Purple Sage/Beacon Light Alignment Study Report

Ada County Highway District and Canyon Highway District #4

June 2008
Parametrix
Purple Sage/Beacon Light Alignment Study Report

Prepared for

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EXECUTIVE SUMMARY

INTRODUCTION AND PURPOSE OF THE STUDY

The Purple Sage Road/Beacon Light Road alignment study is a collaborative effort between the Ada County Highway District (ACHD) and the Canyon Highway District #4 (CHD4). The Purple Sage Road/Beacon Light Road corridor is located in northeastern Canyon County and northwestern Ada County. The study was undertaken in response to Communities in Motion, the long-range transportation plan for southwest Idaho prepared by the regional planning organization Community Planning Association of Southwest Idaho (COMPASS). Communities in Motion identified the corridor as a location that is expected to experience more traffic, serving as a reliever to State Highway 44. The purpose of the study is to identify a connection between Purple Sage Road and Beacon Light Road and make plans for corridor preservation.

PUBLIC INVOLVEMENT

Involving the public early in the study was an integral part of the study process. Public outreach included stakeholder interviews with various agencies and private citizens, two public involvement meetings, and a neighborhood association meeting. A Local Agency Advisory Committee consisting of Ada County, COMPASS, ACHD, CHD4, and two citizens was established for this project and convened twice to discuss goals of the study, screening criteria, and project alternatives.

ALTERNATIVES DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Alternatives were developed based on input from the public, guidance from the highway districts and professional engineering judgment. Specific evaluation criteria were developed based on the goals of the study and included such factors as traffic operations, slope, right-of-way needs and costs. Alternatives were screened against these criteria and five were carried forward for detailed analysis. The results of the analysis and a Consultant-recommended alternative (Alignment B-B2) were presented to the public at the second public information meeting.

Based on the comments received from the public information meeting and a letter from the Nathan Mitchell, Mayor of Star, it was determined that there was a majority of support for Alignment A (see Figure ES-1). The proposed right-of-way width for the recommended alignment is 106 feet. This width will allow the highway districts to ultimately accommodate a 5-lane roadway section if necessary due to future development patterns and traffic volumes. The ACHD commission supported this alternative during its January 23, 2008 meeting. The CHD4 commission did not select a preferred alternative at its January 31, 2008 meeting; however, the Commission did identify two alignments as potential future corridors (Alignment A and Alignment C2) for connecting Purple Sage Road and Beacon Light Road (see the Commission’s letter in Appendix C).
Figure ES-1. Recommended Alignment
1. INTRODUCTION

The Community Planning Association of Southwest Idaho (COMPASS) is the regional transportation planning organization for southwest Idaho, which includes Ada and Canyon Counties. In 2006, COMPASS adopted the regional long-range transportation plan Communities in Motion. The plan is the result of analyses to determine the surface transportation needs and corridors to be preserved into the year 2030 for the greater Treasure Valley. The Purple Sage Road/Beacon Light Road corridor was one such identified corridor. This corridor is located in northeastern Canyon County and northwestern Ada County (see Figure 1).

This alignment study was co-sponsored by the Ada County Highway District (ACHD) and the Canyon Highway District #4 (CHD4). Elements of the study included a local agency advisory committee, two public information meetings, a neighborhood meeting with the Monument Ridge Ranch subdivision, environmental scan, traffic study, access management, drainage, conceptual roadway and structure options, and identifying design constraints within the study boundary area. Public outreach was given a high priority by the highway districts to ensure that the public was informed about the study and study process. The highway districts encouraged comment at public meetings and throughout the study to ensure that key issues of concern were considered into the study.

1.1 PURPOSE AND NEED

1.1.1 Purpose

The purpose of the study is to identify a connection between Purple Sage Road and Beacon Light Road and make plans for corridor preservation.

1.1.2 Need

There are a number of needs for evaluating the Purple Sage/Beacon Light corridor for transportation improvements.

- North of the Boise River, State Highway 44 (SH-44)/State Street is the only east-west corridor linking Canyon and Ada Counties.
- As the area’s population grows, the traffic volume will also continue to grow along State Street/SH-44. Another east-west route would serve local traffic and help relieve congestion along SH-44/State Street.
- Interest remains in residential development in the area foothills north of the city of Star where the corridor is located. Preservation of a corridor is necessary before development encroaches on a potential corridor.
- Local government needs to make land use decisions in consideration of a planned Purple Sage/Beacon Light connection to ensure that the corridor is protected.
- The need to preserve this corridor now is paramount as it will allow local jurisdictions the proper leverage to secure right-of-way now at a lower cost.
- Informing area residents about the study and soliciting their input will help promote understanding about the transportation need and alert future residents about the planned corridor.

1.2 CORRIDOR CHARACTERISTICS
According to the Ada County and Canyon County 2010 Federal Functional Classification Map only one arterial roadway, SH-16, resides within the limits of the study boundary area. SH-16 is functionally classified as a rural principal arterial. According to the COMPASS 2030 Planning Functional Classification Map, Can-Ada Road is functionally classified as a collector road from New Hope Road south to SH-44. All other roadways and roadway segments not identified within the study boundary area are functionally classified as local roads.

Figure 2 shows the existing and approved planned residential areas, environmental features, and major roads. The general study area for the Purple Sage / Beacon Light alignment study is defined by Hartley Road to the east, New Hope Road to the south, Blessinger Road to the west and Purple Sage Road to the north. Many physical and topographic features exist within the identified general study boundary. The terrain is generally flat along the southern and eastern parts of the study area and transitions to rolling foothills in the western and northern sections. Farmers Union Canal is a prominent feature in the study area. North of the canal, the majority of the ground is non-irrigated and vegetated with sagebrush. South of the canal, the majority of the vegetation is irrigated farmland (crops, pasture). Land use in the study area consists of a mix of farmland (irrigated cropland and pasture), older single-family detached residences, low-density estate subdivisions on large lots (2 to 10 acres), public land [Bureau of Land Management (BLM)], and undeveloped land. The BLM owns approximately 80 contiguous acres north of the canal. Other development in the study area includes a privately-owned go-cart track, and a few commercial enterprises (the Star Skydiving Center, the Winery at Eagle Hills, and River Birch golf course).
Purple Sage/Beacon Light Alignment Study

Figure 1
Vicinity Map

1 Inch = 1 Mile

June 2008
Figure 2. Existing Conditions

June 2008
2. PUBLIC INVOLVEMENT

Involving the public early in the study was an integral part of the development process. Stakeholder interviews were conducted with various agencies and private citizens to gain an understanding of issues of concern along this corridor and about this study. Two public involvement meetings along with one meeting with a neighborhood association were also conducted. Two meetings with a Local Agency Advisory Committee established for this project were also held. A summary of these meetings is provided below.

2.1 NOVEMBER 29, 2006 PUBLIC INVOLVEMENT MEETING

The first public involvement meeting was held on November 29, 2006 at the Star Elementary School Gymnasium. Information was provided to the attendees about the origination of the study, the purpose and need for a connection, known features and land use, and traffic data. The attendees were provided with comment sheets and 11” x 17” color maps of the study area and asked where they thought a connection should go. Over 100 people signed the attendance sheet and over 50 suggestions on where the connection should be made were received. These suggestions were reviewed and received further evaluation as to their reasonableness as part of the alternatives development process.

Overall, the following general comments were identified and listed below:

- Expand study area north and south to evaluate more potential alignment options
- Use existing section line roads to make a connection
- Do not use Lanktree Gulch Road as an alignment option
- The project is not needed
- Be sensitive to the rural nature/lifestyle of area residents
- Use BLM Land
- There is interest in having a path or trail to accommodate pedestrians, bicyclists and possibly horses

Figure 3 shows the public’s suggestions for connecting Purple Sage Road with Beacon Light Road.
These were suggestions provided by the public at the November 29, 2006 public involvement meeting.
2.2 FEBRUARY 19, 2007 NEIGHBORHOOD MEETING

The Monument Ridge Ranch Estates subdivision requested a neighborhood meeting with ACHD to express concerns about the use of Lanktree Gulch Road as part of a connection between Purple Sage and Beacon Light Roads as well as the study area boundaries. Lanktree Gulch Road is a local road that is used as the primary access to all parcels located within Monument Ridge Ranch Estates. During this meeting, which was held at Star Fire Station, ACHD stated that Lanktree Gulch Road would not be used as a mainline connection; however, the crossing of Lanktree Gulch Road would still be evaluated as part of the study.

Attendees also expressed concern that the study area did not go far enough south to include New Hope Road. New Hope Road is an east-west oriented road in Ada County approximately 1.5 miles in length from Can-Ada Road to Wing Road and is located approximately 1/4 mile south of Beacon Light Road. Given its proximity to the original study area, existing connectivity to the roadway network, and east-west orientation, coupled with the discussion at this meeting and comments received at the November 29, 2006 public involvement meeting, the study area was adjusted to include New Hope Road.

2.3 JULY 23, 2007 PUBLIC INVOLVEMENT MEETING

The intent of the second public involvement meeting, held at the Eagle Christian Church, was to provide information relative to the alternatives analysis. Displays were developed showing the alternatives screening criteria and alignment options considered. An alternative recommended by the consultant Parametrix was also presented. Through the materials and staff at the meeting, the attendees were informed that the comments received would assist ACHD and CHD4 in determining the final recommended alignment to present to their respective highway commissioners for adoption. Over 180 people attended the public involvement meeting.

2.4 LOCAL AGENCY ADVISORY COMMITTEE

A Local Agency Advisory Committee was established for this study for the purposes of early coordination, identification of issues of concern, land use/development trends, and alternatives development and analysis. Along with ACHD and CHD4, COMPASS, Ada County, Canyon County and the cities of Star, Eagle and Middleton were invited to be part of the committee. Meetings were held on November 15, 2006 and July 11, 2007.

3. ENVIRONMENTAL SCAN

An environmental scan was conducted to identify environmental resources in the study area that may affect the development of alternatives. Environmental resources and concerns identified included the rolling terrain, avoiding BLM land, potential historic resources, and permitting for crossing Farmers Union Canal if fill needed to be placed in the canal. The scan is located in Appendix A.

4. ALIGNMENT ALTERNATIVES

The written comments as well as the 50-plus suggestions received as part of the November 2006 public involvement meeting served as the starting point for evaluating the feasibility and reasonableness of alternatives. The publicly suggested alignments were reviewed and narrowed down to thirteen alternatives deemed reasonable to carry through the tiered screening process. A no-build alternative was not included because it is not consistent with Communities in Motion. This section describes the
evaluation criteria that were established and the engineering analysis that was applied to identify alignment alternatives and to develop a process for evaluating the benefits and disadvantages of each.

4.1 EVALUATION CRITERIA

Specific evaluation criteria were developed based on the goals of the study, and public input on values that should be considered in selecting a final alignment. These criteria were used to evaluate alignment alternatives. ACHD, CHD4 and Parametrix met on April 20, 2007 to discuss potential evaluation criteria. From the meeting ten evaluation criteria were agreed upon. The criteria were divided into Tier 1 and Tier 2. The Tier 1 criteria addressed the purpose of the new corridor, and included traffic operations, cost effectiveness and regional circulation. If an alignment alternative failed to meet these criteria, it was not carried forward. The Tier 2 criterion is considerate of public input on what is important in selecting a recommended alignment. The criteria are described below:

**Tier 1 Evaluation Criteria**
1. Traffic Operations – Number of new road intersections along a proposed alignment
2. Cost Effectiveness – Cost benefit of a proposed alignment (cost per trip)
3. Regional Circulation – Travel time in corridor

**Tier 2 Evaluation Criteria**
4. Proximity Impacts – Number of households within five hundred feet of centerline of the proposed alignment
5. Displacement of Residences and Businesses – How many residences and businesses would be acquired by a proposed alignment
6. Rights-of-Way – Number of acres needed for new roadway
7. Cost Estimate – Cost estimate for construction, structures, and right-of-way
8. Historical – Number of historical properties potentially eligible for the National Register of Historic Places
9. Bureau of Land Management Land – Does a proposed alignment cross BLM land? (use of such land was considered a negative)
10. Slope – Area of proposed alignment with slopes of 25% or higher

4.2 SCREENING PROCESS

The process to narrow the alignment alternatives included a pre screen (Tier 1) and a more rigorous screening (Tier 2). Tier 1 criteria screening eliminated alignments which did not meet the objectives of the study, or significantly impacted existing residences. Alignments that satisfied the Tier 1 criteria were carried forward for additional screening in Tier 2. The results of the tiered alternatives screening process are described in greater detail in Section 4.2.1 and 4.2.2, respectively.

4.2.1 Tier 1 Screening

Of the initial 50-plus publicly suggested alignments, many of them shared certain commonalities, namely general corridor location. As such, the alignments were consolidated and reduced. This ultimately resulted in thirteen alignments considered reasonable for the tiered screening process. Eight of these alignments were removed in Tier 1 from further investigation as they were not consistent with the needs identified for this corridor (e.g. out of direction travel, increased number of intersecting roadways, major impacts to BLM land, see Table 1).

Although a no build alternative was not specifically included in the analysis, the last option in Table 1 is the use of existing roadways, which is essentially the default no-build alternative that the highway districts reserve the right to ultimately consider.
Figure 4 shows the location of the eight alignment alternatives (A through H) that were not carried forward for detailed analysis. Five alternatives were retained as a result of this screening process and carried forward into Tier 2 (see Figure 5).

### Table 1. Alignment Alternatives Evaluated and Removed from Consideration

<table>
<thead>
<tr>
<th>Alignment</th>
<th>Reasons the Alternative was Removed from Further Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>South to Blessinger, East to New Hope to Beacon Light to SH 16</td>
<td>Out of Direction Travel; Substandard Design, Lower Speeds; Steep Terrain, Substantial Cuts and Fills</td>
</tr>
<tr>
<td>South on Blessinger, East to Beacon Light to SH 16</td>
<td>Substandard Design, Lower Speeds; Steep Terrain, Substantial Cuts and Fills; Impacts Existing Residential</td>
</tr>
<tr>
<td>East on Purple Sage, Southeast to Lanktree Gulch, Southeast to Beacon Light to SH 16</td>
<td>Out of Direction Travel; Substandard Design, Lower Speeds; Steep Terrain, Substantial Cuts and Fills; Impacts Existing Development on Lanktree Gulch; Upgrades West End of Lanktree Gulch Rd and Purple Sage Rd to Arterial</td>
</tr>
<tr>
<td>East on Purple Sage past Can-Ada 1+ Mile, South to Beacon Light to SH 16</td>
<td>Out of Direction Travel; Substandard Design, Lower Speeds; Steep Terrain, Substantial Cuts and Fills; Upgrades Purple Sage Rd to Arterial</td>
</tr>
<tr>
<td>North to BLM Land, East to SH 16</td>
<td>Outside of the study area; Out of Direction Travel</td>
</tr>
<tr>
<td>East on Purple Sage, Southeast to SH 16</td>
<td>Steep Terrain, Substantial Cuts and Fills; Impacts Existing Development on Lanktree Gulch Rd; Out of Direction Travel</td>
</tr>
<tr>
<td>East on Purple Sage, Southeast to Lanktree Gulch, South to Wing, East on Beacon Light to SH 16</td>
<td>Out of Direction Travel; Substandard Design, Lower Speeds; Steep Terrain, Substantial Cuts and Fills; Impacts Existing Development on Lanktree Gulch Rd and Wing Rd; Upgrades West End of Lanktree Gulch Rd, Wing Rd and Purple Sage Rd to Arterial</td>
</tr>
<tr>
<td>Use existing roads, Purple Sage to Can-Ada to New Hope to Beacon Light to SH 16</td>
<td>Out of Direction Travel; Substandard Design, Lower Speeds; Upgrades Residential Streets to Arterials; Impacts Existing Developments</td>
</tr>
</tbody>
</table>

### 4.2.2 Alternatives Retained for Detailed Analysis

The final five alignment alternatives were retained for detailed analysis as they best met the following parameters:

- Reduce conflicts with existing residential development
- Minimize traversing steep terrain (greater than 25% in slope)
- Minimize the amount of intersection locations
- Avoid utilizing existing roadways [specifically Purple Sage Road (local road) and Lanktree Gulch Road]
Figure 5. Final Alignments Evaluated
4.2.2.1 Alignment A

From Purple Sage Road, Alignment A extends to the southeast in the vicinity of the Star Skydiving Center, crossing the Farmers Union Canal and ties into New Hope Road. Approximately 1/4 mile west of the Wing Road / New Hope Road intersection, Alignment A turns to the northeast and ties into the existing Beacon Light Road. Alignment A terminates at the intersection of existing Beacon Light Road / SH-16.

Benefits
- Requires the least new right of way
- Does not cross BLM land
- One of the lower user costs (cost per vehicle trip)
- Carries the most trips per day

Concerns
- Has the most structures within 500 feet of the alignment
- Displaces two households
- Among the most expensive to construct
- Affects the most potentially historic properties (3)
- Longest travel time

4.2.2.2 Alignment B-B1

From Purple Sage Road, Alignment B-B1 extends to the southeast toward the Monument Ridge Ranch Estates. The alignment continues east, through existing BLM land, to the approximate limits of the Chukar Point subdivision. The road crosses the Farmers Union Canal to tie into Beacon Light Road east of Wing Road. Alignment B-B1 terminates at the intersection of Beacon Light Road / SH-16.

Benefits
- Fewest number of intersections crossed
- No displacements of structures

Concerns
- Highest user costs (cost per vehicle trip)
- Among the most expensive to construct
- Encroaches on BLM land
- Highest impact on 25% or greater slope
- Affects two potentially historic properties

4.2.2.3 Alignment B-B2

From Purple Sage Road, Alignment B-B2 extends to the south and crosses through a portion of the Star Skydiving Center, bisecting the existing runway. Once the alignment crosses the runway, it continues to the east, crossing the Farmers Union Canal to tie into Beacon Light Road east of Wing Road.
**Benefits**

- Fewest number of intersections crossed
- Least impact on 25% or greater slope
- One of the lower user costs (cost per vehicle trip)
- Has a lower number of structures within 500 feet of the alignment

**Concerns**

- Displaces one business (Star Skydiving Center)
- Encroaches on BLM land

**4.2.2.4 Alignment C-C1**

From Purple Sage Road, Alignment C-C1 extends to the east generally parallel to the local Purple Sage Road in the Star Ridge subdivision for approximately 1/4 mile then shifts southeast then northeast. The alignment continues east and turns to the southeast at the Monument Ridge Ranch Estates, crossing the Farmers Union Canal until it intersects Beacon Light Road east of Wing Road. This proposed alignment terminates at the intersection of Beacon Light Road / SH-16.

**Benefits**

- Does not cross BLM land
- No displacements of structures
- Lowest number of structures within 500' feet of the alignment
- Affects one potentially historic property

**Concerns**

- One of the higher user costs (cost per vehicle trip)
- Requires the most additional right of way
- Among the most expensive to construct
- High impact on 25% or greater slope

**4.2.2.5 Alternative C-C2**

From Purple Sage Road, Alignment C-C2 extends to the east generally parallel to the local Purple Sage Road in the Star Ridge subdivision for approximately 1/2 mile then shifts northeast. The alignment continues east and turns to the southeast at the Monument Ridge Ranch Estates, crossing the Farmers Union Canal until it intersects Beacon Light Road east of Wing Road. This proposed alignment terminates at the intersection of Beacon Light Road / SH-16.

**Benefits**

- Lowest user cost (cost per vehicle trip)
- Least expensive to construct
- Affects one potentially historic property
- Does not cross BLM land
Concerns

- Has highest proximity to residents within 500 feet of the alignment
- Displaces two households
- High impact on 25% or greater slope

4.3 TIER 2 SCREENING

Ten criterion were applied to the final five alignment alternatives. Measures of effectiveness were developed for each of the 10 evaluation criterion. The results of the analysis were further categorized into low, medium and high impacts. The low impacts were those in the bottom third of the range of impacts, medium impacts in the middle third and high impacts in the top third of the range. This categorization of low, median and high impacts was then used to compare the alignment alternatives with one other. A decision matrix showing the results of the screening is shown in Appendix B.
4.4 DISCUSSION OF THE RECOMMENDED ALIGNMENT SELECTION PROCESS

4.4.1 Public Meeting Comments

On July 23, 2007 a public involvement meeting was conducted at the Eagle Christian Church to inform the public of the five alignment alternatives proposed for the corridor. All five alignments were deemed feasible to satisfy the needs of the study. At the public involvement meeting, Parametrix presented Alignment B-B2 as the “consultant” recommended alignment with the intent of utilizing public input to determine a “final” recommended alignment. The “consultant” recommended alignment B-B2 as it was determined to have the least amount of impact of the alternatives retained for detailed analysis. There was very little public support for the “consultant” recommended alignment at the meeting. Of all the options presented at the public meeting, Alignment A received overwhelming support.

4.4.2 City of Star Recommendation for Alignment A

On November 13, 2007, City of Star Mayor Nathan Mitchell sent a letter to the ACHD Commission stating the city’s preference for Alignment A. The letter was provided at the request of Craig Herndon, ACHD Studies Coordinator, who made a presentation to the Star City Council on November 7, 2007 about the study process and alignment options. A copy of the letter is located in Appendix C.

4.4.3 Ada County Highway District Commission

On January 23, 2008, Craig Herndon, ACHD Studies Coordinator, presented a staff report to the ACHD Commission at their regularly scheduled meeting. Mr. Herndon requested that the Commission adopt Alignment A as the recommended option. This option was the most favored based on public comment and the results of the Travel Demand Model predicting the alignment would receive the greatest usage. The Commission unanimously adopted Alignment A as the recommended alignment.

4.4.4 Canyon Highway District #4 Commission

On January 31, 2008, Tim Richard, CHD4 District Engineer, presented information to the CHD4 Commission at their regularly scheduled meeting about the status and progress of the alignment study. The Commission considered the alternatives, technical summary and public input into the study. The Commission did not select a preferred alternative; however, the Commission did identify two alternatives (Alignments A and C2) as potential future corridor to connect Purple Sage Road and Beacon Light Road. The Commission recommended that these two alternatives should be evaluated further for the potential benefits and impacts, if additional funding is available. A copy of a letter to this effect from the Commission to ACHD is located in Appendix C.
5. TRAFFIC ANALYSIS

A traffic analysis was conducted for this study (See Appendix D). Of the five final alignments, only two separate alignments were evaluated. Alignment options B-B1, B-B2, C-C1, and C-C2 are similar in nature and did not justify the need for independent analyses. All analyses were conducted based on information obtained from COMPASS. COMPASS’ Long Range Transportation Plan developed two distinct sets of traffic volume projections, one based on the Community Choices demographics and one based on the Trend demographics. The traffic projections based on the Community Choices demographics provided the most conservative traffic projection estimates. COMPASS then completed a special revision of the Community Choices demographics. The intent of this special revision was to ensure that all potential foothill growth was included in the analysis and is referred to as the Preservation demographics.

The traffic analysis showed that all of the alignment alternatives are projected to perform at an acceptable level-of-service (LOS) with a 3-lane section. Alignment A is projected to serve approximately 17% more traffic on Purple Sage/Beacon Light Road (15,300 vpd versus 13,100 vpd) than the other alignment alternatives. However, there were no major differences between the alignment alternatives that would justify recommending the elimination of any alternatives or recommending a preferred alignment based solely on the traffic operations analysis.

6. RECOMMENDED ALIGNMENT

Alignment A is carried forward as the recommended alignment for this study (Figure 6). Corridor preservation is the primary goal of this study. A 3-lane roadway section is warranted for Purple Sage Road/Beacon Light Road from Blessinger Road to SH-16 for all of the studied alignments; however, right-of-way should be preserved for a 5-lane section based on ACHD policy regarding preserving section line roads as well as the explosive growth being experienced in the Treasure Valley. However, the “Traffic Study Report” also states, “it is recommended that the entire corridor be preserved as a 5-lane corridor including initial right-of-way for a 5-lane section”. Roadway sections of three and five lanes were developed based on the standards outlined (MA3-NPL and MA5-PL2-B2) in ACHD’s Development Policy Manual. The roadway design criteria discussion in this document (Section 6.1.1) describes how each typical section was modified to satisfy the needs of the corridor.

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Note:
Alignment "A" was adjusted from what is shown on Figure 5 to avoid the runway end at the skydiving center and to improve driver use.

Purple Sage/ Beacon Light Alignment Study
Figure 6
Recommended Alignment
June 2008

Figure 6. Recommended Alignment
6.1 ROADWAY DESIGN

6.1.1 Design Criteria

Prior to conducting the geometric design, certain data was necessary to develop a horizontal and vertical alignment and cross sections. Geographic Information Systems data for Ada County was obtained from ACHD which contained contour data sufficient to generate roadway plans, profiles and cross sections. Contour data for Canyon County was not available so Parametrix developed three-dimensional contours. The contours were generated based on information obtained from an United States Geological Survey (USGS) topographic map and was integrated into the contour data obtained from Ada County. Some discontinuities existed along the Ada County and Canyon County line when data files were merged. It was assumed that for purposes of this study the merged contour data was sufficient for the level of detail necessary to determine the corridor footprint and cut/fill quantities.

Design criteria were established and confirmed by both highway agencies during the initial development of alignments. Once Alignment A was determined to be carried forward as the recommended alignment the design criteria were reconfirmed. Table 2 identifies the design criteria used for this project, which is consistent with the ACHD Development Policy Manual for Minor Arterial Roadways. Note that superelevation is the transition of the roadway cross slope and a K-value is the length of a vertical curve divided by the algebraic difference between two vertical grades.

<table>
<thead>
<tr>
<th>Design Speed</th>
<th>Minimum K-Values</th>
<th>Max Superelevation</th>
<th>Min Horizontal Curve Radius</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crest</td>
<td>Sag</td>
<td></td>
</tr>
<tr>
<td>45 MPH</td>
<td>$K_{\text{min}} = 61$</td>
<td>$K_{\text{min}} = 79$</td>
<td>$4%$</td>
</tr>
</tbody>
</table>

In addition to these criteria, all vertical grades were limited to a maximum of 6%. A structural section for the roadway asphalt, base and subbase thickness was assumed. Refer to Table 3 below for the assumed structural section for the corridor:

<table>
<thead>
<tr>
<th>Material</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt Course</td>
<td>4 inches</td>
</tr>
<tr>
<td>Base Course</td>
<td>8 inches</td>
</tr>
<tr>
<td>Subbase Course</td>
<td>18 inches</td>
</tr>
<tr>
<td>Total Section Depth</td>
<td>30 inches</td>
</tr>
</tbody>
</table>

6.1.2 Typical Section Development

The first typical section was developed based on the 3-Lane, Minor Arterial as depicted in the ACHD Development Policy Manual. The proposed 3-lane section developed by Parametrix removed the curb and gutter, utilized a 6’ safety shoulder, 5’ detached sidewalk, identified the center lane as a median, and increased the proposed right-of-way take from 96’ to 106’. These features deviate from the 3-Lane, Minor Arterial ACHD typical section (MA3-NPL).
The proposed typical section has a raised median in order to require and maintain sufficient access management along the corridor. The proposed paved shoulder will be sufficient to serve any bicycle traffic along the corridor. All other aspects of the typical section correspond to the ACHD Development Policy Manual.

The second typical section was developed based on the 5-Lane, Minor Arterial as depicted in the ACHD Development Policy Manual. This section was modified to replace the existing center lane with a raised center median. All other aspects of the typical section are similar to what is outlined in the ACHD Development Policy Manual (MA5-PL2-B2). This typical section has a dedicated bicycle lane and sidewalk on each side of the proposed roadway.

After the typical sections were developed for this study, ACHD embarked on a process with local governments called the “Transportation and Land Use Integration Plan” (TLIP). Ultimately, TLIP will provide guidance for typical sections and roadway features. TLIP recommendations should be considered during future Purple Sage/Beacon Light design phases.

Clearance to roadside obstructions was another consideration for the proposed 3-lane section. The AASHTO Roadside Design Guide was utilized for determining clearance requirements along the roadway. Based on the design speed and average daily traffic, roadside clearance requirements are satisfied with a horizontal clear zone of 20’ at a 1V:6H slope. Due to the depth of the structural section, 23’ of clear zone is provided.

The drainage analysis determined that an open channel ditch (1V:2H) would be required to convey surface runoff flows. Behind the ditch and proposed sidewalk, a sideslope (1V:2H) was used to match (daylight) the existing topography. The horizontal distance required to daylight to the existing ground varies throughout the project and is indicated on Figure 6. The full development of the roadway structural section and the conveyance measures proposed are the primary reasons why this 3-lane section requires 106’ of right-of-way. The typical section for the 3-lane and 5-lane road section is shown on Figure 7.
3-LANE RURAL ROADWAY DESIGN
( INITIAL )

5-LANE URBAN ROADWAY DESIGN
( ULTIMATE AS TRAFFIC WARRANTS )

FUTURE ROADWAY FEATURES
SUCH AS MULTI-USE PATHWAYS
MAY BE COORDINATED WITH
FUTURE DEVELOPMENT AND
LOCAL LAND-USE AGENCIES.
6.2 CORRIDOR CHARACTERISTICS / FEATURES

Specific physical features and/or obstructions along Alignment A were identified during the initial layout of the corridor and further analyzed once it was identified as the recommended alignment.

6.2.1 Lanktree Gulch

Lanktree Gulch is located in Ada and Canyon County and traverses generally from the northeast to the southwest throughout the corridor limits. Alignment A does cross Lanktree Gulch along the bearing of Blessinger Road in Canyon County. Additional details specific to the conveyance measures for crossing Lanktree Gulch are located in Section 6.5 of this report.

6.2.2 Farmers Union Canal

Farmers Union Canal is also located in Ada and Canyon County and traverses generally from the northeast to the southwest throughout the corridor boundary. Alignment A crosses Farmers Union Canal approximately ¼ mile north and west of the Can-Ada Road / New Hope Road intersection. The skew of the crossing was minimized over the canal. Additional details specific to the conveyance measures for crossing Farmers Union Canal are located in Section 6.5 of this report.

6.2.3 Star Skydiving Center/Airport

The Star Skydiving Center/Airport is located entirely in Canyon County directly west of Can-Ada Road between Purple Sage Road and Beacon Light Road. During the initial layout of Alignment A it was determined that a portion of the runway would be impacted by this proposed alignment. However, once Alignment A was selected as the recommended alignment, further analysis revealed that the limits of the runway safety area could be avoided without any increased travel time.

6.2.4 Steep Grades

Throughout the public involvement process, many of the residents voiced concern regarding the placement of a roadway along existing slopes with grades in excess of 25%. In addition to this public concern, the Tier 1 screening evaluation identified “slope” as a method of criteria to rank alignments against each other.

Throughout the process of identifying and developing a recommended alignment, avoiding to the extent practical, slopes in excess of 25% was essential. All proposed vertical grades are equal to or less than 6% throughout the corridor.

6.3 RECOMMENDED ALIGNMENT CHARACTERISTICS

6.3.1 Plan and Profile

All geometric design within Ada County was developed from contour data obtained through ACHD. A contour map was developed and integrated for the practical limits of analysis within Canyon County. Therefore, all northings, eastings, and elevations used to develop the attached plans and profiles are as accurate as the data provided by ACHD for Ada County and data created for Canyon County and should be considered as conceptual. Plan and profile sheets are located in Appendix E and include the existing ground features and corresponding contour information.
6.3.2 Right of Way

The proposed right-of-way width for the recommended alignment is 106 feet. This width will allow the highway districts to ultimately accommodate a 5-lane roadway section if necessary due to future development patterns and traffic volumes. Preserving right-of-way is necessary to accommodate planned improvements and to inform developers and property owners adjacent to the right-of-way that a future roadway is planned in proximity to their property.

Initial typical sections indicated that a 96’ right-of-way would be sufficient to develop the 3-lane section. However, further analysis resulted in an increase from 96’ to 106’ right-of-way to widen the shoulders to accommodate bicyclists and allow necessary drainage facilities to convey the road surface runoff.

Due to the topography of the site, roadway construction will require cut and fill throughout the project limits. The proposed roadway, including the travel lanes, shoulder, ditches and sidewalk will be developed within the proposed 106’ right-of-way. All grading one foot’ beyond the proposed sidewalk location is outside the proposed right-of-way and will require permanent easements. Figure 6 depicts the general boundary necessary to daylight to the existing ground. Section 6.6 and Appendix G detail the conceptual dollar amounts associated with right-of-way and permanent easements needed for developing this corridor.

6.3.3 Future 5-lane corridor considerations

All geometric analysis for this project was based on the 3-lane rural typical section because this section requires a larger footprint than the proposed 5-lane urban section. This approach resulted in a corridor footprint that accommodates the 3-lane improvements and allows flexibility for conversion to a 5-lane roadway if future development patterns and traffic volumes warrant added capacity. Note that the 3-lane section does not have curb and gutter, while the 5-lane urban section utilizes a curb and gutter section that would require a storm drain system. This 5-lane urban section is consistent with current ACHD Development Policy standards.

6.3.4 Intersections

The traffic analysis provided recommendations for improvements to two intersections in the Purple Sage/Beacon Light corridor. The first recommendation is to install a two-way stop-controlled intersection (with stop signs on the north and south legs) at the intersection of Purple Sage Road and Blessinger Road. Exclusive left-turn lanes are recommended on the east and west legs of the intersection. The second recommendation is to signalize the intersection of the new extension of Purple Sage/Beacon Light Road and Can/Ada Road. Exclusive left turn lanes are recommended on all legs of the intersection.
Figure 8 and Figure 9 show the proposed intersection layout for a 3-lane and 5-lane, respectively. The recommended storage lengths shown for the left turn lanes were based on the ACHD Intersection Planning Level Standards. However, the traffic analysis recommended 250 feet of storage for the south leg of the intersection as opposed to 100 feet of storage recommended by the ACHD Intersection Planning Level Standards.

For purposes of this corridor study it was assumed that the intersection of SH-16 and Purple Sage Road/Beacon Light Road will be a future interchange location and was not included as part of the intersection analysis. The future interchange was identified in “Communities in Motion”, the Regional Long-Range Transportation Plan developed by COMPASS.

The recommended alignment does not intersect with the existing Blessinger Road; however as development occurs, future access will be necessary. Determining the exact location for the two new intersections with Blessinger Road would need to be determined in a future design phase. Appendix F contains the Access Management report for this study that describes the analysis and recommends various access management strategies.

6.3.5 Pedestrians & Bicyclists

Pedestrian and bicycle facilities have been identified for consideration as a part of the Purple Sage/Beacon Light Alignment Study. Two typical sections have been proposed.

Under the 3-lane typical section, there is no curb and gutter. A 6’ paved safety shoulder and 5’ detached sidewalk are proposed for use by bicyclists and pedestrians. These features deviate from the 3-Lane, Minor Arterial ACHD typical section (MA3-NPL). These modifications have been proposed as the corridor is rural in nature. Under the 5-lane typical section, a dedicated bicycle lane and sidewalk would be proposed on each side of the road.

Based on the alignment alternatives, no potential school crossings have been identified as there are no existing or planned schools in the area. The corridor is rural in nature and the majority of children residing in the vicinity of the corridor are transported by bus or other means of vehicular transportation.

Future roadside features such as multi-use pathways may be constructed in a coordinated effort by future development and local land-use agencies.
Figure 8. Proposed 3-Lane Intersection Layout
Figure 9. Proposed 5-Lane Intersection Layout
6.4 ACCESS MANAGEMENT

For an arterial roadway, the management of access locations and their design is the most critical element impacting long term roadway capacity, public safety, and travel time. The intent of the Access Management report located in Appendix F is to help ensure the proposed conceptual alignment for Purple Sage/Beacon Light Road operates well into the future as a minor arterial with good mobility and safety.

As a result of the corridor study, including an assessment of mobility needs, traffic volumes, and understanding of engineering principles of capacity and functional operation, it is recommended that Purple Sage/Beacon Light Road be maintained at an arterial level of access control. It is recommended full movement access locations be uniformly spaced at 1/4 mile intervals and that no other direct access be permitted. Furthermore, it is recommended 1/2 mile traffic signal spacing be utilized. To support this level of access, a system of local/collector streets is recommended to ensure the road system works efficiently (see Figure 10).

This arterial level of access management will ensure long term capacity is preserved, travel times will be consistent over the years, and the frequency of crashes will be minimized. These performance measures will benefit business and residential development and provide the necessary capacity for the build-out of the area.

6.5 DRAINAGE

The study area has numerous natural and man-made drainages, irrigation canals, and laterals. As a result, the recommended alignment will require new water crossings at a few locations.

Figure 11 shows the location of the major drainages and proposed water crossings. The following narrative describes the existing conditions, anticipated effects, and mitigation measures as they relate to drainage and construction of the recommended alignment.
Figure 10. Access Management and Conceptual Local Network Plan

- Ensures Good Local Circulation Patterns
- Increases Traffic Operation Performance
- Increases Public Safety
Floodplains

The Federal Emergency Management Agency (FEMA) flood insurance rate maps were reviewed to identify any floodplains that the recommended alignment may encroach upon. The recommended alignment is located within the following maps (See Table 4):

Table 4. Flood Insurance Rate Maps

<table>
<thead>
<tr>
<th>Map Revised Date</th>
<th>Map Number</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 19, 2003</td>
<td>16001C 0130H</td>
<td>Ada County, ID and Incorporated Areas</td>
</tr>
<tr>
<td>February 19, 2003</td>
<td>16001C 0125H</td>
<td>Ada County, ID and Incorporated Areas</td>
</tr>
<tr>
<td>December 3, 2003</td>
<td>160208 0234C</td>
<td>Canyon County, ID (Unincorporated Areas)</td>
</tr>
<tr>
<td>December 3, 2003</td>
<td>160208 0250C</td>
<td>Canyon County, ID (Unincorporated Areas)</td>
</tr>
</tbody>
</table>

The recommended alignment extends through Zone “A” of the FEMA identified floodplain for Gulch Creek. A FEMA Zone “A” floodplain is an area with a 1% annual chance of flooding. Gulch Creek runs from the north to the south, perpendicular to the recommended alignment. The floodplain crosses the recommended alignment at the existing Beacon Light Road and Pollard Lane intersection. The Flood Insurance Study for Ada County and Incorporated Areas (Revised October 2, 2003) does not provide any information for Gulch Creek. A channel east of Pollard Lane contains (2) – 60” corrugated metal pipes. These culverts are not identified on the flood insurance rate map; however, the map identifies a floodplain approximately 700’ wide at the intersection, which is much wider than the existing channel. Additionally, the floodplain is not contained within the channel upstream or downstream of the intersection with the proposed alignment.

The recommended alignment should not cause any changes in the floodplain that would negatively impact upstream or downstream properties. The recommended alignment profile approximately matches the existing elevations of Beacon Light Road at Pollard Lane at the location of the Gulch Creek floodplain. It is assumed that matching 60” reinforced concrete pipes will be used for conveying storm flows under the recommended alignment.
Figure 11. Major Drainages and Proposed Water Crossings
6.5.1 Major Drainages

The recommended alignment crosses Lanktree Gulch at approximately Station 137+00. Lanktree Gulch is a basin consisting of mostly undeveloped land. Small portions of the most upstream drainage area and southern drainage area are large lot, single family residential. Lanktree Gulch is not shown as a floodplain on the FEMA flood insurance rate map; therefore no storm flow information was available. A TR-55 analysis of Lanktree Gulch was performed to determine the 25-year and 100-year storm flow rates at the location of the recommended alignment. Existing contour information was provided for a portion of the drainage area by the Ada County Highway District GIS department. For the drainage basin tributary areas of Lanktree Gulch beyond the GIS contour data, the USGS contour maps were used. It was determined that the tributary area of Lanktree Gulch, at the location of the recommended alignment crossing, is approximately 3030 acres (4.73 square miles). Soil information from the United States Department of Agriculture, Natural Resources Conservation Service was used to determine the hydrologic soil groups of the drainage basin. A weighted runoff coefficient (CN) value of 72 was calculated for the existing soils within the Lanktree Gulch drainage basin. Table 5 shows the results of the TR-55 hydrologic analysis of Lanktree Gulch:

<table>
<thead>
<tr>
<th>25 - YEAR (cfs)</th>
<th>100 - YEAR (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>177</td>
<td>304</td>
</tr>
</tbody>
</table>

Based on the results of the TR-55 analysis, it was determined that a culvert was capable of conveying the entire 100-year storm event. Initially, it was thought a bridge structure may be warranted for the Lanktree Gulch crossing. Because the 100-year flow rate within Lanktree Gulch is relatively small [(304 cubic feet/second (cfs)], the additional costs of a bridge structure ruled out its feasibility for a crossing of Lanktree Gulch. In sizing the culvert, the 100-year flow rate was bulked 10% to accommodate for sediment load. Additionally, the culvert should not flow 100% full. Based on these design parameters, a culvert, 4’ high and 17’ wide, was selected for conveying Lanktree Gulch storm flows under the proposed alignment.

6.5.2 Irrigation

The study area includes properties that receive irrigation water. The major source of this irrigation water is the Farmers Union Canal. This canal is maintained by the Farmers Cooperative Ditch Company. The Farmers Union Canal is an earthen trapezoidal channel with dimensions that vary, however the majority of the channel has approximately a 5’ base width, 5’ height, and 15’ width at the top of bank. A field visit indicated a high scour mark approximately 3.5’ vertical from the invert of the canal. The canal crosses Can-Ada Road through a 48” corrugated metal pipe. Farmers Cooperative Ditch Company was contacted for irrigation flow information. Per Farmers Cooperative Ditch Company, the Farmers Union Canal has an average flow rate of approximately 20 cfs, with a high rate of around 30 cfs during irrigation season. Farmers Cooperative Ditch Company also stated that the existing culvert
crossings are oversized to allow for debris in the canal. The recommended alignment crosses the Farmers Union Canal at approximately Station 202+75. A 48” reinforced concrete pipe with a capacity of 36 cfs was selected for the crossing of the Farmers Union Canal.

Additional irrigation impacts as a result of the recommended alignment are minimal. A cluster of concrete irrigation boxes and gates at the intersection of Beacon Light Road and Wing Road will require removal and replacement, as will irrigation boxes and irrigation manholes along New Hope Road. The majority of the properties using irrigation water along New Hope Road are irrigating their properties by flood irrigation. Irrigation water is conveyed through earthen ditches, closed pipe systems, and concrete lined trapezoidal channels. These properties will require the irrigation infrastructure to be relocated at the time of construction. A portion of the properties along New Hope Road are currently being developed into single family residences. As this happens, the use of irrigation water will change from flood irrigating fields to pressurized irrigation systems.

6.5.3 Roadway Runoff

There are several options available for roadway drainage for the Purple Sage/Beacon Light recommended alignment. The method of storm drainage was selected based on the location along the recommended alignment and the typical section that is constructed. All roadside drainage features listed below have been analyzed for a 100-year storm event. The alignment study recommends a 3-lane rural section to be constructed with enough right-of-way preserved that ultimately a 5-lane urban section could be constructed without the need to purchase additional right-of-way.

6.5.3.1 Rural Road Section

The rural road section includes 3-lanes with roadside ditches. For the rural road section, a roadside drainage swale is the most cost effective method of handling roadway drainage. Roadway drainage is conveyed from the road straight into the roadside drainage ditches or swales depicted on the typical sections. These swales can include rock check dams which provide storage within the swale, and lower storm runoff velocities that contribute to erosion. The roadside drainage swale has been sized as a triangular channel, 2:1 side slopes, and a depth of 1.5 feet, which provides capacity for the 100-year storm flow rate.

Detention ponds will be required to mitigate the increase in runoff for the post construction condition compared to the existing condition. The profile of the recommended alignment creates three low points, which are possible locations of a detention pond. These low points are located at Sta. 142+46, Sta. 226+73, and Sta. 344+64 (See sheets 1, 3, and 5 of Appendix E). The rational method was used to determine the storm flow rates and volumes for the tributary areas to these locations. Table 6 summarizes the detention pond sizing requirements.

<table>
<thead>
<tr>
<th>TRIBUTARY AREA</th>
<th>PRE –PROJECT VOLUME (CF)</th>
<th>POST PROJECT VOLUME (CF)</th>
<th>DETENTION POND SIZE REQUIREMENT (CF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA 120+64 – STA 191+90</td>
<td>17,950</td>
<td>28,500</td>
<td>10,650</td>
</tr>
<tr>
<td>STA 191+90– STA 327+50</td>
<td>79,900</td>
<td>29,700</td>
<td>29,900</td>
</tr>
<tr>
<td>STA 327+50– STA 359+58</td>
<td>12,100</td>
<td>4,500</td>
<td>4,550</td>
</tr>
</tbody>
</table>

6.5.3.2 Urban Section

The urban road section includes 5 lanes with curb, gutter, and sidewalk. Storm drainage shall be conveyed within the gutter to catch basins. From the catch basins, storm flows can be conveyed to swales located behind the sidewalk, to large pond sites, or to subsurface infiltration facilities.
Drainage swales located behind the sidewalk would be among the least expensive methods of storm water disposal in an urban section. The swales could be constructed with catch basins that flow directly into the swale, not requiring storm drain pipe within the street. The swales could be utilized as small, localized ponds that infiltrate storm water into the soil. These swales could also flow to larger storm water detention facilities. The soil in the project area is well draining and lends itself to infiltration. Subsurface infiltration facilities are also a possible method for handling storm water in an urban section. Subsurface infiltration facilities are a good selection in areas where a planter and sidewalk are to be constructed. The subsurface infiltration facility can be constructed below a sidewalk. Disadvantages to subsurface infiltration facilities include a higher construction cost and a limited life span of the facility.

Depending on how the area around the recommended alignment is developed, it is possible that a swale or a subsurface infiltration facility may not be the best method for capturing storm flows. A piped system could be used for handling storm runoff. Storm flows would be conveyed from catch basins to a storm drain pipe within the roadway. This pipe may be oversized to hold a design volume of storm flow and to meter out flows at the pre-development level. Storm drain pipes can also convey flows to localized detention facilities, or to subsurface infiltration facilities. The disadvantage of a piped system is the initial construction cost.

6.6 COST ESTIMATE

A conceptual cost estimate, based on 2008 construction dollars, was developed for this project. It was assumed that this project may be phased into separate projects as future development occurs and funding becomes available. With that in mind, the cost estimate was separated into one mile segments from Purple Sage Road to SH-16. Additionally, the cost estimate was divided within Mile Section 3 as the Canyon County/Ada County line is within this section. Costs for each mile varied, with excavation/embankment being the major cost associated with each mile. The following table (see Table 7) indicates the total project cost, per one mile, for the recommended alignment. The total project cost includes all costs associated with right-of-way acquisition, easements, slope easements, engineering and construction for the recommended alignment. Right-of-way costs are based on information provided by ACHD. A detailed conceptual cost estimate is located in Appendix G.

<table>
<thead>
<tr>
<th>Table 7. Conceptual Cost Estimate</th>
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<tbody>
<tr>
<td>Mile Section</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>3</td>
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<tr>
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<td>4</td>
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<td>5</td>
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</table>
7. CONCLUSION

The traffic analysis conducted for this study supports the need for a connection between Purple Sage Road and Beacon Light Road that has been identified by COMPASS. The corridor is currently located in an area with land uses that include single-family houses, farmland, an airport, and undeveloped land. This area, however, is also attracting interest from developers for new residential development. As development occurs, the recommended alignment may be modified to fit with development plans as long as the mobility needs of the corridor are met and design constraints are not violated.

There are a series of steps that should be undertaken by the highway districts for the recommended alternative, Alignment A. The highway districts should inform and collaborate with the planning agencies for the cities of Star and Middleton as well as Ada and Canyon Counties to preserve the corridor from future development and document the corridor in their respective comprehensive plans. The design process should be advanced beyond the conceptual level that occurred with this study to final design as development occurs. Finally, the highway districts should begin purchasing right-of-way to ensure the corridor is preserved for future transportation improvements.

The public took a keen interest in this study. The public provided good insights into the community values and issues of concern for the study to be considerate of. Turnout and participation in public meetings was very high. The highway districts should continue to keep the public informed about the next phases of the project.
8. REFERENCES


