance expenditure for each year from 2017 through 2021. Category 4 roads include routes such as SR-373/ Death Valley Junction Road, SR-319/ Panaca Road, and SR-278/Eureka-Carlin Road. The average PSI has been steadily in the fair category for some time, and it is projected that category 4 roads will stay in fair condition on average despite the limited funding they receive. Average rehabilitation spending in category 4 is only about $6.6 million per year since 2017, but this category also receives significant rehabilitation funding of over $4 million per year, which helps maintain performance.

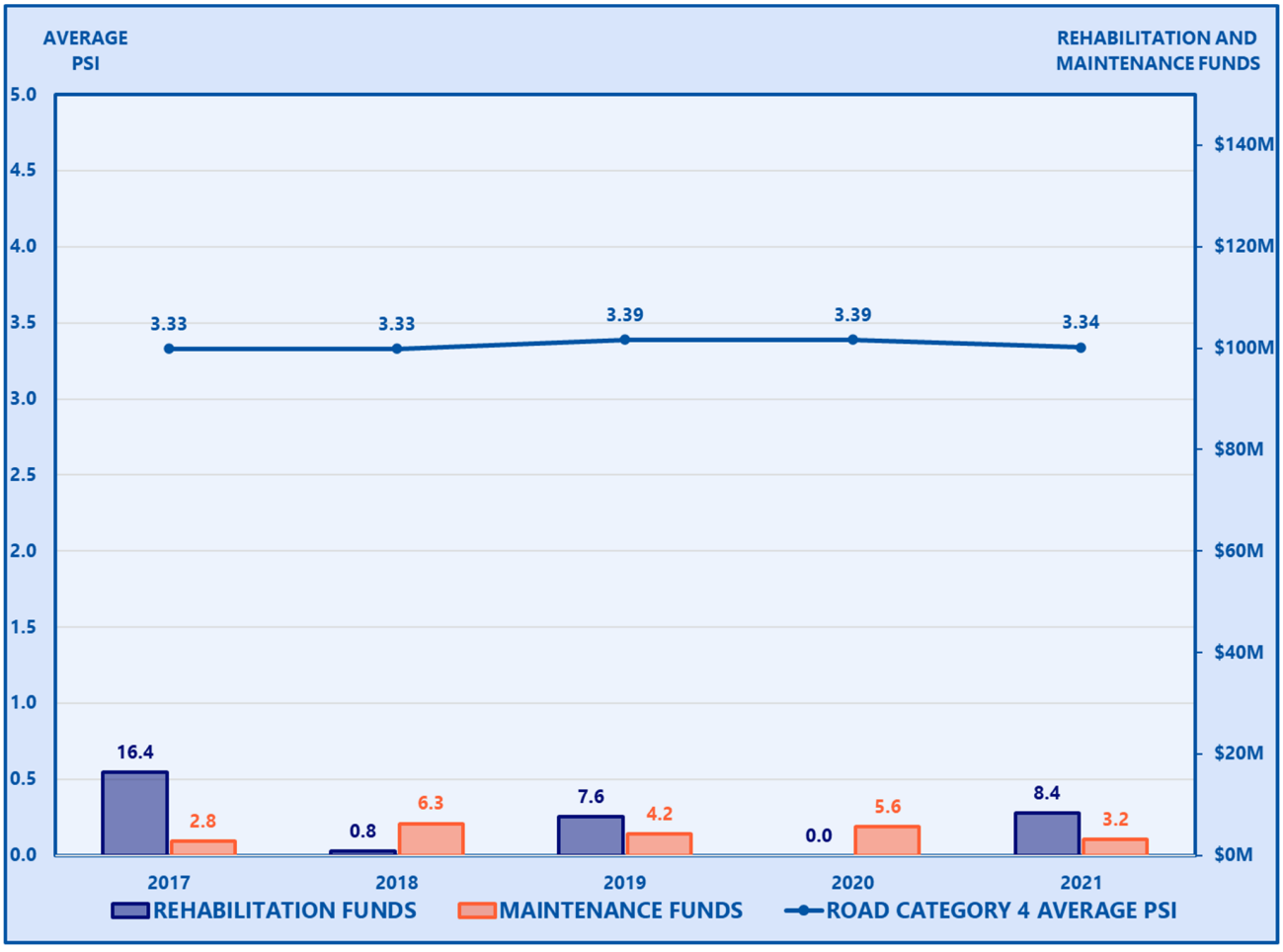

FIGURE 18. Average PSI and Expenditures for Road Category 4

FIGURE 19 presents the long-term average PSI for road category 5 and the rehabilitation and maintenance expenditure for each year from 2015 through 2019. Category 5 roads include routes such as SR-140/Denio-Adel Road, SR-375/Warm Springs Road, and SR-722/Carrol Summit Road. These roads have been in the middle of the mediocre range for a long time. Because of the generally low volume and network importance of category 5 roads, they receive very little rehabilitation funding, though the additional $5 million plus in maintenance funds they receive each year help stabilize performance. This category of roads has been performing below target for some time, and increased spending is expected. This should result in the average PSI increasing slowly over time as the new target is reached. However, this modest target will still likely be met without average condition improving beyond the mediocre range.

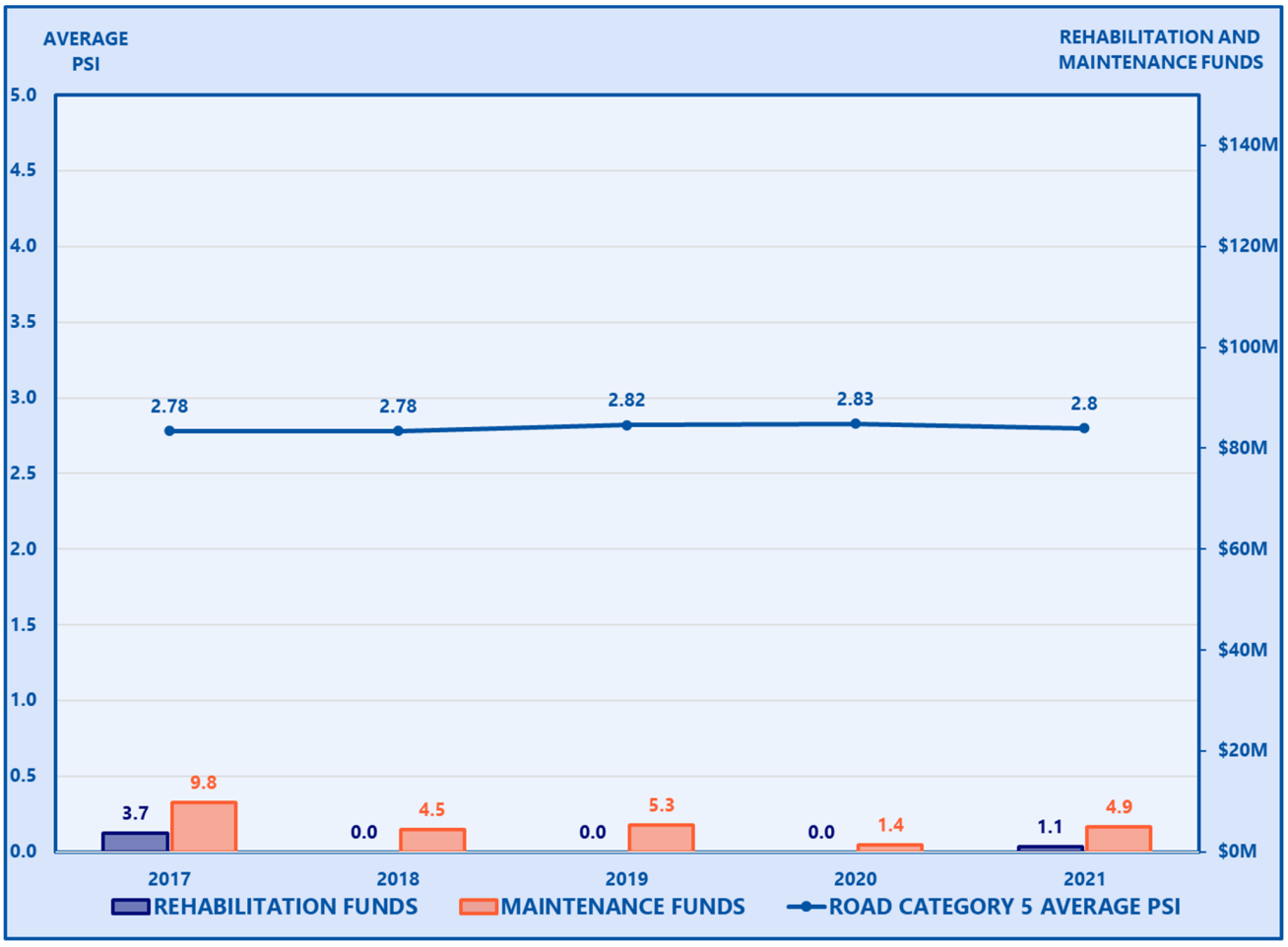

FIGURE 19. Average PSI and Expenditures for Road Category 5

PAVEMENT CONDITION GOAL

A pavement condition goal has been established to provide a measure of the effectiveness of the maintenance and rehabilitation repair work that is performed on state roads. Careful consideration was used to balance the cost of rehabilitation at varying pavement condition levels with the availability of funds. Other criteria used in the process included pavement deterioration rates, the effectiveness of maintenance repair work, traffic volume, the number of heavy trucks, and the cost to repair or replace roads in each road prioritization category. The current performance goal is 95% fair or better for category 1, 90% for category 2, 85% for category 3, 75% for category 4, and 50% for category 5.

TABLE 9 lists the current status of each road category with respect to the established pavement condition goal. Category 1 is divided into asphalt (A) and Portland Cement Concrete (C) categories for clarity. The data shows that category 1, 2, 3, and 4 roads meet or exceed the goal, and category 5 roads are well below the goal.

TABLE 9. Pavement Condition Versus Established Goal by Road Category

Condition	PSI Rating Scale	PSI Condition by Road Prioritization Category Percentage (%) and Number of Miles						
		Road Category 1		Road Category 2	Road Category 3	Road Category 4	Road Category 5	Roadway Network Totals
		A	C					
Very Good	5.00 to 4.00	74.0% 401.9	6.2% 5.9	40.2% 427.4	21.6% 235.0	5.7% 46.6	0.2% 2.6	**21.4% 1,119**
Good	3.99 to 3.50	21.0% 113.8	30.2% 29.0	37.0% 393.5	44.0% 478.2	37.5% 308.4	11.5% 185.3	**28.9% 1,508**
Fair	3.49 to 3.00	4.4% 23.70	37.2% 35.60	13.1% 139.50	22.2% 240.90	33.9% 278.90	28.8% 465.70	**22.7% 1,185**
Mediocre	2.99 to 2.50	0.6% 3.4	22.7% 21.8	6.0% 64.0	9.7% 104.9	17.0% 140.1	33.9% 547.6	**16.9% 882**
Poor	2.49 to 2.00	0.0% 0.1	3.4% 3.2	2.6% 27.3	2.1% 22.6	4.9% 40.6	15.5% 251.4	**6.6% 345**
Very Poor	< 2.00	0.0% 0.0	0.4% 0.3	1.0% 10.9	0.4% 4.6	1.0% 8.6	10.2% 164.9	**3.6% 189**
Total Miles:		**639**		**1,063**	**1,086**	**823**	**1,618**	**5,229**
Condition Goal: Min. Percentage of Roads in Fair or Better Condition		**95%**		**90%**	**85%**	**75%**	**50%**	
Current Condition: Percentage of Roads in Fair or Better Condition		**95.5%**		**90.4%**	**87.8%**	**77.0%**	**40.4%**	**72.9%**
Does the current condition meet the condition goal?		**YES**		**YES**	**YES**	**YES**	**NO**	**----**

FIGURE 20 displays the percentage of miles per road category as identified by the PSI pavement condition rating system. The majority of the pavement in road categories 1 through 4 is in fair or better condition. The majority of pavement in road category 5 is in mediocre or worse condition.

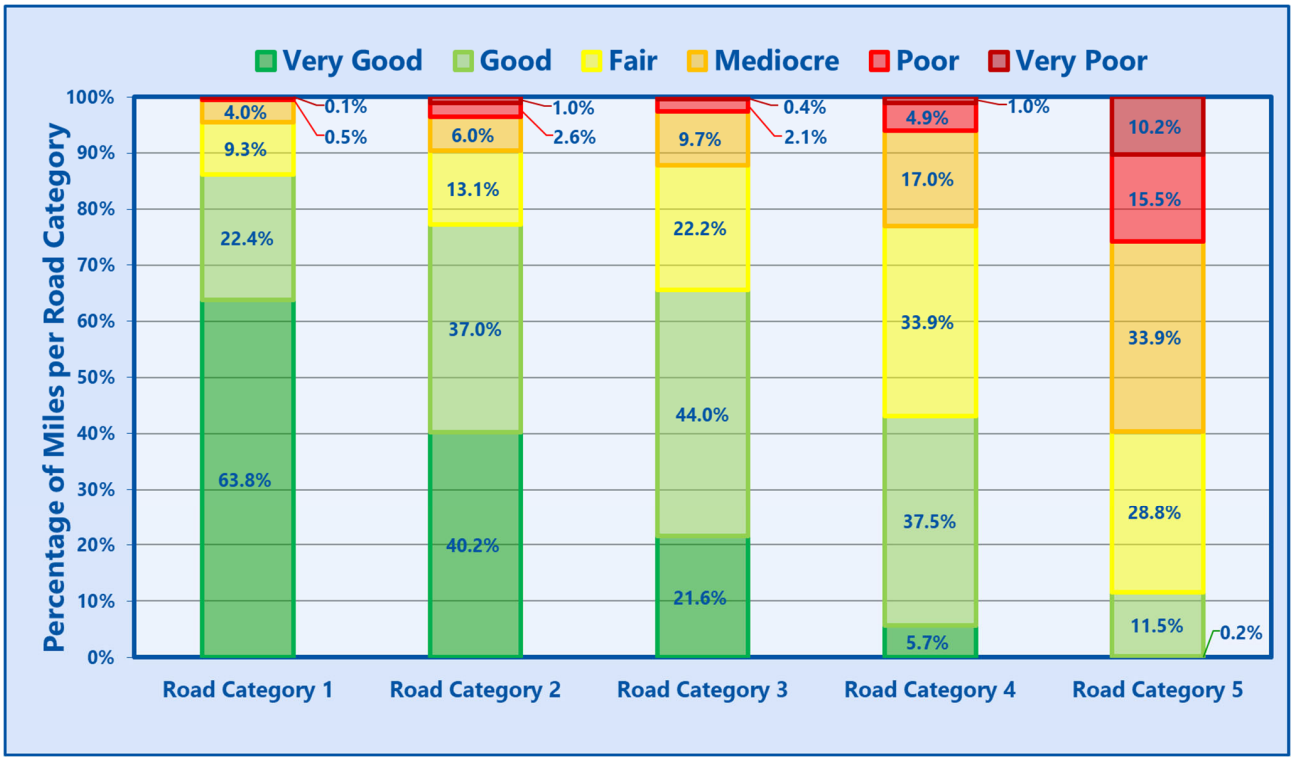

FIGURE 20. Percentage of Miles per Road Category and Pavement Condition

This shows that each successive category has generally less very good and good roads, and generally more mediocre, poor, and very poor roads. It is also worth noting that even though the percent fair or better for Category 2 and 3 is not much lower than that for Category 1, fair and good roads make up a much higher portion of those roads, whereas Category 1 is predominantly very good.

TRANSPORTATION ASSET MANAGEMENT PLAN CONSISTENCY

The Transportation Asset Management Plan (TAMP) establishes investment expectations for NDOT based on historical state revenue and the typical NDOT share of that revenue. Relevant to the highway preservation process, anticipated investments in pavement maintenance, preservation, rehabilitation, and reconstruction are set in this plan.

Although these specific work type categories are prescribed by FHWA, there is no common definition provided, and each agency must develop internal definitions. Consistent with what has been previously identified, NDOT uses the following work type definitions for this purpose:

- **Maintenance**. This category includes repairs that address surface deterioration, but that do not improve the pavement's ability to carry traffic loads - generally funded with Maintenance funds
- **Preservation**. Used more specifically when describing pavement treatments, preservation includes those treatments applied to roads in good condition in order to prevent further degradation and maintain a high level of service – generally funded with 3R funds.
- **Rehabilitation**. This category includes more substantial repairs that are applied when the pavement is in fair or worse condition to repair the structurally deficient section and provide a new surface the improves the pavement's ability to carry traffic loads – generally funded with 3R funds.
- **Reconstruction**. Reconstruction repairs are applied to roads that are damaged to the point where they require replacement or recycling of the bound layers, and potentially the base layers – generally funded with 3R funds.

In order to inform FHWA's annual determination of consistency under 23 U.S.C. 119 (23 CFR 515.13(b)), NDOT provides a breakdown of spending corresponding to each of these categories. TABLE 10 shows the individual category investment targets established in the TAMP, as well as the reported 2021 and 2022 investments.

TABLE 10. Transportation Asset Management Plan Investment Consistency

Work Type	TAMP Expected Investment	FY2021 Investment	FY2022 Investment
Maintenance	$25,000,000	$28,619,298 114%	$32,426,401 130%
Preservation	$35,000,000	$93,199,212 266%	$76,785,940 219%
Rehabilitation	$35,000,000	$65,819,385 188%	$44,168,784 126%
Reconstruction	$5,000,000	$35,722,167 714%	$8,964,402 179%

From this, we can see that each year, NDOT has exceeded investment commitments in each work type category, and often significantly so. These numbers are somewhat different from those used elsewhere in this report because of differences in how the spending is accounted for and which projects are specifically included in the defined time period.

ADEQUACY OF PAVEMENT PRESERVATION FUNDS

The adequacy of pavement preservation funds can be determined by comparing the current average spending and resulting condition to the spending necessary to meet the established pavement condition goal. In addition to the established goal of 95% fair or better for category 1, 90% for category 2, 85% for category 3, 75% for category 4, and 50% for category 5, there is also a general expectation that the overall network PSI should not significantly degrade.

Categories 1, 2, 3, and 4 currently meet the established pavement condition goal, and only category 5 does not. The percent fair or better for most of the categories appears stable. Categories 1, 2, and 4 are slightly better in 2021 than 2017, and categories 2 and 5 are slightly worse.

As was shown in FIGURES 14 through 19, the average PSI pavement condition for the entire network is generally stable. Overall, and within each category, the 2021 PSI is very similar to the 2017 PSI.

TABLE 11 is a summary of the average number of miles rehabilitated for years 2021 and 2022 as well as the average funding allocated to each category during that same time period.

TABLE 11. Average Investment of Preservation Funds by Category

Road Prioritization Category	1	2	3	4	5
Average Centerline Miles Rehabilitated	69.5	69.3	11.6	15.3	1.2
Average Lane Miles Rehabilitated	299.7	145.1	23.3	30.6	2.4
Current Average Funds per Year	$80.2M	$55.0M	$16.9M	$8.4M	$1.1M
Total Current Average Funds per Year	$161.6M				

TABLE 12 shows the investment necessary to meet and maintain the established fair or better goals. This investment allows underperforming category 5 to meet targeted performance within five years, and keeps all other categories from degrading. Approximately $205 million is necessary to keep the network in a state that meets this target.

TABLE 12. Funding Necessary to Meet and Maintain Fair or Better Targets

Road Prioritization Category	1	2	3	4	5
Average Centerline Miles Requiring Rehabilitation	44.1	34.3	36.7	25.7	69.6
Average Lane Miles Requiring Rehabilitation	194.8	111.1	75.3	51.6	139.5
Current Average Funds per Year	$83.8M	$54.9M	$31.1M	$13.9M	$20.9M
Total Current Average Funds per Year	$204.6M				

Comparing this with the previous spending shows that the total necessary to meet and maintain the currently established targets is $43 million more than what has been provided. Comparing Tables 11 and 12, it can be seen that categories 1 and 2 are receiving funding at adequate levels, categories 3 and 4 are receiving about 50% of what is required, and category 5 is receiving only about 5% of what is necessary to meet the target performance.

The significance of category 1 roads is clear in this spending, where they account for nearly 50% of the funds. This helps ensure that these high priority roads are not only maintained above 95% fair or better as a group, but are also not allowed to degrade significantly below their current levels.

While the recent $161.6 million is nearly 60% higher than historical spending levels, it is still somewhat lower than what is necessary to maintain the entire network at the desired levels. While categories 1 and 2 are receiving projects at the required levels, categories 3-5 are not. Project selection for FY 2023 and beyond is expected to reduce this disparity and help ensure that all categories receive the share of the funding they require.

PROGRESS IN THE 10-YEAR PLAN FOR RESURFACING OF STATE HIGHWAYS

The amount of pavement repair work has been restricted for many years due to long-term financial constraints. The funds allocated for the pavement repair budgets are limited because funds are often used for other purposes such as capacity improvement projects and other program budget obligations.

The current pavement performance goals were established to be both achievable and provide levels of service appropriate for each category. As part of the commitment to meet these goals, funding levels have also been increased beyond what has been historically provided.

FIGURE 21 illustrates the projected condition of the state-maintained roadway network over the next ten (10) years using three different budget scenarios. The scenarios presented are:

- Provide funding necessary to maintain the network consistent with the established condition goals.
- Continue to provide funding at a level consistent with the last biennium.
- Provide reduced budget consistent with the long-term historical spending level.

The budget scenario representing the current spending commitment to maintain the percent fair or better targets is represented with the green line. Spending $205 million per year on pavement rehabilitation work should allow each category of roads to quickly meet the established percent fair or better target and maintain the performance long-term. This is shown as a network composite target of approximately 75% going forward.

In order to show the future network condition using the historical funding levels, the 2013 to 2020 average of $103 million is used. This budget scenario is represented by the red line, which shows average yearly condition for each historical year, and projected condition with just the previous average spending for the next ten (10) years. Spending $103 million per year will result in the network deteriorating to a state where only approximately 62% of roads are in fair or better condition by the year 2033.

The average expenditure from 2021 and 2022 is $161 million, which is higher than the historical average but still below the level necessary to meet target performance. This budget scenario is represented by the yellow line, which shows average yearly condition for each historical year, and projected condition with just the previous average spending for the next ten (10) years. Spending $161 million per year will result in the network deteriorating to a state where only approximately 69% of roads are in fair or better condition by the year 2033.

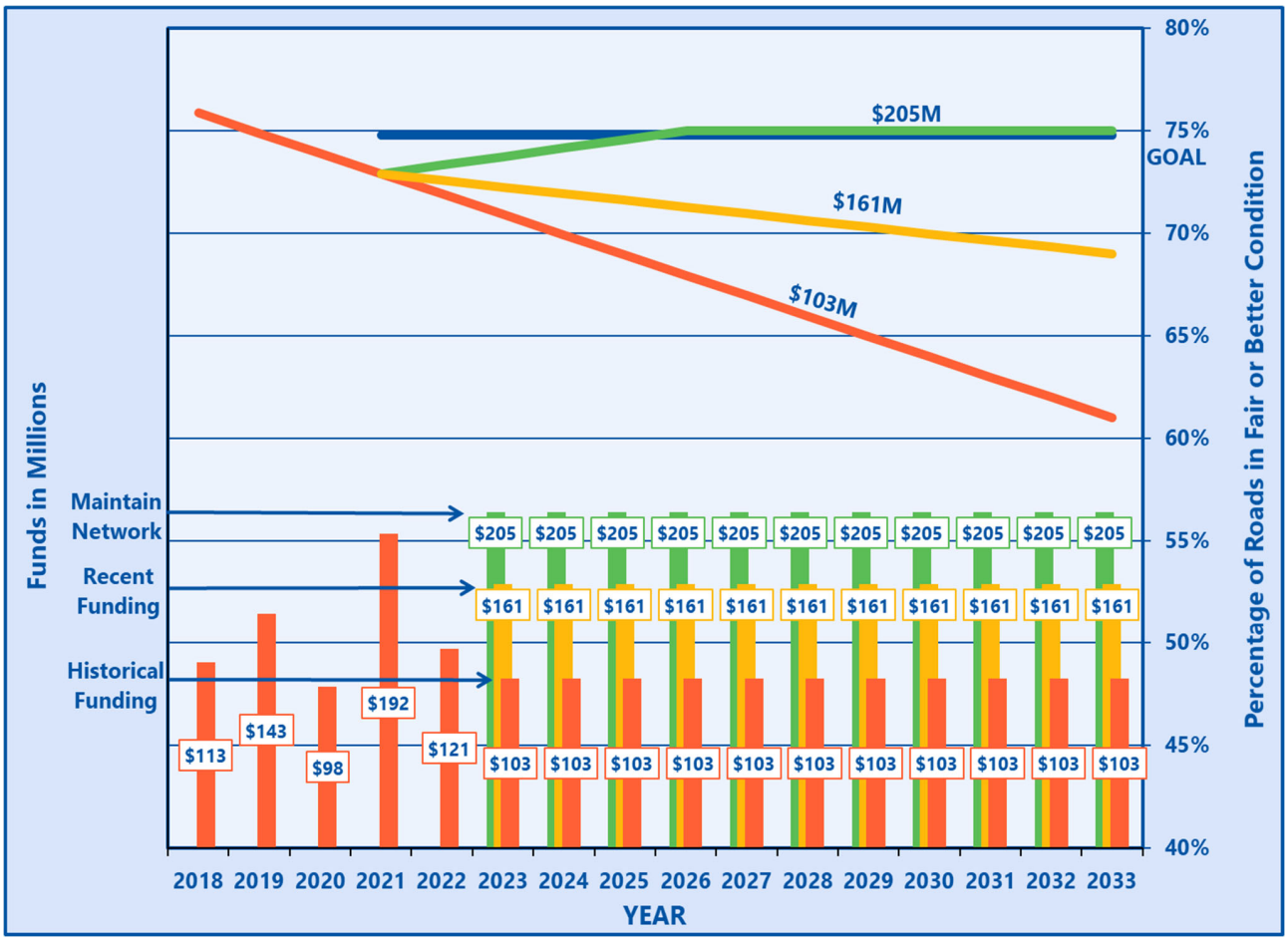

FIGURE 21. Future State-maintained Roadway Network Funding Alternatives

Neither the current reduced spending levels, nor the historical average will result in a network that performs at the expected standard. Currently, all categories except category 5 meet the target performance level, but both of these alternative scenarios result in all categories except category 1 quickly falling below target levels.

PAVEMENT PRESERVATION SUMMARY

The State Highway Preservation Report is presented to Nevada Legislature with the intent to fulfill the requirements as outlined in Nevada Revised Statute 408.203(3). NDOT is accountable to report the progress made on the resurfacing plan for state highways. The following aspects of the resurfacing plan have been addressed:

- The pavement preservation revenues and expenditures for fiscal years 2021 and 2022 were presented. The revenue for the maintenance and rehabilitation repair work constructed on state highways is primarily funded by the federal government and the State of Nevada. This revenue generally consists of vehicle fuel tax and registration fees. $379,948,943 were invested for road maintenance and rehabilitation repair work during the last biennium. FIGURE 5 illustrates the funding sources and construction expenditures for the road repair work.

- TABLES 3, 4, and 5 summarized the rehabilitation and maintenance repair work that was advertised in fiscal years 2021 and 2022. The information includes lists of rehabilitation projects along with the associated mileage and cost for each project. The project locations and scopes of work were also reported.

- The pavement condition of the state-maintained roadway network was provided. The pavement condition was objectively measured with the Present Serviceability Index (PSI) rating system. This rating system quantifies pavement condition into one of six sections that correspond to pavement in very good, good, fair, mediocre, poor, and very poor or failed condition. The data were described using several methods including tabular format, maps, analysis by district and county distribution, and a long-term investigation displayed on column charts.

- Each road prioritization category was evaluated to determine if the goal to maintain a minimum of 95% of category 1 roads, 90% of category 2 roads, 85% of category 3 roads, 75% of category 4 roads, and 50% of category 5 roads in fair or better condition was met as shown in TABLE 9. It was concluded that category 1, 2, 3, and 4 roads met or exceeded the established pavement condition goal, and category 5 roads did not.

- Consistency of the preservation investments was compared to the targets contained in the Nevada Transportation Asset Management Plan. TABLE 10 shows that these investment commitments are not only being met, but significantly exceeded in most cases.

- TABLES 11 and 12 were developed to document the adequacy of pavement preservation funds. The condition of the roadway network was predicted based on deterioration rates and scheduled rehabilitation work. Predicted conditions forecast that the increased 2021-2022 average funding level of $161 million per year is inadequate to maintain each category of road in conformance to the established percent fair or better target. An increased total of $205 million per year is necessary to meet the performance targets.

- The progress in the 10-year plan for resurfacing of state highways was examined and two different budget scenarios were investigated. The first budget scenario included an average of $205 million per year expenditure for rehabilitation repair work. This budget scenario would result in a consistent pavement condition level of 75% of roads in fair or better condition, with each category meeting fair or better condition goals. The second budget scenario included historical averages of $103 million and $161 million per year expenditure for rehabilitation repair work. These scenarios would both result in the roadway network pavement condition level deteriorating well below the target performance levels by 2033.

Supplementary information contained in the report includes:

- An explanation of the state-maintained roadway network inventory including the PMS inventory management through designated road prioritization categories 1 through 5.
- A description of the PSI pavement condition rating system that is used to objectively rank pavement conditions for many PMS purposes.
- Definitions for various pavement repair strategies as well as the optimal construction timing based on the PSI pavement condition rating system.
- Commentary regarding the costs for construction of state highway pavement rehabilitation projects.

BRIDGE PRESERVATION

INTRODUCTION

This report summarizes the Nevada Department of Transportation's (NDOT) efforts to preserve the state's bridge infrastructure which has an approximate as-constructed value of $2.3 billion. Preserving bridge infrastructure is one of NDOT's highest priorities. Numerous resources are employed to maintain bridges in structurally sound, functional, and safe condition. Although the focus in the following discussion is on state-maintained bridges, information on bridges maintained by other agencies is also included, as these bridges are also eligible for federal funds that are administered by NDOT. Moreover, NDOT is responsible for inspecting and reporting the condition of all the bridges open to the public in Nevada, except bridges on federal lands. Bridges on federal lands are inspected and maintained by the federal government.

THE BRIDGE MANAGEMENT SYSTEM

Bridges are managed using the National Bridge Inventory (NBI) data which provides an inventory of bridge condition, location, needed repairs, load limits, susceptibility to flooding, and ownership information. A separate prioritization list enables NDOT to evaluate earthquake susceptibility and risks. This data, together with other factors, allows NDOT to identify preservation priorities and monitor efforts to keep its bridges functioning in good condition.

BRIDGE INVENTORY

There are currently 2,128 public bridges in NDOT bridge inventory. A bridge is a structure spanning 20 feet or more that carries traffic over a depression or obstruction and includes multiple box culverts and pipes. The maintenance of the bridge inventory is shared by many different organizations: NDOT maintains 1,242 bridges; county and city governments maintain 814 bridges; other local agencies maintain 48 bridges; private entities maintain 11 bridges; railroad maintains 6 bridges; and other state agencies maintain 7 bridges.

BRIDGE CONDITION REPORTING

Data in the NDOT bridge inventory is collected in accordance with the National Bridge Inspection Standards (NBIS) and is reported to the National Bridge Inventory (NBI). For each bridge, the condition rating is determined for three primary elements: deck, superstructure, and substructure.

Bridge-sized culverts have a single, independent rating. NBI general condition ratings are assessed on a scale that ranges from 0 (failed condition) to 9 (excellent condition). The lowest of the three ratings for bridges, or the single rating for culverts, is used to represent the overall condition of the structure. Ratings of 7 or better, represent a bridge that is in good condition and ratings of 5 or 6 represent a bridge in fair condition. If any of the condition ratings are 4 or below, the bridge is in poor condition. A structure deemed to be in poor condition is classified as structurally deficient (SD), and becomes a priority for corrective measures, and may be posted to restrict the weight of vehicles using them. If a deficiency is determined to be severe, or the load-carrying capacity is extremely low, the bridge would be closed to protect the travelling public.

The condition assessment is based upon a physical inspection of the structure. The deleterious effects of age, environment, fatigue, hydrologic scour, settling, and traffic collisions are assessed in the evaluation. Every bridge in Nevada is inspected at least once every two years. Bridges in poor condition are inspected more often. Inspection findings are factored into the determination of the bridge load and condition ratings. The load rating denotes the strength of the bridge compared to the design-truck loading.

NDOT adheres to policies and procedures in accordance with the FHWA's requirements. The FHWA included the verbiage discussing Structurally Deficient bridges in a report to Congress entitled "2008 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance." The verbiage was as follows:

"Structurally Deficient bridges are not inherently unsafe. Bridges are considered structurally deficient if significant load-carrying elements are found to be in poor or worse condition due to deterioration and/or damage, or the adequacy of the waterway opening provided by the bridge is determined to be extremely insufficient to the point of causing intolerable traffic interruptions. That a bridge is deficient does not imply that it is likely to collapse or that it is unsafe. By conducting properly scheduled inspections, unsafe conditions may be identified; if the bridge is determined to be unsafe, the structure must be closed. A deficient bridge, when left open to traffic, typically requires significant maintenance and repair to remain in service and eventual rehabilitation or replacement to address deficiencies. To remain in service, Structurally Deficient bridges often have weight limits that restrict the gross weight of vehicles using the bridges to less

than the maximum weight typically allowed by statute."

Bridges are considered Structurally Deficient if:

- Significant load-carrying elements are found to be in poor condition.
- The bridge has insufficient load carrying capacity and may have weight limits to remain in service (see photo below for a sample weight limit posting).

Example of Structurally Deficient Bridge

There are 1,242 bridges on the NDOT-maintained system that were reported in 2021. Based on the report, 12 or 1.0% of the NDOT bridges are Structurally Deficient. There are 886 bridges that are maintained by non-NDOT agencies that were reported in 2021. Based on the report, 20 or 2.3% of the non-NDOT bridges are Structurally Deficient. FIGURE 22 summarizes the substandard bridge conditions on the NDOT and locally maintained bridge networks.

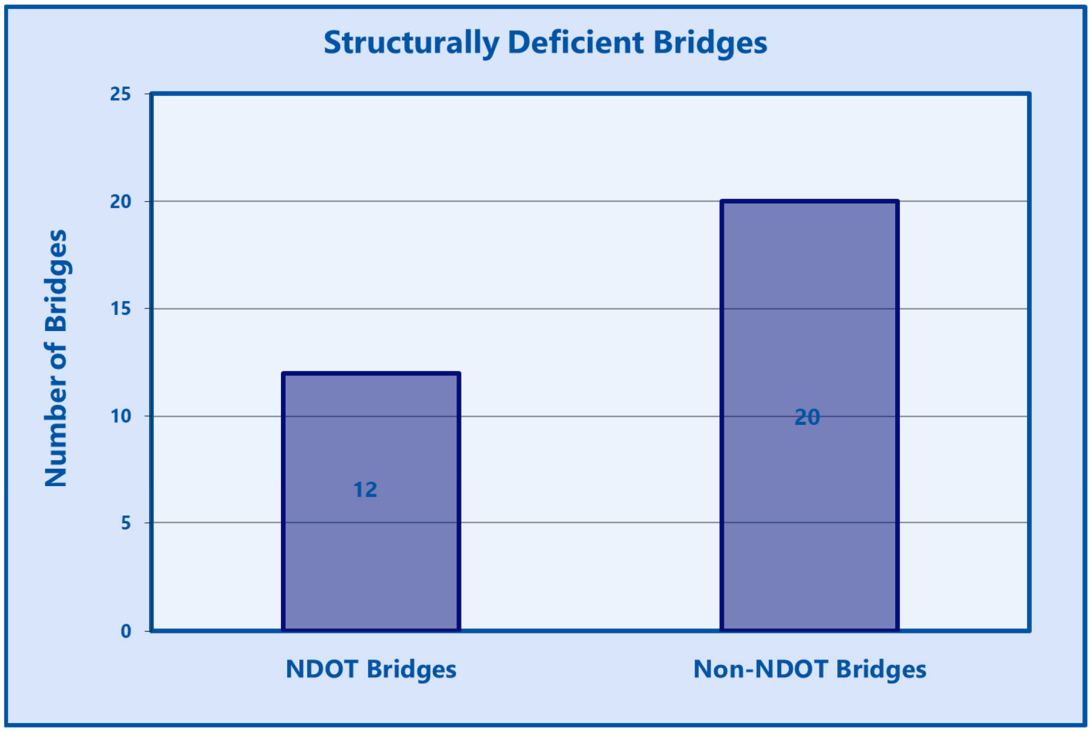

FIGURE 22. Structurally Deficient Bridges

FIGURES 23A, 23B, 23C, 23D, 23E and 23F locate the Structurally Deficient bridges in NDOT's bridge inventory.

Northwestern Nevada

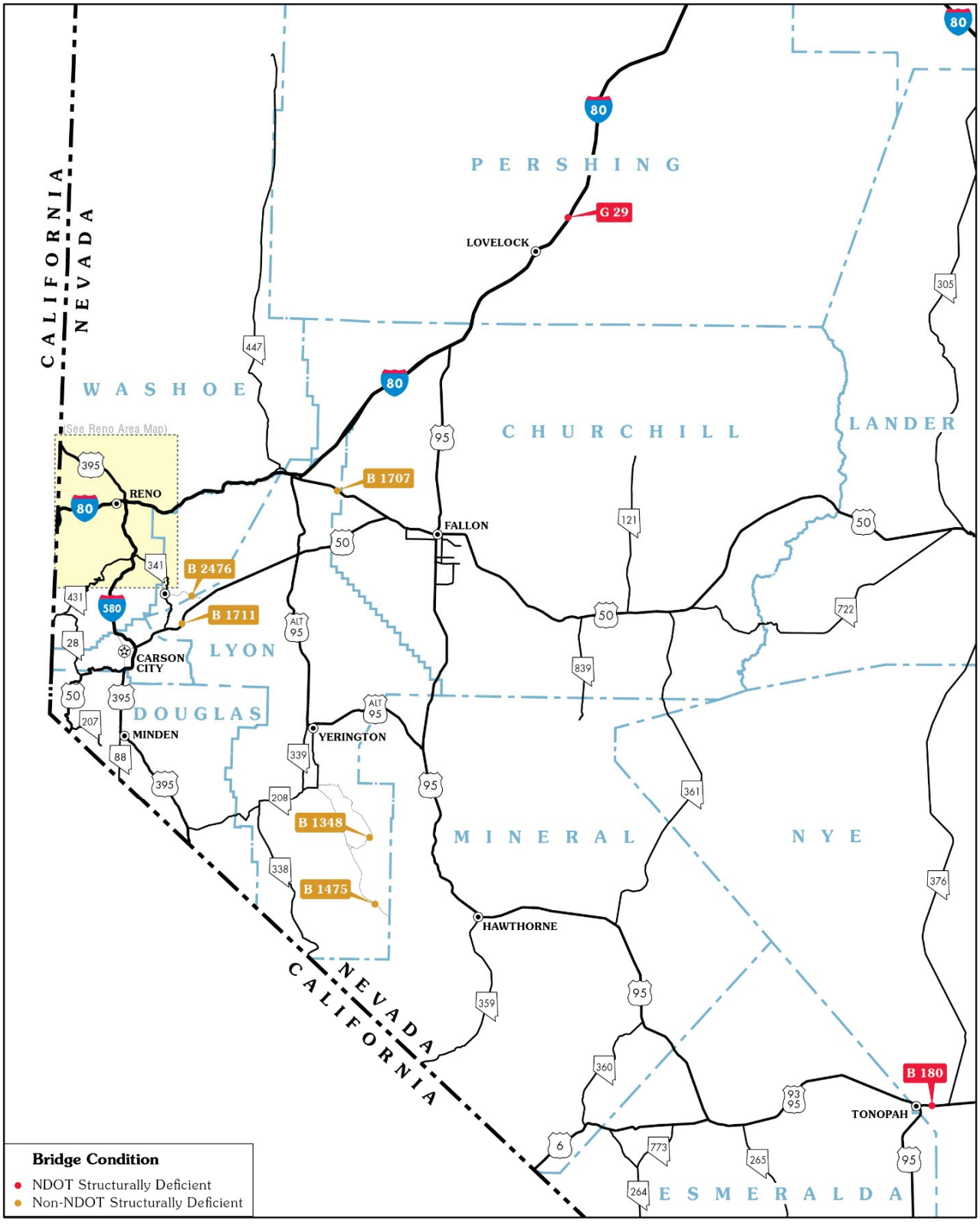

FIGURE 23A. Locations of Structurally Deficient Bridges

*Bridges categorized as Structurally Deficient may have less than desirable load carrying capacity or geometrics, but they are not considered unsafe. Please refer to the discussion in the Bridge Condition Reporting on Page 51 to 52.

Northeastern Nevada

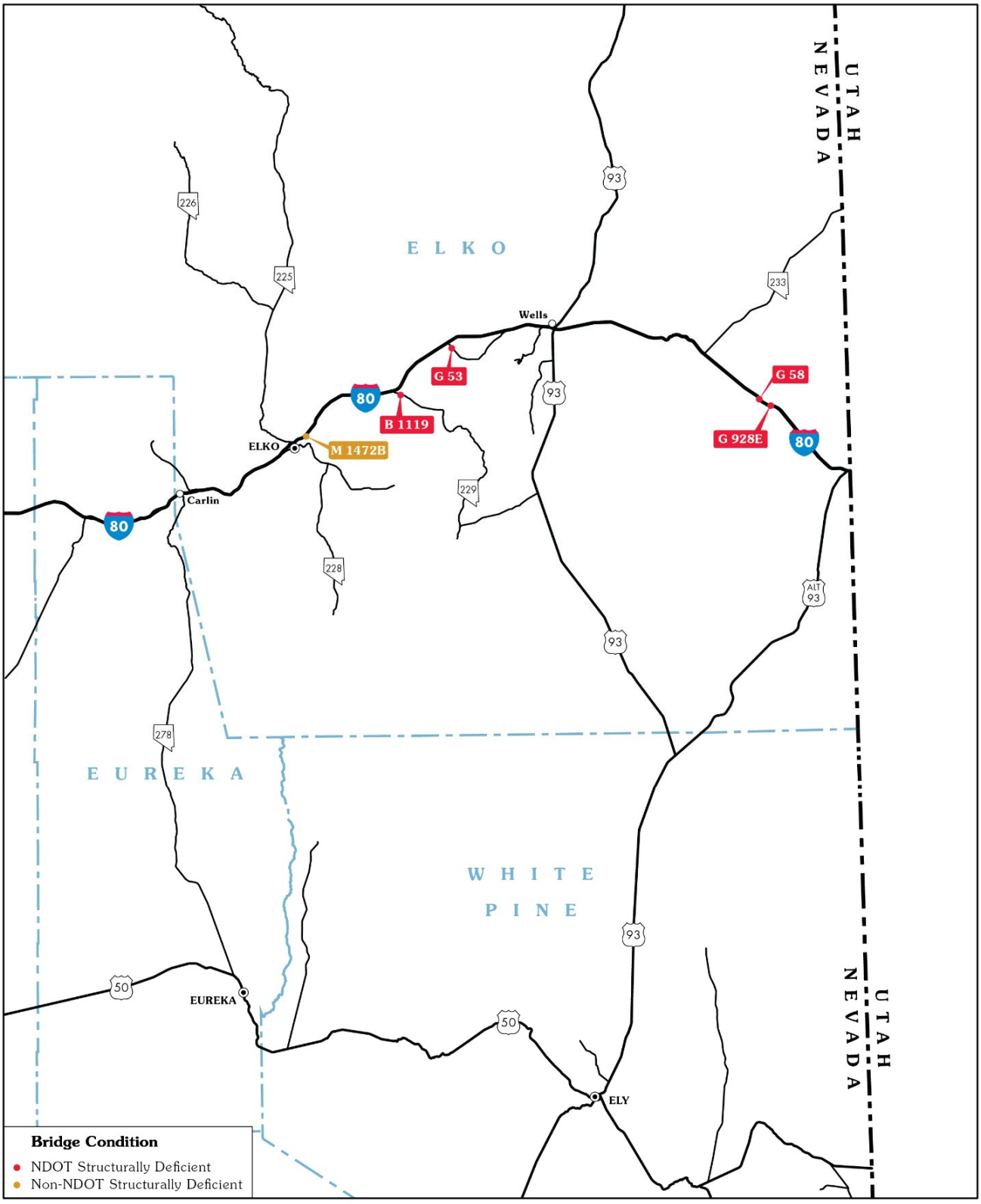

FIGURE 23B. Locations of Structurally Deficient Bridges

*Bridges categorized as Structurally Deficient may have less than desirable load carrying capacity or geometrics, but they are not considered unsafe. Please refer to the discussion in the Bridge Condition Reporting on Page 51 to 52.

Las Vegas Area

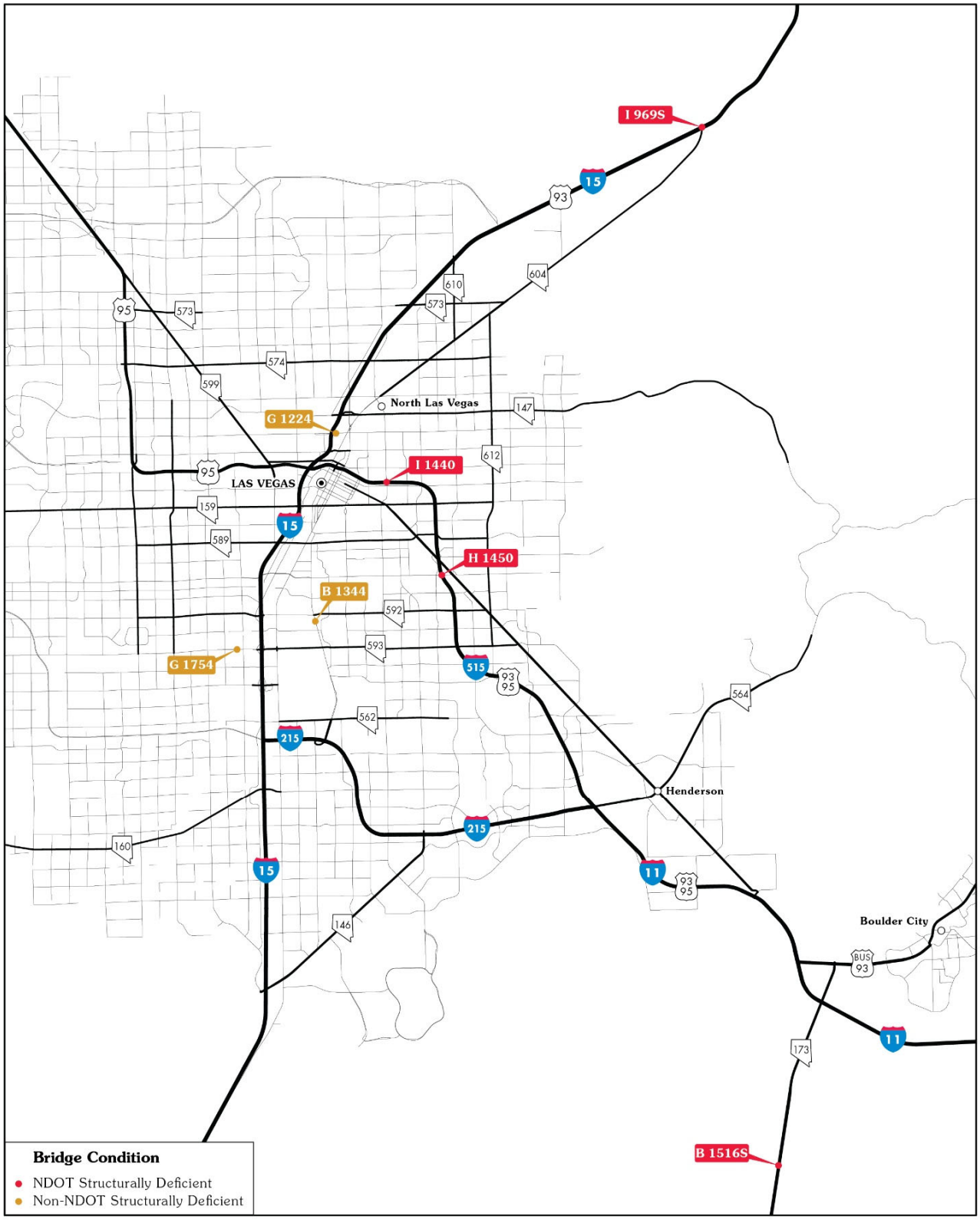

FIGURE 23C. Locations of Structurally Deficient Bridges

*Bridges categorized as Structurally Deficient may have less than desirable load carrying capacity or geometrics, but they are not considered unsafe. Please refer to the discussion in the Bridge Condition Reporting on Page 51 to 52.

Reno Area

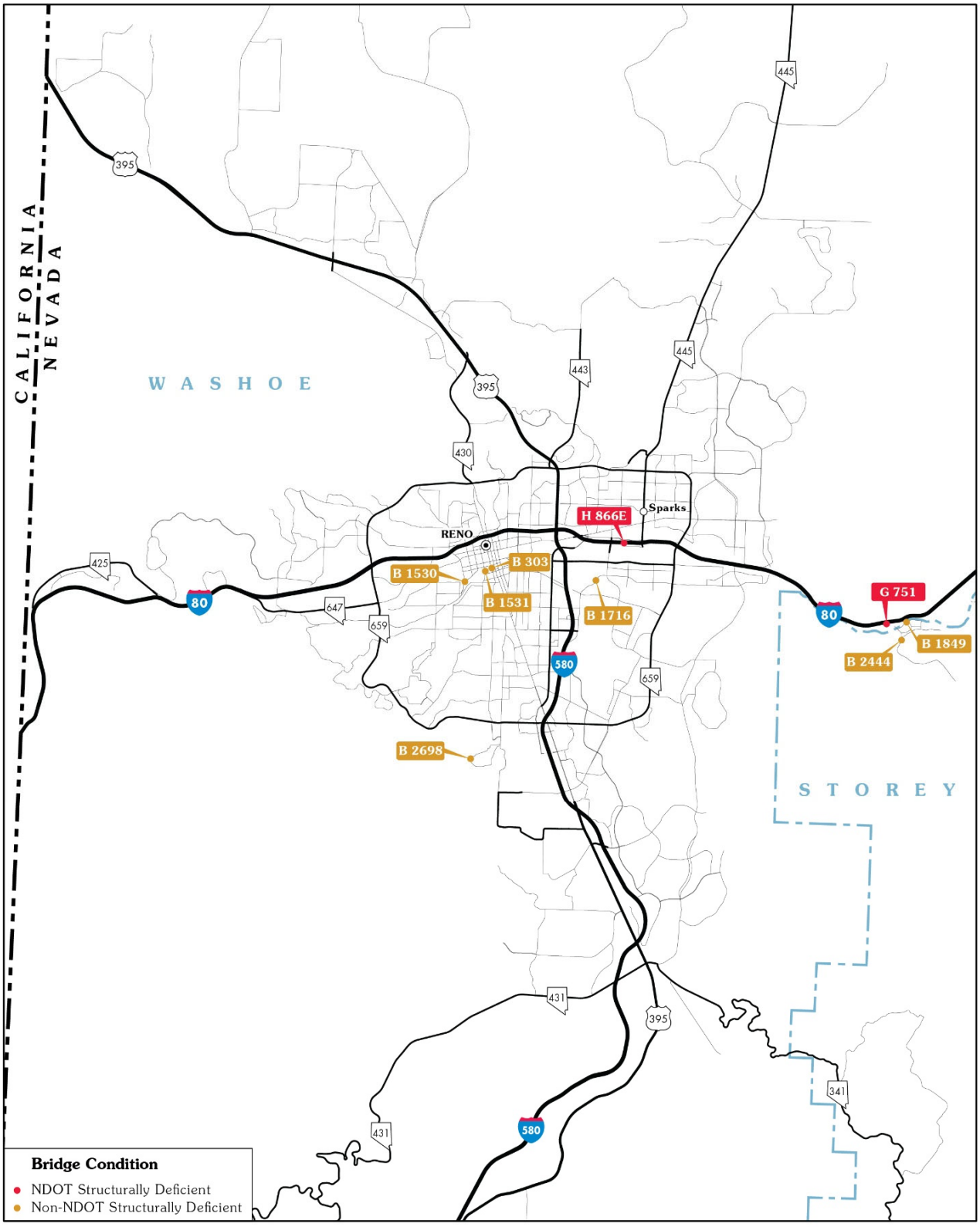

FIGURE 23D. Locations of Structurally Deficient Bridges

*Bridges categorized as Structurally Deficient may have less than desirable load carrying capacity or geometrics, but they are not considered unsafe. Please refer to the discussion in the Bridge Condition Reporting on Page 51 to 52.

Southeastern Nevada

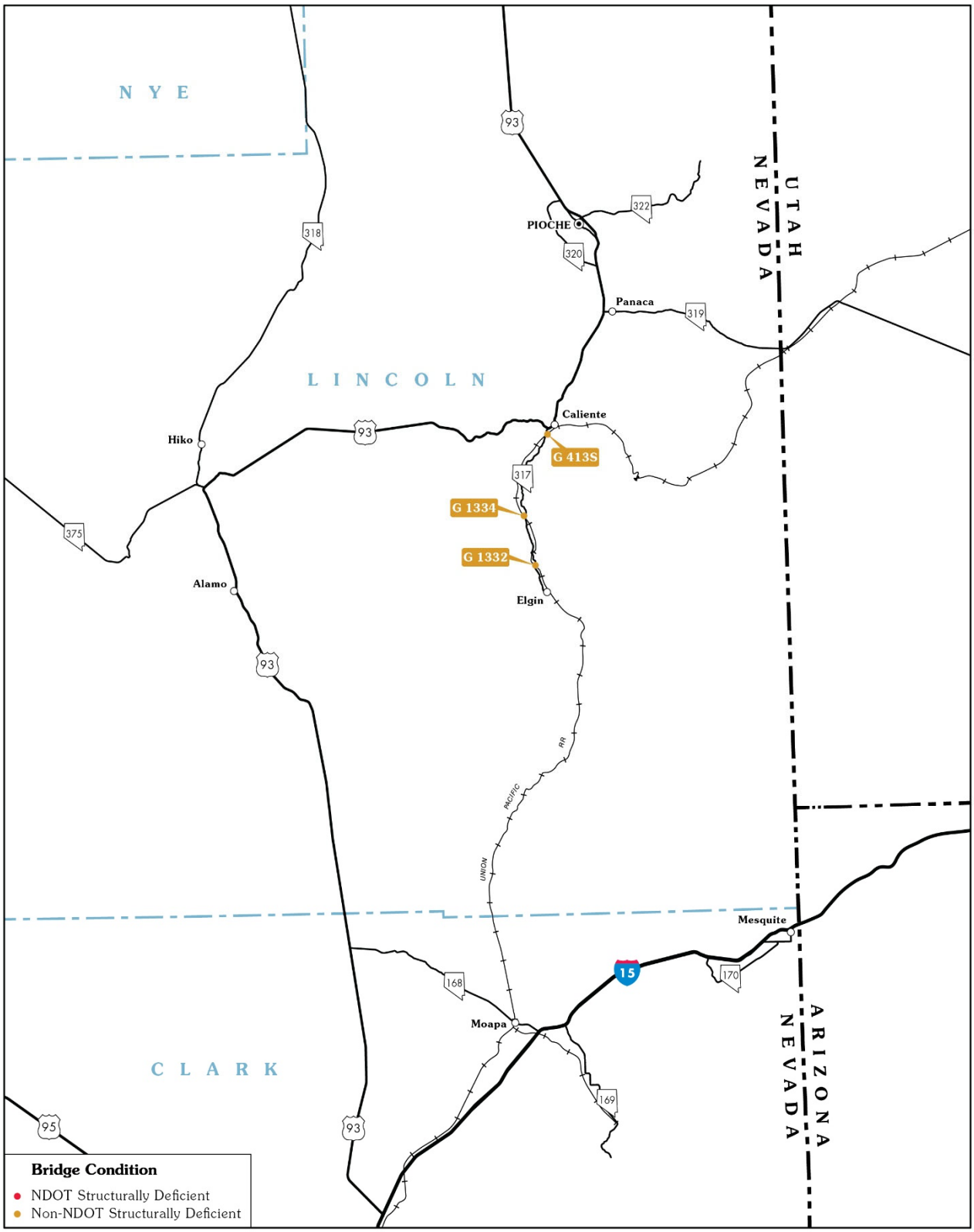

FIGURE 23E. Locations of Structurally Deficient Bridges

*Bridges categorized as Structurally Deficient may have less than desirable load carrying capacity or geometrics, but they are not considered unsafe. Please refer to the discussion in the Bridge Condition Reporting on Page 51 to 52.

McDermitt Area

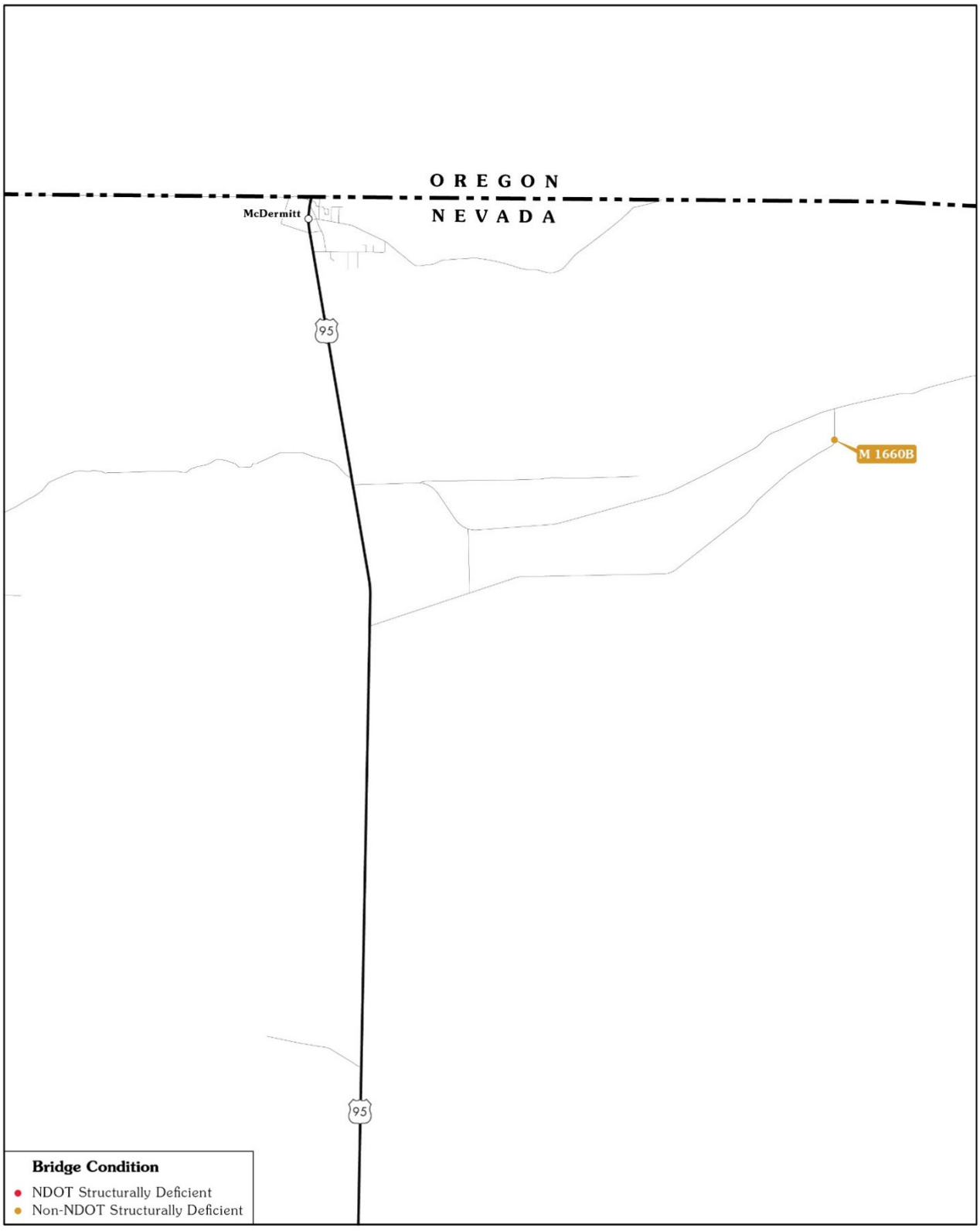

FIGURE 23F. Locations of Structurally Deficient Bridges

*Bridges categorized as Structurally Deficient may have less than desirable load carrying capacity or geometrics, but they are not considered unsafe. Please refer to the discussion in the Bridge Condition Reporting on Page 51 to 52.

In addition to the condition rating, a bridge's susceptibility to seismic activity is considered when assessing its condition or "health." Nevada is the third most seismically active state in the US. Only California and Alaska are more seismically active. The central and western parts of Nevada are the most active, but southern Nevada does have the potential for damaging earthquakes. NDOT has replaced or retrofitted 155 bridge structures at a cost of over $56 million since NDOT began including seismic activity as a component in the project prioritization process.

FIGURE 24 illustrates the condition of bridges in Nevada. Only 1.5% of the bridges in Nevada are considered to be in poor condition. NDOT goes above and beyond the requirement in inspecting bridges. Railroad crossings and pedestrian structures are not required to be inspected by the Federal Highway Administration. For the sake of public safety, NDOT inspects these bridges when they span NDOT facilities, but does not report these ratings.

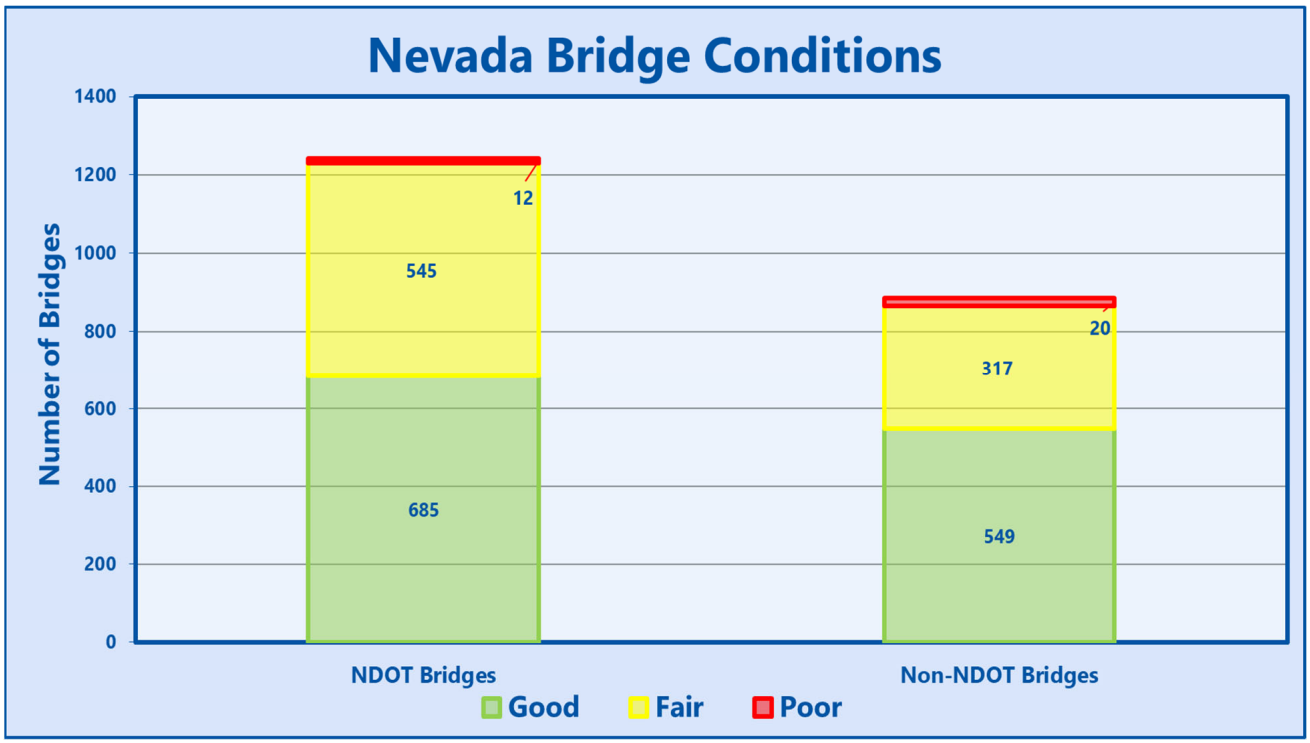

FIGURE 24. Nevada Bridge Conditions

Nevada bridge conditions compare very favorably to the bridge conditions in many other states, even though more than half of NDOT's bridges are over 40 years old. Older bridges generally have a service life of at least 50 years. Recently built bridges are expected to have a design life of 75 years. This prolonged design life was achieved by improvements in material, design, and

construction methods. FIGURE 25 shows the age distribution of the state's bridges in 10-year increments.

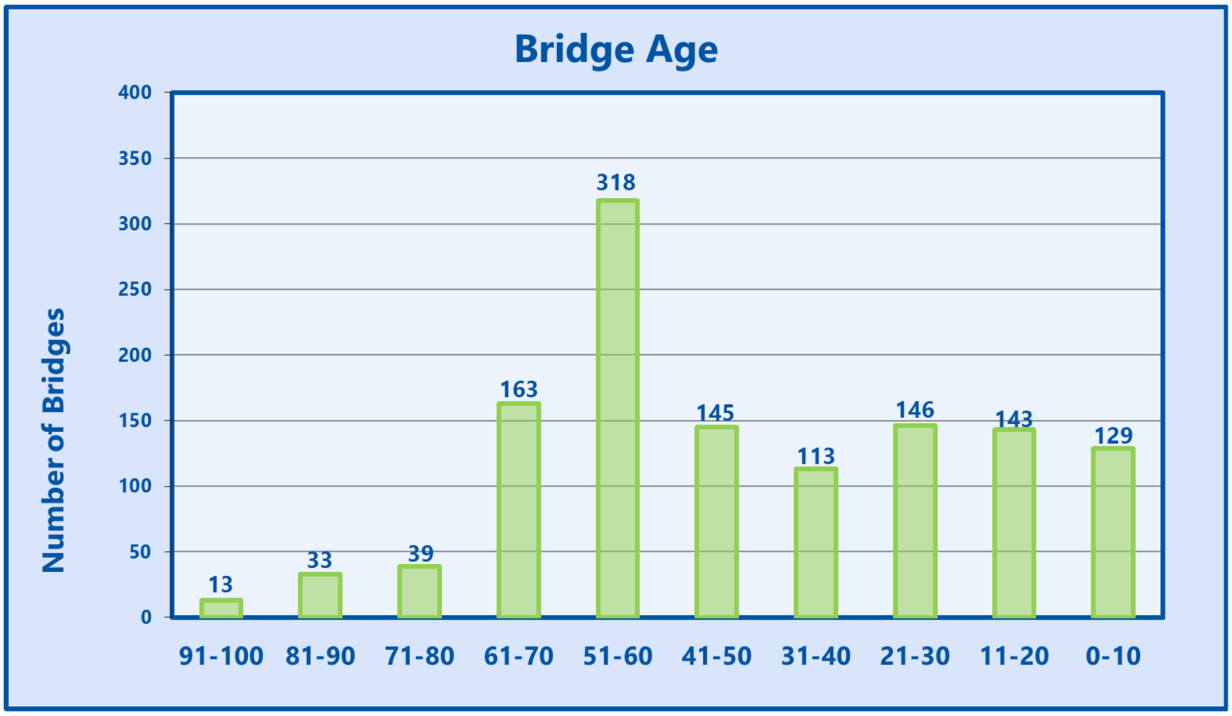

FIGURE 25. Bridge Age

BRIDGE CONDITION OVER TIME

FIGURE 26 lists the number of Structurally Deficient NDOT bridges over the previous 20 years. As the figure shows, the number has decreased significantly.

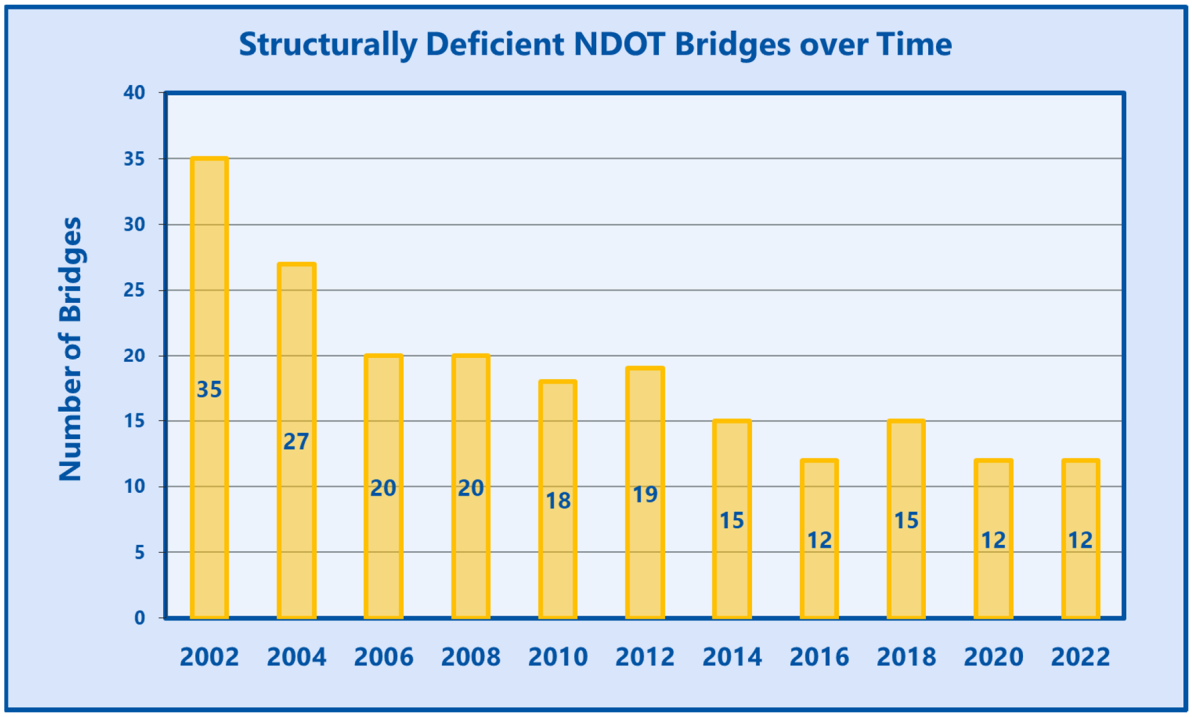

FIGURE 26. Structurally Deficient NDOT Bridges over Time

FIGURE 27 lists the number of Structurally Deficient non-NDOT bridges over the previous 20 years. The number has been stable for the past decade and is well below the national average by percentage.

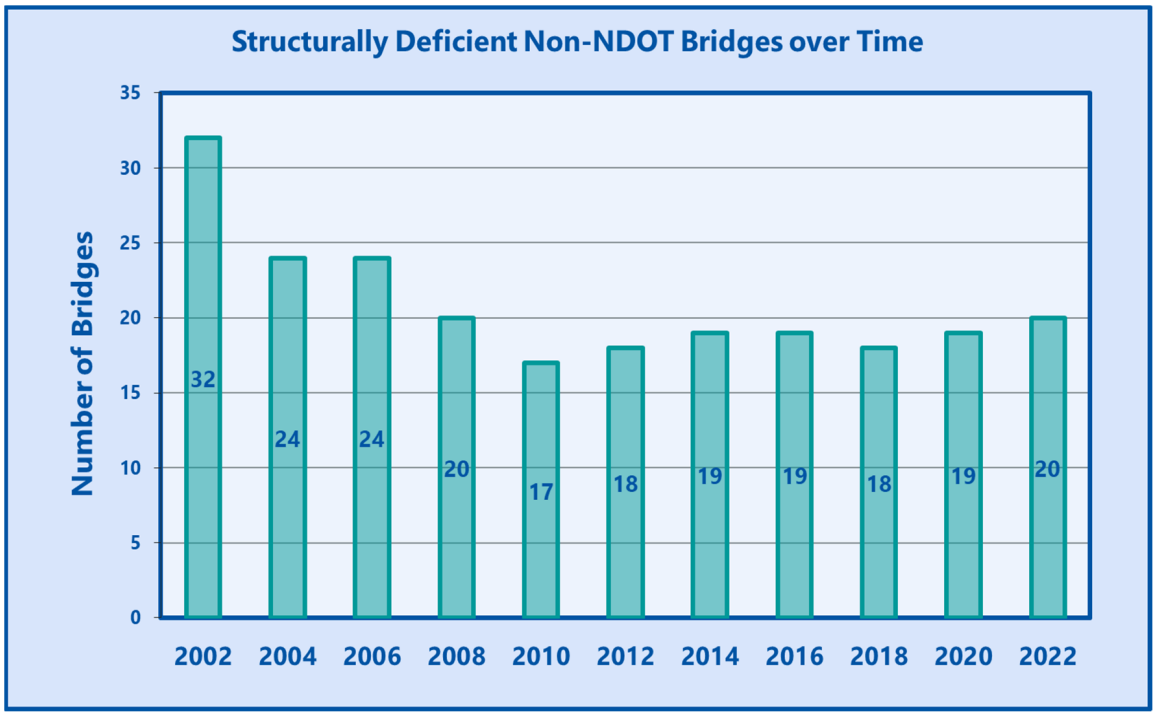

FIGURE 27. Structurally Deficient Non-NDOT Bridges over Time

THE COST OF BRIDGE CLOSURE FOR OWNERS

Structurally Deficient bridge locations are displayed in FIGURE 23A through FIGURE 23E. Currently there are no Structurally Deficient bridges on I-15 in Las Vegas and US-395 in Reno. Only four deficient structures are located on primary routes including one (H-866E) on I-80 in Reno, one on I-80 west of Wendover, and two (I-1440 and H-1450) on the I-515 in Las Vegas. Both Las Vegas structures were recently replaced and opened to traffic in 2022. These routes connect Nevada with the rest of the country and carry hundreds of thousands of automobiles and trucks on a daily basis. Some Nevada Interstates bridges carry more than 100,000 vehicles daily in northern Nevada urban areas and approximately 250,000 vehicles daily in southern Nevada urban areas. If closure of a bridge in rural Nevada was required, the detour might add a few hundred additional miles to the travelers' journeys. A bridge closure and subsequent detours in urban areas will create extensive traffic jams and cause additional vehicle crashes. In both rural and urban bridge closures, the user costs due to travel delay or crashes will be quite significant until the bridge is reconstructed or repaired. Often, user costs due to delay or crashes can be in the hundreds of

thousands of dollars per day. The importance of bridge maintenance and rehabilitation cannot be overemphasized.

PROJECT PRIORITIZATION

The bridge preservation program competes for funding with capacity improvement, operations, pavement, hydraulic, and safety projects and programs. Since available funding is limited, engineers prioritize projects in such a manner that will improve the condition of the entire bridge infrastructure network while maximizing bridge performance and keeping costs to a minimum.

Bridge projects are developed and prioritized based upon bridge condition (Condition Ratings and Structurally Deficient status), essentiality for public needs (NHS status, ADT, and ADTT etc.), and association of other ongoing project work at the same location (pavement rehabilitation work etc.). Seismic retrofit work is prioritized based on a bridge's earthquake vulnerability and importance. The seismic vulnerability of older state-owned bridges has been investigated. Certain bridge types, such as large culverts, do not need seismic retrofit.

BRIDGE PRESERVATION FUNDING

Similar to pavement rehabilitation, some bridge preservation work is paid for with state fuel taxes and vehicle registration fees. Historically, available state funding has only been sufficient to provide the required match for federal funds and to fund bridge maintenance costs.

Along with the Departments previously established funding commitments, recent passage of the Infrastructure Investment and Jobs Acct (IIJA) has provided additional resources for the expansion of NDOT's bridge rehabilitation and preservation program. Included in the infrastructure bill are specific federal formula funding amounts for each state as well as small and large bridge grant opportunities.

Under federal funding guidelines, off-system bridges must receive more than $2 million of the available federal funds. Bridges are described as off-system when the bridges are not located on the federal aid highway system. Off-system roads include Rural Minor Collector and Rural and Urban Local roads. Bridges are described as on-system when the bridges are located on the

federal aid highway system. The Interstate, Urban Collector, and Rural Minor Arterial roads are included in the federal aid highway system. Of the 1,242 state-maintained bridges, 937 bridges are on-system and 305 bridges are off-system. Of the 886 county, city, other local agency, private, and other state agency bridges, 116 bridges are on-system and 770 bridges are off-system.

BIENNIAL EXPENDITURES FOR FISCAL YEARS 2021 TO 2022

TABLE 13 lists approximately $29 million worth of bridge preservation and rehabilitation work that NDOT obligated in fiscal years 2021 and 2022.

TABLE 13. Bridge Expenditures in Fiscal Years 2021 and 2022

Fiscal Year	Repair Strategy					Total
	Maintenance	Preservation	Rehabilitation	Replacement	Seismic Retrofit	
2021	$2,235,505	$11,444,980	$12,614,598	$17,170,296	$814,413	$44,279,792
2022	$565,668	$2,748,026	$2,252,042	$6,984,720	$0	$12,550,456
Biennium Total	**$2,801,173**	**$14,193,006**	**$14,866,640**	**$24,155,016**	**$814,413**	**$56,830,248**

PRESENT FUNDING VERSUS NEEDED FUNDING

The majority of NDOT maintained bridges were built prior to the 1980s. These older bridges typically have a useful service life of about 50 years, although bridges that were built more recently are expected to have a useful service life of 75 years. It is anticipated that most bridges approaching 50 years old will require major rehabilitation or replacement relatively soon. FIGURE 25 illustrates that many NDOT maintained bridges are approaching 50 years old and may be reaching the end of their useful service life. The estimated cost to replace all of the NDOT maintained bridges that are currently over 50 years old is $1.1 billion. Because of the large number of bridges approaching 50 years old, the estimated cost to replace all of the NDOT maintained bridges that will be over 50 years old ten years from now is $1.8 billion.

Replacing all of NDOT's bridges over 50 years old is not practical to accomplish in five years or even ten years. The strategy to forecast future bridge preservation costs is to replace the bridges gradually over the next fifty years, before the bridges reach 100 years old. Replacing 2% of the bridges over 50 years old each year will allow for a gradual replacement of all the old bridges, but it does not replace the bridges quickly enough to decrease the number of bridges over 50 years

old. Since NDOT already has 566 bridges over 50 years old, replacing 3 bridges a year is a replacement rate of 0.5% which is inadequate. Gradually increasing the replacement rate to 2% over the next ten years will ultimately require replacing 12 bridges a year because NDOT will have approximately 600 bridges over 50 years old at that time. If a 2% annual replacement rate is maintained for the subsequent ten years, the trends will begin to stabilize; twenty years from now NDOT would have approximately 620 bridges over 50 years old and would be replacing 12 bridges each year.

BRIDGE PRESERVATION ACTION PLAN

NDOT's bridge preservation action plan is similar to plans detailed in previous State Highway Preservation Reports. The action plan is to preserve Nevada's public bridges in good condition by implementing the following bridge management practices:

- Replace or rehabilitate Structurally Deficient bridges before the bridges become hazardous or overly burdensome to users.
- Apply timely corrective measures to existing structures.
- Apply effective preventive maintenance strategies to existing structures.

BRIDGE PRESERVATION SUMMARY

Nevada has enjoyed the benefit of good bridge conditions as compared to the bridge conditions in many other states for quite a while. Nevada's preservation program and favorable environment have contributed to the positive results. The overall good condition of our inventory has allowed us to shift from a previous "worst first" approach to a more proactive preservation approach. However, NDOT's bridge assets are aging. After a useful life of 50 years, many of NDOT's older bridges will require replacement. NDOT's current bridge replacement rate of approximately 3 bridges a year will not keep up with the large number of bridges reaching the end of their useful life. Increased spending in bridge corrective maintenance, rehabilitation, and replacement is necessary to preserve NDOT's bridge assets and to avoid costly bridge closures and emergency bridge replacements. Building on the success of the past two-year cycle, NDOT will continue to prioritize necessary preservation and rehabilitation work and increase the rate of structure replacements to position the Department for continued success in the future.

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