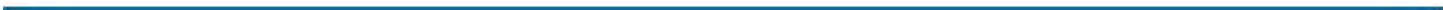




Appendix H – Alternatives Development Screening Technical Memorandum





Technical Memo

Date: Thursday, May 23, 2019

Project: Southern Meade County Corridor Study

To: Study Advisory Team

From: HDR

Subject: Alternatives Development Screening

Alternatives Development

For the preliminary alternatives development of the proposed east-west Southern Meade County connector, a total of 12 build alternatives were considered. From these alternatives considered, the study advisory team (SAT) will select up to three build alternatives to study further, referred to as “study alternatives” within this memo. The 12 build alternatives considered are certainly not an all inclusive list of all possible alternatives.

The following factors were considered when selecting the list of possible build alternatives to screen.

- Connectivity of existing roadways to provide additional egresses and methods of travel to fragmented neighborhoods prevalent north of Rapid City.
- Alignment with section lines, which is the preference of the county.
- Following the existing topography in order to reduce construction costs.

Each alternative is broken down to three segments. Segment A is between Erickson Ranch Road and Haines Avenue. Segment B is between Haines Avenue and 143rd Avenue. Segment C is between 143rd Avenue and Elk Vale Road. This was done so that each alternative could be disassembled and reassembled with other alternative segments if desired.

Per some concerns raised during the public meeting, the alignments of each alternative were extended to Elk Vale Road, designated as “Segment C”. Elk Vale Road is not part of the study area, but has been included in the preliminary analysis because of its regional importance to future connectivity along the eastern edge of the study area. Elk Vale Road provides a direct north/south connection to I-90 (Exit 61) and the US-16 Bypass. The Segment C analysis only provides a cursory review to determine if the corresponding Segment A/B alignments could easily facilitate a future Segment C connection.

Screening Methodology

Alternatives developed were screened to further explore potential impacts and construction feasibility. The following methodology was used to compare the alternatives and determine the feasibility of each. Table 1 is a summary of the scoring criteria and their relative rankings. The alternatives were scored in the different categories and summarized in Table 2. A red score indicates that the alternative scored low in a particular category; yellow indicates the alternative scored in the middle or average compared to the other alternatives in a category; and green indicates an alternative scored high compared to the other alternatives in a category. The score of each category is added together for each alternative. The highest score an alternative could



receive was 210. The methodology of the scoring is described within the bulleted paragraphs that follow.

Figure 2 illustrates the locations of each alternative, the topography, existing roadway connectivity, and transmission line locations. Figure 3 illustrates the potential impacts to drainage crossings, wetlands, and floodplain encroachment. Figure 4 illustrates the military compatibility areas (MCA). Figure 5 demonstrates the alternatives chosen by the SAT to be carried forward and investigated further.

- **Potential impacts to cultural/historic sites** – A record search of the State Historic Preservation Office (SHPO) directory was performed to determine the known potential cultural and historic sites within the study area. The study area was extended to the east as far as Elk Vale Road and west to Interstate 90 for the SHPO record search. As mentioned previously, this was done to try and avoid known cultural sites and historic properties if Meade County decides to extend the corridor beyond the current study limits in the future. Moving forward, further investigation within the study area will be performed during the windshield survey for the selected study alternatives. This category is weighted out of 20 due to the high importance to avoid all impacts to historic and cultural sites.

Cultural/Historic Site Scoring Key:

- 20 No anticipated impacts to known cultural/historic sites.
- 10 Unlikely anticipated impacts to known cultural/historic sites.
- 0 Likely anticipated impacts to known cultural/historic sites.

Number of wetland/drainage crossings – A desktop wetland delineation will occur after the SAT has narrowed down the number of study alternatives. For this preliminary analysis, the number of stream crossings and the sum of their Strahler stream orders were counted for each alternative to provide an indication for the number of culverts required and the surrogate measure of potential wetland impacts.

Definition of Stream Order: A first-order stream is the smallest of the world's streams and consists of small tributaries. These are the streams that flow into and "feed" larger streams but do not normally have any water flowing into them. In addition, first and second order streams generally form on steep slopes and flow quickly until they slow down and meet the next order waterway. First through third order streams are also called headwater streams and constitute any waterways in the upper reaches of the watershed. It is estimated that over 80% of the world's waterways are these first through third order or headwater streams.

USGS's National Hydrography Dataset (NHD) was used to compute both the number of tributary crossings and the sum of each crossings stream order per the Strahler stream order classification method. NHD crossings with higher stream orders are more likely to contain wetland and/or physical stream channel characteristics. This category is weighted out of 10.



Wetland/Drainage Crossings Scoring Key:

- 10 Stream order Sum <10
- 5 Stream order Sum >10 and <20
- 0 Stream order Sum >20

- **Floodplain encroachment** – The length of FEMA designated 1% annual chance floodplain encroachment is provided on figure 3. Floodplain boundaries were retrieved from FEMA’s National Flood Hazard Layer (NFHL). Floodplain impacts were weighted out of 20 due to the high importance to avoid floodplain encroachment.

Floodplain Encroachment Scoring Key:

- 20 No anticipated floodplain encroachment
- 10 Possible floodplain encroachment
- 0 Anticipated floodplain encroachment

- **Potential impacts to private structures or buildings** – Aerial imagery was used to determine potential impacts to any structures or buildings. Structures were avoided as much as possible during the process of routing the alignments. This category was weighted out of 20 due to the high importance to avoid impacts to private property.

Private Structures or Buildings Scoring Key:

- 20 No impacts anticipated to structures or buildings
- 10 Impacts to structures or buildings can likely be avoided, but will need careful consideration during design.
- 0 Impacts anticipated to structures or buildings

- **Preliminary intersection geometrics** – Four intersections per corridor alternative were reviewed to determine the preliminary intersection geometrics including where the corridor intersected Erickson Ranch Road, Haines Avenue, 143rd Avenue, and Elk Vale Road. It is ideal in terms of having adequate sight distance for the intersections of the future corridor to be located on the horizontal and vertical tangent sections of the intersecting roadways. For the purposes of the alternatives development stage, if the intersection fell within a vertical curve or horizontal curve, it was listed as having poor intersection geometrics. Further investigation will occur for the selected study alternatives. This category is weighted out of 10 for each intersection.

Intersection Geometrics Scoring Key:

- 10 No horizontal or vertical curves identified at the intersection.
- 5 Either a horizontal or vertical curve identified at the intersection.
- 0 Both a horizontal or vertical curve identified at the intersection.

- **Connectivity to Existing Development** – Many of the neighborhoods in the area are fragmented and only provide one ingress/egress. It would be advantageous for the future corridor to provide connectivity to existing developments and provide the opportunity for the neighborhood to meet Meade County’s egress codes. This category is weighted out of 10.



Connectivity to Existing Development Scoring Key:

- 10 The alternative alignment provides the opportunity for connectivity to two or more existing developments.
- 5 The alternative alignment provides the opportunity for connectivity to only one existing development.
- 0 The alternative alignment provides little to no opportunity for connectivity to an existing development.

- **Section Line Alignment** – It is the county’s preference to align their roadways with section lines, whenever it is feasible and economical. This category gives preference to alignments that follow section lines. The county already owns 66 feet of unplatted right of way along section lines, which will reduce the amount of right of way acquisition required in the future. This category is weighted out of 10.

Section Line Alignment Scoring Key:

- 10 The alignment follows a section line for the majority of its length. Alignment may diverge from the section line near major intersections and still receive a high score.
- 5 The alignment follows a section line for a portion of its length.
- 0 The alignment does not follow a section line for any of its length.

- **Topography** – Contours were generated from a USGS digital elevation model (dem) and displayed in ten foot intervals. Strategically placing the east-west corridor in areas with gradual topography will increase the constructability of the corridor and likely be more attractive to development of adjacent parcels. This category is weighted out of 10.

Topography Key Scoring Key:

- 10 Few identifiable steep grades
- 5 Moderately steep grades
- 0 Frequent steep grades

- **Earthwork** – All alternatives were designed utilizing a 55 mph design speed and modeled at a very conceptual level to obtain approximate earthwork quantities and preliminary grading limits. The typical section used to model the alternatives is shown below.

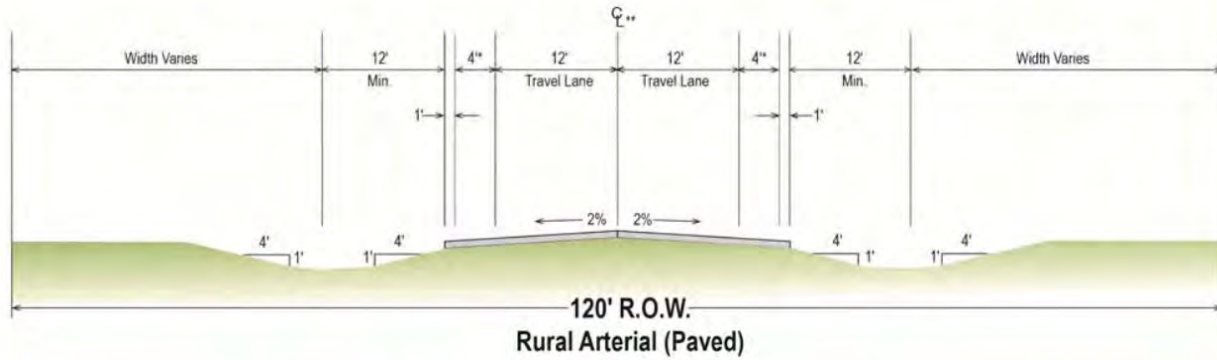


Figure 1. Typical Section
Source: (Meade Moving Forward 2040, 2016)

These earthwork values are preliminary in nature at this point for a few reasons and were only used to get an idea of the general order of magnitude of the grading effort of the corridor if constructed. The preliminary nature of the earthwork volume at this point is due to the topography not being survey quality and utilizing preliminary roadway design geometrics. Once the alternatives are narrowed down, a more detailed design will optimize the profiles to refine the earthwork volumes. This category is weighted out of 10.

Earthwork Volumes Scoring Key:

- 10** Low earthwork volumes
- 5** Moderate earthwork volumes
- 0** High earthwork volumes

- **East-West Travel Demand** – Some alternatives may be better suited to serve the east-west travel demand than others due to their connectivity to existing roadways or their proximity to a redundant east-west arterial, such as Elk Creek Road. There are several developments throughout the south half of the study area that have unserved east-west demand, where their only option is to travel north or south for long distances before they can travel east or west. The alternatives near the north end of the study area will likely decrease in suitability to meet east-west demand the closer the corridor is to Elk Creek Road. Due to the very high importance of this corridor to serve east-west travel demand, this category is weighted out of 30.

East-West Travel Demand Scoring Key:

- 30** Corridor is positioned at least three miles away from Elk Creek Road.
- 15** Corridor is positioned greater than two miles and less than three miles away from Elk Creek Road.
- 0** Corridor is positioned less than two miles away from Elk Creek Road.

- **Utilities** – The only visible utility using aerial photography are two large transmission lines highlighted with a dashed red line in Figure 2. Alternatives 1 through 6 will require two transmission line crossings. Transmission line poles were avoided with all of the alternatives. Clearance of the span wire at the transmission line crossings will need to be a consideration once the number of alternatives is narrowed down. Transmission lines are particularly expensive to move, so coordination with Black Hills Energy will occur at a

future date. Other utilities such as gas transmission lines, water or sanitary sewer were not provided at this time. There is very little utility infrastructure or utility master plans within the study area.

Utilities Key Scoring Key:

- 10 Corridor does not have any anticipated impacts or coordination requirements with known transmission lines.
- 5 Corridor will traverse under two overhead transmission lines. Coordination with utility company will be required to avoid any clearance issues or transmission pole/guy wire relocations.
- 0 Corridor is known to impact a transmission line pole which will require relocation.

- **Future Connectivity to Arterial Network** – As stated earlier, Elk Vale Road is an arterial roadway and has regional importance to the connectivity along the eastern edge of the study area. Elk Vale Road provides a direct north/south connection to I-90 (Exit 61) and US16 Bypass. Likewise, to the west of the study area, I-90 has regional importance to the connectivity of the proposed corridor to Black Hawk and other towns to the west of I-90. This category looked at the overall feasibility of the proposed corridor extending to the east and the west to provide connectivity to both I-90 and Elk Vale Road in terms of topography, wetlands/drainage impacts, cultural/historic site impacts, floodplain encroachment, or structure/building impacts.

Feasibility of Future Connectivity to Arterial Network Scoring Key:

- 10 Segment A/B alignments could easily facilitate a future connection.
- 0 Segment A/B alignments could not easily facilitate a future connection.

- **Military Compatibility Areas** - MCA's were obtained from the 2016 Ellsworth Air Force Base Joint Land Use Study and shown for informational purposes only in Figure 4. The location of the corridor in relation to the MCAs was not used in the screening methodology. It should be noted that in the areas where the Day-Night Average Sound Level noise contour is greater than 65 decibels (dB), manufactured and mobile homes are discouraged to be built. The eastern portion of the study area and almost the entire area between 143rd Avenue and Elk Vale Road extend into the 65 dB or higher noise contours. The safety MCA has additional building guidelines for compatible land use types, densities, and intensities. Table 5.14-1 in the Background Report for the Ellsworth Air Force Base Joint Land Use Study has a full list of land uses and their compatibility in relation to the accident potential zones and noise zones. The safety MCA is the area with the highest potential for an incident and is comprised of the clear zone and two levels of accident potential zones for the Ellsworth AFB runway. None of the safety MCA enters into the study area of this corridor study. However, the accident prevention zone II extends to the west of Elk Vale Road, which may limit median/high density residential development and some commercial development in this area.



The preliminary alternative scoring criteria and their relative weights is summarized in table 1 below.

Table 1. Summary of Category Weights

Category	Weight
Cultural & Historic Sites	20
Wetlands & Drainages	10
Floodplain Impacts	20
Structures & Buildings	20
Intersection Geometrics at Erickson Ranch Rd	10
Intersection Geometrics at Haines Ave	10
Intersection Geometrics at 143rd Ave	10
Intersection Geometrics at Elk Vale Rd	10
Connectivity to Existing Development	10
Section Line Alignment	10
Topography	10
Earthwork	10
East-West Travel Demand	30
Utilities	10
Feasibility of Future Connectivity to Arterial Network (I-90 West)	10
Feasibility of Future Connectivity to Arterial Network (Elk Vale Rd)	10
Total	210



Summary of Findings

The scores of the preliminary alternatives analysis can be found below in table 2.

Table 2. Summary of Alternative Scorings

Preliminary Alternative #	Color on Figures	Cultural & Historic Sites	Wetlands & Drainages	Flood-plain Impacts	Structures & Buildings	Intersection Geometrics Erickson Ranch Rd	Intersection Geometrics Haines Ave	Intersection Geometrics 143rd Ave	Intersection Geometrics Elk Vale Rd	Connectivity to Existing Development	Section Line Alignment	Topography	Earth-work	East-West Travel Demand	Utilities	Feasibility of Future Connectivity to Arterial Network (I-90 West)	Feasibility of Future Connectivity to Arterial Network (Elk Vale Rd)	Final Score
Weight		20	10	20	20	10	10	10	10	10	10	10	10	30	10	10	10	Total Out of 210
No Build		20	10	20	20	N/A	N/A	N/A	N/A	0	0	N/A	N/A	0	10	0	0	N/A
1	Dark Purple	20	0	0	0	5	10	5	5	10	10	0	0	30	5	10	0	110
2	Light Purple	20	0	0	0	5	5	10	10	10	0	0	0	30	5	10	0	105
3	Red	10	5	10	0	0	5	0	5	10	10	0	5	30	5	10	0	105
4	Brick Red	20	5	20	20	10	5	10	5	5	0	5	5	30	5	10	10	165
5	Blue	20	5	20	20	10	10	5	10	0	0	5	5	30	5	10	10	165
6	Light Green	20	5	20	20	0	5	10	10	5	10	0	0	30	5	10	10	160
7	Gold	20	0	20	10	5	10	10	5	5	0	0	5	15	5	0	10	120
8	Yellow	20	0	20	10	10	10	10	10	10	10	5	10	15	5	0	10	155
9	Dark Green	10	0	20	10	10	10	10	10	10	0	10	10	0	5	0	0	115
10	Orange	10	0	20	20	10	10	10	10	10	0	10	10	0	5	0	0	125
11	Pink	20	5	20	20	10	10	5	10	10	5	10	10	0	5	0	10	150
12	Light Blue	20	10	20	20	5	10	5	5	0	0	10	10	15	5	0	10	145

A summary of the analysis findings are described below with discussion on whether the alternative is feasible or not. The feasibility as well as the final rank of each alternative should be part of the discussion of whether it is brought forward as a study build alternative.

- **Alternative 1** scored a 110 out of 210 points and is not likely to be feasible. Although this alternative provides connectivity between Peaceful Pines Road, I-90 Exit 52 and Black Hawk to the west and 224th Avenue to the east, it is not feasible due to steep terrain, impacts to existing houses and floodplains, and potential sight distance issues at 3 of the 4 major roadway intersections.
- **Alternative 2** scored a 105 out of 210 points and is not likely to be feasible. Although this alternative provides connectivity between I/90 Exit 52 and Black Hawk to the west, and Elk Value Road to the east, it is not feasible due to steep terrain, impacts to existing houses and floodplains, and potential sight distance issues at 2 of the 4 major roadway intersections.
- **Alternative 3** scored 105 out of 210 points and is not likely to be feasible. This option is not feasible due to the possible impacts to the historic Heidgerken Homestead, other potential private building impacts, and potential sight distance issues at 4 of the 4 major roadway intersections.
- **Alternative 4** scored 165 out of 210 points and is likely to be feasible. There are no known historic, cultural, building, or floodplain impacts identified at this time. Possible vertical sight distance issues identified at the Haines Avenue intersection. Possible sight distance issues have been identified at Elk Vale Road as well. Possible wetland impacts on segment 4A. Segment 4C provides connectivity to 223rd Street.
- **Alternative 5** scored 165 out of 210 points and is likely to be feasible. There are no known historic, cultural, building, or floodplain impacts identified. May require the realignment of 143rd Avenue in order to provide adequate sight distance at this intersection. Alternative 5 appears to offer little connectivity to existing local neighborhoods or local/collector roadways.
- **Alternative 6** scored 160 out of 210 points and is likely to be feasible. There are no known historic, cultural, building, or floodplain impacts identified. Possible sight distance issues have been identified at Erickson Ranch Road and Haines Avenue. Alternative 6A cuts through a significant hill as it intersects with Erickson Ranch Road, which will require a significant amount of earthwork. The majority of this alignment aligns with a section line, which is the county preference.
- **Alternative 7** scored 130 out of 210 points and could possibly be feasible. Alternative 7A has significant elevation changes which would require a very large amount of cut. However, segments 7B and 7C are feasible in terms of the amount of earthwork required. There are no known historic, cultural, building, or floodplain impacts identified. Possible sight distance issues have been identified at Erickson Ranch Road and Elk Vale Road.
- **Alternative 8** scored 155 out of 210 points and is likely to be feasible. There are no known cultural, building, or floodplain impacts identified. Alternative 8 increases



connectivity to Peterson Road and Horseshoe Road. There are several homes along Peterson Road, where impacts to their properties will need to be avoided. There is a high amount of drainage crossings. The majority of this alignment aligns with a section line or existing roadway, which is the county preference.

- **Alternative 9** scored 115 out of 210 points and is likely to be feasible, but should not be carried forward. This alternative does not appear to offer much benefit since Elk Creek Road runs parallel and is less than 2 miles to the north. Cultural/historic site could be avoided by moving termini to Elk Value Road, far enough to the north to not impact the site. Alternative 9 doesn't traverse steep terrain, has no identified issues at the major roadway intersections, and provides connectivity to Drolc Ln. and Forest Pl.
- **Alternative 10** scored 125 out of 210 points and is likely to be feasible, but should not be carried forward. This alternative does not appear to offer much benefit since Elk Creek Road runs parallel and is less than 2 miles to the north. Cultural/historic sites could be avoided by moving termini to Erickson Ranch Road and Elk Value Road far enough to the north to not impact these two sites. Alternative 10 doesn't traverse steep terrain, has no identified issues at the major roadway intersections, and provides connectivity to Rocky Road.
- **Alternative 11** scored 150 out of 210 points and is likely to be feasible, but should not be carried forward. This alternative does not appear to offer much benefit since Elk Creek Road runs parallel and is only 1 mile north. Existing neighborhoods that would connect to 11A are already connected to Elk Creek Road. Segments 11B & 11C do not connect to any existing neighborhoods. Alternative 11 doesn't traverse steep terrain, and has one potential sight distance issue at 1 out of the 4 major roadway intersections. The majority of segment 11A aligns with a section line or existing roadway, which is the county preference.
- **Alternative 12** scored 145 out of 210 points and is likely to be feasible. There are no known historic, cultural, building, or floodplain impacts identified. This alternative does the best job at following the contours and avoiding drainage crossings. This alternative would require the least amount of culverts and have the least amount of wetland impacts. May require the realignment of 143rd Avenue in order to provide adequate sight distance at this intersection. Non-ideal intersection geometrics are present at 3 out of the 4 major roadway intersections. Alternative 12 appears to offer little connectivity to existing local neighborhoods or local/collector roadways.



The final ranking of the alternatives is listed below in Table 3.

Table 3. Ranking of Build Alternatives

Rank	Build Alternative	Final Score
1	Alternative 4	165
2	Alternative 5	165
3	Alternative 6	160
4	Alternative 8	155
5	Alternative 11	150
6	Alternative 12	145
7	Alternative 7	130
8	Alternative 10	125
9	Alternative 9	115
10	Alternative 1	110
11	Alternative 2	105
12	Alternative 3	105

Conclusion

Alternatives 4, 5, and 6 ranked the highest of all the alternatives included in the preliminary alternative screening analysis. A maximum of three build alternatives will be brought forward to study in further detail.

The study advisory team met on May 13, 2019 to determine which alternatives merited further investigation. The study advisory team discussed each alternative and selected the following alternatives to study further with slight modifications to the alignments as follows. The build alternatives chosen along with the modifications listed below are illustrated in Figure 5.

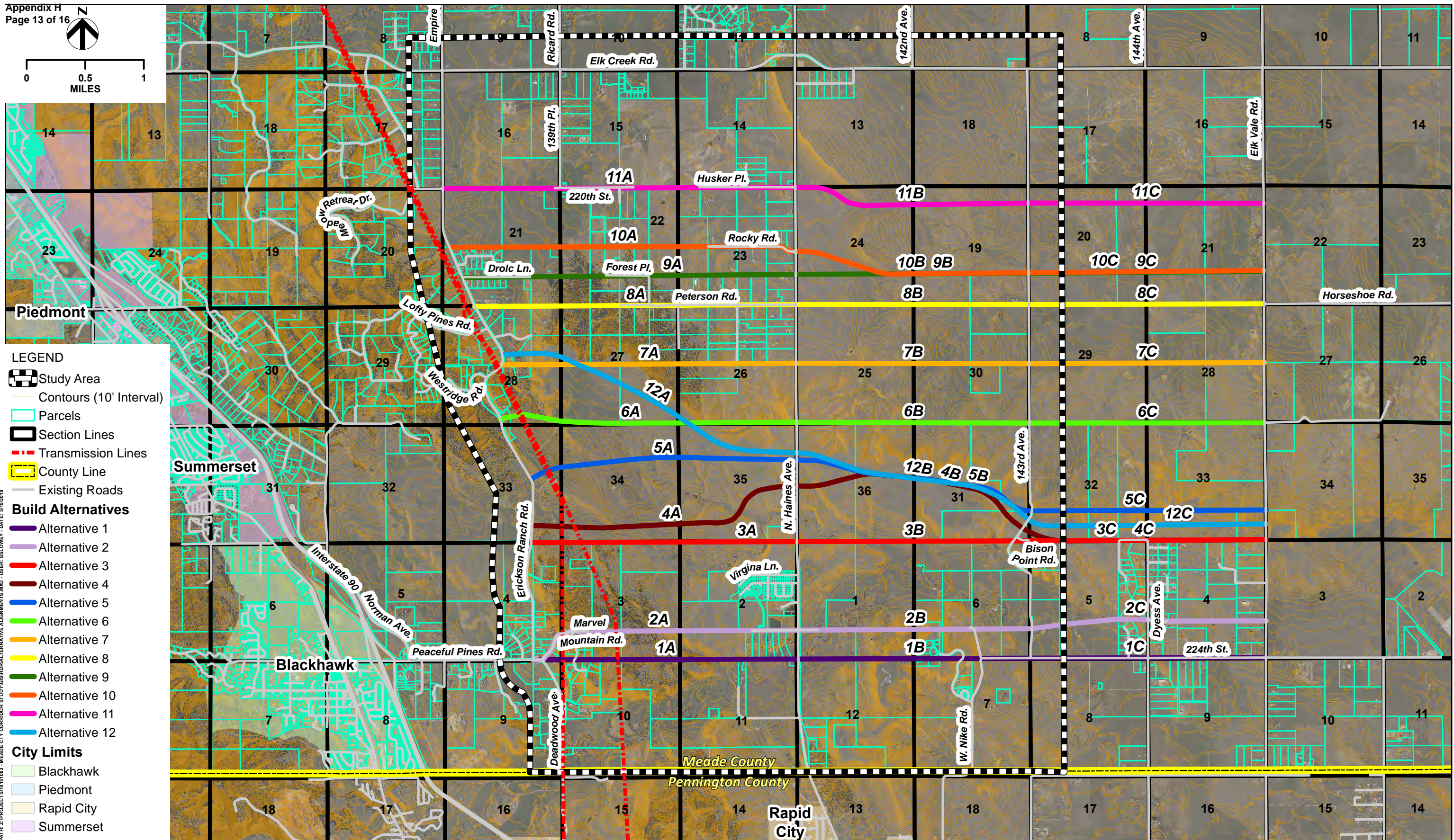
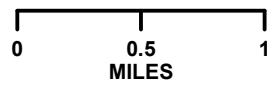
- Alternative 4 – Alternative 4 was shifted slightly to avoid steep terrain in certain locations and intersect Haines Avenue at a more optimal location.
- Alternative 5 – The east half of segment 5B was revised to match the east half of segment 4B. The reasoning behind this is to better align the intersection at 143rd within a tangent section.
- Alternative 6 - Alternative 6 was modified at the intersection with Erickson Ranch Road in order to shift it to the tangent section of Erickson Ranch Road moving. The intersection at Haines Avenue and a significant portion of the alignment was also shifted south to avoid steep terrain and intersect Haines Avenue at a more optimal location.

Alternatives 8, 11, and 12 received relatively high scores, but they did not make the final selection for the following reasons.

- Alternative 8 would likely be unfeasible for future connectivity to the arterial network to the west. It also has fairly rough terrain between Erickson Ranch Road and Haines Avenue. According to a member of the study advisory team, a connection between Peterson Road and Erickson Ranch Road has been studied before and found to be unfeasible due to the steep terrain. For these reasons, Alternative 8 will not be carried forward for further study.



- Alternative 11 does not appear to offer much benefit since Elk Creek Road runs parallel and is only 1 mile to the north. For this reason, this alternative was not selected to be studied further.
- Alternative 12 generally runs northwest and southeast, which the SAT decided would require cut through traffic to backtrack for northeast and southwest travel. The skew of the roadway alignment also lengthens the amount of roadway required, which would increase the cost to build this roadway. Three out of the four intersections on this alignment, specifically at Erickson Ranch Road, 143rd Avenue, and Elk Vale Avenue, tie into horizontal or vertical curves. For these reasons, Alternative 12 was not selected to be studied further.



LEGEND

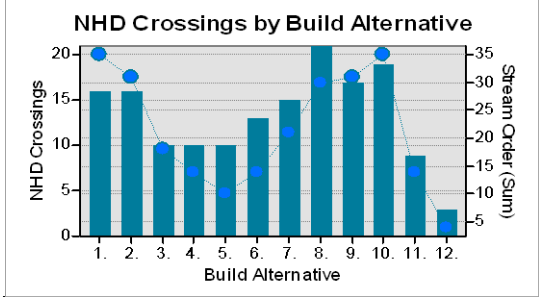
- Study Area
- Contours (10' Interval)
- Parcels
- Section Lines
- Transmission Lines
- County Line
- Existing Roads
- Build Alternatives**
- Alternative 1
- Alternative 2
- Alternative 3
- Alternative 4
- Alternative 5
- Alternative 6
- Alternative 7
- Alternative 8
- Alternative 9
- Alternative 10
- Alternative 11
- Alternative 12
- City Limits**
- Blackhawk
- Piedmont
- Rapid City
- Summerset

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**BUILD ALTERNATIVES
TOPOGRAPHY & ROADWAY CONNECTIVITY**
SOUTHERN MEADE COUNTY CORRIDOR STUDY

DATE
5/7/2019
FIGURE
FIGURE 2



LEGEND

- Study Area
- County Line
- Existing Roads

Build Alternatives

- Alternative 1
- Alternative 2
- Alternative 3
- Alternative 4
- Alternative 5
- Alternative 6
- Alternative 7
- Alternative 8
- Alternative 9
- Alternative 10
- Alternative 11
- Alternative 12

National Hydrography Dataset (NHD)

Strahler Stream Order

- 1
- 2
- 3
- 4

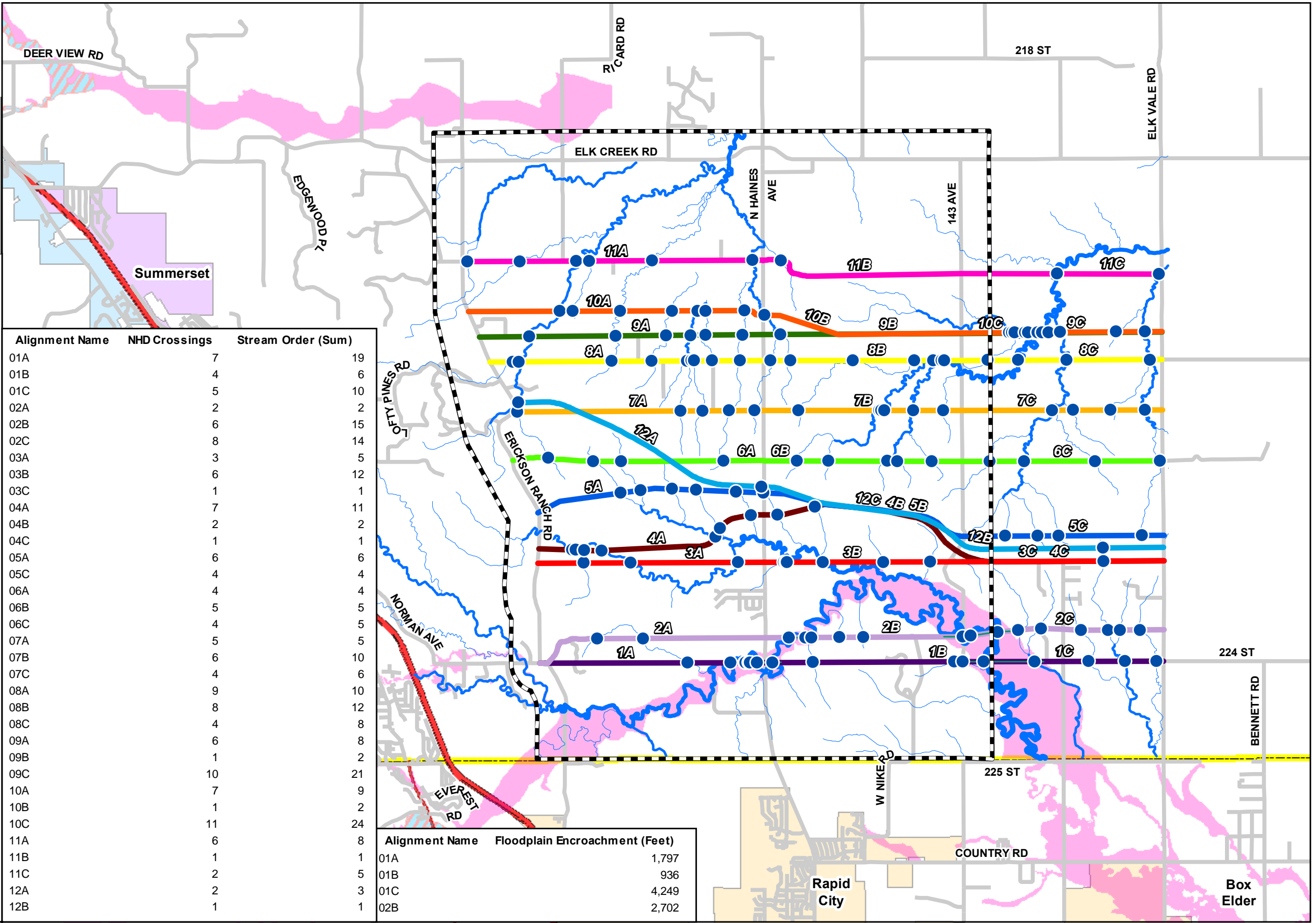
- NHD Crossings

FEMA Flood Hazard Layer

- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Interstate

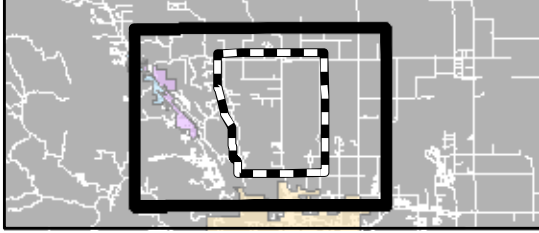
City Limits

- Blackhawk
- Piedmont
- Rapid City
- Summerset



Alignment Name	NHD Crossings	Stream Order (Sum)
01A	7	19
01B	4	6
01C	5	10
02A	2	2
02B	6	15
02C	8	14
03A	3	5
03B	6	12
03C	1	1
04A	7	11
04B	2	2
04C	1	1
05A	6	6
05C	4	4
06A	4	4
06B	5	5
06C	4	5
07A	5	5
07B	6	10
07C	4	6
08A	9	10
08B	8	12
08C	4	8
09A	6	8
09B	1	2
09C	10	21
10A	7	9
10B	1	2
10C	11	24
11A	6	8
11B	1	1
11C	2	5
12A	2	3
12B	1	1

Alignment Name	Floodplain Encroachment (Feet)
01A	1,797
01B	936
01C	4,249
02B	2,702



**WETLAND & FLOODPLAIN RESOURCES
PRELIMINARY DESKTOP IMPACT ANALYSIS**

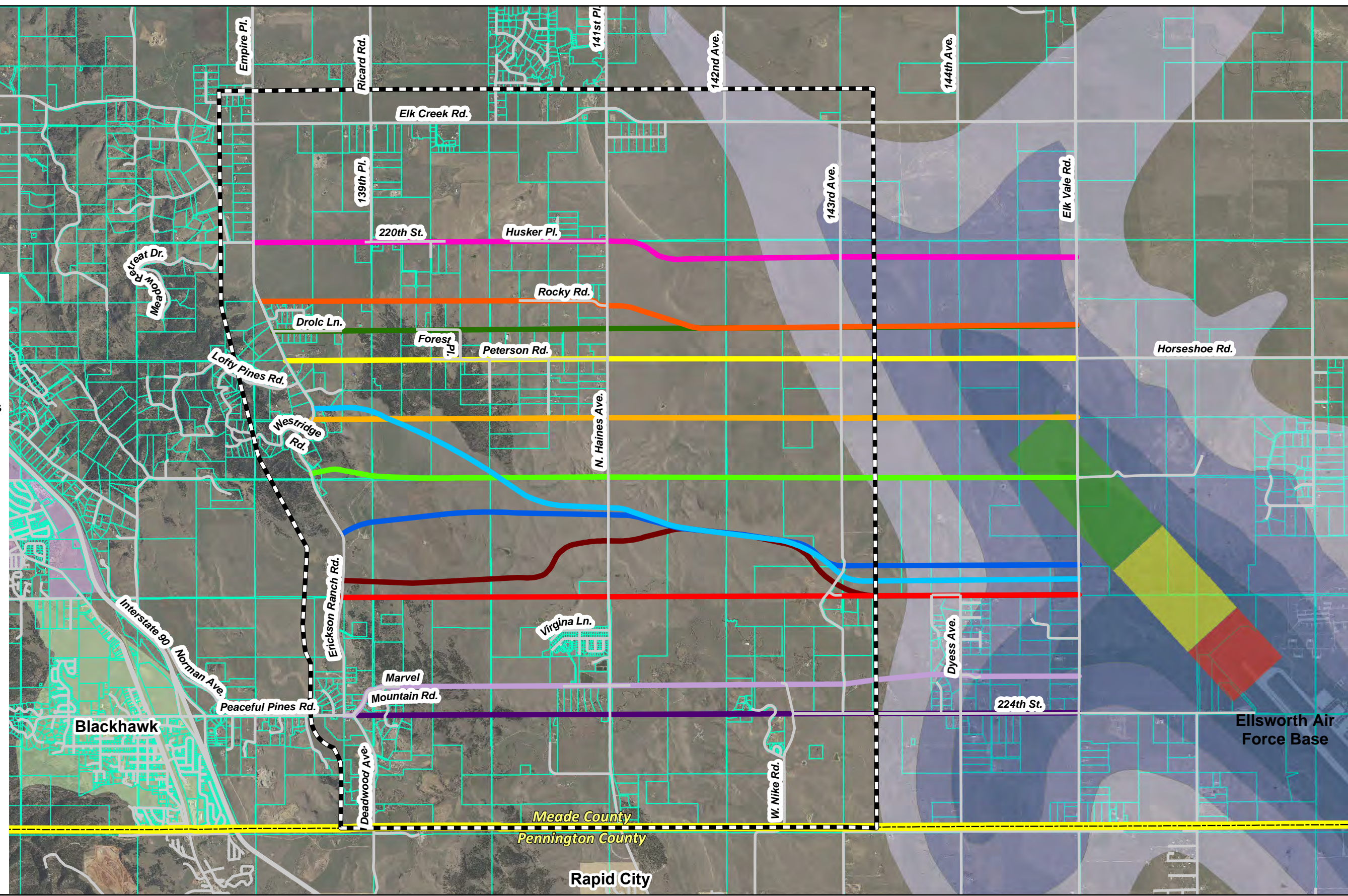
SOUTHERN MEADE COUNTY CORRIDOR STUDY

DATE
5/7/2019

FIGURE
FIGURE 3

LEGEND

- Study Area
- Runway Safety Zone**
- APZ II
- APZ I
- CLEAR ZONE
- Air Force's Noise Contours**
- 65 - 70 dB
- 70 - 75 dB
- 75 - 80 dB
- > 80 dB
- Parcels
- County Line
- Existing Roads
- Build Alternatives**
- Alternative 1
- Alternative 2
- Alternative 3
- Alternative 4
- Alternative 5
- Alternative 6
- Alternative 7
- Alternative 8
- Alternative 9
- Alternative 10
- Alternative 11
- Alternative 12
- City Limits**
- Blackhawk
- Piedmont
- Rapid City
- Summerset

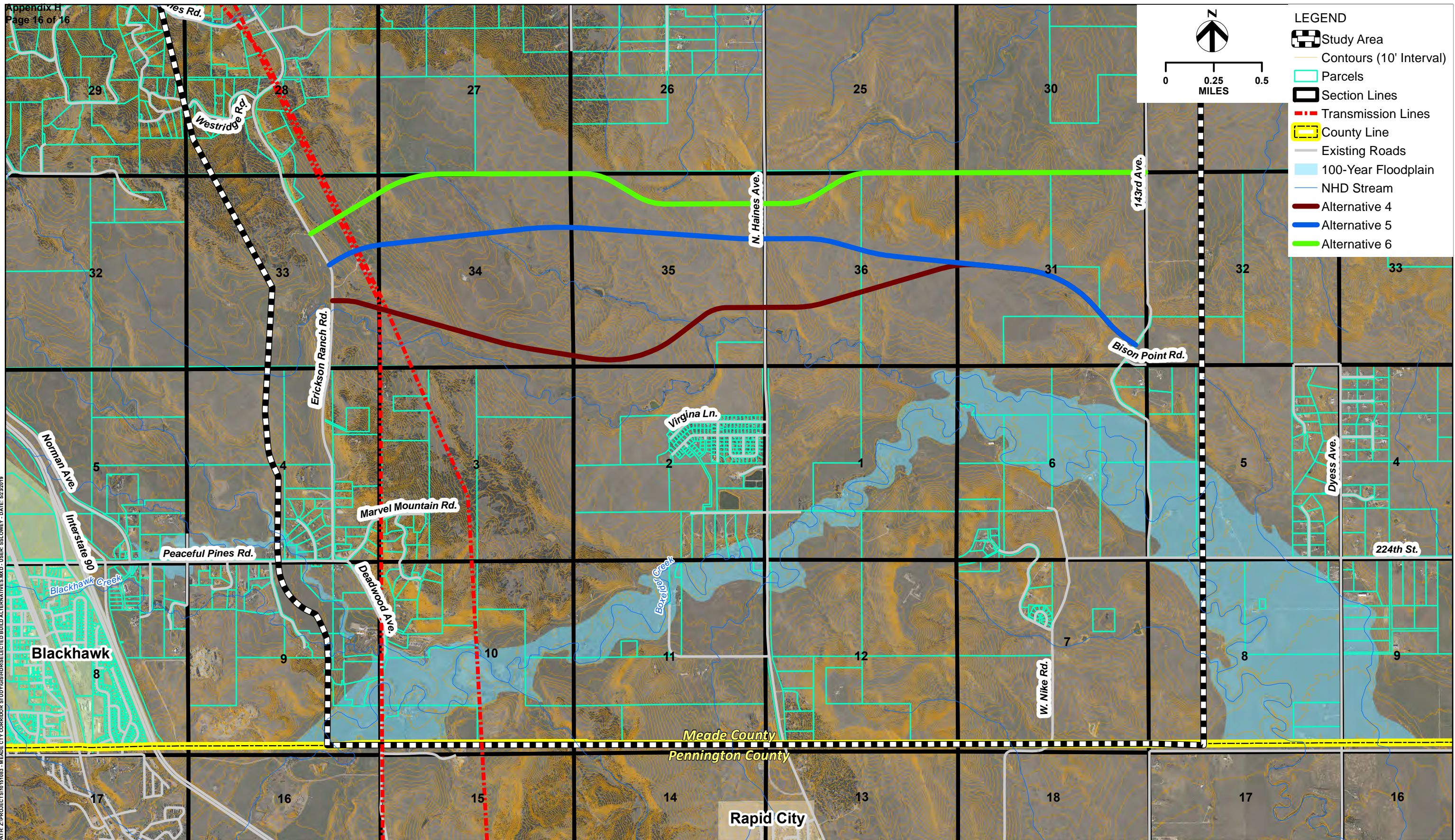


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**BUILD ALTERNATIVES
AIR FORCE'S MILITARY COMPATIBILITY
AREAS (MCA)**
SOUTHERN MEADE COUNTY CORRIDOR STUDY

DATE
5/7/2019
FIGURE
FIGURE 4



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SELECTED STUDY BUILD ALTERNATIVES
SOUTHERN MEADE COUNTY CORRIDOR STUDY

DATE
5/17/2019
FIGURE
FIGURE 5