Appendix 6.B.

US 89 Corridor Study
U.S. 89
Corridor Study
Star Valley, WY

Wyoming Department
Of Transportation
Systems Planning

January 2005
# Table of Contents

Introduction ................................................................. 3
  Study Area ............................................................... 3
  Study Purpose .......................................................... 3
  Goals ............................................................................. 3

Analysis of Existing Conditions ........................................... 5
  Functional Road Classification ......................................... 5
  Traffic Volumes ........................................................... 6
  Maintenance ............................................................... 6
  Mix of Traffic ............................................................ 7
  Level of Service ........................................................ 8
  Crash Analysis ............................................................ 10
  Existing Highway Geometry ......................................... 14
  Speed Analysis .......................................................... 14
  Law Enforcement ......................................................... 15
  Access .......................................................................... 15
  Multi-Modal Transportation .......................................... 16
  Structures ..................................................................... 17
  Communities .............................................................. 17
  Land Use ........................................................................ 18

Analysis of Future Conditions .............................................. 19
  Future Population ........................................................ 19
  Future Traffic Levels .................................................... 19
  Future LOS .................................................................... 20
  Future Land Use ........................................................ 21

Improvement Recommendations .......................................... 22
  Access Management ...................................................... 22
  Long-Range Capacity Improvement Recommendations ........ 24
  Right-of-Way .................................................................. 27
  Cost of Construction ...................................................... 27
  Town of Smoot Speed Limit ........................................... 27
  Environmental Concerns ................................................ 28

Study Area Map .............................................................. Appendix A
Public Comments ............................................................ Appendix B
Introduction

Study Area

This corridor study examines US Highway 89 from Milepost 69 north through Alpine Junction. The study includes a short section of US Highway 26 from the Idaho State line to Alpine Junction, milepost 0.00 through milepost 2.37. The study area includes the area known as Star Valley, including the communities of Smoot, Afton, Grover, Thayne, Etna and Alpine (see Appendix A for study area map).

US 89 is the primary access for the Star Valley area and provides vital links to Interstate 80 (I-80) and to Jackson, WY. Star Valley is a growing community with many residents working in Jackson.

US 89 is going through a transition in Star Valley as land use shifts from low intensity agriculture to more residential development. While US 89 is a principal arterial, it also runs through the center of a developing area. Local residents use the road for short, regular commutes. Due to the lack of a secondary system of connecting roads, US 89 also serves the purpose of a collector road, the “main street”, for a dispersed community.

Study Purpose

US 89, through the Star Valley Corridor has been degraded in its ability to serve as a principal arterial. A combination of insufficient local road networks along with insufficient access controls has placed a strain on the operation of this highway to perform its intended function. The purpose of this corridor study is to formulate a strategy to improve and protect the ability of the highway to fulfill its intended function into the future.

The following goals and objectives were formulated in response to WYDOT, and Lincoln County needs as well as public response.

Goals

Goal 1: Determine Current Status of Travel Corridor

Objectives:
- Identify crash rates, locations, and causes.
- Identify maintenance problems and locations throughout the corridor.
- Determine current traffic volumes.
- Calculate current Levels of Service (LOS).
Goal 2: Determine Future Needs of Travel Corridor

Objectives:
- Forecast future traffic volumes.
- Calculate expected future Levels of Service (LOS).
- Identify probable future needs.

Goal 3: Improve/Maintain Level of Service

Objectives:
- Develop a plan for improvement of traffic flow through the corridor.

Goal 4: Control Access along the corridor

Objectives:
- Develop an access management plan for the corridor
- Coordinate with Lincoln County on local access and land use issues.

Goal 5: Improve Safety

Objectives:
- Identify improvements to crash hazard areas.
- Evaluate the need for future acceleration, deceleration, and turning lanes.
- Evaluate future traffic and right of way enforcement strategies.
- Identify future passing lane needs.
- Identify future maintenance needs.

Goal 6: Coordinate with Partners, including the public and Lincoln County

Objectives:
- Coordinate public involvement and partner cooperative action with WYDOT and Lincoln County.
- Involve local government on study team.
- Involve Federal Highway Administration and Forest Service on study team.
- Maintain schedule of public meetings for information dissemination and public input.

The goals and objectives of this study are intended to promote a comprehensive approach to meeting the future needs of the Star Valley travel corridor.
Analysis of Existing Conditions

Roadway Functional Classification

Roadway functional classification denotes the primary function of a road – roads serve to efficiently move people and goods from a beginning point to a destination, allow people to safely access abutting property, or a combination of the two. The following is a brief description of roadway classifications:

- “Principal Arterial - Interstates” have the highest functional classification. The main purpose of the interstate system is the high-speed, safe movement of people and goods. Access is fully controlled and direct access to abutting land and at grade intersections is not allowed.
- Non-interstate roadways that serve to primarily move goods and people over long distances, while allowing for limited access to abutting lands are classified as “Principal Arterials - Other.”
- “Minor Arterials” constitute routes whose design should provide relatively high travel speeds, with minimum interference to through traffic.
- Roadways classified as “Collectors” serve the dual purpose of efficiently moving people and goods and directly accessing abutting land.
- Roadways classified as “Local Roads” have the lowest functional class and provide the highest degree of direct access to abutting land with lower mobility.

Figure 1 provides an overview of the Federal Highway Administration’s (FHWA) Functional Classification System. US 89 is functionally classified as a Principal Arterial and designated as part of the National Highway System (NHS). The NHS consists of strategic highways throughout the nation that are critical to national security and economic viability. As such, the primary function of the highway is the safe and efficient movement of people and goods from their point of origin to their point of destination. However, US 89 also functions as a collector and/or local road in the communities and many rural areas along the
corridor. Serving accesses along the travel corridor is the secondary purpose of US 89.

**Traffic Volumes**

The traffic levels on US 89 within the study area have shown an increasing rate of growth for the past ten years. Figure 2 shows a sample of growth, from 1992 to 2002. In recent years, as Figure 2 demonstrates, there has been a marked increase in the rate of traffic growth through the travel corridor.

![Figure 2](image-url)  
10-Year Traffic

Source: WYDOT Planning

**Maintenance**

WYDOT is concerned about its ability to adequately maintain US 89. The need for highway maintenance increases as traffic volumes increase. The increasing number of access points adversely affects safety. Lack of county road connectivity places a burden on both WYDOT and the county in performing maintenance operations. Insufficient shoulders throughout much of the corridor, along with obstacles in the highway right-of-way also create maintenance problems along US 89.

One of the most critical concerns is providing safe access to the county road network, especially in the northern portion of Lincoln County. As traffic increases along the corridor, this will become more difficult to accomplish, and may require additional traffic control measures. New development in the area is placing pressure on WYDOT for new access points, intersection control, snow removal and additional highway maintenance activities.

Due to the lack of an adequate system of connecting county roads, local traffic is being forced to use the US 89 corridor. Traffic volumes are increasing on existing county roads that connect to US 89. County road maintenance activities
increase as road wear and deterioration become greater with the increase in use. This impacts WYDOT by requiring turning lanes at some of the existing intersections. This increases the need for surface maintenance and traffic control at these intersections.

Inadequate shoulders along many segments of US 89 make snow removal more difficult. Maintenance repairs can be damaged as thawing and refreezing deteriorates the road surface where snow cannot be completely removed. School buses and farm equipment have limited maneuverability and in some areas have become hazards for school children and motorists.

Right-of-way obstructions, such as mailboxes and inadequate setbacks, create safety and maintenance concerns. These obstructions make snow removal and right-of-way maintenance more difficult and costly. These objects lead to an increase in crash severity in some instances.

Lincoln County is addressing many transportation concerns through their County Transportation Study. This should address access control issues relevant to the U.S. 89 corridor and compliance with WYDOT’s Access Management Policy.

Mix of Traffic

The percentage of trucks utilizing the US 89 travel corridor has decreased noticeably in the last ten years. Figure 3 illustrates the average percentage of trucks throughout the corridor from 1981 to 2001.

The decrease in the percentage of truck traffic through the study area occurred in the 1990’s. This coincides with the increase in residential development through the Star Valley area. Table 1 details the traffic volume of all vehicles and trucks through the corridor. The decrease in percentage of truck traffic is due to an increase in overall traffic volumes and not a decrease in truck usage. The number of trucks using US 89 has been relatively constant; however the overall number of vehicles has increased over time.
Table 1
Historic Traffic Volumes

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Creek</td>
<td>1,550</td>
<td>185</td>
<td>1,960</td>
<td>205</td>
<td>1,740</td>
<td>150</td>
<td>1,960</td>
<td>140</td>
</tr>
<tr>
<td>Afton S.</td>
<td>4,200</td>
<td>230</td>
<td>5,080</td>
<td>280</td>
<td>6,460</td>
<td>280</td>
<td>7,000</td>
<td>300</td>
</tr>
<tr>
<td>JCT WY 238</td>
<td>2,260</td>
<td>245</td>
<td>2,460</td>
<td>280</td>
<td>3,700</td>
<td>240</td>
<td>4,650</td>
<td>240</td>
</tr>
<tr>
<td>Thayne S.</td>
<td>2,410</td>
<td>230</td>
<td>2,860</td>
<td>290</td>
<td>4,050</td>
<td>260</td>
<td>5,090</td>
<td>250</td>
</tr>
<tr>
<td>Etna</td>
<td>1,730</td>
<td>210</td>
<td>2,200</td>
<td>250</td>
<td>3,300</td>
<td>210</td>
<td>3,560</td>
<td>290</td>
</tr>
<tr>
<td>Alpine Jct</td>
<td>1,970</td>
<td>210</td>
<td>2,600</td>
<td>310</td>
<td>3,400</td>
<td>330</td>
<td>3,610</td>
<td>390</td>
</tr>
</tbody>
</table>

Source: WYDOT Planning

Level of Service

Level of Service (LOS) is a qualitative measurement describing traffic conditions. Generally, LOS measures volume, capacity, speed and travel time, freedom to maneuver, traffic interruptions, and comfort levels. There are six levels that may be identified through the LOS analysis. Each level corresponds to a letter “grade,” A through F. The higher the letter, the better the LOS will be. The following provides a brief overview of the LOS grading system:
**LOS A:**
Free flow traffic, low traffic density, passing demand well below passing capacity

**LOS B:**
Minimum delays, stable traffic density, passing demand equals passing capacity

**LOS C:**
Stable conditions, somewhat restricted movement, acceptable traffic conditions

**LOS D:**
Restricted traffic movement, high passing demand, very little passing opportunity

**LOS E:**
Numerous delays, no passing opportunities, congestion

**LOS F:**
Severe congestion, no passing opportunities, forced traffic flow
Current levels of service within the study area range from B to C. These are acceptable levels and represent reasonable traffic flow and comfort for drivers. The LOS is higher, “B”, towards Smoot at the southern end of the corridor. However, as vehicles travel north and traffic increases, the LOS decreases to “C”. Table 2 illustrates the current LOS throughout the US 89 Study Corridor. AADT refers to Annual Average Daily Traffic, or the annual average number of vehicles to drive on a specified section of roadway during a 24-hour period. DHV refers to Design Hourly Volume, the 30th highest hourly volume of traffic for a calendar year.

### Crash Analysis

Between 1992 and 2001, there were a total of 912 crashes on US 89 in the Star Valley Corridor Study area. Fourteen of these crashes resulted in at least one fatality.

The crash rate measures how many crashes occur per million vehicle miles traveled on a highway. The crash rate for US 89 within the study area averages 1.74 crashes per 1 million vehicle miles. The statewide average for the same time period on similar highways is 1.384 crashes per 1 million vehicle miles. The crash rate in the study area is about 25 percent higher than the statewide average.

The fatal crash rate represents total crashes involving at least one fatality per 100 million vehicle miles. The average fatal crash rate in the study area for 1992 through 2001 is 2.71. The average fatal crash rate for the same time period statewide is 2.45, or approximately 10 percent lower than the fatal crash rate within the study area.

Of all the crashes on US 89 within the study area, nearly 67 percent involved only property damage. More than 31.5 percent of the crashes involved at least one injury, and approximately 1.5 percent involved a fatality.

An examination of the geographic location of crashes throughout the study corridor shows that crashes occur more frequently in proximity to more heavily populated areas. Predominantly, the areas surrounding Afton, Thayne,
Freedom, and Alpine Junction appear to show more significant numbers of crashes than the rest of the study corridor.

It is expected that there will be more locations experiencing a significant number of crashes as LOS decreases with increasing traffic volumes. Conditions linked to high crash rates often include vehicles entering and leaving the flow of traffic. If more access points to the highway are allowed, there will be more locations for drivers to enter and exit the flow of traffic. As a result, there will be a higher potential for crashes.

The most prevalent contributing factors to crashes through the study area are directly related to both turning movements and accesses onto and off of US 89. These findings are from crashes reported to or by law enforcement agencies on the study section of US 89. All crashes that result in a total damage estimate of more than $1,000, or result in any injury or fatality are reported.

First Harmful Event

The first harmful event in a crash is defined as the first occurrence of injury or damage. Statewide, the most common first harmful event reported in 2002 was a motor vehicle colliding with another motor vehicle. Many crashes occurring with this type of first harmful event result in serious injuries.

Table 3 lists the first harmful events from crashes evaluated in this study. In Star Valley, motor vehicles colliding with other motor vehicles in traffic make up the most common first harmful event in reported crashes. In the study area, approximately 37 percent of all crashes fall into this category compared to almost 45 percent for the State (in 2002). The overturn rate in the study area is slightly lower than the statewide average at 8.3 percent versus 11.5 percent for the State.

Table 3
Crash Types in the Study Area

<table>
<thead>
<tr>
<th>First Harmful Events</th>
<th>Count</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian</td>
<td>5</td>
<td>0.5%</td>
</tr>
<tr>
<td>MV in Traffic</td>
<td>347</td>
<td>36.6%</td>
</tr>
<tr>
<td>MV on Other Roadway</td>
<td>7</td>
<td>0.7%</td>
</tr>
<tr>
<td>Parked MV</td>
<td>12</td>
<td>1.3%</td>
</tr>
<tr>
<td>Domestic Animal</td>
<td>23</td>
<td>2.4%</td>
</tr>
<tr>
<td>Wild Animal</td>
<td>2</td>
<td>0.2%</td>
</tr>
<tr>
<td>Other Non-Fixed Object</td>
<td>127</td>
<td>13.4%</td>
</tr>
<tr>
<td>Overturn</td>
<td>79</td>
<td>8.3%</td>
</tr>
<tr>
<td>Other Fixed Object</td>
<td>227</td>
<td>23.9%</td>
</tr>
<tr>
<td>None Reported</td>
<td>119</td>
<td>12.6%</td>
</tr>
</tbody>
</table>

Source: WYDOT Planning
It is interesting to note that the percentage of crashes in the study area with motor vehicles colliding with fixed objects is substantially higher than the State average. In 2002 about 16 percent of the crashes in the State were with “other fixed objects while 23.9 percent of the crashes in the study were of this variety. This may be caused, in part, by the lack of a “clear zone” in the right-of-way. This road was not constructed under guidelines requiring wider shoulders, increased right-of-way, and more strict clear zone requirements.

Human Factors

A human factor in a crash refers to circumstances directly involved with a crash that can be traced to the vehicle driver. Examples include the use of alcohol, drugs, falling asleep and driving at unsafe speeds.

Table 4 lists the human factors reported for the crashes included in the study. Two primary areas of concern regarding human factors are unsafe speed and failure to yield right of way. Both of these driver behaviors are likely to escalate if the number of access points and traffic levels continue to grow on US 89.

Table 4:
Driver Behavior in Reported Crashes

<table>
<thead>
<tr>
<th>Human Factor</th>
<th>Count</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>62</td>
<td>6.5%</td>
</tr>
<tr>
<td>Fell Asleep</td>
<td>50</td>
<td>5.3%</td>
</tr>
<tr>
<td>Following Too Closely</td>
<td>33</td>
<td>3.5%</td>
</tr>
<tr>
<td>Failure to Yield Right of Way</td>
<td>96</td>
<td>10.1%</td>
</tr>
<tr>
<td>Turning Improperly</td>
<td>21</td>
<td>2.2%</td>
</tr>
<tr>
<td>Unsafe Speeds for Conditions</td>
<td>186</td>
<td>19.6%</td>
</tr>
<tr>
<td>Disregarding Traffic Control</td>
<td>4</td>
<td>0.4%</td>
</tr>
<tr>
<td>Distraction</td>
<td>13</td>
<td>1.4%</td>
</tr>
<tr>
<td>Improper Passing</td>
<td>2</td>
<td>0.2%</td>
</tr>
<tr>
<td>Driver Inexperience</td>
<td>148</td>
<td>15.6%</td>
</tr>
<tr>
<td>No Violations</td>
<td>201</td>
<td>21.2%</td>
</tr>
<tr>
<td>Other</td>
<td>68</td>
<td>7.2%</td>
</tr>
<tr>
<td>None Reported</td>
<td>64</td>
<td>6.8%</td>
</tr>
</tbody>
</table>

Source: WYDOT Planning

Collision Type

This description applies to the first type of collision to occur during a crash. Collision type only applies to crashes that occur between two or more vehicles involved. All single vehicle crashes are excluded from this section of the safety report.

Table 5 provides an accounting of collision types within the study area. Left turn and rear end collisions make up a large proportion of crashes on US 89. The
data indicates that a large number of collisions in Star Valley occur during a turn or while a vehicle is waiting to make a turn. These types of collisions are directly related to the number of turning movements which are directly related to the number of access points on the highway.

Table 5
Motor Vehicle Collisions

<table>
<thead>
<tr>
<th>Collision Type</th>
<th>Count</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head-On</td>
<td>66</td>
<td>6.9%</td>
</tr>
<tr>
<td>Rear End</td>
<td>99</td>
<td>10.4%</td>
</tr>
<tr>
<td>Angle</td>
<td>59</td>
<td>6.2%</td>
</tr>
<tr>
<td>Sideswipe</td>
<td>57</td>
<td>6.0%</td>
</tr>
<tr>
<td>Left Turn</td>
<td>110</td>
<td>11.6%</td>
</tr>
<tr>
<td>Right Turn</td>
<td>31</td>
<td>3.3%</td>
</tr>
<tr>
<td>Other</td>
<td>31</td>
<td>3.3%</td>
</tr>
<tr>
<td>None Reported</td>
<td>495</td>
<td>52.1%</td>
</tr>
</tbody>
</table>

Source: WYDOT Planning

Road and Weather Conditions

Weather conditions apply to the prevailing atmospheric conditions at the time of a crash. These conditions do not necessarily apply to the condition of the roadway surface. Road conditions refer to the status of a roadway surface. These do not always relate directly to the weather conditions. For instance, a road surface can be icy while the weather conditions are sunny and clear. Tables 6 and 7 detail the road and weather conditions during crashes included in the study.

Table 6
Roadway Surface Conditions

<table>
<thead>
<tr>
<th>Roadway Conditions</th>
<th>Count</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry</td>
<td>512</td>
<td>53.8%</td>
</tr>
<tr>
<td>Wet</td>
<td>58</td>
<td>6.1%</td>
</tr>
<tr>
<td>Icy</td>
<td>181</td>
<td>19.0%</td>
</tr>
<tr>
<td>Snowy</td>
<td>53</td>
<td>5.6%</td>
</tr>
<tr>
<td>Slushy</td>
<td>22</td>
<td>2.3%</td>
</tr>
<tr>
<td>Condition Not Reported</td>
<td>125</td>
<td>13.1%</td>
</tr>
</tbody>
</table>

Source: WYDOT Planning
Table 7
Atmospheric Conditions at the Time of Crashes

<table>
<thead>
<tr>
<th>Weather Conditions</th>
<th>Count</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear/Cloudy</td>
<td>643</td>
<td>67.6%</td>
</tr>
<tr>
<td>Rain</td>
<td>42</td>
<td>4.4%</td>
</tr>
<tr>
<td>Snowing</td>
<td>156</td>
<td>16.4%</td>
</tr>
<tr>
<td>Fog</td>
<td>14</td>
<td>1.5%</td>
</tr>
<tr>
<td>Strong Wind</td>
<td>4</td>
<td>0.4%</td>
</tr>
<tr>
<td>Ground Blizzard</td>
<td>6</td>
<td>0.6%</td>
</tr>
<tr>
<td>Sleet/Hail/Freezing Rain</td>
<td>6</td>
<td>0.6%</td>
</tr>
<tr>
<td>Condition Not Reported</td>
<td>80</td>
<td>8.4%</td>
</tr>
</tbody>
</table>

Source: WYDOT Planning

Existing Highway Geometry

Part of the safety review of this corridor study was an analysis of the existing geometric alignment of the highway. WYDOT’s Project Development Section ran a horizontal and vertical curve check to determine the safety of this section of roadway based on sight distance. The review examined the ability of a vehicle, traveling the speed limit, to safely stop based on sight distance. The methods compensate for speed and headlight use and are based on “as built roadway plans”. The review for Highway 89 within the study area was evaluated for a 70 mile per hour (MPH) design speed. This 70 MPH “design speed” does not indicate a safe, recommended, or legal speed limit. The design speed is used as a safety factor only. A 70 MPH design speed is commonly used for a 2-lane highway with a posted 65 MPH speed limit.

Horizontal curve analysis safely evaluates the ability to negotiate curves at a given speed. The horizontal curve check did not find any areas that failed to meet a 70 MPH design speed.

Vertical curve analysis evaluates the safety of a roadway for negotiating hilly and mountainous terrain. The vertical curve evaluation found a number of areas between milepost 97, south of Thayne, and Alpine Junction that do not meet a 70 MPH design speed.

Speed Analysis

WYDOT’s Traffic Program performed free flow, spot speed studies throughout the study area in June of 2003. The free flow speeds were taken with radar where 100 sample sections were measured in both directions of travel. All sampled vehicles were selected randomly. Sampled vehicles were those not impeded by turning or slowing vehicles. The data collected was obtained from 10:15 a.m. to 2:25 p.m. on a dry, typical weekday.
The 85th percentile speed is the most generally used and preferred criteria for determining the maximum speed limit for a roadway. Utilizing the data collected, it has been determined that the 85th percentile speeds for the corridor are relatively close to posted speed limits, with the exception of the speed limit within the town of Smoot.

The 85th percentile speed for northbound traffic through the town of Smoot was 48 MPH, and 46 MPH for southbound traffic. The posted speed limit is 30 MPH.

Law Enforcement

The public has voiced concern regarding the level of law enforcement in the US 89 study area. In response to this, WYDOT and the Wyoming Highway Patrol examined the number of citations issued in the study area and compared them to three other sections of roadway in Wyoming.

To determine citation rates, all sections studied were compared for the number of citations per 10,000 AADT and per 100,000 Vehicle Miles Traveled. These rates are referred to as “citation rates” for this study.

US 89 was compared with I 80 from Rock Springs to the Granger Junction, US 191 from Eden to Hoback Junction, and US 85 from the Goshen County line to Mule Creek Junction. These sites allowed comparisons between the law enforcement norm on US 89 and a busy section of interstate as well as two sections of rural principal arterial highway that experience traffic patterns similar to US 89.

The results of this study indicated a lower level of citations on US 89 than on all compared facilities. US 89 experienced a citation rate approximately 30 percent lower than the interstate section. Additionally, US 89 experienced a citation rate approximately 50 percent lower than both US 191 and US 85, within the studied areas.

Additionally, the US 89 corridor is commonly used for motorcycle, ATV and snowmobile travel. Shoulders are most often avoided and the traffic remains off pavement, but within WYDOT right-of-way. Typically, these motorized vehicles are not registered, nor are they legal to drive in the right-of-way.

Access

Access management attempts to balance the competing needs of providing access to land while preserving safe and efficient traffic flow. Highway functional classification indicates the priority function of a roadway. Higher order roadways are intended to efficiently move people over long distances connecting major
destinations. Lower classified roadways connect to higher order highways and allow people to safely access abutting properties.

The primary purpose of US 89, as a principal arterial, is mobility. The Highway has also been designated as part of the National Highway System. Access to abutting property is a secondary or minor function. The travel corridor should be planned and constructed to maintain the highest level of mobility. Direct access to the highway from abutting land should be minimized. Land access should be provided through other roadways as much as possible.

As residential development in Star Valley has increased, more access points have been permitted on US 89. Mobility has begun to suffer as a result of the proliferation of accesses. As of 2003, more than 425 access points (excluding incorporated towns) have been granted within the study area.

In Star Valley, a substantial number of crashes can be linked to the lack of effective access management. Crashes involving following too closely, failure to yield right of way, improper turning, and disregarding traffic controls can be linked to improper access management. These account for 17 percent of all crashes in the study area. Rear end collisions, and both right and left turn crashes can be linked to access management as well. In the study area, these account for 26 percent of all crashes.

In order to maintain the existing levels of mobility and safety on this highway, it will be important to restrict the granting of new accesses. Success will require cooperation and coordination between WYDOT and Lincoln County in the area of access management.

**Multi-Modal Transportation**

Southern Teton Area Rapid Transit (START) provides public transportation service from Alpine to Jackson. START is the only public transportation provider with fixed route service in Lincoln County. On-demand transit service is available in Afton and Thayne through the Star Valley Senior Center and the Thayne Senior Center.
Structures

There are 10 bridge structures within the study area. Table 8 describes each of the structures. All of these structures are located on US 89. All bridges within the study area have acceptable sufficiency ratings. Ideally, some of the bridges should be wider, providing a wider shoulder across the structure to match the roadway.

<table>
<thead>
<tr>
<th>Milepost</th>
<th>Feature Crossed</th>
<th>Type</th>
<th>Length</th>
<th>Width</th>
<th>Sufficiency Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>72.09</td>
<td>Salt River</td>
<td>Steel Girder</td>
<td>100</td>
<td>40</td>
<td>85.72</td>
</tr>
<tr>
<td>77.82</td>
<td>Cottonwood Creek</td>
<td>Steel Girder</td>
<td>53</td>
<td>40</td>
<td>81.49</td>
</tr>
<tr>
<td>82.09</td>
<td>Dry Creek</td>
<td>Steel Girder</td>
<td>53</td>
<td>40</td>
<td>100.00</td>
</tr>
<tr>
<td>85.7</td>
<td>Swift Creek</td>
<td>Steel Girder</td>
<td>45</td>
<td>68</td>
<td>94.92</td>
</tr>
<tr>
<td>95.18</td>
<td>Salt River</td>
<td>PS Concrete Girder</td>
<td>157</td>
<td>34</td>
<td>74.00</td>
</tr>
<tr>
<td>96.2</td>
<td>Salt River</td>
<td>PS Concrete Girder</td>
<td>137</td>
<td>34</td>
<td>79.00</td>
</tr>
<tr>
<td>98.16</td>
<td>Etna Irrigation Canal</td>
<td>PS Concrete Girder</td>
<td>138</td>
<td>34</td>
<td>67.00</td>
</tr>
<tr>
<td>99.42</td>
<td>Etna Irrigation Canal</td>
<td>Concrete Girder</td>
<td>46</td>
<td>40</td>
<td>73.71</td>
</tr>
<tr>
<td>100.35</td>
<td>Etna Irrigation Canal</td>
<td>Concrete Box</td>
<td>33</td>
<td>36</td>
<td>80.00</td>
</tr>
<tr>
<td>117.99</td>
<td>Snake River</td>
<td>Steel Girder</td>
<td>541</td>
<td>68</td>
<td>80.00</td>
</tr>
</tbody>
</table>

Source: WYDOT Planning

Communities

There are five communities within the study area. Smoot is the southernmost community with a population of less than 200 people according to the 2000 census. Located 7 miles north of Smoot, Afton represents the largest town in the study area with just over 1,800 people. The community of Grover is 6 miles north of Afton and has a population of approximately 150 people. Thayne is 11 miles north of Grover, with a population of approximately 350 people. Etna lies 7 miles north of Thayne, with an approximate population of 120. Finally, located 11 miles north of Etna, Alpine has a population of approximately 550.
Land Use

Star Valley is experiencing a major change in land use along the US 89 corridor. Much of the valley is experiencing a shift in land use from primarily agrarian to mixed use and residential. The large increase in residential use is due, in large part, to Teton County commuters seeking affordable housing. Figure 4 shows the number of residential and commercial building permits issued for Northern Lincoln County over the past 10 years.

![Figure 4: N. Lincoln Co. Building Permits](image)

Source: Lincoln County Planning Office

The population growth in the Star Valley region is having an adverse impact on the infrastructure throughout the area. Factors including: waste disposal, water quality and delivery, the county road network, and road maintenance are concerns that state and local officials must deal with.

Lincoln County is reviewing their land use regulations through the Lincoln County Transportation Study.
Analysis of Future Conditions

Future Population

Between 1990 and 2000 Lincoln County was one of the fastest growing counties in Wyoming. The population grew more than 15 percent over the ten-year period. Much of this growth was overflow from Teton County, which experienced more than a 50 percent growth in population. Lincoln County, and the study area in particular has become a place to live for many people who work in Teton County due to the much more affordable housing market.

This population growth trend is expected to continue as more land is converted from agricultural use to residential. Table 9 illustrates the anticipated population growth in the study area through 2025.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lincoln County</td>
<td>12177</td>
<td>12625</td>
<td>14573</td>
<td>16800</td>
<td>20700</td>
</tr>
<tr>
<td>Afton</td>
<td>1290</td>
<td>1630</td>
<td>1818</td>
<td>2100</td>
<td>2600</td>
</tr>
<tr>
<td>Alpine</td>
<td>n/a</td>
<td>200</td>
<td>550</td>
<td>750</td>
<td>1000</td>
</tr>
<tr>
<td>Thayne</td>
<td>256</td>
<td>267</td>
<td>341</td>
<td>420</td>
<td>575</td>
</tr>
</tbody>
</table>

Source: WYDOT Planning

Lincoln County calculated population growth forecasts for Star Valley as part of their waste disposal analysis. These growth projections are considerably higher than WYDOT’s 20-year projections, with an anticipated population of 28,000 by 2023. The population forecasts in Table 9 used for this corridor study should be considered conservative. If actual population growth is closer to the county’s projections, traffic conditions will deteriorate more quickly than indicated in this study.

Future Traffic Levels

The US 89 Corridor Study Team’s analysis of future traffic levels through the Corridor Study area are based upon the following assumptions:

- The population of Star Valley will continue to grow in a consistent manner over the next 25 years, and
- The number of trucks will remain fairly constant over time.
By 2027, total AADT is expected to increase more than 35% through the Star Valley Corridor. This projection matches the recent historic growth patterns through Star Valley. Land use continues to shift from agricultural to low-density residential.

Figure 5 illustrates the projected traffic growth measured in AADT in the Star Valley travel corridor by segment and year.

![Figure 5 Traffic Forecasts](image)

**Table 10**

<table>
<thead>
<tr>
<th>MP</th>
<th>Forecast (2027)</th>
<th>AADT</th>
<th>% Trucks</th>
<th>DHV</th>
<th>LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>68 - 77</td>
<td></td>
<td>2100</td>
<td>8</td>
<td>378</td>
<td>B</td>
</tr>
<tr>
<td>78 - 83</td>
<td></td>
<td>2300</td>
<td>6</td>
<td>414</td>
<td>B</td>
</tr>
<tr>
<td>87 - 90</td>
<td></td>
<td>8400</td>
<td>6</td>
<td>1260</td>
<td>D</td>
</tr>
<tr>
<td>90 - 100</td>
<td></td>
<td>6000</td>
<td>6</td>
<td>900</td>
<td>D</td>
</tr>
<tr>
<td>101 - 108</td>
<td></td>
<td>7000</td>
<td>6</td>
<td>810</td>
<td>D</td>
</tr>
<tr>
<td>108 - 117</td>
<td></td>
<td>7100</td>
<td>6</td>
<td>825</td>
<td>D</td>
</tr>
</tbody>
</table>

Source: WYDOT Planning

**Future LOS**

The Level of Service on US 89 in the study area is expected to decline as a result of the forecasted increase in traffic volumes. The road segments in the vicinity of Smoot are expected to remain at LOS “B” through the year 2027. The road segments extending from Afton to Alpine Junction, are expected to decline to LOS “D”. Table 10 details the LOS projected through 2027 by roadway section. These projections take into account the current growth trends through the Star Valley travel corridor. However, the
expected decline in LOS does not consider increased access points to US 89. If more accesses are granted to the highway, travel conditions will very likely be worse than these forecasts indicate. These forecasts indicate the functionality of the highway will be seriously compromised by the year 2027.

Future Land Use

In recent years, Star Valley has experienced a marked increase in residential land use and associated population growth. This growth is reflected in recent traffic volumes as well. This shift in land use from agricultural to low-density residential is expected to continue for the foreseeable future. The economic incentive for landowners to subdivide and sell residential lots is substantial at this time.

As the population of Star Valley continues to increase, the trend for US 89 to function as a “main street” for local communities will continue. With this trend, the function of the highway as a principal arterial will be further compromised. Unfortunately, the terrain in Lincoln County does not allow for an alternate or bypass route to be constructed. Therefore, it is vital to preserve the function of US 89 as a principal arterial for the safe and efficient flow of people and goods through Star Valley.

Lincoln County is currently in the process of evaluating zoning requirements and studying transportation needs throughout the county. The county is considering increasing structure setback requirements for new construction, along with establishing a collector road system that will minimize the demand for additional approaches on US 89. This evaluation is in the preliminary stages.
Improvement Recommendations

Access Management

Access management balances the competing needs of providing access to land while preserving safe and efficient traffic flow on the roadway. The goal of access management is to control how, where, and when vehicles can enter or leave a roadway. It is the conclusion of this study that an excessive number of accesses have been granted on sections of US 89 through the study corridor.

The fundamental recommendation to maintain the functionality of US 89 as a principal arterial through the Star Valley corridor is a commitment to control future access to the highway. Appropriate access management will be critical to minimize the deterioration of operating conditions (LOS) on US 89 as traffic volumes continue to increase over the next 20 years.

In the study corridor, granting access to the highway for low-density residential developments abutting the roadway has adversely affected operating conditions. The number of access points has adversely impacted the safety of the roadway due to the numerous turning movements. The lack of effective access management and the proliferation of accesses are major factors leading to the deterioration of highway safety and efficiency.

Effective access management will allow US 89 to continue to function at an acceptable level for a much longer time and with higher volumes of traffic. Research has shown that effective access management can achieve the following benefits:

- Reduce crashes by as much as 50%,
- Increase highway capacity by 20-45%,
- Extend the life of the highway,
- Reduce travel time and delay by 40-60%,
- Increase ease of access to private and business property,
- Decrease fuel consumption by as much as 35%,
- Reduce vehicular emissions,
- Reduce traffic disruption for residents,
- Postpone the need to build costly and disruptive alternate routes and bypasses,
- Reduce transportation costs, and
- Protect property values.

Conflict points are locations on a roadway or in an intersection where the paths of two vehicles can legally meet. In short, it’s where two vehicles can crash through turning, merging or similar movements. At a four-way intersection, there can be as many as 36 conflict points. Access management limits the number of
conflict points by regulating the number, design and placement of accesses and intersections. The effect of this type of regulation is improved safety and a more efficient roadway. Table 11 clearly shows the safety improvement derived from maintaining effective access control.

### Table 11
Access Management Research Results

<table>
<thead>
<tr>
<th>Access Control</th>
<th>Urban Total</th>
<th>Urban Fatal</th>
<th>Rural Total</th>
<th>Rural Fatal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full</td>
<td>1.86</td>
<td>0.02</td>
<td>1.51</td>
<td>0.03</td>
</tr>
<tr>
<td>Partial</td>
<td>4.96</td>
<td>0.05</td>
<td>2.11</td>
<td>0.06</td>
</tr>
<tr>
<td>None</td>
<td>5.26</td>
<td>0.04</td>
<td>3.32</td>
<td>0.09</td>
</tr>
</tbody>
</table>

Source: Publication No. FHWA-RD-91-044, Volume 1: Access Control

Table 12 illustrates the recommended access spacing for rural areas along US 89. Minimum separation distances are in feet. These standards are based upon WYDOT’s draft access management policy. If two state highways intersect, an access may be allowed with less than the distance in Table 11 but the distance from the intersection to an access must be a minimum of 660 feet. This table is read by selecting the type of approach in the column on the left side. The minimum separation distance from any other type of access across the top row is where the column and row intersect. For example, the minimum separation distance between a field approach and either another field or residential approach is 330 feet. The minimum separation distance between a field and a commercial approach is 660 feet, etc.

### Table 12
Recommended Rural Principal Arterial Access Spacing

<table>
<thead>
<tr>
<th>Access Type</th>
<th>Field</th>
<th>Residential</th>
<th>Commercial</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td>330</td>
<td>330</td>
<td>660</td>
<td>1320</td>
</tr>
<tr>
<td>Residential</td>
<td>330</td>
<td>660</td>
<td>1320</td>
<td>1320</td>
</tr>
<tr>
<td>Commercial</td>
<td>660</td>
<td>1320</td>
<td>2640</td>
<td>2640</td>
</tr>
<tr>
<td>Major</td>
<td>1320</td>
<td>1320</td>
<td>2640</td>
<td>2640</td>
</tr>
</tbody>
</table>

Source: WYDOT Traffic

The study team recommends that both Lincoln County and WYDOT enforce a coordinated access management policy. An effective access management policy will help alleviate the need for immediate capacity improvement projects.
Long-Range Capacity Improvement Recommendations

Without an effective access management strategy in place, traffic conditions throughout Star Valley will rapidly deteriorate. In this case, it will be necessary to consider capacity improvement projects in the corridor in the near future.

With an effectively enforced access management plan in place, the function of US 89 as a principal arterial will be better preserved. The need for capacity improvement projects can be deferred further into the future. The determination for when and how to construct for future growth must be undertaken at the discretion of WYDOT in response to actual long-term future growth.

Capacity improvement projects are a secondary recommendation for 2 reasons:

- Construction options will be extremely expensive and will compete with existing construction plans for funding, and
- Traffic will be delayed for the duration of any road construction through the corridor.

The following are recommended:

5 Lane Sections

The Geometrics Section of WYDOT’s Traffic Program used year 2001 volumes and year 2027 projected volumes to analyze the LOS for the rural areas of US 89 from MP 68, south of Smoot, to MP 116.6, south of Alpine. Areas with current speed limits of 55 MPH or higher were classified as rural. Table 13 shows the current and projected LOS for the current roadway.

<table>
<thead>
<tr>
<th>MP to MP</th>
<th>Location</th>
<th>% DHV</th>
<th>% Trucks</th>
<th>2001 AADT</th>
<th>2027 AADT</th>
<th>2001 DHV</th>
<th>2027 DHV</th>
<th>2001 LOS</th>
<th>2027 LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>68.0-77.5</td>
<td>Smoot S.</td>
<td>18</td>
<td>8</td>
<td>1470</td>
<td>2100</td>
<td>265</td>
<td>378</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>77.8-82.8</td>
<td>Smoot/Afton</td>
<td>18</td>
<td>6</td>
<td>1700</td>
<td>2300</td>
<td>310</td>
<td>414</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>87.3-89.7</td>
<td>Afton/Grover</td>
<td>15</td>
<td>6</td>
<td>4750</td>
<td>8400</td>
<td>715</td>
<td>1260</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>90.1-99.7</td>
<td>Grover/Thayne</td>
<td>15</td>
<td>6</td>
<td>4200</td>
<td>6000</td>
<td>630</td>
<td>900</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>100.6-107.6</td>
<td>Thayne/Etna</td>
<td>15</td>
<td>6</td>
<td>3600</td>
<td>7000</td>
<td>540</td>
<td>1050</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>107.9-116.6</td>
<td>Etna/Alpine</td>
<td>15</td>
<td>6</td>
<td>3300</td>
<td>7100</td>
<td>495</td>
<td>1065</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

Source: WYDOT Planning
The present LOS for the corridor is no lower than “C”. This drops to “D” north of Afton (MP 87.3 - MP 116.6) under projected 2027 growth conditions. Since US 89 is part of the NHS (National Highway System) and classified as a principal arterial, WYDOT would like to maintain at least LOS “C”. A divided multilane highway with a depressed median may be desired, but the difficulty and expense of acquiring the needed right-of-way (ROW) in this corridor limits available options for a multilane section to a 5-lane roadway (2 through lanes in each direction plus a continuous center left turn lane). The Traffic Program’s analysis indicates that the following capacity improvements may be needed to maintain a minimum LOS of “C” through the year 2027:

- Construct a 5-lane section (2 through lanes in each direction and a center two way left turn lane) between Afton and Grover. This will raise the LOS to A.
- Construct either a 5-lane section or 3-lane section (1 lane in each direction and a center two way left turn lane) through Grover (MP 89.7 - MP 90.1). This is an urban area and turning movements suggest installing a continuous left turn lane.
- Install three 5-lane passing segments between Grover and Thayne: 1) a 1.2 mile section north of Grover from MP 90.1 to MP 91.3, 2) a 1.2 mile section from MP 94.3 to MP 95.5, and 3) a 1.2 mile section south of Thayne from MP 98.5 to MP 99.7. The passing section adjacent to Grover and Thayne would allow for sorting of traffic after leaving the slower urban areas. The 5-lane sections allow accesses within the passing segments without the need to install left turn lanes. The installation of the passing segments will barely sustain a LOS C through the year 2027. Installing a 5-lane section from Grover to Thayne will result in a LOS A and will sustain this LOS beyond 2027.
- The highway section from MP 106.6 to MP 116.6 will be at a LOS D by 2027 and a 5-lane section or passing segments may be necessary in this area.

Turn Lanes

WYDOT’s Traffic Program analyzed turning movements throughout the corridor to identify the need for additional turn lanes. The following turn lanes are recommended on US 89:

- A two-way continuous center turn lane is recommended for Grover, no other turn lanes recommended.
- A southbound right turn lane and a northbound left turn lane at WYO 238 (MP 94.16).
- Turn lanes are needed at CR 173S (MP 98.63)
Right-of-Way

It is recommended that WYDOT purchase right-of-way through Star Valley, from north of Afton through Alpine, to accommodate a 5-lane section. This five-lane section should consist of two 12’ through lanes in each direction plus a 12’ center two way left turn lane plus two 8’ shoulders. Long-term future growth of the Star Valley area is expected to eventually require the construction of a 5-lane section through the corridor.

It is recommended that the county require all new construction to maintain a minimum 75-foot setback from the centerline of US 89. It is recommended the county and WYDOT cooperate to purchase or acquire the required right-of-way for future corridor development needs.

Wyoming statutes currently do not allow for corridor preservation and advance purchase of right-of-way. WYDOT’s policy is to purchase right-of-way during the project development phase after the environmental approval process has been completed. Advance purchase of right-of-way would require state and local funding, as federal funds are not available for the purchase of right-of-way until environmental assessments are complete.

Cost of Construction

The cost of constructing the necessary roadway to accommodate projected growth rates through Star Valley is estimated to exceed $75 million, in 2004 dollars. In order to schedule construction for a project of this scope, a needs analysis would have to be initiated. This would evaluate the importance and immediacy of the need for construction through Star Valley compared to needs elsewhere in the state.

Due to the cost and feasibility factors of this construction plan, it is vital that an effective access management plan be adopted. This can be accomplished through WYDOT following a strict Access Management Policy along with effective planning and zoning guidelines implemented through Lincoln County. This will extend the useful life of the existing facility and provide the most cost-effective means of accommodating the projected traffic growth through Star Valley.

Town of Smoot Speed Limit

Wyoming Department of Transportation Traffic personnel conducted a speed study in Smoot as part of the U.S. 89 Corridor Study to determine whether the existing speed limit is set reasonably. The posted speed limit is 30 MPH.
The speed study indicated that an increase of 15 MPH would be justified. Therefore, it is recommended that the existing speed limit be increased to 45 MPH.

Environmental Concerns

Control of future access within the US 89 corridor will forestall the need for any future capacity improvement projects. However, in the event construction becomes necessary in the future, an environmental analysis would be required in order to secure federal funding assistance.

The environmental analysis would need to examine the potential impacts to the human and natural environment due to highway expansion. The analysis would have to examine the social consequences of acquisition and conversion of adjacent private and public lands into a transportation facility. Public scoping would further define the issues to be addressed in the environmental analysis; however, it is reasonable to assume that there would be notable concern from residents over acquisition of additional right-of-way through Star Valley. Potential impacts to cultural resources such as any historic facilities or archeological sites would need to be determined.

Impacts to wildlife resources would be a strong consideration, as good habitat for several species exists in close proximity to the corridor. There are numerous wetlands and streams through out the corridor; potential impacts to wetlands and water impacts would need to be covered in the analysis. These are prime considerations among an array of potential impacts to resources that would have to be addressed in an environmental analysis. This analysis would need to be initiated, when it is determined that access control alone can no longer assure the proper functioning of the highway and expansion is warranted.