

# 4.0 MAINTENANCE AND OPERATION

The maintenance and operation section addresses the needs for the Heartland Expressway Corridor to maintain and preserve the existing 215 miles of pavement as well as the new improvement projects that will be included as part of the “Vision” of the corridor. The Heartland Expressway Corridor traverses a wide variety of terrain from the high plains of Colorado along NE 71 to Kimball, the Platte River valley along US 26, and the rolling hills along US 385 near Chadron.

However, the public expects a certain consistency in maintenance efforts provided by the Nebraska Department of Roads (NDOR). This chapter will detail the two types of maintenance considered: 1) routine maintenance and 2) preventative maintenance. This chapter develops a cost of maintaining and operating the existing pavement along the corridor, which is a mixture of two-lane and four-lane highways, and the additional maintenance and operation costs for new pavement added along the Heartland Expressway Corridor. The new pavement is for the proposed projects identified in the 20-Year vision of the corridor.

## 4.1 MAINTENANCE TYPES

### Routine

Routine functions are those performed frequently and repeated, such as pavement repairs, shoulder grading, paint striping, mowing, snow removal, pavement edge repair, sign maintenance and does include unusual repairs, which are typically warranted due to weather extremes.

Examples of unusual repairs include the undermining of bridges and overtopping of roadways during flooding conditions, excessive asphalt pavement rutting due to extreme heat or concrete pavement “blow ups,” which are sudden, severe breaks in the pavement due to the extreme heat.

Snow removal is a critical maintenance function during the winter season. Due to the windy nature of western Nebraska, severe snow conditions can occasionally cause temporary shutdown of highways in the Heartland Expressway Corridor.

Routine maintenance is typically performed by the NDOR Operations Division personnel. However some functions, such as mowing and rest area maintenance are performed using contracted service providers.

### Preventive

Preventive maintenance is typically focused on the pavement surface. This includes crack sealing, milling, chip seals and thin overlays. This work is done by both in house efforts by the Operations Division and also contracted service providers.

## 4.2 EXISTING CORRIDOR MAINTENANCE EVALUATION

An evaluation was made of the overall maintenance and operations costs for maintaining the roadways along the corridor. NDOR’s Material and Research Division uses a custom written program called the Pavement Optimization Program (POP) which uses extensive databases to develop costs over time to maintain pavement to a certain level of serviceability (driving condition). NDOR’s goal is to maintain all highways at or above 84.7 Nebraska Serviceability Index (NSI). This is equivalent to maintaining a highway in good driving condition.

The designated route of the Heartland Expressway Corridor is about 215 miles in length. Currently, 71 miles (about 1/3) of the corridor is already a four-lane facility. The total cost to maintain the current corridor for 25 years, (until the year 2037) is estimated to be approximately \$134 million. Table 4.1 provides a summary of the maintenance and operations costs for the corridor.

However, the POP assumes that the ongoing district maintenance operations, which include both routine and preventative maintenance, continue at their current pace. These costs average \$4,684 per lane-mile per year, for NDOR's District 5, (which includes the counties in the Nebraska panhandle). Note that a two-lane highway segment ten miles long, (centerline miles) has twenty lane-miles. Similarly, a ten mile long four-lane highway segment has forty lane-miles. The yearly POP maintenance of the existing pavement is estimated to be \$11,042 per lane mile per year.<sup>1</sup>

### 4.3 PROPOSED CORRIDOR MAINTENANCE EVALUATION

Determining the total maintenance costs for the overall Heartland Expressway Corridor involves estimating the maintenance costs for the new pavement as the improvements are added to the system. The maintenance cost for a new pavement is based on the year that the improvement is programmed, and the maintenance costs are spread out over the remainder of the twenty-year program. The additional maintenance costs were estimated with \$4,684 per lane-mile per year. Additional joint sealing costs were used to add the additional costs for the new lanes. The joint sealing cost is estimated to be \$12,500 per lane-mile per year.

The implementation program was used for the estimation of the maintenance and operation costs. This is subject to change due to funding opportunities and agency priorities. Figures 4.1, 4.2, 4.3, and 4.4 illustrate the improvement implementation plan for the Vision of the Heartland Expressway. Based on the implementation plan of the "Vision" of the corridor, the maintenance of the new pavement is estimated to be about \$27,606,908.00 or about \$28 million, as shown in Table 4.1.

### 4.4 REVIEW OF PROCEDURES AND OPPORTUNITIES

There are certain steps that Nebraska should consider to provide a corridor that consistently meets the transportation needs of its users.

The following summary identifies both specific items and formats to meet these needs:

1. Identify and advance Intelligent Transportation Systems (ITS) projects that will improve corridor efficiency and driver information, such as weather conditions.
2. Increase maintenance and operations budgets and personnel to meet future needs of the expanded Heartland Expressway Corridor.
3. Utilize maintenance personnel in planning and design of transportation projects.
4. Increase the state maintenance research effort and that of the Transportation Research Board to minimize and reduce maintenance and operation costs.
5. Increase the scope of maintenance topics during the annual NDOR maintenance and operations conference.
6. Identify and expand innovative and money-saving ideas, such as Nebraska's Adopt a Highway.

<sup>1</sup>The \$4,684 cost covers NDOR's basic maintenance practices (e.g. crack seal or fog seal) completed annually by NDOR personnel. The \$11,402 annual cost is for additional maintenance practices, such as an overlay of a determined depth, to achieve NDOR's pavement maintenance strategy. These numbers were generated from NDOR Materials and Research Division's Pavement Optimization Program (POP).

Table 4.1 – Heartland Expressway Corridor Maintenance and Operation Costs

Hwy	Segment	Completion Year	Length (miles, approximate)	Existing Maintenance & Operation Costs	New Pavement Maintenance & Operations Costs	Total Maintenance & Operation Costs
US 26	Morrill to Minatare	Existing	26	\$40,887,600.00	\$ -	\$40,887,600.00
NE 71	Kimball to Scottsbluff	Existing	47	\$73,912,200.00	\$ -	\$73,912,200.00
US 385	L62A to Alliance	2019	22	\$17,298,600.00	\$4,809,728.00	\$22,108,328.00
US 385	Alliance to Chadron	2020	58	\$45,605,400.00	\$955,536.00	\$46,560,936.00
US 385	Chadron to SD	2022	16	\$12,580,800.00	\$3,048,320.00	\$15,629,120.00
NE 71	I-80	2022	3	\$ -	\$1,143,120.00	\$1,143,120.00
NE 71	Colorado Border to I-80	2021	15	\$4,246,020.00	\$2,998,320.00	\$7,244,340.00
NE 71	I-80 (MP 22) Interchange Rest Area / Visitor Center	2022	N/A	\$ -	\$1,650,000.00	\$1,650,000.00
L62A	US 26 to US 385	2022	8	\$2,516,160.00	\$3,048,320.00	\$5,564,480.00
US 385	Alliance to L7E (Hemingford)	2027	16	\$12,580,800.00	\$1,898,880.00	\$14,479,680.00
US 26	Wyoming State Line to Morrill	2024	7	\$5,504,100.00	\$1,202,488.00	\$6,706,588.00
US 26	Mitchell	2026	1	\$1,572,600.00	\$ -	\$1,572,600.00
US 26	Morrill Relief Route	2027	4	\$ -	\$949,440.00	\$949,440.00
US 385	L7E (Hemingford) to Chadron St Pk.	2032	22	\$17,298,600.00	\$1,580,480.00	\$18,879,080.00
US 26	Minatare to L62A intersection	2027	9	\$4,246,020.00	\$2,136,240.00	\$6,382,260.00
US 385	Chadron Relief Route	2033	4	\$ -	\$299,776.00	\$299,776.00
US 385	Chadron to S Edge of Chadron St Park	2032	14	\$11,008,200.00	\$1,005,760.00	\$12,013,960.00
US 385	Chadron Rest Area / Visitor Center	2034	N/A	\$ -	\$330,000.00	\$330,000.00
NE 71	Colorado Border to I-80	2037	15	\$ -	\$ -	\$ -
	ITS Improvements	2015 to 2025	N/A	\$ -	\$550,500.00	\$550,500.00
				<b>\$249,257,100.00</b>	<b>\$27,606,908.00</b>	<b>\$276,864,008.00</b>

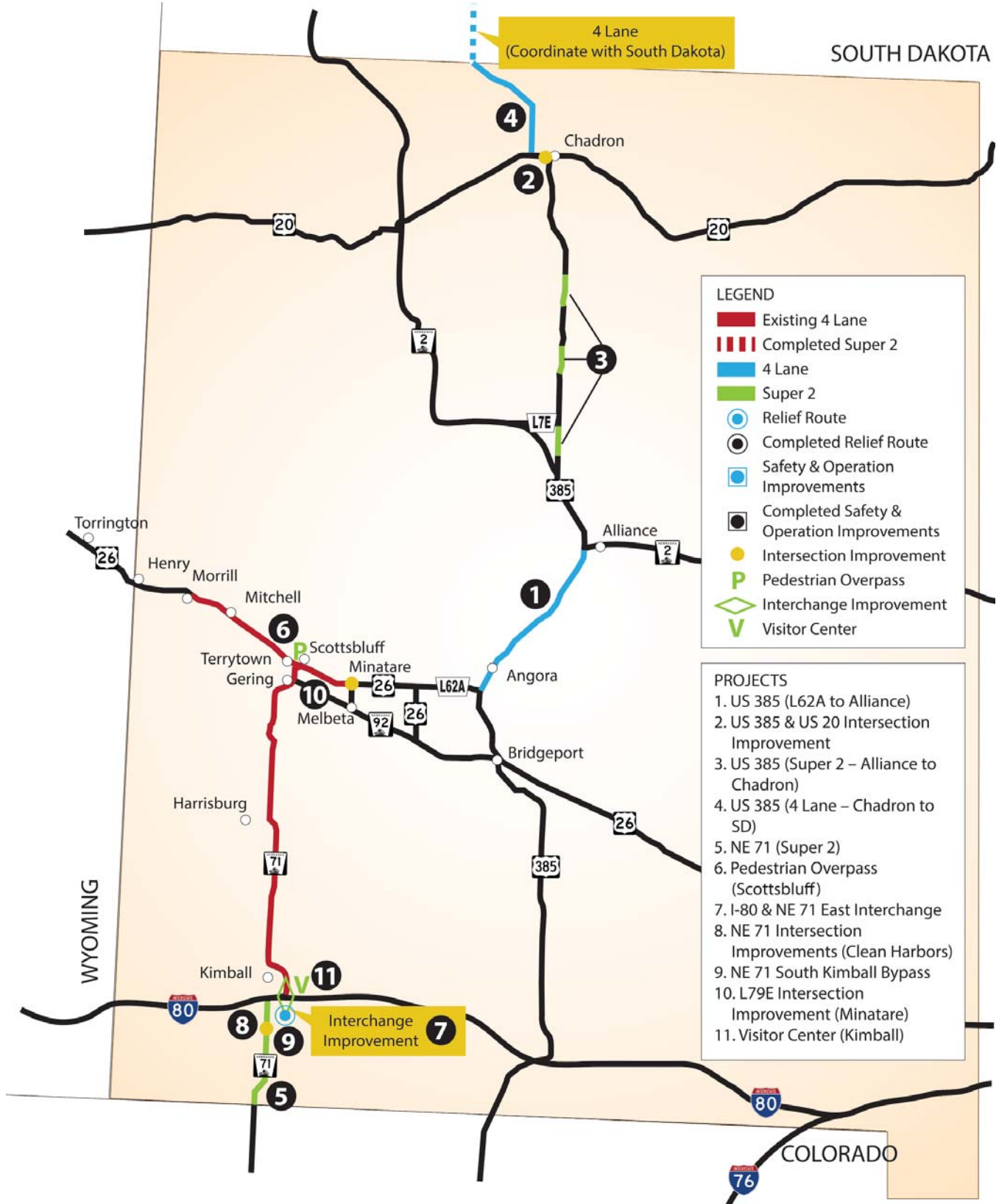


Figure 4.1 – Project Improvement Implementation Plan, 2015-2020



Figure 4.2 – Project Improvement Implementation Plan, 2020-2025

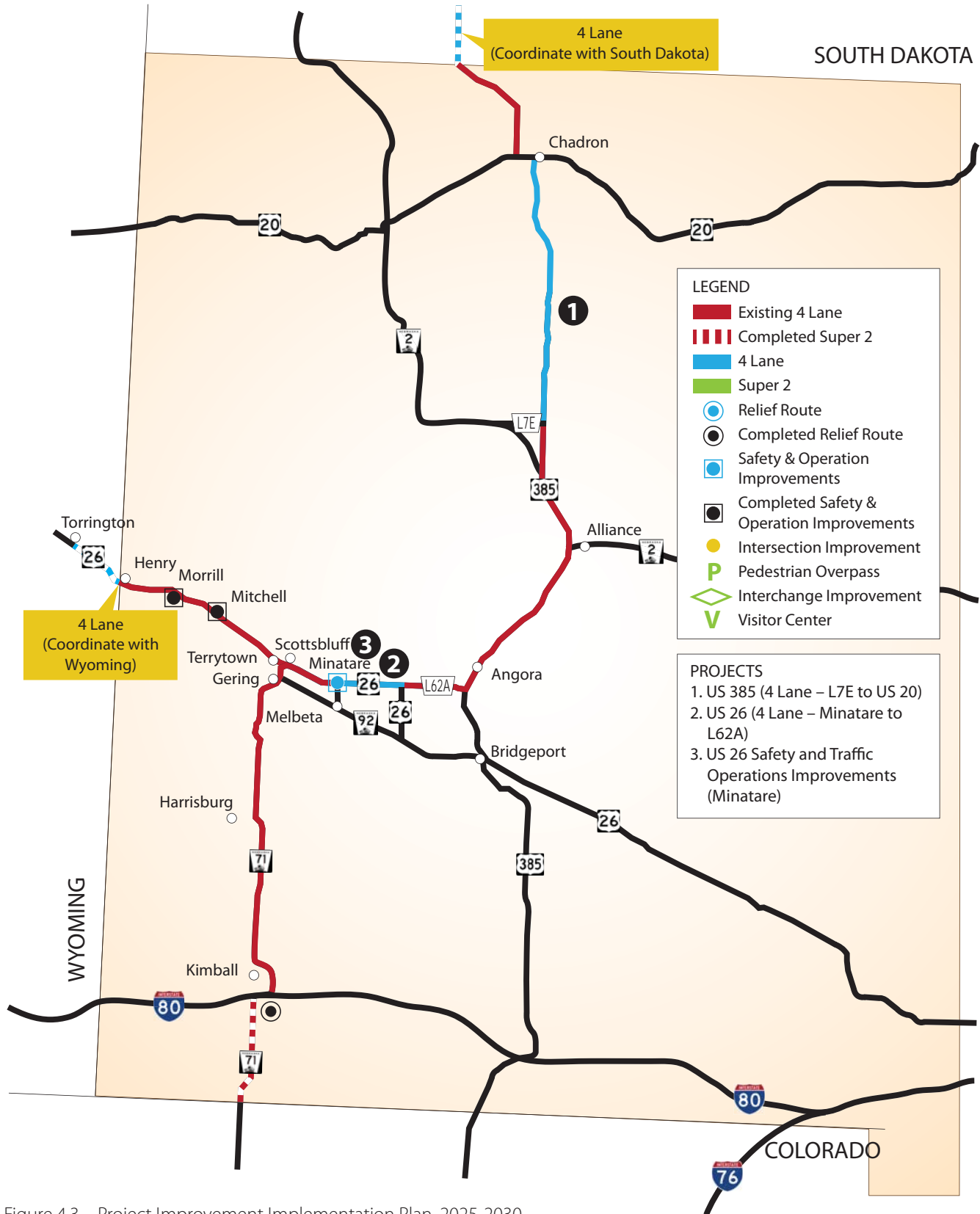


Figure 4.3 – Project Improvement Implementation Plan, 2025-2030

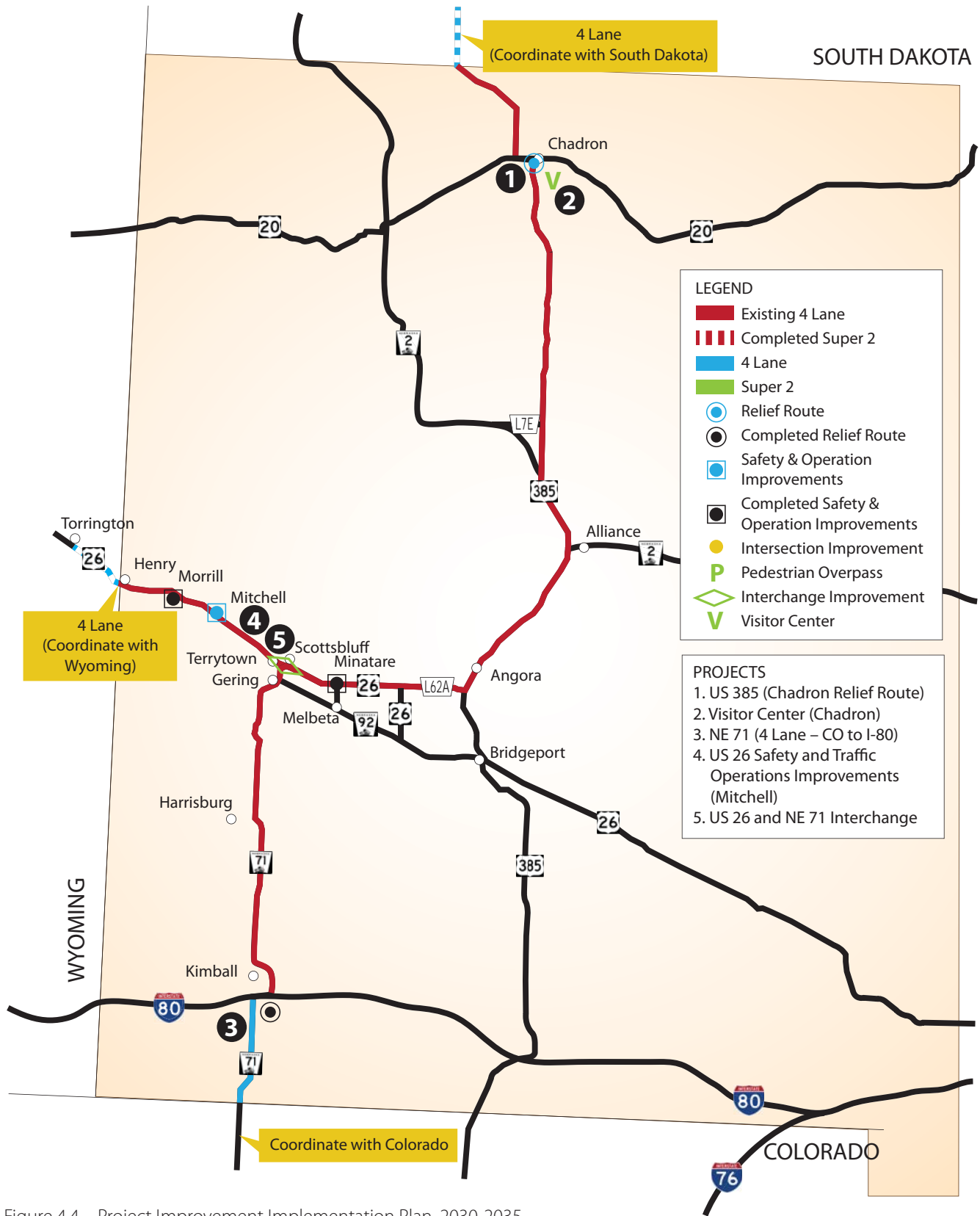


Figure 4.4 – Project Improvement Implementation Plan, 2030-2035